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April 19, 2011

Honorable Kimberly D. Bose
Secretary
Federal Energy Regulatory Commission
888 1st Street N.E.
Washington, D.C. 20426

Subject: **Wells Hydroelectric Project – FERC Project No. 2149**
Annual Report – Anadromous Fish Agreement and Habitat Conservation Plan

Dear Secretary Bose:

Pursuant to Article 59 of the Wells Project License, the Public Utility District No. 1 of Douglas County hereby submits the enclosed annual report of activities related to the Anadromous Fish Agreement and Habitat Conservation Plan for the Wells Project. The enclosed annual report covers activities performed from January 1, 2010 through December 31, 2010.

If you have any questions or require further information, please feel free to contact me at (509) 881-2208 or sbickford@dcpud.org.

Sincerely,

Shane Bickford
Natural Resources Supervisor

Enclosure: CD containing the 2010 HCP Annual Report

Cc: Mr. Patrick Regan, FERC, Portland
Mr. James Hastreiter, FERC, Portland
Mr. Erich Gaedeke, FERC, Portland
Mr. Jon Miyashiro, FERC, Portland
Mr. Matt Cutlip, FERC, Portland
Wells HCP Coordinating, Hatchery and Tributary Committees
Tom Kahler, Douglas PUD
Greg Mackey, Douglas PUD
Scott Kreiter, Douglas PUD

ANNUAL REPORT

CALENDAR YEAR 2010
OF ACTIVITIES UNDER THE ANADROMOUS FISH AGREEMENT
AND HABITAT CONSERVATION PLAN

WELLS HYDROELECTRIC PROJECT
FERC LICENSE NO. 2149

Prepared for

Federal Energy Regulatory Commission
888 First Street N.E.
Washington, D.C. 20426

Prepared by

Anchor QEA, LLC
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and
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1151 Valley Mall Parkway
East Wenatchee, Washington 98802-4497

March 2011

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March 2011

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1 INTRODUCTION

On June 21, 2004, the Federal Energy Regulatory Commission (FERC) approved an Anadromous Fish Agreement and Habitat Conservation Plan (HCP) for the Wells Hydroelectric Project (Wells Dam – FERC License No. 2149) on the Columbia River in Washington State. The Wells Project is owned and operated by Public Utility District No. 1 of Douglas County (Douglas PUD). The HCP provides a comprehensive and long-term adaptive management plan for species covered under the HCP (Plan Species) and their habitats. This document is intended to fulfill Section 6.9 of the HCP and Article 59 of the Wells Project FERC License requiring an annual report of progress toward achieving the No Net Impact (NNI) goal described in Section 3 of the HCP, and a summary of common understandings based upon completed studies.

Designated representatives of the signatories of the Mid-Columbia HCPs (HCPs of the Wells, Rocky Reach, and Rock Island hydroelectric projects) comprise the Coordinating Committees, Hatchery Committees, and Tributary Committees for each HCP, which meet collectively to expedite the process for overseeing and guiding the implementation of their respective HCPs. Minutes from the monthly meetings are compiled in Appendices A (Coordinating Committees), B (Hatchery Committees), and C (Tributary Committees). In addition, a Policy Committee provides a forum for resolution of disputes that are either elevated to or arise in the Coordinating Committees and remain unresolved. The Policy Committees did not meet in 2010. Appendix D lists members of the Wells HCP Committees. The Coordinating Committee for the Wells HCP oversaw the preparation of this seventh Annual Report for calendar year 2010, which covers the period from January 1 to December 31, 2010. (The first through sixth Annual Reports covered January 1 to December 31, 2004 through 2009.)

2 PROGRESS TOWARD MEETING NO NET IMPACT

The Wells Project HCP requires preparation of an Annual Report that describes progress toward achieving the performance standard of NNI for each Plan Species. The NNI standard consists of two components: 1) 91 percent combined adult and juvenile project survival achieved by project improvement measures implemented within the geographic area of the project, and 2) 9 percent compensation for unavoidable project mortality provided through hatchery and tributary programs, with 7 percent compensation provided through hatchery programs and 2 percent through tributary programs (Section 3.1 of the HCP). Section 4.1 of the HCP states that, given the present inability to differentiate between the sources of adult mortality, initial compliance with the combined adult and juvenile survival standard will be based on the measurement of 93 percent juvenile project survival or 95 percent juvenile dam passage survival (described further in Section 4.1.2 of the HCP).

The following sections of this chapter describe activities implemented during 2010 toward maintaining the HCP passage and survival standards and implementing the HCP objectives as they relate to decision making, continued implementation of the juvenile and adult passage plans, and project improvements for hatchery programs and tributary programs.

2.1 Status of Phase Designations for Current Plan Species

A major feature of the Wells HCP is what is termed a “phased implementation plan” to achieve the survival standards. These phases have been described in previous HCP Annual Reports to FERC. Since February 2005, steelhead, subyearling Chinook, yearling Chinook, and sockeye salmon are in Phase III (either Standard Achieved or Additional Juvenile Studies; Table 1). In December 2007, coho salmon were designated as in Phase III (Additional Juvenile Studies). In 2008, land and cash with a total value of $600,000 were transferred to the Yakama Nation pursuant to Douglas PUD’s coho mitigation agreement. This completes Douglas PUD’s coho mitigation obligation through 2017. No changes in Phase Designations occurred in 2010.

Under Phase III conditions (Standard Achieved), Douglas PUD is required to re-evaluate survival at 10-year intervals following completion of three years of valid Juvenile Project Survival studies. Douglas PUD conducted valid juvenile survival studies in 1998, 1999, and

2000. In 2010, Douglas PUD completed the first 10-year juvenile survival validation study, verifying the continued achievement of Phase III (Standards Achieved) for yearling Chinook and steelhead migrating through the Wells Project.

Table 1
Phase Designations for Wells Dam

Plan Species	Phase Designation	Date
Upper Columbia River (UCR) steelhead	Phase III (Standard Achieved)	February 22, 2005, verified November 16, 2010 [1]
UCR yearling spring Chinook	Phase III (Standard Achieved)	February 22, 2005, verified November 16, 2010 [1]
UCR subyearling summer/fall Chinook	Phase III (Additional Juvenile Studies)	February 22, 2005
Okanogan River sockeye	Phase III (Additional Juvenile Studies)	February 22, 2005
Methow River Coho	Phase III (Additional Juvenile Studies)	December 12, 2007

Note:
1 Verified in a Statement of Agreement on November 16, 2010, by the Wells HCP Coordinating Committee.

2.2 2010 HCP Decisions

Throughout 2010, the HCP Coordinating, Hatchery, and Tributary Committees reached agreement on numerous issues during meetings, all of which were documented in the meeting minutes, with many described in stand-alone Statements of Agreement (SOAs). These agreements are summarized in Table 2 and are discussed in the remainder of this report.

Table 2

Summary of 2010 Decisions by the Wells HCP Committees

Meeting Date	Agreement	HCP Committee	Reference
February 1, 2010	Approved the Twisp Steelhead Reproductive Success Study	Hatchery	Appendix B and Appendix F
February 17, 2010	Approved the February 17, 2010, version of the Methow Spring Chinook Hatchery Genetic Management Plan (HGMP)	Hatchery	Appendix B and Appendix F
February 17, 2010	Approved Douglas PUD obtaining gametes from excess summer/fall Chinook broodstock at Wells Hatchery for use as study fish for a 2011 survival study	Hatchery	Appendix B
February 17, 2010	Approved the Twisp Weir Operations Protocols	Hatchery	Appendix B
February 17, 2010	Approved the hatchery-related items of the Wells 2010 Action Plan	Hatchery	Appendix B
Feb. 23, 2010	Approved the Wells 2010 Action Plan	Coordinating	Appendix A
Feb. 23, 2010	Approved the Wells 2010 Bypass Operations Plan	Coordinating	Appendix A
March 17, 2010	Approved the U.S. Fish and Wildlife Service (USFWS) SOA regarding Brood Year (BY) 2010 summer Chinook adult collection at Wells Dam for Entiat National Fish Hatchery (NFH)	Hatchery	Appendix B and Appendix F
March 17, 2010	Approved Washington Department of Fish and Wildlife's (WDFW's) request to surplus excess adult male hatchery-origin Wenatchee steelhead in the 2010 broodstock on hand at Wells Hatchery	Hatchery	Appendix B
March 17, 2010	Approved WDFW's request to collect a limited number of anadromous fish from upper Columbia River hatchery facilities as samples for a predator study with U.S. Geological Survey	Hatchery	Appendix B
March 17, 2010	Approved Colville Confederated Tribe's request to allocate 40,000 steelhead smolts from the Wells Hatchery Okanogan River Basin steelhead smolt production for release into Salmon Creek in 2010	Hatchery	Appendix B
March 23, 2010	Agreed that Douglas and Chelan PUDs should implement survival studies in 2010, irrespective of flow projections	Coordinating	Appendix A
April 8, 2010	Agreed that hatchery facilities are not allowed on lands or conservation easements acquired or partially funded with Tributary Funds	Tributary	Appendix C
June 10, 2010	Agreed to support and participate in targeted project solicitations	Tributary	Appendix C

Meeting Date	Agreement	HCP Committee	Reference
June 22, 2010	Approved dam operations for the 2010 Lamprey Assessment at Wells Dam	Coordinating	Appendix A
September 15, 2010	Approved the use of excess rearing capacity at Wells and Methow hatcheries for Grant PUD rearing production	Hatchery	Appendix B
September 15, 2010	Agreed to discontinue the use of elastomer tags in steelhead programs	Hatchery	Appendix B
September 28, 2010 and October 20, 2010	Agreed to retain Mike Schiewe and the Anchor QEA support team to chair and facilitate the HCP Coordinating and Hatchery Committees for the next 3 years	Coordinating and Hatchery	Appendix A and Appendix B
October 14, 2010	Agreed to retain Tracy Hillman of Bioanalysts, Inc. as the chair of the HCP Tributary Committees	Tributary	Appendix C
October 20, 2010	Approved the Conflict of Interest Policy	Hatchery	Appendix B and Appendix F
November 16, 2010	Approved the 2010 Wells Project Survival Verification Study Results	Coordinating	Appendix C and Appendix E
November 17, 2010	Approved Douglas PUD's participation in the Chief Joseph Hatchery Program	Hatchery	Appendix B and Appendix F
November 17, 2010	Approved the release of 11,000 surplus spring Chinook at the Methow Hatchery, into a pond on the Chewuch River	Hatchery	Appendix B
December 7, 2010	Approved-in-principle the key features of the Wells Steelhead HGMP	Hatchery	Appendix B

2.3 Project Operations and Improvements

This section summarizes project operations toward meeting and maintaining HCP requirements at Wells Dam in 2010. Actions in 2010 were guided by the 2010 Douglas PUD Action Plan (Appendix I), as approved by the Coordinating Committees (Appendix A).

2.3.1 Operations

As in past years, operation of the juvenile bypass system in 2010 was guided by the Juvenile Bypass Operating Plan (Appendix G) and criteria contained within Section 4.3 of the Wells HCP. The spring bypass season started on April 12 at 0000 hours and ran continuously through June 13 at 2400 hours. The spring bypass operated for a total of 63 days and utilized a total discharge of 943 thousand acre feet (KAF), or 7.0 percent of total project discharge volume. Summer bypass started on June 14 at 0000 hours and ran until August 26 at 2400 hours, for a total of 74 days. There was 1,156.5 KAF, or 6.2 percent of the total discharge volume, dedicated to summer bypass. River flows at Wells Dam during the 2010 juvenile migration of Plan Species (April to August) were at 87 percent of the 20-year average.

Two exceptions to normal bypass operations occurred during 2010. On July 28, bypass spill gates were closed for 6.5 hours to allow a contractor to remove debris that was interfering with the operation of the bypass spill bays. On August 19, bypass spillway gate 8 was shut down due to a failure of the bypass spillway gate-hoist cable, and in accordance with Section 4.3.1 of the Wells HCP, turbine units 7 and 8 were shut off until the spillway gate-hoist cable was replaced. The repair of the bypass-bay gate-hoist cable was completed on August 25, after which bypass spillway gate 8 was reopened and turbine 8 was once again made available for power generation.

2.3.2 Improvements

Maintenance and improvement activities at Wells Dam that affected Plan Species were limited to work in the fishways. The fishways at Wells Dam are inspected annually during each winter, and each fishway receives, according to an alternating schedule, either a routine, annual, or more substantial bi-annual maintenance. The east fishway was taken out of service for inspection and annual maintenance between December 22, 2009, and January 5, 2010, and inspection and bi-annual maintenance were performed on the west fishway from January 14 through February 3, 2010. The west fishway was again taken out of service, this time for inspection and annual maintenance, from December 16 through December 29, 2010. The east fishway will receive bi-annual maintenance in January 2011.

2.3.3 Assessment of Project Survival

As previously noted, Douglas PUD has met the HCP survival standard of 91 percent combined adult and juvenile project survival, and is in Phase III of the phased implementation plan for all Plan Species. As required by Section 4.2.5.1 of the Wells HCP, Douglas PUD is required to re-evaluate survival at 10-year intervals. Accordingly, in 2010 Douglas PUD conducted a 10-year "verification" survival study according to a plan approved by the Coordinating Committees at their July 23, 2009 meeting.

In 2010, yearling spring Chinook survival was estimated at 0.9638 with a Standard Error (SE) of 0.0128, which exceeds the HCP juvenile project passage survival standard of 0.93 with SE ≤ 0.025, verifying the continued achievement of Phase III (Standards Achieved) for yearling Chinook and steelhead migrating through the Wells Project. The Coordinating Committees approved the 2010 Wells Project survival verification study results for yearling Chinook and steelhead on November 16, 2010 (Appendix A).

2.3.3.1 Adult Passage Monitoring

The HCP acknowledges that no scientific methodology currently exists that would allow the Wells HCP Coordinating Committee to assess adult project survival for Plan Species (presumed to be 98 percent). This is because available methods are unable to differentiate between mortality caused by the project versus other sources of non-detection (such as mortality from natural causes, injuries resulting from passage at downstream projects, or injuries sustained by marine mammals and harvest activities; or fish not detected for other reasons, such as spawning in locations downstream from Wells Dam). However, the Wells HCP Coordinating Committee is able to evaluate available information to assess whether or not there is a high likelihood that the adult survival rates are being achieved. Table 3 details detections at Priest Rapids Dam of known-origin adult steelhead and Chinook salmon that were tagged with passive integrated transponders (PIT), the number of those adults redetected at Wells Dam, the estimated conversion rate (Priest Rapids Dam to Wells Dam), and average per-project (i.e., four dams and four reservoirs) conversion rates.

These conversion rates are best viewed as a minimum survival estimate between the two detection sites because they encompass mortalities from all sources and non-detected fish (as described above) between the two detection sites. They do not include any indirect or delayed mortality that might occur upstream of Wells Dam (the redetection site). The per-project conversion rate exceeded 98 percent for steelhead and spring and summer Chinook salmon (that is, mortalities from all sources averaged less than 2 percent through each project). Data for fall Chinook and sockeye are not available. As noted above, this 2 percent figure reflects a combination of mortality attributable to both non-project related causes (e.g., recreational and tribal harvest, tailrace spawning, and disease) and dam passage, as well as non-detections resulting from straying and spawning below Wells Dam. For this reason, it is highly probable that the actual conversion rate for adult Plan Species exceeds the 98 percent per-project assumption set forth in the HCP.

Table 3
Adult Conversion Rates for All Available Release Groups

Stock Species	Priest Rapids Dam	Wells Dam	Priest Rapids to Wells Total Conversion Rate	Priest Rapids to Wells Average Per Project Conversion Rate[1]
All Releases[2] Summer Steelhead 2004-2010	5,540	5,124	92.0%	98.0%
All Releases[3] Spring Chinook 2003-2010	428	409	95.6%	98.9%
All Releases[4] Summer Chinook 2003-2004	15	14	93.3%	98.3%

Source: Columbia River DART website: http://www.cbr.washington.edu/dart/pit_obs_adult_conrate.html
Notes:
1 Calculated as Priest Rapids Dam to Wells Dam Total Conversion Rate to the fourth root (four dams and four pools). Adults detected at Wells Dam that were not also detected at Priest Rapids Dam were excluded from the analysis.
2 Summer steelhead released into the Okanogan and Methow River Systems—PIT-tag release site designations: CHEWUR, METHR, OKANR, OMAKC, SIMILR, TWIS2P, TWISPR, TWISPW, BEAV2C, WINT, LIBBYC, METTRP, GOLD2C, and STAPAC. Please note that many fish detected at Priest Rapids in 2010 will not pass Wells Dam until spring of 2011.
3 Spring Chinook salmon released into Methow River System—PIT-tag release site designations: CHEWUP, METH, METHR, TWISPP, TWISPR, BEAV2C, WINT, and METTRP. Some of the 2007, 2004, and 2003 returns included in previous DART conversion-rate calculations for spring Chinook were minijacks from same-year releases, and were thus invalid inclusions in the calculations. Those fish have been excluded from current calculations.
4 Summer Chinook salmon released into Columbia River System above Wells Dam—PIT-tag release site designations: OKANR.

Although not addressed in the HCP, passage of adult bull trout was considered in the operation of Wells Dam in 2010. In 2004, FERC issued an order incorporating the HCP and the U.S. Fish and Wildlife Service (USFWS) *Bull Trout Biological Opinion* into the FERC license for the Wells Dam Project. Article 61 of the Wells Project license requires Douglas PUD to file an annual report with FERC describing the activities required by Douglas PUD's *Bull Trout Monitoring and Management Plan*. On December 24, 2008, Douglas PUD filed a report of bull trout monitoring and management activities conducted in 2005 and 2006, through late-2008. In March 2010, Douglas PUD filed a 2009 Bull Trout Monitoring and Management Plan annual report with FERC that included activities that occurred from late-2008 through 2009 (Appendix M).

2.3.3.2 Completed Studies 2010

Douglas PUD documented the removal of 19,082 northern pikeminnow from the Wells Reservoir and tailrace during annual removal efforts occurring from March 16 to September 30, 2010. From 1995 to present, the pikeminnow removal programs sponsored by Douglas PUD have resulted in the removal of approximately 210,000 pikeminnow from the Wells Project. Documentation of northern pikeminnow removal efforts in 2010 will be presented to the Wells Coordinating Committee in early 2011.

As noted above, Douglas PUD completed a 10-year verification survival study using yearling Chinook salmon. Douglas PUD is required to re-evaluate juvenile project survival for yearling migrants again in 2020. Completion of the draft study report is anticipated in early 2011.

Douglas PUD implemented the second year of a study at Wells Dam on the success of lamprey seeking to enter the fishway entrances under different velocities. The study used Dual Frequency Identification Sonar (DIDSON) to record lamprey behavior at the entrances to the collection galleries of both fishways under two operating conditions: a control condition at 1.5 feet of head differential between the collection gallery and the tailrace (standard operation), and a test condition at 1.0 foot of head differential. The concern of the HCP Coordinating Committee was whether adult salmonids would respond adversely to the reduced velocity of the attraction flow under the test condition (lower head differential). The results of this study will be provided to the HCP Coordinating Committee in early 2011.

2.3.3.3 Planned Studies 2011

As requested by the HCP Coordinating Committee, in 2011 Douglas PUD will measure water velocity at the fishway collection-gallery entrances at Wells Dam under the control and test operating conditions described above for the lamprey study. Velocity will be measured with an acoustic Doppler velocimeter (ADV) at the control and test operating conditions and for at least two different tailwater elevations (low and high) to provide data for a computational model. The model will provide a tool for predicting the effects on entrance conditions of operational or structural modifications to the fishway.

In 2011, Douglas PUD will initiate a study of the life history of ocean-type Chinook in the Wells Reservoir. The study proposal is currently under development.

As in previous years (see Section 2.3.3.3, 2008 HCP Annual Report), Douglas PUD will continue the pikeminnow removal program in 2011.

2.4 Hatchery Compensation

As required by the HCP, Douglas PUD supported hatchery production in 2010 to compensate for unavoidable project mortality and loss of habitat caused by original inundation by the project. Section 8 of the Wells HCP outlines a Hatchery Compensation Plan with two hatchery objectives for Douglas PUD: 1) to provide hatchery compensation for spring Chinook salmon, summer/fall Chinook salmon, sockeye salmon, summer steelhead, and coho salmon (an obligation to compensate for coho was established in December 2007); and 2) to implement specific elements of the hatchery program consistent with the overall objectives of rebuilding natural populations and achieving NNI.

In February 2010, the HCP Hatchery Committees approved the Twisp Weir Steelhead Operations Protocols (Appendix N) that were implemented beginning with the spring 2010 steelhead weir operations season. The weir was used to control the number and origin of the steelhead spawning upstream of the weir consistent with the draft Wells Steelhead HGMP and the Twisp River Steelhead Spawning Success Study (RSS).

The HCP Hatchery Committees reviewed the 2010 Broodstock Collection Protocols in March 2010 (for Chinook, sockeye, coho, and steelhead). The protocols were finalized in April 2010 and implemented at program hatcheries (Appendix H); in-season revisions were made as needed in coordination with the Hatchery Committees. Coho broodstock collection protocols were provided by the Yakama Nation and subsequently incorporated into the 2010 Broodstock Collection Protocol. The 2010 Broodstock Collection Protocols were intended to guide the collection of salmon and steelhead broodstock in the Methow, Wenatchee, and Columbia River basins. The protocols are consistent with previously defined program objectives such as program operational intent (i.e., conservation and/or harvest augmentation) and mitigation production levels (HCPs, Priest Rapids Dam 2008 Biological Opinion), and they comply with Endangered Species Act (ESA) permit provisions. Hatchery compensation for NNI and inundation compensation in 2010 included the release of 835,288 yearling and 471,286 subyearling salmonids from hatcheries associated with the Wells Project (Tables 4 and 5). These totals do not include the increased production of natural-origin sockeye smolts attributed to Douglas PUD's sockeye NNI compensation—the continued implementation of the Fish-Water Management Tool project administered by the Okanagan Nation Alliance and funded by Douglas PUD. The total also does not include NNI compensation paid by Douglas PUD to the Yakama Nation for the Coho Enhancement Program in the Methow Basin. These totals also do not include the Methow Basin spring Chinook raised by Douglas PUD for Chelan and Grant PUDs or the yearling steelhead produced at the Wells Hatchery by Douglas PUD for Grant PUD.

2.4.1 Hatchery Production Summary

Tables 4 and 5 summarize and compare HCP hatchery production objectives and actual 2010 production levels for both the fixed hatchery compensation for original inundation and harvest enhancement programs and HCP passage loss (NNI) compensation programs.

2.4.1.1 Inundation Compensation Program

The FERC license to operate the Wells Hydroelectric Project requires Douglas PUD to rear and release fish to compensate for original impacts associated with the development of the Wells Dam and Reservoir. All of the fish for this program are raised at the Wells Fish Hatchery. The number of fish to be released each year for the Inundation and Harvest Enhancement Program can be found in Section 8.4.6 of the Wells HCP Agreement.

Table 4
Production Objectives and Release Numbers for the Inundation and Harvest Enhancement Programs in 2010

Inundation and Harvest Compensation Program	Numeric Target	Number Released
Yearling Summer/Fall Chinook (2008 BY)	320,000	336,881[1]
Subyearling Summer/Fall Chinook (2008 BY)	484,000	471,286[2]
Yearling Summer Steelhead (2009 BY)	300,000	275,907[3]

Notes:
1 C. Snow (WDFW 2010, personal communication) for the total released.
2 C. Snow (WDFW 2010, personal communication) release on May 14-19 of 471,286.
3 C. Snow (WDFW 2010, personal communication).

2.4.1.2 NNI Compensation Program

Section 8.4.3 of the Wells HCP contains specific numbers of juvenile plan species to be produced to meet Douglas PUD's NNI production levels for unavoidable juvenile losses at the Wells Project. Juvenile passage losses are offset through the production of juvenile plan species at three facilities (Wells Fish Hatchery, Methow Fish Hatchery, and Eastbank Fish Hatchery) and through the implementation of mitigation options identified in the Sockeye Enhancement Decision Tree.

Table 5
Production Objectives for the HCP Passage Loss Compensation Program Released in 2010

No Net Impact Compensation Program	Numeric Target	Number Released
Yearling Summer Steelhead (2009 BY)	48,858	44,934[1]
Yearling Summer/Fall Chinook (2008 BY)	108,570	107,906[2]
Yearling Spring Chinook (2008 BY)	61,071	59,985[3]
Yearling Osoyoos Lake Sockeye[4]	NNI achieved by annually funding the Fish-Water Management Tool	
Methow Coho[5]	NNI achieved by payment to the Yakama Nation for the Coho Enhancement Program in the Methow Basin	

Notes:
1 C. Snow (WDFW 2010, personal communication).
2 Carlton Pond Summer Chinook are released by Chelan PUD for Douglas PUD as part of the Douglas-Chelan Hatchery Sharing Agreement.
3 There were 540,290 spring Chinook smolts released from the Methow Hatchery (May 2010 Memo from C. Snow). The target release of 550,000 fish was a combination of Wells NNI (61,071) and the sharing agreements with Chelan PUD (288,000) and Grant PUD (201,000). The shortfall was equally applied to the three programs, giving Wells NNI 59,985 fish, Chelan PUD 282,878 fish, and Grant PUD 197,425 fish in 2010.
4 Okanogan Sockeye obligation for NNI is covered by Douglas PUD funding of the Fish-Water Management Tool (FWMT) program (Wells HCP, Sections 8.4.4 and 14, Figure 3) managed through the Okanagan Nation Alliance.
5 NNI for Methow coho is achieved through the funding provided to the Yakama Nation for the Coho Enhancement Program as approved by the HCP HC at the December 12, 2007 meeting.

2.4.2 Hatchery Planning

2.4.2.1 Monitoring and Evaluation Plan Implementation

In 2007, Douglas PUD and Washington Department of Fish and Wildlife (WDFW) updated the 2005 Monitoring and Evaluation (M&E) Plan for the operation of Douglas PUD hatchery programs. The M&E Plan is implemented to assist in the determination of whether the specific hatchery objectives defined by the HCP are being met (the M&E Plan is titled: *Conceptual Approach to Monitoring and Evaluation for Hatchery Programs funded by Douglas County Public Utility District*). Implementation of this M&E Plan began in 2006 and continued in 2010 in accordance with two documents: the *Analytical Framework for Monitoring and Evaluating PUD Hatchery Programs*, prepared in 2006 (and updated in 2007), which provides the analysis tools for the M&E Plan; and the document, *Implementation of Comprehensive Monitoring and Evaluation of Hatchery Programs funded by Douglas County PUD* (M&E Implementation Plan), which is prepared annually and describes the M&E activities for the next calendar year, anticipating that adaptive modification of the plan may be necessary in future years. The 2010 M&E Implementation Plan was approved by the Hatchery Committee in November 2009. The 2011 M&E Implementation Plan was finalized by Douglas PUD after a 30-day review and approval by the Hatchery Committees in December 2010 (Appendix P). The Douglas PUD M&E Report documenting M&E activities in 2009, titled *Monitoring and Evaluation of Wells and Methow Hatchery Programs in 2009*, was finalized in February 2011 after a 60-day review and approval by the Hatchery Committee; it is included in this annual report as Appendix K. A similar report will be completed in 2011 for 2010 monitoring and evaluation of natural production and hatchery operations, as well as a 5-year summary report of the M&E program.

2.4.2.2 Hatchery and Genetic Management Plans

In October 2008, the National Marine Fisheries Service (NMFS) requested that the Wells HCP Hatchery Committee prepare updated Hatchery and Genetic Management Plans (HGMPs) for Douglas PUD's hatchery programs, including the Methow spring Chinook and Wells steelhead hatchery programs. NMFS will use the new HGMPs to determine whether the current Biological Opinions and Incidental Take Permits will require amendment or modification, or will require a new consultation. The HGMP for the Methow Hatchery Spring Chinook Program was approved by the Wells HCP Hatchery Committee on February 17, 2010, and was submitted to NOAA Fisheries for ESA consultation on March 12, 2010.

The Wells Hatchery Steelhead HGMP was originally introduced to the Wells HCP Hatchery Committee in the winter of 2009 and is still undergoing review. On December 14, 2010, the Wells HCP Hatchery Committee agreed to an approval-in-principle of key parameters of the Wells Hatchery Steelhead HGMP. The revised draft HGMP for Wells Hatchery Steelhead is expected to be approved in early 2011.

2.4.2.3 Objective 10 of the Hatchery M&E Plan - NTTOC

The Hatchery Committees began addressing the interaction of Plan Species with non-target taxa of concern (NTTOC; Objective 10 of the Hatchery M&E Plan) in early 2008. At the close of 2008, the Hatchery Committees agreed to conduct an expert-panel review of risks to NTTOC using a risk-based model that WDFW has previously developed and applied in the

Yakima River basin (Ham and Pearsons, 2001, Fisheries 26: 15-23). The Hatchery Committees agreed on the species to be analyzed and containment objective categories for these species, as well as potential panel members for the exercise, in November 2008. The final documentation for this decision, titled *Summary and Strategy for Monitoring and Evaluation Plan Objective 10 (NTTOC)*, was made available as Attachment B to the January 21, 2009 Hatchery Committee meeting minutes.

In August 2009, the Hatchery Committees directed the HETT to conduct the NTTOC assessment. For Hatchery Committees' review, input, and approval, the HETT was asked to develop a list of regional and local ecological experts to serve on a panel to estimate the risk of Plan Species hatchery programs to NTTOC, develop a strategy and logistics for conducting the assessment panel workshops (phone, in person, or a combination of the two), and schedule the workshops. In December 2010, the HETT was working on completing the NTTOC risk assessment template and a draft manuscript describing the modified risk assessment approach. The template and the manuscript will be provided to potential panel members, along with a cover letter requesting their participation, in early 2011. The HETT is completing the risk analysis for presentation to the Hatchery Committees and final approval by mid-2011.

2.4.2.4 Steelhead Spawning (Reproductive) Success Study

A steelhead spawning (reproductive) success study (RSS) is required by all three of the Mid-Columbia HCPs; the requirement is in Section 8.5.3 of the Wells HCP. A steelhead RSS is also identified as a Reasonable and Prudent Alternative (RPA) in the Federal Columbia River Power System (FCRPS) 2008 Biological Opinion. On February 1, 2010, the Wells HCP Hatchery Committee approved the Twisp Steelhead Reproductive Success Study plan (RSS) (titled *Steelhead Spawning Success Study Design, Wells HCP*; included in this report as Appendix F). The draft study design covers a 12-year period beginning in 2010, focusing on an adult-to-adult assessment of relative reproductive success of hatchery vs. wild fish, and includes the measurement of covariates of fitness. The study is also designed to provide data that may distinguish genetic and environmental influences on productive success. Study results will be relevant to management of summer steelhead in the Methow subbasin.

2.4.2.5 M&E Program Control Groups

In 2007, the HETT was tasked with making recommendations to the Hatchery Committees on reference streams (now called control groups) for the Chelan and Douglas PUDs' Hatchery M&E Programs. In 2008, the HETT completed preliminary analyses of candidate control groups for spring Chinook hatchery programs in the Chiwawa, Methow, Chewuch, and Twisp rivers. The HETT considered correlation coefficients for effect sizes, and also productivity and abundance. The next step was for the HETT was to provide a list of recommended control groups for steelhead and sockeye. While work on collection of data for potential steelhead control groups progressed in 2009, the HETT revisited the control groups recommended for spring Chinook, concluding that the analysis needed to account for the differences in carrying capacity between control and reference groups. By November 2010, the HETT had completed the evaluation for the Chiwawa spring Chinook population and started on the Wenatchee summer Chinook evaluation. Control/treatment group evaluation for Grant PUD and Douglas PUD hatchery programs are due to be completed in February 2011.

The HETT placed the identification of control populations for supplemented steelhead populations on hold until reliable abundance information for target steelhead populations is available. For sockeye, the HETT determined that no suitable reference populations are available.

2.4.3 Maintenance and Improvements

Several maintenance and improvement activities were implemented supporting hatchery production under the Wells HCP in 2010.

2.4.3.1 East Ladder Brood Collection Trap

In 2010, the HCP Hatchery Committees discussed the need for facility upgrades to the broodstock-trapping facilities on the east ladder at Wells Dam. Because Douglas PUD does not use the trapping facilities on the east ladder to meet any of their mitigation obligations, they asked whether other parties had any interest in funding the upgrades to the east ladder trap to meet their own respective brood collection and study needs. It was agreed that the

HCP parties had little interest in funding any upgrades to the east ladder trap and that instead the parties would use the west ladder trap as their primary brood collection facility.

2.4.3.2 West Ladder Brood Collection Trap

Improvements at the Wells Dam West Ladder/Steelhead Pond at the Methow Hatchery were completed in October 2010. Several final adjustments to the equipment will be made prior to the 2011 field season. Upgrades to the facility consisted of: 1) increasing the size of the area where newly arriving fish are held; 2) a crowder and moveable floor system to facilitate fish handling and reduce stress from the current operational practice where the water level must be dropped to handle fish; 3) a brail to allow water-to-water transfer of fish to trucks; and 4) screens to partition the steelhead broodstock holding area.

2.5 Tributary Committees and Plan Species Accounts

As outlined in the Wells HCP, the signatory parties designated one member each to serve on the Tributary Committee. The Rock Island, Rocky Reach, and Wells Tributary Committees meet on a regularly scheduled basis as a collective group to enhance coordination and minimize meeting dates and schedules. Subject items requiring decisions are voted on in accordance with the terms outlined in the specific HCPs. During 2010, the Tributary Committees met on ten different occasions.

An initial focus of the Tributary Committees in 2010 was to revise their operating procedures that provide a mechanism for decision making; these were initially developed in 2005 and included in that year's annual report (Anchor 2005)[1]. The Tributary Committees also developed Policies and Procedures for soliciting, reviewing, and approving project proposals (Anchor 2005); this document was last updated in March 2010. The Policies and Procedures provide formal guidance to project sponsors on submission of proposals for projects to protect and restore habitat of Plan Species within the geographic scope of the HCP. The Committees established two complementary funding programs, the General Salmon Habitat Program and the Small Projects Program.

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[1] Anchor Environmental, L.L.C. 2005. Annual Report, Calendar Year 2005, of Activities Under the Anadromous Fish Agreement and Habitat Conservation Plan. Wells Hydroelectric Project, FERC license no. 2149. Prepared for FERC by Anchor Environmental L.L.C. and Public Utility District No. 1 of Douglas County.

2.5.1 Regional Coordination

Similar to the Hatchery Committees and to improve coordination, a representative from Grant PUD and the facilitator of the Priest Rapids Coordinating Committees (PRCC) Habitat Subcommittee were invited to the Tributary Committees monthly meetings. In addition, they received meeting announcements, draft agendas, and meeting minutes. This benefits the Tributary Committees through increased coordination and sharing of expertise. The Grant PUD representative and PRCC Habitat Subcommittee facilitator have no voting authority. The Tributary Committees, through the Coordinating Committees, also invited American Rivers and the Confederated Tribes of the Umatilla Indian Reservation to participate in Committees meetings. Both parties contributed to the development of the HCP, yet elected not to sign the document. Neither of these parties participated in the deliberations of the Tributary Committees in 2010.

The Tributary Committees also coordinate with the Upper Columbia Salmon Recovery Board (UCSRB). Coordination is typically between the chairperson of the Tributary Committees and the Executive Director or Associate Director of the UCSRB. The Tributary Committees also invite representatives from the UCSRB to at least one meeting per year to update the Committees on activities proposed by the Board. For example, in April 2010, the Executive Director, the Associate Director, and the UCSRB Data Steward discussed 2010 UCSRB proposed activities with the Tributary Committees. In addition, some members of the Committees typically attend the UCSRB meetings to foster coordination in developing and selecting projects for funding. Some members of the Committees are also members of the UCSRB's Regional Technical Team (RTT), which increases coordination in selecting projects for funding. Many of the policies and procedures of the Salmon Recovery Funding Board (SRFB) and Tributary Committees are complementary, and annual funding rounds by these funding entities have been coordinated over the last several years.

2.5.2 Fiscal Management of Plan Species Accounts

The Tributary Committees set up methods for the long-term management of the Plan Species accounts for each HCP. The Wells Tributary Committee agreed to have Douglas PUD manage the accounting services internally, and to structure the relationship so that it can invoice these administrative costs to the Wells Plan Species accounts. The beginning balance of the Wells Plan Species Account on January 1, 2010, was $549,206.40; Douglas PUD's annual contribution was $240,661.90; interest accrued during 2010 was $3,206.90; funds disbursed for projects in 2010 totaled $44,001.76; disbursements for administrative costs included $2,685.55 to Chelan PUD for administrative support provided to the Wells Plan Species Account, $2,272.00 to Douglas PUD for account administration during 2010, and $1,416.66 to Cordell, Neher & Co. for financial review; resulting in an ending balance of $739,492.33 on December 31, 2010. The 2010 Annual Financial Report for this Plan Species Account is provided in Appendix J.

In January 2009, the Wells Tributary Committee recommended to the Fisheries Parties (via the Wells Coordinating Committee) that Douglas PUD make annual payments to the Wells Plan Species Account beginning in 2010, per Section 7.4.1 of the Wells HCP. The annual contribution would be $176,780 (in 1998 dollars). In February 2009, the Wells Coordinating Committee accepted the recommendation that Douglas PUD make annual payments to the Wells Plan Species Account beginning in January 2010. Accordingly, at the end of January 2010, Douglas PUD made a payment of $237,455 into the Wells Plan Species Account.

In 2009, the Tributary Committees hired the accounting firm Cordell, Neher & Company, PLLC, to conduct an external financial review of the Plan Species accounts. The firm submitted their results to the Tributary Committees in February 2010. The Tributary Committees reviewed the results and concluded that there are no issues with the handling of incoming funds, the budgeting process, or the allocation and approval of funds. The Tributary Committees were satisfied with the financial performance and position of the financial accounts managers for each Plan Species Account. The Tributary Committees will request another external financial review of the Plan Species accounts in 2014.

The Wells Tributary Committee delegated signatory authority to the Tributary Committees Chairperson for processing of payments for invoices approved by the Committee, with the Coordinating Committees Chairperson serving as the alternate. The Tributary Committees Chairperson works for a limited liability corporation and the Tributary Committees provide funds for liability insurance.

2.5.3 General Salmon Habitat Program

The Tributary Committees established the General Salmon Habitat Program as the principle mechanism for funding projects. The goal of the program is to fund projects for the protection and restoration of Plan Species habitat. An important aspect of this program is to assist project sponsors in developing practical and effective applications for relatively large projects. Many habitat projects are increasingly complex in nature and require extensive design, permitting, and public participation to be feasible. Often, a reach-level project involves many authorities and addresses more than one habitat factor. Because of this trend, the General Salmon Habitat Program was designed to fund relatively long-term projects. There is no maximum financial request in the General Salmon Habitat Program; the minimum request is $50,000, although the Tributary Committees may provide lesser amounts during a phased project.

In an effort to coordinate with ongoing funding and implementation programs within the region, the Tributary Committees used the previously established technical framework and review process for this geographic area, and worked with the other funding programs to identify cost-sharing procedures.

2.5.3.1 2010 General Salmon Habitat Projects

The Tributary Committees announced their 2010 funding cycle in April, with pre-proposal applications due on June 4, 2010 and full proposals due on July 19, 2010. The Tributary Committees received 19 pre-proposal applications; two pre-proposals were withdrawn by the sponsors. Therefore, the Tributary Committees reviewed 17 pre-proposals. The Tributary Committees selected six projects that they believed warranted full proposals and dismissed 11 projects because they did not have strong technical merit.

In July, the Tributary Committees received ten full proposals to the General Salmon Habitat Program. Most of these were “cost-shares” with the SRFB or other funding entities. By the end of October, the Bonneville Power Administration agreed to fund what would have been the Tributary Committees’ portion of two proposals. Of the remaining eight proposals, the Tributary Committees approved funding for five projects. Table 6 identifies the projects, sponsors, total cost of each project, amount requested from Tributary Funds, and, if funded, which Plan Species Account supported the project.

Table 6
General Salmon Habitat Program Projects Reviewed by the Tributary Committees in 2010

Project Name	Sponsor[1]	Total Cost	Request from T.C.	Plan Species Account[2]
Boat Launch Off-Channel Pond Reconnection	CCNRD	$136,500	$62,000	RI
White River Van Dusen Conservation Easement	CDLT	$440,000	$60,000	RI
Lower Icicle Creek Reach Assessment	WFC	$75,814	$13,000	Not Funded
Chewuch River Permanent Instream Flow Project	TU-WWP	$1,200,000	$325,000	RR
Upper Methow Riparian Protection IV	MC	$363,003	$54,450	Not Funded
Methow River Acquisition 2010 MR 39.5 LH (Hoffman)	MSRF	$195,048	$74,415	Wells
Methow River Acquisition 2010 MR 41.5 LR (Risley)	MSRF	$238,760	$122,404	Not Funded
Methow River Acquisition 2010 MR 48.7 RB (Bird)	MSRF	$244,760	$94,900	Wells

Notes:
1 CCNRD = Chelan County Natural Resource Department; CDLT = Chelan-Douglas Land Trust; WFC = Wild Fish Conservancy; TU-WWP = Trout Unlimited - Washington Water Project; MC = Methow Conservancy; MSRF = Methow Salmon Recovery Foundation.
2 RI = Rock Island Plan Species Account; RR = Rocky Reach Plan Species Account.

In 2010, the Wells Tributary Committee agreed to fund the following General Salmon Habitat Program projects:

- The Methow River Acquisition 2010 MR 39.5 LH (Hoffman) for the amount of $74,415 (with cost share, the total cost of this acquisition was $195,048). The project will purchase and protect about 22.8 acres along the middle Methow River. The acquisition would include about 15 acres of floodplain and riparian habitat, and about 2,100 feet of riverbank.
- The Methow River Acquisition 2010 MR 48.7 RB (Bird) for the amount of $94,900 (with cost share, the total cost of this acquisition was $244,760). The project will purchase and protect about 18 acres along the middle Methow River between RM 48.6-49.0. The acquisition would include about 17 acres of floodplain and riparian habitat, and about 2,100 feet of riverbank.

2.5.3.2 Modifications to General Salmon Habitat Program Contracts

The Wells Tributary Committee received no requests from project sponsors in 2010 asking for contract amendments to General Salmon Habitat Program projects funded by the Committee.

2.5.4 Small Projects Program

The Small Projects Program has an application and review process that increases the likelihood of participation by private stakeholders that typically do not have the resources or expertise to go through an extensive application process. The Tributary Committees encourage small-scale projects by community groups, in cooperation with landowners, to support salmon recovery on private property. Project sponsors may apply for funding at any time, and in most cases, will receive a funding decision within three months. The maximum contract allowed under the Small Projects Program is $50,000.

2.5.4.1 2010 Small Projects

In 2010, the Tributary Committees received eight requests for funding under the Small Projects Program. Five projects were approved for funding (one project approved for funding was later withdrawn by the sponsor). The three projects not funded lacked technical merit or were inconsistent with the intent of the Small Projects Program. Table 7 identifies the projects, sponsors, total cost of each project, amount requested from Tributary Funds, and, if funded, which Plan Species Account supported the project.

Table 7
Projects Reviewed by the Tributary Committees under the Small Projects Program in 2010

Project Name	Sponsor[1]	Total Cost	Request from T.C.	Plan Species Account[2]
Prevent Fish Entrainment on Inkaneep Creek	ONA	$24,000	$24,000	Wells
Mission Creek Fish Passage Project	CCD	$50,000	$45,000	RI
Moen Surface Diversion to Groundwater Well	CCD	$48,298	$48,298	Not Funded[3]
Methow Subbasin LWD Acquisition and Stockpile	MSRF	$50,000	$50,000	RR
Assessing Nutrient Enhancement Logistics	UCRFEG	$9,875	$9,875	RI
Loan to Support UC Habitat Programmatic	UCSRB	$100,000	$100,000	Not Funded
Pucket Creek/Methow River Sediment Reduction	TU-WWP	$14,543	$17,543	Not Funded
Trout Unlimited Methow LWD Acquisition	TU-WWP	$50,000	$50,000	Not Funded

Notes:
1 ONA = Okanagan Nation Alliance; CCD = Cascadia Conservation District; MSRF = Methow Salmon Recovery Foundation; UCRFEG = Upper Columbia Regional Fisheries Enhancement Group; UCSRB = Upper Columbia Salmon Recovery Board; TU-WWP = Trout Unlimited - Washington Water Project.
2 RI = Rock Island Plan Species Account; RR = Rocky Reach Plan Species Account.
3 The Rocky Reach Tributary Committee selected this project for funding with conditions. The sponsor decided they could not meet the conditions and therefore withdrew the project.

In 2010, the Wells Tributary Committee agreed to fund the following Small Project:

- Prevent Fish Entrainment on Inkaneep Creek for the amount of $24,000 (this project had no cost share). This project will purchase 3,000 hay bales in lieu of irrigating a field for hay production during 2010, which would entail diverting water through an unscreened diversion on the lowermost 0.5 mile of Inkaneep Creek. Inkaneep Creek is an important steelhead/rainbow trout stream that drains into Lake Osoyoos. The sponsor is working diligently with the landowner to develop other alternative water sources and delivery systems. These include withdrawing water from Lake Osoyoos and possibly using a conveyance system that is more efficient than a series of open ditches. The transition to a more modern irrigation system will likely not be implemented until 2011. Thus, the landowner has agreed not to divert water from Inkaneep Creek if hay is provided to feed her cattle.

2.5.4.2 Modifications to Small Project Contracts

The Wells Tributary Committee received no requests from project sponsors in 2010 asking for contract amendments to Small Projects Program projects funded by the Committee.

2.5.5 Tributary Assessment Program

In 2008, the Okanagan Nation Alliance responded to the Tributary Committees request for a proposal to monitor the Okanagan River Restoration Initiative Project. The Wells Tributary Committee agreed to fund three monitoring tasks of the Okanagan River Restoration Initiative: 1) Fish Holding and Rearing, 2) Channel Morphometry and Hydraulics, and 3) Substrate Composition. As required in the Wells HCP, Douglas PUD provided funding for the approved monitoring tasks through the Wells Tributary Assessment Program, as per Section 7.5 of the Wells HCP, rather than through the Wells Plan Species Account.

In August 2010, the Okanagan Nation Alliance submitted a report titled, "Aquatic Monitoring of the Okanagan River Restoration Initiative—Post Construction 2009" for Wells Tributary Committee review. The Wells Tributary Committee reviewed the report and noted that the monitoring efforts should continue as planned. Thus, the Wells Tributary Committee directed Douglas PUD to fund the following component for another year: Fish Holding and Rearing for $4,164. The Wells Tributary Committee elected not to fund any other "unfunded" components of the monitoring plan and directed the sponsor to submit another report and budget at the end of the monitoring year (April 2011).

3 HCP ADMINISTRATION

This chapter lists events of note that occurred in 2010 related to the administration of the HCPs, as well as gives a list of reports published in 2010 that relate to the HCPs.

3.1 Conflict-of-Interest Policy

The HCP Hatchery Committees approved a Conflict-of-Interest Policy in October 2010 (Appendix O). The Policy defines potential conflicts of interest that may arise in the Hatchery Committees during the development and approval of research, monitoring, or evaluation proposals and study plans, and how they will be resolved. The new Conflict-of-Interest Policy is similar to that developed by the HCP Tributary Committees.

3.2 Coordination with the UCSRB

On September 23, 2010, the Chair of the Coordinating and Hatchery Committees presented a summary of HCP accomplishments at a meeting of the UCSRB.

3.3 Mid-Columbia HCP Forums

In 2005 and 2006, Mid-Columbia Forums (Forums) were held as a means of communicating and coordinating with the non-signatories and other interested parties on the implementation of the HCPs. Non-signatory parties at the time of the 2006 meeting included the Confederated Tribes of the Umatilla Reservation and American Rivers. As in 2007, 2008, and in 2009, these parties were invited by letter in 2010 to attend a Forum, in conformity with the 2005 FERC Order on Rehearing 109 FERC 61208 and in accordance with the offer to non-signatory parties of non-voting membership in HCP Tributary and Hatchery Committee processes (Appendix L). The non-signatory parties indicated no interest in attending a Forum in 2010, and thus a Forum was not held in 2010.

3.4 HCP Related Reports Published in Calendar Year 2010

The following is a list of reports released in 2010 related to the implementation of the Wells HCP:

- Alex, K., and C. Rivard-Sirois. 2010. Aquatic monitoring the Okanagan River Restoration Initiative (ORRI) – post-construction, 2009. Prepared by Okanagan

Nation Alliance Fisheries Department, Westbank, BC.

- Anchor QEA. 2010. Annual Report, Calendar Year 2009, of Activities Under the Anadromous Fish Agreement and Habitat Conservation Plan. Wells Hydroelectric Project. FERC License No. 2149. Prepared for FERC. March 2010.
- Le, B. and Public Utility District No. 1 of Douglas County. 2008. Wells Bull Trout Monitoring and Management Plan 2009 Annual Report. Wells Hydroelectric Project, FERC No. 2149. March 30, 2010.
- Johnson, P.N., B. Le, and J.G. Murauskas. Assessment of Adult Pacific Lamprey Response to Velocity Reductions at Wells Dam Fishway Entrances (2009 DIDSON Study Report). Wells Hydroelectric Project, FERC No. 2149. June 2010. 17 pp.
- Snow, C., C. Frady, A. Repp, A. Murdock, S. M. Blankenship, C. Bowman, M. P. Small, J. Von Bargen, and K. I. Warheit. 2009. Monitoring and Evaluation of Wells and Methow Hatchery Programs in 2008. Prepared for Douglas County PUD and Wells HCP Hatchery Committee. WDFW Supplementation Research Team, Methow Field Office, Twisp, Washington.
- Jerald, T. 2010. 2009 Public Utility District No. 1 of Douglas County Northern Pikeminnow Removal and Research Program.
- Public Utility District No. 1 of Douglas County. 2010. Annual Report of Operations, Fish Facilities: 2009. Wells Hydroelectric Project, FERC No. 2149.

APPENDIX A
HABITAT CONSERVATION PLAN COORDINATING COMMITTEES MEETING MINUTES AND CONFERENCE CALL MINUTES

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FINAL MEMORANDUM

To:	Wells, Rocky Reach, and Rock Island HCP Coordinating Committees	**Date:**	February 23, 2010
From:	Michael Schiewe, Chair, HCP Coordinating Committees		
Cc:	Ali Wick, Lance Keller		
Re:	Final Minutes of January 26, 2010 HCP Coordinating Committees Meeting		

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Coordinating Committees met on Tuesday, January 26, 2010, from 9:30 am to 12:30 pm at the Radisson Gateway Hotel in SeaTac, Washington. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Steve Hemstrom will send the 2010 Rock Island Yearling Chinook Study Plan prior to the next Coordinating Committees meeting (Item II-A).
- Steve Hemstrom will send out the Draft 2009 Rocky Reach Juvenile Sockeye Day/Night Survival Study Report prior to the next Coordinating Committees meeting (Item II-B).
- Steve Hemstrom will send a web link to the group with information on half-duplex Passive Integrated Transponder (PIT)-tag systems (Item II-C).
- Tom Kahler will finalize the 2008 Pikeminnow Report and will send it to the Coordinating Committees for the record (Item III-A).
- Tom Kahler will send files of east ladder repair photos to Jerry Marco, who was unable to attend today's meeting in person (Item III-D).

DECISION SUMMARY

There were no decision items at this meeting.

I. Welcome

The Coordinating Committees approved the December 15, 2009 meeting minutes. Ali Wick will distribute the final minutes to the group. Wick will also send out the draft November 24 Subyearling Workshop meeting minutes next week.

II. Chelan PUD

A. Status of Rock Island Yearling Chinook Study Plan 2010

Steve Hemstrom said that he will be distributing a draft study plan soon; he is waiting for a river-wide schematic for inclusion in the plan. Coordinating Committees members agreed to provide any suggestions or comments on the study plan as soon as possible, so that the plan can be approved at the February 2010 Coordinating Committees meeting.

B. Draft 2009 Rocky Reach Juvenile Sockeye Day/Night Survival Study Report

Steve Hemstrom said that he received comments from the Coordinating Committees on this report and that John Skalski (University of Washington) is currently revising it. Bob Rose offered several comments at today's meeting. He asked that detailed information on fish passage routes and operations during the study be included in the report. He suggested asking Tracey Steig to present EonFusion individual fish tracking results at a future Coordinating Committees meeting. Bryan Nordlund suggested that Chelan PUD might look into modeling how artificial lighting or natural shading could affect fish use of the bypass. Hemstrom responded that this would be an interesting question to investigate and noted this suggestion. He said that he will send out the draft report prior to the next Coordinating Committees meeting.

C. 2010 Lamprey Monitoring

Steve Hemstrom updated the group that Chelan PUD is investigating the potential to install half-duplex PIT-tag detection equipment in the fishways at Rocky Reach and Rock Island Dams (one system at Rocky Reach; one system per fishway at Rock Island). Hemstrom said that specific dates of installation and more information on these systems will be available soon. Upon request by Bryan Nordlund, Hemstrom said he would send a web link out to the group that contains information on half-duplex systems.

D. Rocky Reach Fish Forum

Keith Truscott updated the group that the Rocky Reach Fish Forum meeting is coming up this Thursday (January 28), and Truscott said that minutes from this meeting will be provided to the Coordinating Committees before the next Coordinating Committees meeting. At this meeting, the lamprey technical workgroup will be selecting a consultant for conducting a literature review.

E. Pikeminnow Derby

Bob Rose asked for an update on the setup and results of the Chelan PUD annual pikeminnow derby, as he is interested in potentially organizing one using the Grant PUD No Net Impact (NNI) funds under the Grant PUD Settlement Agreement. Steve Hemstrom said that Chelan PUD supports the East Wenatchee Rotary in a pikeminnow derby on Fathers' Day every year, and does so as a sub-contract to the Rotary.

F. Route-specific Passage Report and Statistical Analysis Plan

Steve Hemstrom said that these two documents were sent out by email yesterday. One is the Route-specific Passage Report for 2009, and the other is a statistical analysis plan for the 2010 studies. The Statistical Analysis Plan covers the design and proposed analysis for yearling Chinook studies at Rocky Reach and Rock Island dams.

III. Douglas PUD

A. 2008 Douglas PUD Pikeminnow Report

Tom Kahler asked whether there were comments on the 2008 Douglas PUD Pikeminnow Report that was sent out in late December 2009. Jim Craig provided some comments today. Teresa Scott asked about the size of the pikeminnow population, and whether there is some way to estimate the efficacy of the removal program relative to the existing population size. Kahler indicated that the last population estimate was completed about 10 years ago. Several members commented on the difficulty of making population estimates in systems that are open to fish moving into and out of the population. There were no other comments by Coordinating Committees members on the report. The Committees agreed that Kahler will finalize the report with Craig's comments incorporated and will then send it back to the Committees for the record.

B. Douglas PUD HCP 2010 Action Plan

Tom Kahler distributed the 2010 Action Plan that is currently out for Coordinating Committees' review. This document was previously sent by email. There were no comments to the plan today, and approval will be a decision item at the next meeting.

C. Summary of 2009 Bypass Operations

Tom Kahler provided copies of the summary memorandum of 2009 bypass operations, which was previously sent by email. There were no editorial comments to this memorandum today and Tom Kahler will finalize the document.

D. East Ladder Repair

Tom Kahler provided copies of some photos of a recent repair for the attraction water flow pipe for the side entrance to the east ladder. Kahler will send these photos electronically to Jerry Marco, who was unable to attend today's meeting in person.

IV. USFWS

A. Proposed Bull Trout Critical Habitat

Jim Craig updated the group that proposed bull trout critical habitat has now been published in the Federal Register, which includes the Mid-Columbia region.

V. Tributary and Hatchery Committees Update

Mike Schiewe updated the group that the Tributary Committees update was sent out recently. He noted that there were six projects funded, with no projects funded out of the Wells Fund this year.

Mike Schiewe updated the group on the following discussions that occurred at the recent Hatchery Committees meeting:

- The Douglas PUD Hatchery Genetic Management Plans (HGMPs) are in the process of being finalized. A steelhead reproductive success study is included as an appendix to the Wells steelhead HGMP. The steelhead HGMP focuses on maintaining a high proportion natural influence (PNI) in the population.
- Chelan PUD is preparing a letter and analysis for submission to National Marine Fisheries Service (NMFS), requesting a Letter of Concurrence under the existing permit to address potential impacts on listed species for the Chelan Falls facility.

- The Hatchery Committees agreed that Chelan PUD can implement the conversion of the Turtle Rock summer/fall program to a 600,000 yearling smolt program beginning with brood year 2010.
- The Hatchery Committees agreed that Chelan PUD can use Chiwawa acclimation facility to rear and acclimate steelhead for release into the Wenatchee River and its tributaries, consistent with Section 5.6 of the *Wenatchee River Summer Steelhead HGMP*.
- Chelan PUD updated the Hatchery Committees that consistent with discussions with Washington State Department of Transportation (WSDOT) and the Hatchery Committees, Chelan PUD plans to remove a sediment deposit upstream of the Dryden weir.
- HCP entities will be sending letters to Washington State Department of Ecology (Ecology) in support of Chelan PUD's water rights application for the new Chiwawa facility.
- Blackbird Pond will again be used to acclimate 50,000 steelhead this year. Washington Department of Fish and Wildlife (WDFW) and Chelan PUD will be PIT-tagging a portion of these fish, but the actual number is still being discussed.
- The Hatchery Committees are reviewing the use of carbon dioxide as a fish anesthetic.
- Bonneville Power Administration (BPA) funding has been approved for the Yakama Nation (YN) to implement their steelhead kelt reconditioning program.
- WDFW has distributed a Twisp Weir Operations Protocol for Hatchery Committees' review.
- The Hatchery Evaluation Technical Team (HETT) will soon be implementing the analysis of Non-Target Taxa of Concern; this is regional objective Number 10 of the Hatchery Monitoring and Evaluation (M&E) program.

VI. HCP Administration

A. Next Meetings

The next scheduled Coordinating Committees meeting will be on February 23, March 23, and April 27, all in SeaTac.

List of Attachments

Attachment A – List of Attendees

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor QEA, LLC
Ali Wick	Anchor QEA, LLC
Steve Hemstrom *	Chelan PUD
Keith Truscott * (by phone)	Chelan PUD
Lance Keller	Chelan PUD
Jerry Marco * (by phone)	Colville Confederated Tribes
Tom Kahler *	Douglas PUD
Bryan Nordlund *	NMFS
Jim Craig *	USFWS
Teresa Scott *	WDFW
Bob Rose *	Yakama Nation

* Denotes Coordinating Committees member or alternate

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FINAL MEMORANDUM

To:	Wells, Rocky Reach, and Rock Island HCP Coordinating Committees	**Date:**	April 6, 2010
From:	Michael Schiewe, Chair, HCP Coordinating Committees		
Cc:	Ali Wick, Lance Keller		
Re:	Final Minutes of February 23, 2010 HCP Coordinating Committees Meeting		

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Coordinating Committees met on Tuesday, February 23, 2010, from 9:30 am to 12:00 pm at the Radisson Gateway Hotel in SeaTac, Washington. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Tom Kahler will finalize the 2008 Pikeminnow Report and will send it back to the Coordinating Committee for the record (item from January meeting).
- Steve Hemstrom will talk to John Skalski about whether virtual release (single-release) methods could be used to estimate subyearling Chinook survival (Item II).
- Coordinating Committee representatives from Douglas and Chelan PUDs will meet to prepare a summary of what actions regarding testing subyearling Chinook survival may be feasible based on current knowledge and technologies and will report back in April 2010 (Item II).
- The Coordinating Committee will provide comments on the 2010 Rocky Reach yearling Chinook survival study plan, the 2010 Rock Island Yearling Chinook and Steelhead Survival study plan, and the 2010 Rocky Reach and Rock Island Fish Spill Plan by March 9 (Items III-B, III-C, and III-D).
- Steve Hemstrom will discuss with Tracy Steig whether it is possible to use the tailrace detection array to detect tags expelled by pikeminnow evaluate day/night differences in predation during the 2010 Rocky Reach yearling Chinook study (Item III-C).
- Lance Keller will add a note to the 2009 Rocky Reach Bypass Report noting that lamprey juveniles captured in the Rocky Reach bypass were migrating fish, and will add this item to the protocols for 2010 (Item III-F).

- Tom Kahler will send the revised 2010 Action Plan to Ali Wick for distribution (Item IV-C).

DECISION SUMMARY

- The Coordinating Committees approved the Chelan PUD 2010 Fisheries Action Plan (Item III-A).
- The Coordinating Committees approved the Douglas PUD 2010 Action Plan as revised (Item IV-C).
- The Coordinating Committees approved the Douglas PUD 2010 Bypass Operations Plan (Item IV-D).

I. Welcome

The Coordinating Committees approved the January 26, 2010 meeting minutes. Ali Wick will distribute the final minutes to the group.

II. Subyearling Workshop – Minutes Approval and Path Forward

The group discussed the November 24, 2009 subyearling workshop minutes and approved them with minor revisions. Ali Wick will distribute the final minutes to the Coordinating Committees. The Committees discussed the appropriate path forward given the information and technology that is currently available. Two key issues discussed were the bias caused by tag effects and the bias caused by the multiple life-histories expressed by subyearling Chinook. The Committees also discussed the issues with passive integrated transponder tag (PIT-tag) detection during the winter months when subyearling detection facilities are usually not operating. Another issue covered was the potential use of a virtual release protocol to estimate survival. Steve Hemstrom said that he will talk to John Skalski about the statistical practicality and suitability of this protocol given its inherent biases. Shane Bickford and Hemstrom agreed that Douglas and Chelan PUDs will meet to prepare a summary of what actions may be feasible based on current knowledge and technologies, and will report back in April 2010.

III. Chelan PUD

A. Approval of 2010 Fisheries Action Plan

Steve Hemstrom presented the Chelan PUD 2010 Fisheries Action Plan, which had previously been sent out by email. There were no comments from the group and the plan was approved.

B. 2010 Rocky Reach Yearling Chinook Survival Study Plan

Steve Hemstrom said that he had previously sent out the 2010 Rocky Reach Yearling Chinook Survival Study Plan and asked for any comments on this plan. Hemstrom noted that this is a day/night release pilot study and will not be used for phase designation. He said that the final study is scheduled for 2011. Following the Committee's questions on the ability to detect day/night differences in predation, Hemstrom agreed to discuss with Tracy Steig whether it may be possible to use the tailrace detection array for this purpose. Bob Rose asked Hemstrom to address survival in fish that pass through the upper turbine area versus the lower turbine area. These results might be used to better understand whether turbine access elevations affect survival, and whether there is tailrace predation. Hemstrom said that it is not possible to detect fish elevation in close proximity to the turbines because the tag is acoustic and background noise prevents monitoring in those areas. The study plan will be considered for approval next month (March), so the Coordinating Committees agreed to provide comments by March 9.

C. 2010 Rock Island Yearling Chinook and Steelhead Survival Study Plan

Steve Hemstrom outlined the key points of the 2010 Rock Island Yearling Chinook and Steelhead Study Plan. The plan was previously sent out for Coordinating Committee's review. Hemstrom noted that 2010 is the third phase designation study for yearling Chinook at Rock Island under the 10% spill level, and the second year for steelhead. . . . Similar to the Rocky Reach plan, the study plan will be up for approval in March, so the Committee agreed to provide comments by March 9.

D. 2010 Rocky Reach and Rock Island Fish Spill Plan

Steve Hemstrom introduced the 2010 Rocky Reach and Rock Island Fish Spill Plan, which had been previously sent out. The spill plan will be up for approval in March, so the Coordinating Committee agreed to provide comments by March 9.

E. 2009 Pikeminnow Control Report

Lance Keller gave an overview of the 2009 pikeminnow control effort and report, which was recently sent to the Coordinating Committee. The document describes the various fish-capture methods used for the effort, and it reports that there were 90,291 fish removed in total. Keller said that the program will continue in spring 2010.

F. 2009 Rocky Reach Bypass Report

Lance Keller said that the 2009 Rocky Reach Bypass Report had been distributed by email and asked for any comments. Bob Rose asked whether the lamprey macropthalmia that were observed during the bypass operations were juvenile lamprey that were actively migrating through the project or whether they were non-migratory fish. Lance Keller said that they were migrating fish. He agreed to add a note to report this information in the 2009 bypass report, and will add this item to the protocols for 2010. There were no further comments on this report.

IV. Douglas PUD

A. Update on Rocky Reach PIT-tag Detection

Tom Kahler gave an update on Douglas PUD's effort to modify the flow spreaders at the Rocky Reach juvenile bypass to accommodate antennas for PIT-tag detection. There was a small equipment failure during construction that has been remedied and the project is now running smoothly.

B. Update on the Survival Verification Study

Shane Bickford updated the group on the survival verification study. He noted that about 82,000 yearling Chinook were tagged at Wells Hatchery last week. He said that tagging went well and fish are now located in Wells Hatchery raceways. The first release is scheduled for April. The Coordinating Committees discussed the forecast for exceptionally low flows this year and the potential for study conditions to fall outside the range of what are normally required for survival studies. Shane Bickford asked the committee whether they still wanted to move forward with the scheduled 2010 survival verification study given the fact that snow pack upstream of Grand Coulee is currently at 73% of normal and that under these conditions there is a high likelihood that river flows will be below the environmental flow criteria outlined within Section 4.1.4 of the HCP. The committee recognized the concern and expressed some interest in proceeding, but wanted to wait for updated information on projected flows.

C. Approval of the 2010 Action Plan

Tom Kahler asked for approval of the 2010 Action Plan, previously sent out. He relayed several changes that the Hatchery Committees had requested at last week's meeting. Kahler will send the revised plan to Ali Wick for distribution. The Coordinating Committees approved the plan as revised.

D. Approval of 2010 Bypass Operations Plan

Tom Kahler provided the 2010 Bypass Operations Plan, which contains expected fish numbers and the planned operations for this year based on past historic hydroacoustic and fyke-net data and Coordinating Committee decisions.

V. Tributary and Hatchery Committees Update

Mike Schiewe updated the group that the Tributary Committees update was sent out recently. He noted that Steve Hays has replaced Keith Truscott on the Tributary Committees for Chelan PUD. He also said that one member of the Tributary Committees moved to schedule a meeting with the Hatchery Committee in order to discuss whether and/or how tributary funding might contribute to supplementation goals, but the remainder of the Tributary Committee declined to second the motion..

Mike Schiewe updated the group on the following discussions that occurred at the recent Hatchery Committees meeting:

- For the Wells Steelhead Hatchery Genetic Management Plan (HGMP), the Yakama Nation and National Marine Fisheries Service (NMFS) will be meeting to discuss the appropriate size of the potential Wells steelhead program, given recovery needs and legal requirements. These discussions are occurring both in the Hatchery Committees and at a higher level, and may be elevated to the dispute resolution process.
- The Methow Spring Chinook HGMP was approved by the Hatchery Committees on February 17, contingent upon language revisions in two paragraphs. This language is being fine-tuned, and Hatchery Committees members will likely approve the revised language by February 25..
- Douglas PUD vetted the 2010 Action Plan with the Hatchery Committees.

- The Hatchery Committees memorialized an agreement to use excess summer/fall Chinook broodstock for additional study fish for Douglas PUD's upcoming survival studies if necessary. This agreement was confirmed in September 2009 by email.
- An HGMP may be required for the Chelan Falls program. If that turns out to be the case, Chelan PUD will have to delay contracting and constructing the project until the permits are in place.
- The Hatchery Committees approved continued rearing in 2010 of 400,000 juveniles at Ringold Hatchery contingent on development of a fish condition and health evaluation program.
- Chelan PUD is developing planning options to provide multiple pathways to move steelhead from Turtle Rock by 2011, working three different avenues to do so.
- The Yakama Nation has been discussing with U.S. Fish and Wildlife Service (USFWS) the potential to recondition kelts at the Winthrop National Fish Hatchery (NFH).
- The Yakama Nation is working with the Priest Rapids Coordinating Committee Hatchery Subcommittee (PRCC-HSC) to use Carlton Pond as an overwintering acclimation site.

VI. HCP Administration

A. Next Meetings

The next scheduled Coordinating Committees meetings will be on March 23 and April 27 in SeaTac. The May meeting may occur on the east side of the mountains, but is still to be determined.

List of Attachments

Attachment A – List of Attendees

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor QEA, LLC
Ali Wick	Anchor QEA, LLC
Steve Hemstrom *	Chelan PUD
Lance Keller	Chelan PUD
Jerry Marco *	Colville Confederated Tribes
Josh Murauskas (by phone)	Douglas PUD
Tom Kahler *	Douglas PUD
Shane Bickford *	Douglas PUD
Bryan Nordlund *	NMFS
Jim Craig *	USFWS
Bill Tweit * (by phone)	WDFW
Bob Rose *	Yakama Nation

* Denotes Coordinating Committees member or alternate

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FINAL MEMORANDUM

To: Wells, Rocky Reach, and Rock Island HCP Coordinating Committees

Date: April 27, 2010

From: Michael Schiewe, Chair, HCP Coordinating Committees

Cc: Ali Wick

Re: Final Minutes of March 23, 2010 HCP Coordinating Committees Meeting

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Coordinating Committees met on Tuesday, March 23, 2010, from 9:30 am to 12:00 pm at the Radisson Gateway Hotel in SeaTac, Washington. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Ali Wick will send the YN plans for the kelt trap at the Twisp weir to Bryan Nordlund (Item II).
- Steve Hemstrom will provide the 2010 Rocky Reach yearling Chinook survival study plan as revised (Item IV-A).

DECISION SUMMARY

- The Committees agreed that both utilities should go forward with the survival studies in 2010 as previously approved by the Committee, irrespective of river flow projections. The Committees further agreed that if survival standards are met or exceeded, and river flows are lower than specified for HCP survival studies, then the Committees would validate the studies if they otherwise met HCP standards; and if survival standards are not met, and river flows are lower than the HCP study standards, then the Committees would invalidate the studies, and repeat the studies in 2011 (Item III-A).
- The Committees approved the Rocky Reach 2010 Yearling Chinook Survival Study Plan with No Spill (Item IV-A).
- The Committees approved the Rock Island 2010 Yearling Chinook and Steelhead Survival Study Plan (Item IV-B).

I. Welcome

The Coordinating Committees will approve the February 23 meeting minutes by email. Ali Wick will distribute the revised minutes to the group.

II. Hatchery and Tributary Committees Update

Mike Schiewe updated the Committees that the Tributary Committees met this month, discussing the following items:

- Regarding conservation easements and acquisitions, a joint meeting between the Hatchery and Tributary Committees will not be needed. At this month's meeting, the Tributary Committees added language to the management guidelines for conservation easements/acquired lands.
- The Tributary Committees reviewed and updated the policies and procedures for funding projects.

Mike Schiewe updated the group on the following actions and discussions that occurred at the recent Hatchery Committees meeting:

- Douglas PUD has submitted its Methow spring Chinook HGMP to NMFS.
- Work on the Douglas PUD Methow steelhead HGMP is on hold, pending discussions among NMFS, YN, and co-managers regarding program size.
- Douglas PUD updated the group on this spring's M&E activities.
- Douglas PUD requested and received HC approval for a delayed schedule for distribution and review of the 2009 M&E Report.
- The Committees reviewed the 2010 broodstock collection protocols prepared by WDFW; these will be submitted to NMFS on April 15.
- WDFW is developing guidelines for utilizing surplus adults. This would be an addendum to the Upper Columbia HGMPs.
- WDFW and NMFS are working through permitting issues for the Chelan Falls program.
- The YN is developing a proposal plan for a kelt trap at the Twisp weir; Ali Wick will send this plan to Bryan Nordlund.
- The YN is compiling input from Committees members on the importance of Wells ladder trapping as an evaluation point for programs, and agreed to initiate discussion

with parties who might be willing to contribute to upgrades of the trapping facilities on the east ladder.

- The CCT received approval to transfer 40k of the 100k Wells Hatchery steelhead destined for the Okanogan for release in Salmon Creek.
- Chelan PUD introduced a draft SOA for discussion requesting an extension of HC approval of their current sockeye mitigation program.
- CPUD introduced a draft SOA advancing design of the Chelan Falls summer/fall Chinook rearing/acclimation facilities.
- The Committees approved USFWS' taking of 120 summer Chinook from Wells for use as broodstock at Entiat NFH.
- NMFS will soon publish a notice in the Federal Register opening public comment on the Wenatchee HGMPs.

III. Douglas PUD

A. Water Year and 2010 Verification Study

Shane Bickford noted that, as discussed at last meeting, 2010 is expected to be an exceptionally low water year. These conditions could potentially interfere with the applicability of the results for the planned 10-year survival verification study. He asked for additional feedback from the Committees on whether Douglas PUD should to go forward with the study. The group discussed whether results from this year would be acceptable if it turns out that survival targets were met or exceeded. The Committees agreed that the PUD should go forward with the studies this year, irrespective of flow projections. The Committees further agreed that if survival standards are met or exceeded, and river flows are lower than specified for HCP survival studies, then the Committees would <u>validate</u> the studies if they otherwise met HCP standards; and if survival standards are not met, and river flows are lower than the HCP study standards, then the Committees would invalidate the studies, and repeat the studies in 2011.

IV. Chelan PUD

A. Approval of Rocky Reach 2010 Yearling Chinook Survival Study Plan with No Spill

Steve Hemstrom noted that he did not receive any comments on the 2010 Rocky Reach yearling Chinook survival study plan. At today's meeting, the Committees provided a few brief edits. The Committees approved the plan. Hemstrom will send out the final plan.

B. Approval of Rock Island 2010 Yearling Chinook and Steelhead Survival Study Plan

Steve Hemstrom asked for approval of the 2010 Rock Island yearling Chinook and steelhead survival study plan. The Committees approved the plan.

C. Fishway Update

Steve Hemstrom updated the group that the RR and RI maintenance is now complete, as is the half-duplex PIT-tag detector installations at RR.

D. Action Items from February 23 meeting

Steve Hemstrom reported that he had asked John Skalski about whether virtual release (single-release) methods could contribute to understanding subyearling Chinook survival. Skalski's opinion was that this method could potentially be used, but he was skeptical that any results could be useful beyond a very preliminary ballpark estimate.

Steve Hemstrom reported that he had talked with Tracy Steig about whether it is possible to use data from the tailrace detection array at RR to detect differences in predation during the 2010 Rocky Reach yearling Chinook study. Steig's opinion was that this array could be used, but that data from 3-dimensional arrays would be far superior. Hemstrom noted that it was not possible to deploy a 3-dimensional array in the tailrace.

V. HCP Administration

A. Next Meetings

The next scheduled Coordinating Committees meeting will be on April 27 in SeaTac and on May 25, the meeting will be held on the east side. Final plans for the May meeting will be forthcoming.

List of Attachments

Attachment A – List of Attendees

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor QEA, LLC
Ali Wick	Anchor QEA, LLC
Steve Hemstrom *	Chelan PUD
Lance Keller *	Chelan PUD
Jerry Marco *	Colville Confederated Tribes
Shane Bickford *	Douglas PUD
Bryan Nordlund *	NMFS
Jim Craig *	USFWS
Teresa Scott *	WDFW
Bob Rose *	Yakama Nation

* Denotes Coordinating Committees member or alternate

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FINAL MEMORANDUM

To:	Wells, Rocky Reach, and Rock Island HCP Coordinating Committees	**Date:**	May 25, 2010
From:	Michael Schiewe, Chair, HCP Coordinating Committees		
Cc:	Ali Wick		
Re:	Final Minutes of April 27, 2010 HCP Coordinating Committees Meeting		

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Coordinating Committees met on Tuesday, April 27, 2010, from 9:30 am to 12:00 pm by conference call. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- For the June meeting, Chelan PUD and Douglas PUD will develop an outline of an analytical plan for evaluating life history variation of previously tagged subyearling Chinook, using the passive integrated transponder tag (PIT-tag) detection capability at Rocky Reach Dam and lower-river detection sites (Item IV-B).
- Jim Craig will provide a summary of PIT-tagging that is currently occurring in the Entiat subbasin (Item IV-B).

DECISION SUMMARY

There were no decision items during this meeting.

I. Welcome

The Coordinating Committees approved the March 23 meeting minutes by email, and Ali Wick will distribute the revised minutes to the group.

II. Douglas PUD

A. Bypass Update

Tom Kahler notified the group that spring operation of the bypass has begun per the bypass operation plan. There were no questions or comments.

B. Survival Study Update

Tom Kahler updated the group that the 10-year validation survival study is proceeding as planned. He indicated that the sixth of 15 releases was occurring that day.

C. CRITFC Annual Request to Sample and Tag Sockeye from the Wells Ladders

Tom Kahler said a Columbia River Inter-Tribal Fish Commission (CRITFC) request to sample and tag sockeye at Wells east ladder has been received. Kahler is in communication with CRITFC to verify whether there is any change in this year's sampling with regard to timing or number of fish to be tagged. He agreed to notify the Coordinating Committees if anything in the sampling plan is substantially different from previous years. No one on the Committee opposed the proposed sockeye sampling and tagging activity.

III. Hatchery and Tributary Committees Update

Mike Schiewe updated the Coordinating Committees that the Tributary Committees met this month, discussing the following items:

- The Tributary Committees met with staff of the Upper Columbia Salmon Recovery Board (UCSRB) for a briefing on planned UCSRB activities for 2010. UCSRB staff expressed an interest in whether Tributary Committees funds could be used for targeted solicitations. The Tributary Committees agreed to discuss this at a future meeting.

Schiewe also updated the group on the following actions and discussions that occurred at the recent Hatchery Committees meeting:

- Brian Zimmerman, the Artificial Passage Supervisor for the Confederated Tribes of the Umatilla Indian Reservation, provided a presentation on the use of carbon dioxide (CO_2) as an anesthetic for handling adult fish.
- The Yakama Nation and Douglas PUD are discussing a potential YN kelt trap at Twisp Weir.
- The Yakama Nation checked with Douglas PUD, Chelan PUD, and the Colville Confederated Tribes regarding coordinating funding for facility upgrades at Wells east ladder, but there was limited interest at this time.
- The Hatchery Committees approved in principle the use of circular culture tanks at Chelan Falls Hatchery.

- The Hatchery Committees discussed their long-term goal for the Skaha sockeye program—whether it is to produce a certain number of smolts or to support reintroduction. The Hatchery Committees' consensus was that they support the reintroduction goal, but feel it would be premature to make any decision about smolt production until the scheduled 2017 check in.
- The Hatchery Committees reviewed conceptual drawings of the retrofit of the Eastbank incubation facility, showing locations for additional incubation and rearing vessels.
- The Wells steelhead Hatchery Genetic Management Plan (HGMP) is still under discussion with the National Marine Fisheries Service (NMFS) and *U.S. vs. Oregon* parties.
- Washington Department of Fish and Wildlife (WDFW) has completed the 2010 broodstock collection protocols and submitted them to NMFS.
- The Hatchery Committees have compiled a list of tagging/marking protocols and is sharing this information within their agencies in case there is more information to be added.
- The Hatchery Committees will soon be considering study plan approval guidelines for the Hatchery Committees. This item was put on hold during development of the HGMPs due to workload issues.

IV. Chelan PUD

A. Update on 2010 Survival Study Preparation

Keith Truscott updated the group that preparations are complete for the yearling Chinook and steelhead studies at Rock Island Dam as well as the day/night yearling Chinook study at Rocky Reach. These studies will begin according to the study plans provided to the Coordinating Committees.

B. Subyearling Chinook Discussion (Chelan PUD and Douglas PUD)

Keith Truscott said that it may be possible to gain some information about subyearling summer Chinook migration timing and rearing characteristics by interrogating the PTAGIS database for PIT-tag recoveries observed through the newly installed Rocky Reach PIT-tag system. Entities such as the USFWS and WDFW are currently operating rotary screw traps and PIT-tagging subyearling summer Chinook in subbasins upstream of Rocky Reach Dam (Entiat, Methow) For the June meeting, Chelan PUD and Douglas PUD will develop an outline of an analytical plan for evaluating life-history variation of subyearling summer Chinook PIT tagged during M&E activities above Rocky Reach Dam, taking into account the PIT-tag detection capability at Rocky Reach and lower-river detection sites. To support this effort, Jim Craig agreed to provide a summary of subyearling PIT-tagging that is currently occurring in the Entiat subbasin.

C. Rocky Reach Fish Forum Update - Lamprey Upstream Passage

Keith Truscott updated the group that Chelan PUD has contracted with a consulting group to conduct a literature review of methodologies used to date at other hydro project ladders to improve upstream passage conditions for adult lamprey. The consultant will provide a report of their findings to the Rocky Reach Fish Forum for implementation consideration in 2011.

V. HCP Administration

A. Next Meetings

The next scheduled Coordinating Committees meeting will be on May 25 in Wenatchee. Ali Wick will work with Lance Keller and Tom Kahler to develop an agenda for the meeting. The meeting will occur at Wells Dam from 9:00 to 10:00 am, followed by a Wells Dam tour from 10:00 to 11:00; the group will get lunch at Lone Pine Cafe and finish the day with a tour at Rocky Reach at 1:00 pm. The subsequent Coordinating Committees meetings will occur on June 22 and July 27, both in SeaTac.

List of Attachments

Attachment A – List of Attendees

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor QEA, LLC
Ali Wick	Anchor QEA, LLC
Keith Truscott *	Chelan PUD
Lance Keller *	Chelan PUD
Jerry Marco *	Colville Confederated Tribes
Tom Kahler *	Douglas PUD
Bryan Nordlund *	NMFS
Jim Craig *	USFWS
Teresa Scott *	WDFW
Bob Rose *	Yakama Nation

* Denotes Coordinating Committees member or alternate

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FINAL MEMORANDUM

To:	Wells, Rocky Reach, and Rock Island HCP Coordinating Committees	**Date:**	June 23, 2010
From:	Michael Schiewe, Chair, HCP Coordinating Committees		
Cc:	Ali Wick		
Re:	Final Minutes of May 25, 2010 HCP Coordinating Committees Meeting		

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Coordinating Committees met on Tuesday, May 25, 2010, from 9:00 am to 10:00 am at Wells Dam. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

There were no action items from this meeting.

DECISION SUMMARY

There were no decision items during this meeting.

I. Welcome

The Coordinating Committees approved the April 27 meeting minutes with no revisions. Ali Wick will distribute the revised minutes to the group.

II. Chelan PUD

A. Survival Study Update

Steve Hemstrom updated the group that the 2010 survival studies are going well so far, and that the last releases are coming up at the end of May. He noted that the fish travel times from Wells to Rocky Reach Boat Restricted Zone (BRZ) are 4.5 to 4.7 days for Chinook, which is about 3 days slower than for sockeye; this travel time is typical for these species. The number of steelhead passing the project has been low. River flows at the start of the study were below the HCP minimum for valid survival studies, but have risen in the past few days. Nonetheless, he expects that flow minimums will be met by the end of the study because the minimums are based on a study average.

III. Douglas PUD

A. Survival Study Update

Tom Kahler updated the group on the 2010 survival verification study. He showed some photos and video of fish releases from the study, and said that the study has been proceeding well. Kahler reported that study releases are now complete. Upon inspecting fish prior to release, fish appeared to be doing well and showed no marks from Passive Integrated Transponder tag (PIT-tag) insertion. Travel times were as fast as 3 days, with an average travel time of 10 days.

IV. Hatchery and Tributary Committees Update

Ali Wick updated the Coordinating Committees that the Tributary Committees met this month, and the summary has been emailed to the group.

- The Wells Tributary Committees approved $24,000 in funding for a Small Projects Program application from the Okanagan Nation Alliance titled Prevent Fish Entrainment on Inkaneep Creek.
- The Rocky Reach Tributary Committee approved the 80% design drawings for the Entiat National Fish Hatchery Habitat Improvement Project.
- The Tributary Committees agreed to support and participate in the Upper Columbia Salmon Recovery Board (UCSRB) targeted solicitation process.
- The Rock Island Tributary Committee agreed to fund the conservation easement on the Daley-Wilson property on the White River.
- At their next meeting, the Tributary Committees will review a Small Project Program application and review General Salmon Habitat Program Pre-proposals.

Ali Wick also updated the group on the following actions and discussions that occurred at the most recent Hatchery Committees meeting:

- The Hatchery Committees approved a proposal to compare performance of yearling summer/fall Chinook reared at the new Chelan Falls facility in circular tanks to the performance of summer/fall yearling Chinook reared in other upper-Columbia programs
- The Yakama Nation (YN), Chelan PUD, U.S. Fish and Wildlife Service (USFWS), and Washington Department of Fish and Wildlife (WDFW), collectively the Tumwater

Working Group, have been meeting to discuss alternative fish anesthetics for use at Tumwater Dam. This topic is still under discussion.

- The Hatchery Committees previously agreed that they were supportive of continuing to acclimate fish at Blackbird Pond; National Marine Fisheries Service (NMFS) verified at this meeting that Endangered Species Act (ESA) coverage for the program applies this year and in future years for youth fisheries at the pond.
- Chelan PUD discussed recent volitional release testing at the Chiwawa steelhead circular ponds; more detailed results will be available at the next Hatchery Committees meeting.
- A NMFS concurrence letter is forthcoming for ESA coverage at Chelan Falls.
- Andrew Murdoch provided a presentation on some upcoming Bonneville Power Administration (BPA)-funded studies that WDFW will be implementing, in coordination with other entities.
- The Wells Steelhead Hatchery Genetic Management Plan (HGMP) is still on hold, pending resolution of key program features including release locations and numbers of fish released at each location.
- The YN has met with Douglas PUD and WDFW to discuss options for the YN to capture kelts at the Twisp Weir; the YN will test a prototype soon.
- Tom Scribner presented several brief underwater videos showing hatchery fish using acclimation ponds—one of coho in Biddle Pond and one of coho in Wolf Creek. Links are as follows: Biddle Pond: http://www.youtube.com/watch?v=pLQ-DkAmsBo; Wolf Creek: http://www.youtube.com/watch?v=IsAStUNmY5o.
- Allyson Purcell (NMFS) has requested an opportunity to brief the Hatchery Committees on the draft Mitchell Act Environmental Impact Statement (EIS) that will be released for public comment on August 1, 2010. This briefing will occur in conjunction with the Priest Rapids Coordinating Committee (PRCC) Habitat Subcommittee (HSC) in June.
- The Hatchery Committees are finalizing a protocol for approval and implementation of research studies by the HCP Committees.
- Tom Scribner forwarded a letter from Columbia River Inter-Tribal Fish Commission (CRITFC) regarding the HGMP process. This letter was tribal communication with National Oceanic and Atmospheric Administration (NOAA) as it relates to production agreements in *U.S. v. Oregon* and the potential inconsistency with HGMPs that have been submitted or will be submitted for consultation.

V. HCP Administration

A. Next Meetings

The next scheduled Coordinating Committees meetings will be on June 22, July 27, and August 24, all in SeaTac.

List of Attachments

Attachment A – List of Attendees

Attachment A
List of Attendees

Name	Organization
Ali Wick	Anchor QEA, LLC
Steve Hemstrom *	Chelan PUD
Jerry Marco *	Colville Confederated Tribes
Tom Kahler *	Douglas PUD
Bryan Nordlund *	NMFS
Jim Craig *	USFWS
Teresa Scott *	WDFW
Bob Rose *	Yakama Nation

* Denotes Coordinating Committees member or alternate

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FINAL MEMORANDUM

To:	Wells, Rocky Reach, and Rock Island HCP Coordinating Committees	**Date:**	August 10, 2010
From:	Michael Schiewe, Chair, HCP Coordinating Committees		
Cc:	Ali Wick		
Re:	Final Minutes of June 22, 2010 HCP Coordinating Committees Meeting		

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Coordinating Committees met on Tuesday, June 22, 2010, from 9:30 am to 12:30 pm at the Radisson Gateway Hotel in SeaTac. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Douglas PUD will send to Ali Wick an electronic copy of their lamprey presentation and the Aquatic Settlement Workgroup (Aquatic SWG) Entrance Velocity presentation, for posting on the ftp site (Item II-A).
- Jim Craig will check on availability of the U.S. Fish and Wildlife Service (USFWS) Dual-Frequency Identification Sonar (DIDSON) camera for use at Wells Dam during the 2010 lamprey study (Item II-A).
- Douglas PUD will send a copy of a plan view of the fishway entrance to Ali Wick for distribution to the Coordinating Committees (Item II-A).

DECISION SUMMARY

- The Coordinating Committees approved the 2010 Lamprey Assessment at Wells Dam, as modified by the additional requirement of empirical measurement of fishway entrance velocities (Item II-A).

I. Welcome

The Coordinating Committees approved the May 25, 2010 meeting minutes as revised. Ali Wick will finalize and distribute the revised meeting minutes to the group.

II. Douglas PUD

A. Proposed 2010 Lamprey Assessment at Wells Dam (Decision Item) (Beau Patterson)

Beau Patterson explained how DIDSON cameras were used in 2009 at the Wells Fishway entrances to observe lamprey behavior. Based on the results, Douglas PUD is proposing to repeat fishway entrance observations using DIDSON cameras again in 2010, with modifications. Background information on the Wells Project and on past lamprey passage studies at Wells Dam was presented and included in an accompanying PowerPoint presentation. To date, only 800 adult lamprey have been counted passing Bonneville Dam. This count is very low for this time of the year. Lamprey have been counted at Wells Dam since 1998, and the Wells Dam count averages 0.6 percent of the count at Bonneville. Lamprey radio telemetry studies at Wells Dam have shown low entrance efficiency, with a 2-year mean of 27 percent; upper ladder efficiency is 100 percent with no fall back. Hence, the fishway entrance appears to be the primary impediment to adult lamprey passage at Wells Dam. Patterson described some of the difficulties encountered using radio telemetry for studies of lamprey passage, including tag effects and low sample size. Because of the limitations of radio telemetry studies, the Douglas PUD Aquatic Settlement Work Group (Aquatic SWG) has decided to use DIDSON cameras to investigate lamprey behavior at the fishway entrances.

The 2009 study included 11 replicate tests of 3-day block treatments at head differentials of 1.5, 1.0, and 0.5 feet. Testing was conducted for 4-hour periods at night (2100-0059 hours) from August 21 through September 23; both fishways were operated simultaneously. Patterson noted that only 11 behavior sequences were observed during 2009 as a result of missing of the majority of the lamprey migration. There were 5 entrance attempts with 3 successful entries. There was 67 percent success under reduced head differential treatments (n=3) and 50 percent success under the 1.5 feet differential treatment (n=2). Although the low sample size precluded statistical analysis, behaviors observed suggested that the 1.0 head differential condition provided better passage conditions for lamprey than did the 0.5 or 1.5 feet head differential conditions.

Based on these results, the Aquatic SWG is recommending three modifications to the 2009 study design proposed for the 2010 study: 1) increase sampling duration to 55 days (August 7 through September 30); 2) increase replicate lengths to 8 hours (1700–0059 hours); and 3) eliminate the low velocity treatment. The modification to increase the sampling duration is intended to capture more of the adult lamprey migration period. The longer sampling time period will encapsulate the majority of the observed historic run. In 2009, the sampling duration was designed to target a period when steelhead were not moving at all. The proposed change in replicate length is based on 2009 passage duration and observed and calculated entrance times. The intent is that by increasing replicate length, more of the peak activity will be captured. Eliminating the low velocity treatment is proposed because the low velocities in 2009 appeared to be inadequate to attract lamprey. Douglas PUD does not anticipate any effect on adult salmonid passage success as a result of the revised study, with little to no incremental delay in passage. The 2010 study times are outside the spring Chinook, sockeye, and coho migration period and past the peak summer/fall Chinook run time (10-year average peak is July 13).

Patterson noted that the potential effect on steelhead passage is a main consideration, although no effect on passage success is anticipated and there is expected to be little to no incremental delay. The proposed time for implementing velocity changes at the fishway entrance for the 2010 study, 1700-0059 hours, is the lowest 8-hour diel entrance period for steelhead (11 percent of diel passage). Hence, 5.5 percent of the run would experience the 1.0-foot head differential on entry during the study; 94.5 percent would experience normal operations.

Jim Craig asked if Douglas PUD planned to implement other recommendations made in the 2009 report, in particular, attempting to get more of a vertical picture of the fishway entrance. Shane Bickford responded that most lamprey approach and enter along the bottom of the entrance, and that based on the numbers of fish counted at the entrance and the numbers of fish observed passing the dam, not many fish are being missed. Craig mentioned that there might be an additional DIDSON unit available from the USFWS and he would check on its availability. Bickford said he thought it would be easy to monitor more of the fishway entrance if an additional DIDSON were made available.

Bryan Nordlund asked if in the 2009 study, the potential effect of reduced powerhouse flow versus the approach of fish to the powerhouse was considered. Patterson said it was not considered in 2009. Steve Hemstrom pointed out that flows typically increase around 2200 hours from Grand Coulee, so it is hard to reduce flows at night. Nordlund next asked about results of the earlier radio telemetry studies. He indicated he was wondering how much consideration has been given to the fishway configuration as it affects lamprey passage versus how much changing entrance velocity alone might improve lamprey passage. Nordlund asked whether entrance velocities had been empirically measured. Bickford responded that Washington State University (WSU) had modeled entrance velocities, and that velocities were, as designed, 7.7 to 8.1 feet per second (ft/s) for the 1.0-foot head differential. Bickford showed some additional modeled entrance velocities at different head differentials, indicating that 5.7 to 5.8 ft/s is considered the maximum lamprey swimming ability. Nordlund stated his concern with the 5.7 to 5.8 velocity, explaining that when designing for salmonid passage, velocities are typically much higher. He suggested the possible need to look more at configuration improvements rather than velocity alone. Bickford said that ultimately Douglas PUD needed to get into the 60 to 65 percent entrance efficiency with lamprey.

Nordlund requested additional discussion of why Douglas PUD had concluded that the 2009 study conditions had a limited effect on salmon passage, and likewise did not expect an effect with the 2010 modifications. Bickford explained that one of the reasons Douglas PUD concluded that there would be little effect at a 1.0-foot head differential is that Rocky Reach and Rock Island are already are operating at head differentials of less than 1.5 feet. Nordlund and Bickford discussed the differences in ladder entrance locations, configuration, etc, among these dams, and how that also might affect attraction and passage. Nordlund explained that a higher entrance head differential translates to higher average entrance velocity. A higher entrance jet velocity projects further into the tailrace, and may be critical for salmonid (and maybe Lamprey) attraction to the ladders entrances, particularly at mid to high river flow. He also asked why it was postulated that velocity through the entrance gate could make a difference in Lamprey passage success, because the average velocity in the fishway entrance produced by either a 1.0 or 1.5 foot entrance head exceeded the burst velocity of Lamprey. He then pointed out that variation from the average velocity at different points within the fishway entrance could potentially be used by Lamprey for passage. Since the Wells fishway entrances are fairly unique, in situ velocity data probably doesn't exist for this style of gate but could be very important to understand how lamprey might enter the fishway entrance. Nordlund concluded his questioning by requesting that Douglas PUD conduct velocity mapping at the Wells Dam fishway entrances. Bickford agreed to measure fishway entrance velocities as an addition to the 2010 lamprey passage study proposal. Nordlund emphasized that there may be a need for additional radio telemetry studies for salmonids if lamprey passage studies indicated a need for long-term changed velocities at the fishway entrances, particularly for mid to high river flows. Bickford agreed that there should be follow-up radio telemetry studies on adult salmonid passage if velocity changes are made for lamprey at the fishway entrances.

Bickford asked Nordlund what kind of entrance structures might be more conducive to adult lamprey passage. Nordlund said that based on Mary Moser's (National Marine Fisheries Service [NMFS]) work in the lower Columbia River, covering diffuser gratings edges and rounding or eliminating sharp corners in fishways are methods that have been shown to improve adult lamprey passage in fishways. He noted that the fishway entrances that Grant PUD installed in the last decade at the Priest Rapids project dams were simple full depth slotted structures, and his understanding is that lamprey enter these pretty well. He suggested that lamprey passage may be complicated at the Wells entrance(s) by the convoluted path from the exterior fishway walls. Lamprey would need to move from the exterior fishway walls, into a gate recess, then around the wing gates that protrude from the face of the fishway entrance and form a gap between the fishway exterior wall and the vertical wing gate for the entire depth of the entrance. He thought there may be up to five 90° corners for lamprey to maneuver between the tailrace and the entrance pool, or possibly they could swim past a gap of about 6 inches to avoid these turns. He noted that this could explain why most lamprey enter the fishway from the lower sill, not the sides of the entrance. Nordlund indicated he would also like to look at how lamprey manage the gate area with the 6-inch gap between the open gates and the fishway wall —maybe with DIDSON.

In conclusion, the Coordinating Committees approved the 2010 Lamprey Study, as modified by the addition of empirical measurement of fishway entrance velocities. Craig will check on the availability of the USFWS DIDSON unit to expand fishway entrance coverage. Douglas PUD will provide a plan view of the fishway entrance to the Committees for review.

B. Update on Wells Yearling Chinook Survival Study (Tom Kahler)

Tom Kahler provided an update on the Wells Dam yearling Chinook survival study. He reported that all releases have been successfully completed (as of May 17), and that Passive Integrated Transponder tag (PIT-tag) detections are being compiled from the PTAGIS database. Based on data compiled to date, mean harmonic travel times were 15 days to Rocky Reach and 26 days to McNary. Overwhelmingly, the most detections have been at Rocky Reach. He noted that the estuary trawls are detecting about half of the fish picked up at John Day Dam, which is a very high detection rate. Shane Bickford said they might be able to estimate survival to Bonneville if enough fish are detected by the estuary trawl. Kahler completed his update by explaining that river flows were very low and did not meet HCP representative environmental conditions for a valid study for April 16 to May 31 for spring migrant studies. Average flow this year was 90,332 cfs, which falls below the window judged to be environmentally acceptable per the negotiated terms for valid studies in the HCP (the 90^{th} percentile from HCP Section 14, Figure 2a is 100,523 cfs). Lastly, Kahler reported that nearly two-thirds of the study fish have been detected downstream. Rocky Reach has detected more than 50 percent of all released summer Chinook yearlings.

C. Wells Project Relicensing Update (Shane Bickford)

Shane Bickford updated the Coordinating Committees that the final Wells license application was filed with the Federal Energy Regulatory Commission (FERC) on May 27. Douglas PUD also submitted the Offer of Settlement on this same date, requesting that the settlement agreement and the management plans be included in the new license. The Tendering Notice for the final license application was issues by FERC on June 2. The Tendering Notice contains FERC's tentative dates for issuing the notice indicating that the application is ready for environmental analysis, also known as the NREA Document. Douglas PUD is now waiting for FERC to issue the NREA Document. Douglas PUD is now working on the 401 application and anticipates providing a draft of that document to the Washington State Department of Ecology (Ecology) in early July.

III. Chelan PUD

A. Operating Items (Steve Hemstrom)

Steve Hemstrom said that Chelan PUD was notified this spring about the potential cracking of wedge carriers at Rocky Reach Dam based on modeled stresses and pressures of operating conditions at Rocky Reach Dam. Wedge carriers secure the rotor in the turbine. Model data of stresses and pressures showed there should be cracks in the wedge carriers and they should already have failed. Inspection of the units has begun and no cracks have been observed yet. Each unit has to be taken out for 3 days for inspection. Units CI and C2 are up next for inspection. Bryan Nordlund asked if the inspection of C1 and C2 could be delayed until after juvenile migration because these units are important in creating the attraction for the juvenile bypass. Steve Hemstrom said the inspections cannot be delayed any longer given the safety concerns. Chelan PUD had already delayed the inspections to complete their survival studies. Hemstrom will keep the Coordinating Committees updated on progress.

B. Study Items (Steve Hemstrom)

Steve Hemstrom updated the Coordinating Committees on this year's studies. Rocky Reach survival study release dates were April 29 through June 7. There were 15 releases of fish from the Wells and Rocky Reach tailraces. Grand Coulee flow averaged 93,064 cubic feet per second (cfs), which is low and below the HCP flow conditions for a valid study. The Rock Island survival study ran from May 1through June 9. Grand Coulee flow averaged 97,000 cfs and the Rock Island spill was 10.1percent. Hemstrom noted that they were not able to collect enough steelhead at Rocky Reach for the last release of the Rock Island study and instead used fish from the Rock Island juvenile fish bypass. These fish were released in the tailrace of Rocky Reach and included Wenatchee steelhead. Chelan PUD will provide preliminary results as soon as data are available.

C. Analysis of Subyearling Chinook PIT-tag Detections at Rocky Reach Dam (Steve Hemstrom)

Steve Hemstrom distributed a preliminary outline of potential analyses that Chelan and Douglas PUDs will conduct to better understand life history diversity of summer/fall Chinook in the Upper Columbia. He indicated that Chelan and Douglas PUDs will assess subyearling Chinook project travel time using all subyearling Chinook PIT-tag data available from upstream of the Project. Tom Kahler said Charlie Snow's 2009 screw trap data showed almost 9,000 summer Chinook subyearlings at the trap, but only 17 were of taggable size. Most fish that arrive at the screw trap are fry. Only at the end of the trapping season are the arriving fish large enough to to tag, and thus, the tagged fish are not representative of the run at large. Kahler noted that the U.S. Geological Survey (USGS) tags hundreds of summer Chinook each year in the Methow subbasin. So, in total, there will be perhaps 2,000 Chinook PIT-tagged upstream of Rocky Reach. About 6,000 Wells hatchery summer Chinook subyearlings are tagged, but these are also not representative of the run at large. Nonetheless, Chelan PUD will look at the PIT-tag data for these fish as well. Hemstrom noted that Wenatchee Basin screw traps will be put in as early in the spring as possible and run through the juvenile migration season. Douglas and Chelan PUD plan to repeat the tagging and data analysis in 2011. Shane Bickford indicated the Colville Confederated Tribes are required to PIT-tag 20,000 juvenile summer Chinook as part of the Chief Joe summer Chinook hatchery program, and that these fish will contribute to this analysis in the future.

D. Pikeminnow Update (Lance Keller)

Lance Keller said that 36,000 to 37,000 pikeminnow have been captured and that fishing is ongoing. This year, Chelan PUD is using both a contractor and the U.S. Department of Agriculture (USDA) simultaneously to remove pikeminnow. The Wenatchee Rotary Pikeminnow Derby this year caught 5,027 pikeminnow, averaging just under 0.5 pound each. Chelan PUD will begin ladder trapping of pikeminnow at Rock Island today (June 22). Lamprey trapped incidentally will be given to R.D. Nelly (USFWS) for lamprey studies, as requested.

IV. Hatchery and Tributary Committees Update (Mike Schiewe)

Mike Schiewe updated the Coordinating Committees that the Tributary Committees met on June 10, and discussed the following items:

- A small project proposal from Cascadia Conservation District was reviewed. The project is planned for Mission Creek and proposes to put in log weirs and do riparian planting. Requested funding was for $45,000 of a $50,000 total cost. The request was approved.

- The Tributary Committees now have 19 general habitat fund pre-proposals to review. One pre-proposal was withdrawn by the project sponsor and one pre-proposal was rejected as unlikely to receive funding. The rejected pre-proposal was for nutrient enhancement. Site visits are planned for June 21 through 24 jointly with the Regional Technical Team (RTT).

Mike Schiewe updated the Coordinating Committees on the following actions and discussions that occurred at the most recent Hatchery Committees meeting on June 16:

- Chelan PUD provided updates on ongoing hatchery studies that began in 2009. One study was a pilot project to rear steelhead at the Chiwawa Hatchery using circular tanks. Based on the first year of rearing, fish health and quality appeared excellent. Using a volitional release system with three tanks, about 90 percent of the fish volitionally moved to the center tank within about 10 days of being offered access, and about 90 percent were smolted. With normal raceway rearing, volitional movement may take 10 to 20 days with only half considered smolted. Chiwawa steelhead smolts traveling to McNary showed rapid travel time compared to Blackbird Island steelhead smolts. Chiwawa steelhead were affected by a minor outbreak of fungal disease. Chelan PUD will install a UV system.
- Chelan PUD recently completed the first year of a 2-year study to enumerate sockeye returning to the Wenatchee system. For the study, Chelan PUD installed PIT-tag arrays in the lower White River and in the Little Wenatchee River. The goal of the study was to compare area–under-the-curve spawner estimates with spawner estimates generated using PIT-tag detection data. This year, counts are very close, given the low water levels. Overall, it seems like PIT-tags may provide better sockeye counts compared to redd surveys. PowerPoint presentations were prepared for both Chelan PUD presentations and are available on the Anchor QEA ftp site.
- Chelan PUD has been working on a Hatchery Committees commitment on long-term goals for the Skaha sockeye program. Chelan PUD is requesting credit for natural production resulting from the reintroduction program. Chelan PUD is looking at investing in a new Okanagan Nation Alliance (ONA) hatchery facility, and wants to ensure that that the investment will contribute to meeting their HCP mitigation requirement.

- Chelan PUD circulated the 2010 Monitoring and Evaluation (M&E) Implementation Plan. They are asking for a thorough review of their PIT-tagging operations to ensure that all PIT-tagging and tracking efforts are still relevant.
- Chelan PUD announced the release of their 2009 M&E report. It is available on Anchor QEA's ftp site.
- Douglas PUD reported that they are rearing 100,000 summer Chinook at Wells Hatchery for a repeat survival study in 2011 if required. Douglas PUD asked for input on what can be done with these summer Chinook if a repeat study is not needed. Rob Jones indicated that there was flexibility under the permit to allow for release along with the regular production.
- Mike Schiewe updated the Hatchery Committees on the status of discussions regarding the Methow steelhead Hatchery Genetic Management Plan (HGMP), and particularly, agreement on smolt release numbers. Based on discussions with Steve Parker, Yakama Nation (YN), it appears that an agreement is close and may be completed by September.
- Mike Tonseth indicated there were about 100,000 surplus Wenatchee summer Chinook that Washington Department of Fish and Wildlife (WDFW) was recommending be transferred to the YN for use in their Yakima River reintroduction program. Absent a use with another HCP program, the Hatchery Committees approved the transfer.
- Mike Tonseth gave an update on Wenatchee steehead returns. They had an excellent return at Tumwater—one of the largest recorded—but a larger number of hatchery fish passed upstream of Tumwater than preferred. Without adult management being implemented at Tumwater, Proportionate Natural Influence (PNI) was about 0.4.
- Mike Tonseth gave update of the PBT pilot study. Tissue samples for genetic analysis were collected from 196 spring Chinook at Priest Rapids Dam; these fish were also PIT-tagged for identification at Tumwater Dam. To date, approximately 94 percent of the tagged fish were detected at Rock Island Dam, 64 percent were detected at Rocky Reach Dam, and 54 percent at Wells Dams. There have not yet been any detections at Tumwater Dam as of last Wednesday (June 16).
- Mike Tonseth briefed the Hatchery Committees on preliminary results of steelhead spawning studies over the last 3 years, using PIT-tags, Floy tags, and more intensive spawning ground surveys. The Floy tag study is being conducted to get an idea of steelhead distribution on the upper Columbia spawning grounds. Redd distribution

maps revealed that hatchery fish are spawning in the same areas where wild fish are spawning.

- Mike Tonseth reported that WDFW released the Turtle Rock subyearlings being held in net pens at Chelan Falls earlier than planned. The subyearlings were released June 7 after a loss of about 8,000 fish per day. The fish mortality occurred when the second turbine at the Chelan Falls powerhouse came on and fish in the pens were impinged on the nets. This is the only year subyearlings have and will be held in net pens at Chelan Falls.
- Last on the schedule, Allyson Purcell of NMFS presented an overview of the Mitchell Act Hatchery Program Environmental Impact Statement (EIS). Five alternatives have been defined in the EIS, including a No Action alternative. The Draft EIS shows that some of the alternatives would reduce production and, as a result, would have various social impacts. The Draft EIS will be released at the end of July 2010. Purcell said an alternative that combined parts of the five alternatives would likely end up being the preferred alternative.
- The Hatchery Committees are working on a protocol for Committee member involvement in reviewing research proposals. They are also developing a conflict-of-interest policy. A draft policy has been circulated and is out for comments. The Hatchery Committees will work toward approving the conflict-of-interest policy over the next several meetings.

V. HCP Administration (Mike Schiewe)

A. Next Meetings

The next scheduled Coordinating Committees meetings will be on July 27, August 24, and September 28, all in SeaTac.

List of Attachments

Attachment A – List of Attendees

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor QEA, LLC
Carmen Andonaegui	Anchor QEA, LLC
Steve Hemstrom *	Chelan PUD
Lance Keller *	Chelan PUD
Tom Kahler *	Douglas PUD
Beau Patterson	Douglas PUD
Shane Bickford *	Douglas PUD
Bryan Nordlund *	NMFS
Jim Craig *	USFWS
Teresa Scott *	WDFW

* Denotes Coordinating Committees member or alternate

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DRAFT MEMORANDUM

To:	Wells, Rocky Reach, and Rock Island HCP Coordinating Committees	**Date:**	August 24, 2010
From:	Michael Schiewe, Chair, HCP Coordinating Committees		
Cc:	Ali Wick		
Re:	Minutes of July 27, 2010 HCP Coordinating Committees Meeting		

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Coordinating Committees met on Tuesday, July 27, 2010, from 9:30 am to 11:30 am by conference call. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Chelan PUD will develop and implement preventative maintenance procedures to ensure that all picket barriers are functioning as planned. Steve Hemstrom will provide a copy of the preventative maintenance procedure to the Coordinating Committees when finalized (Item II-A).
- Jerry Marco will inform Coordinating Committees members of the proposed date for a site visit to Zosel Dam (Item III-B).
- Teresa Scott will notify the appropriate Washington Department of Fish and Wildlife (WDFW) staff person to contact Jerry Marco regarding participating in a site visit to Zosel Dam (Item III-B).

DECISION SUMMARY

- There were no decision items at this meeting.

I. Welcome

The Coordinating Committees will delay approval of the June 22, 2010 meeting minutes to allow extra time for review. Comments are due August 4. A decision to approve the June 22, 2010 meeting minutes will be solicited by email in one week. Ali Wick will redistribute the revised June 22, 2010 meeting minutes to the Committees for approval.

II. Chelan PUD

A. Rock Island Right Bank Fishway Outage, Fish Rescue, and Sockeye Passage (Steve Hemstrom)

Steve Hemstrom reported that an email notice was sent July 9 to the Coordinating Committees that the right bank fish ladder was shut down on July 7 for approximately 34 hours after dam operators reported that several adult sockeye were behind the picket barrier. Chelan PUD dewatered the area behind the picket barrier to allow for salvage of sockeye. At the time of the scheduled outage, most sockeye were using the right bank ladder. During the outage, a single picket was found to be missing, leaving a 4- to 4.5-inch space through which sockeye could pass. Using heavy equipment and 30 to 40 staff members, 743 sockeye were captured from the auxiliary water space (AWS) and released into the forebay. A total of 41 dead sockeye were found in the AWS. Given the advanced stage of decomposition, it appeared that the fish may have been in the space for several days. During the outage, 16 adult summer Chinook, 3 juvenile steelhead, 1 summer Chinook jack, and 2 lamprey were salvaged from the main ladder. The problem of fish getting into the AWS was not likely noticed until enough fish had moved past the picket barrier and become trapped in the AWS. Chelan PUD checked all the picket barriers and re-welded the broken one into place. Chelan PUD will develop and implement preventative maintenance procedures in the future to ensure that all picket barriers are functioning as planned. The preventative maintenance procedure will be provided to the Committees when finalized.

Hemstrom reported that on July 7, when the right ladder was down, sockeye passage at the left fishway increased, suggesting fish moved to the left ladder with the right ladder shut off. Teresa Scott asked if there was a delay in passage for some adult sockeye even though some number of fish shifted to passing at the left bank ladder. Hemstrom said some delay was likely; however, he did not know how many were delayed. He reported that 20,538 sockeye passed Rock Island Dam on July 6. On July 7, 22,917 fish passed the dam with the right bank ladder out; however, the outage occurred during a time when sockeye passage numbers were increasing.

B. Rocky Reach Unit Outages to Inspect Rotor Wedge Carriers (Steve Hemstrom)

Steve Hemstrom reported that at the last Coordinating Committees meeting, he informed members about problems with cracks in rotor wedge carriers, and more recently (July 9), he provided an email follow up. Each unit has to be taken down to check the rotor wedge carrier for cracks. Units C1 and C2 are the bypass units operating at Rocky Reach Dam. Unit C2 was taken down from 0600 hrs on July 11 to 0600 hours on July 12 and checked. Some cracks were found in the welds that were not believed to extend into the rotor wedge carrier itself. Unit C1 will be taken out of service and checked August 1 through 3. Hemstrom summarized that so far, no cracks have been found in the wedge carriers themselves, only in the welds. Mike Schiewe asked if cracks in welds represent any risk. Hemstrom said they did not, and that the units were brought back on-line. Hemstrom said that next year more work related to evaluating the effect of stress on the units may have to be done with units being taken out of service for up to 13 weeks at a time. If this additional work is required, Chelan PUD will plan for scheduling downtime outside of the fish passage season.

C. Half-Duplex PIT-tag Detection Systems at Rocky Reach and Rock Island Dams (Steve Hemstrom)

Steve Hemstrom reported that installation of the half-duplex Passive Integrated Transponder tag (PIT-tag) detection systems at Rocky Reach and Rock Island dams was completed about 3 weeks ago.

D. Pikeminnow Predation Control Update (Lance Keller)

Lance Keller reported that a total of 58,500 pikeminnow have been removed this year. The removal using longline fishing by Tyson has ended for the year. Tyson removed 31,620 fish out of the Rocky Reach and Rock Island reservoirs. Tyson reported that the average length of pikeminnow captured this year was 10 mm shorter than the average length of fish removed last year. U.S. Department of Agriculture (USDA) fishing will continue through this week in both reservoirs. To date, USDA has removed 21,807 pikeminnow. A total of 5,027 fish were removed during the Rotary Club Derby this year. The longline fishing, the USDA fishing, and the Rotary Club Derby are the three big pikeminnow removal efforts funded by Chelan PUD. Removal of pikeminnow from the fishway ladders is a smaller effort usually conducted annually. This year, ladder trapping was halted to avoid any interference with the large sockeye run.

III. Douglas PUD

A. Update on Installation of the DIDSON Camera Units (Tom Kahler)

Tom Kahler reported that on July 20, attraction flows were shut off and ladder flows reduced from 6:00 am to 12:00 pm and from 12:30 pm to 4:30 pm, respectively, in the east and west fish ladders, in order to install Dual-frequency Identification Sonar (DIDSON) camera units for lamprey research.

B. Fish Counters Update (Tom Kahler)

Tom Kahler reported that the large sockeye return has delayed the fish count at Wells Dam. Passage is recorded digitally, and then the digital copies are reviewed and the fish are counted in work shifts. Currently, counters are 1 week behind, but fish passage numbers are dropping and Kahler predicted the counters would be caught up by the end of July. Steve Hemstrom added that on July 5, the peak count was 22,000 sockeye passing Rocky Reach in one 24-hour period, and that counts at Rocky Reach appear to be starting to decline.

Jerry Marco added that the thermal barrier that often forms at the mouth of the Okanogan River at this time of year is now in place, and that upstream sockeye migration is no longer occurring. Mike Schiewe asked at what temperature the thermal barrier occurs. Marco reported that it occurs at 21 to 22 degrees C; presently, the temperature is 23.5 degrees C. Marco said it set up earlier in July and then it broke, allowing sockeye to move upstream into the Okanogan River before the barrier re-established itself at the mouth. Marco explained that fish can potentially become trapped in the Okanogan River by thermal conditions when this occurs. The thermal barrier at the mouth can break as early as mid-August if a cooling trend occurs.

Marco also reported that the Colville Confederated Tribes (CCT) are concerned about fish passage at Zosel Dam. Marco indicated that he is arranging a site visit for National Marine Fisheries Service (NMFS) engineering staff to view the situation, and said that Coordinating Committees' members are welcome to attend. Marco said the intent of the visit is to see if anything can be done with operations, given the current dam configuration, to improve fish passage. There is also a concern with passage capacity. When a large number of fish try to pass the small facility, they are delayed. Hemstrom and Teresa Scott expressed interest in the site visit. Marco promised to keep them posted on the possible site visit date. Kahler explained that Zosel Dam is located at the outlet of Osoyoos Lake and that the Okanogan/Tonasket Irrigation District manages the facility. Scott noted that the Washington State Department of Ecology (Ecology) has regulatory responsibility for operations of Zosel Dam, and they should be made aware of the tribes' concerns. Scott suggested that it would useful for WDFW staff to participate in the site visit. Marco asked Scott to have the appropriate WDFW person contact him regarding the site visit.

Scott asked how many fish were stacking up at thermal barrier at the mouth of the Okanogan River. Based on dam counts and harvest estimates, Marco estimated that about 30,000 to 50,000 sockeye had stacked up since the thermal barrier set up. He further noted that video counts at Zosel Dam show about 100,000 fish passing to date. Scott asked about an estimate of sockeye losses as a result of the delay at the Okanogan River mouth thermal barrier. Kahler said he is not aware that anyone has tried to calculate losses associated with the delay but that temperatures in the reservoir do not exceed 19 degrees C. Kahler and Scott discussed how many entities are involved in managing operations at Zosel Dam. Kahler said it is a bilateral boundary issue and that Bob Steele and Dennis Beich, WDFW, have attended the Okanogan Bilateral Technical Working Group meetings in the past. Scott said she did not think WDFW has any decision-making authority regarding Zosel Dam operations.

C. Update on Wells Yearling Chinook Survival Study Fish (Tom Kahler)

Tom Kahler reported that detections of the Wells yearling survival study fish are being documented, with recent detections mostly downstream of McNary Dam. Detections are also already coming in for mini jacks. Mike Schiewe asked about the schedule for completing the study. Kahler responded that he is still looking at the PIT Tag Information System (PTAGIS) site weekly to monitor detections. As detections decline, data analysis will begin; Douglas PUD wants to include as many outmigrants as possible. The PUD plans to continue to monitor detections for another couple of weeks, revisiting the numbers the first week in August to decide when to stop monitoring. Kahler reported as an example that, so far in the month of July, 16 fish that had been released at the Wells Dam tailrace were detected at downstream juvenile detection sites; they want to give these fish more time to migrate.

IV. Hatchery and Tributary Committee Update (Mike Schiewe)

Mike Schiewe updated the Coordinating Committees that the Tributary Committees met on July 8 and discussed the following items:

- A small project from Cascadia Conservation District was conditionally approved for $48,000. The project proposes to retire a surface water withdrawal and replace it with a well withdrawal. The approval is contingent on the sponsor decommissioning the irrigation ditch and the irrigation intake. The project will be funded by the Rocky Reach Plan Species Account.

- The Tributary Committees are working through the general salmon habitat project applications. Originally, 19 pre-applications were received and then two were withdrawn. Of the remaining 17 pre-applications, some were determined to be unlikely to receive funding. Of those remaining 11 pre-applications, three were determined to be fundable if revised. For final review, full proposals were requested for six applications. The next step is for the Tributary Committees to review the full proposals in August and to decide which are fundable and whether they wanted to invite any of the project sponsors to the September meeting to give presentations on and answer questions about the full proposals. Kahler reported that the Tributary Committees are seeing higher quality proposals each successive year of the program.

Mike Schiewe updated the Coordinating Committees on the following actions and discussions that occurred at the most recent Hatchery Committees meeting on July 21:

- WDFW presented a request to collect four additional summer Chinook adults as broodstock for an egg-to-fry survival study by WDFW and NMFS. The request was approved.
- A proposal by WDFW to manage adult steelhead escapement over Tumwater Dam, consistent with the current Permit 1395 and consistent with the draft Hatchery Genetic Management Plan (HGMP) was ultimately approved by the Hatchery Committees with the requirement to have in place a plan for dealing with surplus adult steelhead prior to implementation. The Yakama Nation (YN) also asked that the draft HGMP currently under review by NMFS be modified to allow evaluation of alternative steelhead escapement goals above Tumwater Dam. The Hatchery Committees agreed to this change.
- The Hatchery Committees agreed to close the outlet to Blackbird Pond, consistent with the NMFS authorization to allow a kid's fishery on the remaining fish in the pond.
- Bill Gale, U.S. Fish and Wildlife Service (USFWS), updated the Hatchery Committees on the effort among USFWS, WDFW, and the tribes in the *U.S. v Oregon* forum to agree on the number of fish to release in the Methow subbasin and release locations. This discussion is related to the Winthrop and Wells HGMPs. WDFW and the tribes

expect to reach agreement by September or October 2010. Fish production and release numbers will then be brought to the Hatchery Committees for consideration in the Wells HGMP.

- The YN briefed the Hatchery Committees on the expanded acclimation project in the Methow and Wenatchee subbasins. Acclimation sites will be expanded in both subbasins in 2010/2011.
- The CCT reported that the collection of summer Chinook broodstock at the mouth of the Okanogan River using purse seines was going well. They anticipate reaching their broodstock collection goal of 157 adults.
- Chelan PUD presented preliminary juvenile salmonid survival estimates from several hatchery rearing studies. Survival to McNary of fish reared at different densities and in different rearing environments was compared. Hatchery Chinook reared in circular ponds survived at slightly higher rates than hatchery fish reared in raceways. Steelhead reared in circular tanks with a volitional release had a very high survival rate to McNary of 70 percent.
- The Hatchery Committees approved an adjustment of size-at-release targets for Chelan PUD summer/fall Chinook over-winter acclimated at Dryden Hatchery to match up with Grant PUD summer/fall Chinook to be acclimated at Dryden Hatchery.
- Chelan PUD reiterated their request for support letters from agencies and tribes represented by the Hatchery Committees for their application for Chiwawa River water rights for operation of the Chiwawa Facility. Chelan PUD said they may need to apply for additional water rights at the Dryden Facility if an increase in acclimation is desired. No decisions were made.
- The Hatchery Evaluation Technical Team (HETT) is making progress with their work on Non-Target Taxa of Concern (NTTOC) and on the effort to identify reference or control streams. Completion is anticipated by spring or early summer of 2011. If no further assignments are made, the HETT would then disband.
- The Hatchery Committees discussed a conflict-of-interest policy regarding how to involve Committees members on research proposals presented to the Hatchery Committees. The draft conflict-of-interest policy follows the Tributary Committees format. The Hatchery Committees are still considering the policy.
- The presentation by the Okanagan Nation Alliance (ONA) and Kim Hyatt on the results of the Okanagan water management program and the Okanagan sockeye

program will be held in Wenatchee on the morning of August 19 at a combined Hatchery Committees and Grant PUD Hatchery Subcommittee meeting. The location is to be determined.

Teresa Scott asked if there were any Federal Energy Regulatory Commission (FERC) requirements regarding a change in the size-at-release target for summer Chinook at the Dryden Facility, which the Hatchery Committees approved. Tom Kahler said that FERC defers to the HCP, which defines obligations for fish production to benefit the plan species. Schiewe agreed that under the adaptive management policy, HCP Committees are given latitude and any changes are memorialized in the annual HCP report to FERC. Kahler cited Section 8.6 of the Wells HCP, which describes the process of program modifications.

Scott also noted that WDFW has been caught in the middle on water-rights issues in the past, and that WDFW has an internal procedure for handling these. She stated that Coordinating Committees members should be aware of WDFW's advisory role with Ecology. Schiewe stated that all Coordinating Committees members have overlapping commitments and need to coordinate positions internally.

V. HCP Administration (Mike Schiewe)

A. Next Meetings

The next scheduled Coordinating Committees meeting will be on August 24. A decision will be made as to whether the August 24 meeting will be by conference call or face-to-face. The next meetings after this will be on September 28 and October 26, and will be held in SeaTac.

List of Attachments

Attachment A – List of Attendees

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor QEA, LLC
Carmen Andonaegui	Anchor QEA, LLC
Steve Hemstrom *	Chelan PUD
Lance Keller *	Chelan PUD
Tom Kahler *	Douglas PUD
Jim Craig*	USFWS
Jerry Marco*	CCT
Bob Rose*	Yakama Nation
Teresa Scott *	WDFW

* Denotes Coordinating Committees member or alternate

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FINAL MEMORANDUM

To:	Wells, Rocky Reach, and Rock Island HCP Coordinating Committees	**Date:**	October 1, 2010
From:	Michael Schiewe, Chair, HCP Coordinating Committees		
Cc:	Carmen Andonaegui		
Re:	Final Minutes of August 24, 2010 HCP Coordinating Committees Meeting		

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Coordinating Committees met on Tuesday, August 24, 2010, from 9:30 am to 12:30 pm in SeaTac. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Steve Hemstrom will send the Data Access in Real Time (DART) Real Time program login and password to the Coordinating Committees members (Item II-A).
- Steve Hemstrom will send Carmen Andonaegui the report on adult lamprey passage prepared for Chelan PUD (Anderson et al., June 2010) for distribution to the Coordinating Committees (Item II-D).
- Steve Hemstrom will ask the Rocky Reach Fishery Forum for the period of time for which they are requesting closure of the orifice gates to facilitate adult lamprey passage, and whether any monitoring is planned. He will report to the Coordinating Committees prior to the next Committees' meeting (Item II-D).
- Steve Hemstrom will provide the LGL Chinook radio telemetry study reports (1998 and 1999) to Carmen Andonaegui for distribution to the Coordinating Committees (Item II-D).
- Steve Hemstrom will provide Bryan Nordlund the dimensions and operating elevation for the adult fishway (Item II-D).
- Carmen Andonaegui will email the FTP site access instructions to the Coordinating Committees (Item VI-B).
- Andrew Grassell will provide his email address to Carmen Andonaegui for distribution to the Coordinating Committees (Item II-E).

- Tom Kahler will develop a draft contingency plan for emergency shut-off of a Wells Dam bypass spillway for the Coordinating Committees' review prior to next year's juvenile fish passage season. Kahler will initially provide the Committees with a timeline for contingency plan development, distribution, and review (Item III-C).

DECISION SUMMARY

- There were no decision items at this meeting.

I. Welcome

The Coordinating Committees approved the July 27, 2010 meeting minutes, as revised. Carmen Andonaegui will finalize the minutes and distribute them to the Committees.

II. Chelan PUD

A. Update on Summer Spill and Subyearling Run-timing (Steve Hemstrom)

Steve Hemstrom reported that spill at Rock Island Dam was stopped August 20 at midnight with an estimated 99.8 percent of the subyearling run completed. To exceed 5 percent of the subyearling run, an increase of 1,136 in the index count would be required.

Spill at Rocky Reach Dam was shut off on August 20 at midnight with an estimated 98.3 percent of the subyearling run completed, and 3 consecutive days of subyearling counts less-than or equal to 0.03 percent of the total annual subyearling run. To exceed 5 percent of the subyearling run, an increase in the index count of 3,017 would be required. The index count for subyearlings was 60,333, the largest count of subyearlings since the RR bypass has operated.

Hemstrom explained that Chelan PUD uses the Real Time modeling program to estimate when 95 percent of the juvenile fish run has been completed. He will email the Real Time program login information to Coordinating Committees members. Hemstrom briefly explained how to use the Real Time modeling program to predict percent of a fish run completed. He is available for further explanation.

Teresa Scott asked why Chelan PUD uses the DART website and not the Fish Passage Center (FPC) website to post fish passage numbers. Hemstrom replied that only designated smolt monitoring stations report smolt passage data on the FPC website, and that while Rock Island is a designated FPC smolt monitoring site, Rocky Reach is not. Hemstrom said Dr. John Skalski, University of Washington Columbia Basin Research (CBR), developed the Real Time model. Tom Kahler indicated that Douglas PUD also uses CBR to manage their Wells adult-passage and tributary smolt-trapping data on the DART site.

B. Ancillary Survival Study Analyses: Tag Lot Effects; Tagger Effects (Steve Hemstrom)

Steve Hemstrom reported that Dr. John Skalski has completed preliminary analyses of survival study data to determine if there was evidence of a tag lot effect (12 individually manufactured tag lots were used). No tag lot effects were identified. Skalski also examined preliminary data to determine if there was evidence of a tagger effect. Three fish taggers were used during the survival study, and no tagger effect was identified. Hemstrom said that Skalski has completed the preliminary survival analysis for Chinook and steelhead under 10 percent spill conditions at Rock Island Dam. The preliminary survival estimate for yearling Chinook was about 94 percent (both the Wenatchee and Rocky Reach tailrace release groups, individually and combined). Juvenile steelhead survival was about 97percent. This was the second year of the steelhead and the third year of the Chinook survival study under 10 percent spill. The survival results this year were achieved with flows during the study period below the valid flow criteria identified in the HCP; however, the survival was still greater than the required 93 percent project survival required in the HCP. Results of route-specific survival estimates for all possible juvenile downstream dam passage routes (juvenile bypass, top spill, gatewells, and turbine units) are pending.

Responding to a question, Hemstrom explained that at Rocky Reach Dam, juvenile fish behavior in the forebay is documented using acoustic tags and a three-dimensional detection array; the information collected includes dam approach (river left or river right), depth of approach, and passage route. He also indicated that the Beebe Bridge array upstream of Rocky Reach Dam allows detections of numbers of fish passing that site, and that these detections are then compared to numbers of fish moving past the detection array at the boat restriction zone (BRZ) in the forebay of Rocky Reach Dam. The results are used to partition out reservoir mortality, which is assumed to be the result of predation. Hemstrom said that the draft 2010 juvenile survival reports would likely be available for Coordinating Committees' review by the end of September 2010.

C. Summary of Detections at the Rocky Reach Surface Collector PIT-tag Detector (Steve Hemstrom)

Steve Hemstrom reported that preliminary analyses of Rocky Reach Dam tailrace detection data for acoustic-tagged yearling Chinook indicated that travel times from Wells Dam to Rocky Reach Dam were slow. He noted that Douglas PUD was releasing Passive Integrated Transponder tagged (PIT-tagged) yearling Chinook during the same period as Chelan PUD was conducting their yearling Chinook acoustic tag study. Chelan PUD looked at the travel times of Douglas PUD's PIT-tagged yearling fish between Wells Dam and Rocky Reach Dam. A total of 24 percent of the PIT-tagged yearlings released at Wells Dam took more than 20 days to reach Rocky Reach Dam; the average maximum battery life for acoustic tags is 20 days. Hemstrom raised the concern that, with a maximum 20-day acoustic tag life, the use of acoustic tags for yearling survival studies could be problematic if yearling fish travel time is greater than 20 days. Acoustic-tagged yearlings that pass Rocky Reach Dam more than 20 days after release would be counted as mortalities if the acoustic tag battery life has been exceeded. Tom Kahler added that some Douglas PUD PIT-tagged juveniles released in April did not show up at Rocky Reach Dam until June.

Bryan Nordlund asked if early-released yearling travel times were slower than travel times for yearlings released later in the migration season. Hemstrom responded that Chelan PUD had not analyzed travel times as they relate to early versus late releases, but that they can look at this. Mike Schiewe asked what the flows were like during the study period. Hemstrom responded that flows varied considerably and that they would evaluate the flow regime during the study period as it relates to juvenile travel times.

Lance Keller said the total number of yearlings detected by the juvenile bypass PIT tag detector since start-up on April 1 was 80,661. The bypass operated a total of 145 days. The total detections will be expanded for an estimate of the total number of yearling Chinook to pass through the Rocky Reach bypass system in 2010.

D. Rocky Reach Fish Forum Recommendations for Modifications to Rocky Reach Adult Fishway: Lamprey Passage (Steve Hemstrom)

Steve Hemstrom reported that the Rocky Reach Fish Forum (Forum) recommended closing selected orifice gates a Rocky Reach Dam to facilitate adult lamprey passage. Lamprey appear to be entering the fishway properly but some are then exiting back through the orifice gates to the tailrace. There are three fishway entrances (the spillway, right bank ladder, and left bank ladder entrances); orifice gates 1, 2, and 3 are located on the right bank fishway. The Forum has asked for Coordinating Committees feedback on whether closing selected sets of orifice gates will be problematic for anadromous fish passage.

Hemstrom described a report on adult Pacific lamprey upstream passage prepared for Chelan PUD by Long View Associates (Anderson et al., June 2010), which has a diagram showing the location of the orifice gates relative to the fishway entrances. Hemstrom will send Carmen Andonaegui the report for distribution to the Coordinating Committee. The gates that the Forum is asking to be closed are the three gates that are the farthest downstream, nearest the right bank entrance to the ladder. Bryan Nordlund asked if the flow that would have passed through the closed orifice gates could be transferred to the fishway entrance to help meet the 1.1 head differential. Hemstrom indicated that he would get back to Nordlund with the requested information.

Hemstrom explained that the Forum's second recommendation was to install ramps in the upper portion of the fish ladder at the perched orifices. Hemstrom said installation of ramps would require concrete pours and the work would be done during annual fishway closure for maintenance. Teresa Scott asked if the lamprey ramps at Rocky Reach would be similar to the lamprey ramps installed recently at Bonneville Dam, which are stainless steel. Nordlund said the Rocky Reach ramps would be "mini-ramps" that modify the existing fishway at Rocky Reach, rather than the separate, stainless steel lamprey ramps constructed within the fishway at Bonneville Dam. Mike Schiewe asked about the timing for closing the orifice gates. Hemstrom responded that the orifice gate closures would likely occur prior to the 2011 adult lamprey passage season, which runs from July through September.

Responding to a question, Hemstrom indicated he did not know whether the Forum was requesting closure of the orifice gates for a set number of years or permanently; he will ask Jeff Osborne for clarification. Nordlund said he would like time to look at the hydraulics in the fishway and asked if the orifice gates had been monitored during past Chinook telemetry studies. Hemstrom responded that they had. Scott asked how potential negative effects of the ramps on anadromous salmon would be addressed. Mike Schiewe explained that there is an adaptive management component within the HCP, and that the Coordinating Committees would work to find a solution. Hemstrom agreed to ask the Forum about their plans to monitor potential effects of the fishway lamprey ramps on lamprey and anadromous fish passage.

In summary, Hemstrom agreed to obtain additional information from the Forum about the expected duration of the closure of the orifice gates and whether monitoring is planned. The Committees agreed to additional time for Nordlund to review fishway hydraulics before any decisions are made. Hemstrom will report back to the Committees and will request a decision on the Forum's request at the next Committees meeting. Hemstrom will provide Nordlund with the dimensions and operating elevation for the fishway so he can calculate discharge. Tom Kahler mentioned that LGL had monitored the orifices during prior radio telemetry studies of steelhead. Hemstrom will provide the LGL radio telemetry study reports (2001 and 2003) to Andonaegui for distribution to the Committees.

E. Discussion of the Rocky Reach Pool Raise Feasibility Study (Steve Hemstrom)

Steve Hemstrom reported that Chelan PUD is evaluating a 3-foot pool raise at Rocky Reach at the request of the Washington State Department of Ecology (Ecology). Andrew Grassell called into the meeting to participate in this discussion item. Grassell is Chelan PUD's lead for Chelan PUD water storage evaluations. Chelan PUD is also investigating a pumped storage option. The water storage evaluations are being investigated in accordance with Washington State's 2006 legislation requiring Ecology to investigate new water supplies from the Columbia River for both in-stream and out-of-stream benefits. In November 2009, Chelan PUD signed an agreement to work with Ecology to investigate water storage options. Chelan PUD has completed internal scoping of the pool raise alternative. In November 2010, they will send an initial, informal, pre-consultation package to stakeholders. In March 2011, they will begin Phase I of a formal, three-stage consultation process—a 1-year consultation with stakeholders to complete issue identification and study plans identification. At the end of Phase I, Chelan PUD will make a "go/no go" decision prior to continuing to Phase II study implementation. Grassell said the schedule is subject to change. The pool raise proposal is to increase the pool operating elevation by 3 feet, with Ecology having the rights to use of the additional stored water from July through mid-September before pool elevations are drafted back to normal operating elevations. As flows allow, Chelan PUD would refill and operate the Project as per current operating conditions during the winter and early spring. Ecology staff is planning to schedule preliminary meetings on the proposed pool raise in November.

Bryan Nordlund said he is interested in understanding the effects of the proposal on, for example, operation of the surface collector at Rocky Reach, which is designed to operate at specific pool operating levels. Nordlund mentioned the potential effect of low flow operations on the surface collector, and was particularly interested in how a 3-foot pool raise and subsequent operations could affect passage annually. Tom Kahler asked how reservoir refill would be met following a July through September release of water. Grassell said there is no set proposal for filling other than looking to refill as quickly as possible after September. A reservoir refill plan would be part of more detailed information to be developed for an initial proposal package.

Grassell said Chelan PUD would engage all stakeholders who have an interest in the proposal to provide input during planning. Stakeholder groups would include, but not be limited to, the Hanford Reach fisheries technical work group, tribes, and agencies. The 3-foot pool raise equates to approximately 28,000 acre feet of stored water. Over a 30-day period at Rocky Reach, this would add an additional 1.4 kilo cubic feet per second (kcfs) throughout the day if released evenly across that period. Hemstrom said they are not sure how the Ecology water would be released, but said it is a small amount of water relative to Columbia River flows at Rocky Reach Dam. Teresa Scott informed the Coordinating Committees that she has worked on the Columbia River Basin Water Management Program since it was passed by the Legislature. She explained that one-third of "new," stored water is obligated for in-stream use and that Ecology is required to consult with agencies on how this in-stream water will be used. WDFW is already consulting with Ecology on the Lake Roosevelt incremental releases, a water supply project that resulted from the 2006 Columbia River Basin Water Management Project.

Grassell reported Chelan PUD is also conducting a pre-appraisal pumped storage study to investigate areas adjacent to the Columbia River and Lake Chelan to see if there are any likely sites to accommodate pumped storage. The investigation is funded by Ecology with HDR providing consulting services. Chelan PUD is looking at three elements: economic, social (the value of the release of water for downstream, out-of-stream uses during low flow periods), and natural resources benefits. If the initial investigation indicates there are any probable pumped storage sites, Chelan PUD will further investigate the alternative. Scott asked whether the Federal Energy Regulatory Commission (FERC) consultation process will be used if a likely site is found. Grassell replied that there are a lot of check-ins prior to any proposal being sent to FERC. He said the pumped storage proposal is much more in its infancy relative to the pool raise concept. The pool raise concept, if moved beyond Phase II, would be developed into a non-capacity FERC license amendment. A pumped storage concept would require a new license that is not associated with either Chelan PUD hydroelectric project. Grassell asked that Coordinating Committees members call him at (509) 661-4626 if they have any questions regarding the water storage concepts. Grassell will provide Carmen Andonaegui with his email address for distribution to the Committees.

III. Douglas PUD

A. Measurement of Fishway Entrance Velocities (Tom Kahler)

Tom Kahler said that in response to Bryan Nordlund's request for empirical fishway entrance velocities at Wells Dam, Douglas PUD will implement a proposal from Northwest Hydraulic Consultants. The proposal is to measure fishway entrance velocities using an Acoustic Doppler Velocimeter (ADV). Douglas PUD will construct a frame to drop into the fishway entrance. To support the frame, a frame guide will have to be installed in the entrance. Douglas PUD is proposing to do the construction in the fishway as soon as possible and they are asking for input from the Coordinating Committees for preferences on timing for conducting work in the fishway, as construction would require shutting down the fishway. To construct the frame guide during the start of the lamprey passage season would require a shutdown during the peak of the steelhead run. Construction could wait until the steelhead run tapers off and then 1 or 2 days of testing the entrance velocities at the 1-foot and 1.5-foot head differentials could be recorded. Migration timing of steelhead by mid-November is about 10 to 15 fish per day, including both ladders. Douglas PUD prefers to accomplish the work in early-to-mid-November, before the weather gets too bad. Bryan Nordlund asked if the frame could be inserted and removed once the guides are in. Nordlund would like velocity readings at different tailwater elevations at various times. Hemstrom said that in order to install the frame guide, the ladder would have to be closed down about half a day in mid-November. Installation timing is also subject to contractor availability. Nordlund asked that input on the frame guide's design be sought from lamprey experts. Nordlund said he will ask for input from Mary Moser of the National Marine Fisheries Service (NMFS). Kahler and Nordlund discussed various design concerns. Nordlund offered to speak with Douglas PUD's frame guide design team. Kahler will provide the design team with the comments of the Committees.

B. Update on the 2010 Yearling Migrant Survival Study – 10-year Validation (Tom Kahler)

Tom Kahler reported that Douglas PUD is analyzing survival study PIT-tag detection data, and is designating July 31as the cut-off date for the yearling migration. He explained that detection events at juvenile detection coils in August have been fewer than 10 for all three release groups combined. Kahler noted, however, that as August proceeds, the number of mini-jack detections have been increasing; that is, many of the yearlings released at Wells Dam are migrating downstream–many past Bonneville Dam, and even the estuary trawl—and then migrating back upstream through the adult fishways. He noted that mini-jacks are observed each year among the various, small PIT-tag release groups, but we did not anticipate as many as have been observed (i.e., hundreds) out of this relatively large release of PIT-tagged fish. Kahler indicated that, for the analysis of these data, mini-jacks that have not been detected previously passing downstream as juveniles will be rejected from these data. The proportions of returning mini-jacks are similar among release groups. The rejection of these detections will result in a conservative estimate of yearling survival, since many of the fish have been detected only at adult detection sites as mini-jacks. Kahler said he anticipates that a draft report will be available for review in September. Mike Schiewe suggested having Dr. John Skalski present the survival study results for both PUDs to the Coordinating Committees.

C. Update on Spillway Gate Malfunction at Wells Dam (Tom Kahler)

Tom Kahler said he sent out an email on August 20th to the Coordinating Committees regarding the emergency shutdown of spillway gate 8 at Wells Dam. The gate was shutdown on the afternoon of August 19th after a cable on spillway gate 8 broke while the gate was being lifted. The gate dropped and stuck in place so that water was still flowing through the bypass. However, there was concern of damage to the gate's guides or seals so turbine unit 8 was shut off in accordance with Section 4.3.1 of the Wells HCP. Kahler reported that turbine unit 7 was already down because it is being re-wound. Douglas PUD is working to pull the spillway gate out and get it back into the bypass operating position of a 1-foot elevation opening while the cable is repaired. They hope to have this action completed by Wednesday afternoon (August 25). This bypass shutdown and notification to the Coordinating Committees was implemented in accordance with the HCP procedures for such an event. Wells Dam is now operating eight turbine units. Kahler requested that the Coordinating Committees discuss potential alternative operations that could be implemented in this case or such events in the future. In this case, one possible alternative would be to operate spillbay 9, which has no bypass baffles, with spillway gate 9 at a 3-foot opening to get the same forebay flow approach net as would be produced by normal bypass operation of spillbay 8 (bypass baffles in place and spillway gate 8 at a 1-foot opening). Kahler reported that given that juvenile bypass operations are scheduled to end at midnight, August 26th, the repaired spillway gate will only be operating for about one day before spill shut-off. Bryan Nordlund said he thinks a contingency plan would be a good idea in case a similar event occurs in the future. Jim Craig concurred. Teresa Scott said she was fine with the actions taken by Douglas PUD. Kahler agreed to draft a contingency plan for gate operation in the event of failures in the future, for Coordinating Committees' review prior to next year's juvenile fish passage season.

IV. Colville Confederated Tribes

A. Update on Okanogan River Confluence Passage relative to Thermal Barrier (Jerry Marco)

Jerry Marco reported that he has not yet set a date for a tour of Zosel Dam and has held off for two reasons: after learning more about the conditions surrounding operations of Zosel, he does not think there are many options for flow management; and an adult PIT-tag study is being implemented this year by Columbia River Inter-Tribal Fish Commission (CRITFC), which will provide more information on adult passage upstream of Zosel Dam.

Under the current operating agreement, Marco explained that Zosel Dam operates April through October to maintain a lake elevation of between 911.0 and 911.5 feet at Lake Osoyoos. Zosel Dam has four spill gates and two fish ladders. The fish ladders as currently operated do not allow fish passage; however, as adults are observed stacking up at ladder entrances, the gates in each ladder can be opened to allow passage. The problem is maintaining lake elevations while providing fish passage. Marco reported that using video monitors, the maximum number of adult fish counted passing through both fish ladders in a 24-hour period was 34,700. He said that sockeye use the left bank ladder quite a bit more than do either steelhead or Chinook.

Regarding sockeye passage at the Okanogan River thermal barrier, Marco said some fish do move into the Okanogan River before the thermal barrier sets up. Once the thermal barrier breaks, sockeye again move quickly upstream, mostly all passing within a week. Marco said CRITFC is conducting a fish tagging study this year, funded by Bonneville Power Administration (BPA) under the Fish Accords Memorandum of Agreement (MOA). A total of 400 adults were PIT-tagged, 64 acoustically tagged, and 52 tagged with external temperature loggers between June 28 and July 26, targeting fish at Wells Dam. Although the acoustic-tag array at the base of Zosel Dam is not operating this year, there are a total of 28 acoustic-tag detectors upstream of Wells Dam in the Columbia River at the mouth of the Okanogan River and in the Okanogan River in the U.S. and Canada. There is also an acoustic-tag detection array at Chief Joe Dam, and four on the Similkameen River. The fish tagging study will provide information on adult movement upstream of Wells Dam in 2010, including upstream of Zosel Dam.

Marco said the thermal barrier is still in place at the mouth of Okanogan River. Yesterday, the Malott gage high temperature was 22.3 degrees C; the low was 20.2 degrees C. Temperatures are expected to decline in the next few days. A temperature of 21 degrees C impedes fish passage, with a few fish still moving into the Okanogan River. When temperatures exceed 24 degrees C, temperature becomes a complete barrier to passage. Temperatures at the mouth have exceeded 24 degrees C over the past few weeks. Marco said it may take 3 or 4 days of temperatures under 20 degrees C before sockeye will begin to move into the Okanogan River. Marco said some sockeye mortalities have been observed in the Similkameen but not many have been observed upstream of Zosel Dam.

Steve Hemstrom asked what the water temperature heat source was within the Okanogan River. Marco said there is not much difference between water temperature at the outlet of Lake Osoyoos and the river at Malott. This is a surface water effect of Lake Osoyoos, and probably also the chain of lakes upstream in the Okanogan River system. All the Okanogan River lakes are pre-existing, although they are larger now with dams and water management operations, but the sockeye are likely adapted to a higher temperature regime. Marco said to contact him if anyone is still interested in touring Zosel Dam. Bryan Nordlund said he will ask Aaron Beavers at NOAA if he still has plans to visit Zosel Dam. Teresa Scott said she will remind Ecology of the offer for a tour of Zosel Dam. She said Ecology has a staff person who is assigned to participate in management decisions regarding operations at Zosel Dam. She will remind him to call Marco if he is interested in a tour.

The Coordinating Committees discussed adult passage at Zosel Dam, noting that opening the fish ladders only when adults are observed milling at the entrances affects fish passage timing and counts. Marco said that when the gates in the ladder are opened enough to allow passage, fish move right through the gates. Scott asked if there was a water-related management action that would help adult passage, with an understanding of the constraints. She would like Coordinating Committees members to think about what might be possible. Marco suggested that Scott speak with the WDFW representative on the Zosel Dam advisory board. Lake landowners have a strong interest in lake level management and this operating agreement is up for renegotiation soon.

V. Hatchery and Tributary Committee Update (Mike Schiewe)

Mike Schiewe updated the Coordinating Committees that the Tributary Committees met on August 12 and discussed the following items:

- Continuation of Okanagan Nations Alliance (ONA) monitoring funded by the Wells Committee for monitoring adult holding and rearing habitat. This monitoring is part of a $200,000 HCP monitoring fund. The Wells Committee instructed Douglas PUD to continue the monitoring for year 3 of the 5 years contract, and to continue to re-evaluate funding on an annual basis.
- The Rocky Reach Tributary Committee approved funding of a $50,000 Small Project Program proposal by the Methow Salmon Recovery Foundation (MSRF) for a project to stockpile root wads to be made available for future habitat improvement projects.
- The Tributary Committees received ten final applications for funding under the General Salmon Habitat Program and asked for more information for three of the proposals. Most proposals are cost shares with the Salmon Recovery Funding Board (SRFB). The Tributary Committees will work with SRFB on funding decisions.
- Prior to allocation for approved 2010 projects, available funds in the HCP Plan Species Accounts were: Rock Island – $1.9 million, Rocky Reach – $1.4 million, and Wells – $725,000.
- A presentation by Upper Columbia Salmon Recovery Board (UCSRB) staff, generally describing their operations and available funds, which total about $22.5 million. Julie Morgan spoke about how the UCSRB could help the Tributary Committees and the Habitat Committees with their work, especially Grant PUD's Habitat Committee. James White, data coordinator, spoke about his interest in obtaining monitoring and evaluation data from the work funded by the Tributary Committees and requested they add coordination of monitoring as a requirement to contracts they fund. The Tributary Committees agreed to take the request under advisement.

- The next Tributary Committees meeting will be in October. Lee Carlson is now the Yakama Nation representative on the Tributary Committees.

Mike Schiewe updated the Coordinating Committees on the following actions and discussions that occurred at the most recent Hatchery Committees meeting on August 18. The Coordinating Committees joined the Priest Rapids Coordinating Committee (PRCC) on August 19 for Canada's Department of Fisheries and Oceans (DFO) water management model presentation by Kim Hyatt, and a presentation of the ONA Skaha Reintroduction Project:

- Discussed continued testing of the Skaha Reintroduction program. Chelan and Grant PUDs are considering funding construction of a hatchery to produce 5 million fry annually for stocking into Skaha Lake with an option to expand production to 8 million fry for stocking in Okanagan Lake. The Yakama Nation questioned whether the PUDs will still meet their mitigation obligations during implementation of the reintroduction program as they will not be meeting the production targets annually in the interim. There was an explanation of how previous decisions by the Hatchery Committees considered PUD mitigation obligations and how Okanagan Lake reintroduction plays into the equation.
- Approved Chelan PUD's 2011 Monitoring and Evaluation workplan.
- Greg Mackey reported his review of Floy tag effects on fish, specifically whether tag colors affect fish behavior. His only recommendation was to avoid use of red and rotate colors in case there is a tag-color bias.
- Yakama Nation presented their multispecies acclimation plan, a MOA Accord project. The plan is intended to provide better distribution of salmonid production in the Methow and Wenatchee subbasins, resulting in higher adult returns. Several concerns were raised. One was regarding acclimating fish in the Twisp River on top of Douglas PUD's reproductive success study. Another concern was sample sizes of PIT-tagged groups. The addition of PIT-tag detection capability at Rocky Reach means smaller numbers of PIT-tagged fish may be needed for the same level of precision, but that higher numbers may still be required for evaluation of adult returns.
- WDFW is working with NMFS to implement steelhead fisheries in the upper Columbia beginning in September.
- The discussion on the Conflict-of-Interest policy is taking time. There is a range of opinions on how to frame the issue and implement the policy. One issue raised was

whether to exclude those who may contribute to development of a Request for Proposals (RFP) from then bidding on that RFP. The Hatchery Committees are looking to implement the policy for one year, or some period of time, evaluate it, and put a policy into use eventually for the long term.

- Mike Schiewe will be giving a presentation to UCSRB on September 22 and 23 on the background and operation of the HCP Committees.

VI. HCP Administration (Mike Schiewe)

A. Next Meetings

The next scheduled Coordinating Committees' meetings will be on September 28, October 26, and November 23, all in SeaTac.

B. Change over

Mike Schiewe reported that because of Ali Wick's increasing involvement in activities associated with the Gulf oil spill, Carmen Andonaegui would be taking over coordination of Coordinating Committees' meeting arrangements, meeting minutes, and general communications. As a reminder, she will email the HCP FTP site access instructions to the Committees Please copy Andonaegui on all future Committees communications and remove Wick from the distribution.

List of Attachments

Attachment A – List of Attendees

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor QEA, LLC
Carmen Andonaegui	Anchor QEA, LLC
Steve Hemstrom *	Chelan PUD
Lance Keller *	Chelan PUD
Andrew Grassell (by phone)	Chelan PUD
Tom Kahler *	Douglas PUD
Jerry Marco* (by phone)	CCT
Jim Craig* (by phone)	USFWS
Bryan Nordlund* (by phone)	NOAA
Teresa Scott *	WDFW

* Denotes Coordinating Committees member or alternate

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FINAL MEMORANDUM

To:	Wells, Rocky Reach, and Rock Island HCP Coordinating Committees	**Date:**	October 27, 2010
From:	Michael Schiewe, Chair, HCP Coordinating Committees		
Cc:	Carmen Andonaegui		
Re:	Final Minutes of September 28, 2010 HCP Coordinating Committees Meeting		

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Coordinating Committees met on Tuesday, September 28, 2010, from 9:30 am to 12:15 pm in SeaTac. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Steve Hemstrom will invite John Skalski to the October 26 Coordinating Committees meeting to present the results of Rock Island survival study (Item IV-B).
- Steve Hemstrom will provide Carmen Andonaegui with the three radio telemetry study reports conducted at Rocky Reach on yearling Chinook survival for posting on the FTP site (Item IV-C).
- Steve Hemstrom will provide Jerry Marco with information on how long it took to overhaul the two fishway attraction pumps at Rocky Reach Dam (Item IV-D).
- Steve Hemstrom will verify requested fishway closure times for the overhaul of the third fishway attraction pump at Rocky Reach Dam, and verify whether the proposed closure dates are within the normal annual maintenance closure dates for fishway maintenance (Item IV-D).

DECISION SUMMARY

- There were no decision items at this meeting.

I. Welcome

The Coordinating Committees approved the August 24, 2010 meeting minutes, as revised. Carmen Andonaegui will finalize the minutes and distribute them to the Committees.

II. Hatchery and Tributary Committee Update (Mike Schiewe)

Mike Schiewe reported to the Coordinating Committees that the Tributary Committees did not meet in September, so there is no briefing. The next meeting of the Tributary Committee will be October 14.

Mike Schiewe updated the Coordinating Committees on the following actions and discussions that occurred at the most recent Hatchery Committees meeting on September 15:

- The Committees approved the annual request by Grant PUD under the PUDs' hatchery sharing agreement to utilize excess capacity at Douglas PUD hatcheries to raise spring Chinook at the Methow Hatchery and steelhead at the Wells Hatchery.
- The Hatchery Committees have been unable to reach agreement on the Wells Hatchery steelhead Hatchery Genetic Management Plan (HGMP). Both overall Methow Basin (includes Winthrop National Fish Hatchery [WNFH]) production numbers and release locations have not been resolved. The draft HGMP that was subject to a preliminary vote by the Wells Hatchery Committee in February 2010 contemplated a release of 250,000 steelhead smolts in the Methow River (combined Wells Hatchery and WNFH production). The Wells Hatchery production included 50,000 smolts for an integrated program in the Twisp River using locally adapted broodstock; a segregated program release of 100,000 smolts into the lower Methow River; and a segregated program release of 200,000 smolts into the mainstem Columbia River downstream of Wells Dam. The 250,000 smolt release proposed for the Methow subbasin is a reduction that is more in line with the Hatchery Scientific Review Group's (HSRG's) recommendation of 100,000 smolts than the current releases of approximately 420,000 smolts. At the time of the February Hatchery Committee's vote, the Yakama Nation (YN) did not support the 250,000 smolt release number. The Methow Subbasin steelhead smolt release level being considered under *U.S. v Oregon* is 350,000. In the *U.S. v Oregon* process, the National Marine Fisheries Service (NMFS) has objected to a 350,000 smolt release as too high, and not sustainable. A Production Advisory Committee (PAC) subgroup (under the *U.S v Oregon* process) composed of representatives of the U.S. Fish and Wildlife Service (USFWS), YN, and Washington Department of Fish and Wildlife (WDFW) is working to develop a Methow Subbasin release level that can be supported by the PAC parties. In the meantime, Douglas PUD has requested advice from NMFS on how to move the Wells steelhead HGMP forward, and NMFS has recommended that

Douglas PUD (as the Endangered Species Act [ESA] Action Agency) submit it for formal review. Douglas PUD is currently requesting edits to the current version of the Wells Hatchery steelhead HGMP with the intention of putting a revised HGMP before the Hatchery Committee at the November meeting for a vote. If the Hatchery Committee members are not able to reach agreement, Douglas PUD will make a determination as to whether to go into the HCPs' dispute resolution process. At the end of the dispute resolution process, if the dispute is not resolved, Douglas PUD can submit the HGMP to NOAA requesting a formal opinion. Comments on the Wells Hatchery Steelhead HGMP are due to Douglas PUD on October 8.

- Douglas PUD is working with the Colville Confederated Tribes (CCT) to support Chinook production at Chief Joseph Hatchery to meet Douglas PUD's No Net Impact (NNI) commitment for the Wells Project. Douglas PUD and CCT are close to an agreement.
- The year 2013 marks the date for making adjustments to the HCP hatchery programs consistent with empirical survival study estimates. Chelan PUD's negotiated Chinook and steelhead hatchery production that exceeds the NNI requirement will end in 2013; NNI levels will be recalculated, and all remaining hatchery programs will be adjusted accordingly. The Hatchery Committees will be discussing how to best use any vacated hatchery space.
- Chelan PUD is reviewing their passive integrated transponder tagging (PIT-tagging) efforts over the past 5 years. They are requesting Hatchery Committees members' input to identify study objectives for ongoing and future PIT-tagging efforts.
- The Hatchery Committees approved discontinuing the use of elastomer tags for marking steelhead. Hatchery Committees members will review fin clipping options for future adult management needs.
- The YN presented the 2010 expanded acclimation program results for the Wenatchee and Methow subbasins. The long-term goal is to develop multi-species acclimation pond sites. Growth and survival results for both single and multi-species acclimation sites were generally positive. For 2011, the YN proposed repeating steelhead and coho acclimation in Wenatchee subbasin as implemented in 2010, and also proposed an evaluation of Lincoln Pond in the Twisp River as a new acclimation site for steelhead. Douglas PUD expressed concern that a change in acclimation of hatchery steelhead in the Twisp could affect the ongoing steelhead reproductive success study.

The issue is still under discussion in the Hatchery Committees. A final decision is not needed until next year.

- CCT reported that they plan to transfer 200,000 yearling summer Chinook to Bonaparte Pond.
- WDFW reported on the disposition of excess adult steelhead removed at Tumwater Dam. Some were distributed to food banks and to tribes, with some being relocated to Blackbird Pond for harvest in the kid's fishery.
- The Hatchery Committees' Conflict of Interest policy is being finalized and will be presented to the Committees with a Statement of Agreement (SOA) for implementation.

III. NMFS

A. NMFS Organizational Changes (Bryan Nordlund)

Bryan Nordlund reported on the recent reorganization of NMFS' Northwest Regional Office. The Salmon Recovery Division has been eliminated, and the Salmon Hatchery Branch has been transferred to a new Salmon Management Division. Also, the Salmon Harvest Branch has been moved from the Sustainable Fisheries Division into the new Salmon Management Division as well. The remainder of the Salmon Recovery Division has been moved to the Protected Species Division. Bob Turner is the acting Assistance Regional Administrator (ARA) of the new Salmon Management Division. Donna Darm is the ARA of the Protected Species Division. Rob Walton, former ARA of the Salmon Recovery Division, has been reassigned to work with Donna Darm in the Protected Species Division. The organization of the Hydropower and Habitat Divisions has not changed.

IV. Chelan PUD

A. Rocky Reach and Rock Island Final 2010 Spill Operations Summary 2010 (Steve Hemstrom)

Steve Hemstrom provided a summary of the 2010 Rocky Reach and Rock Island fish spill program (Attachment B). At Rocky Reach Dam, summer spill ran from June 9 through August 31 and covered 98.4 percent of the subyearling Chinook run. The summer spill target was 9 percent of the flow. The percent spilled was 17.01. The 17.1 percent figure included spill past the dam to pass water from Grand Coulee Dam. Water was spilled for a total of 73 days. At Rock Island Dam, spring spill ran from April 17 through June 8 covering 99.85 percent of the run for steelhead, 98.56 percent for yearling Chinook, and 98.40 percent for sockeye, for a total spring percent spill of 10.01 percent. The spring spill target was 10 percent. Water was spilled for a total of 53 days. The summer spill target at Rock Island was 20 percent. Spill ran from June 9 through August 20 for a summer spill percentage of 19.99 percent. Percent of run with spill was 97.94 for a total of 73 days of spill. Cumulative index counts were provided.

B. Final Rock Island Survival Estimates from the 2010 Survival Study Draft Report (Steve Hemstrom)

Steve Hemstrom provided a summary of survival study results at Rock Island Dam, at both 10 and 20 percent spill for each Plan species. The 2010 results were based on preliminary analyses by John Skalski of Columbia Basin Research (Attachment C). Hemstrom explained that with the results of this year's study, yearling Chinook meet the criteria for Phase III (standards achieved), with an average 3-year survival estimate of 93.75 percent. A draft report should be ready for the Coordinating Committees by the October meeting. Hemstrom indicated he would like the Committees to consider approving this new Phase Designation at the October Coordinating Committees meeting. He indicated that approval on an expedited timeline would allow Chelan PUD to budget for potential study needs for the coming year.

Hemstrom also reported that with the completion of this year's study, the 2-year average survival estimate for steelhead under 10 percent spill at Rock Island Dam was 96.75 percent. Hemstrom said he will also ask the Coordinating Committees to approve moving steelhead into Phase III based on these estimates. Hemstrom noted that Section 5.3.3 of the Rock Island HCP (page 13, last sentence) states that if spill is reduced, the Coordinating Committees can decide whether 1 to 3 years of survival studies are to be conducted under the new spill operations. Flows in 2010 were the second lowest on record since 1995, yet steelhead passage survival at Rock Island was still high. The Committees discussed the concern that survival estimates could change between the draft calculations and the final calculations that might be presented in the final report. The Committees agreed that if John Skalski could present the study results at the October meeting, they would have a greater comfort level with making an expedited decision regarding phase designation. Hemstrom agreed to invite Skalski to the October Coordinating Committee meeting. Bryan Nordlund asked if there were differences in survival estimates between the Wenatchee and Rocky Reach tailrace releases. Hemstrom said there was about five tenths of a percent (0.005) difference, but that the difference was not significant. Hemstrom said he will make the SOAs for moving both spring Chinook and steelhead at Rock Island into Phase III conditional on the survival estimates in the final report being the same as in the draft report, and the final report being approved by the Committees. The draft report will also show there was no significant difference among the 12 tag lots or among taggers.

C. Follow-up: Closure of Orifice Gates in the Rocky Reach Fishway to Benefit Lamprey Passage (Steve Hemstrom)

Steve Hemstrom distributed copies of three radio telemetry study reports conducted at Rocky Reach on yearling Chinook. He will provide Carmen Andonaegui with a CD of the reports to post on the FTP site. Bryan Nordlund provided handouts of a fishway attraction flow analysis (Attachment D). The analysis examined flows from the orifice gates relative to entire powerhouse flows. There are six open orifice gates. About 20 percent of flow (about 175 cubic feet per second [cfs]) would be lost from the lower fishway with closure of three orifice gates. Responding to a question from Nordlund, Hemstrom agreed to check with Chelan PUD engineers to see if there is a way to transfer flows from the closed orifice gates to other gates. Hemstrom also will request that Chelan PUD engineers review Nordlund's analysis. He said that the gate closures would not be implemented until next year's lamprey passage season at the earliest. Hemstrom said that he has reviewed lamprey passage counts from the past 10 years for use in determining the highest passage period. Responding to a question regarding how the effects of the gate closures on lamprey passage would be evaluated, Hemstrom said that the Rocky Reach Fish Forum is still discussing options.

D. Request to Overhaul the Third Fishway Attraction Water Pump at Rocky Reach (Steve Hemstrom)

Steve Hemstrom reported that of the three large fishway attraction pumps at Rocky Reach Dam, the overhaul of one pump has been completed, additional work remains to be done on Pump B, and one pump still needs a full overhaul. The proposal is to begin the overhaul of the third pump during the 2010-2011 maintenance work window. This will require a complete shut-down of the fishway from December 31 to March 1 of 2010/2011. Jerry Marco requested information on the length of time it took to overhaul the other two other attraction pumps. Hemstrom agreed to report back to the Coordinating Committees with that information. Hemstrom explained that the time needed to complete an overhaul can vary depending on the condition of the pumps and the ability to obtain parts. Hemstrom will verify requested fishway closure times for the overhaul and whether the dates are within the normal annual maintenance closure dates for fishway maintenance. He will request updates on the status of pump overhauls for Committees members.

V. Douglas PUD

A. Preliminary Survival Verification Study Results (Shane Bickford)

Shane Bickford explained that the purpose of the 2010 survival verification study was to confirm that the Wells Project continues to maintain the high rates of survival measured during the Phase I survival studies (1998-2000). To familiarize Coordinating Committees members with methods used during PIT-tag survival studies, Bickford played a video highlighting survival study operations. The 2010 Survival Verification video is available for viewing on the Douglas PUD website on the HCP page at:
http://www.douglaspud.org/Environment/WellsHCPStatement.aspx

Bickford summarized that even during a low water year; the Wells Project continues to meet the HCP smolt survival standard. He noted that for the 2010 survival verification study, Douglas PUD added an Okanogan release site. Yearling summer/fall Chinook were selected by the Wells Coordinating Committee as the representative species for yearling Chinook and steelhead. Study fish were released at mouth of the Okanogan River; the mouth of the Methow River; and in the Wells Dam tailrace. The verification study had four phases. In the first phase, PIT-tag detection facilities were constructed at Rocky Reach Dam. This site proved to be essential to the study as the capture rates at the Corps lower River projects were less than half of what they were 10 years ago during the Phase I survival studies.. Results from the survival verification study indicate that Rocky Reach capture rates average 42% and ranged from 24% to 48%. The second phase of the study was PIT-tagging fish. The third phase of the study was release of the tagged fish, which involved matching up release protocols among release groups. The fourth phase was an assessment of study fish physiology.

Bickford reported that Douglas PUD had just received draft survival estimates from John Skalski, but that the draft report will not be finished until November. The Department of Fisheries and Oceans (DFO) is behind in processing the pathology and physiology samples and has said the analyses will be available by November 15. Steve Hemstrom asked Bickford about the purpose of pathology and physiology information. Bickford said having information on the physiology of the study fish can be helpful in understanding survival study results if there is an unexpected result.

Bickford noted that August 21 was used as the download date for PIT-tag detections for the purpose of estimating survival; after July 31, 99 percent of detections were mini-jacks detected moving upstream through adult fishway PIT-tag coils. No data from mini-jacks were used to estimate survival. Bickford said that study conditions in 2010 were not representative of historic study conditions: Okanogan River flows were the lowest ever recorded for April and May, and the second lowest flows since 1977 were recorded in April at Wells Dam. Travel times of study fish were 28 to 48 days from release to Rocky Reach, much longer than usual. Bickford provided a handout of survival estimates calculated using both the Cormack-Jolly-Seber method of estimating survival and modeled survival estimates. Cormack-Jolly-Seber estimated survival rates for the Wells Project were 97.8 percent; modeled survival estimates were 96.4 percent. Both are above the NNI standard of 93 percent. Bickford said Douglas PUD would likely propose using the modeled results as the more conservative estimate of smolt survival at the Wells Project. Ultimately Dr. Skalski would be asked to determine the most appropriate method to report survival for the 2010 study.

Because of the high survival estimates and high precision of the estimates presented, the Coordinating Committees discussed that additional studies were not likely to be required at this time. In the event that this changed before final approval, Mike Schiewe asked about the timing of PIT-tagging fish for any additional survival studies if required. Bickford said if the study does need to be repeated, fish will need to be PIT-tagged in February. Bickford said 100,000 study fish are available. If not needed for a survival study, he indicated they would not receive a coded-wire tag (CWT), and would be added to the population of production fish in November. Accordingly, he would request a formal decision by the Committees at the November meeting. It was discussed that if John Skalski attended the October meeting to review the Rock Island studies, then he could also review the Wells studies with the Committees. Bickford stated that he would be unable to attend the October meeting and the report would not be complete by then; thus, Douglas would invite Skalski to present the Wells study results at the November meeting.

B. Three-year review of Anchor QEA's HCP Chairing and Facilitation (Tom Kahler)

Tom Kahler reported that a 3-year review by the HCP Coordinating Committees of Anchor QEA's chairing of the Coordinating Committees and support has been completed. The Committees have unanimously agreed to ask Mike Schiewe and the Anchor QEA support team to continue in this capacity for the next 3 years.

C. Changes to Wells Fishway – Discussion from Last Meeting (Tom Kahler)

Tom Kahler reported that Douglas PUD is continuing to develop a plan for measuring adult fishway entrance velocities at Wells Dam. They anticipate the use of an Acoustic Doppler Velocimeter (ADV) to document flow during a November test. He noted that they no longer anticipate the need for installing steel channels or other infrastructure to receive the ADV carrier frame that would be fabricated to position the Velocimeter as described in the Northwest Hydraulic Consultants (NHC) proposal. Instead, the carrier frame would utilize the existing bulkhead slots outside the wing-gates at the fishway entrance, and no new structures would be necessary. The study design is to record velocities at a low-water tailrace elevation and at a higher-water tailrace elevation, and to extrapolate velocities at tailrace elevations in between. The rationale for measuring at two tailrace elevations and then extrapolating is that it is difficult to maintain a constant tailrace elevation during the three transects required to complete each measurement event, and adding more test elevations increases the likelihood that fluctuations in tailrace elevations will occur during the measurement events. Bryan Nordlund agreed with this approach. Shane Bickford said the NHC's study will provide the data needed to develop a computational velocity model of the fishway gallery and entrance. A physical and computational model for the fish ladder and collection gallery already exists but it does not have accurate pinpoint velocities for the entrance. The modeled velocities will be used to evaluate the effect of proposed fishway modification on lamprey and salmonid passage.

VI. USFWS

A. Bull Trout Critical Habitat Rule (Jim Craig)

Jim Craig reported that the final bull trout Critical Habitat rule will be released on September 30. He said the Designated Critical Habitat boundaries under the new rule are similar to what was proposed in 2002. The mainstem Columbia River up to Chief Joseph Dam is being designated, as are the reservoirs. Federal lands are included; tribal lands are excluded. The Chelan River upstream of the first falls is excluded. Some new areas have been designated in the new rule, including the lower Yakima River and Yakima River reservoirs. All lands previously excluded because of the Federal Columbia River Power System (FCRPS) Biological Opinion are back in.

VII. HCP Administration (Mike Schiewe)

A. Next Meetings

Mike Schiewe asked for discussion on changing the November and December meeting dates to accommodate conflicts during the upcoming holiday season. The next meetings (all at SeaTac) will be October 26, November 16, and December 14.

List of Attachments

Attachment A – List of Attendees
Attachment B – 2010 Rocky Reach and Rock Island Spill Program Summary
Attachment C – Summary of survival study estimates at Rock Island Dam
Attachment D – Fishway attraction flow analysis of orifice gates relative to entire powerhouse flows.

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor QEA, LLC
Carmen Andonaegui	Anchor QEA, LLC
Steve Hemstrom *	Chelan PUD
Lance Keller *	Chelan PUD
Shane Bickford *	Douglas PUD
Tom Kahler*	Douglas PUD
Jerry Marco*	CCT
Bob Rose*	YN
Jim Craig*	USFWS
Bryan Nordlund*	NOAA
Teresa Scott *	WDFW

* Denotes Coordinating Committees member or alternate

Final
2010 Rocky Reach and Rock Island Fish Spill Program Summary

ROCKY REACH

Summer Fish Spill at Rocky Reach

Target species:	Subyearling Chinook
Spill target percentage:	9% of daily average river flow
Spill start date:	June 9, 0001 hrs
Spill stop date:	August 20, 2400 hrs
Percent of run with spill:	**98.40%** (as of August 31)
Summer spill percentage:	**17.01%**
Cumulative index count:	59,751 subyearling Chins (final on Aug 31)
Total spill days:	73

ROCK ISLAND

Spring Fish Spill at Rock Island

Target species:	Yearling Chinook, steelhead, sockeye
Spill target percentage:	10% of daily average river flow
Spill start date:	April 17, 0001 hrs
Spill stop date:	June 8, 2400 hrs (immediate increase to 20%)
Percent of run with spill:	**Stlhd 99.85%; Yearling Chins 98.56; Sockeye 98.40%**
Spring spill percentage:	**10.01%** (April 17 through June 8)
Cumulative index count:	37,404 sockeye; 17,194 steelhead; 11,802 Yearling Chins
Total spill days:	53

Summer Fish Spill at Rock Island

Target species: `	Subyearling Chinook
Spill target percentage:	20% of daily average river flow
Spill start date:	June 9, 0001 hrs
Spill stop date:	August 20, 2400 hrs
Percent of run with spill:	**97.94%** (as of Aug 31)
Summer spill percentage**:**	**19.99%** (June 9 through August 20)
Cumulative index count:	23,205 subyearling Chins (final on Aug 31)
Total spill days:	73

Juvenile Index Counts 2003-2010 from Rocky Reach Juvenile Fish Bypass and Rock Island Bypass Trap.

Table 1. Rocky Reach Juvenile Index Counts, 2003-2010

Species	2003	2004	2005	2006	2007	2008	2009	**2010**
Sockeye	71,683	30,935	17,575	239,185	169,937	136,206	40,758	**724,394**
Steelhead	10,585	6,433	5,821	4,329	4,532	8,721	6,309	**4,931**
Yearling Chins	13,918	53,946	27,611	23,461	18,080	38,394	18,946	**33,840**
Subyearling Chins	172,392	20,062	10,978	19,996	13,496	11,820	11,944	**59,751**

Table 2. Rock Island Juvenile Index Counts,2003-2010

Species	2003	2004	2005	2006	2007	2008	2009	**2010**
Sockeye	10,312	7,114	1,991	34,604	16,410	38,965	4,926	**37,404**
Steelhead	15,507	10,735	15,974	26,930	18,482	22,780	17,636	**17,194**
Yearling Chins	15,355	12,574	14,797	37,267	23,714	22,562	9,225	**11,802**
Subyearling Chins	25,916	23,563	18,710	27,106	15,686	15,940	8,189	**23,205**

Table 4.1. Summary of yearling Chinook salmon, steelhead, and sockeye salmon smolt survival estimates at Rock Island. Survival estimates for individual studies, associated standard errors (in parentheses), and cross-year arithmetic averages are presented.

Species	Year	PIT-tag	Acoustic-tag
Yearling Chinook salmon	2002**	0.956 (0.025)	0.952 (0.026)
	2003**	0.934 (0.012)	0.939 (0.016)
	2004**	0.914 (0.023)	0.942 (0.012)
	2002–2004 Arith. Avg.:	**0.9347**	**0.9443**
	2007*		0.9725 (0.019)
	2008*		0.8972 (0.016)
	2010*		0.9428 (0.0081)
		2007-2010 Arith. Avg.:	**0.9375**
Steelhead	2004**		0.9658 (0.0114)
	2005**		0.9158 (0.0154)
	2006**		0.9396 (0.0132)
		2004-2006 Arith. Avg.:	**0.9404**
	2008*		0.9699 (0.0133)
	2010*		0.9652 (0.0122)
		2008, 2010 Arith. Avg.:	**0.9675**
Sockeye salmon	2007+		0.9188 (0.0123)
	2008*		0.9335 (0.0163)
	2009*		0.9457 (0.0159)
		2007–2009 Arith. Avg.:	**0.9327**

* Paired-release study conducted with 10% project spill
** Paired-release study conducted with 20% project spill
\+ Single-release survival estimate with 10% project spill

Attachment D

Fishway Attraction Flow Analysis - Closing 3 OG's in Rocky Reach Right Powerhouse Collection Channel

Delta WSE, Fishway channel to tailwater (feet)	Gate Width (feet)	Gate Height (feet)	Orifice Coefficient	Flow Area (square feet)	Flow, per orifice gate (cfs)	Flow, three orifice gates (cfs)	Flow, six orifice gates (cfs)	Minimum Existing Right Powerhouse Attraction Flow (cfs)	Maximum Existing Right Powerhouse Flow (cfs)	Range of percentage of right powerhouse attraction flow lost with 3 OG's closed (cfs)	
0.8	6	1.75	0.62	10.5	47	140	280				
0.9	6	1.75	0.62	10.5	50	149	297				
1.0	6	1.75	0.62	10.5	52	157	313	711	1083	22.1%	14.5%
1.1	6	1.75	0.62	10.5	55	164	329				
1.2	6	1.75	0.62	10.5	57	172	343				
1.3	6	1.75	0.62	10.5	60	179	357				
1.4	6	1.75	0.62	10.5	62	185	371	768	1140	24.1%	16.3%
1.5	6	1.75	0.62	10.5	64	192	384				

Per the 2009 FPC annual fishway Inspection report (Rocky Reach):

The Right Powerhouse Entrances, RPE-1 and RPE-2 are rotary wing gates that operate with a 3-ft opening, and require a head differential of 1.0 ft to 2.0 ft. The head differentials at RPE-1 and RPE-2 ranged from 1.0 to 1.4 feet for the 2009 season, all within HCP criteria.
Six orifice gates operated along the channel (1, 2, 3, 16, 18, and 20) from April through October. All gates operated satisfactorily.

Attraction Flow Calculations, per Lowell Rainey Data:

RPE-1 flow =	199	cfs minimum attraction flow	fixed sill - no flow increase available
	385	cfs maximum attraction flow	
RPE-2 flow =	199	cfs minimum attraction flow	fixed sill - no flow increase available
	385	cfs maximum attraction flow	
LPE-1 flow =	497	cfs minimum, low tailwater	stop logs and reg gate - maybe can increase flow
	588	cfs maximum attraction flow	
LPE-3 flow =	497	cfs minimum attraction flow	fixed sill - no flow increase available
	588	cfs maximum attraction flow	

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FINAL MEMORANDUM

To:	Wells, Rocky Reach, and Rock Island HCP Coordinating Committees	**Date:**	November 17, 2010
From:	Michael Schiewe, Chair, HCP Coordinating Committees		
Cc:	Carmen Andonaegui		
Re:	Final Minutes of October 26, 2010 HCP Coordinating Committees Meeting		

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Coordinating Committees met on Tuesday, October 26, 2010, from 9:30 am to 12:15 pm in SeaTac. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Steve Hemstrom will provide additional information on the sockeye project survival at Rocky Reach Dam requested by Bill Tweit (Item III-D).
- Steve Hemstrom will check with Kim Hyatt about his availability to make a presentation on Upper Columbia Basin sockeye salmon to the Coordinating Committees (Item III-D).
- Steve Hemstrom will prepare a proposal to begin a new 3-year cycle of survival testing of yearling survival at Rocky Reach for consideration by the Coordinating Committees (Item III-D).
- Tom Kahler will determine whether Douglas PUD has studied the survival of juvenile salmonids through a spillbay that is 8 feet open rather than one foot open (in contrast to bypass spill) at Wells Dam, and if so, Kahler will provide the results to Bryan Nordlund (Item IV-B).
- Tom Kahler will speak with Wells Project engineers about operations available to maintain the desired spillway flow net and flow shape during the closure of a bypass bay (Item IV-B).
- Tom Kahler will provide an electronic Word version of the HCP to Bryan Nordlund (Item V-B).

DECISION SUMMARY

- There were no decision items at this meeting.

I. Welcome

The Coordinating Committees reviewed the agenda. Bill Tweit announced that the Washington State Department of Ecology (Ecology) will be releasing the Draft Environmental Impact Statement (DEIS) for the Odessa Subarea Special Study Supplemental Feed Route on Tuesday. If anyone has questions on the DEIS which they would like to direct to the Washington Department of Fish and Wildlife (WDFW), they can contact Teresa Scott, WDFW's primary liaison with Ecology. Comments on the DEIS itself should go to the U.S. Bureau of Reclamation and are due by December 31, 2010. The Committees approved the September 28, 2010 meeting minutes, as revised. Carmen Andonaegui will finalize the minutes and distribute them to the Committees.

II. Hatchery and Tributary Committee Update (Mike Schiewe)

Mike Schiewe updated the Coordinating Committees that the Tributary Committees met on October 14 and discussed the following items:

- The Tributary Committees reviewed three Small Project Program applications. Two were rejected and one was approved. The one approved was a proposal for $9,875 to investigate the logistics of distributing salmon carcasses. A proposal by the Upper Columbia Salmon Recovery Board (the Board) for a $100,000 no-interest loan to cover reimbursable costs to subcontractors and to be repaid in 2017 was rejected. The requested amount exceeded the Small Projects Program's allowed total budget request. Also rejected was a proposal from Trout Unlimited to address sediment delivery from a road into the Methow River. The Tributary Committees suggested that a proposal to relocate the road, which currently was within the riparian zone and crossed the stream in three places—each with under-sized culverts, would be more likely to resolve the problem.
- On November 18, the Tributary Committees will meet to review eight General Salmon Habitat Program proposals. Two of the original ten proposals submitted to the committees for the General Salmon Habitat Program fund were funded by Bonneville Power Administration (BPA).

- The Tributary Committees rejected adding language to Tributary Committees-funded contracts with project sponsors requiring project sponsors to coordinate monitoring effort with the Board. Rather than take on a responsibility to require project sponsors by contract to coordinate with the Board, the Tributary Committees will provide the Board with alternate language encouraging project sponsors to coordinate with the Board on project monitoring. Tom Kahler explained that such coordination could be as simple as providing the Board with monitoring data that are collected as part of a project action.

Mike Schiewe updated the Coordinating Committees on the following actions and discussions that occurred at the most recent Hatchery Committees meeting on October 20:

- Two Statements of Agreement (SOAs) were approved by the Hatchery Committees. One was approval of a second year of testing steelhead rearing in circular ponds utilizing a water-reuse technology at the Chiwawa Facility. The second was the Hatchery Committees' Conflict of Interest Policy.
- Hatchery Committees discussed recalculating hatchery production and contribution for No Net Impact (NNI). Although details differ between Douglas and Chelan PUDs on initial levels of hatchery production and subsequent adjustment of that production, each of their respective HCPs specifies recalculation of at least one aspect of these obligations in 2013. For Chelan PUD, production levels have been well above the assumed 7-percent rate of unavoidable project mortality. Starting with 2013 production, Chelan PUD will align subsequent production obligations with project survival estimates. Douglas PUD's current hatchery production already corresponds with estimates of project survival, and will adjust whenever survival studies generate new survival estimates (not specifically in 2013). Despite this difference, all three HCPs require the adjustment of production in 2013 commensurate with changes in the population dynamics of the target stocks, irrespective of initial production and subsequent changes resulting from survival studies. Thus, the year 2013 will be the last release year with current production levels, and releases in 2014 will reflect adjusted production values. There are a number of ways to approach calculating mitigation obligations in addition to the method used in the Biological Assessment and Management Plan (BAMP); in some cases, there are new data on smolt production that can be used. The PUDs need to start considering recalculation methods now because broodstock requirements need

to be adjusted for Chinook and sockeye by 2012 and for steelhead by the 2013 brood year. Tracy Hillman, BioAnalysts, gave a presentation using information on the Chiwawa spring Chinook population as an example of how population models can be used to estimate smolt production. Mike Schiewe will keep the Coordinating Committees updated on the Hatchery Committees' progress on recalculating production levels. In summary, Douglas PUD's production level will remain at around 3.8 percent (reduced to 3.7 or 3.4 percent as a result of the 2010 survival verification study), and Chelan PUD's production level will be reduced. Production from all programs will be adjusted according to the revised estimates of the number of smolts/emigrants that pass the respective projects (population dynamics).

- Douglas PUD informed the Hatchery Committees that their commitment to supporting the Colville Confederated Tribes (CCT) Okanogan Chinook hatchery program at Chief Joseph Dam was firm but that they were waiting for the results of the 2010 survival study before entering into a long-term contractual obligation with BPA for fish rearing and compensation.
- The U.S. Fish and Wildlife Service (USFWS) was the only entity that provided written comments to Douglas PUD on the draft Wells Hatchery steelhead Hatchery Genetic Management Plan (HGMP). There was a lot of discussion by the Hatchery Committees on the draft HGMP. Schiewe explained that Douglas PUD may elevate this issue to dispute resolution within the HCP forum. The 250,000 smolt production level preliminarily agreed to by the Hatchery Committees in February 2010 was not supported by the Yakama Nation (YN) at that time and is still not supported by the YN. There is a policy meeting of selected *U.S. v OR* members on October 26 to address this issue. In the HCP forum, Douglas PUD will probably ask for vote to approve the draft HGMP at the November 17 Hatchery Committees meeting. National Marine Fisheries Service (NMFS) is continuing to work on this issue through the *U.S. v OR* process, but is required to independently evaluate any proposal under Section 7 of the Endangered Species Act (ESA).
- Mike Tonseth updated the Hatchery Committees on WDFW's testing of electro anesthesia as a method for anesthetizing adult fish using DC current. He explained that it is working very well and could be very useful at Tumwater Dam, but more evaluation is needed. Bryan Nordlund asked if Tonseth was producing a report on the prototype and testing, and in what timeframe it might be ready. Schiewe suggested Nordlund contact Tonseth with questions.

- The Hatchery Evaluation Technical Team (HETT) have been working on elements of the Non-Target Taxa of Concern (NTTOC) and reference stream selection objectives of the Hatchery Monitoring and Evaluation (M&E) plan for the Hatchery Committees. Schiewe said he is encouraging HETT to complete the tasks in time for use in the 5-year Hatchery M&E Reports.

III. Chelan PUD

A. Presentation of 2010 Rock Island Survival Study Results (John Skalski and Rich Townsend, Columbia Basin Research)

Dr. John Skalsi, Columbia Basin Research, presented the draft 2010 Rock Island Project survival study results (see Attachment B – Draft 2010 CCPUD Rock Island Survival Study; and Attachment C – Skalski - Final 2010 Rock Island Survival Study Results Presentation) and provided a handout summarizing the draft results (see Attachment D – Survival Testing and NNI Tools: RI and RR HCPs). The yearling Chinook salmon study included releases at both the Rocky Reach tailrace and at the mouth of the Wenatchee River (45 and 55 percent of the total release, respectively) to mimic the natural proportion of stocks passing the dam. The two releases were treated as a composite to estimate survival to Crescent Bar. There was also a Rock Island tailrace release to isolate survival through the Rock Island project. Tagger and tag lot effects were analyzed. Three taggers were used during the study, contributing equally to the three release groups. No tagger effects were detected. Tag lots were evenly distributed across the releases and an analysis was conducted to assess whether there were detectable differences in survival among tag lots. No tag lot effects were detected. Fish detections were evaluated downstream at Cresent Bar and at Sunland Estates to evaluate mixing of release groups. The timing of releases resulted in very good mixing at downstream detection points. Survival estimates were corrected for tag life based on a tag life study curve. There was greater than a 98 percent probability that a tag was still active when fish passed the Crescent Bar detection site, calling for less than a 2 percent correction. Rock Island Project survival for fish from the Wenatchee release site was slightly lower than for fish released in the Rocky Reach tailrace. The pooled release survival estimate was 94.28 percent. Corrected for tag life, survival was estimated at 94.86.

For the steelhead survival estimate, two release sites were used: Rocky Reach and Rock Island tailraces, with a paired mark-recapture survival to Crescent Bar. Six taggers were used and their tagged steelhead were evenly distributed between release groups. No tagger effect was detected. Tag lots were evenly distributed between release groups and there was no significant difference in survival between tag lots. Downstream mixing at Crescent Bar and Sunland was evaluated. Rocky Reach tailrace releases arrived about one-half day earlier than Rock Island tailrace releases, but there was reasonably good mixing. Tagged fish arrivals were well within the tag life curve. The probability that a tag was still alive when fish passed the downstream tag detector array at Crescent Bar was 98.5 percent. The estimate of steelhead survival was 95.51 percent. Corrected for tag life, survival was 96.52 percent.

Skalski provided a cross-year summary of Rock Island Project survivals. Yearling Chinook survival studies at Rock Island started in 2001 using acoustic tags at 20 percent spill. The three year average (2002 through 2004) achieved the HCP survival standards with an average survival estimate of 93 percent or better. Chelan PUD has now completed three years of survival studies at Rock Island at 10 percent spill (from 2007, 2008, and 2010), with an average 93.75 percent survival.

Steelhead survival studies at Rock Island were conducted from 2004 to 2006 at 20 percent spill, with a 3-year average survival of 94.04 percent; at 10 percent spill, the 2-year (2008 and 2010) average survival was 96.75 percent. Sockeye survival studies for Rock Island were all conducted at 10 percent spill with a single-release in 2007 and paired releases (Rocky Reach and Rock Island tailraces) for the last 2 years of study (2008 and 2009) for an average survival of 93.27 percent. Steve Hemstrom recommends a paired release study be used for the 10-year verification study that includes treatment releases at both the Wenatchee R. and Rocky Reach tailrace sites.

There were no questions concerning the survival study results presented. Bob Rose expressed his appreciation for a clean study and an easy-to-read presentation of results in the draft report. At the next meeting of the Coordinating Committees on November 16, Skalski will present the Douglas PUD survival study results. The draft results of Chelan PUD's Rocky Reach survival study will also be ready at that time.

B. Discussion of Draft SOA to Move Rock Island Steelhead into Phase III Standards Achieved with 10 Percent Spill Operation (Steve Hemstrom)

Steve Hemstrom said Chelan has now completed 2 years of valid juvenile steelhead survival studies at 10 percent spill at Rock Island Project. At the November 16 Coordinating

Committees meeting, he will ask the Coordinating Committees to approve steelhead as Phase III Standard Achieved under 10 percent spill, with 2 years of survival studies and an average 96.75 percent survival. He noted that the HCP allows the Committees to decide among 1 to 3 years of survival studies for Phase III Standard Achieved designation at reduced spill (Section 5.3.3), and that steelhead survival for the third year of study would have to be less than 85.49 percent to miss the allowed three-year average project survival standard of 93 percent or better. Hemstrom said he is only asking for discussion of the draft SOA at this point.

Bill Tweit stated that WDFW supports Chelan PUD's efforts to avoid unnecessary testing. He asked whether resources saved as a result of not conducting a third year of steelhead survival studies could be applied towards some other natural resource issue, for example lamprey passage at the Project. Hemstrom replied that the Rocky Reach Fish Forum addresses lamprey passage issues. Hemstrom agreed that not conducting a third year of study will free up resources, but suggested that they could be focused on Rocky Reach juvenile passage testing. He said that applying savings on steelhead studies and transferring it to some other study is ultimately a management decision. Hemstrom said he would like to focus on spring Chinook survival at Rocky Reach. He indicated that Chelan PUD would like to do a CFD model for Rocky Reach to evaluate Chinook passage, similar to what was done for sockeye. Bryan Nordlund said he is not that uncomfortable with 2 years of study on steelhead survival at Rock Island but wants to discuss this among the fishery agencies. Jim Craig said he is generally fine with 2 years of study. Jerry Marco says he is also fine with 2 years of study given size of the margin by which the 93 percent average survival estimate has been exceeded. Bob Rose said he is comfortable with the 2 years of study. Rose noted the lower survival for yearling Chinook from Rocky Reach to Crescent Bar in Table 3.5 of the draft Rock Island 2010 survival study report. Rose said it seemed to suggest a predation issue in Rocky Reach pool that might affect both spring Chinook and steelhead. He said there may be opportunities to improve overall survival as it relates to predation.

Nordlund asked if Chelan PUD planned to propose reducing spill to an even lower level (e.g., 5 percent) and evaluate juvenile survival. Hemstrom said he would strongly recommend against further reducing spill given that Chinook and sockeye survival estimates at 10 percent spill were above 93%, but not greatly above. Hemstrom explained that the lack of difference in survival between 10 and 20 percent spill is partly a reflection of the better job implementing the survival studies (i.e., no tagger effects and better predator control). Also, even when spill was reduced from 20% to 10%, all passage routes and spill gates are still open and spill is still available, but some spill gates would have to be closed if spill were reduced to 5%. Hemstrom also suggested that reduced predation also contributed to high juvenile project survival. Hemstrom said Chelan has removed 452,000 pikeminnow from Rocky Reach and Rock Island reservoirs since 2005. More than 85,000 pikeminnow were removed in 2010. Hemstrom said Chelan PUD will continue with the pikeminnow removal effort until they start seeing lower catch rates. Tom Kahler said this year is the first year Douglas PUD has had a lower catch rate in the Wells pool than in previous years.

Hemstrom said that Chelan PUD will ask the Coordinating Committees to approve a Phase III designation for steelhead at Rock Island Project after 2 years of survival studies at 10 percent spill at the November 16 Committees meeting.

C. Discussion of Draft SOA to move Rock Island Yearling Chinook into Phase III Standards Achieved with 10 Percent Spill (Steve Hemstrom)

Steve Hemstrom reported that 3 years of yearling Chinook survival studies (2007, 2008, and 2010) have been completed under conditions of 10 percent spill at Rock Island, with an average survival of 93.75 percent. He said Chelan PUD will ask the Coordinating Committees to approve a SOA designating yearling Chinook as Phase III standards achieved at the next Committees meeting. There were no questions from any Committees members on this draft SOA. Mike Schiewe asked if the Committees were ready to approve the SOA today. Bob Rose said he was not ready to approve the SOA today, and would like to wait until the next meeting of the Committees. Schiewe confirmed that the SOA will be on the November meeting agenda.

D. Okanagan Sockeye and Yearling Chinook – Tools to Achieve NNI at Rocky Reach (Steve Hemstrom)

Steve Hemstrom introduced the topic of sockeye and yearling Chinook passage survival at Rocky Reach Dam. He provided two handouts (see Attachment E – Historic Runs and Habitat Availability and Current Potential Sockeye Habitat; and Attachment F – Final Hatchery Committee SOA Regarding Skaha Lake and Okanogan Lake Sockeye Reintroduction). Hemstrom began the discussion with sockeye and the SOA approved by the Hatchery Committees on August 26, 2010. The SOA states that Chelan PUD's commitment to the Skaha Reintroduction Program through 2021 meets the NNI sockeye production obligation for the Okanogan Basin for the Rocky Reach and Rock Island projects. Hemstrom suggested that this could be interpreted to mean that Chelan PUD can meet their Rocky Reach and Rock Island projects' o project survival and hatchery obligations by supporting the Skaha Reintroduction Program as Douglas PUD did with its water management tool. He said Chelan PUD would prefer to invest in the Skaha Reintroduction Program, and suspend survival studies for sockeye at Rocky Reach. Hemstrom noted that 2010 adult returns attributable to the Okanagan Nation Alliance's (ONA) program were estimated to be 10% of the total.

Bob Rose asked Hemstrom how long Chelan would propose a suspension of survival studies. Hemstrom responded that Chelan PUD would like to suspended survival studies until it could be determined how well the Skaha Reintroduction program is working. Hemstrom also suggested using a retrospective analysis to estimate what might be accomplished with the Skaha re-introduction program, similar to what Douglas PUD did to estimate the value of the water management program. Hemstrom said there is greater potential to produce sockeye through contributing to the Skaha Reintroduction Program than by producing a fixed number of smolts calculated for NNI based on survival studies. He suggested that when final estimates of 2010 sockeye returns are available that they will likely show that Skaha production may already be closer to a 10 percent compensation goal than the NNI obligation of 7 percent. Hemstrom said the Hatchery Committees-approved SOA calls for construction of a hatchery facility that has a capacity for 5 million eggs, which could be increased to 8 million eggs if Okanagan Lake opens. Jerry Marco mentioned that Canadian politics are driving the pace at which the sockeye program can be fully implemented. Hemstrom said the first step is to open Skaha Lake and get natural production from the lake. Canada's concern is, in part, the effect of sockeye production and management on the kokanee fishery in Okanagan Lake. Hemstrom said this is something that will need to be worked through. He offered to ask Kim Hyatt, Department of Fisheries and Oceans (DFO) Canada, and Joe Miller to give a presentation to the Coordinating Committees on the Skaha reintroduction program and implementation of the Fish Water Management Tool. Rose asked when Hemstrom would like a decision. Hemstrom said a decision is needed by December 2010, in time to plan for the 2011 survival studies. A sockeye survival study could be conducted along with Chinook if necessary.

Bryan Nordlund stated that the purpose of survival studies is to document meeting the 93 percent juvenile project survival standard and maximize survival through the project. Nordlund said the majority of the survival estimates for sockeye over the past 5 years at Rocky Reach have been below the 93 percent required survival. He said he prefers that this be the primary indicator for project survival although he agrees that the Skaha Reintroduction Program appears to be successful. Hemstrom noted that Chelan PUD had conducted tests of best operating conditions for Rocky Reach in 2007; results were used to establish operations during sockeye migration in subsequent years. He also noted the uncertain effects of tagging on sockeye survival and that virtually no one else on the Columbia River is attempting to tag and measure project survival for juvenile sockeye. Bill Tweit stated that he thought Grant PUD was attempting, but did not have results. . Nordlund asked why Chelan PUD would not conduct a third year of sockeye survival testing given that the average project survival for last 2 years (2008 and 2009) meets the 93 percent survival standard. Hemstrom said Chelan PUD is currently in the Phase III Additional Tools phase, and selecting the best 2 survival years of the past 5 years of survival studies might be a departure from the HCP. He recognized that suspending survival studies is also a departure from the HCP.

Bill Tweit said he would like operations institutionalized at Rocky Reach Dam that provide the HCP survival standard of 93 percent or higher. He said he would like survival to continue to be monitored. Tweit also noted that he believes that Upper Columbia sockeye will need production in Okanogan Lake to survive the effects of climate change. He said the early success of the Skaha Reintroduction Program during a year of excellent ocean conditions may not be representative of the future, and that there is a need to continue the Skaha Reintroduction Program while continuing to test survival at Rocky Reach Project. Hemstrom responded that Chelan PUD's obligation is to produce the HCP-required number of smolts and is not tied to climate change effects on survival.

Tweit requested that Chelan PUD provide a description of project operations as implemented in 2008 and 2009 that were based on the 2007 operating study. He also asked when Chelan PUD might propose to reinitiate sockeye project survival studies, and a description of how Douglas PUD calculated NNI for sockeye. Kahler described Douglas PUD's retrospective analysis of historic hydrological data from the Canadian Okanagan that estimated smolt production from Lake Osoyoos. The results of that analysis concluded that, had Douglas

PUD's Fish-Water Management Tool been used by water managers during the 25-year period of record, annual smolt production would have increased by an average 55%. Hemstrom reiterated that based on the hatchery mitigation SOA, Chelan PUD will continue to fund and explore Skaha Lake reintroduction through 2021, and if Okanogan Lake opens up, then additional fry production would kick in. Hemstrom will provide additional information on the sockeye project survival at Rocky Reach Dam requested by Bill Tweit.

Jerry Marco noted that the CCT are part of the Okanogan Nation Alliance (ONA), and support the Skaha Reintroduction Program. Marco said he also believes there is a need for a third year of sockeye survival studies. He said the Skaha reintroduction program is part of the ONA's long-term effort to open Okanogan Lake; however, political concerns in Canada have necessitated a phased approach starting with production above McIntyre Dam up to Skaha Lake with rearing in Lake Osoyoos first, then opening Skaha Lake, and putting a timeline on moving towards opening Okanogan Lake. Marco said he wants to make sure that as production is increased in the Okanogan Basin lakes, smolts are not killed at the HCP projects. Bob Rose said he favors another sockeye survival study in 2011, with at most a 1-year deferral to 2012. Hemstrom agreed to check with Kim Hyatt regarding his availability to make a presentation on Upper Columbia sockeye at the November Coordinating Committees meeting.

Hemstrom began the discussion of yearling Chinook survival at Rocky Reach by saying Chelan PUD would need a 95 percent project survival or better for the third year survival study to meet or exceed the HCP survival standard of 93 percent. The low survival estimate in 2005 (91.09 percent), which occurred before any operational changes took place at Rocky Reach, is driving the need for the 95 percent or better survival estimate in 2011. This year, Chelan PUD conducted a pilot study of yearling Chinook passage at Rocky Reach Dam to evaluate day and night time passage. Yearling Chinook at Rocky Reach are currently in Phase III Provisional Review. The HCP states that at the end of the 5-year provisional review period, the last 2 years of previous survival studies estimates must be used to calculate the average survival.

Hemstrom said Chelan PUD would prefer to estimate yearling Chinook survival at Rocky Reach using 3 additional years of survival studies rather than 1 year (2011), and average in two estimates of lower survival (2004, 2005) based on operations used prior to identifying and implementing Project improvements. Therefore, Chelan PUD will request that the Coordinating Committees approve restarting survival studies for yearling Chinook at Rocky Reach. Hemstrom said the preliminary results of the 2010 study are less than 95 percent survival. If a survival estimate of 93 percent can still not be demonstrated after 5 years of testing, the HCP allows for a one-time provisional review. If survival is still less than 93 percent, then Chelan PUD would be required to go into Phase II Additional Tools (Section 5.3.3, page 13, and Section 5.3.2, page 12, of the Rocky Reach HCP). Tweit said he would support restarting the survival studies if the change in operations intended to improve project survival were substantial. Schiewe asked Hemstrom if project operation changes met the "substantial" test. Nordlund commented that in his view, the changes made for sockeye, and consequently all species, have been substantial. Hemstrom noted that flows for a valid study in 2010 for Chinook were not met. Hemstrom agreed to review the 2010 survival study results before the next meeting and draft a proposal for the Committees to consider.

E. Update on Rocky Reach AWS Attraction Water Pump Overhaul (Steve Hemstrom)

Steve Hemstrom reported on the dates proposed for overhauling the AWS pumps during the 2010 to 2011 maintenance period (see Attachment G - Memo on Rocky Reach fishway AWS Pump Overhaul 2010/2011). The normal maintenance period is January 2 through February 28. With the pump overhaul, the outage will require an extra month and will extend from December 1 through February 28. Hemstrom said that typically after November 15 at Rocky Reach, no steelhead are observed passing the dam.

IV. Douglas PUD

A. 2010 Bypass Summary (Tom Kahler)

Tom Kahler reported that the 2010 Wells Juvenile Bypass Summary was distributed to the Coordinating Committees by email on October 8. He asked if there were any questions on the summary. There were no questions.

B. Contingency Measures During Bypass Malfunctions (Tom Kahler)

Tom Kahler reviewed the malfunction at Spill Gate 8 as reported at the August Coordinating Committees meeting. He said the Committees discussed the need for Douglas PUD to develop a contingency plan for dam operations in the event of future gate failures. Kahler asked for suggestions, saying he has not yet drafted a contingency plan. His only thought is to allow full spill through an adjacent spill gate, which would more than triple flows through the spillway. Bryan Nordlund asked whether Douglas PUD has backup baffles available. Nordlund asked whether dam operators could potentially pull out baffles and boards from another spill gate unit and place these in a malfunctioning unit. Nordlund asked if there were data on juvenile survival through a fully opened spill gate versus a baffled spillway. Kahler replied he was not sure but that he will ask Shane Bickford whether such tests were conducted during the development of the bypass system, and report results to the Committees. Nordlund also asked if a contingency plan could be tiered such that if a repair will require a one-day change versus a multi-day or longer outage, there could be contingency plans for both short- and long-term spill gate outages. Nordlund asked how fully opening a spill gate might alter the flow shape as well as the flow net. He said, with a spill gate down, there may be a need to pull from lower in the water column to more closely create the desired flow shape. Nordlund asked Kahler to check with Douglas PUD engineers for a range of operation options available for maintaining desired flow net and flow shape. Kahler said he would draft a contingency plan prior to the 2011 juvenile passage season.

C. 10-Year Validation Survival Study Update

Tom Kahler reported that he did not have an update on the Wells yearling Chinook survival study for today's meeting and will instead present the information at next month's meeting with Dr. John Skalski present.

V. HCP Administration (Mike Schiewe)

A. Next Meetings

The next scheduled Coordinating Committees' meetings will be on November 16, December 14, and January 25, all in SeaTac.

B. General

Tom Kahler will provide an electronic Word version of the HCP to Bryan Nordlund, as requested.

List of Attachments

Attachment A – List of Attendees

Attachment B – Draft 2010 Chelan PUD Rock Island Survival Study

Attachment C – Skalski - Final 2010 Rock Island Survival Study Results Presentation

Attachment D – Survival Testing and NNI Tools: RI and RR HCPs

Attachment E – Historic Runs and Habitat Availability and Current Potential Sockeye Habitat

Attachment F – Final SOA Regarding Skaha Lake and Okanogan Lake Sockeye Reintroduction

Attachment G – Memo on Rocky Reach fishway AWS Pump Overhaul 2010/2011

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor QEA, LLC
Carmen Andonaegui	Anchor QEA, LLC
Steve Hemstrom *	Chelan PUD
Lance Keller	Chelan PUD
Tom Kahler*	Douglas PUD
Jerry Marco*	CCT
Bob Rose* (by phone)	YN
Jim Craig*	USFWS
John Skalski	Columbia Basin Research
Rich Townsend	Columbia Basin Research
Bryan Nordlund*	NOAA
Bill Tweit *	WDFW

* Denotes Coordinating Committees member or alternate

Attachment B

Survival of Yearling Chinook Salmon and Steelhead Smolts through the Rock Island Project in 2010

Prepared for:
Public Utility District No. 1 of Chelan County
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Prepared by:
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6 October 2010

Executive Summary

Study Objective

The objective of the 2010 acoustic-tag study was to estimate passage survival of yearling Chinook salmon and steelhead smolts through Rock Island Project.

Tag-Release Methods

Tag releases of yearling Chinook salmon smolts were performed at the Rocky Reach tailrace and Wenatchee River mouth (treatment groups) and Rock Island tailrace (control) to estimate passage survival through the Rock Island project. The Rocky Reach tailrace and Wenatchee River mouth releases were used to mimic run-of-river sources of Chinook salmon and were released in the ratio of 45%:55%. Totals of 503, 609, and 501 yearling Chinook salmon smolts were released at the respective locations. Steelhead releases occurred at Rocky Reach and Rock Island tailraces. Release numbers were 500 and 500 respectively. The HTI 795Lm micro-acoustic tags were used in both species. The paired release-recapture method of Burnham et al. (1987) was used to estimate project passage survival. Corrections for tag life were based on the method in Townsend et al. (2006).

Results

Examination for tag-lot and tagger effects found nothing that would preclude analysis of all the tagging data as expected. Downstream mixing of the release groups appeared adequate to fulfill model assumptions. Average tag life was estimated to be 31.04 days. Probabilities that tags were active at downstream detection sites exceeded 0.98 in all cases.

The estimates of project survival in 2010 achieved the desired precision level of $\widehat{SE} \leq 0.025$, and point estimates of survival were ≥ 0.93, the criteria specified in the Habitat Conservation Plan (HCP).

Project	Method	Stock	Survival Estimate	Standard Error
Rock Island	Acoustic tag	Yearling Chinook salmon, ROR	0.9428	0.0081
		Steelhead, ROR	0.9652	0.0122

* ROR = run of river

This report conforms to the guidelines of the Peven et al. (2005) survival studies recommendations.

Survival Study Summary

Year: 2010	Start date: 1 May	Stop date: June 9

Study site(s): Rock Island project

Objective(s) of study: Estimate project survival

State hypothesis, if applicable: N/A

Fish
- Species-race: Yearling Chinook salmon smolts
- Source: Run-of-river from Rocky Reach juvenile collection facility

Size (median & range)
- Weight: Median – 47.4 gm, range – 23.8-116.6 gm
- Length: Median – 165.0 mm, range – 131.0-219.0 mm

Tag Type/model: *HTI Model 795Lm* micro acoustic tag
Weight (gm): 0.65 gm in air

Implant procedure: Surgical; acoustic tag

Survival estimate (per species or objective)

Type (project, etc.): Project	Rock Island
Value & SE:	0.9428 (SE = 0.0081)

- Sample size/replicate: ≈ 34/replicate (Rocky Reach & Rock Island) & 40/replicate (Wenatchee)
- # replicates: 15 replicates (Rocky Reach, Wenatchee, & Rock Island)
- Analytical model: Paired release-recapture model

Hypothesis test and results (if applicable): N/A

Characteristics of estimate
- Effects reflected (direct, total, etc): Total project
- Absolute or relative: Absolute

Environmental/operating conditions
- Discharge: Rocky Reach, median: 111.7 kcfs, range: 76.5 – 135.8 kcfs
  Rock Island, median: 122.6 kcfs, range: 84.2 – 143.0 kcfs
  Wenatchee River, median: 6.4 kcfs, range: 3.1 – 13.7 kcfs
- Temperature: Rocky Reach, median: 9.9°C, range: 7.4 – 10.7°C
  Rock Island, median: 10.0°C, range: 7.8 – 10.7°C
- TDG: Rocky Reach, median: 105.4 %, range: 103.4 – 107.5 %
  Rock Island, median: 108.8 % , range: 106.8 – 111.8 %
- Treatment(s): None.

Unique study characteristics: Two upper release locations, Rocky Reach tailrace and Wenatchee River mouth, pooled for treatment survival.

Survival Study Summary

Year: 2010 | Start date: 1 May | Stop date: 9 June

Study site(s): Rock Island project

Objective(s) of study: Estimate project survival

State hypothesis, if applicable: N/A

Fish
- Species-race: Steelhead smolts
- Source: Run-of-river from Rocky Reach juvenile collection facility

Size (median & range)
- Weight: Median – 61.25 gm, range – 9.5-122.6 gm
- Length: Median – 193 mm, range – 101-231 mm

Tag Type/model: *HTI Model 795Lm* micro acoustic tag
Weight (gm): 0.65 gm in air

Implant procedure
- Surgical: Acoustic tag

Survival estimate (per species or objective)
- Type (project, etc.): Project — Rock Island
- Value & SE: 0.9652 (SE = 0.0122)
- Sample size/replicate: ≈ 33/replicate (Rocky Reach & Rock Island)
- # replicates: 15 replicates (Rocky Reach & Rock Island)
- Analytical model: Paired release-recapture model

Hypothesis test and results (if applicable): N/A

Characteristics of estimate
- Effects reflected (direct, total, etc.): Total project
- Absolute or relative: Absolute

Environmental/operating conditions
- Discharge: Rocky Reach, median: 111.7 kcfs, range: 76.5 – 135.8 kcfs
  Rock Island, median: 122.6 kcfs, range: 84.2 – 143.0 kcfs
- Temperature: Rocky Reach, median: 9.9°C, range: 7.4 – 10.7°C
  Rock Island, median: 10.0°C, range: 7.8 – 10.7°C
- TDG: Rocky Reach, median: 105.4 %, range: 103.4 – 107.5 %
  Rock Island, median: 108.8 % , range: 106.8 – 111.8 %
- Treatment(s): None.

Unique study characteristics: None.

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1. Introduction

In 2010, run-of-river (ROR) yearling Chinook salmon and steelhead smolts were used to estimate project passage survival at Rock Island Dam. All smolts used in the study were run-of-river fish collected at the Rocky Reach juvenile sampling facility. Replicate releases were performed from 1–30 May 2010, and the release-recapture data pooled to provide a season-wide average passage survival estimate at Rock Island.

The steelhead release-recapture study was the traditional paired-release design with tagged fish releases at Rocky Reach and Rock Island tailraces. A modification of the traditional paired-release design was used in 2010 to estimate project passage survival for yearling Chinook salmon smolts. To better represent the actual migrant population in the Rock Island reservoir, releases from Rocky Reach tailrace and at the mouth of the Wenatchee River were combined to form the treatment group. The ratio of Rocky Reach tailrace:Wenatchee River release groups was 45:55. This mixture rate represents the historical contributions of the upper Columbia River and Wenatchee stocks to the yearling Chinook salmon population in the Rock Island reservoir. The recapture data from these two release groups was pooled in the traditional paired-release analysis. A traditional tailrace release below Rock Island Dam served as the downstream control group.

2. Methods

2.1 Acoustic-Tag Handling, Tagging, and Release Procedures

The smolt handling, tagging, and release procedures used in 2010 follow the methods described in Skalski et al. (2005) and Appendix A. Fish for the study were acquired from the Rocky Reach juvenile bypass system. Table 2.1 summarizes the number of tags released per location in performing the 2010 release-recapture survival study. The yearling Chinook salmon survival study involved three release sites; the steelhead, only two release sites.

Table 2.1. Sample sizes of acoustic-tag releases used in the 2010 Chelan County PUD yearling Chinook salmon and steelhead smolt survival studies at Rock Island Dam.

Location	Release sizes	
	Yearling Chinook	Steelhead
Rocky Reach tailrace	503	500
Wenatchee River mouth	609	--
Rock Island tailrace	501	500
Total	1613	1000

For yearling Chinook salmon, fifteen replicate bi-daily releases were performed from 1–30 May 2010 to estimate season-wide passage survival. At Rocky Reach and Rock Island tailraces, approximately 34 fish per replicate were released. At the mouth of the Wenatchee River, each replicate bi-daily release group was approximately 40 fish.

For steelhead smolts, 15 replicate bi-daily releases were performed 1–30 May 2010. At Rocky Reach and Rock Island tailraces, approximately 33 fish were released per replicate.

2.2 Statistical Methods

2.2.1 Project Survival Estimates for Yearling Chinook Salmon

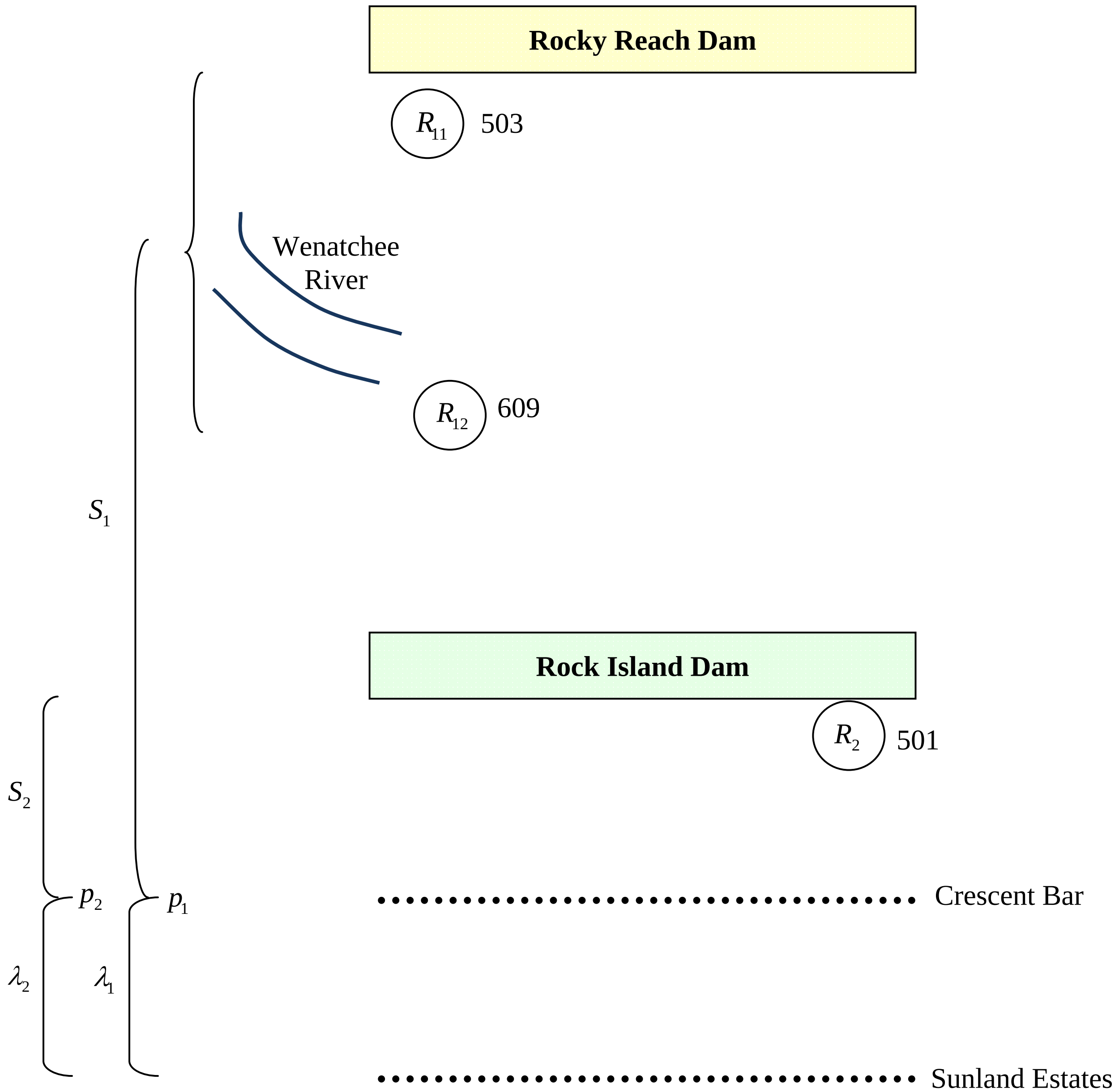
A total of three release groups were used to estimate project passage survival at Rock Island Dam (R_{11}, R_{12}, and R_2; Figure 2.1). To better represent the actual migrant population in the Rock Island reservoir, releases from Rocky Reach tailrace (R_{11}) and at the mouth of the Wenatchee River (R_{12}) were combined to form the treatment group. The ratio of Rocky Reach tailrace:Wenatchee River release groups (i.e., R_{11}:R_{12}) were in the proportion 45:55. This mixture rate was used to represent the historical contributions of the Upper Columbia River and Wenatchee stocks to the yearling Chinook salmon population in the Rock Island reservoir. The recapture data from these two release groups were combined in the analysis. A traditional tailrace release below Rock Island Dam (R_2) served as the downstream control group (Figure 2.2). Tag-life corrections were performed separately for each of the three release groups.

2.2.2 Project Survival Estimates for Steelhead

The paired release-recapture methods of Burnham et al. (1984), as described by Skalski et al. (2003; 2005a; 2005b; 2006; 2007; 2008) were used to analyze the acoustic-tag data for steelhead (Figure 2.2). Survival estimates were calculated from pooling the capture histories of the replicate releases across the season, and adjusted for the estimated acoustic-tag life, as described in Townsend et al. (2006).

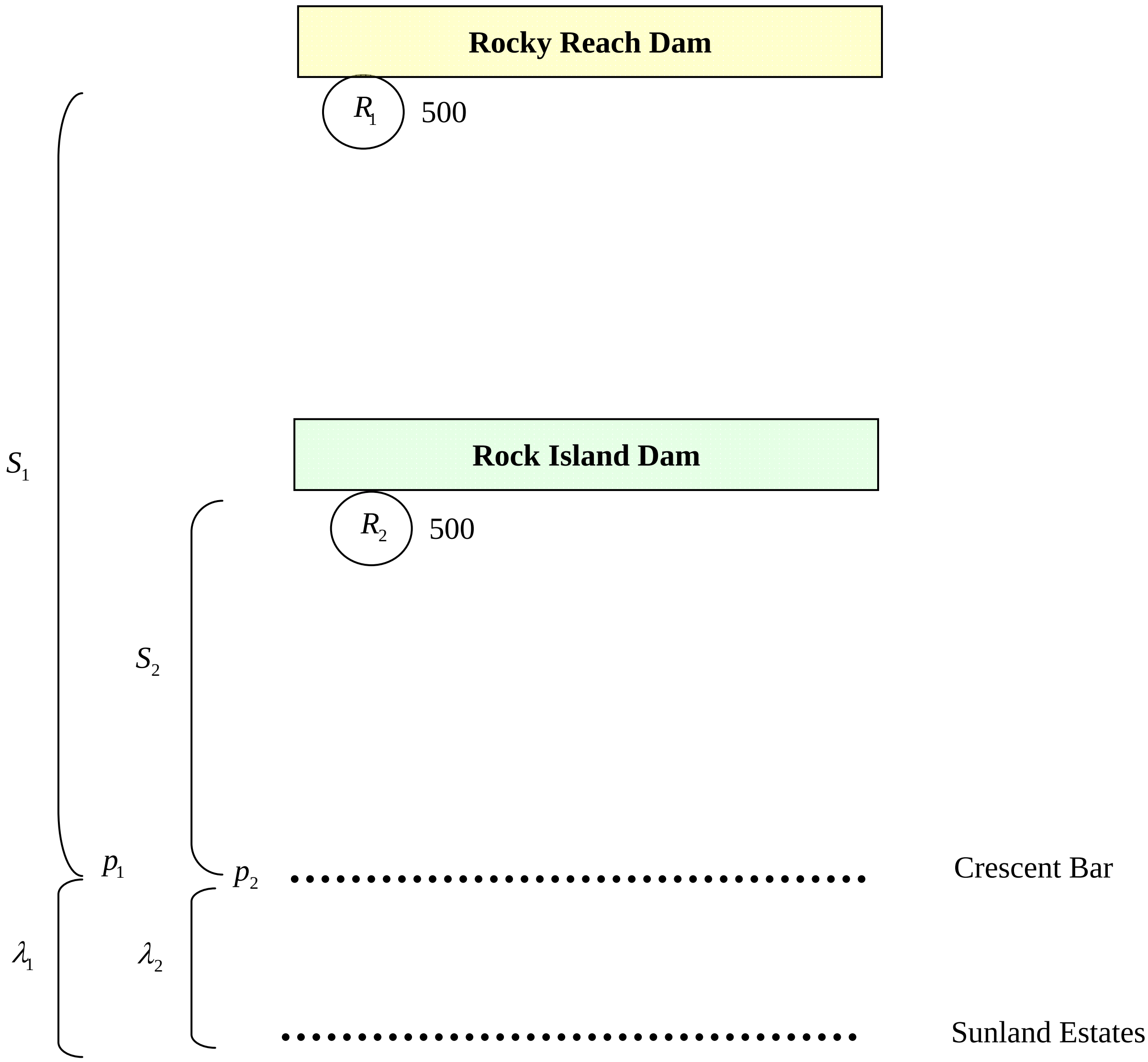
2.2.3 Tag-Life Corrections

In 2010, the *HTI 795Lm* micro-tag was used for the yearling Chinook salmon smolts. A total of 59 tags were systematically sampled to estimate tag life. These tags were monitored continuously until failure of all tags. The vitality model (Li and Anderson 2009) was used to characterize the tag-life data. The same tag-life data and model were used to make tag-life adjustments to the release-recapture estimates of survival for both yearling Chinook salmon and steelhead.



Rocky Island passage survival: $\hat{S}_{\mathrm{RI}} = \dfrac{\hat{S}_1}{\hat{S}_2}$

Figure 2.1. Schematic of the releases used to estimate project passage survival for yearling Chinook salmon smolts at Rock Island Dam in 2010. Release sizes R_{11}:R_{12} are in the ratio 45:55 to represent relative contributions of Upper Columbia River and Wenatchee River Chinook salmon stocks in the Rock Island pool. Data for releases R_{11} and R_{12} were combined in the tag analyses.



Rocky Reach passage survival: $\hat{S}_{\mathrm{RI}} = \dfrac{\hat{S}_1}{\hat{S}_2}$

Figure 2.2. Schematic of the releases used to estimate project passage survival for steelhead smolts at Rock Island Dam in 2010.

3. Results

Results for the yearling Chinook salmon are presented completely, followed by the results for the steelhead survival study.

3.1 Yearling Chinook Salmon

3.1.1 Examination of Tagger Effects

Examination of tagger effects consisted of two separate analyses. The first analysis assessed whether the different taggers (i.e., #1, #2, and #3) were proportionately represented in fish releases at each release site. A chi-square test of homogeneity was not rejected $\left(P\left(\chi^2_{12} \geq 0.5388\right) = 1.0\right)$ (Table 3.1). The second analysis assessed whether the fish tagged by the different personnel had equal in-river survival. To increase the sensitivity of this analysis, data from all release groups (including those used at Rocky Reach in a separate study) were evaluated. Survivals were compared over five reaches and seven release groups for a total of 23 release-by-reach combinations. Three comparisons were significant (3/23 $\rightarrow$ 13.0%) (Tables 3.2 and 3.3). None of the significant comparisons were involved in the Rock Island survival studies, and there was no consistent pattern among the survival estimates of fish tagged by different individuals. For these reasons, tagging effects were considered inconsequential, and all fish were used in the survival analyses. Cumulative survivals downriver for fish, tagged by different investigators by release site, are provided in Figure 3.1.

3.1.2 Examination of Tag-Lot Effects

The examination of possible effects of different tag lots on survival consisted of two separate analyses. The first analysis found tag lots were homogeneously distributed across the various release groups of yearling Chinook salmon smolts in 2010 $\left(P\left(\chi^2_{138} \geq 4.2213\right) = 1.0\right)$ (Table 3.4). The second analysis found the survival estimates for the fish tagged by different tag lots were homogeneous for all release groups (Table 3.5). Analyses were based on the survival estimates from the respective release sites to Crescent Bar rather than reach specific for expediency and to reduce the number of possible analyses. No compelling evidence was found that would preclude using all tag lots in the subsequent survival analysis.

Table 3.1. Number of yearling Chinook salmon tagged at each release site by tagger in 2010. The distribution of tagging effort for the three taggers at the release sites was homogeneous $\left(P(\chi^2_{12} \geq 0.5388) = 1.0000\right)$.

Tagger	#1	#2	#3
Wells tailrace Chinook salmon (day)	123	129	127
Wells tailrace Chinook salmon (night)	126	128	127
Rocky Reach SC Chinook salmon (day)	149	151	152
Rocky Reach SC tailrace Chinook salmon (day)	171	165	167
Rocky Reach SC tailrace Chinook salmon (night)	127	122	127
Wenatchee River Chinook salmon (day)	204	204	201
Rock Island tailrace Chinook salmon (day)	170	166	165
Total tags	1070	1065	1066

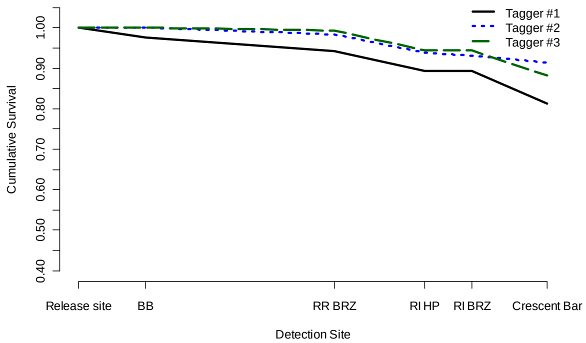
Table 3.2. Reach survival estimates by release group and tagger (i.e., #1, #2, and #3) for all yearling Chinook salmon smolts used in 2010 by Chelan County PUD. Shaded cells indicate heterogeneous survival estimates between fish from different taggers at $\alpha < 0.05$ (see Table 3.3).

			CJS Survival					
Release site	Release	Tagger	Release to Beebe Bridge	Beebe Bridge to RR Boat R. Zone	RR Boat R. Zone to RI Hydropark	RI Hydropark to RI Boat R. Zone	RI Boat R. Zone to Crescent Bar	Overall
Wells tailrace	Day	#1	0.9756 (0.0139)	0.9667 (0.0164)	0.9483 (0.0206)	1.0000 (0.0043)	0.9091 (0.0274)	0.8131
		#2	1.0000 (0.0039)	0.9845 (0.0108)	0.9528 (0.0188)	0.9917 (0.0081)	0.9833 (0.0116)	0.9147
		#3	1.0000 (0.0040)	0.9921 (0.0077)	0.9524 (0.0190)	1.0000 (0.0041)	0.9333 (0.0228)	0.8819
	Night	#1	0.9841 (0.0111)	0.9839 (0.0113)	0.9754 (0.0140)	1.0000 (0.0041)	0.9496 (0.0201)	0.8968
		#2	0.9844 (0.0109)	0.9683 (0.0156)	0.8770 (0.0297)	0.9907 (0.0092)	0.9434 (0.0224)	0.7813
		#3	0.9685 (0.0155)	0.9512 (0.0194)	0.9145 (0.0258)	1.0000 (0.0043)	0.9346 (0.0239)	0.7874
Rocky Reach SC	Day	#1			0.9664 (0.0147)	1.0000 (0.0037)	0.9653 (0.0152)	0.9329
		#2			0.9404 (0.0193)	1.0000 (0.0106)	0.9648 (0.0155)	0.9073
		#3			0.9868 (0.0092)	0.9933 (0.0065)	0.9262 (0.0214)	0.9079
Rocky Reach tailrace	Day	#1			1.0000 (0.0034)	0.9942 (0.0057)	0.9529 (0.0162)	0.9474
		#2			1.0000 (0.0000)	1.0000 (0.0000)	0.9212 (0.0210)	0.9212
		#3			0.9880 (0.0084)	0.9939 (0.0059)	0.9634 (0.0146)	0.9460
	Night	#1			1.0000 (0.0040)	1.0000 (0.0040)	0.9684 (0.0155)	0.9684
		#2			0.9754 (0.0140)	1.0000 (0.0000)	0.9496 (0.0201)	0.9262
		#3			0.9921 (0.0077)	1.0000 (0.0040)	0.9444 (0.0204)	0.9369
Wenatchee River	Day	#1			0.9853 (0.0084)	1.0000 (0.0032)	0.9403 (0.0167)	0.9265
		#2			0.9902 (0.0068)	1.0000 (0.0031)	0.9505 (0.0153)	0.9412
		#3			0.9900 (0.0069)	1.0000 (0.0032)	0.9397 (0.0169)	0.9303
Rock Island tailrace	Day	#1					0.9941 (0.0057)	0.9941
		#2					1.0000 (0.0035)	1.0000
		#3					0.9939 (0.0059)	0.9939

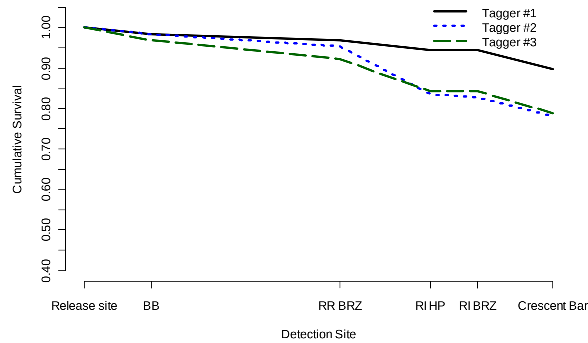
Table 3.3. *F*-tests of homogeneous reach survivals for yearling Chinook salmon smolts tagged by different investigations in 2010. Significant tests ($\alpha < 0.05$) are shaded.

Release site	Release		Release to Beebe Bridge	Beebe Bridge to RR BRZ	RR BRZ to RI Hydropark	RI Hydropark to RI BRZ	RI BRZ to Crescent Bar
Wells tailrace	Day	*F*	2.653	1.146	0.016	0.683	3.057
		p-value	0.070	0.318	0.984	0.505	0.047
	Night	*F*	0.515	1.074	4.243	0.721	0.115
		p-value	0.598	0.342	0.014	0.486	0.891
Rocky Reach SC	Day	*F*			2.410	0.267	1.624
		p-value			0.090	0.766	0.197
Rocky Reach tailrace	Day	*F*			1.754	0.527	1.580
		p-value			0.173	0.590	0.206
	Night	*F*			1.744	0.000	0.451
		p-value			0.173	1.000	0.637
Wenatchee River	Day	*F*			0.140	0.000	0.138
		p-value			0.869	1.000	0.871
Rock Island tailrace	Day	*F*					0.453
		p-value					0.636

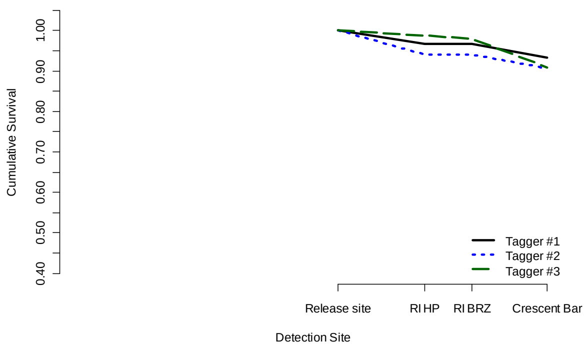
a1. Wells tailrace releases (day)



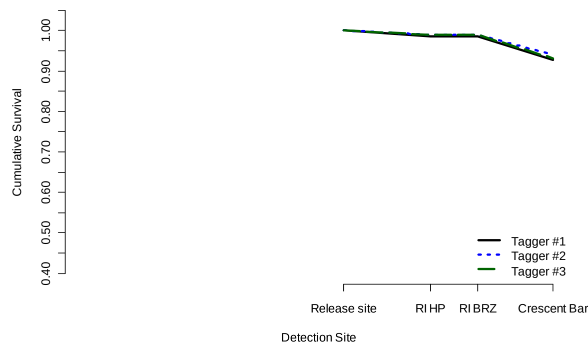
a2. Wells tailrace releases (night)



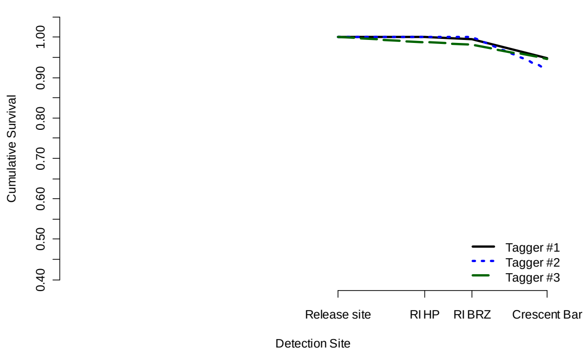
b. Rocky Reach SC releases (day)



c. Wenatchee River mouth releases (day)



d1. Rocky Reach tailrace releases (day)



d2. Rocky Reach tailrace releases (night)

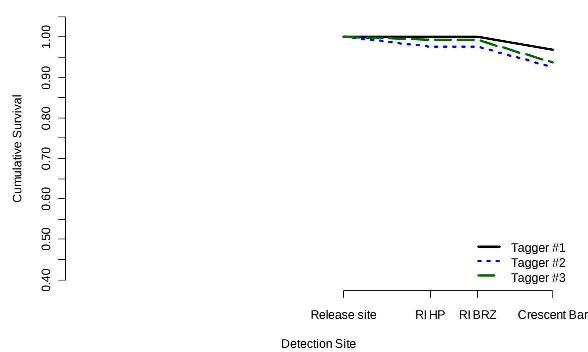


Figure 3.1. Pattern of cumulative survival of yearling Chinook salmon smolts by tagger for (a1 and a2) the Wells tailrace, (b) Rocky Reach Surface Collector, (c) Wenatchee River mouth, and (d1 and d2) Rocky Reach tailrace releases.

Table 3.4. Test of homogeneity shows that the tag lots were well distributed across the Chinook salmon release sites in 2010 $\left(P\left(\chi^2_{138} \geq 4.2213\right) \approx 1\right)$.

Tag lot	Wells tailrace (day)	Wells tailrace (night)	Rocky Reach SC (day)	Rocky Reach SC tailrace (day)	Rocky Reach SC tailrace (night)	Wenatchee River (day)	Rock Island tailrace (day)	Total tags
10201	13	13	16	17	14	21	17	111
10202	15	15	18	21	15	24	20	128
10203	16	16	19	21	15	25	21	133
10204	15	15	18	21	15	26	21	131
10205	14	14	17	18	15	23	19	120
10206	15	15	18	21	14	24	21	128
10207	15	15	18	20	15	24	20	127
10208	16	16	20	22	17	28	23	142
10209	9	11	10	11	8	13	12	74
10210	14	14	17	19	14	24	19	121
10211	16	16	19	21	16	26	21	135
10212	15	15	18	20	14	25	19	126
10213	15	15	18	20	15	24	20	127
10215	19	19	21	23	18	28	23	151
10216	16	16	19	21	16	26	21	135
10217	18	18	22	26	19	30	25	158
10218	18	18	19	21	16	26	21	139
10219	19	19	25	24	19	30	25	161
10220	16	16	20	22	16	28	23	141
10221	16	16	19	22	18	26	21	138
10222	7	7	8	12	8	13	10	65
10258	22	22	26	28	22	34	28	182
10259	20	20	24	27	20	31	26	168
10260	20	20	23	25	17	30	25	160

Table 3.5. Reach survival estimates for yearling Chinook salmon smolts by tag lot from each release site to Crescent Bar in 2010. Day and night releases were pooled. Standard errors in parentheses. No significant departure from homogeneity was detected ($P > 0.05$).

Tag lot	Wells tailrace to Crescent Bar	Rocky Reach SC to Crescent Bar	Rocky Reach tailrace to Crescent Bar	Wenatchee River to Crescent Bar	Rock Island tailrace to Crescent Bar
10201	0.8077 (0.0773)	0.9375 (0.0605)	0.9032 (0.0531)	0.9048 (0.0641)	1.0000 (0.0108)
10202	0.7143 (0.0854)	1.0000 (0.0105)	1.0000 (0.0074)	0.9167 (0.0564)	1.0000 (0.0100)
10203	0.7931 (0.0752)	0.9474 (0.0512)	0.8889 (0.0524)	0.9200 (0.0543)	1.0000 (0.0098)
10204	0.8571 (0.0661)	0.8889 (0.0741)	0.9167 (0.0461)	0.9231 (0.0523)	1.0000 (0.0098)
10205	0.7407 (0.0843)	1.0000 (0.0108)	0.9697 (0.0298)	0.9565 (0.0425)	1.0000 (0.0103)
10206	0.8929 (0.0584)	1.0000 (0.0105)	0.9714 (0.0281)	0.8750 (0.0675)	1.0000 (0.0098)
10207	0.7857 (0.0775)	0.8889 (0.0741)	1.0000 (0.0076)	0.8750 (0.0675)	1.0000 (0.0100)
10208	0.8621 (0.0640)	1.0000 (0.0100)	0.9744 (0.0253)	0.9643 (0.0350)	1.0000 (0.0093)
10209	0.8182 (0.0822)	0.9000 (0.0949)	1.0000 (0.0103)	0.9231 (0.0739)	1.0000 (0.0129)
10210	0.9643 (0.0350)	0.8824 (0.0781)	0.9091 (0.0500)	0.9583 (0.0408)	1.0000 (0.0103)
10211	0.8125 (0.0690)	0.9474 (0.0512)	0.9189 (0.0449)	0.9231 (0.0523)	1.0000 (0.0098)
10212	0.7333 (0.0807)	0.9444 (0.0540)	0.9412 (0.0403)	0.9600 (0.0392)	0.9474 (0.0512)
10213	0.8667 (0.0621)	0.9444 (0.0540)	0.9714 (0.0281)	0.9167 (0.0564)	1.0000 (0.0100)
10215	0.7368 (0.0714)	0.9048 (0.0641)	0.9512 (0.0336)	0.9643 (0.0350)	0.9565 (0.0425)
10216	0.8125 (0.0690)	0.8421 (0.0837)	1.0000 (0.0073)	0.9615 (0.0377)	1.0000 (0.0098)
10217	0.9444 (0.0382)	0.8636 (0.0732)	0.9556 (0.0307)	0.9000 (0.0548)	1.0000 (0.0089)
10218	0.9444 (0.0382)	0.9474 (0.0512)	0.9189 (0.0449)	1.0000 (0.0088)	1.0000 (0.0098)
10219	0.9211 (0.0437	0.8400 (0.0733)	0.8837 (0.0489)	0.9333 (0.0455)	1.0000 (0.0089)
10220	0.8437 (0.0642)	0.8500 (0.0798)	0.9474 (0.0362)	0.9643 (0.0350)	1.0000 (0.0093)
10221	0.8750 (0.0585)	0.8947 (0.0704)	0.9250 (0.0416)	0.8846 (0.0627)	1.0000 (0.0098)
10222	0.9286 (0.0688)	0.8750 (0.1169)	0.9500 (0.0487)	1.0000 (0.0124)	1.0000 (0.0141)
10258	0.7273 (0.0671)	0.9615 (0.0377)	0.9000 (0.0424)	0.9412 (0.0403)	1.0000 (0.0084)
10259	0.8750 (0.0523)	0.8750 (0.0675)	0.9574 (0.0294)	0.9032 (0.0531)	1.0000 (0.0088)
10260	0.8250 (0.0601)	0.8696 (0.0702)	0.8810 (0.0500)	0.9333 (0.0455)	1.0000 (0.0089)
F-test	1.264	0.643	1.031	0.485	0.670
$P\left(F_{23,\alpha} > F\right)$	0.178	0.902	0.420	0.982	0.879

3.1.3 Downstream Mixing of Release Groups

Inspection of the downstream arrival distributions indicates the Rocky Reach tailrace, Wenatchee River mouth, and Rock Island tailrace releases all arrived about the same time at Crescent Bar and Sunland Estates (Figure 3.2). Although chi-square tests of homogeneity are significant ($P < 0.0001$), arrival patterns overlapped with similar modes.

3.1.4 Size Distributions

For every yearling Chinook salmon smolt tagged, length and weight data were recorded. Table 3.6 provides the median and range in fish length for each release group. Median size was 165.0 mm with a range of 131.0 to 219.0 mm for the smolts in the survival analysis. Visual inspection indicates similar distributions for length, weight, and condition factor across the three release groups (Figure 3.3). Figure 3.4 provides the length frequency distribution for yearling Chinook salmonid smolts used in the acoustic-tag survival study and those fish sampled at the Rocky Reach juvenile sampling facility.

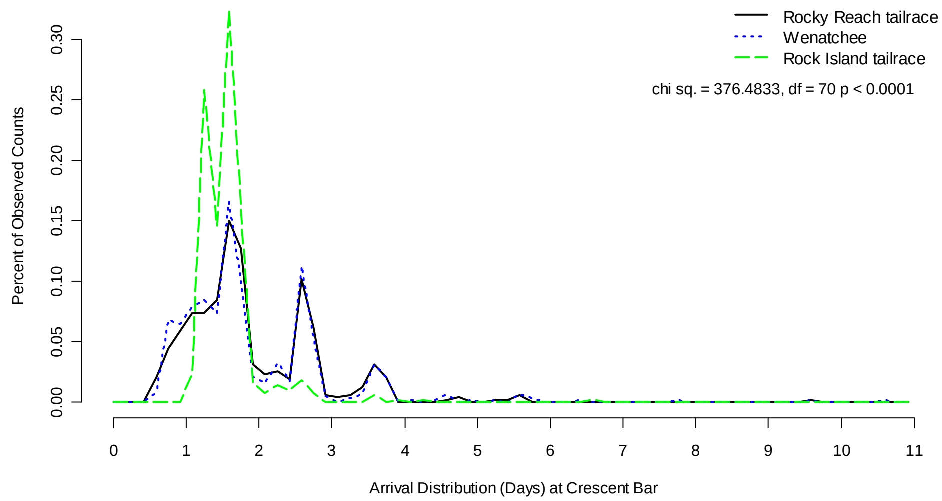
3.1.5 Tag-Life Adjustments

A total of 59 acoustic tags were used in a the tag-life study to model a tag-life survivorship curve for the tags used in the 2010 yearling Chinook salmon and steelhead survival studies at the Rock Island project. The tag-life data were found to best fit the vitality model of Li and Anderson (2009). The fitted model (Figure 3.5) was used to estimate the probabilities of acoustic tags being active when fish arrived at the downstream detection sites. Average tag life was estimated to be 31.04 days. Comparison of downstream arrival distributions at Crescent Bar and Sunland Estates indicates all fish arrived by 13 and 19 days, respectively, and well within the observed tag-life curve (Figure 3.6). In all cases, the probability a tag was active when fish from a release group arrived at a downstream detection site exceeded 0.98 (Table 3.7). Reach survival estimates adjusted for tag life were therefore only slightly different than the unadjusted survival estimates.

3.1.6 Project Passage Survival Estimate – Yearling Chinook Salmon

A paired release-recapture model adjusted for travel times was used to estimate project passage survival at Rock Island. The capture data (Table 3.8) from releases at the Rocky Reach tailrace and Wenatchee River mouth were pooled, assuming times between tag activation and downstream arrival were homogeneous between groups. This assumption is supported by the same activation times for both groups and coincident arrival-time distribution downstream (Figure 3.6).

a. Yearling Chinook arrival distribution at Crescent Bar.



b. Yearling Chinook arrival distribution at Sunland Estates.

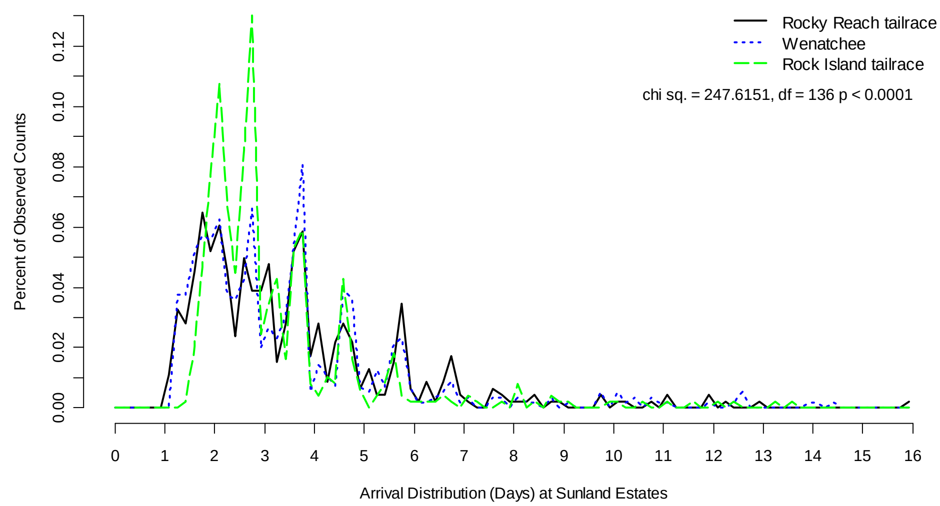


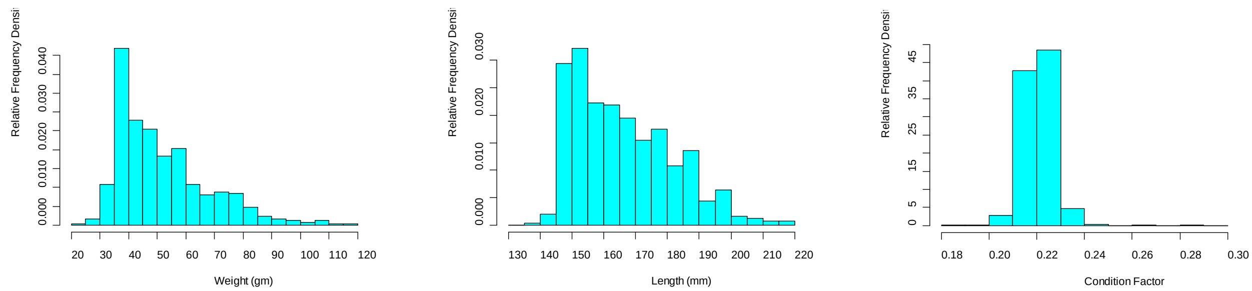
Figure 3.2. Arrival distribution plots for yearling Chinook salmon smolt at (a) Crescent Bar and (b) Sunland Estates detection arrays. Times are adjusted relative to the Rocky Reach tailrace release time.

Table 3.6. Range and median for fish length of acoustic-tagged, run-of-river yearling Chinook salmon smolts by release group in the 2010 survival study.

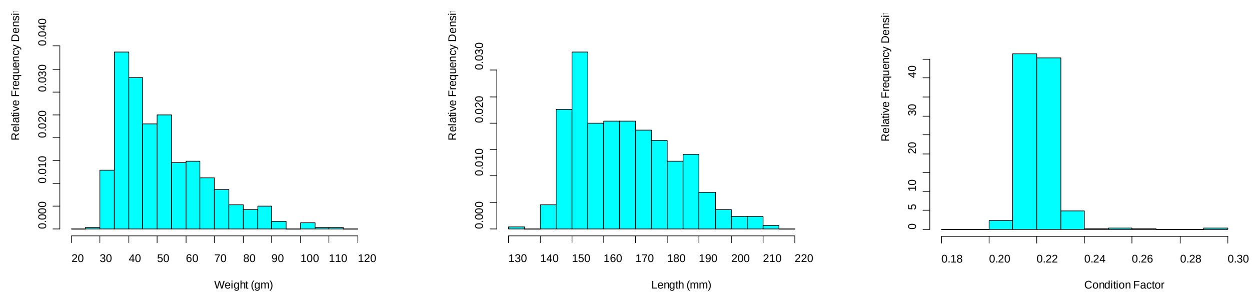
	Rocky Reach Dam		Wenatchee		Rock Island Dam	
Release	Median (mm)	Range (mm)	Median (mm)	Range (mm)	Median (mm)	Range (mm)
1	172.5	139.0-198.0	173.0	141.0-194.0	170.0	154.0-190.0
2	166.0	148.0-190.0	165.0	146.0-203.0	179.0	145.0-216.0
3	180.0	149.0-204.0	184.0	158.0-214.0	185.0	145.0-210.0
4	185.0	160.0-218.0	180.0	150.0-207.0	182.0	150.0-215.0
5	175.0	151.0-205.0	174.0	141.0-192.0	169.0	150.0-210.0
6	171.0	147.0-200.0	170.0	150.0-200.0	167.0	146.0-201.0
7	164.0	147.0-204.0	175.0	131.0-211.0	174.0	153.0-215.0
8	164.0	145.0-199.0	163.5	145.0-187.0	169.0	153.0-205.0
9	152.0	145.0-192.0	151.0	145.0-201.0	162.5	145.0-211.0
10	155.5	145.0-198.0	154.0	146.0-197.0	158.0	148.0-201.0
11	153.0	145.0-178.0	153.5	145.0-194.0	155.0	149.0-176.0
12	155.0	148.0-215.0	155.0	145.0-200.0	160.0	150.0-204.0
13	155.0	147.0-190.0	160.0	149.0-203.0	159.5	149.0-193.0
14	154.0	148.0-219.0	154.0	146.0-190.0	169.0	150.0-210.0
15	175.0	150.0-208.0	167.0	148.0-207.0	164.0	151.0-195.0

Weight (gm) | Length (mm) | Condition Factor

a. Rocky Reach



b. Wenatchee River mouth



c. Rock Island

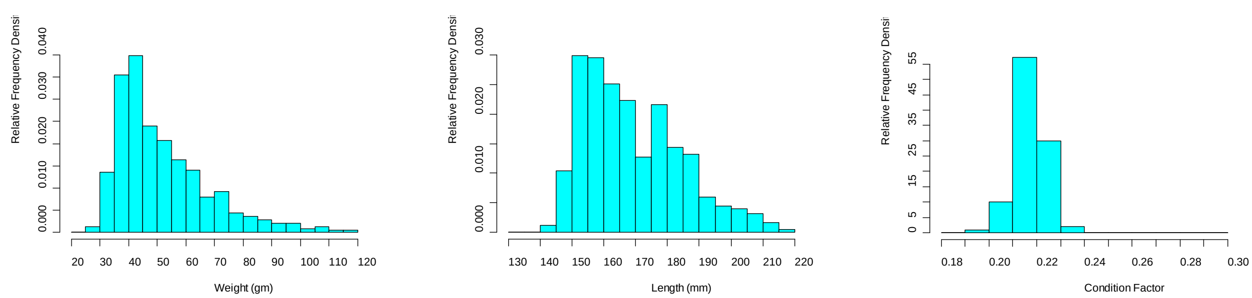


Figure 3.3. Distributions of weight (gm), length (mm), and condition factor for yearling Chinook salmon smolts used in the 2010 acoustic-tag survival study for (a) Rocky Reach, (b) Wenatchee River mouth, and (c) Rock Island tailrace releases.

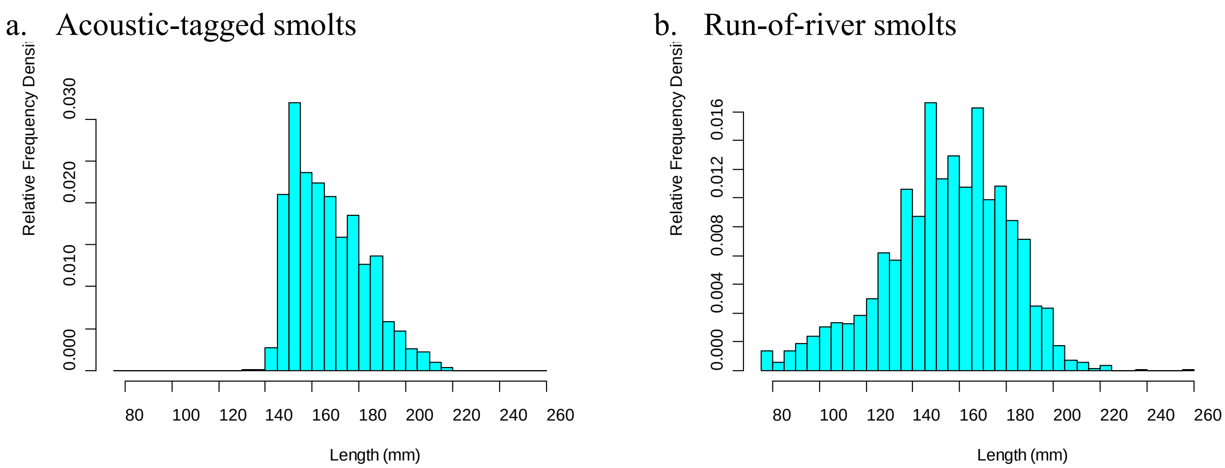


Figure 3.4. Comparisons of length distributions of yearling Chinook salmon smolts (a) used in the acoustic-tag analysis and (b) the run-of-river as measured at the Rocky Reach juvenile collection facility.

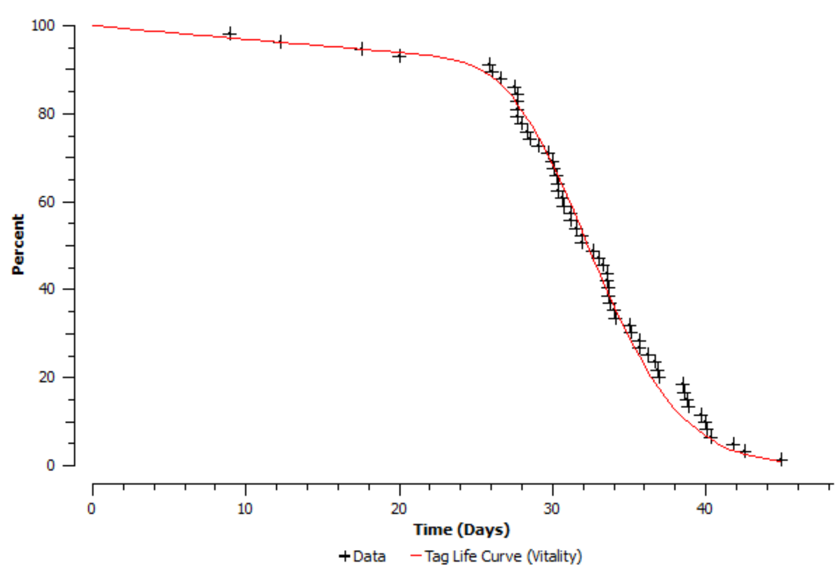
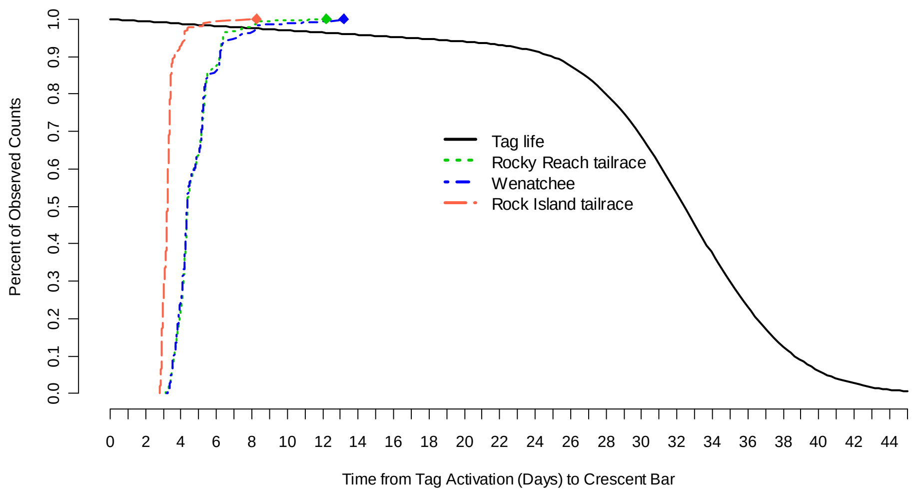


Figure 3.5. Fitted survivorship curve using the vitality model of Li and Anderson (2009) and the observed failure times of *HTI 795Lm* micro-acoustic tags in 2010.

a. Arrival distribution at Crescent Bar.



b. Arrival distribution at Sunland Estates.

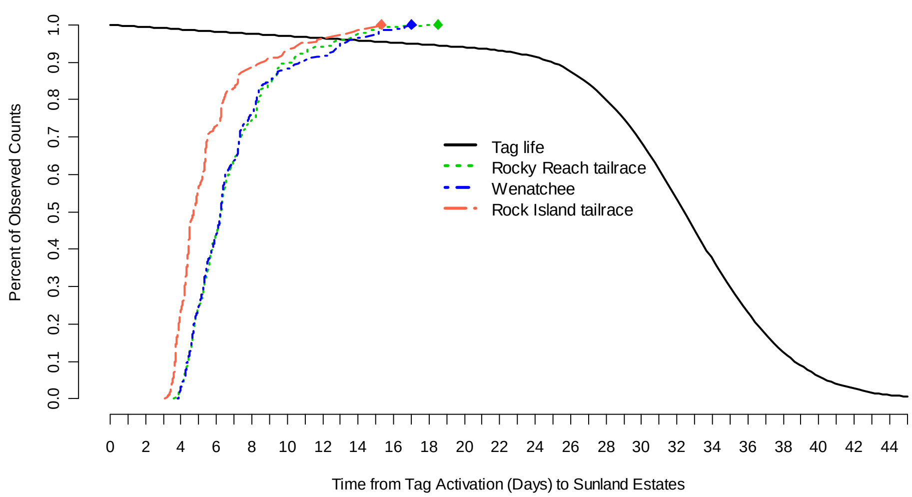


Figure 3.6. Vitality survivorship curve for tag life in 2010 vs. timing of downstream detections of yearling Chinook salmon smolts at (a) Crescent Bar and (b) Sunland Estates.

Table 3.7. Estimates of the probability an acoustic tag was active at a downstream detection site by Chinook salmon release groups in 2010. Standard errors in parentheses.

	Detection location	
Release location	Crescent Bar	Sunland Estates
Rocky Reach tailrace	0.9859 (0.0052)	0.9809 (0.0070)
Wenatchee	0.9859 (0.0052)	0.9809 (0.0070)
Rock Island tailrace	0.9899 (0.0037)	0.9847 (0.0056)

Table 3.8. Downstream capture histories by release group for yearling Chinook salmon used in estimating project passage survival at Rock Island, 2010. A “1” indicates detection, “0” otherwise. Detection sites are at Crescent Bar and Sunland Estates, respectively.

	Detection history				
Release site	11	01	10	00	Total
Rocky Reach tailrace	462	0	10	31	503
Wenatchee	559	0	9	41	609
Rock Island tailrace	492	0	7	2	501

Project passage survival was estimated by the ratio of survival for the treatment groups (i.e., upstream release group: pooled Rocky Reach tailrace and Wenatchee River mouth) $\left(\hat{S}_1 = 0.9486, \quad \widehat{SE} = 0.0092\right)$ to the control group (i.e., Rock Island tailrace) $\left(\hat{S}_2 = 1.0062, \widehat{SE} = 0.0050\right)$ to Sunland Estates. This ratio estimates project passage survival throughout the Rock Island Project to be $\hat{S}_{\mathrm{RI}} = 0.9428\left(\widehat{SE} = 0.0081\right)$ (Table 3.9). This estimate is based on the assumption that Columbia River and Wenatchee River stocks contribute to the run-of-river Chinook salmon smolts at a ratio of 503:609, i.e., 45%:55%. This estimate and associated standard error met Habitat Conservation Plan (HCP) study requirements.

The resulting survival estimate for the Rock Island project of $\hat{S}_{\mathrm{RI}}$ = 0.9486 was computed as a quotient of two survival estimates with the denominator greater than 1 (Table 3.9). It is recommended that the survival for the control group (i.e., $\hat{S}_2$ = 1.0062) not be adjusted downward to 1.0 for purposes of estimating project survival. The value 1.0062 for the control survival resulted from an unadjusted survival estimate of 0.9960 corrected for the probability of tag life of 0.9899. If the tag-life adjustment in the denominator was too great, it would also be too high for the treatment survival estimate in the numerator of $\hat{S}_{\mathrm{RI}}$. Adjusting one contribution to $\hat{S}_{\mathrm{RI}}$ and not the other could produce systematic bias that the ratio estimator helps to avoid.

It may be interesting to note the survival estimates for Rocky Reach tailrace and Wenatchee River mouth releases to Crescent Bar were $\hat{S}$ = 0.9515 $\left(\widehat{SE} = 0.0119\right)$ and $\hat{S}$ = 0.9457 $\left(\widehat{SE} = 0.0114\right)$, respectively. These reach survival estimates are not significantly different ($P = 0.7249$) despite the shorter reach for the Wenatchee River mouth release group to Crescent Bar. Mean travel times differed by approximately 2 hours.

3.2 Steelhead Smolts

3.2.1 Examination for Tagger Effects

A total of six taggers were responsible for tagging the steelhead smolts in this study. The relative contributions of each tagger to the upstream and downstream release groups were homogenous $\left(P\left(\chi_5^2 \geq 0.3361\right) = 0.9969\right)$ (Table 3.10). The survivals of the fish tagged by the different taggers were homogeneous, indicating no significant tagger effect (Table 3.10, Table 3.11). Consequently, all fish, regardless of tagger, were used in the survival analysis.

Table 3.9. Estimated probabilities of survival and detection (adjusted for tag failure) for the yearling Chinook salmon smolts released from Rocky Reach tailrace and Wenatchee (pooled), and Rock Island tailrace. Standard errors in parentheses.

Release location	$\hat{S}$ Release to Crescent Bar	λ	$\hat{S}_{\text{Project}}$
Rocky Reach tailrace & Wenatchee	0.9486 (0.0092)	0.9868 (0.0042)	0.9428 (0.0081)
Rock Island tailrace	1.0062 (0.0050)	0.9912 (0.0053)	
	Detection probability at Sunland Estates		
Rocky Reach tailrace & Wenatchee	1.0000 (<0.0001)		
Rock Island tailrace	1.0000 (<0.0001)		

Table 3.10. Number of steelhead smolts tagged at each release site by tagger in 2010. The distribution of tagging effort for the seven taggers, at the release sites was homogeneous $\left(P(\chi_5^2 \geq 0.3361) = 0.9969\right)$.

Tagger	#1	#2	#3	#4	#5	#6
Rocky Reach tailrace steelhead (day)	69	102	67	100	63	99
Rock Island tailrace steelhead (day)	64	102	67	99	67	101
Total tags	133	204	134	199	130	200

Table 3.11. Reach survival for steelhead smolts by tagger for releases from Rocky Reach and Rock Island tailraces to Crescent Bar in 2010. No tests of homogeneity of survival were significantly (Table 3.12) (α < 0.05).

		CJS Survival			
Release Site	Tagger	RR Boat R. Zone to RI Hydropark	RI Hydropark to RI Boat R. Zone	RI Boat R. Zone to Crescent Bar	Overall
Rocky Reach Tailrace (Day)	#1	0.9855 (0.0143)	1.0000 (0.0054)	1.0000 (0.0054)	0.9855
	#2	1.0000 (0.0044)	1.0000 (0.0044)	0.9412 (0.0233)	0.9412
	#3	1.0000 (0.0055)	1.0000 (0.0055)	0.9552 (0.0253)	0.9552
	#4	0.9800 (0.0140)	1.0000 (0.0045)	0.9388 (0.0242)	0.9200
	#5	0.9841 (0.0157)	1.0000 (0.0057)	0.9677 (0.0224)	0.9523
	#6	0.9899 (0.0100)	1.0000 (0.0045)	0.9388 (0.0242)	0.9293
Rock Island Tailrace (Day)	#1			1.0000 (0.0056)	1.0000
	#2			0.9804 (0.0137)	0.9804
	#3			0.9851 (0.0147)	0.9851
	#4			0.9596 (0.0198)	0.9596
	#5			0.9851 (0.0147)	0.9851
	#6			0.9805 (0.0138)	0.9805

Table 3.12. *F*-tests of homogeneous reach survivals for steelhead smolts by tagger for releases from Rocky Reach and Rock Island tailraces. No tests were significant (α < 0.05).

Release Site		RR Boat R. Zone to RI Hydropark	RI Hydropark to RI Boat R. Zone	RI Boat R. Zone to Crescent Bar
Rocky Reach tailrace	*F*	0.5348	0.0000	0.0571
	P-value	0.7501	1.0000	0.9979
Rock Island tailrace	*F*			0.8263
	P-value			0.5363

3.2.2 Examination of Lot Effects

Tags from the various tag lots were homogeneously distributed to the Rocky Reach and Rock Island tailrace groups $\left(P\left(\chi^2_{23} \geq 0.1091\right) = 1\right)$ (Table 3.13). Furthermore, reach survival estimates by tag lot were found to be homogeneous (P < 0.05) (Table 3.14). Consequently, all fish, regardless of the source of the tag, were used in the survival analysis.

3.2.3 Downstream Mixing of Release Groups

Travel times were very short for steelhead smolts, with arrivals peaking 1–2 days after release (Figure 3.7). The Rocky Reach and Rock Island tailrace release groups were offset at the downstream detection location by approximately ½ day (Figure 3.7).

3.2.4 Size Distributions

The steelhead smolts used in the acoustic-tag study ranged in length from 146 m to 231 mm with a median length of 193 mm (Table 3.15). The length, weight, and condition factor distributions were similar between the Rocky Reach and Rock Island tailrace releases (Figure 3.8). The length distribution of the acoustic-tagged steelhead was slightly truncated in both the lower and upper tails compared to steelhead measured at the Rocky Reach juvenile sampling facility (Figure 3.9).

3.2.5 Tag-Life Adjustments

The same tag-life data used for the yearling Chinook salmon smolts (see Section 3.1.5) were also used for the steelhead survival study at Rock Island. Based on steelhead downstream arrival distributions (Figure 3.10), the probabilities tags were active upon fish arrival at the downstream detection sites were all greater than 0.98 (Table 3.16).

3.2.6 Project Passage Survival Estimate – Steelhead

The capture histories of the acoustic-tagged steelhead smolts released from Rocky Reach and Rock Island tailraces at the Crescent Bar and Sunland Estates detection sites were used to estimate project passage survival (Table 3.17). The ratio of the reach survivals from Rocky Reach tailrace to Crescent Bar $\left(\hat{S} = 0.9551, \widehat{SE} = 0.0113\right)$ and Rock Island tailrace to Crescent Bar $\left(\hat{S} = 0.9895, \quad \widehat{SE} = 0.0028\right)$ was used to calculate project passage survival at Rock Island (Table 3.18). The project passage survival of steelhead smolts in 2010 was estimated to be $\hat{S}_{\mathrm{RI}} = 0.9652$ $\left(\widehat{SE} = 0.0122\right)$. This estimate and associated standard error met HCP survival study requirements.

Table 3.13. Tests of homogeneity shows that the tag lots were well distributed across the steelhead release sites $\left(P\left(\chi^2_{23} \geq 0.1019\right) \approx 1\right)$.

Tag lot	10201	10202	10203	10204	10205	10206	10207	10208
Rocky Reach tailrace	17	22	16	29	22	24	25	23
Rock Island tailrace	17	22	17	29	21	23	25	23
Total tags	34	44	33	58	43	47	50	46

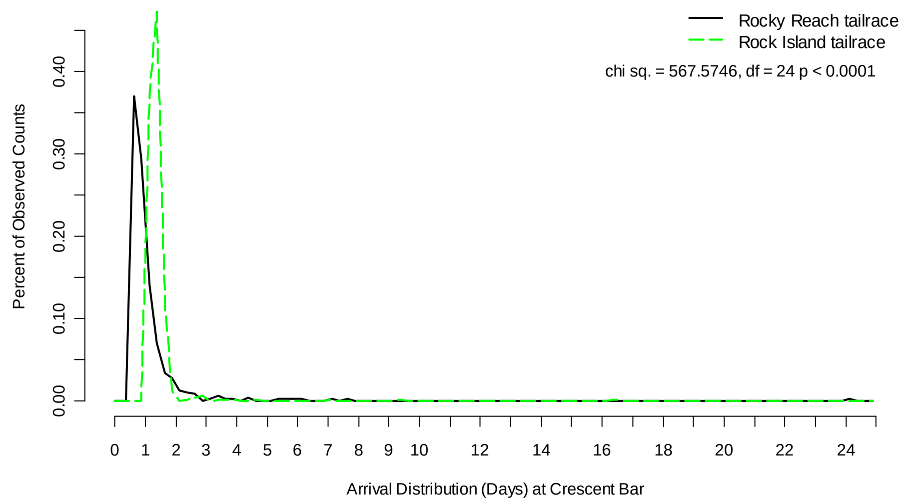
Tag lot	10209	10210	10211	10212	10213	10215	10216	10217
Rocky Reach tailrace	12	22	18	27	29	20	18	15
Rock Island tailrace	12	22	18	27	29	20	19	15
Total tags	24	44	36	54	58	40	37	30

Tag lot	10218	10219	10220	10221	10222	10258	10259	10260
Rocky Reach tailrace	17	19	23	25	3	23	27	24
Rock Island tailrace	17	19	23	25	3	23	27	24
Total tags	34	38	46	50	6	46	54	48

Table 3.14. Reach survival for steelhead salmon smolts by tag lot from each release site to Crescent Bar in 2010. Tests of homogeneity were not significant ($P > 0.05$). Standard errors in parentheses.

Tag lot	Rocky Reach tailrace to Crescent Bar	Rock Island tailrace to Crescent Bar
10201	0.8824 (0.0781)	1.0000 (0.0108)
10202	0.9091 (0.0613)	0.9545 (0.0444)
10203	1.0000 (0.0112)	1.0000 (0.0108)
10204	1.0000 (0.0083)	1.0000 (0.0083)
10205	1.0000 (0.0095)	0.9524 (0.0465)
10206	0.9167 (0.0564)	1.0000 (0.0093)
10207	0.9200 (0.0543)	0.9600 (0.0392)
10208	0.9565 (0.0425)	0.9565 (0.0425)
10209	0.9167 (0.0798)	1.0000 (0.0129)
10210	1.0000 (0.0095)	1.0000 (0.0095)
10211	0.9444 (0.0540)	0.8333 (0.0878)
10212	0.9630 (0.0363)	0.9583 (0.0408)
10213	0.8276 (0.0701)	1.0000 (0.0000)
10215	0.9000 (0.0671)	1.0000 (0.0100)
10216	0.9444 (0.0540)	1.0000 (0.0103)
10217	0.9333 (0.0644)	1.0000 (0.0115)
10218	0.8824 (0.0781)	0.9412 (0.0571)
10219	0.8947 (0.0704)	1.0000 (0.0103)
10220	1.0000 (0.0093)	1.0000 (0.0093)
10221	0.9200 (0.0543)	1.0000 (0.0089)
10222	1.0000 (0.0258)	1.0000 (0.0258)
10258	1.0000 (0.0093)	1.0000 (0.0093)
10259	1.0000 (0.0086)	1.0000 (0.0086)
10260	0.9630 (0.0363)	0.9583 (0.0408)
F-test	0.941	1.432
$P(>F_{23})$	0.542	0.082

a. Steelhead arrival distribution at Crescent Bar.



b. Steelhead arrival distribution at Sunland Estates.

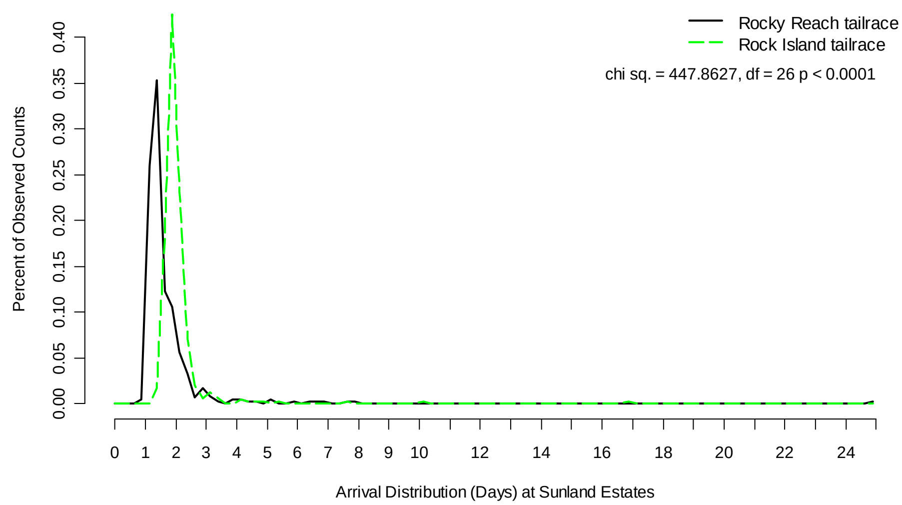


Figure 3.7. Arrival distribution plots for steelhead smolts at (a) Crescent Bar and (b) Sunland Estates detection arrays by release group. Times are adjusted relative to the Rocky Reach tailrace release.

Table 3.15. Range and median size of acoustic-tagged steelhead smolts by release group in the 2010 survival study.

	Rocky Reach Dam		Rock Island Dam	
Release	Median (mm)	Range (mm)	Median (mm)	Range (mm)
1	210	172-225	204.5	157-227
2	194	158-225	202	158-227
3	188	154-228	200	166-227
4	197	119-227	193	160-229
5	193	160-229	195.5	163-224
6	197	149-231	204	169-229
7	191	148-229	195	158-223
8	195	156-229	196	159-229
9	201	174-228	191.5	165-225
10	195	161-224	193	158-219
11	183	150-215	192	156-220
12	180.5	148-224	191	153-226
13	175.5	156-217	186	160-225
14	179	152-226	180	155-224
15	176	101-223	186	157-229

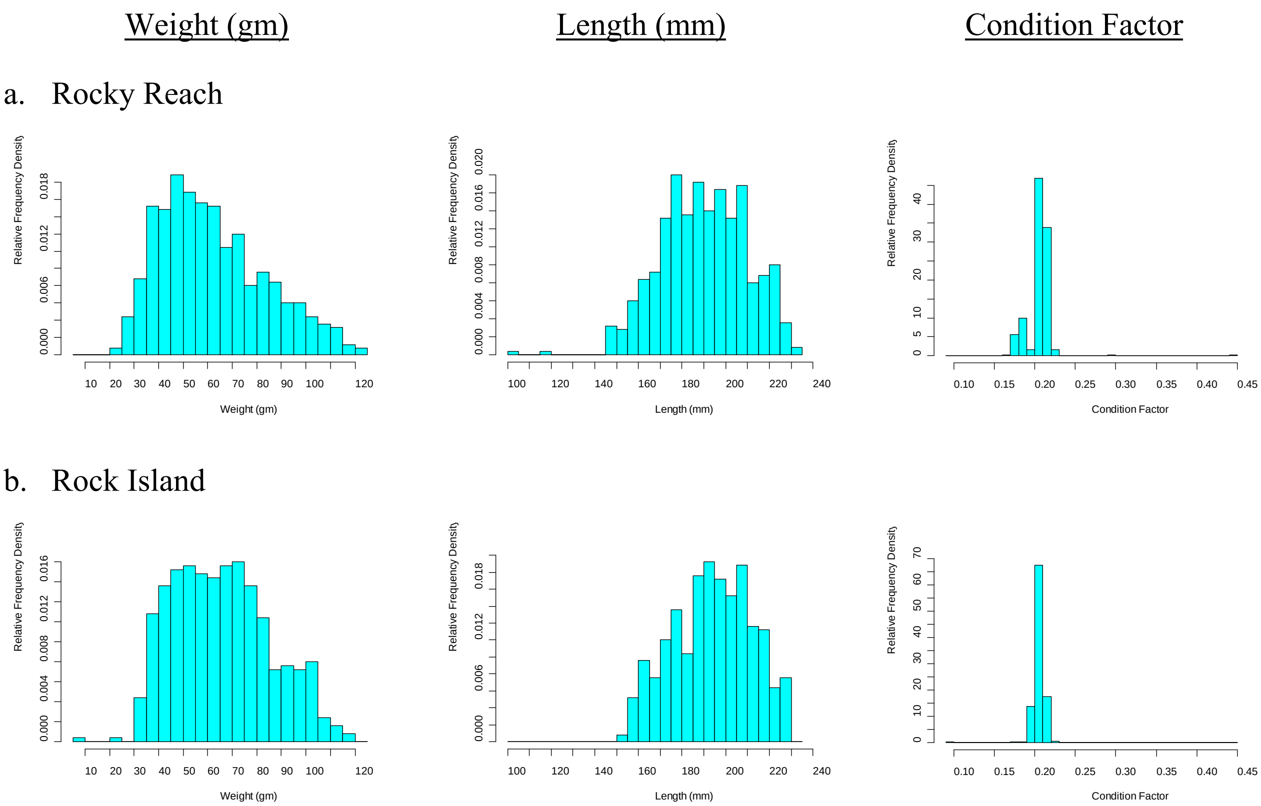


Figure 3.8. Distributions of weight (gm), length (mm), and condition factor for steelhead smolts used in the 2010 acoustic-tag survival study for (a) Rocky Reach and (b) Rock Island tailrace releases.

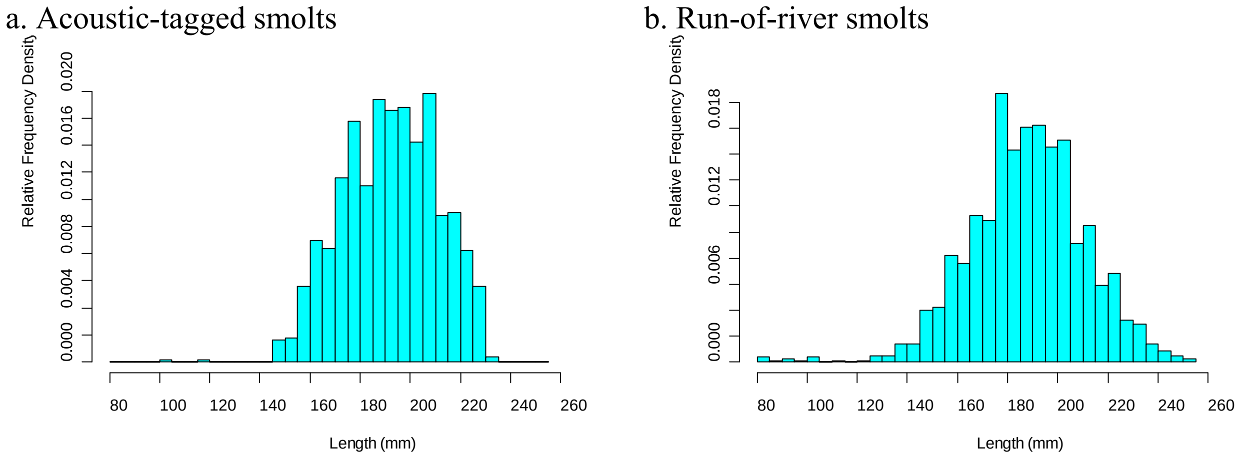
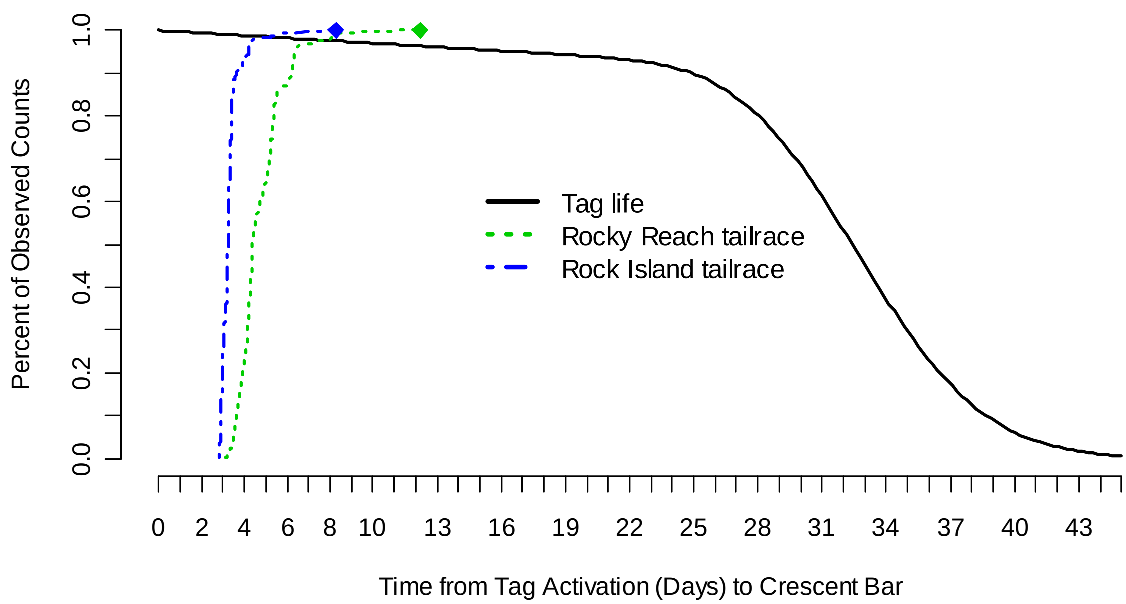


Figure 3.9. Comparisons of length distributions of steelhead smolts (a) used in the acoustic-tag analysis and (b) the run-of-river as measured at the Rocky Reach juvenile collection facility.

a. Steelhead arrival distribution at Crescent Bar.



b. Steelhead arrival distribution at Sunland Estates.

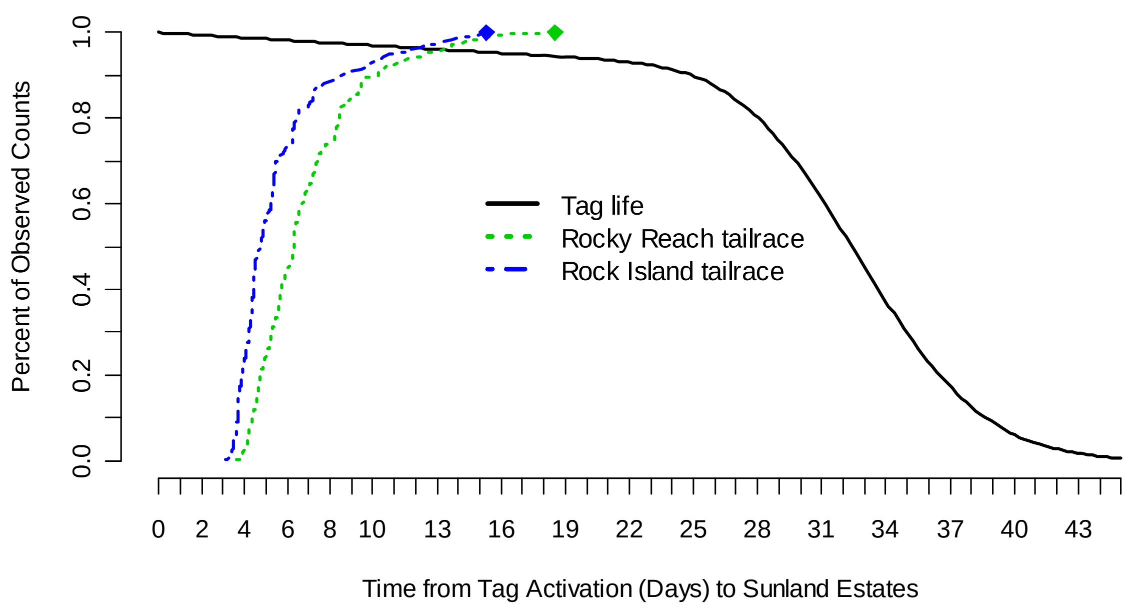


Figure 3.10. Vitality survivorship curve for tag life vs. timing of downstream detections of steelhead smolts at (a) Crescent Bar and (b) Sunland Estates.

Table 3.16. Estimated probabilities of an acoustic-tag being active when a steelhead smolt arrived at Crescent Bar or Sunland Estates for releases from Rocky Reach and Rock Island tailraces. Standard errors in parentheses.

	Detection location	
Release location	Crescent Bar	Sunland Estates
Rocky Reach tailrace	0.9884 (0.0043)	0.9865 (0.0050)
Rock Island tailrace	0.9904 (0.0037)	0.9885 (0.0044)

Table 3.17. Capture histories for steelhead smolt releases from Rocky Reach and Rock Island tailraces. A “1” indicates detection, “0” otherwise. Detection locations were at Crescent Bar and Sunland Estates, respectively.

	Detection History				
Release site	11	01	10	00	Total
Rocky Reach tailrace	465	0	7	28	500
Rock Island tailrace	477	1	12	10	500

Table 3.18. Estimated probabilities of survival (adjusted for tag-failure) and detection for the steelhead smolt released from Rocky Reach and Rock Island tailraces. Standard errors in parentheses.

Release location	$\hat{S}$ Release to Crescent Bar	λ	$\hat{S}_{\text{Project}}$
Rocky Reach tailrace	0.9551 (0.0113)	0.9870 (0.0042)	0.9652 (0.0122)
Rock Island tailrace	0.9895 (0.0028)	0.9774 (0.0070)	
	Detection probability at Sunland Estates		
Rocky Reach tailrace	1.0000 (<0.0001)		
Rock Island tailrace	0.9979 (0.0021)		

4. Summary and Conclusions

The 2010 acoustic-tag survival study of yearling Chinook salmon passage through the Rock Island project is the third year of survival estimates under 10% project spill. The 2010 study produced a survival estimate for yearling Chinook salmon of $\hat{S}_{\mathrm{RI}} = 0.9428\left(\widehat{\mathrm{SE}} = 0.0081\right)$. The point estimate exceeded the HCP requirement of $S \geq 0.93$, and the estimated standard error met the requirement of $\mathrm{SE} \leq 0.025$. The three year, 2007–2010, arithmetic average for project passage survival at Rock Island for yearling Chinook salmon is $\hat{\bar{S}} = 0.9375$ (Table 4.1).

The 2010 steelhead study was the second year of project passage survival estimation for that species at Rock Island. The 2010 study produced a survival estimate of $\hat{S}_{\mathrm{RI}} = 0.9652\left(\widehat{\mathrm{SE}} = 0.0122\right)$. The point estimate and associated standard error met HCP requirements. The two-year (i.e., 2008, 2010) arithmetic average for steelhead passage survival at Rock Island is calculated to be $\hat{\bar{S}} = 0.9675$ (Table 4.1).

Average spring flow at Rock Island, 1–30 May 2010 was 120.5 kcfs. Historically, 1995–2009, average daily river flows ranged from 61.0 to 254.2 kcfs, with a 15-year average of 152.3 kcfs (F). The average flow in 2010 was ranked the second smallest in the last 16 years. Average percent spill during the 2010 survival trials was 10.0%.

Table 4.1. Summary of yearling Chinook salmon, steelhead, and sockeye salmon smolt survival estimates at Rock Island. Survival estimates for individual studies, associated standard errors (in parentheses), and cross-year arithmetic averages are presented.

Species	Year	PIT-tag	Acoustic-tag
Yearling Chinook salmon	2002**	0.956 (0.025)	0.952 (0.026)
	2003**	0.934 (0.012)	0.939 (0.016)
	2004**	0.914 (0.023)	0.942 (0.012)
	2002–2004 Arith. Avg.:	**0.9347**	**0.9443**
	2007*		0.9725 (0.019)
	2008*		0.8972 (0.016)
	2010*		0.9428 (0.0081)
		2007-2010 Arith. Avg.:	**0.9375**
Steelhead	2004**		0.9658 (0.0114)
	2005**		0.9158 (0.0154)
	2006**		0.9396 (0.0132)
		2004-2006 Arith. Avg.:	**0.9404**
	2008*		0.9699 (0.0133)
	2010*		0.9652 (0.0122)
		2008, 2010 Arith. Avg.:	**0.9675**
Sockeye salmon	2007+		0.9188 (0.0123)
	2008*		0.9335 (0.0163)
	2009*		0.9457 (0.0159)
		2007–2009 Arith. Avg.:	**0.9327**

* Paired-release study conducted with 10% project spill
** Paired-release study conducted with 20% project spill
\+ Single-release survival estimate with 10% project spill

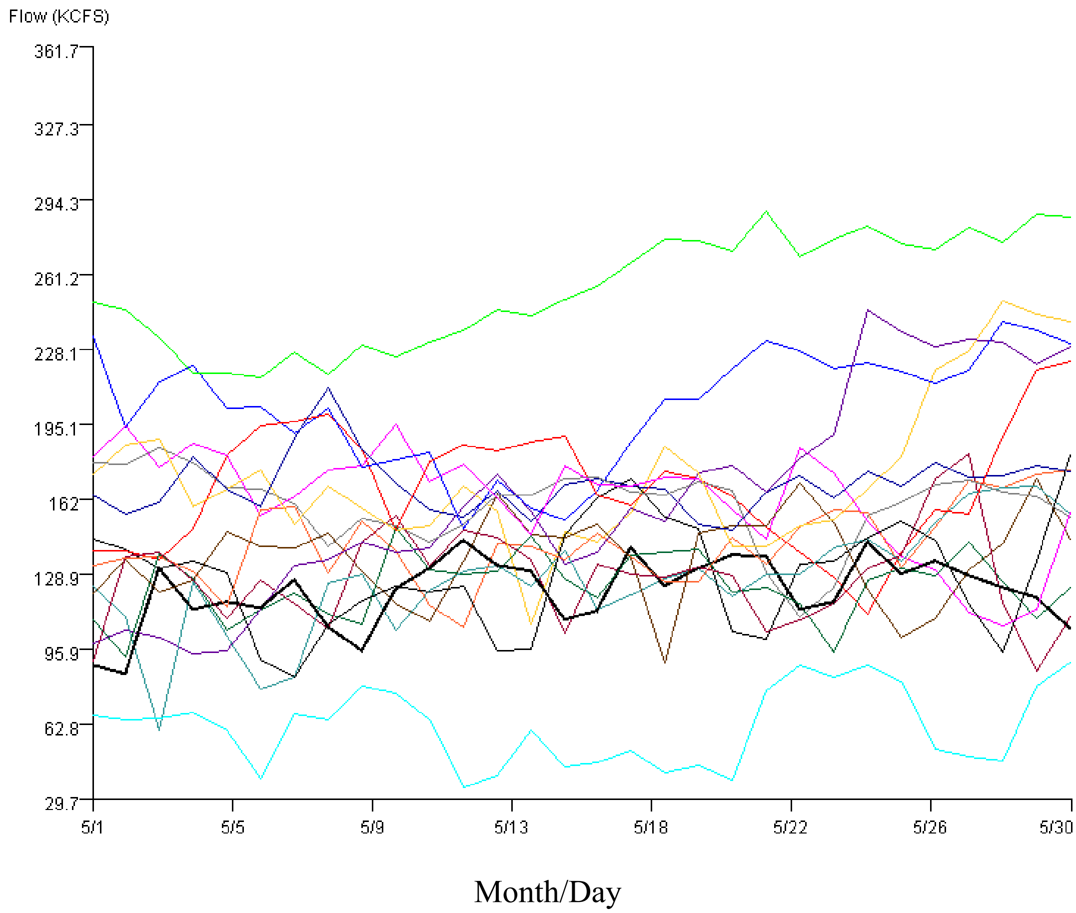


Figure 4.1. Flow at Rock Island Dam for the years 1995-2010 from 1–30 May. The darker black line is the flow observed in 2010.

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Appendix A

Statistical Methods and Tests of Assumptions for the
2010 Acoustic-Tagged Yearling Chinook Salmon and Steelhead Survival Study
at Rock Island Hydroproject

A1.0 Introduction

In 2010, yearling Chinook salmon and steelhead smolts were used to estimate project passage survival at Rock Island Dam. The project passage survival was based on a paired release-recapture design conducted over the course of the spring outmigration.

A2.0 Release-Recapture Design

Estimates of Rock Island project passage survival were based on paired releases (i.e., R_1 and R_2) of acoustic-tagged smolts from Rocky Reach and Rock Island tailraces (Figure A1). Downstream hydrophone detection arrays were located at Crescent Bar and Sunland Estates as in previous years.

A3.0 Statistical Analysis

A3.1 Survival Estimates

In estimating Rock Island passage survival, the fully parameterized release-recapture model can be written as follows:

$$\begin{aligned} L = &\binom{R_1}{\underset{\sim}{n}}\left(S_{11}p_{11}\lambda_1\right)^{n_{11}}\left(S_{11}\left(1-p_{11}\right)\lambda_1\right)^{n_{01}}\left(S_{11}p_{11}\left(1-\lambda_1\right)\right)^{n_{10}} \\ &\cdot\left(\left(1-S_{11}\right)+S_{11}\left(1-p_{11}\right)\left(1-\lambda_1\right)\right)^{n_{00}} \\ &\cdot\binom{R_2}{\underset{\sim}{m}}\left(S_{21}p_{21}\lambda_2\right)^{m_{11}}\left(S_{21}\left(1-p_{21}\right)\lambda_2\right)^{m_{01}}\left(S_{21}p_2\left(1-\lambda_2\right)\right)^{m_{10}} \\ &\cdot\left(\left(1-S_{21}\right)+S_{21}\left(1-p_{21}\right)\left(1-\lambda_2\right)\right)^{m_{00}} \end{aligned} \tag{A1}$$

where $\underset{\sim}{n}$ and $\underset{\sim}{m}$ are the vectors of counts associated with the downstream capture histories of releases R_1 and R_2, respectively (Figure A1).

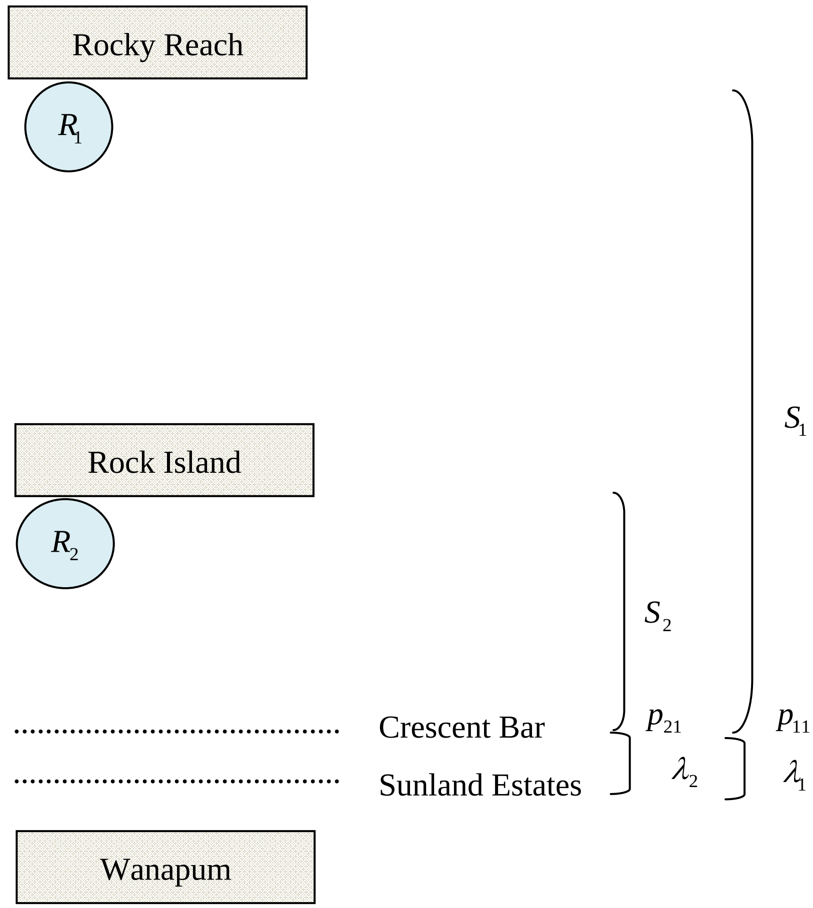
In the case of tag failure, additional parameters need to be added to the above model (A2), based on the methods of Townsend et al. (2006). Table A1 presents the expected probabilities of occurrence for each of the possible capture histories under tag-failure where:

L_{11} = probability a tag from release R_1 survives the first reach,

$P\left(L_{12}\middle|L_{11}\right)$ = conditional probability a tag from release R_1 survives the second reach given its survival to the first reach,

L_{12} = probability a tag from release R_1 survives both reach 1 and reach 2,

L_{21} = probability a tag from release R_2 survives the first reach,



Rock Island project survival $\hat{S}_{RI} = \dfrac{\hat{S}_1}{\hat{S}_2}$

Figure A1. Schematic of the paired release-recapture design to estimate project passage survival at Rock Island Dam, indicating estimable parameters.

Table A1. Detection histories and expected probabilities of occurrences for releases R_1 and R_2 for the acoustic-tag study.

Release	Detection History	Expected Probabilities
R_1	11	$S_{11}L_{11}p_{11}P\left(L_{12} \middle\| L_{11}\right)\lambda_1 = S_{11}p_{11}L_{12}\lambda_1$
	01	$S_{11}L_{11}\left(1-p_{11}\right)P\left(L_{12} \middle\| L_{11}\right)\lambda_1 = S_{11}\left(1-p_{11}\right)L_{12}\lambda_1$
	10	$S_{11}L_{11}p_{11}\left[1-P\left(L_{12} \middle\| L_{11}\right)\lambda_1\right] = S_{11}p_{11}\left(L_{11}-L_{12}\lambda_1\right)$
	00	$\left(1-S_{11}\right)+S_{11}\left[\left(1-L_{11}\right)+L_{11}\left(1-p_{11}\right)-L_{12}\left(1-p_{11}\right)\lambda_1\right]$
R_2	11	$S_{21}p_{21}P\left(L_{22} \middle\| L_{21}\right)\lambda_2 = S_{21}p_{21}L_{22}\lambda_2$
	01	$S_{21}L_{21}\left(1-p_{21}\right)P\left(L_{22} \middle\| L_{21}\right)\lambda_2 = S_{21}\left(1-p_{21}\right)L_{22}\lambda_2$
	10	$S_{21}p_{21}\left[1-P\left(L_{22} \middle\| L_{21}\right)\lambda_2\right] = S_{21}p_{21}\left(L_{21}-L_{22}\lambda_2\right)$
	00	$\left(1-S_{21}\right)+S_{21}\left[\left(1-L_{21}\right)+L_{21}\left(1-p_{21}\right)-L_{22}\left(1-p_{21}\right)\lambda_2\right]$

$P\left(L_{22} \middle| L_{21}\right)$ = conditional probability a tag from release R_2 survives the second reach conditional on its surviving the first reach,

L_{22} = probability a tag from release R_2 survives both reach 1 and reach 2.

The joint likelihood can be expressed as

$$L = L\left(S_{11}, p_{11}, \lambda_1 \middle| R_1, \underset{\sim}{n}, \underset{\sim}{L}_1\right) \cdot L\left(S_{21}, p_{21}, \lambda_2 \middle| R_2, \underset{\sim}{m}, \underset{\sim}{L}_2\right). \tag{A2}$$

The estimates of survival from likelihood model (A2) should be more reliable for it takes into account tag-life probabilities less than one.

The estimates of the survival and capture parameters in likelihood model (A2) were calculated, treating the estimates of tag-life (i.e., $\hat{L}_{12}$, $\hat{L}_{11}$, $\hat{L}_{21}$, and $\hat{L}_{22}$) as known constants. However, to calculate a realistic variance estimator for the survival parameters, the error in the estimation of the tag-life probabilities must be incorporated into an overall variance calculation. The variance of the survival estimates was calculated using the total variance formula

$$\operatorname{Var}\left(\hat{S}_{RI}\right) = \operatorname{Var}_{\hat{\underset{\sim}{L}}}\left[E\left(\hat{S}_{RI} \middle| \hat{\underset{\sim}{L}}\right)\right] + E_{\hat{\underset{\sim}{L}}}\left[\operatorname{Var}\left(\hat{S}_{RI} \middle| \hat{\underset{\sim}{L}}\right)\right]. \tag{A3}$$

The above variance can therefore be estimated in stages using the expression

$$\widehat{\operatorname{Var}}\left(\hat{S}_{RI}\right) = s^2_{\hat{S}_{RI}|\hat{L}} + \operatorname{Var}\left(\hat{S}_{RI} \middle| \hat{\underset{\sim}{L}}\right). \tag{A4}$$

The second term in Eq. (A4) was derived from the maximum likelihood model (A2), conditioned on the tag-life probabilities (i.e., $\hat{\underset{\sim}{L}}$). The first variance component in Eq. (A4) was calculated using bootstrap resampling techniques (Efron and Tibshirani 1993). Alternative estimates of $\hat{\underset{\sim}{L}}$ was computed by bootstrapping both the observed tag-life data and travel-time data. For each estimated vector of tag-life parameters, survival was estimated using likelihood model (A2). One thousand bootstrap estimates of the tag-life parameters were calculated along with the corresponding conditional maximum likelihood estimates of survival. The first variance component in Eq. (A4) was then estimated by the quantity

$$s^2_{\hat{S}_{RI}|\hat{L}} = \frac{\sum_{b=1}^{1000}\left(\hat{S}_b - \hat{\bar{S}}\right)^2}{(1000-1)}$$

where $\hat{S}_b$ = the bth bootstrap estimate of survival $(b = 1, \ldots, 1000)$,

$$\hat{\bar{S}} = \frac{\sum_{b=1}^{1000} \hat{S}_b}{1000}.$$

Use of Eqs. (A3) and (A4) also permitted examining the contribution of the sampling error in the tag-life parameters to the overall variance in survival estimates.

A3.2 Estimating Tag Life

In 2010, 59 Lm tags were used to characterize tag life from systematically sampling tags used in the yearling Chinook salmon and steelhead releases. The tags were initiated and continually monitored in water until they failed. The vitality model of Li and Anderson (2009) was used to characterize the failure-time data.

The probability density function (pdf) for the vitality model can be written as

$$f(t) = 1 - \left(\Phi\left(\frac{1-rt}{\sqrt{u^2 + S^2 t}} \right) - e^{\left(\frac{2u^2 r^2}{S^4} + \frac{2r}{S^2} \right)} \Phi\left(\frac{2u^2 r + rt + 1}{\sqrt{u^2 + S^2 t}} \right) \right)^{e^{-kt}}$$

where

Φ = cumulative normal distribution,

r = average wear rate of components,

S = standard deviation in wear rate,

k = rate of accidental failure,

u = standard deviation in quality of original components.

The random failure component, in addition to battery discharge, gives the vitality model additional latitude to fit tag-life data not found in other failure-time distributions such as the Weibull or Gompertz. Parameter estimation was based on maximum likelihood estimation.

A3.3 Tests of Assumptions

Tests Within a Release. The detection design for 2009 (Figure A1) does not permit calculation of Burnham et al. (1987) Tests 2 and 3. Because smolts are not physically rehandled during detection, there was no reason to believe upstream detection would have an effect on downstream survival and detection processes.

Tests of Mixing. For the estimates of project survival to be valid, the detection data need to conform to the assumptions of statistical model (A1). One assumption was the downstream mixing of release groups. Chi-square R × C contingency tables were used to test the assumption of homogeneous arrival distributions for the various paired-releases. The chi-square contingency table tests of homogeneity was of the form:

		Release	
		R_1	R_2
Arrival Date	1		
	2		
	$\vdots$		
	D		

A4.0 Literature Cited

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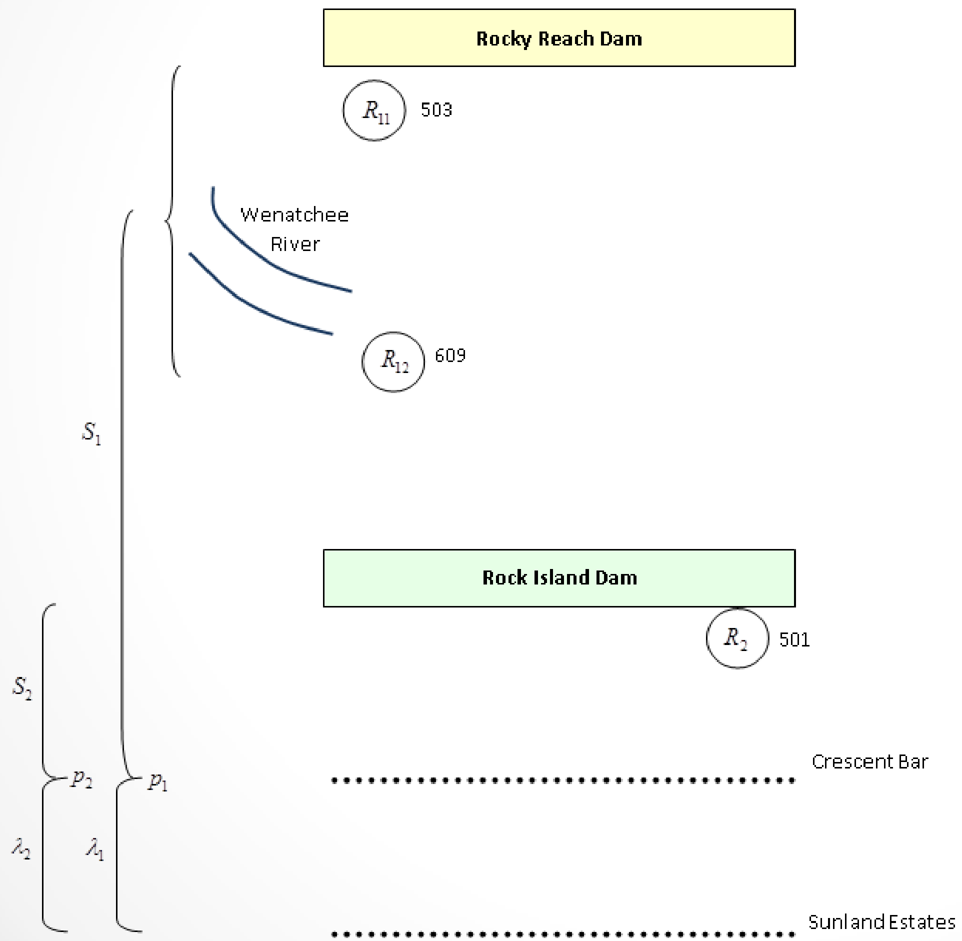
Attachment C

Survival of Yearling Chinook Salmon and Steelhead Rock Island Project, 2010

John R. Skalski
University of Washington

Yearling Chinook Salmon
Rock Island Dam

Release-Recapture Design: Yearling Chinook Salmon



Release Ratio

$$\frac{R_{11}}{R_{12}} = \frac{503}{609} \rightarrow 45:55$$

Rock Island Passage Survival

$$\hat{S}_{RI} = \frac{\hat{S}_1}{\hat{S}_2}$$

Homogeneous Tagger Effort

Yearling Chinook Salmon

Location	Tagger #1	Tagger #2	Tagger #3
Rocky Reach tailrace	171	165	167
Wenatchee River mouth	204	204	201
Rock Island tailrace	170	166	165

$$P\left(\chi_4^2 \geq 0.0709\right) = 0.9994$$

Homogeneous Survivals of Fish by Tagger

Release Site	Tagger	Release to RI Hydropark	RI Hydropark to RI BRZ	RI BRZ to Crescent Bar
RR tailrace	#1	1.0000 (0.0034)	0.9942 (0.0057)	0.9529 (0.0162)
	#2	1.0000 (0.0000)	1.0000 (0.0000)	0.9212 (0.0210)
	#3	0.9880 (0.0084)	0.9939 (0.0059)	0.9634 (0.0146)
Wenatchee River	#1	0.9853 (0.0084)	1.0000 (0.0032)	0.9403 (0.0167)
	#2	0.9902 (0.0068)	1.0000 (0.0031)	0.9505 (0.0153)
	#3	0.9900 (0.0069)	1.0000 (0.0032)	0.9397 (0.0169)
RI tailrace	#1			0.9941 (0.0057)
	#2			1.0000 (0.0035)
	#3			0.9939 (0.0059)

Nonsignificant $P \geq 0.173$

Homogeneous Tag-Lot Distribution

Tag Lot	10201	10202	10203	10204	10205	10206	10207	10208	10209	10210	10211	10212
RR tailrace	17	21	21	21	18	21	20	22	11	19	21	20
Wenatchee R.	21	24	25	26	23	24	24	28	13	24	26	25
RI tailrace	17	20	21	21	19	21	20	23	12	19	21	19
Total tags	55	65	67	68	60	66	64	73	36	62	68	64

10213	10215	10216	10217	10218	10219	10220	10221	10222	10258	10259	10260
20	23	21	26	21	24	22	22	12	28	27	25
24	28	26	30	26	30	28	26	13	34	31	30
20	23	21	25	21	25	23	21	10	28	26	25
64	74	68	81	68	79	73	69	35	90	84	80

$$P\left(\chi^2_{46} \geq 0.7373\right) \approx 1.0$$

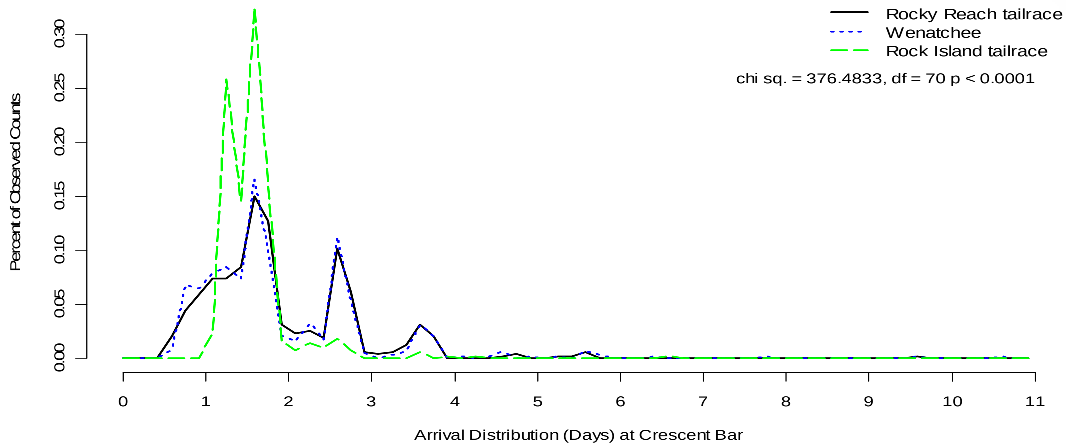
Homogeneous Survivals by Tag Lot

Tag lot	10201	10202	10203	10204	10205	10206	10207	10208	10209	10210	10211	10212	10213
RR tailrace to C. Bar	0.9032 (0.0531)	1.0000 (0.0074)	0.8889 (0.0524)	0.9167 (0.0461)	0.9697 (0.0298)	0.9714 (0.0281)	1.0000 (0.0076)	0.9744 (0.0253)	1.0000 (0.0103)	0.9091 (0.0500)	0.9189 (0.0449)	0.9412 (0.0403)	0.9714 (0.0281)
Wenatchee R. to C. Bar	0.9048 (0.0641)	0.9167 (0.0564)	0.9200 (0.0543)	0.9231 (0.0523)	0.9565 (0.0425)	0.8750 (0.0675)	0.8750 (0.0675)	0.9643 (0.0350)	0.9231 (0.0739)	0.9583 (0.0408)	0.9231 (0.0523)	0.9600 (0.0392)	0.9167 (0.0564)
RI tailrace to C. Bar	1.0000 (0.0108)	1.0000 (0.0100)	1.0000 (0.0098)	1.0000 (0.0098)	1.0000 (0.0103)	1.0000 (0.0098)	1.0000 (0.0100)	1.0000 (0.0093)	1.0000 (0.0129)	1.0000 (0.0103)	1.0000 (0.0098)	0.9474 (0.0512)	1.0000 (0.0100)

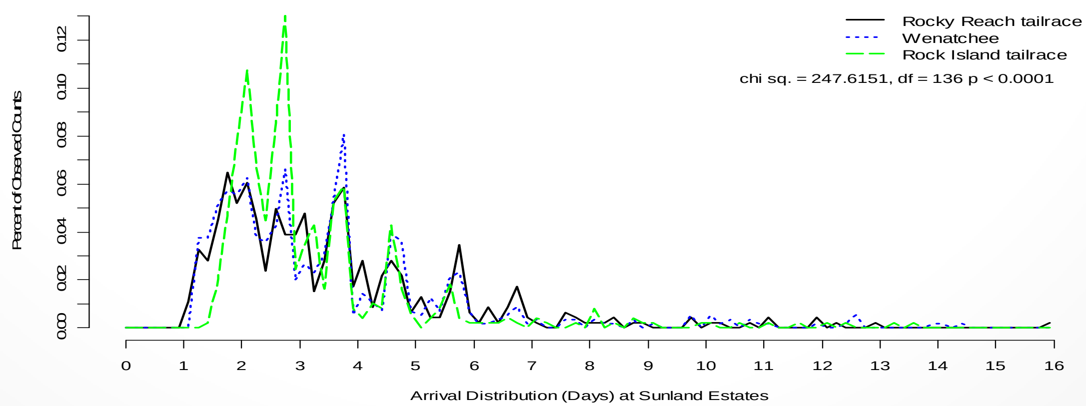
10215	10216	10217	10218	10219	10220	10221	10222	10258	10259	10260	*F*-test	$P\left(F_{23,\infty} > F\right)$
0.9512 (0.0336)	1.0000 (0.0073)	0.9556 (0.0307)	0.9189 (0.0449)	0.8837 (0.0489)	0.9474 (0.0362)	0.9250 (0.0416)	0.9500 (0.0487)	0.9000 (0.0424)	0.9574 (0.0294)	0.8810 (0.0500)	1.031	0.420
0.9643 (0.0350)	0.9615 (0.0377)	0.9000 (0.0548)	1.0000 (0.0088)	0.9333 (0.0455)	0.9643 (0.0350)	0.8846 (0.0627)	1.0000 (0.0124)	0.9412 (0.0403)	0.9032 (0.0531)	0.9333 (0.0455)	0.485	0.982
0.9565 (0.0425)	1.0000 (0.0098)	1.0000 (0.0089)	1.0000 (0.0098)	1.0000 (0.0089)	1.0000 (0.0093)	1.0000 (0.0098)	1.0000 (0.0141)	1.0000 (0.0084)	1.0000 (0.0088)	1.0000 (0.0089)	0.670	0.879

Downstream Mixing

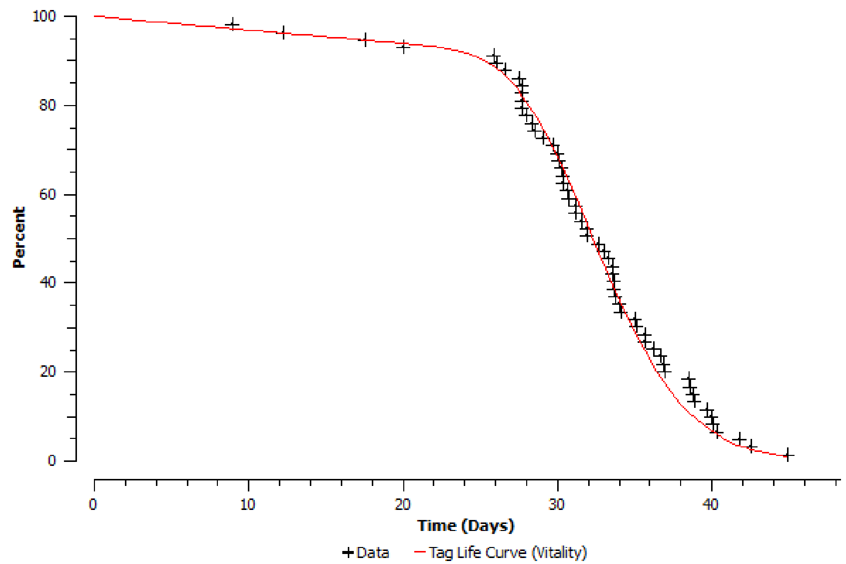
a. Crescent Bar



b. Sunland Estates



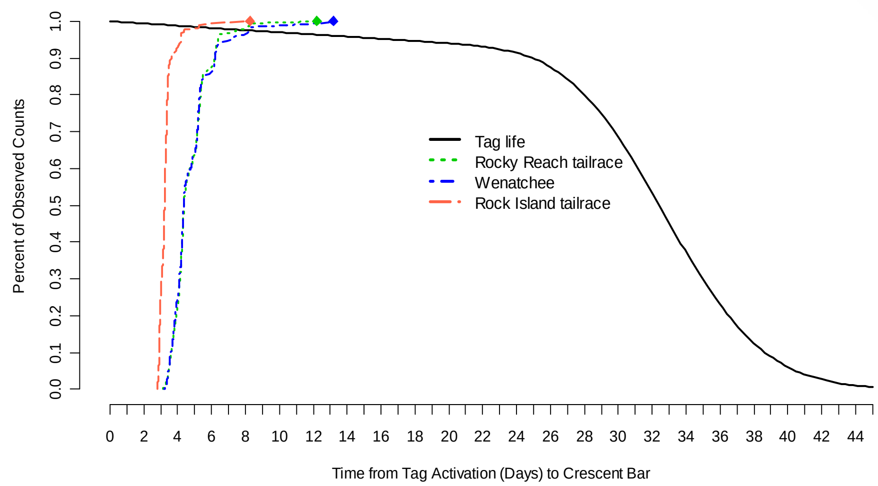
Fitted Tag-Life Survivorship Curve



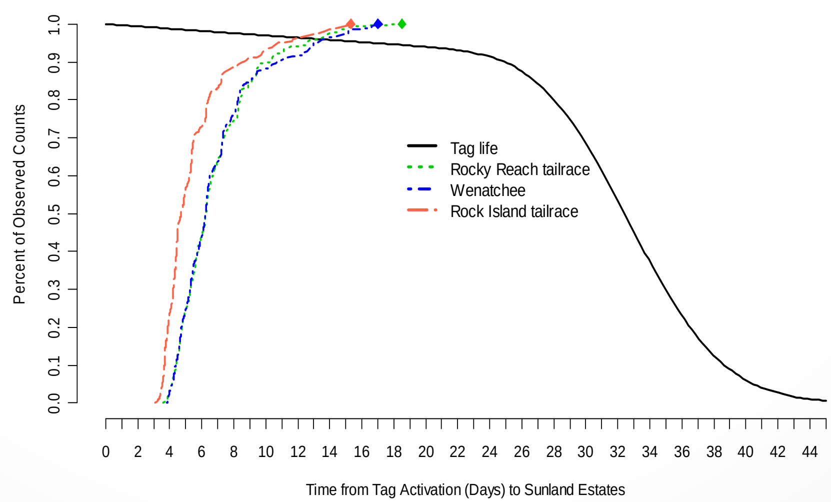
Vitality model of Li and Anderson (2009)

Curve

a. Crescent Bar



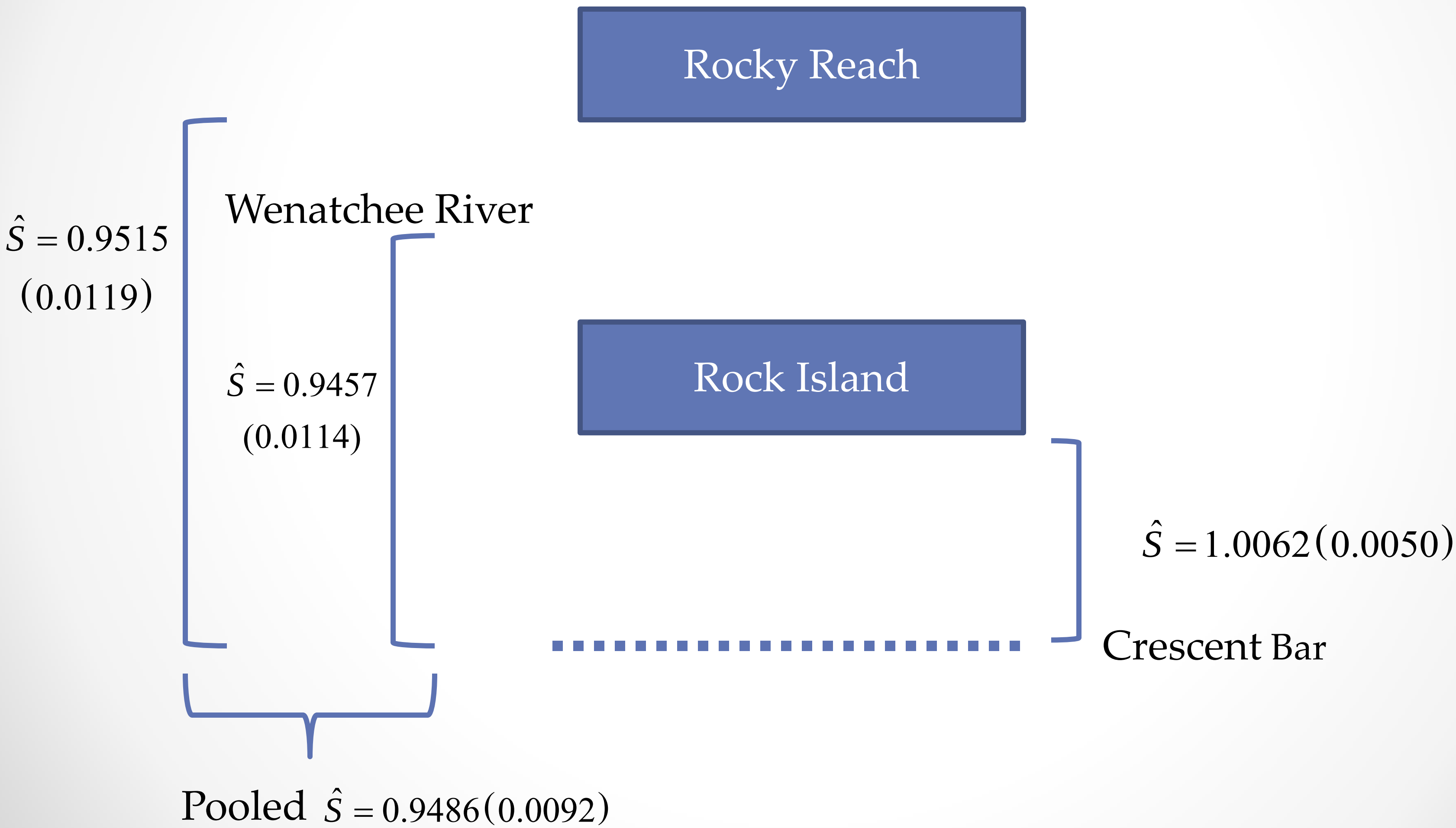
b. Sunland Estates



Probabilities of Acoustic Tags Being Active at Downstream Detection Sites

Release location	Detection location	
	Crescent Bar	Sunland Estates
Rocky Reach tailrace	0.9859 (0.0052)	0.9809 (0.0070)
Wenatchee River mouth	0.9859 (0.0052)	0.9809 (0.0070)
Rock Island tailrace	0.9899 (0.0037)	0.9847 (0.0056)

Rock Island Project Survival Estimate
Yearling Chinook Salmon

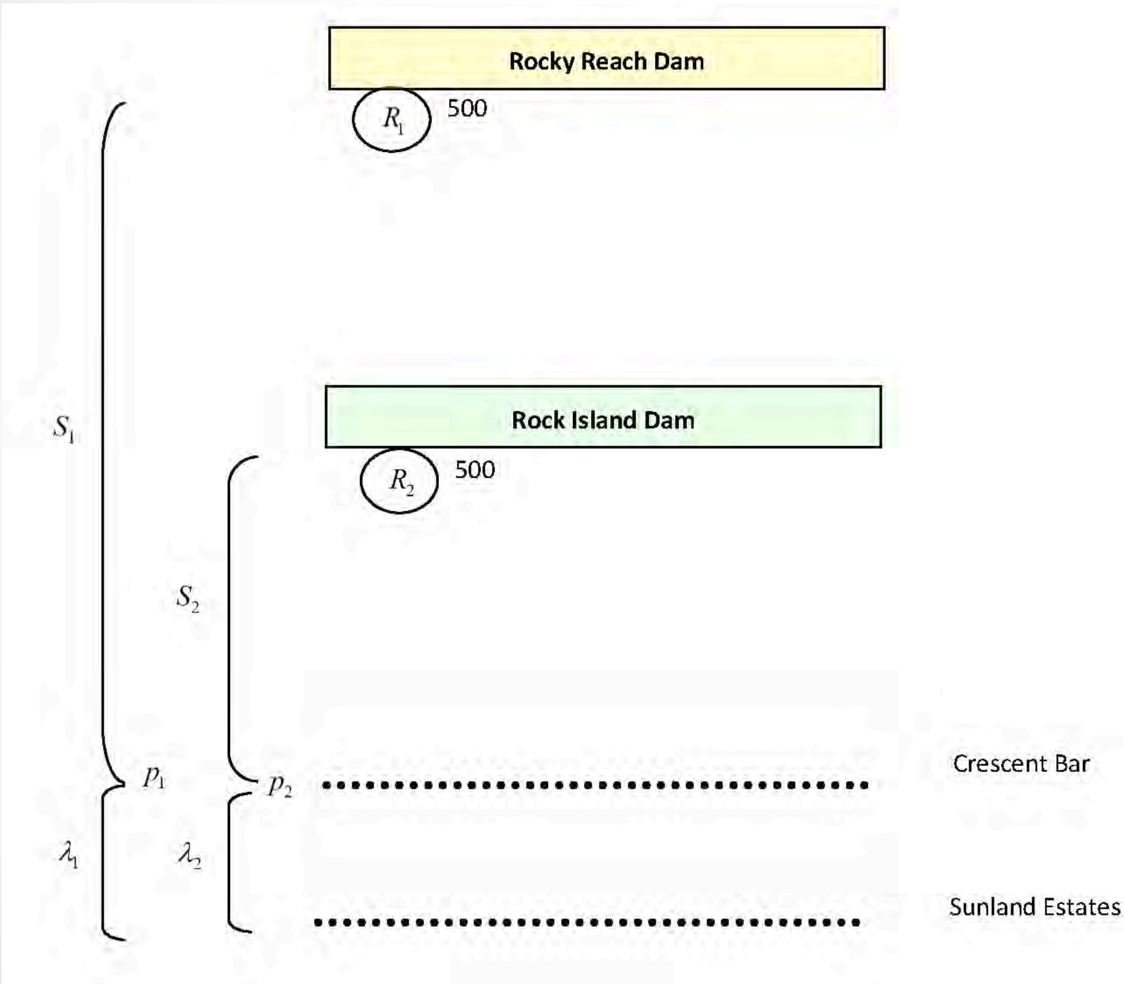


Rock Island Project Survival Estimate Yearling Chinook Salmon, 2010

$$\hat{S}_{\mathrm{RI}} = \frac{0.9486}{1.0062} = 0.9428\left(\mathrm{SE} = 0.0081\right)$$

Steelhead
Rock Island Dam

Release-Recapture Design: Steelhead



Rock Island Passage Survival

$$\hat{S}_{\mathrm{RI}} = \frac{\hat{S}_1}{\hat{S}_2}$$

Homogeneous Tagger Effort

Steelhead

Location	Tagger					
	#1	#2	#3	#4	#5	#6
RR tailrace	69	102	67	100	63	99
RI tailrace	64	102	67	99	67	101

$$P\left(\chi_5^2 \geq 0.3361\right) = 0.9969$$

Homogeneous Survivals of Fish by Tagger

Release Site	Tagger	Release to RI Hydropark	RI Hydropark to RI BRZ	RI BRZ to Crescent Bar
RR Tailrace	#1	0.9855 (0.0143)	1.0000 (0.0054)	1.0000 (0.0054)
	#2	1.0000 (0.0044)	1.0000 (0.0044)	0.9412 (0.0233)
	#3	1.0000 (0.0055)	1.0000 (0.0055)	0.9552 (0.0253)
	#4	0.9800 (0.0140)	1.0000 (0.0045)	0.9388 (0.0242)
	#5	0.9841 (0.0157)	1.0000 (0.0057)	0.9677 (0.0224)
	#6	0.9899 (0.0100)	1.0000 (0.0045)	0.9388 (0.0242)
RI Tailrace	#1			1.0000 (0.0056)
	#2			0.9804 (0.0137)
	#3			0.9851 (0.0147)
	#4			0.9596 (0.0198)
	#5			0.9851 (0.0147)
	#6			0.9805 (0.0138)

Nonsignificant $P \geq 0.5363$

Homogeneous Tag-Lot Distribution

Tag lot	10201	10202	10203	10204	10205	10206	10207	10208	10209	10210	10211	10212
RR tailrace	17	22	16	29	22	24	25	23	12	22	18	27
RI tailrace	17	22	17	29	21	23	25	23	12	22	18	27
Total tags	34	44	33	58	43	47	50	46	24	44	36	54

10213	10215	10216	10217	10218	10219	10220	10221	10222	10258	10259	10260
29	20	18	15	17	19	23	25	3	23	27	24
29	20	19	15	17	19	23	25	3	23	27	24
58	40	37	30	34	38	46	50	6	46	54	48

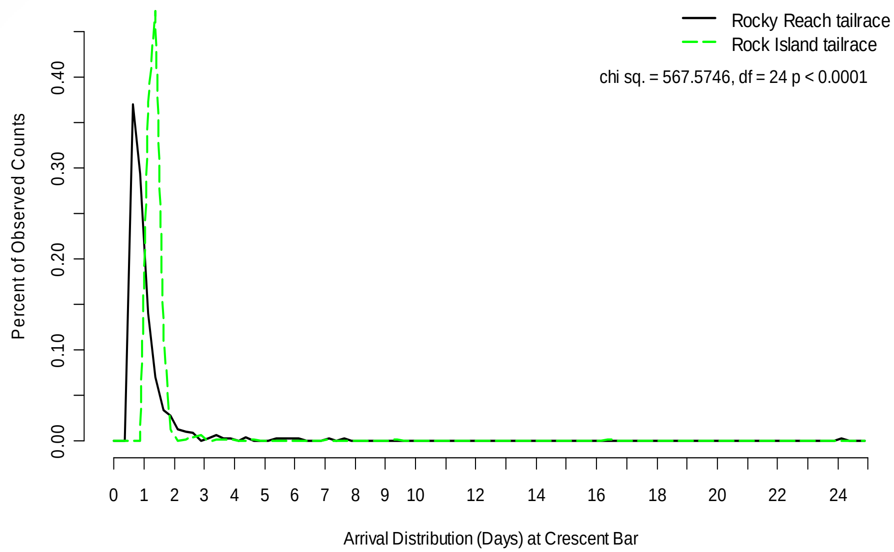
$$P\left(\chi^2_{23} \geq 0.1019\right) \approx 1$$

Homogeneous Survivals by Tag Lot

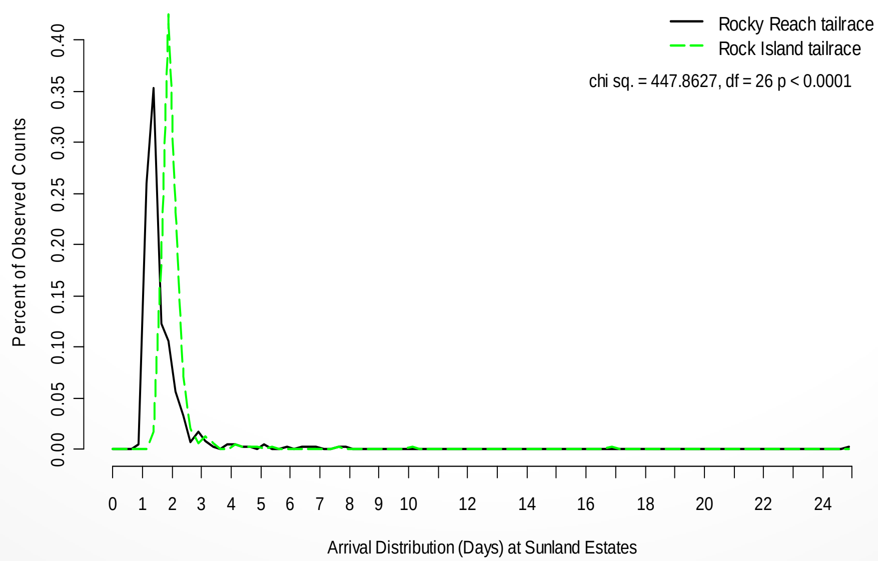
Tag lot	10201	10202	10203	10204	10205	10206	10207	10208	10209	10210	10211	10212	10213	10215	10216	10217	10218	10219	10220	10221	10222	10258	10259	10260	*F*-test	$P(>F_{23})$
RR tailrace to C Bar	0.8824 (0.0781)	0.9091 (0.0613)	1.0000 (0.0112)	1.0000 (0.0083)	1.0000 (0.0095)	0.9167 (0.0564)	0.9200 (0.0543)	0.9565 (0.0425)	0.9167 (0.0798)	1.0000 (0.0095)	0.9444 (0.0540)	0.9630 (0.0363)	0.8276 (0.0701)	0.9000 (0.0671)	0.9444 (0.0540)	0.9333 (0.0644)	0.8824 (0.0781)	0.8947 (0.0704)	1.0000 (0.0093)	0.9200 (0.0543)	1.0000 (0.0258)	1.0000 (0.0093)	1.0000 (0.0086)	0.9630 (0.0363)	0.941	0.542
RI tailrace to C Bar	1.0000 (0.0108)	0.9545 (0.0444)	1.0000 (0.0108)	1.0000 (0.0083)	0.9524 (0.0465)	1.0000 (0.0093)	0.9600 (0.0392)	0.9565 (0.0425)	1.0000 (0.0129)	1.0000 (0.0095)	0.8333 (0.0878)	0.9583 (0.0408)	1.0000 (0.0000)	1.0000 (0.0100)	1.0000 (0.0103)	1.0000 (0.0115)	0.9412 (0.0571)	1.0000 (0.0103)	1.0000 (0.0093)	1.0000 (0.0089)	1.0000 (0.0258)	1.0000 (0.0093)	1.0000 (0.0086)	0.9583 (0.0408)	1.432	0.082

Downstream Mixing

a. Crescent Bar

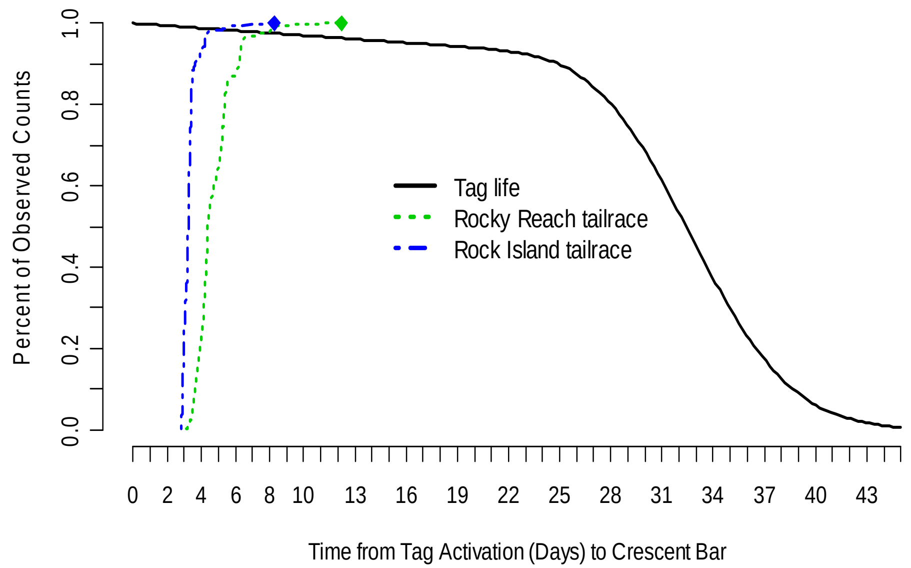


b. Sunland Estates

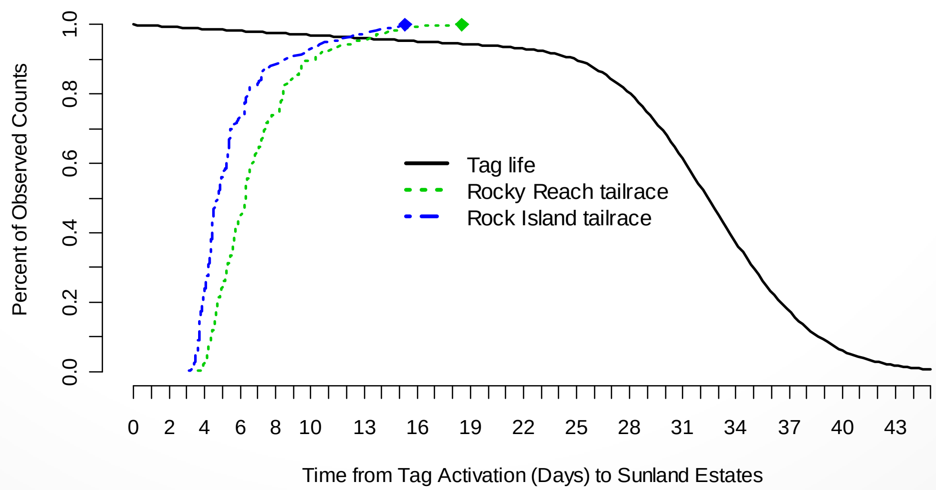


Arrival Distributions vs. Tag-Life Curve

a. Crescent Bar



b. Sunland Estates



Probabilities of Acoustic Tags Being Active at Downstream Detection Sites

Release location	Detection Location	
	Crescent Bar	Sunland Estates
Rocky Reach tailrace	0.9884 (0.0043)	0.9865 (0.0050)
Rock Island tailrace	0.9904 (0.0037)	0.9885 (0.0044)

Rock Island Project Survival Estimate Steelhead, 2010

$$\hat{S}_{\mathrm{RI}} = \frac{0.9551}{0.9895} = 0.9652\left(\mathrm{SE} = 0.0122\right)$$

Cross-Year Summaries

Rock Island – Yearling Chinook Salmon

Year	PIT Tag	Acoustic Tag
2002**	0.956 (0.025)	0.952 (0.026)
2003**	0.934 (0.012)	0.939 (0.016)
2004**	0.914 (0.023)	0.942 (0.012)
2002 – 2004 Arithmetic Average:	**0.9347**	**0.9443**
2007*		0.9725 (0.019)
2008*		0.8972 (0.016)
2010*		0.9428 (0.0081)
2007 – 2010 Arithmetic Average:		**0.9375**

**20% spill
*10% spill

Rock Island – Steelhead

Year	Acoustic Tag
2004*	0.9658 (0.0114)
2005*	0.9158 (0.0154)
2006*	0.9396 (0.0132)
2002 – 2006 Arithmetic Average:	**0.9404**
2008**	0.9699 (0.0133)
2010**	0.9652 (0.0122)
2008, 2010 Arithmetic Average:	**0.9675**

*20% spill
**10% spill

Rock Island – Sockeye Salmon

Year	Acoustic Tag
2007+	0.9188 (0.0123)
2008*	0.9335 (0.0163)
2009*	0.9457 (0.0159)
2007 – 2009 Arithmetic Average:	**0.9327**

+Single-release survival estimate with 10% project spill
*Paired-release study conducted with 10% project spill

Background and Summary of HCP Survival Testing and Phase Designations at the Rock Island and Rocky Reach Projects

Rock Island

The 2010 survival estimates for Rock Island yearling Chinook and steelhead are confirmed, and will be published in the October 2010 draft survival report. The paired release survival estimate for Chinook in 2010 is **0.9428** with a standard error of 0.0081. With this estimate, Chinook will move to HCP Phase III Standard Achieved with a three-year arithmetic mean survival of **0.9375**. Both sockeye and Yearling Chinook have achieved the 93% HCP juvenile survival standard under a 10% spill operation at Rock Island (Table 1). Sockeye entered HCP Phase III Standard Achieved status after completion of the 2009 survival study with an estimate of **0.9457**. The three-year mean survival for sockeye at Rock Island is **0.9327.**

Table 1. Yearling Chinook and sockeye Project survival study estimates (% survival) at Rock Island with a 10% spill operation.

Year	$\hat{S}$ Chinook	$\hat{S}$ Sockeye
2007	97.25	91.88
2008	89.72	93.35
2010	94.28	94.57
Mean $\hat{S}_{RI}$	93.75	93.27

Steelhead

Chelan has completed two survival studies for steelhead at Rock Island with a 10% spring spill operation. The two survival estimates for years 2008 and 2010 are **0.9699** and **0.9652**, respectively (Table 2). River flows at Rock Island in 2010 were the second lowest in the last 16 years. River flows was below the 10th percentile flow and did not meet "valid study flow" specified in the HCP; yet the survival estimate for steelhead was still very high (0.9652). The Rock Island Coordinating Committee agreed in a prior SOA not to invalidate successful results at Rock Island if flows were below the HCP minimum. With results from the first two years of study, a third and final steelhead study in 2011 would need to yield a survival estimate of **0.8549** or better to put steelhead in Phase III Standard Achieved status. With these survival numbers, Chelan believes that Rock Island steelhead have clearly demonstrated compliance with the HCP juvenile survival standard of 93 percent.

Table 2. Rock Island steelhead Project survival estimates under the 10% spill operation and the minimum estimate needed to meet the three-year 93% juvenile survival standard if a study is conducted in 2011.

Year	$\hat{S}$ steelhead
2008	96.99
2010	96.52
2011	**85.49**
Mean $\hat{S}_{RI}$	93.00

Justification for moving Rock Island steelhead into Phase III Standards Achieved

Juvenile steelhead have performed exceptionally well at Rock Island since survival studies began in 2004. The arithmetic mean survival for all years of study (2004-2010, three at 20% spill and two 10% spill) is **0.9513**. Given the extremely low probability that a 2011 valid flow study would result in a survival estimate below 85.5 percent, Chelan is proposing to move Rock Island steelhead directly into CHP Phase III Standard Achieved at Rock Island.

HCP CC has Authority in the Rock Island HCP
Based on language in the Rock Island HCP, the HCP Coordinating Committee has authority to designate steelhead with results from two years of survival studies… *"If the survival standard has been exceeded, the Coordinating Committee shall reduce spill for the next juvenile migration…. If spill is reduced, the Coordinating Committee shall oversee another one to three years of testing to confirm achievement of the survival standard under the new operations." [Rock Island HCP, Section 5.5.3, Page 13]*. Spill was reduced and re-testing began in 2007 at Rock Island.

<u>Rocky Reach Yearling Chinook</u>
After completion of yearling Chinook studies in 2004 and 2005 at Rocky Reach, Chinook entered HCP Phase III Provisional Review status because survival estimates for the two years were between 91.0 and 93.0 percent (Table 3). Flows for both studies were very low, and the 2004 study was below valid river flow of 100,523 cfs.

To test the tools and survival benefits developed in the Provisional Review period 2005-2010), Chelan proposes to restart survival testing for yearling Chinook in 2011-2013 under Phase III "additional juvenile studies" as outlined in the Rocky Reach HCP [page 14 Section 5.3.3, RR HCP]. Doing so will allow Chelan to conduct survival studies with smaller acoustic tags, and benefit from tools it has implemented over the last five years at to measure "current" survival conditions for yearling Chinook at the Rocky Reach Project

HCP CC has Authority in the Rocky Reach HCP
Section 5.3.3 of Rocky Reach HCP states…. *"The District shall proceed to Phase III (Provisional Review) when Juvenile Project Survival studies indicate that Plan Species survival is less than 93% but greater than or equal to 91%. Provisional Review allows the District a one time (plan-species specific) five-year period to implement additional measures or conduct additional juvenile or additional adult survival studies to more accurately determine whether the pertinent survival standard is being achieved. If at the end of this period Juvenile Project Survival is still less than 93% but greater than or equal to 91% and the Combined Adult and Juvenile Survival Studies are inconclusive, then the District will move to Phase II (Additional Tools). When the Provisional Review Studies indicate that the Combined Adult and Juvenile Survival estimates are greater than or equal to 91% or when the Juvenile Project Survival Studies indicate that survival is greater than or equal to 93% then the District shall proceed to Phase III (Standard Achieved). If the Provisional Review Studies indicate that the 95% Juvenile Dam Passage Survival Standard has been achieved through direct measurement or calculation, then the District shall proceed to Phase III (Additional Juvenile Studies)"*.

<u>(Phase III Additional Juvenile Studies)</u> The District shall proceed to Phase III (Additional Juvenile Studies) when Juvenile Dam Passage Survival studies or Juvenile Dam Passage calculations indicate that Juvenile Dam Passage Survival is greater than or equal to 95%. Because measurement or calculation of Juvenile Dam Passage Survival does not address juvenile mortality in the pool or the indirect effects of juvenile project passage, the District will evaluate either the 91% Combined Adult and Juvenile Project Survival or the 93% Juvenile Project Survival as determined appropriate by the Coordinating Committee.

Rocky Reach Operations and Programs implemented to Benefit Survival during Provisional Review
- Significant increase in Pikeminnow control program effort and funding
- 448,000 + pikeminnow removed 2005-2010 (ave 74,680 fish per year since 2005)
- 2007 Didson camera predation research in RR surface collector showed predation by pikeminnow; turned off RR deck lights above bypass surface collector channels at night and initiated pikeminnow control each year in surface collector entrances.

- Modified RR turbine unit operation to run in sequential order to eliminate “quiet water spaces” in tailrace where predators may accumulate. -Initiated pikeminnow control in surface collector
- Run RR turbine units under “Water View” best efficiency loading following 2007 block loading study.
- All 11 RR turbine units re-hab completed with “minimum gap runners” and imbedded leading edges in hub (units 1-8) - “fish friendly” modifications.

Table 3. Yearling Chinook Project passage survival estimates and 2011 Project survival needed to achieve Phase III Standards Achieved for Chinook at Rocky Reach.

Year	$\hat{S}_{RR}$ Project
2004	92.93
2005	91.09
2010	Pilot day/night
2011	**95.00**
Mean $\hat{\bar{S}}_{RR}$	93.00

Table 4. Yearling Chinook Dam passage survival estimates during HCP studies at the Rocky Reach Project.

Year	$\hat{S}_{RR}$ Dam
2004	95.30
2005	analyzing
2010	analyzing
Mean $\hat{\bar{S}}_{RR}$	?

Table 5. Steelhead Project passage survival estimates during HCP studies at the Rocky Reach.

Year	$\hat{S}_{RR}$ Project
2004	98.33
2005	93.03
2006	96.00
Mean $\hat{\bar{S}}_{RR}$	**95.79**

Sockeye Salmon at Rocky Reach and Rock Island Pre and Post HCP and Tools for meeting NNI

1. *Adult sockeye returns are at record levels*. Median adult returns at Bonneville Dam: 69k preceding the HCPs; 123k following the HCPs. The 2010 adult return of 387k fish is nearly six times the pre-HCP median return. An average of 99.6% of the adult sockeye enumerated past McNary are observed at Priest Rapids (vs. Ice Harbor), demonstrating how upper-Columbia stocks drive basin-wide returns. Passage

improvements and compensation measures by mid-Columbia PUDs have been positively correlated with adult returns.

2. ***Survival standards have been achieved at the Rock Island Project and "at dam" survival has exceeded 95% at Rocky Reach Dam***. Downstream passage of juvenile sockeye has exceeded 95% at both dams, with project survival over 93% at Rock Island. Testing in 2009 at Rocky Reach resulted in a Project passage exceeding 95% (95.45%), and dam passage survival of 97%. These results indicate that "at dam" survival at both projects is acceptable, and the "project" survival is likely achievable at Rocky Reach with advancing technology to reduce tagging effects and tag failures through the longer Reservoir. Survival estimates to adjust compensation requirements may not be applicable until production through the Skaha Program is fully implemented and evaluated.

3. ***Skaha has potential to increase natural production that could greatly exceed current hatchery production***. Median adult sockeye returns decreased nearly 70% when Skaha and Okanogan lakes were first closed in the early 1900s. These two lakes contain 89% of the combined available rearing habitat currently or potentially accessible in the Columbia River Basin for sockeye. The record 291,752 adult sockeye enumerated at Wells Dam in 2010 (338,308-RI; 295,634-RR was comprised of approximately 10% "pilot" Skaha-origin fish. District-funded monitoring and evaluation will determine the level of production – all applicable to NNI credit – prior to and following the decision to re-open the Skaha and Okanogan lake systems in the near future.

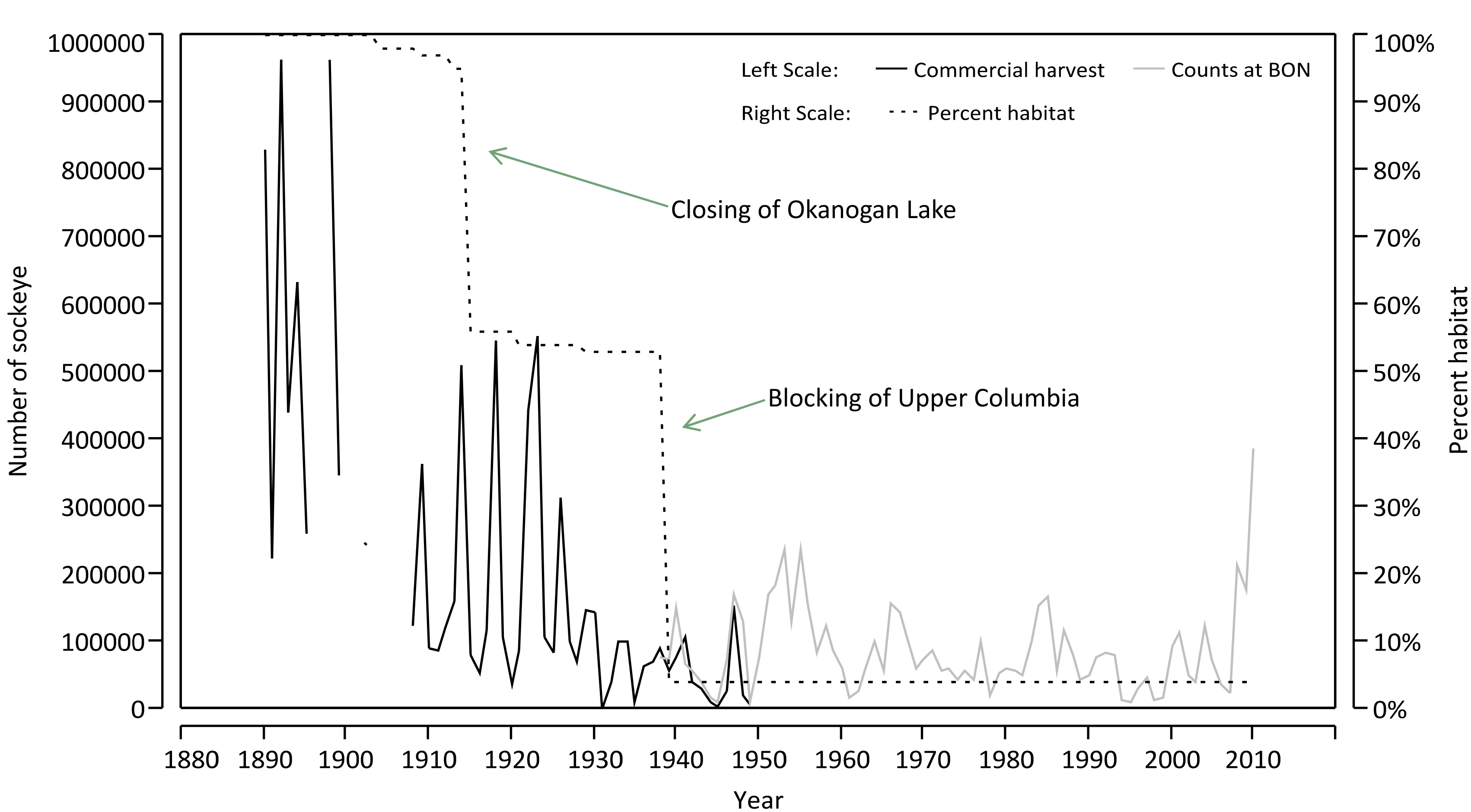
4. ***Precedent has been set for alternative sockeye enhancement measures to meet NNI in HCP forums***. The Sockeye Enhancement Decision Tree utilized in the Wells HCP demonstrated the ability to explore alternative mitigation techniques to achieve NNI. The Water Management Tool has been successfully used to increase sockeye spawning and rearing habitat, thus providing an increase in production that would otherwise not be realized. Given the challenges with compensation for unavoidable sockeye losses, Chelan PUD should pursue similar avenues as described in the Skaha Program.

5. Table 5. Dam and Project passage survival estimates for juvenile sockeye during HCP studies at the Rocky Reach Project, 2005-2009

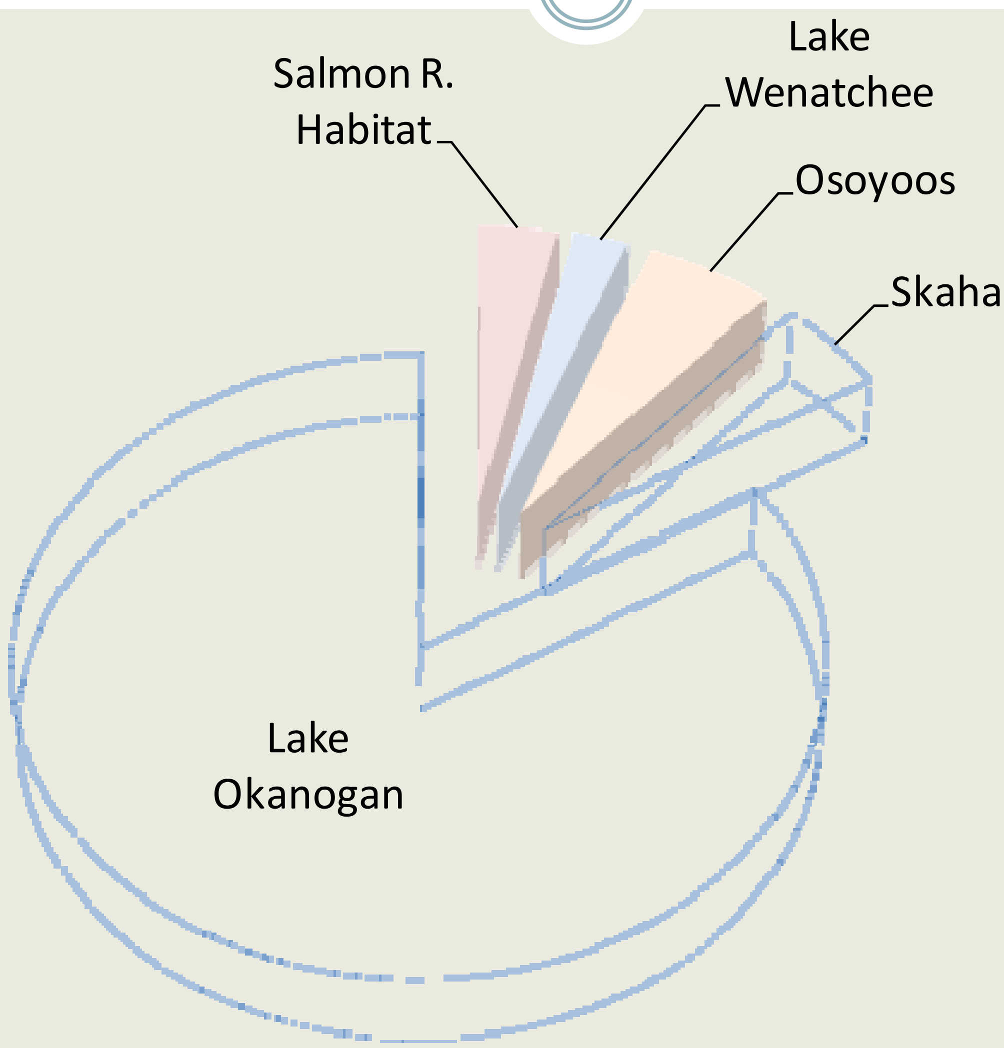
Year	$\hat{S}_{RR}$ Dam	$\hat{S}_{RR}$ Project
2005	92.78	89.20
2006	97.94	93.31
2007	91.29	89.49
2008	96.95	92.02
2009	97.52	95.45
Mean $\hat{\hat{S}}_{RR}$	95.29	91.90

Historic runs and habitat availability

1



Current and potential sockeye habitat



Rocky Reach and Rock Island HCP Hatchery Committees
Statement of Agreement
Regarding Skaha Lake and Okanogan Lake Sockeye Reintroduction
Approved via conference call on 8/26/2010

Background

The Rocky Reach and Rock Island Habitat Conservation Plans' (HCPs) require Chelan PUD to mitigate for Okanogan sockeye. The current goal is 591,040 hatchery smolts annually (300,000 for Rocky Reach and 291,040 for Rock Island). Unfortunately, artificial production of sockeye has been largely unsuccessful in the Columbia River Basin and contributes a negligible number of returning adults (< 1% of the 2010 Columbia Basin run).[1, 2] In British Columbia, artificial propagation of sockeye has been successful in some instances, but results are variable across habitats.[3] One of the primary obstacles is that hatchery return rates are often equivalent or lower than natural return rates of sockeye, thus negating the hatchery production benefit associated with removing adults (broodstock) from the natural environment. For example, hatchery return rates for Lake Wenatchee sockeye program have only exceeded natural return rates in 8 of the 15 years examined and are statistically equivalent.[4] Therefore, allowing broodstock to spawn in natural habitats often yields a higher rate of recruits/spawner than hatchery production. The Hatchery Scientific Review Group (HSRG) acknowledged that lower replacement rates of hatchery-origin fish greatly limits the options available for meeting both conservation and harvest goals and offered no recommendations for changes to the Lake Wenatchee sockeye program.[5]

Acknowledging the difficulties associated with artificial production of sockeye, the Hatchery Committees (HC) approved Chelan PUD (District) funding the Okanogan Nation Alliance (ONA) experimental reintroduction of sockeye in Skaha Lake *in lieu* of a prescribed smolt release. This re-introduction program includes hatchery fry production and a monitoring and evaluation program to evaluate the efficacy of reopening significant habitats in Skaha and, potentially, Okanogan Lake for natural sockeye rearing/production. The primary concern with re-introduction is the potential for deleterious ecological interactions between anadromous sockeye and resident kokanee:

"The central question in this investigation relates to the performance of the resident kokanee population during the reintroduction of their anadromous counterparts. Investigators must decide how great a

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[1] Mahnken, C., G. Ruggerone, W. Waknitz, and T. Flagg. 1998. A historical perspective on salmonid production from Pacific Rim hatcheries. N. Pac. Anadr. Fish Comm. Bull. No. 1: 38-53.
[2] Columbia River DART. Data Access in Real Time. Columbia Basin Research. School of Aquatic & Fishery Sciences, University of Washington. Number based on extrapolation of adult PIT returns from Lake Wenatchee hatchery production.
[3] E.g., Hyatt, K.D., K.L. Mathias, D.J. McQueen, B. Mercer, P. Milligan, and D.P. Rankin. 2005. Evaluation of Hatchery versus Wild Sockeye Salmon Fry Growth and Survival in Two British Columbia Lakes North American Journal of Fisheries Management 25:3, 745-762.
[4] Hillman, T., J. Miller, M. Tonseth, T. Miller, and A. Murdoch. Monitoring and evaluation of the Chelan County PUD Hatchery Programs. Wenatchee, WA. pp. 82-83 (1989-2003 brood years); Wilcoxon/Kruskal-Wallis Tests used for comparison.
[5] HSRG (Hatchery Scientific Review Group). 2009. Columbia River Hatchery Reform System-Wide Report. Columbia River Hatchery Reform Project, Final Systemwide Report.

change in growth and survival of kokanee (particularly juveniles), and over how long, should be accepted as clear evidence of success or failure of the reintroduction experiment."[6]

The hatchery fry plants and M&E program (funded by the District and Grant PUD) will allow Canadian managers to address this issue and ultimately make a determination on whether or not to open Skaha Lake to anadromous sockeye. The initial emphasis on Skaha Lake is intended as a "proof of concept" for reintroducing sockeye to the much larger Okanagan Lake:

"*A longterm restoration goal is to reintroduce sockeye into Okanagan Lake in order to increase lake habitat for adult holding and juvenile rearing. It has been proposed to first reintroduce sockeye into Skaha Lake*."[7]

The rationale for re-introducing sockeye to Skaha and Okanogan Lakes is based primarily on the magnitude of rearing habitat they represent and the potential deterioration of existing rearing habitat in Osoyoos Lake. The predicted juvenile rearing capacity of Skaha Lake [2,010 (ha)] is 1,977 smolts/ha, which translates to 3.9 million smolts[8] (roughly equivalent to Osoyoos Lake), while the potential for Okanogan Lake is much higher (35,100 ha). Okanogan Lake alone has over seven times the rearing habitat of all the existing sockeye producing lakes in the Columbia River Basin *combined* (including Wenatchee, Osoyoos, and Redfish lakes)[9]. Moreover, additional rearing habitat compliments improved spawning habitats (e.g., Douglas PUD's Okanagan Basin Fish Water Management Tool) that have already increased the survival of juvenile sockeye within the Okanogan Basin.

Because the HC has agreed that sockeye mitigation is best achieved by reestablishing natural production; and because fry releases are necessary for making a decision whether to open passage to Skaha Lake (i.e., reestablishing natural production); HCP compliance should initially be evaluated in terms of fry planted annually in the context of the reintroduction program, rather than production of hatchery smolts. This distinction is important because the success of the reintroduction program may be completely independent of the number of hatchery smolts produced. Alternatively, using a hatchery smolt target as a compliance metric could lead to the early abandonment of an otherwise promising program: If the Skaha reintroduction program is successful at providing the ecological justification for opening Skaha Lake, but does not regularly produce the HCP target of 591,040 smolts, the program could be considered a failure under the strict interpretation of the HCP production tables. For this reason, a more appropriate interim metric would be the number of fry planted necessary to properly implement the reintroduction evaluation.

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[6] Wright, Howie, and Howard Smith, Editor. 2003. Management Plan for Experimental Reintroduction of Sockeye into Skaha Lake: Proposed Implementation, Monitoring, and Evaluation. Prepared by Okanagan Nation Alliance Fisheries Department, Westbank, BC.

[7] Wright, H., S. Lawrence, and B. Rebellato. 2003. Evaluation of an Experimental Reintroduction of Sockeye Salmon into Skaha Lake; Year 3 of 3; Addendum to the Assessment of Juvenile Oncorhynchus nerka (Sockeye and Kokanee) Rearing Conditions of Skaha and Osoyoos Lakes 2002 Section of the 2002 Technical Report. Project No. 200001300. BPA Report DOE/BP-00005136-5.

[8] Fisher, C., D. Machin, H. Wright, and K. Long. 2002. Evaluation of an Experimental Re-introduction of Sockeye Salmon into Skaha Lake; Year 2 of 3. Project No. 200001300. BPA Report DOE/BP-00005136-2.

[9] Mullan, J.W. 1986. Determinants of sockeye salmon abundance in the Columbia River, 1880's-1982: a review and synthesis. Biological Report 86(12) September, 1986. Fish and Wildlife Service U.S. Department of Interior

Evaluating reintroduction potential requires a larger number of sockeye fry than are currently available, and the District, in collaboration with Grant PUD, is considering funding the construction and operation of a new multimillion dollar Penticton Hatchery to meet production required for reintroduction efforts. In order for the District to proceed with funding hatchery construction, the District needs assurance that the HC will support the annual fry plant target for the course of the experimental reintroduction program and beyond, if supported by the Canadian Okanagan Basin Technical Working Group [COBTWG; Fisheries and Oceans Canada, Okanagan Nation Alliance Fisheries Program, and the B.C. Ministry of Environment]. On July 2nd, 2010, COBTWG provided approval in principle to a five year extension (i.e., to the 2020 brood-year with releases in 2021) of the experimental use of the hatchery-origin sockeye in Skaha Lake based upon the success of the program to date.

In summary, the HC requires that the District meet its mitigation requirements for sockeye production but would also presumably support the District's funding of a program that has potential to influence the decision to reopen major sockeye habitats of the Upper Columbia River, potentially increasing natural production that could greatly exceed current hatchery production. The limiting factor is that, up to this point, the District and HC parties have agreed on a hatchery smolt production target that is not necessarily aligned with the intended purpose of the program the District is currently funding. Both the District and the HC parties are at some risk of not achieving the maximum benefit of the Skaha Program if there is not a clear linkage between HCP mitigation credit and the implementation of the reintroduction program.

Statement of Agreement

The Rocky Reach and Rock Island Habitat Conservation Plans' (HCP) Hatchery Committees agree that:

1. The "mitigation goal" of the Skaha Program is establishing natural production and significant new rearing habitats in Skaha Lake and potentially Okanogan Lake.

2. The District, in collaboration with Grant PUD, will provide funding for hatchery operations, monitoring and evaluation, and construction of a hatchery in Penticton to produce sufficient quantities of fry to support reintroduction efforts. COBTWG has agreed in principle to an additional 5 years of fry production through broodyear 2020.

3. The HC agrees to support the District's funding and implementation of the Skaha program, from 2010 through 2021 (i.e., release of the 2020 brood year), in order to meet the District's No Net Impact (NNI) sockeye obligation for the Okanogan Basin.

4. In the event reintroduction is successful, the District will receive NNI credit for Rocky Reach and Rock Island projects from (1) natural-origin smolts emigrating from Skaha and Okanogan lakes <u>and</u> (2) fry produced by the District-funded hatchery.

5. In the event that reintroduction is not successful, as defined by (1) discontinued support by COBTWG, or (2) a determination made by the HC following a comprehensive program assessment in 2021, the District will implement alternative mitigation measures determined by

the HC to satisfy NNI obligations for sockeye salmon. Alternative mitigation options could include, but are not limited to, funding an NNI account earmarked for sockeye enhancement or a production swap involving another species.

6. As a contingency for additional production at the Penticton hatchery in the future, the District will acquire the space and core infrastructure necessary to construct hatchery capacity for an 8 million egg program (i.e., 3 million more eggs than is currently approved). The program has approval from COBTWG for 5 million eggs until broodyear 2020.

7. If the Skaha Program is determined to be successful prior to 2021, the HC may require the District to expand the Penticton hatchery program to 8 million eggs, and reallocate all or a portion of the resulting fry production for use in Okanogan Lake until 2021, pending COBTWG approval of an Okanogan Lake reintroduction program.

October 26, 2010

HCP Coordinating Committee – October meeting, SeaTac

Memo Report on 2010-11 Rocky Reach AWS large pump overhaul.

** - Normal annual fishway maintenance outage period at Rocky Reach, without AWS pump overhaul work, is January 2 - through February 28.

* AWS pump overhaul requires 3-month outage

<u>*2010-11 AWS pump overhaul period</u>: December 1 – February 28; watered back up March 1.

<u>2009-10 AWS pump overhaul period</u>: Fishway was down three full months; De-water began November 30. Fishway watered back up March 1.

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FINAL MEMORANDUM

To:	Wells, Rocky Reach, and Rock Island HCP Coordinating Committees	**Date:**	December 15, 2010
From:	Michael Schiewe, Chair,		
Cc:	Carmen Andonaegui		
Re:	Final Minutes of November 16, 2010 HCP Coordinating Committees Meeting		

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Coordinating Committees met on Tuesday, November 16, 2010, from 9:30 am to 12:15 pm in SeaTac. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Tom Kahler will finalize the Wells 2010 Survival Verification Study Statement of Agreement (SOA) as agreed and provide the final SOA to Carmen Andonaegui to distribute to the Coordinating Committees and post on the ftp site (Item III-B).
- Steve Hemstrom will email Carmen Andonaegui the 4-page background and summary paper of HCP survival testing and phase designations at the Rocky Reach and Rock Island projects for distribution to Jerry Marco and Bryan Nordlund (Item IV-A).
- Steve Hemstrom will email the draft 2010 Rocky Reach Project yearling Chinook survival study to Carmen Andonaegui for distribution to the Coordinating Committees as soon as it is available (Item IV-B).
- Steve Hemstrom will prepare a draft SOA for phase designation for sockeye at Rocky Reach for the Coordinating Committees' consideration (Item IV-C).
- Steve Hemstrom will prepare a draft SOA for restarting yearling Chinook survival studies at Rocky Reach for consideration at the December Coordinating Committees meeting (Item IV-D).
- Steve Hemstrom will email the two-page summary of the proposal to restart yearling Chinook survival studies at Rocky Reach (Attachment E) to Carmen for distribution to Jerry Marco and Nordlund (Item IV-D).

DECISION SUMMARY

- The Coordinating Committees approved the SOA for the 2010 Wells Project Survival Verification Study Results, as modified (Item III-B).
- The Coordinating Committees approved the SOA for Phase III Standards Achieved Designation for steelhead at Rock Island at 10 percent spill operation (Item IV-A).
- The Coordinating Committees approved the SOA for Phase III Standards Achieved Designation for spring Chinook at Rock Island at 10 percent spill operation (Item IV-B).

I. Welcome

The Coordinating Committees reviewed the agenda. There were no additions to the agenda. The Committees approved the October 26, 2010 meeting minutes, as revised. Carmen Andonaegui will finalize the minutes and distribute them to the Committees.

II. Hatchery and Tributary Committee Update (Mike Schiewe)

There were no Hatchery or Tributary Committees updates for this month's meeting. The Hatchery Committees will meet November 17; the Tributary Committees will meet November 18.

III. Douglas PUD

A. Presentation: 2010 Wells Project Survival Verification Study Results (John Skalski)

Dr. John Skalski, Columbia Basin Research, presented the results of the 2010 Wells Project Yearling Chinook Passage Survival Study (see Attachment B). Yearling spring migrant survival standards were met based on 3 years of survival studies conducted in 1998, 1999, and 2000 with an average survival estimate of 0.962 and a standard error (SE) of 0.0089. The 2010 survival study is the 10-year re-evaluation of project survival for yearling spring migrants using yearling Chinook as the representative species as per Section 4.2.5.1 of the Wells HCP.

The study design was a paired release-recapture using Passive Integrated Transponder tagged (PIT-tagged) fish. The treatment release group was a composite of fish released at two different locations—the mouth of the Okanogan River and the mouth of the Methow River.

Twenty five percent of the fish were released at the mouth of the Okanogan River, and 75 percent of the fish were released near the mouth of the Methow River, based on the relative historic contribution of yearling Chinook passing Wells Dam. The upstream release group was paired with a downstream control group released in the Wells Project tailrace. The fish releases for the study were conducted between April 18 and May 17, 2010, using 15 replicate releases. Releases were timed to facilitate good downstream mixing of release groups.

Survival estimates were calculated from point-of-release to the Wells tailrace, with downstream detections at Rocky Reach, McNary, John Day, and Bonneville dams. Skalski reported that a major difference between acoustic tag studies and PIT-tag studies is the difference in detection rates, with PIT-tag detection probability being lower than that for acoustic tags, and hence, PIT-tag studies requiring larger sample sizes. Also, acoustic-tagged fish are detected as they pass through an acoustic field and require no re-handling after initial tagging. In contrast, PIT-tagged fish are detected when they pass through a juvenile bypass system, an event that may influence the probability of subsequent detection and survival; therefore, the analysis of a PIT-tag study must include a test of the effect of upstream detection on subsequent detection downstream.

Skalski next summarized study results. He said that releases reflected the 1:3 ratio of Okanogan- to Methow-released fish as expected. Skalski reported that analysis of downstream mixing at Rocky Reach showed Wells tailrace releases arrived somewhat earlier than upstream releases, but mixing was still good, and that at McNary Dam and downstream of that location, arrivals of all groups were similar. In general, travel times started off slowly and increased over time. The Burnham tests of the assumption that upstream detection had no effect on downstream survival or detection revealed no apparent effects. Skalski reported that detections at Rocky Reach were the highest, and detection at downstream locations (McNary, John Day, and Bonneville dams) was lower than at Rocky Reach. Project passage survival was estimated for each replicate to see if there was any change over time. There were no obvious trends to suggest that seasonality affected survival. Skalski stated that the final survival estimate was calculated as a weighted average of the 15 replicates. The survival estimate was 0.9638 with a SE = 0.0128, which exceeds the HCP juvenile project passage survival standard of 0.93 with SE ≤ 0.025. Skalski provided the rationale for using the weighted-average method for estimating survival, saying the method was selected *a priori* in the study plan because it was the method used in previous survival studies. A comparison of survival estimates for 2010, with SEs, was provided for a pooled estimate and an arithmetic average, both of which produced higher estimates of survival than the weighted average. Thus, regardless of calculation method, the 2010 survival estimate surpasses the HCP survival standard. Flows at Wells Dam over the last 20 years were compared to 2010 flows. Flow during the 2010 study releases was the second lowest flows recorded in the last 20 years, and the HCP project survival standard was still met. In conclusion, the 4-year average (1998, 1999, 2000, and 2010) estimated project survival of 0.963 exceeds the HCP project survival standard of 0.93.

Teresa Scott asked about the purpose of the flow requirement for a valid survival study. Hemstrom explained that the flow standards are intended to ensure that survival is estimated under flows more representative of average conditions[1]. For example, if a survival study were conducted under excessively high flow conditions, there might be a benefit to survival, based on the assumption that survival is related to flow. This, however, would not be representative of conditions under most years.

Bryan Nordlund asked if fish were tested for physiological indicators of smoltification prior to fish release. Kahler said they do not have the information yet on physiology, but the fish were tested. The Canada Department of Fisheries and Oceans (DFO) is still analyzing samples. Nordlund asked about the long travel time to Rocky Reach Dam. Kahler said travel times historically show steelhead passing Rocky Reach within 2 weeks of release. In 1998, yearling Chinook average travel time to Rocky Reach was 18.3 days. Nordlund commented that these were fairly long travel times, even with higher flows. Mike Schiewe stated that there have been several studies documenting a correlation between flow and travel times, but that travel times do not necessarily correlate to survival.

B. DECISION ITEM: Draft SOA 2010 Wells Project Survival Verification Study, Phase III (Standards Achieved) (Tom Kahler)

Tom Kahler introduced an SOA for approval of the 2010 Wells Project survival verification study results, verifying the continued achievement of Phase III (Standards Achieved) for

[1] The Wells Project HCP, Section 4.1.4, says "testing shall reflect Representative Environmental Conditions and Representative Operational Conditions for each test, for each Plan Species and life history. Studies conducted during years where flow conditions, during the study, fall between the 10% and 90% points on the Flow Duration Curve (See Section 14, Figure 2a and 2b) shall be considered to have satisfied Representative Environmental Conditions.

yearling Chinook and steelhead migrating through the Wells Project. He asked for the Coordinating Committees' approval based on the survival study findings provided by Dr. John Skalski, in lieu of a final report, which is pending.

Teresa Scott asked why Douglas PUD could not wait for release of the final survival study report before requesting approval of the SOA. Kahler replied that Douglas PUD needs the updated survival estimate for a SOA approving Douglas PUD's participation in the Chief Joseph Hatchery mitigation program. Douglas PUD is also holding 100,000 yearling Chinook on station for use in a survival study for 2011 should the 2010 study results be rejected and Douglas PUD be required to repeat the study. Additionally, Douglas PUD's contractors for a potential 2011 study seek certainty regarding their spring schedules. Kahler explained that the study results will not change from what was presented today by Skalski. The only item delaying the report release is completion of the physiology report by the Canada DFO, an agency that is currently involved in a judicial inquiry over forecasts of Fraser River sockeye—a process with no certain timeline.

Bryan Nordlund asked if the production numbers in the SOA were intended to represent the HCP 2013 recalculated production numbers or the number by which the current production would be reduced. Kahler responded that the production numbers in the SOA are intended only to represent the total adjusted No Net Impact (NNI) production based on the 2010 survival estimate of 96.4 percent, as provided for in Section 8.4.4 of the Wells HCP. Kahler will edit the text of the SOA to make it clear that the production numbers in the SOA are the final adjusted production numbers based on 2010 survivals. Jerry Marco asked if the ±2.5 percent for the survival estimate in the SOA is the SE. Kahler said it is the confidence interval, and agreed to edit the SOA to provide the SE for the survival estimate rather than refer to the ±2.5 percent confidence interval.

There were no additional questions and the SOA was approved as modified. Kahler will finalize the SOA as discussed and provide the final SOA to Carmen Andonaegui to distribute to the Committees and post on the ftp site.

IV. Chelan PUD

A. DECISION ITEM: SOA to Move Rock Island Steelhead into Phase III Standards Achieved under a 10 Percent Spill Operation (Steve Hemstrom)

Steve Hemstrom stated that Chelan PUD is seeking approval of a Phase III (Standards Achieved) designation for steelhead at Rock Island Project under a 10 percent spill operation based on 2 years of survival studies at Rock Island with a 96.75 percent arithmetic mean survival. He provided a 4-page handout presenting the background and summary of HCP survival testing and phase designations at Rocky Reach and Rock Island projects. Hemstrom referred to the Rock Island HCP, which gives discretion to the Coordinating Committees to approve standards achieved under reduced spill with 1 to 3 years of survival testing. The SOA was approved. Hemstrom will email Carmen Andonaegui the background paper for distribution to Jerry Marco and Bryan Nordlund.

B. DECISION ITEM: SOA to Move Rock Island Yearling Chinook into Phase III Standards Achieved under a 10 Percent Spill Operation (Steve Hemstrom)

Steve Hemstrom stated that Chelan PUD is seeking approval of Phase III (Standards Achieved) designation for spring Chinook at Rock Island Project under a 10 percent spill operation with a 3-year arithmetic mean survival of 93.75 percent. The SOA was approved. Hemstrom will send the draft 2010 Rocky Reach Project survival studies report to Carmen Andonaegui for distribution to the Coordinating Committees as soon as it is available.

C. Presentation of the Okanogan River Sockeye Production Program (Joe Miller)

Mike Schiewe introduced this item with a brief background on Chelan PUD's involvement in the Okanagan Nation Alliance's (ONA) Okanogan River Sockeye Reintroduction Program. Participation in the program began in 2004 with agreement by the Hatchery Committees that Chelan PUD would contribute funding to the Sockeye Reintroduction Program in lieu of their HCP hatchery mitigation obligations (Grant PUD also contributes to the program). Josh Murauskas said an SOA was recently approved by the Hatchery Committees extending the Chelan PUD's funding of the Sockeye Reintroduction Program in lieu of smolt releases until 2021[2]. Steve Hemstrom said the SOA was distributed at the last Coordinating Committees meeting.

Joe Miller and Murauskas presented to the Coordinating Committees the same presentation given to the Hatchery Committees (Attachment C). The presentation describes a path forward for Chelan PUD's ongoing involvement in the Sockeye Reintroduction Program. Miller stated that roughly 10 percent of this year's sockeye run was attributable to Skaha program fish. Results of a review of historical run estimates of the sockeye fishery in the upper Columbia River clearly show the effect of the loss of upstream passage into Okanogan Lake and at Grand Coulee Dam on run size. High variability is normal in sockeye runs, but Murauskas stated that peaks dropped considerably with the loss of available upstream habitat. Murauskas suggested that the Okanogan River Water Management Program contributed to the 2010 spike in adult returns, saying that the increase was at least partially due to an improvement in egg-to-smolt survival, not an increase in habitat area. Murauskas presented a pie chart showing the current and potential habitat provided by the Okanogan Basin lakes compared to Lake Wenatchee and Snake River Basin habitat, in which Lake Okanogan is very large by comparison.

As part of Chelan PUD's continuing support of the Sockeye Reintroduction Program in lieu of smolt production, Miller said Chelan PUD is now considering funding construction of a hatchery for the production of fry for release in Skaha Lake. Prior to taking this step, Chelan PUD would like to know the extent of the Coordinating Committees' support of Chelan PUD's continuing involvement in the program. Miller emphasized the difficulty of culturing sockeye and said Chelan PUD believes the answer to successfully mitigating for sockeye losses is in utilizing habitat and not through standard hatchery production. He stated that a goal of the sockeye program is to increase rearing capacity, with Skaha Lake reintroduction as insurance for success. Miller cited the 2002 ONA Reintroduction Plan, noting that if the Skaha Lake Reintroduction program is successful, there is the potential to open Lake Okanogan to production. Chelan PUD has agreed to an extension to 2021 to fund operation of the ONA Sockeye Reintroduction Program. Schiewe said that in 2004, Chelan PUD had received Hatchery Committees' approval to use their contribution to the Sockeye Reintroduction Program to meet their sockeye mitigation obligation until 2013. Miller summarized, saying the Hatchery Committees have agreed to support Chelan PUD's participation in the Sockeye Reintroduction Program in lieu of smolt production, but that they would like certainty concerning the Coordinating Committees' support.

[2] Approved via conference call on 8/26/2010, SOA Regarding Skaha Lake and Okanogan Lake Sockeye Reintroduction, Rocky Reach and Rock Island HCP Hatchery Committees.

Murauskas said the hatchery facility will initially have a capacity for 5 million sockeye eggs, with an option to expand to 8 million eggs if the Canadian government opens Okanogan Lake to sockeye production. Bob Rose asked if there are any permitting issues that might interfere with staying on schedule to produce fish for an effective evaluation by 2021. Miller said no permitting problems have been identified, and hatchery planning is at about a 30% design phase. Chelan PUD expects to have a build-out design by this summer. Rose asked how a Coordinating Committees' decision relates to the Hatchery Committees. Keith Truscott said the approval from the Coordinating Committees would allow Chelan PUD the opportunity to let this project unfold. He said that Chelan PUD has demonstrated 95 percent dam passage survival for sockeye at Rocky Reach Dam, and they are asking for approval of a standards achieved designation coupled with an investment in the Sockeye Reintroduction Program. Truscott said Chelan PUD continues to support the NNI concept for all HCP species, but believes that the Sockeye Reintroduction Program is the best way to meet sockeye needs.

Bryan Nordlund asked about the historic sockeye run estimates for the Columbia Basin presented by Chelan PUD in Murauskas' presentation. Murauskas said they are based on cannery production numbers in the lower Columbia River; dam passage numbers are from Bonneville Dam. Nordlund asked why the Snake River sockeye numbers were not included in sockeye estimates. Murauskas responded that even at historic levels, Snake River production was so low as to be negligible in comparison to production in the upper Okanogan Basin and Arrow Lakes. Murauskas explained that the sockeye production shown in the slide presentation pie chart was based on the current acreage of habitat, and that in the absence of Arrow Lakes production, Snake River production becomes a larger portion of total current production and is reflected in the chart. Nordlund expressed concern about moving away from using dam passage and project survival estimates to verify meeting the NNI survival passage standard.

Nordlund asked if Chelan PUD plans to evaluate sockeye survival at Rocky Reach in the future. Hemstrom said Chelan PUD has demonstrated 95 percent dam survival at Rocky Reach. He said of the sockeye survival studies conducted in the past 4 years, 2007 survival was low but included a test of block loading operations at Rocky Reach. Nordlund said his concern is not with dam passage survival but with juvenile project survival. His concern is with using dam passage survival without answering the question of juvenile project survival. Nordlund referred to the HCP, saying the first requirement is to meet project survival standards and asked when Chelan PUD plans to address project survival. Murauskas said he thinks the high dam survival, coupled with the good Skaha Lake reintroduction results, could make up for any impacts of project survival. He said that if it were determined in 2021 that the Sockeye Reintroduction Program is not successful, smolt production could be reconsidered. Nordlund said there is a fundamental need to go back to the basic element of the HCP, which uses juvenile project survival as a factor for calculating a 91 percent combined juvenile and adult project survival. He said he is not comfortable using the Sockeye Reintroduction Program in lieu of getting project survival estimates, and reiterated that dam survival does not come into consideration unless project survival cannot be measured. He mentioned the combined adult/juvenile survival standard and suggested that perhaps adult dam survival can be revisited in light of assessing the effects of juvenile passage survival on NNI. Schiewe said the Committees should look at the relationship between dam passage and project survival, saying the PUDs can mainly affect dam survival. To avoid mixing mitigation obligations, which pertain to survival, with hatchery obligations, Schiewe suggested that perhaps the Committees should consider approving a Phase III designation for sockeye survival, independent of Chelan PUD's commitment to the Sockeye Reintroduction Program as the hatchery mitigation component.

Truscott said Chelan PUD is proposing participation in the Sockeye Reintroduction Program to address production needs consistent with meeting project survival at both Rocky Reach and Rock Island projects. When the Sockeye Reintroduction Program pilot program agreement ends in 2021, he suggested the Committees could evaluate the extent to which the program has addressed meeting Chelan PUD mitigation obligations. Miller said that Chelan PUD is looking for certainty that the Committees are fully supportive of their approach to funding the Sockeye Reintroduction Program. Schiewe noted that Chelan PUD already has this support from the Hatchery Committees, but that, as explained by Nordlund, Chelan PUD needs to focus on demonstrating achievement of a Phase III designation. Nordlund suggested this could be achieved by using the 3-year average of survival estimates from 2006, 2008, and 2009. The 2007 survival estimate could be rejected given the block-loading operations in effect during the study; these did not prove beneficial for fish passage and consequently are no longer in place. Nordlund stated that this approach may be justified for meeting a Phase III designation for sockeye at Rocky Reach. Jim Craig agreed with this approach, saying it would address HCP process, provide an SOA for approval of the Phase III designation for sockeye for 10 years, and start the clock for a 10-year survival verification study, while still allowing time for the Skaha Reintroduction Program to go forward.

Teresa Scott stated she believes that the loss of habitat is fundamental to the problem of low sockeye production. She asked whether habitat actions are being considered. Schiewe said Kim Hyatt, Canada DFO, addressed the question of other stakeholder involvement during a joint meeting of the HCP Hatchery Committees and the Priest Rapids Hatchery Subcommittee (PRHSC). Hyatt said there are still multiple issues to be resolved among user groups but that, ultimately, if the tribes want sockeye reintroduction to proceed, it will proceed. Jerry Marco mentioned that to date, the Sockeye Reintroduction Program has not been able to release the large number of fry needed for the Skaha evaluation, but that a new hatchery will allow the number to be increased. Ultimately, evaluations need to show that fry releases can be increased without resulting in negative impacts to kokanee production in Skaha Lake. Miller said that so far evaluation results have been positive. In a July 2, 2010, letter to Chelan PUD, the Canadian Okanagan Basin Technical Working Group (COBTWG; see Attachment D) said they see an opportunity to go forward with increasing releases to see how sockeye and kokanee interact. Marco agreed that as long as there are good sockeye adult returns, fry production could be increased. Scott asked whether Chelan PUD will fund the cost of opening adult passage into Skaha Lake to allow for natural production if adult returns continue to be successful. Marco said that the Hatchery Committees SOA was not clear on this point. Schiewe pointed out that the Hatchery Committees SOA speaks to credit for natural production, which implies that there will be passage. Miller said Chelan PUD considers supporting a successful Sockeye Reintroduction Program to include an adult passage component, and therefore would fund the cost of providing adult passage. Scott asked why adult passage is not already being addressed to support natural production. Marco explained that there was a lack of support by the Canadian government for adult passage; instead, there was agreement to evaluate ecological interactions between sockeye and kokanee using the Sockeye Reintroduction Program to test sockeye production in Skaha Lake. If reintroduction is successful without negative interactions with kokanee, then the Canadian government will be willing to consider allowing passage into Skaha Lake. Murauskas said that the COBTWG will consider establishing adult passage in 2017 and that successful natural production is important to Chelan PUD.

Schiewe summarized the discussion, saying that Chelan PUD will bring a proposal on phase designation for sockeye to the Coordinating Committees. The proposal will provide justification for using existing survival study results to estimate 3-year average Project passage survival at Rocky Reach. The proposal may also include estimates of adult passage survival. Schiewe said that the Committees need to agree to survival estimates and Phase Designation for HCP plan species for the Hatchery Committees to then use in recalculating mitigation requirements. Hemstrom said that Chelan PUD will use 2006, 2008, and 2009 project survival. Rose asked why the 2005 survival estimate will not be used, and Hemstrom replied that 2005 was the first year of survival testing, using initial tools at hand, and is not reflective of current operations. Chelan PUD will use the three most current survival study years, excluding 2007, as discussed. Hemstrom will prepare this SOA to bring before the Committees for approval of sockeye phase designation. Committees' members agreed on this approach.

D. Restarting Rocky Reach yearling Chinook Survival Studies (Steve Hemstrom)

Steve Hemstrom provided a draft proposal to restart yearling Chinook survival studies at Rocky Reach Dam in 2011 (Attachment E). After survival studies on yearling Chinook in 2004 and 2005, yearling Chinook were placed into Phase III Provisional Review for a 5-year period to allow time to investigate tools for increasing juvenile survival at the project, with a re-check of survival in 2011.

Chelan PUD is proposing to restart survival testing for yearling Chinook in 2011 and would like to conduct up to 3 additional years of testing under current operating conditions. Chelan PUD would like to set aside the 2004 and 2005 survival study estimates, which were low and influenced by project operations that are no longer implemented. Bryan Nordlund, who was present during drafting of the HCP, said the idea behind Provisional Review was to allow an adaptive management process to occur to promote investigations that would result in improved survival compared to existing conditions. He said he saw no reason for averaging past survival estimates into new survival estimates obtained under new operating conditions. Nordlund supported estimating survival under new conditions as the baseline. The recommendation from the Coordinating Committees was for Chelan PUD to provide an SOA for restarting yearling survival testing to the Committees for consideration. Hemstrom summarized the results of the draft 2010 survival study, saying day versus night passage evaluations revealed differences, but that survival averaged 92.56 percent. Hemstrom noted there was almost a 5 percent passage survival increase for fish passing at night. He suggested that the 2010 survival estimate could be used as the Year One survival study result. Mike Schiewe suggested that the Committees would need to see the results of the 2010 study and a draft SOA before approving a restart of yearling Chinook survival studies. Hemstrom agreed to bring an SOA to the Committees for the next meeting and to provide the draft 2010 yearling Chinook survival study report to the Committees as soon as it is available. Hemstrom will email the 2-page summary of the proposal to restart yearling Chinook survival studies at Rocky Reach (Attachment E) to Carmen for distribution to the Committees.

V. HCP Administration (Mike Schiewe)

A. *Next Meetings*

The next scheduled Coordinating Committees meetings will be on December 14, January 25, and February 22, all in SeaTac.

List of Attachments

Attachment A – List of Attendees

Attachment B – John Skalski: Project Passage Survival at Wells 2010 Presentation

Attachment C – Introduction of Sockeye Salmon to Skaha Lake (PowerPoint presentation)

Attachment D – July 2, 2010, letter to Chelan PUD from COBTWG

Attachment E – Summary of Proposal to Restart Yearling Chinook Juvenile Survival Studies at Rocky Reach in 2011

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor QEA, LLC
Carmen Andonaegui	Anchor QEA, LLC
Keith Truscott	Chelan PUD
Steve Hemstrom *	Chelan PUD
Joe Miller	Chelan PUD
Josh Murauskas	Chelan PUD
Lance Keller *	Chelan PUD
Tom Kahler*	Douglas PUD
Jerry Marco* (by phone)	CCT
Bob Rose*	YN
Jim Craig*	USFWS
John Skalski	Columbia Basin Research
Rich Townsend	Columbia Basin Research
Bryan Nordlund* (by phone)	NOAA
Teresa Scott *	WDFW

* Denotes Coordinating Committees member or alternate

Project Passage Survival at Wells, 2010: Yearling Chinook Salmon

~

10-Year Checkup

John R. Skalski

University of Washington

Study Objective

- Estimate survival of yearling Chinook salmon smolts through the Wells Project
- Evaluate compliance with HCP survival standard for yearling migrants

$$\hat{S} \geq 0.93 \text{ with } \widehat{SE} \leq 0.025$$

- Compare the estimate with historical performance

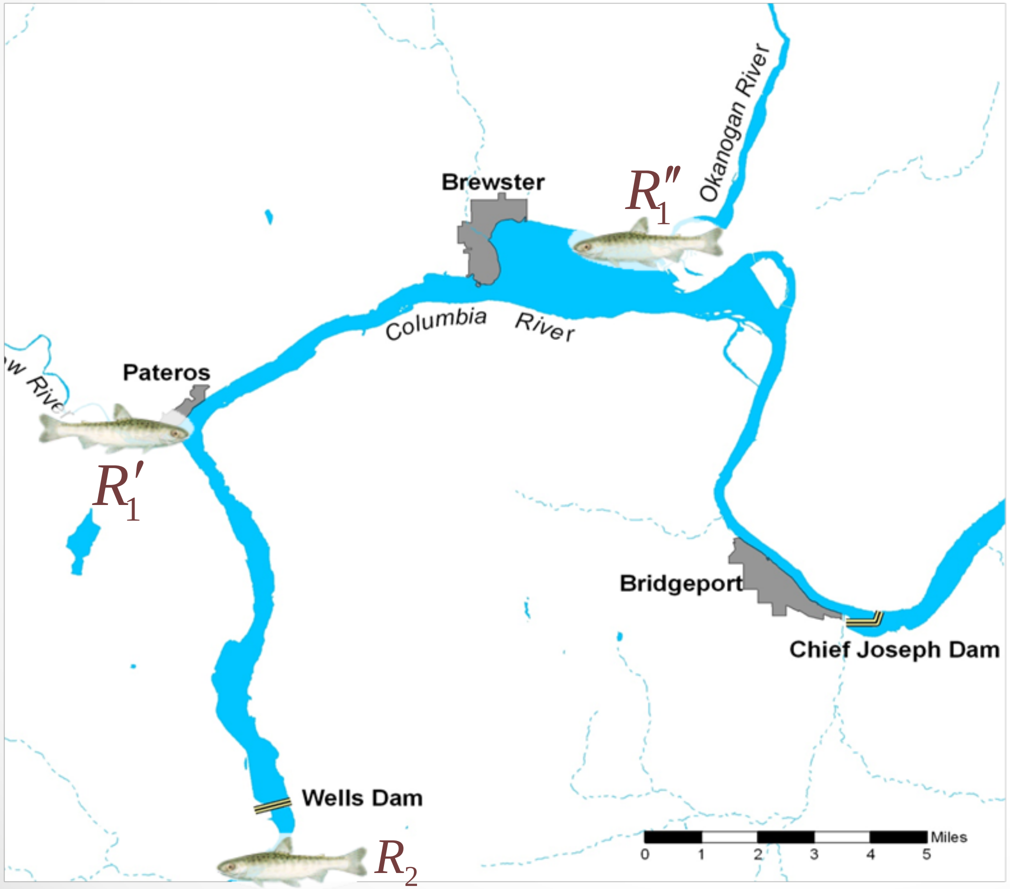
$$\hat{\hat{S}} = 0.962, \widehat{SE} = 0.0089$$

Study Design

- PIT-Tag paired release-recapture design
- Random Assignment of tagged fish to release sites
- Pooled treatment release
  - Okanogan River and Methow River
  - 25%:75%
- Control release
  - Wells tailrace

Study Area

RELEASE LOCATIONS

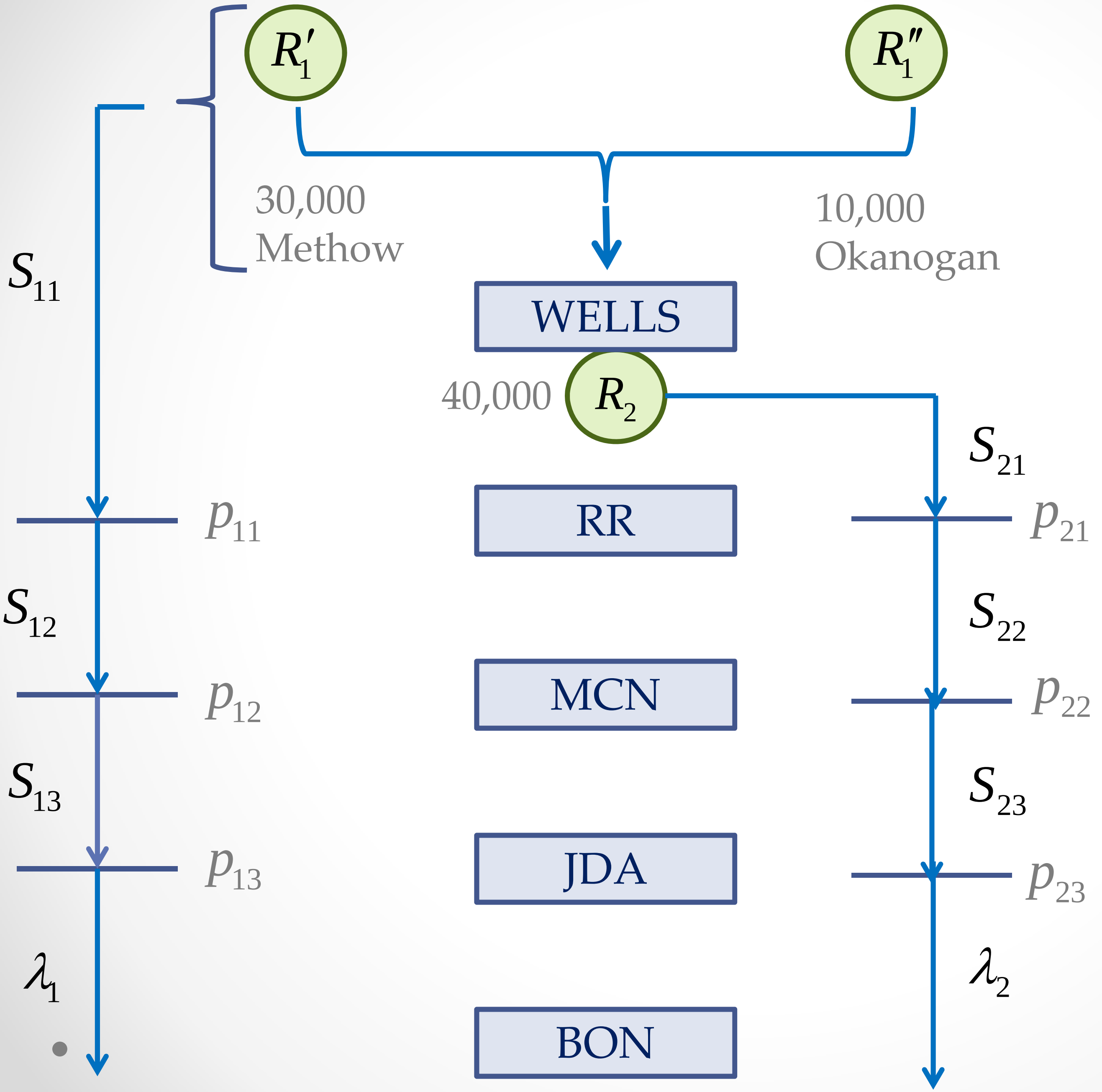


$$\frac{R_1''}{R_1'} = 1:3 \text{ Ratio}$$

Study Design (continued)

- Study Period: 18 April – 17 May 2010
- 15 Replicates
  - Okanogan – 667
  - Methow – 2000
  - Wells tailrace – 2667
- Release timing → facilitate downstream mixing
  - Day 1, 17:00 @ Okanogan
  - Day 2, 10:00 @ Methow
  - Day 2, 14:00 @ Wells tailrace

Release-Recapture Model



Project Survival through Wells:

$$\hat{S}_W = \frac{\hat{S}_{11}}{\hat{S}_{21}}$$

Results

TAG RELEASES

Methow	30,343	75.10% vs. 24.90%
Okanogan	10,062	
Wells Tailrace	36,750	
TOTAL	77,155	

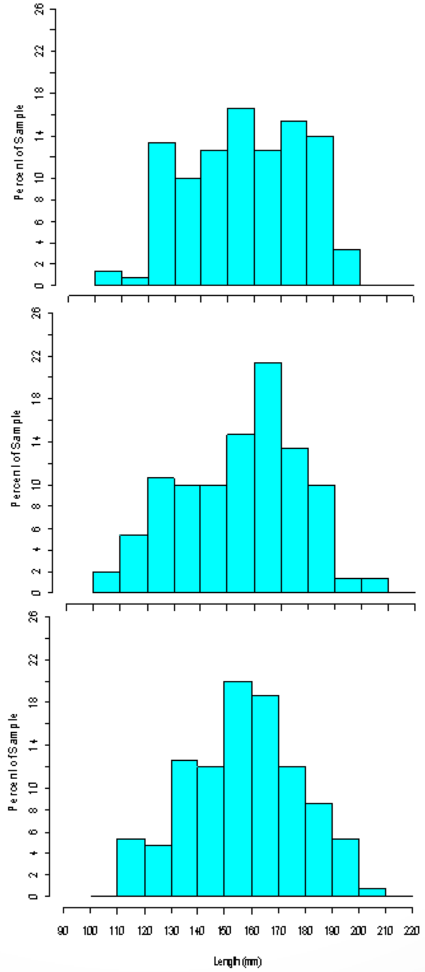
MORTALITIES during holding: 0.087%

Size Distribution

Pateros

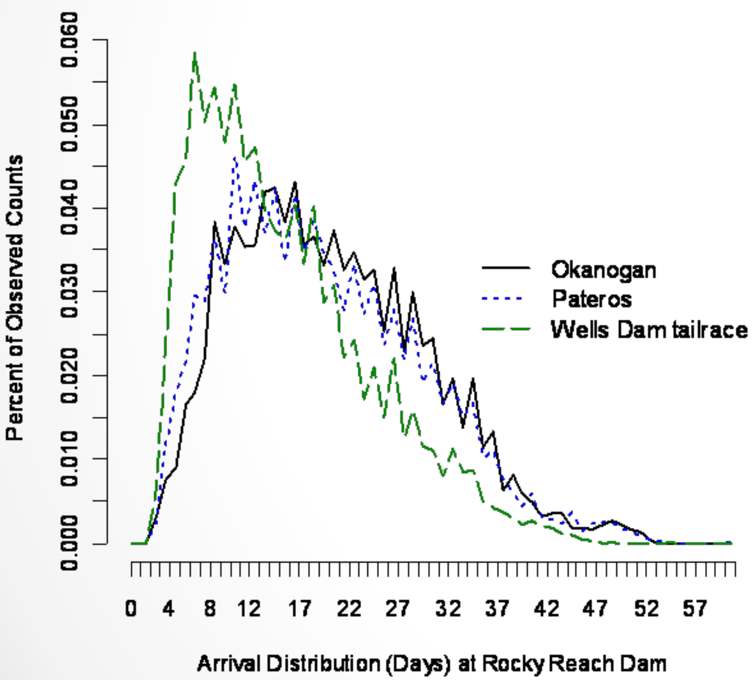
Okanogan

Wells

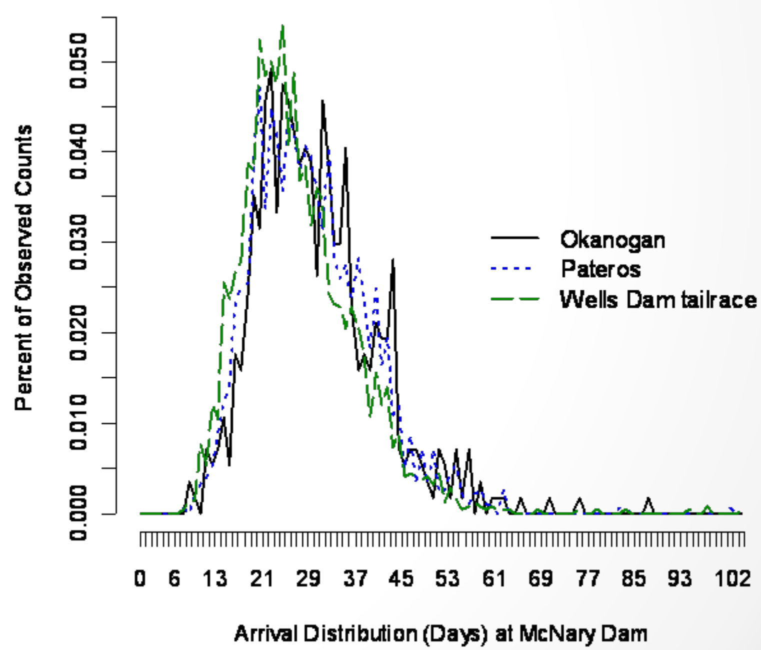


Downstream Mixing

Rocky Reach



McNary



Burnham Tests of Assumptions

- ASSUMPTION: Upstream detection has no effect on downstream survival or detection
- TEST 2: 4/30 tests significant at $P < 0.10$ (i.e., 13.3%)
- TEST 3: 1/30 tests significant at $P < 0.10$ (i.e., 3.3%)

CONCLUSION: No apparent problem

Detection Probabilities

RR $\hat{\bar{p}}_{1\cdot} = 0.4223$

MCN $\hat{\bar{p}}_{2} = 0.0869$

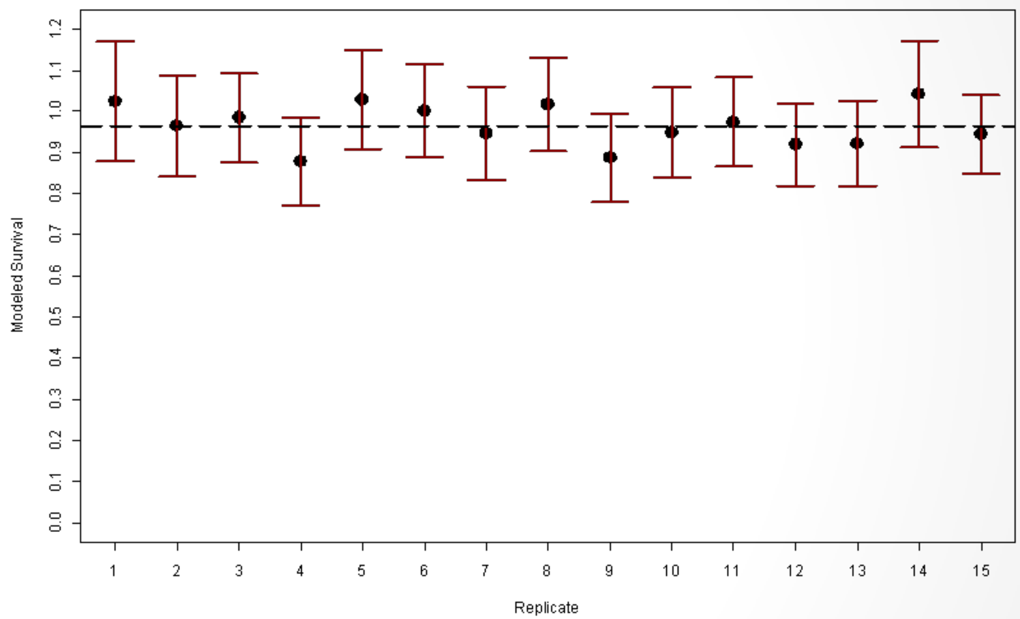
JDA $\hat{\bar{p}}_{3} = 0.0322$

BON $\hat{\bar{\lambda}} = 0.1153$

Historic
Rocky Reach
1998 = 0.092
1999 = 0.229
2000 = 0.593

Replicate Survival Estimates across the Season

Reps	$\hat{S}$ ($\widehat{SE}$)
1	1.0233 (0.0744)
2	0.9643 (0.0626)
3	0.9841 (0.0554)
4	0.8774 (0.0545)
5	1.0288 (0.0618)
6	1.0021 (0.0578)
7	0.9461 (0.0580)
8	1.0162 (0.0581)
9	0.8864 (0.0545)
10	0.9492 (0.0558)
11	0.9743 (0.0553)
12	0.9195 (0.0512)
13	0.9224 (0.0531)
15	1.0421 (0.0661)
15	0.9435 (0.0489)



CONCLUSION:

No obvious seasonal trend

Survival Estimate: Wells Project, 2010, Yearling Chinook Smolts

$$\hat{S} = \frac{\sum_{i=1}^{15} \hat{S}_i W_i}{\sum_{i=1}^{15} W_i} \text{ where } W_i = \frac{1}{\mathrm{CV}\left(\hat{S}_i\right)^2}$$

$$\hat{S} = 0.9638 \left(\widehat{\mathrm{SE}} = 0.0128\right)$$

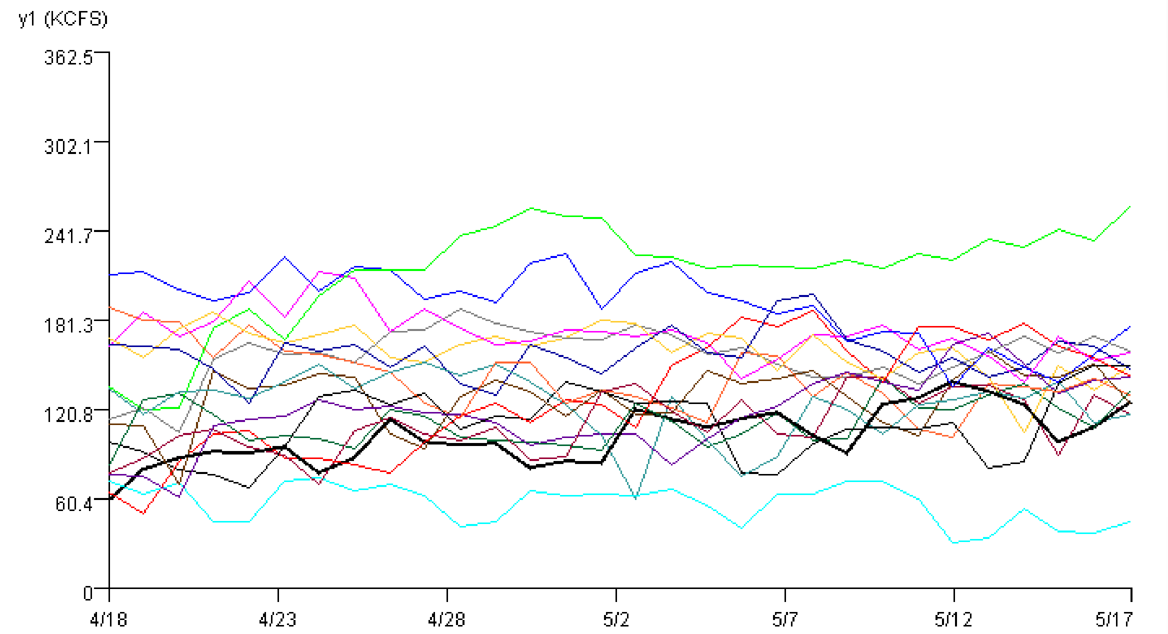
CONCLUSION: Meets HCP requirements

$$\hat{S} \geq 0.93 \text{ and } \widehat{\mathrm{SE}} \leq 0.025$$

Robustness of 2010 Estimate

Weighted Average	0.9638	$(\widehat{SE} = 0.0128)$
Pooled Estimate	0.9732	$(\widehat{SE} = 0.0191)$
Arithmetic Average	0.9653	$(\widehat{SE} = 0.0132)$

Historic Flows at Wells Dam



Average flow in 2010 was ranked the second lowest in the last 20 years

Historical Comparison: Yearling Smolts at Wells

YEAR	$\hat{S}$	SE
1998	0.997	0.015
1999	0.943	0.016
2000	0.946	0.015
3-Year Arithmetic Average	0.962	0.0089
2010 Check-Up	0.964	0.0128
4-Year Arithmetic Average	0.963	0.0074

P-value of $P = 0.9636$

Supporting Slide

Rationale for Weighting Scheme

- Traditionally,

$$W \propto \frac{1}{\text{Variance}}$$

- However, in survival studies,

$$\mathrm{Var}\left(\hat{S}_i\right) \propto \hat{S}_i^2 \cdot f\left(\underset{\sim}{R}, \underset{\sim}{p}\right)$$

- To eliminate correlation between $\hat{S}_i$ and its weight

$$W_i = \frac{1}{\mathrm{CV}\left(\hat{S}_i\right)^2} = \frac{1}{\left(\frac{\mathrm{SE}\left(\hat{S}_i\right)}{\hat{S}_i}\right)^2} = \frac{1}{\left(\frac{\mathrm{Var}\left(\hat{S}_i\right)}{\hat{S}_i^2}\right)} = \frac{1}{\left(\frac{\hat{S}_i^2 \cdot f\left(\underset{\sim}{R}, \underset{\sim}{p}\right)}{\hat{S}_i^2}\right)} = \frac{1}{f\left(\underset{\sim}{R}, \underset{\sim}{p}\right)}$$

Attachment C

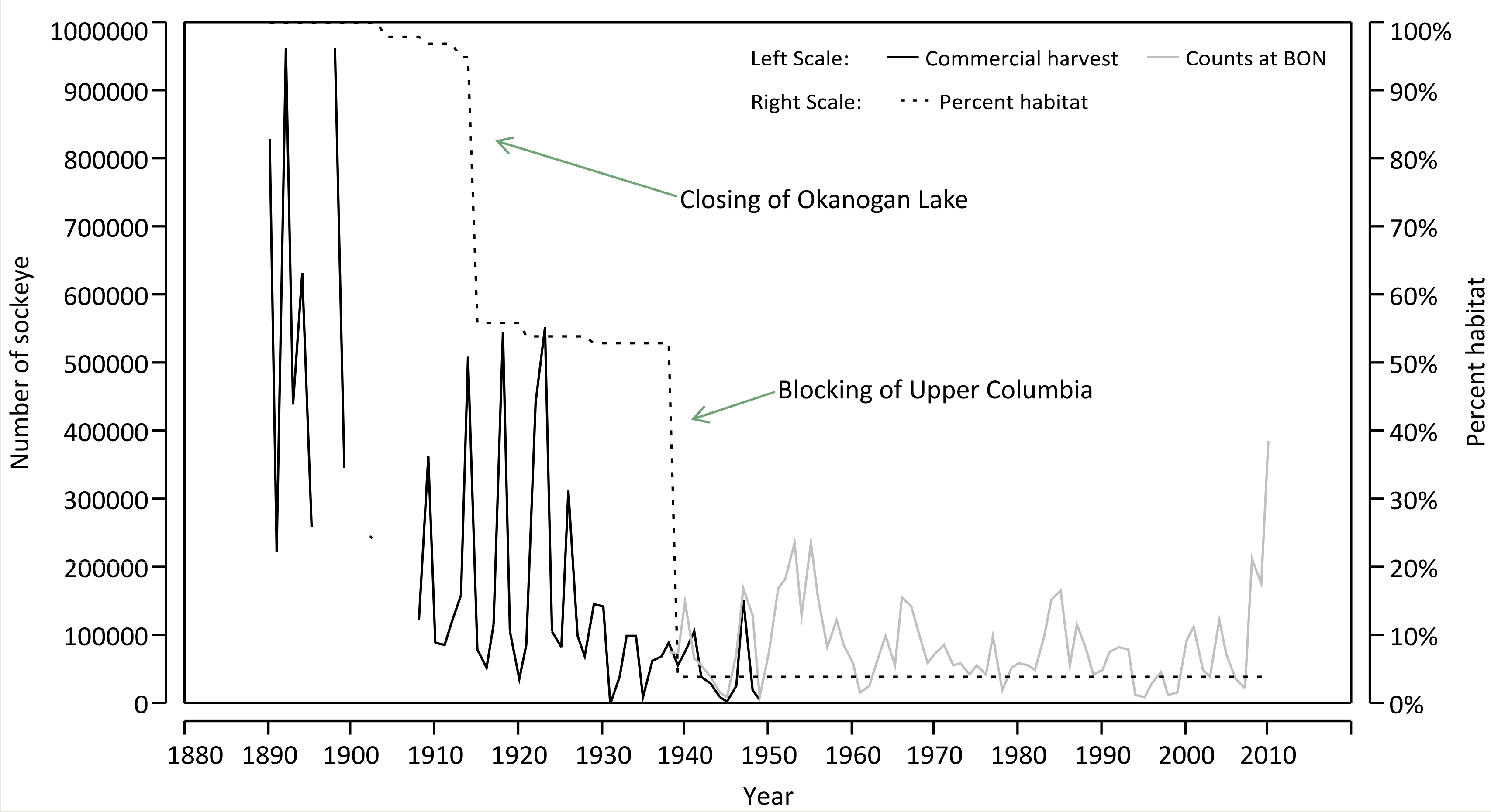
Rocky Reach and Rock Island Habitat and Conservation Plans

REINTRODUCTION OF SOCKEYE SALMON TO SKAHA LAKE

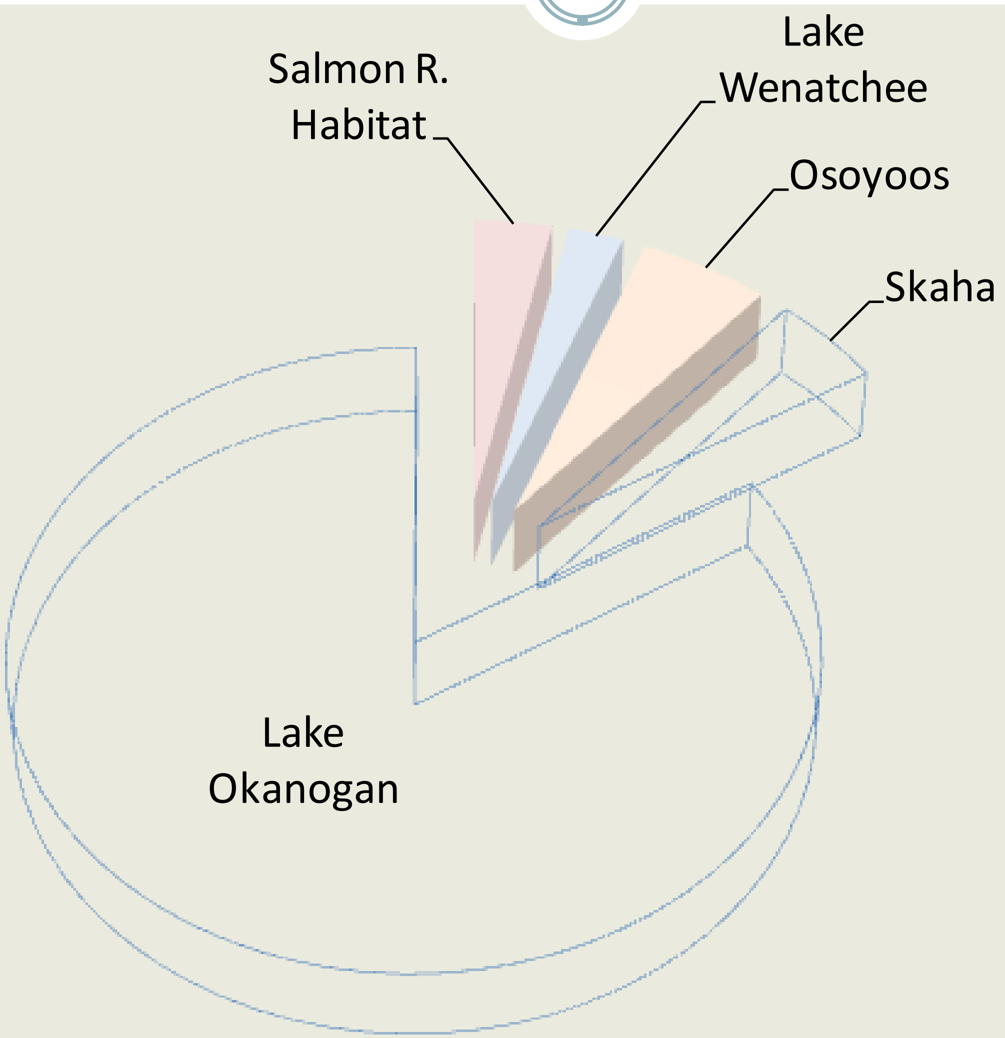
AUGUST 18TH, 2010

Why Fisheries?
Demonstration Fishery

Historic runs and habitat availability



Current and potential sockeye habitat



Key components

- Chelan PUD’s sockeye mitigation obligation
- Lack of success in artificial production
- Agreement to pursue reintroduction efforts *in lieu* of prescribed smolt releases

Path for sockeye reintroduction

Key concepts

- PUD contributions
  - Multi-million dollar sockeye fry production facility
  - Operations and maintenance; monitoring and evaluation
- HC supports
  - Establishing natural production and significant new rearing habitats in Skaha Lake and potentially Okanogan Lake
  - Credit for efforts and successful reintroduction

Summary

- HC has agreed to Skaha reintroduction efforts
- District needs HC support to continue program
- Critical decision point on constructing hatchery

- Questions or Comments?

Attachment D

SAVE For

N OKANAGAN BASIN TECHNICAL WORKING GROUP

C/O Ministry of Environment, Fish and Wildlife Section
102 Industrial Place, Penticton, British Columbia, V2A7C8

	Fax:	Phone:	Email:
Chairperson	250-490-2231	250-490-8243	steve.matthews@gov.bc.ca
Secretariat	250-490-9707	250-490-9779	crivard@syilx.org

July 2nd, 2010

Chelan PUD
PO Box 1231
Wenatchee WA 98807-1231

ATTN: Joe Miller, Hatchery Program Manager

Re: Probability of hatchery use five years past 2015 brood year to the 2020 Brood year

Dear Joe,

The Canadian Okanagan Basin Technical Working Group (COBTWG) has been requested to provide approval in principle for a 5-year extension (i.e. to the 2020 brood-year) of the experimental use of hatchery-origin sockeye fry from a maximum of 5 million eggs for introduction to Skaha Lake. Approval of this 5 year extension will provide the Public Utility Districts (PUDs), who are funding the Skaha Reintroduction Program a defensible rationale for costs to construct a hatchery in support of the program. The current term of this 12 year program ends with the 2015 Brood year, after which there will be a decision on restoration of salmon passage into Skaha Lake at Okanagan Falls Dam. The monitoring and evaluation components established for the 12 year program to meet PUD mitigation and COBTWG adaptive management requirements would also apply to the extended program, if approved. Monitoring and evaluation components involve both Osoyoos Lake and Skaha Lake sockeye. Therefore, to answer the question, we have provided a brief summary on the status of the variables to date based on the 2004-2007 brood year reports.

Sockeye Results: For the 2004-2008 brood years, Skaha Lake sockeye egg-to-smolt survivals have either equalled or exceeded those observed in Osoyoos Lake to date. This has been primarily due to elevated egg-to-fry survival of hatchery origin relative to wild sockeye. However, we are seeing lower fry-to-smolt survival of hatchery-origin relative to wild fry and this is a subject of further evaluation. For the 2004 brood year, smolt-to-adult survivals of Skaha and Osoyoos Lake Sockeye were similar.

C/O Ministry of Environment, Fish and Wildlife Section
102 Industrial Place, Penticton, British Columbia, V2A7C8

	Fax:	Phone:	Email:
Chairperson	250-490-2231	250-490-8243	steve.matthews@gov.bc.ca
Secretariat	250-490-9707	250-490-9779	crivard@syilx.org

Kokanee Results: For the 2005-2008 monitoring years, there has been no detectable change in fry-to-age-one kokanee growth and survival with sockeye present. Also, bioenergetics analysis of forage consumption by fish and macro-invertebrates has shown that the major drivers of Skaha Lake production are Mysis relicta and older age classes of kokanee.

The Skaha Reintroduction program results are positive to date although hatchery release densities have been low (and one of the rationales for construction of a hatchery). Given results to date and maintenance of the annual monitoring and evaluation program, we do not anticipate any technical reason for COBTWG to withhold the required approval of a 5-year hatchery program extension past 2015. We also anticipate that the extension of the time span for adaptive management of the overall Skaha Project will provide additional opportunities for COBTWG and program proponents to evaluate some unresolved questions about prospects for the longer term operational effectiveness of the program. For example, we can speculate that these years may be used to move forward past the question of "if passage is allowed" to answer the question of, "how much" and moving towards an abundance based escapement objective taking into account both Skaha Sockeye returns and Skaha Lake kokanee abundance.

COBTWG approval of the request in this letter will provide greater certainty and improve project planning for the PUDs and enhance opportunities for COBTWG to build on our collaborative technically based approach to salmon restoration.

Respectfully,

Paul Askey for Steve Matthews,
COBTWG chair

SM/crs
cc: COBTWG members

Attachment E

Proposal to re-start yearling Chinook Juvenile at Rocky Reach in 2011 following the HCP Provisional Review Period, 2005-2010

<u>Rocky Reach Yearling Chinook 2004-2005</u>
After completion of HCP Phase I survival studies for yearling Chinook in 2004 and 2005 at Rocky Reach, yearling Chinook entered HCP Phase III Provisional Review status as directed in the HCP because survival estimates for the two years were between 91.0 and 93.0 percent (Table 1). River flows for both studies were very low. The 2004 study flow from Grand Coulee (99,013 cfs) was below valid river flow of 100,523 cfs, but the HCP Coordinating Committee voted to accept the study as valid.

The HCP Provisional Review period 2005-2010 was …"designed to implement additional measures or conduct additional juvenile survival studies to accurately determine whether the pertinent survival standard is being achieved." Chelan proposes to restart survival testing for yearling Chinook in 2011 and conduct up to three studies through 2013 under Phase III "additional juvenile studies" as outlined in the Rocky Reach HCP [page 14 Section 5.3.3, RR HCP]. Doing so will allow Chelan to conduct survival studies with smaller acoustic tags, and benefit from Project operational changes and survival tools it has implemented over the last five years to measure "current" survival conditions for yearling Chinook at the Rocky Reach Project.

HCP CC has Authority in the Rocky Reach HCP
Section 5.3.3 of Rocky Reach HCP states…. *"The District shall proceed to Phase III (Provisional Review) when Juvenile Project Survival studies indicate that Plan Species survival is less than 93% but greater than or equal to 91%. Provisional Review allows the District a one time (plan-species specific) five-year period to implement additional measures or conduct additional juvenile or additional adult survival studies to more accurately determine whether the pertinent survival standard is being achieved. If at the end of this period Juvenile Project Survival is still less than 93% but greater than or equal to 91% and the Combined Adult and Juvenile Survival Studies are inconclusive, then the District will move to Phase II (Additional Tools). When the Provisional Review Studies indicate that the Combined Adult and Juvenile Survival estimates are greater than or equal to 91% or when the Juvenile Project Survival Studies indicate that survival is greater than or equal to 93% then the District shall proceed to Phase III (Standard Achieved). If the Provisional Review Studies indicate that the 95% Juvenile Dam Passage Survival Standard has been achieved through direct measurement or calculation, then the District shall proceed to Phase III (Additional Juvenile Studies)".*

<u>*(Phase III Additional Juvenile Studies)*</u> *The District shall proceed to Phase III (Additional Juvenile Studies) when Juvenile Dam Passage Survival studies or Juvenile Dam Passage calculations indicate that Juvenile Dam Passage Survival is greater than or equal to 95%. Because measurement or calculation of Juvenile Dam Passage Survival does not address juvenile mortality in the pool or the indirect effects of juvenile project passage, the District will evaluate either the 91% Combined Adult and Juvenile Project Survival or the 93% Juvenile Project Survival as determined appropriate by the Coordinating Committee.*

Rocky Reach Operations and Programs implemented to Benefit Survival during Provisional Review

- Significant increase in Pikeminnow control program effort and funding
- 448,000 + pikeminnow removed 2005-2010 (ave 74,680 fish per year since 2005)
- Chelan's 2007 Didson camera predation research in RR surface collector showed predation by pikeminnow; turned off RR deck lighting above bypass surface collector channels at night.
- Initiated direct pikeminnow control in surface collector to increase entrance efficiency and survival of smolts entering the bypass system.
- Chelan modified RR turbine unit operation to run in sequential order: Start 1-11 and stop 11-1, to eliminate "quiet water spaces" in tailrace where predators may accumulate.
- Run RR turbine units under "Water View" best efficiency loading following 2007 block loading study which showed increased Powerhouse survival during Waterview test blocks.
- All 11 RR turbine units re-hab completed with "minimum gap runners" and imbedded leading edges in hub (units 1-8) - "fish friendly" modifications.

Study Design Modifications Since 2005

- Survival study methodology has been improved to eliminate biases.
- Individual tag groups are now evenly distributed across all test and control replicates.
- Each tagger now tags equal numbers of fish in corresponding test and control replicates.
- Tag technology has improved since 2005, and smaller tags were used in 2010 (0.65 g vs. 1.5 g)

Table 1. Yearling Chinook Project passage survival estimates and 2011 Project survival needed to achieve Phase III Standards Achieved for Chinook at Rocky Reach.

Year	$\hat{S}_{RR}$ Project
2004	92.93
2005	91.09
2010	Pilot day/night
2011	**95.00**
Mean $\hat{\bar{S}}_{RR}$	93.00

ANCHOR QEA

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FINAL MEMORANDUM

To:	Wells, Rocky Reach, and Rock Island HCP Coordinating Committees	**Date:**	January 25, 2011
From:	Michael Schiewe, Chair,		
Cc:	Carmen Andonaegui		
Re:	Final Minutes of December 14, 2010 HCP Coordinating Committees Meeting		

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Coordinating Committees met on Tuesday, December 14, 2010, from 9:30 am to 12:15 pm in SeaTac. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Steve Hemstrom will revise the Sockeye Phase III Standards Achieved Statement of Agreement (SOA) and send to Carmen Andonaegui for distribution to the Coordinating Committees (Item II-A).
- Steve Hemstrom will add an appendix to the 2010 Rocky Reach Yearling Chinook Survival Study adding interpretation and discussion (Item II-C).
- Carmen Andonaegui will send an email to the Coordinating Committees changing the due date for comments on the 2010 Rocky Reach Yearling Chinook Survival Study to January 14 (Item II-C).
- Chelan PUD will prepare draft 2011 Action Plans for review by the Coordinating Committees by the January 2011 meeting (Item III-A).
- Carmen Andonaegui will provide to the Coordinating Committees meeting dates for 2011 meetings (Item V-A).

DECISION SUMMARY

- The Coordinating Committees approved the SOA for sockeye Phase III Standards Achieved at the Rocky Reach Project, as modified. The SOA will be finalized in five working days (on December 22).
- The Coordinating Committees approved the SOA to restart in 2011, up to three years of yearling Chinook survival studies at the Rocky Reach Project. The SOA will be finalized in five working days (on December 22).

REVIEW ITEMS

- Draft 2010 Rocky Reach Yearling Chinook Survival Study Report: 30-day review period with comments due January 14, 2011.
- Draft 2011 Wells HCP Action Plan: 30-day review period with comments due January 14, 2011.

I. Welcome

The Coordinating Committees reviewed the agenda. There were no additions to the agenda. The Committees approved the November 16, 2010 meeting minutes, as revised. Carmen Andonaegui will finalize the minutes and distribute them to the Committees.

II. Chelan PUD

A. DECISION ITEM: SOA to Approve Rocky Reach Sockeye Phase III Standards Achieved (Steve Hemstrom)

Steve Hemstrom presented to the Coordinating Committees for approval, the Statement of Agreement (SOA) for Phase III Standards Achieved for sockeye at Rocky Reach Project (Attachment B). Hemstrom said the three-year average juvenile sockeye Project survival standard of 93.59 percent was achieved using survival study results from 2006, 2008, and 2009. The 3-year average juvenile dam passage survival estimate was 97.11 percent for the same years. The combined adult and juvenile project survival standard was calculated to be 93.12 percent. The Committees' members discussed the difficulties that still remain for calculating a combined adult and juvenile Project survival. The Committee agreed to delete the second page of the SOA which contained the data and calculation for the combined adult and juvenile sockeye survival for Rocky Reach.

Mike Schiewe said Bob Rose and Steve Parker (Yakama Nation) informed him they had discussed Chelan PUD's request for approval of Phase III Standards Achieved for juvenile sockeye project survival for the Rocky Reach Project. Rose said the Yakama Nation is in support of the designation, however he asked for an additional five working days to read the SOA, which he said he had not yet had time to do. All Committees' members present approved the SOA, as modified during today's discussion; Hemstrom will revise SOA and email it to Carmen Andonaegui for distribution to the Committees. Following 5 working days (on December 22), the SOA will be finalized as approved. (Note: On December 17 Bob

Rose sent an email to the Coordinating Committees documenting the YN approval of the SOA).

B. DECISION ITEM: SOA to Approve 2011 Re-start of Rocky Reach Yearling Chinook Survival Studies (Phase III Additional Juvenile Studies) (Steve Hemstrom)

Steve Hemstrom presented to the Coordinating Committees an SOA for approval to restart three years of yearling Chinook survival studies starting in 2011, for the Rocky Reach Project (Attachment C). Mike Schiewe asked for comments from Committees' members; there were no comments. Schiewe stated Bob Rose said he supports restarting yearling Chinook survival studies but has asked for an additional five working days to read the SOA, which he said he had not yet had time to do. The Committees approved the SOA, which will be finalized on December 22, after five working days. (Note: On December 17 Bob Rose sent an email to the Coordinating Committees documenting the YN approval of the SOA).

C. Discussion: 2010 Draft Rocky Reach Yearling Chinook Survival Study Report (Steve Hemstrom)

Steve Hemstrom introduced the draft 2010 Rocky Reach Yearling Chinook Survival Study (Attachment D) and provided a summary of the results. He explained that the 2010 survival study was designed to generate independent project survival estimates for daytime versus nighttime releases. The results were 0.9518 project survival for fish released during the day compared to 0.8984 project survival for fish release at night; the pooled average was 0.9250. For fish passing at night, regardless of release timing, survival was estimated to be 0.9478. The survival estimate for fish passing during the day, regardless of release timing, was 0.9143. Chelan PUD will be reviewing these findings with the Coordinating Committees and Dr. John Skalski (Columbia Basin Research) to determine whether a daytime versus nighttime survival study should be repeated in 2011 or whether to implement a day-release only study in 2011.

Hemstrom noted that survival estimates generated from the direct release into the juvenile bypass system to the next downstream detection site from the dam seemed low, despite the fact that fish exiting the juvenile bypass were in very good condition. Hemstrom said survival is normally very high in the bypass and that mortalities were probably occurring after fish exit the bypass. Bryan Nordlund noted that dam passage survival for the daytime releases (0.9143) was low considering that the pooled day- and night-released project passage was 0.9250. Hemstrom said that Chelan PUD is looking at absolute survival through non-bypass routes and that he plans to talk with Skalski about difference between single-release absolute survival estimates versus the relative survival estimates.

Nordlund suggested providing discussion in the 2010 survival study report that speaks to how lower flow years may relate to lower survivals. Mike Schiewe said additional interpretation of the study results could be included in an appendix to the report. Hemstrom agreed to add an appendix to the 2010 survival study providing additional discussion and interpretation of results. There were no additional comments on the draft study report.

Schiewe suggested a 30-day review period for the draft report although the HCP allows for a 60-day review period. There were no objections to a 30-day review period for the draft report so comments will be due January 14, 2011 with a goal of approving the study results at the January 25 Committees meeting. Carmen Andonaegui will notify the Committees by email of the January 14 deadline for comments on the draft 2010 survival study report.

III. Douglas PUD

A. Discussion: Draft 2011Wells HCP Action Plan (Tom Kahler)

Tom Kahler provided copies of the draft 2011 Wells HCP Action Plan (Attachment E). Mike Schiewe said the Action Plan outlines expected products, events, and due dates for the Wells Project in the coming year. Kahler would like approval of the Action Plan by the Committees in early 2011. He said the Action Plan includes Hatchery and Tributary committees' scheduled actions as well. These committees are also reviewing the Action Plan.

Kahler said Items 4, 5, and 6 are new items not included in earlier Action Plans. Item 4 is a life-history study of subyearling Chinook salmon. He reminded the Committees of the study proposed last spring by Chelan and Douglas PUDs to monitor passage of PIT-tagged subyearling Chinook through the Rocky Reach juvenile fish bypass system. He noted that the numbers of PIT-tagged subyearlings originating above Wells and Rocky Reach dams are low, and that, with this proposed study, Douglas PUD is planning to increase the numbers of PIT-tagged sub-yearling Chinook available for downstream detection. Kahler said he plans to bring a proposal for a study of subyearling Chinook life histories to the Committees in the next month. Bryan Nordlund asked if Chelan PUD was also considering a subyearling Chinook life history study. Hemstrom said Chelan PUD will continue to monitor at Rocky

Reach Dam for PIT tags and monitor the PTAGIS website for subyearlings tagged above Rocky Reach. Hemstrom said Chelan PUD monitoring will extend to at least June 2012. Kahler reiterated that the proposed study was an expansion of the study proposed last spring by Chelan and Douglas PUD, to which Hemstrom referred. He said Douglas PUD is also planning to monitor adult returns as part of their subyearling life history study.

Kahler said Item 5 is part of the on-going, lamprey passage study, and addresses the measurement of fishway entrance velocities as requested by the Committees.

Item 6 is intended to address the HCP requirement that juvenile fish bypass operations be evaluated every 10 years (Section 4.3.2). Currently, Wells Dam bypass operations are based on the results of studies conducted between 1982 and 2002. The Committees discussed possible methods for testing bypass operations (e.g., fyke nets and hydroacoustics). Teresa Scott asked how important it was to validate bypass operations given the potential for take of listed species. Kahler indicated that it was a requirement of the HCP, but agreed with others that the Committee could waive that requirement if there was no evidence that current bypass operations were not achieving HCP standards. Steve Hemstrom said that based on his review of run-timing at Rocky Reach Dam, bypass operations at Wells Dam appear to cover 95 percent of the juvenile migration. Schiewe said the HCP requirement is a verification requirement not a requirement for a study itself.

Jerry Marco asked about the potential value of starting juvenile bypass operations prior to April each year to provide passage for spring-migrating wild juveniles. Kahler said that bypass startup timing is based on hydroacoustic evaluations overwhelmingly influenced by releases from supplementation programs. He asked for ideas from Committees' members on how to address validating run-timing. Jim Craig said the USFWS has screw traps that are put into the rivers as early as conditions allow in the spring. He suggested that screw trap data would provide insight into whether run-timing starts in the tributaries earlier than was previously thought. Kahler noted that the timing of detection at tributary traps was not a surrogate for mainstem dam passage, especially in the Methow where the screw trap is 17 miles upstream from the confluence with the Columbia. Schiewe suggested that the issue of juvenile bypass operations would require further discussion and should be revisited in January. He asked Chelan PUD to prepare an Action Plan for 2011. Steve Hemstrom agreed to provide a draft 2011 Action Plan for Rocky Reach and Rock Island projects to the Committees.

IV. Hatchery and Tributary Committee Update (Mike Schiewe)

Mike Schiewe updated the Coordinating Committees that the Tributary Committees met on November 18 and discussed the following items:

- The Tributary Committees completed review of eight proposals to the 2010 General Salmon Habitat Program. The Committees approved funding for five projects.
- The Tributary Committees resolved with the Upper Columbia Salmon Recovery Board (UCSRB) Committees contract language related to whether or not to require the project sponsor to manage coordination between the UCSRB and project landowner. The Committees developed language that encourages rather than requires the sponsors to coordinate with the UCSRB and landowner.
- The Tributary Committees determined that targeted solicitations are appropriate as long as the projects fit within the General Salmon Habitat Program objectives.
- The US Fish and Wildlife Service (USFWS) advised the Tributary Committees that David Morgan would be replaced by Kate Terrell as the USFWS representative on the Tributary Committees.

Mike Schiewe updated the Coordinating Committees on the following actions and discussions that occurred at the most recent Hatchery Committees meeting on November 17:

- The Hatchery Committees approved a Statement of Agreement (SOAs) that memorialized the sharing of Chelan PUD hatchery facilities, primarily with Grant PUD.
- The Hatchery Committees approved an SOA for Douglas PUD's participation in funding of the new Chief Joseph Hatchery program to meet Douglas PUD's hatchery NNI mitigation obligation.
- The Hatchery Committees agreed to the release from Methow Hatchery of the surplus spring Chinook from the 2009 broodyear that were above and beyond production level into an off-channel pond on the Chewuch River.
- Chelan and Douglas PUDs are preparing proposals to the Hatchery Committees for estimating smolt production as part of the HCP 2013 hatchery NNI recalculations. The Hatchery Committees are considering the use of the Biological Assessment and

Management Plan (BAMP) smolt-estimation method and the use of monitoring and evaluation (M&E) HCP program results, among a few options.

- The NOAA Northwest Fisheries Science Center (NWFSC) gave a presentation to the Hatchery Committees on the results of two years of physiological testing of various Chelan PUD summer Chinook hatchery production groups. Initial focus of the evaluation was on recirculation-reared fish compared to raceway-reared fish, looking at condition factors and proportion of minijack returns. No differences were detected over two years of evaluation.
- The Hatchery Committees have been working to resolve differences regarding the appropriate size of the Methow River component of the Wells steelhead hatchery program. The Committees have tentatively reached a compromise for program release numbers that should move the draft Hatchery and Genetics Management Plan (HGMP) out of Hatchery Committees and to NMFS for review. The proposed program size to be considered for an approval-in-principle at tomorrow's Hatchery Committees meeting is a total Methow Basin release (combined Wells and Winthrop National Fish Hatchery [WNFH]) of 350,000 steelhead smolts for the next two years. In 2013, Wells would reduce releases to the Methow Basin to 150,000, with the balance of the 350,000 smolts being picked up by the WNFH steelhead hatchery program. The balance of Wells steelhead (200,000) would be released into the mainstem Columbia River. There was discussion in the Committees as to whether some of the 200,000 smolts would go into the mainstem above the mouth of the Okanogan River or all into the Columbia River downstream of Wells Dam. A decision revolves around the issue of adult management.

V. HCP Administration (Mike Schiewe)

A. *Next Meetings*

The next scheduled Coordinating Committees' meetings will be on January 25, February 22, and March 22, all in SeaTac.

Carmen Andonaegui will provide to the Coordinating Committees meeting dates for 2011 Coordinating Committees' meeting.

List of Attachments

Attachment A – List of Attendees

Attachment B – SOA to Approve Rocky Reach Sockeye Phase III Standards Achieved

Attachment C – SOA to Approve 2011 Re-start of Rocky Reach Yearling Chinook Survival Studies

Attachment D – Draft 2010 Rocky Reach Yearling Chinook Survival Study

Attachment E – Draft 2011 Wells HCP Action Plan

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor QEA, LLC
Carmen Andonaegui	Anchor QEA, LLC
Steve Hemstrom *	Chelan PUD
Lance Keller	Chelan PUD
Tom Kahler*	Douglas PUD
Jerry Marco (by phone)*	CCT
Jim Craig*	USFWS
Bryan Nordlund*	NOAA
Teresa Scott (by phone) *	WDFW

* Denotes Coordinating Committees member or alternate

Final (12/17/10)
Rocky Reach HCP Coordinating Committee
Statement of Agreement

Approval of HCP Phase III Standards Achieved Designation for Juvenile Sockeye At the Rocky Reach Project

Approved December 17, 2010

Agreement Statement
The Rocky Reach HCP Coordinating Committee (HCP CC) agrees that Chelan PUD (Chelan) has conducted three years (2006, 2008, 2009) of valid Juvenile Project Survival studies (SE $\leq$ 2.5%) for Okanogan Sockeye at the Rocky Reach Project and has exceeded the Juvenile Project Survival Standard (93%) with a three-year arithmetic mean survival of 93.59 percent. This standard was achieved with current operating procedures using the juvenile fish bypass system, the Waterview computer generation control program, and no voluntary spill. The Coordinating Committee agrees that Okanogan sockeye are now in Phase III Standards Achieved at the Rocky Reach Project.

Background
From 2006 through 2009, Chelan conducted three valid project survival studies for juvenile run-of-river Okanogan sockeye at the Rocky Reach Project under HCP Phase II Additional Tools which yielded a three-year arithmetic average Project Survival of 93.59% (Table 1). For these three years of juvenile sockeye studies at the Rocky Reach Project, dam passage survival for sockeye also exceeded the HCP requirement of 95% (Table 1). The HCP CC acknowledges these results and accepts the three-year Project Survival of 93.59%. Results from the 2007 study were not used in the Phase III designation due to the nature of the study design and the study goal. This study compared passage survival under two very different turbine operating configurations, which is not representative of current operating conditions. Results of the study showed that powerhouse survival was significantly higher (7.5%) when turbine units were operated under best efficiency settings using the Plant's normal turbine control program, "Waterview". Following the 2007 study, Rocky Reach implemented the Waterview program exclusively during the smolt outmigration period (fish bypass operating season).

Table 1. Summary of Rocky Reach Project and Dam survival estimates for juvenile run-of-river Okanogan Sockeye with the juvenile bypass system operating, 2006-2009. Both Project and Dam survival estimates surpass the HCP requirements of 93.0 and 95.0 percent survival, respectively.

Year	$\hat{S}$ Project	$\hat{S}$ Dam
2006	0.9331 (SE=0.0121)	0.9685
2008	0.9202 (SE=0.0212)	0.9695
2009	0.9545 (SE=0.0118)	0.9752
Mean $\hat{S}$	**0.9359**	**0.9711**

Attachment C

Final
Rocky Reach HCP Coordinating Committee
Statement of Agreement

Approval to re-start Phase III Project Survival Testing
for Yearling Chinook at the Rocky Reach Project

Approved December 17, 2010

Agreement Statement
The Rocky Reach HCP Coordinating Committee (HCP CC) agrees that Chelan PUD (Chelan) should initiate up to three years of juvenile survival testing beginning in 2011 for yearling Chinook salmon at the Rocky Reach Project under Phase III Additional Juvenile Studies. Chelan will conduct up to three additional juvenile Project survival studies from 2011-2013 to determine the current status of HCP Project Survival for yearling Chinook. The Coordinating Committee may elect to include results from the 2010 Provisional Review study ($\hat{S} = 0.9250$) if results from the 2011-2012 yearling Chinook studies average 93.25% or greater, and the three year average is 93% or greater.

Background
Initial HCP Phase I survival studies at Rocky Reach for yearling Chinook in 2004 and 2005 yielded results that directed the HCP CC, per the HCP Agreement, to designate yearling Chinook in Phase III Provisional Review status. Survival estimates for the two years were between 91.0 and 93.0 percent. River flows during both studies in 2004-05 were very low (2004=99,013 cfs; 2005=103,939 cfs). The 2004 study was below the valid HCP flow of 100,523 cfs from Grand Coulee, but the HCP Coordinating Committee voted to accept the study as valid. These early survival estimates may no longer be valid due to passage of time and implementation of measures since 2005 by Chelan to increase juvenile project survival.

Per the Rocky Reach HCP, the Provisional Review period 2005-2010 was … "*designed to implement additional measures or conduct additional juvenile survival studies to accurately determine whether the pertinent survival standard is being achieved*." In this five year period, Chelan conducted two years of Didson camera predation studies in the fish bypass system, increased predator control efforts by more than 50%, tested powerhouse survival with modified turbine operations, and improved survival study methodology to eliminate negative bias in Project survival estimations. As a necessary means to fully evaluate the survival benefits from implementing these measures, Chelan will restart Project Survival testing for yearling Chinook beginning in 2011 and will conduct up to three studies through 2013 under Phase III "additional juvenile studies", as outlined in the Rocky Reach HCP [page 14 Section 5.3.3; RR HCP]. The Coordinating Committee may elect to include the survival estimate from the 2010 Provisional Review study ($\hat{S} = 0.9250$) at Rocky Reach if results from the 2011-2012 studies combine to average 93% or greater for the three years. The new studies will enable Chelan to utilize smaller, newer generation acoustic tags than those used in 2004-2005, and will yield a better estimate of "current" survival conditions for yearling Chinook at the Rocky Reach Project.

Attachment D

DRAFT
Survival, Diel Passage, and Migration Dynamics of Yearling Chinook Salmon Smolts at Rocky Reach Dam in 2010

Prepared for:
Public Utility District No. 1 of Chelan County
P.O. Box 1231
327 North Wenatchee Avenue
Wenatchee, Washington 98801

Prepared by:
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25 October 2010

Executive Summary

Study Objective

The overall objective of the 2010 yearling Chinook salmon smolt studies at Rocky Reach Dam was to estimate and compare project passage survival and dam passage survival between daytime and nighttime releases. The standard powerhouse operation "Waterview" was in effect throughout the study. In addition to the acoustic-tag studies, juvenile passage at the Rocky Reach Juvenile Sampling Facility (JSF) was sampled hourly, 24 April to 4 June, to estimate diel passage distribution of run-of-river smolts at the project.

Methods

Yearling Chinook salmon smolts were tagged with HTI *Model 795Lm Acoustic Tags*. Paired release-recapture methods were used to estimate project passage survival for day and nighttime releases. A triple-release method was used to estimate dam passage survival, route-specific survivals, and passage proportions during nautical day and nighttime periods.

Results

Project passage survival at Rocky Reach was estimated to be $\hat{S}_{\text{RR-Day}} = 0.9518$ ($\widehat{\text{SE}} = 0.0166$) for daytime releases and $\hat{S}_{\text{RR-Night}} = 0.8984$ ($\widehat{\text{SE}} = 0.0196$) for nighttime releases. A pooled estimate of project passage survival was calculated to be $\hat{S}_{\text{RR}} = 0.9250$ ($\widehat{\text{SE}} = 0.0142$).

Passage proportions for nautical day and nighttime releases of smolts were significantly different at three of the four passage routes.

Table ES.1. Estimates of acoustic-tagged yearling Chinook salmon smolt passage proportions at Rocky Reach Dam during nautical day and night periods. Standard errors in parentheses. Two-tailed *P*-values for a difference in passage use.

	Passage proportions		
Route	Nautical day	Nautical night	*P*-value (2-tailed)
Surface collector	0.4262 (0.0224)	0.6000 (0.0316)	0.0000
Bypass screens	0.0676 (0.0114)	0.0208 (0.0092)	0.0014
Units 1–2	0.1906 (0.0178)	0.0833 (0.0178)	0.0000
Units 3–11	0.3156 (0.0210)	0.2958 (0.0295)	0.5845

Significantly more yearling Chinook salmon smolts used the surface collector at night. Passage through the bypass screens and Units 1–2 decreased at night. Dam passage survival during the nautical day was estimated to be $\hat{S}_{\text{RR-Day}} = 0.9143$ ($\widehat{SE} = 0.0121$) and during the night, $\hat{S}_{\text{RR-Night}} = 0.9478$ ($\widehat{SE} = 0.0127$).

This report conforms to the guidelines of the Peven et al. (2005) recommendations for survival studies.

Survival Study Summary

Year: 2010 Start date: 29 April 2010 Stop date: 30 May 2010	
Study site(s): Rocky Reach project	
Objective(s) of study: Estimate project survival	
State hypothesis, if applicable: N/A	
Fish • Species-race: Yearling Chinook salmon smolts • Source: Run-of-river from Rocky Reach juvenile sampling facility	
Size (median & range) • Weight: Median – 49.9 g, range – 21.8 – 111.3 g • Length: Median – 169 mm, range – 135 – 212 mm	
Tag • Type/model: HTI *Model 795Lm Acoustic Tag* • Weight (g): 0.65 g in air	
Implant procedure • Surgical: Acoustic tag	
Type (project, etc.): Project survival	Rocky Reach
• Project – Day Releases	0.9518 (0.0166)
• Project – Night Releases	0.8984 (0.0196)
• Project – Day/Night Pooled	0.9250 (0.0142)
• Dam – Day Passage	0.9143 (0.0121)
• Dam – Night Passage	0.9478 (0.0127)
• Sample size/replicate: 25 /rep. (Wells, day & night; RR, night); 33/rep. (RR, day) • # replicates: 15 replicates (Wells & Rocky Reach, day & night) • Analytical model: Paired release-recapture model, triple-release model	
Hypothesis test and results (if applicable): N/A	
Characteristics of estimate • Effects reflected (direct, total, etc.): Total project • Absolute or relative: Absolute	
Environmental/operating conditions • Discharge: Rocky Reach, median: 109.2 kcfs, range: 75.9 – 135.8 kcfs • Temperature: Rocky Reach, median: 9.6 ^{o}C, range: 7.4 – 10.7 ^{o}C • TDG: Rocky Reach, median: 105.4 %, range: 103.4 – 107.5 % • Treatment(s): Day and nighttime releases	
Unique study characteristics: None	

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1. Introduction

The purpose of the 2010 acoustic-tag investigations of yearling Chinook salmon smolts at Rocky Reach Dam (Fig. 1.1) was to estimate project passage and route-specific survival of daytime and nighttime releases. Information from these release-recapture studies was combined with information on the diel passage of smolts at the dam to better understand migration dynamics and dam passage survival at the project, and to design an appropriate release strategy that best represents project passage behavior of run-of river (ROR) Chinook smolts. Specific objectives of the study were as follows:

1. Estimate Rocky Reach project passage survival using daytime and nighttime releases.
2. Estimate dam passage survival at Rocky Reach and partition project passage survival into dam and pool components for daytime releases.
3. Compare route-specific passage proportions and relative survivals between daytime and nighttime releases at Rocky Reach Dam.
4. Characterize arrival timing of daytime and nighttime releases from Wells tailrace to Rocky Reach Dam.
5. Compare arrival distributions of tagged fish at Rocky Reach Dam to the diel passage distribution of ROR fish at the juvenile sampling facility.

The intent of the release-recapture study was to estimate project passage survivals under standard daytime release conditions and compare that estimate to one obtained from analogous nighttime releases. The releases also provided smolt arrival distributions at the dam throughout the day in order to compare route-specific passage distribution and survivals between nautical day and nighttime (Appendix A) conditions.

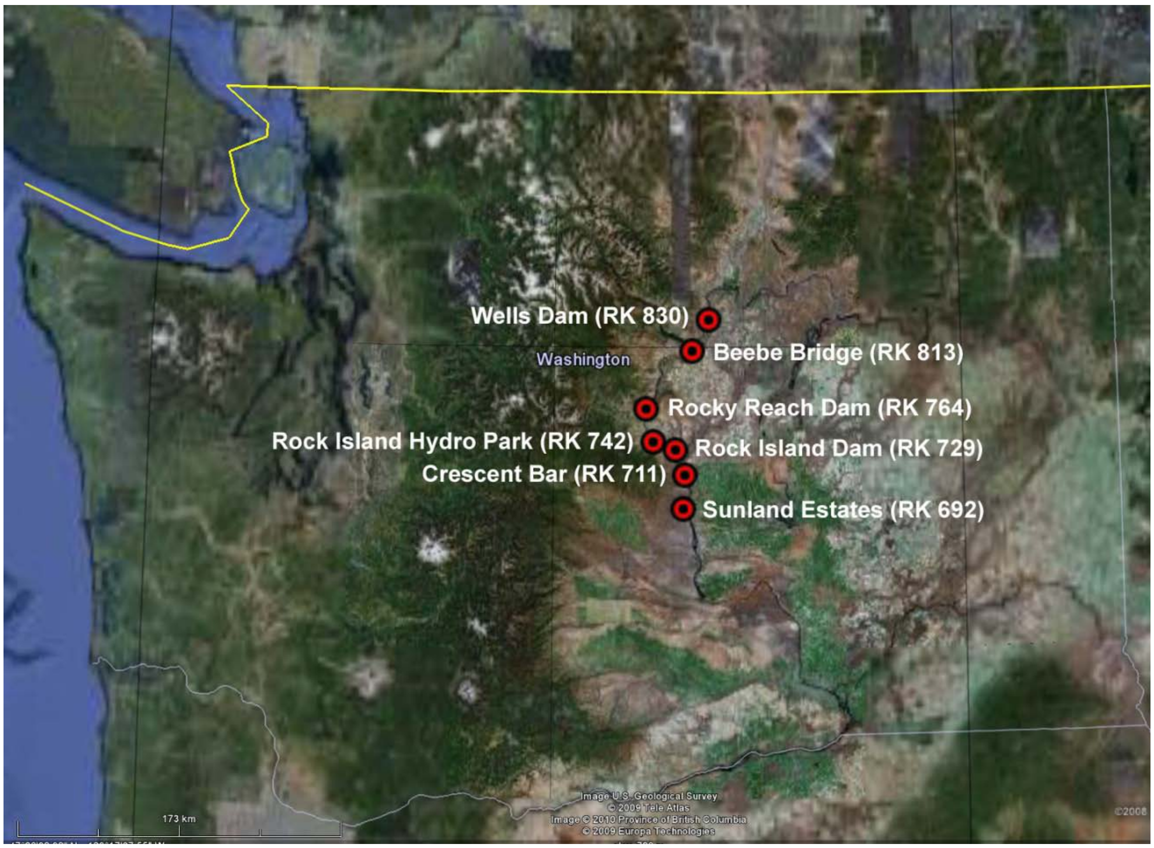


Figure 1.1. Map of the study area showing Wells, Rocky Reach, and Rock Island dams and the locations of the acoustic detection arrays used in the 2010 Rocky Reach Project passage survival study.

2. Release-Recapture Design

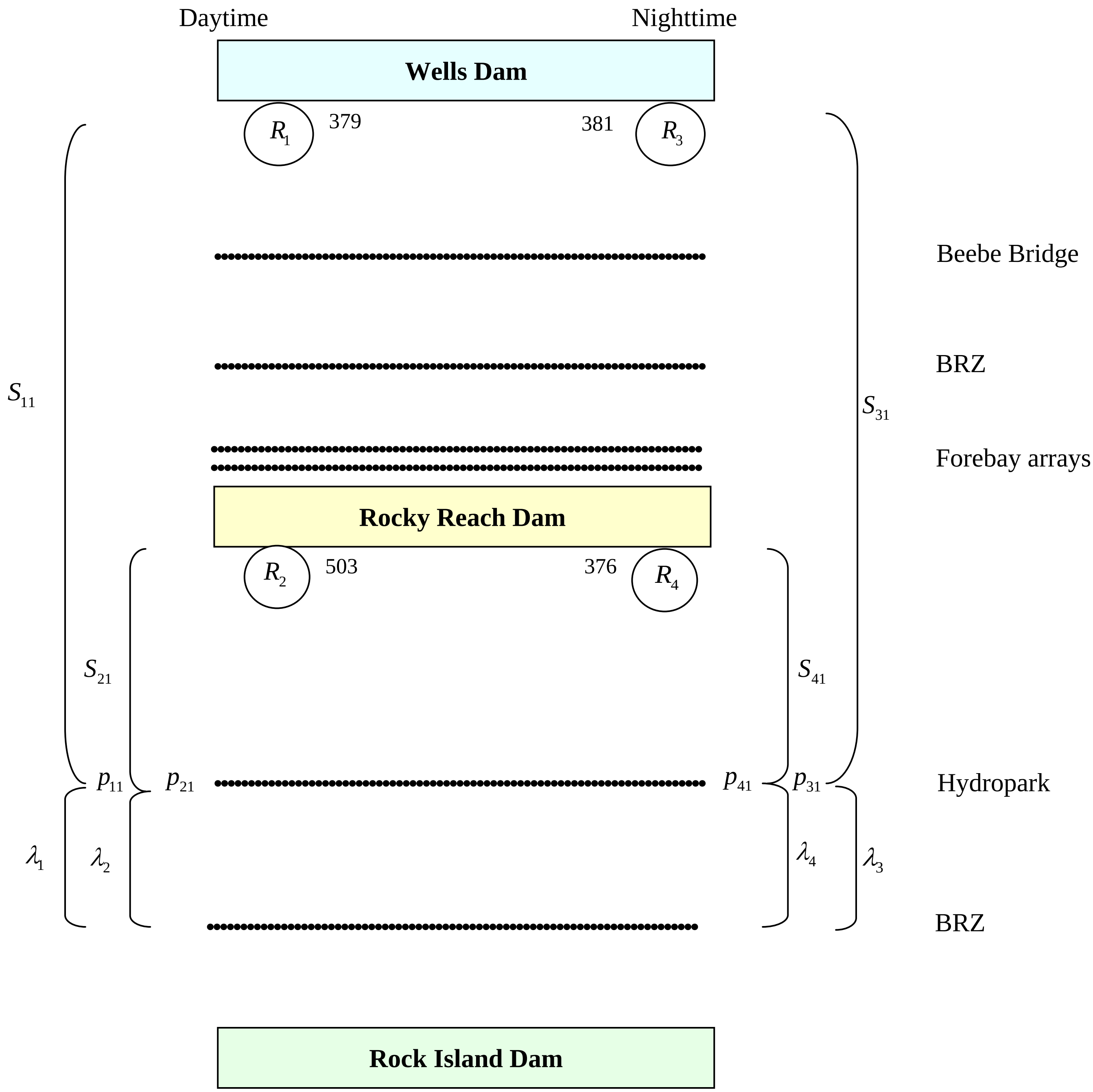
The objectives of the 2010 yearling Chinook salmon smolt survival study at Rocky Reach were accomplished using a total of five different release groups. Some release groups were used for more than one study objective. Based on analyses performed in Skalski et al. (2010), no conclusive tagger or tag-lot effects were identified in the 2010 yearling Chinook salmon tag investigations. Formal examination of the tagger effects and tag-lot effects can be found in Skalski et al. (2010).

2.1 Paired Releases

A standard paired release-recapture design was used to estimate project passage survival based on releases in the Wells and Rocky Reach tailraces (Fig. 2.1). Separate paired releases were performed during day (approximately 1 pm PDT) and night (approximately 12 midnight PDT) times. The purpose was to provide separate estimates of project passage survival for the day and nighttime releases. At Wells tailrace, release sizes were approximately 380 each for the day and nighttime releases. At Rocky Reach tailrace, the daytime release was 503 smolts, while the nighttime release was 376 (Fig. 2.1). The day and night releases were performed in 15 replicates each over the period 29 April to 30 May 2010.

2.2 Triple-Release Design

An additional daytime release of 452 yearling Chinook salmon smolts was performed at the entrance of the surface collector at Rocky Reach to estimate route-specific passage proportions, survivals, and dam passage survival during daytime hours (Fig. 2.2). No nighttime surface collector release was performed. Instead, the estimate of surface collector passage survival calculated during daytime hours was assumed the same at nighttime in order to estimate route-specific survivals at night.



Rocky Reach passage survival: $\hat{S}_{\text{RR-Day}} = \dfrac{\hat{S}_{11}}{\hat{S}_{21}}$ and $\hat{S}_{\text{RR-Night}} = \dfrac{\hat{S}_{31}}{\hat{S}_{41}}$

Figure 2.1. Schematic of the paired-release design for daytime and nighttime releases used to estimate dam passage survival at Rocky Reach.

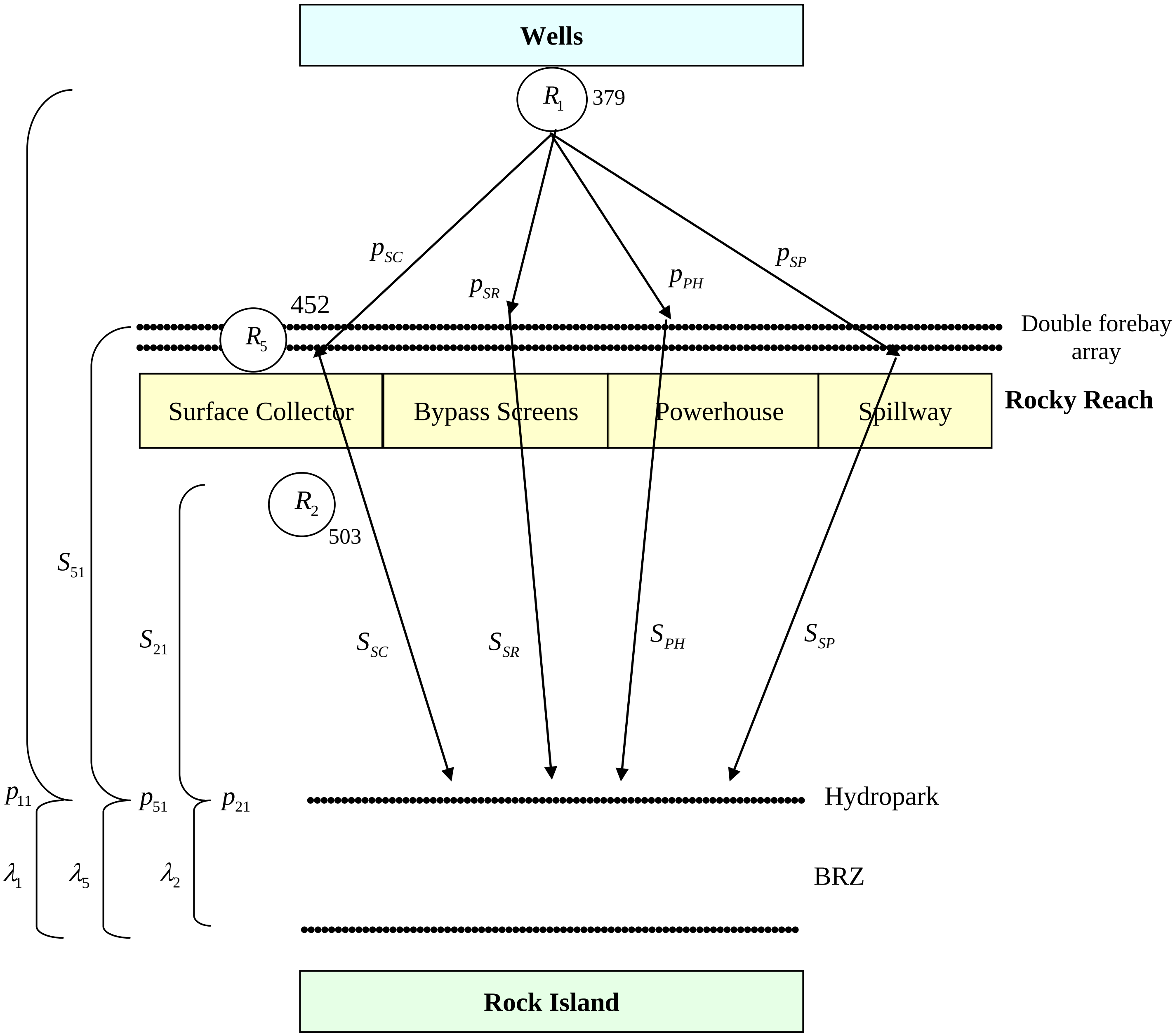


Figure 2.2. Schematic of the triple-release design used to estimate dam, project, and route-specific passage survivals and proportions.

3. Statistical Analysis

3.1 Paired-Release Design

Statistical methods of estimating project passage survival using the paired release-recapture methods of Burnham et al. (1987) were used to provide separate day and nighttime survivals based on respective release groups.

3.2 Route-Specific Survivals and Passage Proportions

Route-specific survivals and passage proportions were calculated for yearling Chinook salmon smolts that arrived at Rocky Reach Dam during nautical day and nautical nighttime periods. Separate estimates of passage proportions and survivals were calculated for each temporal group. These values were used, in turn, to estimate dam passage survivals for each temporal group.

At each passage route within Rocky Reach Dam, a double hydroacoustic array was deployed to detect acoustic-tagged smolt during dam passage. The double-detection data was used to estimate the absolute abundance (N) of tagged smolts through the routes. Define for any particular passage route the following variables:

n_{10} = number of tagged smolt detected at the 1st array but not the 2nd,

n_{01} = number of tagged smolt detected at the 2nd array but not the 1st,

n_{11} = number of tagged smolt detected at both the 1st and 2nd arrays.

From these counts of smolt with various route-specific detections histories, absolute passage abundance $(\hat{N})$ of tagged smolts can be estimated as

$$\hat{N} = \frac{(n_{10} + n_{11} + 1)(n_{01} + n_{11} + 1)}{(n_{11} + 1)} - 1$$

or

$$\hat{N} = \frac{(n_1 + 1)(n_2 + 1)}{(n_{11} + 1)} - 1 \qquad (1)$$

where $n_1 = n_{10} + n_{11}$ and $n_2 = n_{01} + n_{11}$ with associated variance estimate (Seber 1982:60)

$$\hat{\text{V}}\text{ar}(\hat{N}) = \frac{(n_1 + 1)(n_2 + 1)(n_1 - n_{11})(n_2 - n_{11})}{(n_{11} + 1)^2 (n_{11} + 2)}. \qquad (2)$$

The estimated probability of detection (p_1) in the first array was calculated as

$$\hat{p}_1 = \frac{n_{11}}{n_2},$$

and the probability of detection $\left(p_2\right)$ at the second array as

$$\hat{p}_2 = \frac{n_{11}}{n_1}.$$

The overall probability of a smolt being detected in the double array system was

$$\hat{p} = 1 - \left(1 - \hat{p}_1\right)\left(1 - \hat{p}_2\right) = \frac{n_{11}\left(n_1 + n_2 - n_{11}\right)}{n_1 n_2}$$

Passage abundance was estimated for the surface collector $\left(\hat{N}_{SC}\right)$, bypass screens $\left(\hat{N}_{BY}\right)$, powerhouse $\left(\hat{N}_{PH}\right)$ and spillway $\left(\hat{N}_{SP}\right)$.

The proportion of the acoustic-tagged smolt passing through the surface collector $\left(\hat{P}_{SC}\right)$ was estimated by

$$\hat{P}_{SC} = \frac{\hat{N}_{SC}}{\hat{N}_{SC} + \hat{N}_{BY} + \hat{N}_{PH} + \hat{N}_{SP}}. \tag{3}$$

Using the delta method (Seber 1982:7–9), the variance of $\hat{P}_{SC}$ was approximated by

$$\widehat{\mathrm{Var}}\left(\hat{P}_{SC}\right) = \hat{P}_{SC}^2\left(1 - \hat{P}_{SC}\right)^2\left[\frac{\widehat{\mathrm{Var}}\left(\hat{N}_{SC}\right)}{\hat{N}_{SC}^2} + \frac{\widehat{\mathrm{Var}}\left(\hat{N}_{BY}\right) + \widehat{\mathrm{Var}}\left(\hat{N}_{PH}\right) + \widehat{\mathrm{Var}}\left(\hat{N}_{SP}\right)}{(\hat{N}_{BY} + \hat{N}_{PH} + \hat{N}_{SP})^2}\right]. \tag{4}$$

Values of $\hat{P}_{BY}$, $\hat{P}_{PH}$ and $\hat{P}_{SP}$ and associated variances were estimated analogously to Eq. (3)and Eq. (4), respectively.

The paired-releases above $\left(R_1\right)$ and $\left(R_5\right)$ below the surface collector were used to estimate yearling Chinook salmon survival through the surface collector (Fig. 2.2). Survival through the surface collector was estimated by the quotient

$$\hat{S}_{SC} = \frac{\left(\dfrac{t}{R_2}\right)}{\left(\dfrac{c}{R_3}\right)} \tag{5}$$

where

t = number of R_2 smolt detected downstream,

c = number of R_3 smolt detected downstream.

The variance of $\hat{S}_{SC}$ was estimated as

$$\widehat{\operatorname{Var}}\left(\hat{S}_{SC}\right)=\hat{S}_{SC}^2\left[\frac{1}{t}-\frac{1}{R_2}+\frac{1}{c}-\frac{1}{R_3}\right]. \tag{6}$$

Smolts known to have passed through the various routes at Rocky Reach Dam (Fig. 2.2) were monitored downriver to obtain their capture histories. Define the following variables:

N_{SC} = number of smolts known to have passed through surface collector,

n_{SC} = number of smolts among N_{SC} detected downriver,

N_{BY} = number of smolts known to have passed through bypass system,

n_{BY} = number of smolts among N_{BY} detected downriver,

N_{U1-2} = number of smolts known to have passed through turbine units 1–2,

n_{U1-2} = number of smolts among N_{U1-2} detected downriver,

N_{U3-11} = number of smolts known to have passed through turbine units 3–11,

n_{U3-11} = number of smolts among N_{U3-11} detected downriver,

N_{SP} = number of smolts known to have passed through the spillway,

n_{SP} = number of smolts among N_{SP} detected downriver.

Using the relative recoveries of smolt through the various routes compared to the surface collector, route-specific survival probabilities were estimated. For example, at the bypass, i.e.,

$$\hat{S}_{BY}=\hat{S}_{SC}\cdot\frac{\left(\dfrac{n_{BY}}{N_{BY}}\right)}{\left(\dfrac{n_{SC}}{N_{SC}}\right)}, \tag{7}$$

and at turbine units 1–2,

$$\hat{S}_{U1-2}=\frac{\left(\dfrac{n_{U1-2}}{N_{U1-2}}\right)}{\left(\dfrac{n_{SC}}{N_{SC}}\right)}, \tag{8}$$

turbine units 3–11,

$$\hat{S}_{U3-11} = \frac{\left(\dfrac{n_{U3-11}}{N_{U3-11}}\right)}{\left(\dfrac{n_{SC}}{N_{SC}}\right)}, \tag{9}$$

and the spillway,

$$\hat{S}_{SP} = \hat{S}_{SC} \frac{\left(\dfrac{n_{SP}}{N_{SP}}\right)}{\left(\dfrac{n_{SC}}{N_{SC}}\right)}. \tag{10}$$

The variance of $\hat{S}_{BY}$, for example, was estimated by

$$\begin{aligned} \widehat{\text{Var}}\left(\hat{S}_{BY}\right) &= \widehat{\text{Var}}\left(\hat{R}_{BY/SC}\right) \cdot \hat{S}_{SC}^2 + \widehat{\text{Var}}\left(\hat{S}_{SC}\right) \cdot \hat{R}_{BY/SC}^2 \\ &\quad - \widehat{\text{Var}}\left(\hat{R}_{BY/SC}\right) \cdot \widehat{\text{Var}}\left(\hat{S}_{SC}\right), \end{aligned} \tag{11}$$

where

$$\widehat{\text{Var}}\left(\hat{R}_{BY/SC}\right) = \hat{R}_{BY/SC}^2 \left[\frac{1}{n_{BY}} - \frac{1}{N_{BY}} + \frac{1}{n_{SC}} - \frac{1}{N_{SC}}\right]. \tag{12}$$

The variances of $\hat{S}_{U1-2}$, $\hat{S}_{U3-11}$, and $\hat{S}_{SP}$ were expressed analogously.

Using the estimates of route-specific survival and passage proportions, dam passage survival at Rocky Reach Dam (i.e., in the case of no spill) was estimated by the expression

$$\begin{aligned} \hat{S}_{\text{Dam}} &= \hat{P}_{SC} \cdot \hat{S}_{SC} + \hat{P}_{BY} \cdot \hat{S}_{BY} + \hat{P}_{U1-2} \cdot \hat{S}_{U1-2} + \hat{P}_{U3-11} \cdot \hat{S}_{U3-11} \\ &= \hat{P}_{SC} \cdot \hat{S}_{SC} + \hat{P}_{BY} \cdot \hat{S}_{SC} \cdot \hat{R}_{BY/SC} + \hat{P}_{U1-2} \cdot \hat{S}_{SC} \cdot \hat{R}_{U1-2/SC} \\ &\quad + \hat{P}_{U3-11} \cdot \hat{S}_{SC} \cdot \hat{R}_{U3-11/SC} \\ &= \hat{S}_{SC}\left[\hat{P}_{SC} + \hat{P}_{BY} \cdot \hat{R}_{BY/SC} + \hat{P}_{U1-2} \cdot \hat{R}_{U1-2/SC} + \hat{P}_{U3-11} \cdot \hat{R}_{U3-11/SC}\right]. \end{aligned} \tag{13}$$

Dam passage survival was estimated for nautical day and nautical night periods, and compared using an asymptotic Z-test.

4. Results

4.1 Diel Passage Distributions

Using the hourly sampling data from the JSF at Rocky Reach, 24 April to 4 June, the diel passage of yearling Chinook salmon smolts was estimated (Fig. 4.1). Inspection of the diel pattern indicates the majority of the yearling Chinook salmon smolts passed through the dam during daylight hours. Of all run-of-river yearling Chinook passing through the surface collector in 2010, an estimated 52.01% passed during nautical day. The remaining 47.99% passed through the surface collector during nautical night. In the previous year, day and night passage percentages were 39.1% and 60.9%, respectively, for yearling Chinook salmon smolts. Examination of Fig. 4.1 indicates the various species of salmonid smolts had very different diel passage distributions. Steelhead, subyearling Chinook, and sockeye salmon passage was predominantly during daytime. Coho salmon had a passage distribution that was to a somewhat lesser extent also dominated by daytime passage.

The diel passage distribution of acoustic-tagged yearling Chinook salmon smolts at Rocky Reach Dam was also examined for the day and nighttime releases of these fish from Wells Dam tailrace. Regardless of release times at Wells, diel arrival passage patterns at Rocky Reach were quite similar (Fig. 4.2b, c) . However, the acoustic-tagged yearling Chinook salmon had much stronger daytime passage component than the ROR yearling Chinook salmon (Fig. 4.2a).

4.2 Project Passage Survival

Project passage survival was separately estimated at Rocky Reach using paired releases during daytime and paired releases during nighttime (Fig. 2.1). The capture histories for the release groups to Rock Island Hydropark and Rock Island Boat Restricted Zone (BRZ) were used to estimate the reach survivals in the paired release-recapture design (Table 4.2). The reach survivals had to be corrected for a very small amount of tag-life failure (Fig. 4.3). In all cases, the probability of a tag being active when fish passed the detection arrays was ≥ 0.97 (Table 4.3). The estimates of project passage survival were calculated using the ratio of the tag-life-adjusted reach survivals from release to Rock Island Hydropark (Table 4.4).

Project passage survival for yearling Chinook salmon using daytime releases was estimated to be $\hat{S}_{\text{RR-Day}} = 0.9518$ ($\widehat{SE} = 0.0166$). For nighttime releases, project passage survival at Rocky Reach was estimated to be $\hat{S}_{\text{RR-Night}} = 0.8984$ ($\widehat{SE} = 0.0196$). The estimates of project passage survival for day and nighttime releases were significantly different ($P = 0.0376$, two-tailed).

Pooling the capture histories for the day and nighttime releases, project passage survival was estimated to be $\hat{S}_{\mathrm{RR}}$ = 0.9250 ($\widehat{\mathrm{SE}}$ = 0.0142). The pooled estimate of 0.9250 is nearly identical to the arithmetic average of 0.9251 due to the nearly equal sizes for day and nighttime releases. If the day and nighttime survival estimates were weighted by diel passage proportions at Rocky Reach Dam (0.6712 vs. 0.3288) for acoustic-tagged fish (Table 4.1), the weighted average would be 0.9342. Alternatively, if the day and nighttime estimates were weighted by the diel passage proportions of ROR yearling Chinook (0.5201 vs. 0.4799), the weighted average would be 0.9262.

4.3 Reach Survivals

The day and nighttime releases permitted comparison of survival estimates over common reaches. For the Wells tailrace releases, reach survival estimates for the day and nighttime release tracked one another as the fish progressed downriver (Table 4.5). In no case were the reach survival estimates significantly different between day and nighttime releases ($P \geq 0.1981$). Similarly, for the Rocky Reach tailrace releases, reach survival estimates for the day and nighttime releases tracked one another as the fish progressed downriver. In no case were the reach survival estimates significantly different between day and nighttime releases ($P \geq 0.4195$) (Table 4.6).

4.4 Route-Specific Passage Proportions and Survivals

Not to be confused with the project passage survival estimates based on times of release, route-specific passage proportions and route survivals were based on times of arrival at Rocky Reach Dam. Acoustic-tagged yearling Chinook salmon smolts arriving at Rocky Reach Dam were classified according to whether they arrived during nautical day or nautical nighttime hours. For each of the time periods, separate estimates of dam passage proportions and route-specific survivals were calculated.

Using the double-acoustic arrays at the face of Rocky Reach Dam, the abundance of acoustic-tagged yearling Chinook salmon smolts passing through the various routes were estimated (Table 4.7). Abundance was estimated using the Lincoln/Petersen closed population model (Seber 1982:59). From the estimates of passage abundances, estimates of passage proportions for day and nighttime arriving yearling Chinook salmon smolts were calculated (Table 4.8). Passage proportions were significantly different at three of the four routes at Rocky Reach Dam between day and nighttime. Fewer yearling Chinook salmon used the bypass screens at night compared to day (2.08% vs. 6.76%). It also appeared fewer fish used Units 1–2 during the night, with their passage shifted to the surface collector instead. The passage percentage at the surface collection went up from 42.62% to 60.00% between day and night (Table 4.8).

For those smolts known to have passed through routes at Rocky Reach Dam, downstream detection histories were obtained (Table 4.9) in order to estimate relative route-specific survivals (Table 4.10). Survival through the surface collector for the daytime releases was estimated to be $\hat{S}_{\mathrm{SC}}$ = 0.9685 ($\widehat{SE}$ = 0.0091). This estimate is significantly lower than that observed in previous years. In 2009, survival through the surface collector was $\hat{S}_{\mathrm{SC}}$ = 0.9968 ($\widehat{SE}$ = 0.0088); in 2008, it was estimated to be $\hat{S}_{\mathrm{SC}}$ = 1.0091 ($\widehat{SE}$ = 0.0082). This estimate of absolute survival through the surface collector was used to convert the relative survival estimates (Table 4.10) to estimate of route-specific absolute survivals (Table 4.11).

Survival estimates, day and night, through Units 3–11 were nearly significant (*P* = 0.0624, two-tailed) and lower during the day (0.8359 vs. 0.9194) (Table 4.11). Survival through the screens also appeared to be depressed during the day vs. night (0.9231 vs. 0.9891) but not significantly so (*P* = 0.0714). Survival through Units 1–2 was the same day and night (*P* = 0.6916) (Table 4.11).

4.5 Dam Passage Survival

Combining the route-specific passage proportions (Table 4.8) with the information on route-specific survival estimates (Table 4.10) produced an estimate of $\hat{S}_{\text{Dam-Day}}$ = 0.9143 ($\widehat{SE}$ = 0.0121) for yearling Chinook salmon smolts that arrived at Rocky Reach Dam during nautical day. For yearling Chinook salmon arriving at Rocky Reach Dam during nautical night, the estimate of dam passage survival was calculated to be $\hat{S}_{\text{Dam-Night}}$ = 0.9478 ($\widehat{SE}$ = 0.0127). These two estimates of dam passage survival are not significantly different (*P* = 0.0562, two-tailed).

An overall estimate of dam passage survival was calculated by weighting day and nighttime survival estimates by the proportions of non-tagged, run-of-river yearling Chinook salmon passing through the surface collector during nautical day (0.5201) and nautical night (0.4799). The overall estimate across day and night was calculated to be $\hat{S}_{\text{Dam}}$ = 0.9304 ($\widehat{SE}$ = 0.0088).

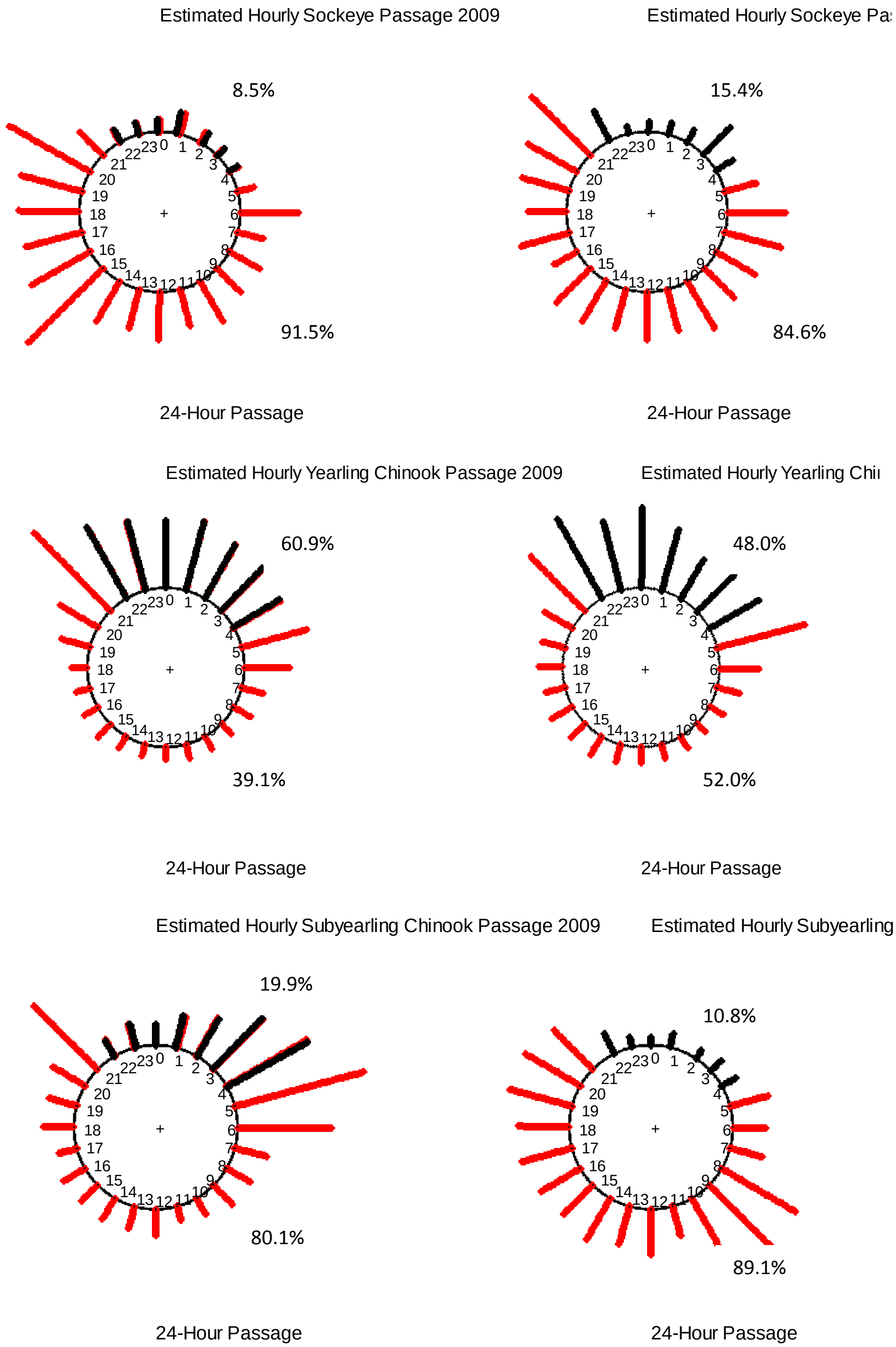


Figure 4.1. Diel relative frequencies of fish passage plotted on a 24-hour clock by fish stock with comparisons of results for 2009 and 2010. Approximate hours of nautical day and night denoted by red and black bars, respectively (see Table A1). Percent passage during nautical day and night indicated.

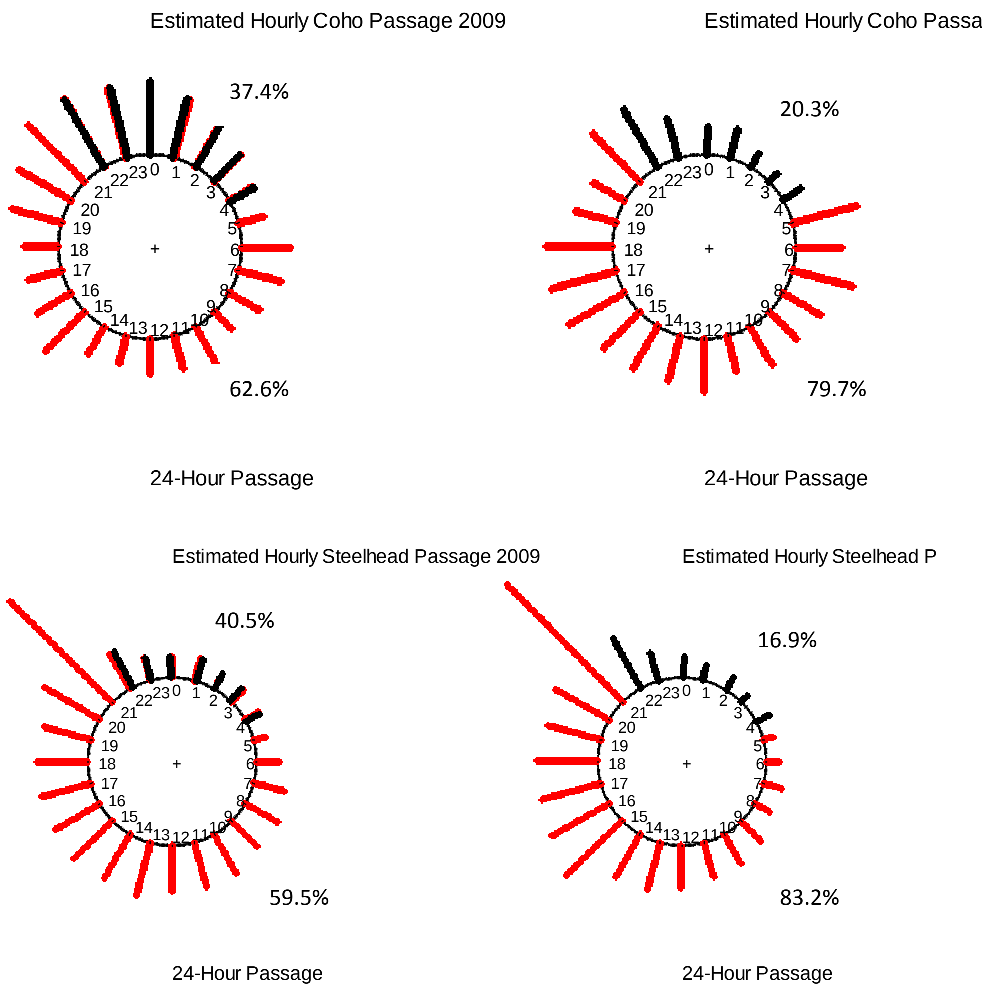


Figure 4.1. (Continued) Diel relative frequencies of fish passage plotted on a 24-hour clock by fish stock with comparisons of results for 2009 and 2010. Approximate hours of nautical day and night denoted by red and black bars, respectively (see Table A1). Percent passage during nautical day and night indicated.

Table 4.1. Estimates of proportions of acoustic-tagged yearling Chinook salmon smolts released from Wells tailrace and detected at Rocky Reach during nautical day and night periods.

		Proportion of Rocky Reach yearling Chinook passage	
Wells tailrace releases	Total released	Nautical day	Nautical night
Day releases	379	0.6612	0.3388
Night releases	381	0.6814	0.3186
Pooled releases	760	0.6712	0.3288
ROR estimated at Juvenile Sampling Facility		0.5201	0.4799

a. Juvenile sampling facility b. Day releases c. Night Releases

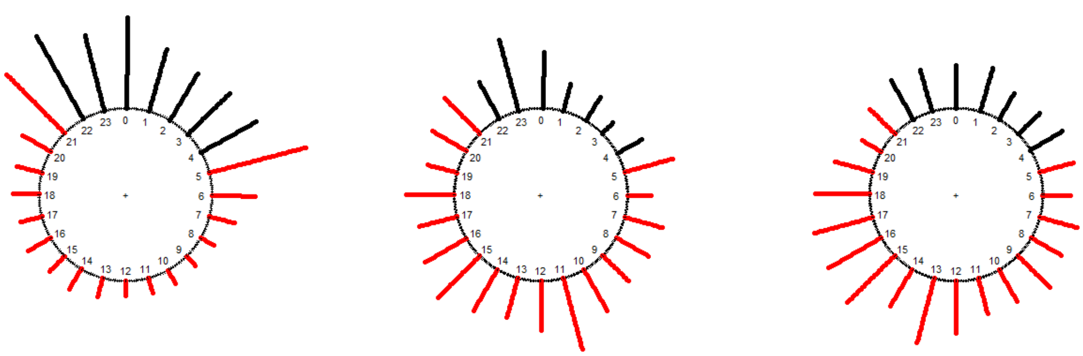
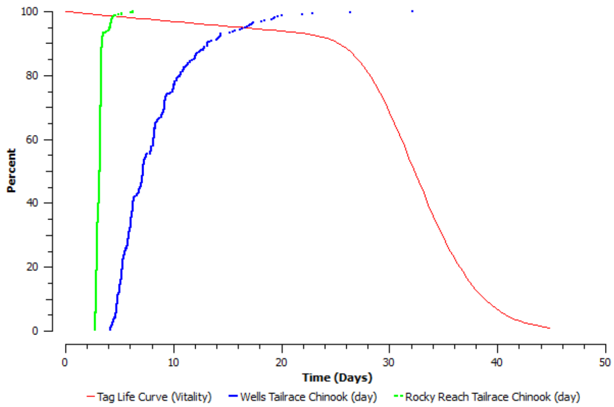
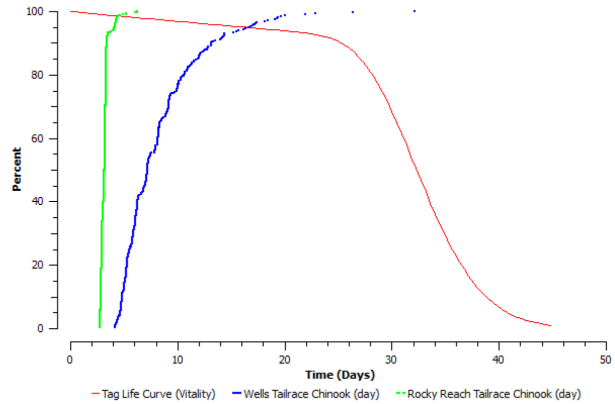


Figure 4.2. Diel relative frequencies of Rocky Reach passage at the (a) Rocky Reach juvenile sampling facility for run-of-river yearling Chinook salmon, and the (b) daytime- released and (c) nighttime- released, acoustic-tagged yearling Chinook salmon smolts from Wells tailrace, plotted on a 24-hour clock. Each clock is normalized to 100%.

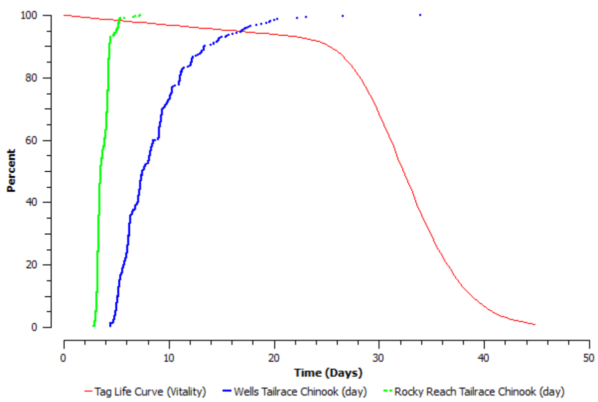
a. Rock Island Hydropark – Daytime releases



b. Rock Island Hydropark – Nighttime releases



c. Rock Island BRZ – Daytime releases



d. Rock Island BRZ – Nighttime releases

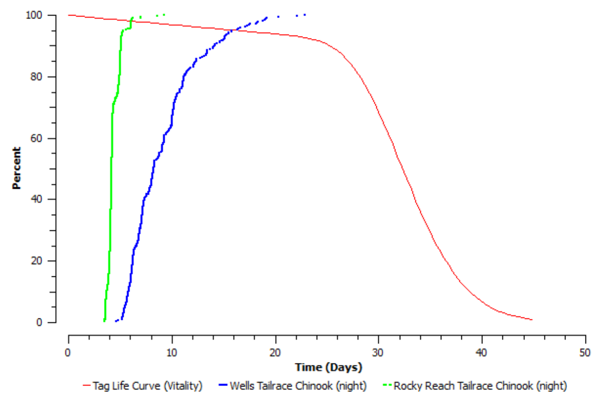


Figure 4.3. Tag-life survivorship curve vs. timing of downstream detections of yearling Chinook salmon smolts tagged with HTI *Model 795Lm Acoustic Tags* at (a) Rock Island Hydropark – daytime releases, (b) Rock Island Hydropark – nighttime releases, (c) Rock Island Boat Restricted Zone (BRZ) – daytime releases, and (d) Rock Island BRZ – nighttime releases.

Table 4.2. Capture histories for the Wells and Rocky Reach day and nighttime releases of yearling Chinook salmon smolts at Rock Island Hydropark and Boat Restricted Zone (BRZ) used in estimating project passage survivals in 2010. The 1 denotes detection; 0, nondetection.

	Detection history				
Release	11	01	10	00	Total
Nautical daytime					
Wells	350	0	1	28	379
Rocky Reach	498	0	3	2	503
Nautical nighttime					
Wells	332	0	1	48	381
Rocky Reach	371	0	1	4	376

Table 4.3. Estimated probabilities an acoustic tag was operational at a detection site as a function of release location and release time for yearling Chinook salmon smolts in the Rocky Reach survival study. Standard errors in parentheses.

		Detection site	
Release time	Release site	Rock Island Hydropark	Rock Island BRZ
Daytime	Wells tailrace	0.9730 (0.0097)	0.9713 (0.0102)
	Rocky Reach tailrace	0.9901 (0.0038)	0.9883 (0.0045)
Nighttime	Wells tailrace	0.9728 (0.0097)	0.9716 (0.0101)
	Rocky Reach tailrace	0.9881 (0.0043)	0.9864 (0.0049)

Table 4.4. Input to the estimates of project passage survival for Rocky Reach yearling Chinook salmon smolts in 2010. Survival estimates are adjusted for acoustic-tag failure. Standard errors in parentheses.

Release site	Release to RI HP	λ	$\hat{S}_{\text{Project}}$
Wells tailrace (day)	0.9518 (0.0166)	0.9989 (0.0028)	0.9518 (0.0166)
Rocky Reach tailrace (day)	1.0000 (0.0007)	0.9958 (0.0035)	
Wells tailrace (night)	0.8984 (0.0200)	0.9982 (0.0030)	0.8984 (0.0196)
Rocky Reach tailrace (night)	1.0000 (0.0041)	0.9991 (0.0027)	
Detection probability at RI HP			
Wells tailrace (day)	1.0000 (0.0000)		
Rocky Reach tailrace (day)	1.0000 (0.0000)		
Wells tailrace (night)	1.0000 (0.0000)		
Rocky Reach tailrace (night)	1.0000 (0.0000)		

Table 4.5. Reach survivals, adjusted for tag life, for yearling Chinook salmon smolts released from Wells tailrace for day and night releases. Standard errors in parentheses.

Reach	Day releases	Night releases	*P*-value (2-tailed)
Release to Beebe Bridge	1.0020 (0.0059)	0.9914 (0.0088)	0.3171
Beebe Bridge to RR BRZ	1.0050 (0.0113)	0.9927 (0.0132)	0.4790
RR BRZ to RI Hydropark	0.9776 (0.0148)	0.9482 (0.0174)	0.1981
RI Hydropark to RI BRZ	1.0266 (0.0107)	1.0261 (0.0114)	0.9745
RI BRZ to Crescent Bar	0.9728 (0.0165)	0.9723 (0.0172)	0.9833
Crescent Bar to Sunland Estates (λ)	0.9788 (0.0079)	0.9744 (0.0089)	0.7116

Table 4.6. Reach survivals, adjusted for tag life, for yearling Chinook salmon smolts released from Rocky Reach tailrace for day and night releases. Standard errors in parentheses.

Reach	Day releases	Night releases	*P*-value (2-tailed)
Release to RI Hydropark	1.0060 (0.0049)	1.0012 (0.0069)	0.5706
RI Hydropark to RI BRZ	1.0079 (0.0055)	1.0139 (0.0050)	0.4195
RI BRZ to Crescent Bar	0.9593 (0.0116)	0.9698 (0.0124)	0.5363
Crescent Bar to Sunland Estates (λ)	0.9788 (0.0066)	0.9803 (0.0074)	0.8798

Table 4.7. Capture histories at Rocky Reach forebay double-arrays for acoustic-tagged yearling Chinook salmon smolts released from Wells tailrace and associated estimated passage abundance. Standard errors are in parentheses. The 1 denotes detection; 0 denotes not detected at the Rocky Reach primary and secondary forebay arrays.

Release site	Nautical day				Nautical night			
	Detection history				Detection history			
	11	10	01	Est. total	11	10	01	Est. total
Surface collector	208	0	0	208.0 (0.0)	144	0	0	144.0 (0.0)
Bypass screens	31	1	1	33.0 (0.0)	5	0	0	5.0 (0.0)
Units 1–2	93	0	0	93.0 (0.0)	20	0	0	20.0 (0.0)
Units 3–11	154	0	0	154.0 (0.0)	71	0	0	71.0 (0.0)

Table 4.8. Estimates of acoustic-tagged yearling Chinook salmon passage proportions at Rocky Reach Dam during nautical day and night periods. Standard errors in parentheses. Two-tailed *P*-values for a difference in passage use.

Route	Passage proportions		*P*-value (2-tailed)
	Nautical day	Nautical night	
Surface collector	0.4262 (0.0224)	0.6000 (0.0316)	0.0000
Bypass screens	0.0676 (0.0114)	0.0208 (0.0092)	0.0014
Units 1–2	0.1906 (0.0178)	0.0833 (0.0178)	0.0000
Units 3–11	0.3156 (0.0210)	0.2958 (0.0295)	0.5845

Table 4.9. Downstream histories of acoustic-tagged yearling Chinook salmon smolts detected during either day or nighttime passage at Rocky Reach Dam. The capture histories denote detections by “1” and nondetections by “0” at Rock Island Hydropark and Rock Island BRZ, respectively.

	Nautical day					Nautical night				
	Detection history					Detection history				
Release site	11	10	01	00	Passage	11	10	01	00	Passage
Rocky Reach Dam										
Surface collector	205	0	0	3	208	141	0	0	3	144
Bypass screens	30	1	0	2	33	5	0	0	0	5
Units 1–2	87	0	0	6	93	18	0	0	2	20
Units 3–11	130	1	0	23	154	66	0	0	5	71
Release 5 above surface collector	432	4	0	16	452					
Release 2 below surface collector	498	3	0	2	503					

Table 4.10. Estimates of route-specific relative survival for yearling Chinook salmon compared to surface collector at Rocky Reach during nautical day and night passage. Standard errors in parentheses.

	Relative survival to the surface collector		
Parameter	Nautical day	Nautical night	*P*-value (2-tailed)
$S_{\text{Bypass screens}}$	0.9531 (0.0429)	1.0213 (0.0124)	0.1267
$S_{\text{Units 1-2}}$	0.9492 (0.0270)	0.9191 (0.0694)	0.6861
$S_{\text{Units 3-11}}$	0.8631 (0.0300)	0.9494 (0.0331)	0.0534

Table 4.11. Estimates of route-specific survival at Rocky Reach for yearling Chinook salmon during nautical day and night periods. Standard errors in parentheses. Two-tailed *P*-values for a difference in survival.

	Absolute survival		
Parameter	Nautical day	Nautical night	*P*-value (2-tailed)
$S_{\text{Surface collector}}$	0.9685 (0.0091)		
$S_{\text{Bypass screens}}$	0.9231 (0.0424)	0.9891 (0.0152)	0.1428
$S_{\text{Units 1-2}}$	0.9192 (0.0276)	0.8902 (0.0677)	0.6916
$S_{\text{Units 3-11}}$	0.8359 (0.0301)	0.9194 (0.0332)	0.0624

5. Discussion

Diel passage distributions (Figure 4.1) were relatively stable between years (2009 and 2010) for all salmonid species, except steelhead. There was almost a 24% decrease in nighttime passage from 2009 to 2010 for steelhead. For yearling Chinook salmon, ROR passage distribution was almost even between nautical day and nighttime hours of the day (i.e., 52% vs. 48%). Regardless of whether acoustic-tagged yearling Chinook were released day or night at Wells tailrace, their arrival distribution was approximately 2:1, day vs. night (Table 4.1).

Project passage survival was significantly different between day and nighttime releases (P = 0.0376). The daytime release produced a project passage survival estimate of $\hat{S}_{\text{RR-Day}}$ = 0.9518 ($\widehat{SE}$ = 0.0166). For nighttime releases, the project passage survival at Rocky Reach was estimated to be $\hat{S}_{\text{RR-Night}}$ = 0.8944 ($\widehat{SE}$ = 0.0196). Pooling the release-recapture data, project passage survival was estimated to be $\hat{S}_{\text{RR}}$ = 0.9250 ($\widehat{SE}$ = 0.0142).

Examination of route-specific passage proportions found significantly more (P < 0.0001) yearling Chinook salmon used the surface collector at night vs. day (i.e., 60.0% vs. 42.6%). Conversely, more yearling Chinook salmon used Units 1–2 during the day vs. night (i.e., 19.1% vs. 8.3%). The shifts in passage-route usage contributed to near significant differences (P = 0.0562) in dam passage survival between day and night. Dam passage survival at night was estimated to be $\hat{S}_{\text{Dam-Night}}$ = 0.9478 ($\widehat{SE}$ = 0.0127), while during daylight hours, $\hat{S}_{\text{Dam-Day}}$ = 0.9304 ($\widehat{SE}$ = 0.0088).

In interpreting the route-specific and dam passage survival estimates, it should be noted that these estimates are all based on the estimate of absolute survival through the surface collector. In 2010, survival through the surface collector was estimated to be $\hat{S}_{\text{SC}}$ = 0.9685 ($\widehat{SE}$ = 0.0091). This estimate of survival through the surface collector was significantly lower (P < 0.05) than that observed in 2009 ($\hat{S}_{\text{SC}}$ = 0.9968 [$\widehat{SE}$ = 0.0088]) and 2008 $\hat{S}_{\text{SC}}$ = 1.0091 ($\widehat{SE}$ = 0.0082). Should the 2010 estimate of survival through the surface collector be too low by chance, then the dam passage survival estimates would be estimated proportionately too low as well. Nevertheless, the ratio of dam passage survival day:night, i.e., 0.9143:0.9478 (or 0.96:1.0) is robust to errors in the estimation of surface collector passage survival.

6. Literature Cited

Burnham, K.P., Anderson, D.R., White, G.C., Brownie, C., and Pollock, K.H. 1987. Design and analysis methods for fish survival experiments based on release-recapture. American Fisheries Society Monograph **5**.

Peven, C., Giorgi, A., Skalski, J., Langeslay, M., Grassell, A., Smith, S., Counihan, T., Perry, R., and Bickford, S. 2005. Guidelines and suggested protocols for conducting, analyzing, and reporting juvenile salmonid survival studies in the Columbia River Basin, final draft, Chelan County Public Utility District, Wenatchee, Washington.

Seber, G.A.F. 1982. The estimation of animal abundance. MacMillan, New York, New York.

Appendix A

Table A1. Nautical sunrise and sunset times during the 2010 smolt survival studies at Rocky Reach Dam (PDT).

Date	Nautical Sunrise (day)	Nautical Sunset (night)
4/28/10	5:50 AM	8:09 PM
4/29/10	5:48 AM	8:10 PM
4/30/10	5:46 AM	8:12 PM
5/1/10	5:45 AM	8:13 PM
5/2/10	5:43 AM	8:14 PM
5/3/10	5:41 AM	8:16 PM
5/4/10	5:40 AM	8:17 PM
5/5/10	5:38 AM	8:18 PM
5/6/10	5:37 AM	8:20 PM
5/7/10	5:35 AM	8:21 PM
5/8/10	5:34 AM	8:22 PM
5/9/10	5:32 AM	8:24 PM
5/10/10	5:31 AM	8:25 PM
5/11/10	5:30 AM	8:26 PM
5/12/10	5:28 AM	8:28 PM
5/13/10	5:27 AM	8:29 PM
5/14/10	5:26 AM	8:30 PM
5/15/10	5:24 AM	8:32 PM
5/16/10	5:23 AM	8:33 PM
5/17/10	5:22 AM	8:34 PM
5/18/10	5:21 AM	8:35 PM
5/19/10	5:20 AM	8:37 PM
5/20/10	5:19 AM	8:38 PM
5/21/10	5:18 AM	8:39 PM
5/22/10	5:17 AM	8:40 PM
5/23/10	5:16 AM	8:41 PM
5/24/10	5:15 AM	8:42 PM
5/25/10	5:14 AM	8:43 PM
5/26/10	5:13 AM	8:44 PM
5/27/10	5:12 AM	8:46 PM
5/28/10	5:11 AM	8:47 PM
5/29/10	5:10 AM	8:48 PM
5/30/10	5:10 AM	8:49 PM
5/31/10	5:09 AM	8:49 PM

Nautical sunrise/sunset is defined to begin in the morning, and to end in the evening, when the center of the sun is geometrically 12 degrees below the horizon. At the beginning or end of nautical twilight, under good atmospheric conditions and in the absence of other illumination, general outlines of ground objects may be distinguishable, but detailed outdoor operations are not possible, and the horizon is indistinct (U.S. Naval Observatory).

DRAFT 2011 ACTION PLAN
WELLS HCP

WELLS HCP COORDINATING COMMITTEE

1. **Bypass Operating Plan**
   a. Draft to Coordinating Committee (CC): .... February 2011
   b. Approval Deadline: .... March 2011
   c. Period Covered: .... April to August 2011
   d. Report Deadline: .... October 2011

2. **Bull Trout Monitoring and Management Plan**
   a. Period Covered: .... January – December 2010
   b. Report Deadline: .... March 2011

3. **Predator Control Programs**
   a. Pikeminnow Removal – Wells Project: .... March – August 2011
   b. Draft 2011 Pikeminnow Report to DCPUD: .... December 2011
   c. Avian Predator Hazing at Wells: .... October 2010 – May 2011

4. **Sub-yearling Chinook Life-history Study**
   a. Develop Study Plan: .... January 2011
   b. Tag and Release Study Fish: .... April-June 2011
   c. Monitor Study Fish: .... April 2011-June 2012
   d. Draft Report to Committee: .... August 2012
   e. Final Report: .... October 2012

5. **Fishway Entrance Velocity Testing**
   a. Testing: .... March 2011
   b. Draft Results to DCPUD: .... April 2011
   c. Results to CC: .... June 2011

6. **Juvenile Migration Run-timing Verification Study**
   a. Work with CC to Develop Study Plan: .... January 2011
   b. Draft Study Plan to CC: .... February 2011
   c. Approval of Final Study Plan by CC: .... March 2011
   d. Implement Study: .... April – August 2011
   e. Draft Results to CC: .... October 2011
   f. Final Report to CC for Approval: .... December 2011

7. **Develop Contingency Plan for Emergency Bypass Operations**
   a. Draft to CC: .... February 2011
   b. Approval of Final by CC: .... April 2011

WELLS HCP HATCHERY COMMITTEE

1. Implement 5-year Hatchery Monitoring and Evaluation (M&E) Plan
   a. Ongoing Implementation: ....January – December 2011
   b. Draft Annual Report for 2010 to Douglas PUD: .... April 2011
   c. Draft Annual Report to Hatchery Committee (HC):... June 2011
   d. Draft 5-year Synthesis/Analysis Report: ....October 2011
   e. Draft 2012 Implementation Plan to HC:..October 2011

2. Update 5-year M&E plan (per Wells HCP §8.5.1)
   a. Draft to HC: ....July 2011
   b. Final to HC:...October 2011

3. HCP Annual Hatchery Production Compliance Report
   a. Period Covered: ....January 2011 – December 2011
   b. Draft to Committee: ....November 2011
   c. Submission Deadline: .... December 2011

4. 2010 Broodstock Collection Protocol
   a. Draft to HC: .... March 2011
   b. Approval Deadline:.. April 2011
   c. Implementation: ....May 2011 to April 2012

5. Annual Implementation Report - Sockeye Fish/Water Management Tools
   a. Period Covered: ....Water Year 2010-2011 (October – September)
   b. Draft to HC: ....*to be determined*
   c. Presentation to HC:..August of September 2011

6. HGMP – Methow Spring Chinook
   a. Draft Spring Chinook HGMP to HC: ....November 2009
   b. Final Spring Chinook HGMP to NMFS: .... March 2010
   c. NMFS Approval of spring Chinook HGMP:..*to be determined*

7. HGMP – Wells Steelhead
   a. Draft Steelhead HGMP to HC: .... February 2011
   b. Final Steelhead HGMP to NMFS: .... March 2011
   c. NMFS Approval of Steelhead HGMP: ....*to be determined*

8. Methow Steelhead Relative Reproductive Success Study
   a. Implementation: .... March 2010 - December 2021
   b. Interim Reports: .... September 2011
   c. Final Report: 2021/2022

9. Population Dynamics Recalculation of NNI Hatchery Production
   a. Proposal to Committee:... February 2011
   b. HC Decision on Final Recalculation Methods: ....*to be determined*

WELLS HCP TRIBUTARY COMMITTEE

1. **Plan Species Account Annual Contribution**
   a. $176,178 in 1998 dollars.. January 2011

2. **Annual Report - Plan Species Account Status**
   a. Draft to Committee: .... February 2011
   b. Approval Deadline:... March 2011
   c. Period Covered: ....January to December 2010

3. **2011 Funding-round – General Salmon Habitat Program**
   a. Request for Project Pre-proposals:........................... *To be determined* (typically in March)
   b. Pre-proposals to Tributary Committee (TC):..... *To be determined* (typically in early June)
   c. Tours of Proposed Projects: ....*To be determined* (typically in late June)
   d. Project Sponsor Presentations to TC: .... *To be determined* (typically in early July)
   e. Final Project Proposals to TC: .... *To be determined* (typically in late July)
   f. RTT Project Rating Decisions: .... *To be determined* (typically in early August)
   g. Supplemental Sponsor Presentations ....*To be determined* (typically in September)
   h. TC Final Funding Decisions: .... *To be determined* (typically in December)

4. **Small Project Program**
   a. Project Review and Funding Decision................................ Applications accepted any time

APPENDIX B
HABITAT CONSERVATION PLAN HATCHERY COMMITTEES MEETING MINUTES AND CONFERENCE CALL MINUTES

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FINAL MEMORANDUM

To:	Wells HCP Hatchery Committee	**Date:**	February 20, 2010
From:	Michael Schiewe, Chair, HCP Hatchery Committees		
Cc:	Ali Wick		
Re:	Final Minutes of January 15, 2010 Wells Hatchery Committees Conference Call		

The Wells Hydroelectric Projects Habitat Conservation Plans (HCPs) Hatchery Committees met via conference call on Friday, January 15, 2010, from 9:00 am to 12:00 pm. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Douglas PUD will revise the Methow spring Chinook and Methow summer steelhead one-page Hatchery Genetic Management Plan (HGMP) summaries and distribute to the Hatchery Committee prior to the January 20 Hatchery Committees meeting (Item I).
- Bill Gale will prepare a one-page summary of the Winthrop National Fish Hatchery steelhead HGMP for distribution to the Committees prior to the January 20 HC meeting (Item II).

DECISION SUMMARY

- There were no decisions at this meeting.

I. Methow Spring Chinook HGMP

Mike Schiewe reviewed the agenda and said that a primary purpose of today's call is to discuss the December 15 and December 24 drafts of the Methow steelhead and Methow spring Chinook HGMPs, respectively. He indicated that the discussion should focus on the level of detail summarized in one-page summaries distributed January 11, and that when agreement was reached, then the full documents could be revised accordingly.

For the Methow spring Chinook HGMP, the key issues discussed on today's call were the management goals (integrated vs. segregated programs), PNI, and the appropriate escapement targets for hatchery and natural origin returning adults. The group discussed a goal of maintaining a pNOB of not less than 50 percent for the Twisp program, but recognized that in low return years, this could result in annual production levels below program targets. It was proposed that under such circumstances, the releases in the upper Methow and Chewuch could be increased to maintain overall basin releases at the 550,000 smolt target. Another issue raised was the importance of a coordinated marking program for all spring Chinook programs above Wells Dam. At the close of this discussion, Douglas PUD staff agreed to update the one-page summaries consistent with today's discussion, and that the Hatchery Committees would continue the discussion at the next Hatchery Committees meeting on January 20. Mike Schiewe reiterated that the goal is to reach a final decision on the HGMPs at or before the February 17 Hatchery Committees meeting.

II. Wells Steelhead HGMP

The Hatchery Committees then discussed the draft Wells steelhead HGMP at the level of the one-page summary.

Key issues discussed today included the need for additional detail about the transition of some of the Wells production to the Okanogan program, as well as the importance of coordinating this HGMP with the HGMP for the Winthrop National Fish Hatchery (WNFH) steelhead program. Several committee members expressed concern over the use of hatchery by hatchery (HxH) smolts for lower Methow releases, and there was general agreement that the goal should to use hatchery by wild (HxW) smolts as much as possible. As was the case with spring Chinook, the group discussed the need for a coordinated marking program for steelhead released above Wells Dam. In order to facilitate further discussion of this HGMP at the January 20 Hatchery Committees meeting, Bill Gale agreed to provide the Committees with a one-page summary for the WNFH steelhead HGMP, similar in detail to that of the Wells summer steelhead HGMP. Douglas PUD will update the Wells summer steelhead HGMP one-page summary consistent with today's discussion.

List of Attachments

Attachment A – List of Attendees

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor QEA, LLC
Ali Wick	Anchor QEA, LLC
Shane Bickford *	Douglas PUD
Tom Kahler *	Douglas PUD
Greg Mackey	Douglas PUD
Joe Miller *	Chelan PUD
Kirk Truscott *	CCT
Kris Petersen *	NMFS
Jeff Korth *	WDFW
Bill Gale *	USFWS
Dave Carie	USFWS
Tom Scribner *	Yakama Nation
Keely Murdoch *	Yakama Nation

* Denotes Hatchery Committees member or alternate

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FINAL MEMORANDUM

To:	Wells, Rocky Reach, and Rock Island HCP Hatchery Committees	**Date:**	February 20, 2010
From:	Michael Schiewe, Chair, HCP Hatchery Committees		
Cc:	Ali Wick, Greg Mackey		
Re:	Final Minutes of January 19, 2010 HCP Hatchery Committees Meeting		

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Hatchery Committees met at Chelan PUD in Wenatchee, Washington, on Wednesday, January 19, 2010, from 9:30 am to 4:00 pm. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Joe Miller will provide the Hatchery Committees with a conceptual plan of the Chiwawa Facility showing the current configuration for rearing spring Chinook salmon, and showing the new spatial orientation given the currently expected numbers of steelhead and spring Chinook (Item II-B).
- Joe Miller will look into the possibility for a temporary water right for use at Chiwawa Hatchery (Item II-B).
- The Hatchery Committees will provide feedback on Chelan PUD's draft responses to the National Marine Fisheries Service (NMFS) letters on Wenatchee Basin Hatchery Genetic Management Plans (HGMPs) by Wednesday, January 27 (Items II-H).
- Greg Mackey will provide the Reproductive Spawning Success (RSS) study plan and Statement of Agreement (SOA) by January 21 (Item III-A).
- The Hatchery Committees will review the Douglas PUD RSS study and SOA, and provide email concurrence by January 29 (Item III-A).
- The Hatchery Committees will provide comments to Douglas PUD on the Methow spring Chinook HGMP by January 29 (Item III-B).
- Tom Kahler will update the spring Chinook HGMP based upon comments received by January 29 and will provide a final draft and SOA to the Hatchery Committees by February 5.

- The Hatchery Committees will provide email concurrence on the spring Chinook HGMP and SOA by Friday February 12 (Item III-B).
- Greg Mackey will modify the steelhead HGMP based on comments at today's meeting and will send it out for review by Friday, January 29 (Item III-C).
- The Hatchery Committees will provide comments on the revised Wells steelhead HGMP by February 5 toward approval of the HGMP and SOA at the Hatchery Committees meeting on February 17 (Item III-C).
- Tom Scribner will check with Steve Parker (Yakama Nation Policy) to clarify whether a reduced number of steelhead in the Methow Basin would be acceptable to the YN in any phase of the program (Item III-C).
- Bill Gale will send the U.S. Fish and Wildlife Service (USFWS) Winthrop National Fish Hatchery summer steelhead program HGMP to Ali Wick for distribution to the group (Item III-C).
- Mike Tonseth will send the Twisp Weir Operations Protocol for Hatchery Committees' review; this protocol will be on the agenda for approval at the next meeting (Item IV-A).
- Keely Murdoch will check with the Colville Tribes and NMFS to verify their agreement with Hatchery Evaluation Technical Team (HETT) members submitting an abstract on the HETT's recently developed Non-Target Taxa of Concern (NTTOC) methods for presentation at an upcoming conference (VI-A).

DECISION SUMMARY

- The Hatchery Committees approved the Rocky Reach and Rock Island HCP Hatchery Committee Statement of Agreement Regarding Transition to a 600,000 Yearling Summer Chinook Program (Attachment B; Item II-A).
- The Hatchery Committees approved the Rocky Reach and Rock Island HCP Hatchery Committee Statement of Agreement Regarding Implementation of Steelhead Rearing and Acclimation at the Chiwawa Acclimation Facility (Attachment C; Item II-B).
- The Hatchery Committees agreed that HETT meetings will occur on a workload-need basis (Item II-C).
- HETT members may present their NTTOC methods work at an upcoming salmon conference (Item VI-A).

DOCUMENT REVIEW SUMMARY

Due date:	Comments to:	Title:	Initially sent out:
1/27	Joe Miller	Chelan PUD responses to NMFS HGMP letters	• 1/15
For approval via e-mail by 1/29	Greg Mackey	RSS Study Plan and SOA	• First draft sent 12/23 • Revised SOA sent 1/21
Comments due 1/29 For approval via e-mail by 2/12	Tom Kahler	Methow Spring Chinook HGMP	• First draft sent 12/15 • Second draft with Hatchery Committees' comments integrated will be sent by 2/5
Comments due 2/5 For approval at 2/17 Hatchery Committees meeting	Greg Mackey	Methow Steelhead HGMP	• First draft sent 12/23 • Second draft with Hatchery Committees' comments integrated will be sent by 1/29
For approval at 2/17 Hatchery Committees meeting	Tom Kahler	DPUD 2010 Action Plan	• Distributed at 1/20 Hatchery Committees meeting

I. Welcome, Agenda Review, Meeting Minutes, Action Items

The Hatchery Committees reviewed the December 16 Hatchery Committees meeting minutes as revised. Ali Wick will send the revised minutes to the Committees for email approval.

II. Chelan PUD

A. DECISION ITEM: Transition to 600,000 Yearling Summer Chinook SOA

Joe Miller introduced this SOA on implementing a 600,000 Columbia River yearling summer Chinook program at Chelan Falls for brood year 2010. Chelan PUD is preparing a letter of concurrence under the existing permit to address potential impacts on listed species. Kris Petersen indicated that such a letter of concurrence, along with sufficient analysis, may be sufficient to provide Endangered Species Act (ESA) coverage under the existing permit. If the Chelan Falls facility is not ready in time to accommodate all of these fish, Mike Tonseth verified that Washington Department of Fish and Wildlife (WDFW) can make space available at the Turtle Rock Facility. The Hatchery Committees approved this SOA, with NMFS abstaining (see Attachment B).

B. DECISION ITEM: Steelhead Acclimation at Chiwawa SOA

Joe Miller introduced this SOA for use the Chiwawa Facility to acclimate steelhead for release into the Wenatchee River and its tributaries consistent with Section 5.6 of the *Wenatchee River Summer Steelhead HGMP*. This is an interim measure to provide in-basin acclimation for steelhead. Tom Scribner expressed concern that the water right needed for steelhead rearing may not be approved in time, and suggested that Chelan PUD apply for a temporary water right in the meantime. Joe Miller agreed to look into the possibility for a temporary water right. Based on Hatchery Committees feedback, he will provide additional information in the background section of the SOA confirming that Chelan PUD will resolve the issues on water supply and the reinforcement of the dividing wall. He will also provide the Committees with a conceptual plan of the Chiwawa Facility that will show both the current configuration for rearing spring Chinook salmon, and the new spatial orientation given the currently expected numbers of steelhead and spring Chinook. The Committees approved the SOA contingent on the modification of the background section to clarify that this SOA does not change or absolve Chelan PUD of any commitments to rear 400,000 steelhead in the Wenatchee sub-basin. (see Attachment C)

C. HETT Meetings

Joe Miller suggested changing the frequency of the HETT meetings. The Hatchery Committees discussed and agreed that the meetings should occur on a workload-need basis.

D. Memo Regarding Dryden Material Removal

Joe Miller provided copies of a memo to the Hatchery Committees notifying them that Chelan PUD will remove the sediment deposit upstream of the Dryden weir. He confirmed that this action is not expected to involve shutting down the trap. Tom Scribner said that the YN has a concern that the material may be placed on the adjacent property that the YN may eventually develop for use. Miller said that placement of the material would likely be temporary, and that the contract would state this fact.

E. Broodstock Collection for 2010

The Hatchery Committees asked for information on WDFW's preparation of the broodstock collection protocols for 2010. Mike Tonseth confirmed that these protocols will continue to be sent to the Committees for review and should be available soon.

F. Chiwawa Water Right Application

Joe Miller provided a draft letter that the HCP parties can use to send to Washington State Department of Ecology (Ecology) as support for the Chiwawa Water Right. Ali Wick will send this out to the Hatchery Committees for their use.

G. Blackbird Pond 2010 Use for Steelhead

Joe Miller and Mike Tonseth indicated that Blackbird Pond was ready to receive 50,000 steelhead again this year. Tonseth also said that about 5,000 of the group will be passive integrated transponder (PIT)-tagged; Miller said that Chelan PUD will coordinate with him, as they would like to PIT-tag more fish.

H. NMFS HGMP Letters

Joe Miller asked whether the Hatchery Committees have any immediate feedback or want to provide feedback on the Chelan PUD response to the NMFS letters sent to Chelan PUD regarding the HGMPs. The Committees agreed to provide feedback on Chelan PUD's responses by Wednesday, January 27. Miller agreed to consolidate any of this feedback and check back in to discuss the feedback with the Committees.

Bill Gale confirmed with Kris Petersen that the public comment process for the Chelan PUD HGMPs will delay final NMFS review of the Leavenworth National Fish Hatchery HGMP that has already been submitted. Petersen verified that this is the case.

I. Review of Monthly Monitoring and Evaluation (M&E) Reports and Engineering Reports

There were no issues regarding this topic to discuss at today's meeting.

III. Douglas PUD

A. Steelhead Reproductive Success Study in the Twisp River

Greg Mackey introduced this topic, indicating that WDFW and Douglas PUD have met to discuss coordinating their respective planned RSS studies in the Twisp River. Andrew Murdoch joined today's meeting to discuss WDFW's planned work. There were some logistical changes as a result of these discussions, and the proposed length of the study was also extended in order to cover more steelhead generations. The Douglas PUD study will focus on three generations for three brood years in succession (thus, the first-generation parents, the second generation progeny, and the third generation progeny of the second generation). This study will primarily focus on adult life stages, and will include intensive spawning ground surveys.

Andrew Murdoch updated the group on WDFW's study plan. It will involve studying age-1 parr, smolts, and adults, in addition to ecological information to understand differences in hatchery and wild populations. WDFW is proposing to manage returning adults at the Twisp Weir, allowing no greater than 50 percent hatchery spawners above the weir. This situation is ideal for the statistical needs of the study, given the size of the population.

Murdoch will provide this proposal as well as one other proposal to the Hatchery Committees (both have been submitted to BPA as part of the Research, Monitoring, and Evaluation [RM&E] process). The second proposal addresses the accuracy and precision for abundance estimates for spring Chinook and steelhead in the Mid-Columbia. Murdoch will send these out for the Committees' information and review; this topic will be a discussion item at a future Hatchery Committees meeting.

Tom Scribner indicated that the YN would like Douglas PUD and WDFW to separately track and account for reconditioned kelts in their RSS studies. Murdoch confirmed that the reconditioned kelts would be treated the same as other animals involved in the study and that the study will provide information on reproductive success of individual fish, including kelts.

Bill Gale commented that he would like to see a more competitive process for developing study plans. Mike Schiewe acknowledged this concern and reminded the group that the Committees agreed to table this discussion until the completion of the HGMP documents, due to Hatchery Committees workload, and that this discussion will indeed be brought back to the Committees once HGMP workload issues have concluded. He noted that it was Douglas PUD's responsibility to make decisions on contracting, and that the Committees' purview is whether the study articulates a rigorous scientific approach to answering the study questions.

The Committees agreed to further review the RSS study plan and then provide email concurrence by next Friday, January 29. Greg Mackey will provide a revised study plan and SOA with language discussed at this meeting by January 21.

B. Methow Spring Chinook HGMP

Tom Kahler distributed a one-page summary of the key points of the Methow Hatchery Spring Chinook HGMP and updated the group on changes that have been made since the Wells Hatchery Committee conference call on January 15. He also said that Douglas PUD will be meeting with the Colville Confederated Tribes (CCT) on January 22 to develop the "take" tables in the document; this coordination is needed because of the overlap with the CCT program at Cassimer Bar. Shane Bickford noted that it will be difficult to meet proportion natural influence (PNI) goals given the low proportion of wild fish in the population. He solicited comment on the HGMP from the Hatchery Committee members. Tom Scribner asked about the likelihood of meeting program goals in the Twisp in low-return years. Bickford acknowledged that meeting broodstock targets in Twisp River during low-return years could be problematic, but noted that the Twisp River represents the best opportunity to develop a locally adapted broodstock in the basin. Further, it was noted that the HGMP contemplates additional production and releases in the Methow and Chewuch when the Twisp is below target levels. Scribner said that he would need more time to consider this approach and asked whether there could be flexibility built into the HGMP. Bickford said that the HGMP itself must remain rather firm in some places in order to create take tables, recognizing that broodstock decisions will be considered on a yearly basis within the Hatchery Committees.

The Committees will provide comments on the Methow Hatchery Spring Chinook HGMP to Douglas PUD by January 29. The document will be redistributed by email after these comments are received, with the intention to finalize the document and receive email approval by the end of the week ending February 5. The Hatchery Committees will provide email concurrence on the spring Chinook HGMP and SOA by Friday February 12.

C. Wells Steelhead HGMP

Greg Mackey distributed a one-page summary of the key points of the Methow Hatchery Steelhead HGMP and updated the group on changes that have been made since the Wells Hatchery Committee conference call on January 15. Mackey noted that the revised HGMP identifies release of hatchery by wild (HxW) smolts in the lower Methow, and a reduction in overall release numbers in Methow basin as recommended by the Hatchery Scientific Review Group (HSRG). Tom Scribner expressed concern with reducing releases in both the upper and lower Methow, and stated that the YN would be unlikely to agree to a reduction below the 350,000 smolts agreed to in the most recent *U.S. v. Oregon* agreement. Shane Bickford said that if the Hatchery Committees can agree on the number of smolts to be released, then it would be straightforward to sort out the proportions to be released in various locations. Scribner agreed to check with Steve Parker (YN Policy) to clarify whether a reduced number would be acceptable to the YN in any phase of the program.

Bill Gale distributed and reviewed a one-page summary of the key points of the USFWS Winthrop National Fish Hatchery summer steelhead program. The Committees provided comments and initial feedback on how it relates to the Wells steelhead program. Gale will send the final HGMP submitted to NMFS to Ali Wick for distribution to the group.

The next step is for the Committees to review the full Methow Hatchery Steelhead HGMP. Greg Mackey will modify the document based on comments at today's meeting and will send it out for review by Friday, January 29. The HGMP will then be up for approval at the February Hatchery Committees meeting.

D. Rocky Reach PIT-Tag Detector

Tom Kahler said that Douglas PUD will be testing the PIT-tag detection array at Rocky Reach Dam for detection efficiency this year. He anticipates that summer Chinook from Wells Hatchery may be used for this purpose. He said that there are 82,000 fish currently at Wells Hatchery that are intended for the 2010 survival study, and some portion of these fish could be used for this test.

E. 2010 Action Plan

Tom Kahler distributed the 2010 Action Plan for Hatchery Committees review and comment. This action plan will be up for approval at the February meeting.

IV. WDFW

A. Approval for Twisp Weir Operations Protocol

Mike Tonseth updated the group that WDFW has a Twisp Weir Operations Protocol for Hatchery Committees review. This protocol will be on the agenda for discussion at the next meeting; Tonseth will send this to Ali Wick for distribution after the meeting.

B. USFWS Collection of Hatchery Steelhead Broodstock at Winthrop National Fish Hatchery

Bill Gale updated the group that the USFWS will open the ladder into the Winthrop brood pond in mid-March of this year in order to attract as many hatchery fish into the brood pond as possible, as per the HGMP for the program. These fish will be for broodstock use; Gale said that USFWS is willing to consider other uses for any excess fish.

V. Yakama Nation

A. Carbon Dioxide for Fish Anesthesia

Tom Scribner discussed the successful use of carbon dioxide to anesthetize fish in the Umatilla River during hatchery operations. He noted this was a promising alternative to MS-222, which required a 21-day depuration period and, thus, is not ideal for fish destined for a consumption fishery. He would like to discuss the potential for using this method and would like to have an expert in this method attend a future meeting to discuss it. The Hatchery Committees concurred with this idea to invite this expert.

VI. HETT Update

A. Input from Hatchery Committees on NTTOC Analysis

Keely Murdoch notified the group that at the last HETT meeting, Todd Pearsons asked whether HETT members would want to participate in a session on ecological interactions at the State of the Salmon conference occurring in May 2010. She asked whether the Hatchery Committees would be supportive of the members presenting the methods information that the HETT has developed. Ali Wick noted that Mike Schiewe had pointed out to her that as a point of process, the HETT is not a stand-alone committee as a working group of the Hatchery Committees, but that it would make sense for the HETT members to present as individual scientists collaborating to represent the body of work they have completed as part of the HETT. The Committees agreed that all HETT members will be invited to participate in the conference and review of the abstracts, but would not be obligated to do so. In addition, all HETT members and members of the Hatchery Committees parties not represented on the HETT would be given an opportunity to review the presentation and any future manuscript that would be developed. Murdoch said that she will check with the CCT and NMFS to verify their agreement with this, as they were not present during this discussion.

At the last HETT meeting, the HETT also discussed the idea of adding an NTTOC analysis on Winthrop summer steelhead and spring Chinook, as these programs are interconnected with HCP Plan Species programs. Bill Gale said today that he would discuss this with his staff and report back to the group.

VII. HCP Administration

A. Next Meetings

The next scheduled Hatchery Committees meetings will occur as follows: February 17, March 17, and April 21, all at the Chelan PUD offices in Wenatchee.

B. Meeting Agreements

The following are agreements made at the meeting that did not require SOAs to memorialize their content:

- HETT meetings will now occur on an as-needed basis (Item II-C).
- HETT members may present their NTTOC methods work at an upcoming salmon conference (Item VI-A).

List of Attachments

Attachment A – List of Attendees
Attachment B – Rocky Reach and Rock Island HCP Hatchery Committee Statement of Agreement Regarding Transition to a 600,000 Yearling Summer Chinook Program
Attachment C – Rocky Reach and Rock Island HCP Hatchery Committee Statement of Agreement Regarding Implementation of Steelhead Rearing and Acclimation at the Chiwawa Acclimation Facility

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor QEA, LLC
Ali Wick	Anchor QEA, LLC
Joe Miller *	Chelan PUD
Alene Underwood	Chelan PUD
Tom Kahler *	Douglas PUD
Shane Bickford *	Douglas PUD
Greg Mackey	Douglas PUD
Todd Pearsons	Grant PUD
Kris Petersen (by phone) *	NMFS
Bill Gale *	USFWS
Mike Tonseth	WDFW
Pat Phillips	WDFW
Andrew Murdoch (present for Item III-A only)	WDFW
Tom Scribner	Yakama Nation
Keely Murdoch *	Yakama Nation

* Denotes Hatchery Committees member or alternate

Rocky Reach and Rock Island HCP Hatchery Committee
Statement of Agreement
Regarding Transition to a 600,000 Yearling Summer Chinook Program
Approved at January 20, 2010 meeting

Statement

The Rocky Reach HCP Hatchery Committee (HC) agrees that Chelan PUD (District) may implement a 600,000 Columbia River yearling summer Chinook program for brood year 2010, and thereafter until subsequent modification by *Periodic Adjustment of District Hatchery Levels* (RR HCP § 8.4.3). The new yearling program will be made up of 400,000 yearling smolts (inundation-not subject to§ 8.4.3) from the conversion from subyearlings and an additional 200,000 yearling smolts from the current production requirements (subject to § 8.4.3).

The District anticipates having the capacity to acclimate 600,000 yearling smolts at the new Chelan Falls facility by 2011. In the event that Chelan Falls facility is not complete by 2011, the District requests approval to acclimate the 600,000 yearling smolts at the Chelan net pens (up to 200,000) and Turtle Rock Island (400,000) as an interim measure.

Background

This SOA serves several purposes: (1) implement the HC approved transition of the Turtle Rock summer Chinook program to 600k yearlings, (2) reduce facility demands on Douglas PUD's Wells hatchery and (3) provide adequate notification for changes to broodstock collection numbers.

In 2006, the HC agreed to transition the summer Chinook program to 600,000 yearling smolts: *The Rocky Reach and Rock Island HCP Hatchery Committees agree that Chelan PUD should move final rearing and acclimation for the Turtle Rock summer Chinook program, to a new facility that will be built near the Chelan Powerhouse area. The new yearling program will be made up of 400,000 fish from the conversion from subyearlings and an additional 200,000 fish from the current production requirements (that are subject to revision in 2013 per the HCP)*[1].

The transition to a 600,000 yearling smolt program will decrease the number of broodstock collected. This reduction would be reflected in the 2010 broodstock collection protocols.

Summer Chinook broodstock would be collected and held at Wells hatchery but spawning and incubation would occur at Eastbank. The relocation of summer Chinook culture activities to Eastbank hatchery will reduce demands on Wells hatchery.

[1] May 17, 2006 SOA: *Statement of Agreement for the Program Conversion and Movement of the Turtle Rock Summer Chinook Hatchery Program to a New Facility near the Chelan Falls Powerhouse*

Attachment C

Rocky Reach and Rock Island HCP Hatchery Committee
Statement of Agreement
Regarding Implementation of Steelhead
Rearing and Acclimation at the Chiwawa Acclimation Facility
Decision at January 20, 2010 meeting
****** Incorporated revisions from 1/20/2010 HC meeting underlined.

Statement

The Rocky Reach and Rock Island HCP Hatchery Committees (HC) agree that Chelan PUD (District) may use the Chiwawa acclimation facility to rear and acclimate steelhead for release into the Wenatchee River and its tributaries consistent with §5.6 of the *Wenatchee River Summer Steelhead Hatchery and Genetic Management Plan* (HGMP).

The District would convert/modify one of the existing Chiwawa spring Chinook acclimation ponds to accommodate approximately 200,000 WxW steelhead for brood year 2011 (e.g., progeny for spawners collected in 2010 and spawned in 2011). The 200,000 steelhead described in this agreement would be in addition to those produced in the Chiwawa re-use pilot (200,000 new smolts in acclimation pond + 40,000 reuse smolts = 240,000 smolts total). The use of the Chiwawa facility to acclimate steelhead would be contingent upon the availability of adequate quantities of Wenatchee River water (based on the District's pending water right application) and appropriate modification to the Chiwawa spring Chinook acclimation ponds to accommodate rearing of both steelhead and variable ELISA levels of spring Chinook. Modifications to address variable ELISA levels of spring Chinook will be based upon the necessary space and water required to accommodate segregated rearing of spring Chinook with ELISA levels between 0.12 and 0.19, based on a historical running-average for Chiwawa River natural origin spring Chinook.[1]

In the event that Wenatchee River water is not available by the time juvenile steelhead are scheduled to be transported to the Chiwawa facility (2011), the District proposes to rear and acclimate steelhead on Chiwawa River (or a combination of Wenatchee and Chiwawa water) as an interim measure. Temporary rearing and acclimation on Chiwawa water would be an improvement over Turtle Rock (Columbia River water) as it would reduce out-of-basin straying (e.g., outside of the Wenatchee Basin) until the Wenatchee water right is acquired.

The agreement to rear 200,000 smolts at Chiwawa does not preclude the rearing and acclimation of additional numbers of steelhead in the event additional space is available at Chiwawa or other locations in the Wenatchee Basin (to be determined by the HC).

The relocation of 200,000 steelhead smolts from acclimation at Turtle Rock Island to the Wenatchee River does reduce or diminish the District's obligation to move its full

[1] As described in the HCP HC approved Appendix 1 "BKD Management" of the *Chiwawa Spring Chinook Hatchery Genetic Management Plan*.

steelhead production (Currently 400,000 smolts) to acclimation in the Wenatchee River Basin according to plans described in the HGMP and as agreed to by the HC. The District is planning to re-allocate capacity within the footprint of the Chiwawa acclimation facility to make efficient use of space provided by the reduction of spring Chinook production. See Attachment 1 for additional information.

Background

This SOA serves several purposes: (1) implement the HC approved HGMP acclimation plan to utilize Chiwawa facility as a steelhead acclimation site, (2) formalize the origin of priority of steelhead to be reared and acclimated (i.e., WxW), and (3) provide adequate notification for any additional approvals/reviews related to the change in location of the program.

The rationale for rearing steelhead at the Chiwawa facility is based on improving the homing fidelity of returning adults to the Wenatchee Basin. The Wenatchee steelhead HGMP (2009) also provides a detailed description of the issues considered in the process of selecting steelhead acclimation facilities.

The use of the Chiwawa facility to rear and acclimate steelhead is possible as a result of reducing the Chiwawa spring Chinook program to 298,000 smolts as agreed to in the December 16th, 2009, Statement Of Agreement: *Reduction of Chiwawa Spring Chinook Production Level to 298,000 Smolts*. The use of the Chiwawa facility for steelhead does not change spring Chinook BKD capacity obligations agreed to previously by the HCP HC.

Attachment 1. Design Update for Chiwawa Rearing & Acclimation Facility.

The District will utilize the 2008 feasibility study[2] as the foundation for creating steelhead acclimation capacity at Chiwawa. Originally, the District proposed implementing the six pond alternative (see Table 1), however, if 50% of the production is acclimated in the existing pond (formerly occupied by spring Chinook), the new configuration may only require construction of three ponds (or two since the previous proposal had a shared center-wall between pairs of ponds). Regardless, it is anticipated that there will be additional design work associated with the development of the facility. The District will move forward with this process and provide the HC with updates for approval if and where proposed changes deviate from the original 2008 proposal. With the HC approval to utilize existing acclimation space at Chiwawa, the project is now "smaller" than originally anticipated and should be more expedient to construct (not withstanding permit issuance timeframes). The District will provide an update on the design process at the February, 2010, HCP HC meeting.

Table 1
Vessel Sizing and Configuration

	Vessel Size (ft)			Rearing Volume Each Pond (cf)
	Length	Width	Average Depth	
Existing Spring Chinook Ponds				
Two equal-size ponds	123.5	50.6	6	37,495
Two-Pond Alternative				
Small pond	120	54	6	38,880
Large pond	170	77	6	78,540
Three-Pond Alternative				
Three equal-size ponds	129	50.6	6	39,164
Six-Pond Alternative[1]				
Six equal-size ponds	107	25	6	16,000

[1]The six-pond alternative utilizes updated biological criteria provided February 26, 2008.

[2] From "*CHIWAWA REARING/ACCLIMATION FACILITY –WENATCHEE STEELHEAD FEASIBILITY (CCPUD 3-3-2008).*"

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FINAL MEMORANDUM

To:	Wells HCP Hatchery Committee	**Date:**	March 24, 2010
From:	Michael Schiewe, Chair, HCP Hatchery Committees		
Cc:	Ali Wick		
Re:	Final Minutes of February 9, 2010 Wells Hatchery Committees Conference Call		

The Wells Hydroelectric Project Habitat Conservation Plan (HCP) Hatchery Committee met via conference call on Tuesday, February 9, 2010, from 9:00 am to 10:00 am. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Douglas PUD will modify the Methow spring Chinook Hatchery Genetic Management Plan (HGMP) as discussed today and will provide revisions for Hatchery Committee review (Item I).
- Tom Scribner agreed to provide some specificity on expected Methow spring Chinook acclimation locations so that Douglas PUD can add this information to the HGMP (Item I).
- Mike Schiewe will contact Rob Walton of National Marine Fisheries Service (NMFS) and encourage him to meet with Steve Parker of Yakama Nation (YN) to discuss the draft Wells steelhead HGMP (Item II).

DECISION SUMMARY

There were no decisions made on this call.

I. Methow Spring Chinook HGMP

Hatchery Committee members discussed the draft Methow Spring Chinook HGMP, focusing on the issues that had been addressed since the last draft. Key issues discussed today included collection of broodstock and expected numbers of adult returns. Douglas PUD agreed to add text stating that any hatchery-origin adults collected at Methow Hatchery in excess of Methow program needs would be made available for use in the Winthrop program. Douglas PUD also agreed to include additional text describing proposed acclimations sites in the Methow River. Tom Scribner agreed to provide specific information on these locations to Douglas PUD by the end of the day.

The Hatchery Committee agreed to consider the Methow spring Chinook HGMP for final approval at next week's Hatchery Committees meeting on February 17.

II. Wells Steelhead HGMP

The Hatchery Committee next discussed the draft Wells steelhead HGMP. Key issues covered today included the YN's commitment to production per the *U.S. v. Oregon* agreement. Tom Scribner explained that any reduced production in the Methow would need to be resolved before the YN could approve an HGMP. Kris Petersen said that the *U.S. v. Oregon* agreement included language stating that hatchery production levels might change as programs underwent Endangered Species Act (ESA) consultation; in order to issue a Section 10 permit for a hatchery program, it would have to be determined that the program does not jeopardize natural production and that it would contribute to recovery. Mike Schiewe said that Steve Parker knows about this footnote because Schiewe and Parker discussed it last week; Schiewe asked Scribner about the anticipated path forward. Tom Scribner said that Steve Parker's decision is that the YN disagrees with any reduction of smolt releases in the Methow Basin. Kris Petersen said that if NMFS were to receive an HGMP with a greater number of smolts released in the Methow Basin than the Hatchery Scientific Review Group (HSRG) recommended, then the HGMP would need to provide justification for the benefit to species recovery.

The group ultimately decided today that resolving this issue lies at a higher level than the Hatchery Committee. Mike Schiewe will contact Rob Walton of NMFS and ask him to meet with Steve Parker of YN to discuss this matter further.

List of Attachments

Attachment A – List of Attendees

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor QEA, LLC
Ali Wick	Anchor QEA, LLC
Shane Bickford *	Douglas PUD
Tom Kahler *	Douglas PUD
Greg Mackey	Douglas PUD
Kris Petersen *	NMFS
Jeff Korth *	WDFW
Bill Gale *	USFWS
Tom Scribner *	Yakama Nation

* Denotes Hatchery Committees member or alternate

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DRAFT MEMORANDUM

To:	Wells, Rocky Reach, and Rock Island HCP Hatchery Committees	**Date:**	April 9, 2010
From:	Michael Schiewe, Chair, HCP Hatchery Committees		
Cc:	Ali Wick, Steve Hays, Shane Bickford, Mike Tonseth, Greg Mackey		
Re:	Final Minutes of February 17, 2010 HCP Hatchery Committees Meeting		

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Hatchery Committees met at Chelan PUD in Wenatchee, Washington, on Wednesday, February 17, 2010, from 9:30 am to 3:30 pm. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Ali Wick will distribute to Hatchery Committees members a copy of the Yakama Nation comment letter regarding the Wells Steelhead Hatchery Genetic Management Plan (HGMP) (Item II-A).
- Greg Mackey will provide the Douglas PUD presentation from today's meeting, *Assessment of Steelhead Program Options for the Methow Basin, 2/17/10*, for distribution to the Hatchery Committees (Item II-A).
- The Wells Hatchery Committee will meet by conference call at 3pm on March 1 to review the status of the disagreement over the Methow smolt production target proposed for the Wells Steelhead HGMP (Item II-A).
- Tom Kahler will send revised text from the final Methow Spring Chinook HGMP to Hatchery Committees members for final verification that the changes requested at the meeting had been adequately incorporated into the document. (Item II-B).
- Tom Kahler will make the recommended changes to the 2010 Action Plan and distribute it to the Hatchery Committees and other HCP committees by March 9, allowing a week for comments (Item II-C).
- Mike Schiewe will review changes to the Douglas PUD 2010 Action Plan with the Coordinating Committees at next week's meeting (Item II-C).

- Tom Kahler will send an email to Ali Wick with recommended revisions to the October Hatchery Committees meeting minutes (Item II-D).
- Ali Wick will revise the September Hatchery Committees meeting minutes, changing "<80,000" to up to 80,000 steelhead smolts (Item II-D).
- Kris Petersen will review the Chelan PUD request for a letter of concurrence providing Endangered Species Act (ESA) coverage under the existing ESA permit for the conversion of the Turtle Rock subyearling summer/fall Chinook program to a yearling summer/fall Chinook program at Chelan Falls. If a new HGMP is required, Petersen will provide an estimated timeline for review and a determination by National Marine Fisheries Service (NMFS) (Item III-A).
- Sam Dilly will provide the presentation, *Chiwawa Steelhead Over-winter Program Review,* for distribution to the Hatchery Committees (Item III-C).
- Hatchery Committees members will provide Ali Wick with names of agency staff with expertise in external marking of fish (Item IV-A).
- Anchor QEA staff will compile current information on marking techniques for consideration by the Hatchery Committees (Item IV-A).
- Kris Petersen will send the HGMP fact sheets she is preparing for the Upper Columbia Salmon Recovery Board (UCSRB) presentation to the Hatchery Committees (Item IV-C).

DECISION SUMMARY

- The Hatchery Committees approved the February 12, 2010 version of the Methow Spring Chinook HGMP, with revisions (Attachment B); NMFS abstained (Item II-B).
- The Hatchery Committees approved continued rearing in 2010 of 400,000 juveniles at Ringold Hatchery contingent on collection of specific monitoring data (Item III-B).

I. Welcome, Agenda Review, Meeting Minutes, Action Items

The Hatchery Committees reviewed the January 15 Wells Hatchery Committee conference call minutes and the January 20 Hatchery Committees meeting minutes. The Jan 15 conference call minutes were approved as written. Douglas PUD and Chelan PUD submitted revisions to the January 20 meeting minutes; the January 20 meeting minutes were approved as revised.

II. Douglas PUD

A. Wells Steelhead HGMP

Mike Schiewe summarized the status of discussions on the Wells Steelhead HGMP to date. The Yakama Nation (YN) position is that the 350,000 juvenile steelhead release number in the Methow Basin negotiated under the *US vs Oregon* settlement is binding. The draft HGMP under review by the Hatchery Committees identifies a total release of 250,000 smolts in the Methow Basin. The YN sent a letter to NMFS asking NMFS to put the Wells steelhead HGMP on hold until the legal and policy issues can be resolved. Kris Petersen indicated there had not yet been a response from NMFS and reiterated NMFS' position, which is to review the HGMP as written by the HCP Hatchery Committees. The Committees discussed options for resolving the program-size issue so that Douglas PUD can include at least a draft version of the HGMP in their Final License Application due May 28, 2010. Keely Murdoch stated that the YN request for a delay was to allow for the issue to be resolved in the *US v Oregon* forum. Murdoch stated that items (a) and (b) of the YN's letter to NMFS would need to be incorporated into the hatchery program for the YN to support the HGMP. Ali Wick will distribute to Hatchery Committees members a copy of the YN letter. Kirk Truscott stated that the Colville Confederated Tribes (CCT) support a reduction of steelhead smolt releases to 250,000 in the Methow Basin. He then suggested the possibility of modifying the draft HGMP to state that the program would contemplate a release of "up to 350,000 smolts," but followed this by stating that the program would include a 5-year period of 250,000 production followed by an evaluation of program success. If the program's biological objectives were not met (i.e., Proportionate Natural Influence [PNI], adult returns) at a 250,000 production level, the program could be revisited. Bill Gale stated that recent monitoring results indicate that too many hatchery fish are returning at current release levels. He indicated that the U.S. Fish and Wildlife Service (USFWS) would be willing to consider modifying their WNFH steelhead program consistent with a program developed by the HCP Hatchery Committees.

Greg Mackey presented an analysis of historic Methow Basin steelhead program data to address some technical questions brought up by Hatchery Committees members during their February 9 conference call. Mackey will provide this presentation for distribution to the Hatchery Committees. The analysis considered alternative production levels over time and the likelihood that they would meet different benchmarks. Production levels evaluated ranged from 100,000 to 550,000. Benchmarks included NMFS Recovery Team Viable

Salmonid Population (VSP)- minimum effective population size of 500 adults; Interior Columbia Technical Recovery Team (ICTRT) minimum abundance of 1,000 adults; Ecosystem Diagnosis and Treatment (EDT) habitat capacity of 1,962 adults; a replacement rate of 1.0; and a PNI of >0.67. The analyses also included use of AHA model V.13.3 with Hatchery Scientific Review Group (HSRG) parameters, except that the model used an adult removal rate of 20 percent (the HSRG used a 75 percent removal rate), reflective of the current fishery extraction data.

Results of the these analyses indicated that a hatchery program size of about 200,000 or less would be the most likely to fully seed the habitat while reducing genetic risk. Natural Recruits per spawner only approached replacement at programs below 100,000 smolts. Adult management (presented as a fishery) became effective in managing for PNI ≥0.67 only at high levels of removal (i.e. 90%) and programs of 200,000 smolts or less.

Following the presentation, Mike Schiewe asked each member to state their position on an appropriate size for the Methow Basin steelhead program. The CCT, Washington Department of Fish and Wildlife (WDFW), Douglas PUD, and USFWS favored a 250,000 smolt release program; YN favored a 350,000 smolt release program; and NMFS abstained. Schiewe stated that the lack of agreement meant that no HGMP could be forwarded to NMFS with Hatchery Committees concurrence, and that one possibility would be to elevate this as a formal dispute to the Coordinating Committee, and if need be to the Policy Committee, consistent with Section 11 (Dispute Resolution) of the Wells HCP.

The Committees agreed to convene via conference call on March 1 at 3:00 pm to consider elevating this as a formal dispute within the HCP process and determine whether there is the potential to reach agreement. The March 1 date is midway through the 20-day period established in Section 11 of the Wells HCP for resolving the disputed issue within the originating committee.

B. Methow Spring Chinook HGMP

The Hatchery Committees unanimously approved the Methow Spring Chinook HGMP, with revisions, and with NMFS abstaining. Revisions will include criteria for additional acclimation sites and include text to clarify that WDFW, in consultation with the Joint Fishery Parties (JFP), is responsible for authorizing conservation fisheries. Keely Murdoch stated that YN considers the method of marking established in the *U.S. vs. Oregon* settlement as the default marking method, and that agreement to the HGMP is not an agreement to a different marking method. The Committee agreed that acclimation of Grant PUD's proportion of Methow Hatchery spring Chinook in Biddle and Goat Wall ponds should be specifically covered within Grant PUD's Artificial Propagation Plan rather than Douglas PUD's HGMP, and that general guidelines or critera be provided in the Methow Spring Chinook HGMP for additional acclimation sites. Tom Kahler will send revised text of the Methow Spring Chinook HGMP to Hatchery Committees members for review, as discussed. Comments must be received by Douglas PUD by the following Thursday (February 25). No response will indicate approval, and Douglas PUD will proceed with submittal of the HGMP to NMFS. The Hatchery Committee approved the SOA dated February 12, 2010.

C. Douglas PUD Wells 2010 Action Plan

Tom Kahler asked for approval of the Wells 2010 Action Plan, which was presented to the Hatchery Committee on January 19, 2010 and first discussed at the January 20 Hatchery Committees meeting, with approval requested at the February 17 meeting. Kahler indicated that it has also been distributed to the Tributary Committees and Coordinating Committees for review of their respective sections. The Hatchery Committees agreed to change the date for review of broodstock collection protocols from February to March 9. The Hatchery Committees also recommended changing the date by which NMFS would approve the HGMPs to "to be determined" because this was not something the Hatchery Committees could control. Douglas PUD agreed to make the recommended changes and Kahler will distribute the final Action Plan to the Hatchery Committees and other HCP committees by March 9. Kahler will discuss the revisions with the Tributary and Coordinating Committees. Mike Schiewe will review changes to the 2010 Action Plan with the Coordinating Committees at next week's Coordinating Committees meeting.

D. Agreement to Use Excess Summer/Fall Chinook Broodstock for Additional Study Fish

On September 28, 2009, following phone discussions with the Hatchery Committee members, Tom Kahler requested via e-mail approval from Hatchery Committee members for obtaining gametes fromexcess summer/fall Chinook broodstock at Wells Hatchery to provide study fish for a 2011 survival study. The members of the Wells Hatchery Committee approved the request via e-mail responses to Kahler on September 28-30. Kahler indicated that Douglas PUD requests the revision of the October Hatchery Committees meeting minutes to document the Committees' approval. Kahler also said that the "Decision Summary" of the September 2009 meeting minutes incorrectly stated that Douglas PUD would produce for Grant PUD "less than 80k" brood year 2011 steelhead smolts rather than "up to 80k" steelhead smolts at Wells Hatchery, and requested that this be revised as well. Ali Wick will correct these minutes and redistribute them.

III. Chelan PUD

A. ESA Coverage for Chelan Falls Yearling Summer/Fall Chinook Program

Joe Miller stated that Chelan PUD is ready to start construction of a Chelan Falls Facility to rear, acclimate, and release yearling summer/fall Chinook as agreed to by the Hatchery Committees. Miller asked Kris Petersen about the status of a NMFS response to Chelan PUD's request regarding coverage for this program under the existing ESA permit. Miller indicated that the response was needed to complete planning and begin construction of the Chelan Falls facilities. Chelan PUD requires assurance from NMFS that the Hatchery Committees-approved plans to convert the subyearling summer Chinook program currently at Turtle Rock to an all yearling program at Chelan Falls at Chelan Falls has ESA coverage. Chelan had proposed that Permit 1347 may be broad enough in scope to cover the actions proposed under the Chelan Falls plan. Petersen stated that she does not have a timeline for responding to the letter but that NMFS has already indicated that a new HGMP will probably be required. Peterson also noted that existing conditions may be different from when the current hatchery program was permitted. For example, she noted that with the completion of the Reach Four Habitat Restoration Project, the interaction between yearling Chinook and steelhead adults may need to be considered. Further, Petersen stated that changing from rearing summer Chinook for release as subyearlings to rearing them for release as yearlings, as well as adding construction activities and water usage, are major hatchery program changes that may require a new HGMP. Miller stated that preparing a new HGMP for the program could delay implementation by 1 to 3 years. Petersen agreed to review the Chelan PUD letter and provide a response, including a timeline for permit approval if a new HGMP is required.

B. Use of Ringold in 2010

Joe Miller presented information on summer/fall Chinook reared at Ringold Hatchery in 2009, and requested Hatchery Committees' approval for rearing up to 400,000 juveniles at Ringold in 2010. In general, the fish survived well and appeared healthy. Kirk Truscott asked if there was any evidence of increased precocity in the 2009 fish, and asked Chelan PUD to look at how the Ringold-reared fish compared to fish reared at Eastbank Hatchery. Miller provided data from WDFW fish health (Steve Roberts) on a limited number of males collected at Ringold –none of which were precocious. However, Miller indicated that the visual assessment of a gonadal development among a small number of males in the summer and fall may not be sufficient to assess precocity. Kirk Truscott asked if Chelan PUD was still planning to conduct the detailed physiological analysis of precocity. Miller indicated that NMFS will be conducting a physiological examination of smoltification and precocity at Bonaparte Pond where the Ringold fish are currently acclimating. These data will be collected in spring (April). Mike Tonseth asked about plans to monitor fish after transfer from Ringold. Miller responded that the primary intial evaluation in 2009 was based on WDFW fish health examinations and survival information collected at Ringold (by Steve Roberts) and Bonaparte (by Bob Rodgers), which indicated that the fish were in good health and survived well (at Ringold and at time of transfer). Miller acknowledged that the size and CV data were not collected in a systematic way, nor compared with a control group at Eastbank. Miller agreed with the request for additional information voiced by Mike Tonseth and Kirk Truscott and indicated that Chelan will ensure that a better protocol is developed for evaluation in 2010. The Hatchery Committees approved continued rearing in 2010 of 400,000 juveniles at Ringold Hatchery contingent on development of a more rigorous evaluation program.

C. Chiwawa Design Information

Sam Dilly provided a presentation titled *Chiwawa Steelhead Over-winter Program Review* Dilly will provide this presentation for distribution to the Hatchery Committees. Dilly reviewed the history of facility planning and design, highlighting changes since original plans in 2006, which were limited to construction of additional ponds for acclimation of steelhead. In 2009, the Hatchery Committees gave approval for a pilot study of partial water-reuse. During facility design, there was a reduction of spring Chinook production to 298,000 juveniles, resulting in additional space at the Chiwawa facility. Currently, Chelan PUD is re-evaluating how these changes affect long-term plans, with the goal of developing overwinter acclimation facilities in the Wenatchee basin as soon possible and making the most effective use of the existing facilities, water resources, and space. In the near term, Dilly indicated that Chelan would be reinforcing the center wall of the Chiwawa ponds to accommodate both steelhead and spring Chinook. Dilly also indicated that Chelan would construct a rearing vessel to accommodate high ELISA spring Chinook.

Dilly relayed that Chelan PUD currently is considering three designs:

1. *Original Design.* – In 2007 to 2009 the Committee had approved a rearing design that included 6 ponds. Chelan PUD is currently working on obtaining permits that would allow for the use of space contemplated in the original design, recognizing that some aspects of the plan may change due to the availability of space in the existing Chiwawa facility.
2. *Water Reuse Design* – This design would use three ponds. Chelan PUD will evaluate the extent to which steelhead reared in these ponds will emigrate volitionally. A Passive Integrated Transponder tag (PIT-tag) detector will be installed at the outlet. The Hatchery Committees provided some additional ideas on how to determine if steelhead smolts are truly emigrating, or are being swept out of the ponds.
3. *2010 Maximize Facility Use Design* – This is a plan (currently at the 30% design stage) to modify the existing facility to maximize use with near-term water rights. Chelan PUD is working with the U.S. Forest Service (USFS) to determine if the design can be implemented using a variance for their existing conditional use permit. Chelan PUD will also need to accomplish various other tasks (i.e., National Pollutant Discharge Elimination System [NPDES] permitting, acquire water rights, U.S. Army Corps of Engineers Section 404 permitting, purchase of private lands, reconfiguration of design to accommodate requirements under the HGMP, and resolve land swap and cultural resources issues with USFS). The goal is to have a 100% design in December 2010, and accommodate 230,000 steelhead and 298,000 spring Chinook on station by fall 2011.

Dilly summarized by stating that these planning options provide multiple pathways to move steelhead out of Turtle Rock by 2011.

D. Update on Potential Sharing of Hatchery Fish with Grant PUD

Joe Miller updated the Hatchery Committees that Chelan PUD is evaluating opportunities to work with Grant PUD to find overlap in hatchery programs to maximize efficiency. For example, both Grant and Chelan PUDs have obligations for summer Chinook in the

Wenatchee subbasin. Miller noted that any delay in permitting the yearling summer Chinook at Chelan Falls will affect other program activities and the near-term opportunities to improve efficiencies.

IV. NMFS

A. Marking Methods/Options

Kris Petersen requested support from Hatchery Committees members to bring people with expertise in mass fish marking techniques to speak to the Committees about current mass marking options (i.e., VIE tag, various fin clipping options). Hatchery Committees members agreed that this was an important and timely issue, with current program management goals and marking needs pushing the limits of the marking methods currently available. Petersen suggested that Anchor QEA could be tasked with compiling information on those tagging options currently available and those under development.

B. Update on HGMP Process and Permit Structure

Kris Petersen stated that NMFS' current goal is to have revised HGMPs for all hatchery programs as soon as possible, and to publish project summaries in the Federal Register with a request for comments. Petersen distributed a draft version of a generic hatchery project description Federal Register notice.

C. Preparation of HGMP Overview for UCSRB

Kris informed the Hatchery Committees that she will be giving the UCSRB a presentation on the Upper Wenatchee HGMPs, by conference call on February 25. She indicated that the presentation will be very general and is intended to provide the UCSRB with an understanding of how hatchery programs contribute to recovery. The goal is to inform UCSRB members so they can better respond to public questions and also so the UCSRB can support the hatchery programs. Petersen agreed to provide Hatchery Committees members with the HGMP fact sheets she is preparing for the UCSRB presentation.

V. WDFW

A. Approval for Twisp Weir Operations Protocols

On February 21, Ali Wick distributed by email to the Hatchery Committees the WDFW Twisp Weir Operations Protocols for review. Mike Tonseth said the weir will probably start operations on March 1, and he would like Hatchery Committees approval of the protocols prior to startup. The Hatchery Committees approved the protocols.

B. Discussion of Adult Spring Chinook Management

Jeff Korth explained that WDFW has been working with NMFS, at NMFS' request, on an addendum to all four Upper Columbia spring Chinook HGMPs to develop guidelines for adult fishery management. The addendum will provide general guidelines related to adult management, over a range of run sizes and run compositions. The addendum is not intended to modify any agreements made by the Hatchery Committees or to modify program activities contained in the HGMP. Keely Murdoch asked when the draft will be available to the co-managers. Art Viola, who joined the Hatchery Committees meeting for this topic, responded that the addendum is currently only a three-page, marked-up, rough draft, but that it will be available for co-manager review as soon as a coherent draft is ready. Korth emphasized that the addendum will not specify which adult management options will be implemented, but will only outline what adult management options are available. Implementation actions will be developed on an annual basis with co-managers.

VI. Yakama Nation

A. Kelt Reconditioning.

Keely Murdoch updated the Hatchery Committees that the YN has been discussing with USFWS the potential to recondition kelts at the Winthrop National Fish Hatchery (NFH). They are also discussing with WDFW the potential to trap kelts in the Twisp River, perhaps at the Twisp Weir.

B. Carlton Pond.

Keely reminded the committee that GCPUD is submitting a Statement of Agreement (SOA) to the Priest Rapids Coordinating Committee Hatchery Subcommittee (PRCC-HSC) for using Carlton Pond as an overwintering acclimation site. It was noted that because the Carlton Pond site is owned by Chelan PUD and used for HCP hatchery programs, any additional use would need to be cleared by the Hatchery Committees.

VII. HCP Administration

A. Next Meetings

The next scheduled Hatchery Committees meetings will occur as follows: March 17, April 21, and May 19, all at the Chelan PUD offices in Wenatchee.

B. Meeting Agreements

The following are agreements made at the meeting that did not require SOAs to memorialize their content:

- The Hatchery Committees approved the hatchery-related items of the Wells 2010 Action Plan, as amended. (Item II-C).
- The Hatchery Committees approved continued rearing in 2010 of 400,000 summer/fall Chinook at Ringold Hatchery, contingent on collection of specific monitoring data (Item III-B).
- Hatchery Committees approved the Twisp Weir Operations Protocols (Item V-A).

The following is an agreement made by email following the January 20, 2010 meeting that did not require SOAs to memorialize their content:

- Hatchery Committees approved the Twisp Steelhead Reproductive Success Study by email on February 1, 2010.

List of Attachments

Attachment A – List of Attendees
Attachment B – SOA 2010 Methow Spring Chinook HGMP

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor QEA, LLC
Carmen Andonaegui	Anchor QEA, LLC
Kirk Truscott *	Colville Confederated Tribes
Joe Miller *	Chelan PUD
Steve Hays (afternoon only)	Chelan PUD
Sam Dilly	Chelan PUD
Tom Kahler *	Douglas PUD
Shane Bickford*	Douglas PUD
Greg Mackey	Douglas PUD
Kris Petersen *	NMFS
Mike Tonseth	WDFW
Art Viola (afternoon only)	WDFW
Pat Phillips	WDFW
Jeff Korth *	WDFW
Keely Murdoch *	Yakama Nation

* Denotes Hatchery Committees member or alternate

Wells HCP Hatchery Committee
Statement of Agreement
2010 Methow Spring Chinook Hatchery Genetics Management Plan
Approved 2-17-10

Statement

The Wells HCP Hatchery Committee approves the Hatchery Genetic Management Plan (HGMP) for the Methow Hatchery Spring Chinook Program, dated February 12, 2010.

Background

The Wells HCP requires Douglas PUD to produce hatchery spring Chinook toward achieving the No Net Impact (NNI) goal of the HCP. Chinook survival at the Wells Project has been measured to average 96.2% during three years of study. The current release of 61,000 spring Chinook smolts mitigates for the unavoidable loss of 3.8% of the juvenile spring Chinook migrating through the Wells Project.

Chelan PUD is required to produce up to 288,000[1] Methow Basin spring Chinook smolts toward achievement of the current NNI goals of the Rocky Reach and Rock Island HCPs, and Grant PUD is required to produce up to 201,000 Methow Basin spring Chinook smolts toward achievement of current NNI goals for the Priest Rapids Hydroelectric Project. Douglas PUD is currently producing these fish on behalf of Chelan and Grant PUDs at the Methow Fish Hatchery under a hatchery sharing agreement.

The HSRG acknowledged there are insufficient NORs to properly integrate all existing spring Chinook production in the Methow Basin, and they were unable to craft a management strategy for the Methow Hatchery that increased NORs under current habitat conditions. The HSRG acknowledged that managing for the recommended PNI values for a primary population may not be possible or appropriate when abundance levels are low. Further, the HSRG recommended managing with a "sliding scale" of NOR extraction for broodstock while modulating pHOS and pNOB to meet objectives for minimum spawner escapement and hatchery production toward a goal of achieving an average PNI over time.

[1] Initial production levels subject to recalculation every 10 years beginning in 2013.

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FINAL MEMORANDUM

To:	Wells HCP Hatchery Committee	**Date:**	March 24, 2010
From:	Michael Schiewe, Chair, HCP Hatchery Committees		
Cc:	Ali Wick		
Re:	Final Minutes of March 1, 2010 Wells Hatchery Committees Conference Call		

The Wells Hydroelectric Project Habitat Conservation Plan (HCP) Hatchery Committee met via conference call on Tuesday, March 1, 2010, from 3:00 pm to 4:00 pm. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Mike Schiewe agreed to coordinate with Steve Parker following the Yakama Nation (YN) and Columbia River Inter-Tribal Fish Commission (CRITFC) meeting taking place on March 3, and will update the Hatchery Committees (Item I).

DECISION SUMMARY

There were no decisions made on this call.

I. Wells Steelhead HGMP

Mike Schiewe began the call by providing an update as to the status of the Wells Steelhead Hatchery Genetic Management Plan (HGMP). He said that each of the HCP parties, except the YN, supports a 250,000 smolt-release hatchery program; the YN supports a 350,000 smolt-release hatchery program and the National Marine Fisheries Service (NMFS) is currently abstaining from voting. As a result, absent the HCP-required unanimous agreement on an action, Douglas PUD is unable to submit a Hatchery Committees-approved revision of the Wells Steelhead HGMP to NMFS. Further, in this particular case, it is unlikely that elevating the dispute through the HCP dispute resolution process would resolve the issue. The concern described by Steve Parker of the YN is largely one of process under the existing *U.S. vs. Oregon* federal court-managed agreement.

Schiewe stated that one option for moving forward might be for the Hatchery Committees to send a letter to NFMS requesting specific guidance on an appropriate program size.

According to Parker, if NMFS responded with program guidance different from what it agreed to under the *U.S. vs. Oregon* forum, then the issue could potentially be resolved in the agreed-to *U.S. vs. Oregon* forum. Rob Jones said that NMFS would be hesitant to provide a production level in response to a letter like this, as NMFS' role under the Endangered Species Act (ESA) is regulatory in nature. Shane Bickford said that Douglas PUD will not send the HGMP to NMFS without further guidance because it would violate the consensus terms of the HCP. Rob Jones said that the YN, NMFS, U.S. Fish and Wildlife Service (USFWS), and Washington Department of Fish and Wildlife (WDFW) are all signatories of *U.S. vs. Oregon* and asked why these groups cannot work together to develop an agreed-to program. Steve Parker responded that the YN already participated in such a work group and agreed to a 350,000 smolt release program in the Methow Basin. Parker said that if new information is available showing that the agreed-to release numbers may be too high to lead to recovery, then it was the responsibility of NMFS to bring the issue back to the *U.S. vs. Oregon* forum for discussion and potential program modification. Jones agreed that the *U.S. vs. Oregon* discussions at the time of the settlement were made with the best available information, but with a provision for adjusting the production tables via the parties coming to the Production Advisory Committee (PAC) with a proposal. He suggested that the *U.S. vs. Oregon* agreement process be followed. Schiewe reminded Jones that the Hatchery Committees have attempted to come up with a consensus proposal, but that the individual members (as noted above) have differing opinions, with the YN only willing to agree to a Hatchery Committees proposal matching the *U.S. vs. Oregon* commitment.

Schiewe asked Hatchery Committees' members for recommendations on next steps to move preparation of a revised Wells Steelhead HGMP forward. Shane Bickford suggested that a technical meeting could be convened to discuss, analyze, and attempt to develop a scientific consensus on program size. Steve Parker commented that such a workshop might be a component of a solution but that the issue at hand is not technical in nature, but policy-process related. Jones indicated that NMFS could potentially respond to a letter from the Hatchery Committees requesting additional guidance by saying that new information is sufficient to conclude that the current program is in violation of its ESA permit and the permit could be revoked. Bickford said that Douglas would not support this course of action because they would then need to decide between breaking with a founding member of the HCP or having a program without the necessary ESA permit. Jones then said that he would rather build a case for what program does make sense, rather than what is not consistent with recovery.

(At this point, Bill Gale left the meeting, and said that he supported sending a letter to NMFS asking for more guidance.)

Near the conclusion of the call, Steve Parker said that the CRITFC leadership is planning to meet on Wednesday, March 3, to evaluate options for elevating this issue to the policy level under *U.S. vs. Oregon*. Schiewe agreed to coordinate with Parker following this meeting, and update the Hatchery Committees. This concluded the discussion.

List of Attachments

Attachment A – List of Attendees

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor QEA, LLC
Ali Wick	Anchor QEA, LLC
Shane Bickford *	Douglas PUD
Tom Kahler *	Douglas PUD
Greg Mackey	Douglas PUD
Kris Petersen *	NMFS
Rob Jones	NMFS
Mike Tonseth *	WDFW
Bill Gale *	USFWS
Keely Murdoch *	Yakama Nation
Steve Parker	Yakama Nation
Tom Scribner *	Yakama Nation

* Denotes Hatchery Committees member or alternate

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FINAL MEMORANDUM

To:	Wells, Rocky Reach, and Rock Island HCP Hatchery Committees	**Date:**	May 19, 2010
From:	Michael Schiewe, Chair, HCP Hatchery Committees		
Cc:	Ali Wick, Steve Hays, Greg Mackey, Mike Tonseth		
Re:	Final Minutes of March 17, 2010 HCP Hatchery Committees Meeting		

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Hatchery Committees met at Chelan PUD in Wenatchee, Washington, on Wednesday, March 17, 2010, from 9:30 am to 4:00 pm. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Keely Murdoch will send her comments on the February 17 Hatchery Committees meeting minutes to Ali Wick (Item I).
- Ali Wick will compile comments on the February 17 Hatchery Committees meeting minutes and send out to the Hatchery Committee for final approval by email (Item I).
- Ali Wick will send the approved February 9 and March 1 conference call minutes to the Hatchery Committees (Item I).
- Greg Mackey will send his Methow Hatchery update notes to Ali Wick (Item II-B).
- Mike Tonseth will look into the causes for the delays in reading scales and coded wire tags needed to complete the annual Hatchery Monitoring and Evaluation (M&E) Reports. He will work with other Hatchery Committees members to explore opportunities for developing coded-wire tag and scale reading capabilities in eastern Washington (Item II-B).
- Joe Miller will revise the draft Skaha and Okanogan lakes Sockeye Reintroduction Statement of Agreement (SOA) to address concerns raised by the Hatchery Committees (Item III-A).
- Joe Miller will revise the draft SOA on Chelan Falls facilities and rearing practices as discussed by the Hatchery Committees (Item III-B).

- Kris Petersen will notify the Hatchery Committees when the Federal Register Notices opening public comment on revised hatchery programs are published (Item IV-A).
- Shane Bickford will send Douglas PUD comments on U.S. Fish and Wildlife's (USFWS's) collection of summer Chinook broodstock to Bill Gale (Item V-A).
- Kirk Truscott and Mike Tonseth will identify procedures for alternate broodstock collection for the Similkameen program (Item VI-A).
- Kirk Truscott will provide to Ali Wick for distribution to the Hatchery Committees, results on purse seining summer Chinook in 2009 (Item VI-A).
- Shane Bickford will provide Douglas PUD comments on the Broodstock Collection Protocols to Ali Wick and copy the Hatchery Committees (Item VI-A).
- Keely Murdoch will provide the coho broodstock collection protocols to Washington Department of Fish and Wildlife (WDFW) for inclusion in the 2009 Broodstock Collection Protocols. (Item VI-A).
- Mike Tonseth will revise the Broodstock Collection Protocols for consideration by the Hatchery Committees at the next meeting (Item VI-A).
- Jeff Korth will distribute draft guidelines for managing surplus returning adult salmon prior to the March 31 Joint Fisheries Parties (JFP) conference call (Item VI-B).
- Ali Wick will set up the JFP conference call for 9:00 am on March 31, 2010, to review the draft guidelines for managing surplus adult returns (Item VI-B).
- Mike Tonseth will work with Kris Petersen regarding shifting the release location of the Turtle Rock subyearling Chinook production to Chelan Falls in 2010 (Item VI-C).
- Tom Scribner will coordinate with Hatchery Committees members regarding potential facility upgrades at the Wells Dam east ladder trap (Item VII-A).
- Tom Scribner will send an electronic copy of the Twisp Weir kelt trap design along with a narrative to Ali Wick for distribution to the Hatchery Committees (Item VII-B).
- Greg Mackey will have Douglas PUD engineers review the Yakama Nation kelt trap design for the Twisp Weir (Item VII-B).
- Jeff Korth will send an email to Mike Schiewe designating the new WDFW Hatchery Committees representative and alternate (Item IX-B).

DECISION SUMMARY

- The Hatchery Committees approved the USFWS SOA regarding Brood Year (BY) 2010 summer Chinook adult collection at Wells for Entiat National Fish Hatchery (NFH), pending revisions (Item V-A).

I. Welcome, Agenda Review, Meeting Minutes, Action Items

The Hatchery Committees reviewed the February 9 and the March 1 Wells Hatchery Committee conference call minutes and the February 17 Hatchery Committees meeting minutes. There were no changes to the February 9 conference call minutes. Tom Kahler provided comments on the March 1 conference call minutes, which were all accepted. The February 9 and March 1 conference call minutes were approved and will be finalized by Ali Wick. Douglas PUD, Keely Murdoch, and Joe Miller submitted edits to the February 17 meeting minutes. Ali Wick will integrate these comments into the draft meeting minutes and send a final version to the Hatchery Committees for approval by email.

Jeff Korth announced that Mike Tonseth will be the new Hatchery Committees representative for WDFW; Jeff Korth will be the alternate.

II. Douglas PUD

A. Wells Steelhead HGMP

Shane Bickford introduced this topic by saying that Douglas PUD has placed completion of the Wells Steelhead Hatchery Genetic Management Plan (HGMP) on hold until a resultion of release numbers is arrived at by the *U.S. v Oregon* parties, allowing the Hatchery Committee to come to consensus on the HGMP. Douglas PUD will operate under the existing permit until the the Hatchery Committee can unanimously approve the steelhead. Mike Schiewe asked if any Hatchery Committee representative wanted to elevate the impass over steelhead release numbers to dispute resolution. Mike Schiewe explained that the Hatchery Committees are still operating under National Marine Fisheries Service (NMFS) requirements to provide new HGMPs on a given timeline unless the Hatchery Committees take action to elevate the issue, formally placing the HGMP on hold at the Hatchery Committee level. Although it is a possibility that NMFS could suspend the Douglas PUD/WDFW permit covering the Wells steelhead program due to the delay, Mike Schiewe indicated he understands this is not likely.

Kris Petersen stated that NMFS is moving forward with taking a comprehensive look at all production numbers for hatchery programs permitted under the Endangered Species Act (ESA) and covered under the *US v Oregon* agreement. The goal is to identify programs that may require revised production numbers as anticipated by the footnotes in the *US v Oregon* production tables. NMFS also intends to identify hatchery programs for which revised production numbers are not anticipated. Kris Petersen stated that NMFS was not comfortable writing a letter to the Hatchery Committees dictating what the HGMP should contain. Douglas PUD acknowledged that the current Douglas PUD steelhead permit is valid and will stay in place until the issue of future juvenile steelhead release locations is resolved by the HCP HC. Bickford stated that Douglas PUD wants to submit an HGMP to NMFS that is a product of the Hatchery Committees. Douglas PUD does not intend to submit an HGMP that is not approved by the Hatchery Committee unless it is forced to under the threat of the permit being revoked. Tom Scribner stated that from the Yakama Nation (YN) perspective, a fact sheet discussing the proposed Wells juvenile steelhead production numbers needs to be developed if any changes in production are to be negotiated in the *US v Oregon* forum. The Hatchery Committees put this issue (of resolving Wells program production numbers) on hold until Douglas PUD is either compelled to submit the HGMP or the JFP provide a recommendation that the Hatchery Committees can approve.

B. Methow Hatchery Updates

Greg Mackey updated the Hatchery Committees regarding several recent events associated with the Methow hatchery and M&E programs. Spring Chinook juveniles were moved from the Methow Hatchery to the Twisp Acclimation Pond on March 4 and into the Chewuch Acclimation Pond on March 5. The remaining fish are on station at the Methow Hatchery. The Twisp Weir was installed and began operation on March 2, within a day of the targeted startup date of March 1. Rotary screw traps are all fishing in the basin (three total). Steelhead spawning surveys will start up soon in Methow Basin. The planned Wells Dam West Ladder/Steelhead Pond improvements have been put out to bid. Mackey will send his Methow Hatchery update notes to Ali Wick for distribution.

Greg Mackey stated that WDFW had requested an extension from April 1 to July 1 for delivery of the draft 2009 Hatchery M&E report to Douglas PUD. He noted that there has been a delay in processing scale samples and CWT reading by WDFW in Olympia, and that the analyses cannot be completed until these data are available. Mike Schiewe noted that an extension of this initial delivery date would require an adjustment to the subsequent M&E schedule dates. Because the delays were caused by reduced budgets (and staffing) that were not expected to change or improve in the short term, WDFW suggested that the Hatchery Committees might want to permanently revise the reporting schedule. Bickford indicated that Douglas PUD would be amenable to a permanent change but noted that the M&E report schedule has already been adjusted once to coincide with the NMFS-required ESA permit reporting dates and that NMFS approval would be critical for any permanent change. The Hatchery Committees discussed the potential to develop scale and CWT reading capacity dedicated to evaluations of the Mid- and Upper-Columbia programs to reduce the current bottneck in obtaining data. WDFW agreed to further explore this idea. YN and WDFW agreed to talk off-line about potential funding for local scale and CWT reading capacity.

Mike Schiewe stated he would like to see both Chelan and Douglas PUDs on the same schedule for producing their M&E reports. Shane Bickford and Joe Miller agreed. The new draft delivery of July 1 for internal PUD review will push the final M&E report out to September rather than the end of June. The Hatchery Committees agreed that this delay was acceptable for the 2009 M&E reports. Kris Petersen stated that as long as selected information can be provided to her prior to releasing the final M&E report, she is not opposed to changing the final M&E Report date to September this year. In response to a question on timing of data, Mike Tonseth agreed to look into the causes for the delays in reading scales and coded wire tags needed to complete the annual Hatchery Monitoring and Evaluation (M&E) Reports. He will work with other Hatchery Committees members to explore opportunities for developing scale and coded-wire tag reading capabilities in eastern Washington.

In a last question on the Methow Hatchery program, Mike Tonseth asked how Biddle Pond juveniles will be monitored for outmigration timing. Keely Murdoch stated that Passive Integrated Transponder (PIT)-tag detection will be in place at Biddle Pond to monitor the outmigration.

III. Chelan PUD

A. Skaha Reintroduction Program – Post-2017

Joe Miller distributed a draft SOA extending the timeline for implementing Chelan PUD’s sockeye mitigation program. He explained that he was not seeking approval of the SOA but wanted to use it to introduce the topic and focus some initial discussion. Miller explained that the existing Hatchery Committees SOA for Skaha Lake Program establishes the first evaluation point as the year 2017. In 2017, the existing timeline calls for determining whether results of the Skaha Lake reintroduction experiment support an increase in natural production and the reintroduction of sockeye into Lake Okanogan. The draft SOA presented today includes a smolt production criterion. Chelan PUD is proposing to change the current study design to allow for a longer-term perspective, so that the focal point is natural reproduction of smolts rather than just fry survival. Chelan PUD proposes to add 10 additional years to the Hatchery Committees-approved program to fund construction of hatchery facilities and operations through 2027 . The program is co-funded by Grant PUD and Chelan PUD. Chelan PUD is proposing that mitigation credit would be based on natural-origin smolt production. Tom Scribner asked whether Chelan PUD had contingency plans for mitigation after 2017 if reintroduction does not meet mitigation obligations. Kirk Truscott stated that he likes the innovative approach of achieving reintroduction and natural production rather than relying on hatchery production. Kris Petersen stated she does not want to forego discussion in 2017 regarding contingencies if reintroduction in Skaha Lake does not occur. Tom Scriber stated he wants to see the Hatchery Committees develop contingencies now for what to do in 2017 if reintroduction goals in Skaha Lake aren't met in 2017. The Hatchery Committees requested that Chelan PUD revise the SOA to include contingencies if the Skaha Lake reintroduction goals are not met in 2017. Miller will revise the SOA to address these concerns.

B. Chelan Falls Acclimation Facilities

Joe Miller provided the draft SOA to the Hatchery Committees, titled "SOA Regarding the Use of Circular Tanks at Chelan Falls," for discussion purposes; he noted that Chelan PUD is not seeking approval at this meeting. The Chelan PUD proposal is to build circular tanks (rather than raceways) and rear summer/fall Chinook to achieve a final rearing density index of 0.2 fish per pound (fpp) at release. Miller indicated that Chelan PUD was basing this proposal on the excellent success experienced to date with Chinook reared in circular tanks at Eastbank Hatchery in 2008 and 2009. Miller emphasized that the proposed circular tanks would not be utilizing re-use water. He reviewed the benefits of circular tanks as outlined in the draft SOA. These included potential survival benefits, improved waste management, water treatment options, improved spatial distribution of rearing fish, and cost savings. Tom Scribner and Mike Tonseth asked whether Chelan PUD had a plan for testing the different rearing densities at the Chelan Falls facility, and if so what the criteria would be for changing to a lower rearing density. Miller indicated that Chelan PUD is open to working with the Hatchery Committees to develop criteria to define success and that the facility would be plumbed for additional circular tanks to allow doubling the number of circular tanks and reducing densities. The Hatchery Committees discussed including side-by-side comparisons of single and double densities. Miller indicated that Chelan PUD's goal is to have the Chelan facility operational by fall of 2011. Chelan PUD will revise the circular tank Chelan Falls proposal for consideration by the Hatchery Committees. Miller will revise the draft SOA as discussed.

IV. NMFS

A. Spring Chinook HGMP Update

Kris Petersen indicated that the draft Federal Register Notice for public comment on the Wenatchee Spring Chinook HGMP had been sent to NMFS Headquarters for review. She will let the Hatchery Committees know when the notices are published.

V. USFWS

A. SOA regarding BY 2010 summer Chinook adult collection at Wells for Entiat NFH

Dave Carie state that USFWS would like to collect 120 adult summer/fall Chinook at Wells Hatchery for transfer to the Entiat NFH as broodstock. Shane Bickford requested that the SOA be amended to say that USFWS will be responsible for all of the collection and transport activities. He will send these comments to Bill Gale for revision of the SOA. The SOA was approved, pending revisions.

VI. WDFW

A. Review of 2010 Broodstock Collection Protocols

The following is a summary of the Hatchery Committees' discussion of the 2010 Broodstock Collection Protocols, by region and program.

Above Wells Dam

<u>Spring Chinook</u>

Mike Tonseth noted that he expects a higher portion of hatchery fish in the Methow Basin 2010 adult returns than in recent years. He also indicated that the estimate for wild spring Chinook for the Methow Basin may be an overestimate. Greg Mackey asked if the

Broodstock Collection Protocols were consistent with the recently submitted HGMP that targets 100,000 juveniles in the Twisp, rather than the current number of 183,000 which would likely not be met. Tom Scriber stated that the assumption is that if Douglas PUD does not achieve the 183,000 production target, the production is made up with MetComp stock. Scribner indicated he needed to make sure that the reduction contained within the spring Chinook HGMP to 100,000 fish was coordinated with the *US v Oregon* agreement.

Keely Murdoch asked about the accuracy of genetic assessment for Twisp fish captured at Wells Dam. Shane Bickford stated it was greater than 80 percent, and probably closer to 85 percent. Murdoch expressed concern that this leaves 15 percent that would not be conclusively identified as Twisp stock and hence not incorporated in Twisp broodstock which would result in an artificial selection for certain genotypes and would not be a collection across the entire population. Tom Scribner discussed his concern that genetic diversity of the Twisp spring Chinook stock may be altered by not including fish that do not have Twisp stock genetic markers. Truscott pointed out that natural-origin fish are collected at Twisp Weir irrespective of whether they possess the Twisp genetic marker.

Shane Bickford asked how Methow Hatchery broodstock requirements were adjusted to allow culling of high enzyme linked immunosorbent assay (ELISA) fish (fish with bacterial kidney disease [BKD]). He stated that a 5-year running average should be used and that the recent 5-year average is 8.2 percent and not the 18.2 percent as described in the Protocol. Mike Tonseth agreed to recheck the number. Bickford agreed to provide the rest of his comments to Ali Wick for distribution to the Hatchery Committees. Kris Petersen asked why Chiwawa spring Chinook smolt-to-adult returns (SARs) were used for estimating Methow returns. Tonseth explained that these are being used as a surrogate given that no other more reliable information is available; Tonseth will clarify this in the Broodstock Collection Protocols.

Mike Tonseth suggested that it may be difficult to meet the natural-origin return (NOR) goal for the MetComp stock with the required extraction limit of no greater than 33 percent of the NOR run. The Hatchery Committees discussed whether the Parental Based Tagging (PBT) sampling at Priest Rapids Dam could be used to better predict the numbers of NOR fish passing Wells Dam, and make in-season adjustments as necessary. Tom Scribner asked if WDFW would consider increasing the numbers of adults collected early in the season to avoid a shortfall later in the season. Tonseth responded that WDFW's goal is to collect adults in proportion to the timing of the entire return. Tonseth also indicated that the NOR extraction rate is typically only about 10 to 15 percent, rather than the 33 percent limit. Kris Petersen stressed the importance of not front-loading the collection and maintaining randomness of collection at Wells.

Upper Columbia Steelhead

Greg Mackey asked the Committee to consider placing collection of 26 wild steelhead for broodstock at the Twisp Weir, rather than at Wells Dam, in the 2010 Broodstock Protocol. These fish would be collected in spring 2011, but must be accounted for in the 2010 Protocol. Furthermore, collection of these fish is consistent with the approved Steelhead Spawning Success Study in the Twisp, where WxW Twisp broodstock will be used to produce smolts for evaluation of the planned management program in the Twisp. Greg Mackey will include this change in their redline of the Broodstock Collection Protocols, which Douglas PUD will provide to the Hatchery Committees.

Greg Mackey also noted that the west ladder at Wells Dam is being upgraded and work will be completed by July 1, 2010. He stated that Douglas PUD would prefer that the Broodstock Collection Protocols state that the use of the west ladder is preferred to improve logistics related to the ongoing projects at Wells Dam and the new trap will greatly improve fish handling. Mike Tonseth agreed to edit the protocols to reflect this preference.

Keely Murdoch asked if retro-fitting the east ladder trap could be a future consideration. Shane Bickford cautioned the Committee that there will be no construction work to upgrade the east ladder trap while the generator rebuild project is taking place at Wells. The Hatchery Committee agreed that the east ladder adult collection facility could be considered for improvement, once the generator rebuild project is completed, including the possibility of joint funding by the entities that use the trap.

Summer Fall Chinook

Kirk Truscott stated he has some adult collection issues he would discuss with Mike Tonseth off-line.

Coho

Keely Murdoch said the coho broodstock collection protocols are not due until June to NMFS but that she would try to complete them sooner so WDFW could include them in the 2010 Broodstock Collection Protocols.

Columbia River mainstem below Wells

Summer/Fall Chinook

Kirk Truscott asked about USFWS collection of broodstock at Wells Dam for the Entiat program. Dave Carie said he could address any questions when the Hatchery Committees consider the draft SOA for the program. Responding to a question from Tom Scribner, Mike Tonseth indicated that ultrasonography is being used throughout the Upper Columbia to balance the collection of male and female broodstock, and that its use has greatly simplified gender determination. In response to a question by Kirk Truscott, Pat Phillips stated that natural-origin stock will be a priority for collection. Phillips clarified that it is a priority to meet the weekly quota of wild fish for the Wells Hatchery. Shane Bickford stated that Douglas PUD's priority for west ladder collection at Wells Dam is to meet the Wells Hatchery summer Chinook obligation contained within the Federal Energy Regulatory Commission (FERC) license for the Wells Project. Tonseth indicated that both NOR targets and production goals can be accommodated.

Wenatchee River Basin

Wenatchee Spring Chinook

Mike Tonseth said to disregard any reference to the collection of 672 spring Chinook in the draft protocols; WDFW is currently working to revise the production tables. Tom Scribner indicated that he needs to coordinate revised production targets through *US v Oregon*. Mike Schiewe reminded the Hatchery Committees that they had approved a Chiwawa Program production target of 298,000 smolts and that each member is responsible for making sure this target is consistent with any of their other existing agreements.

Kris Petersen stated that the Broodstock Collection Protocols should include information on the Parental Based Tagging (PBT) study that will be conducted in 2010, and Mike Tonseth agreed. Tom Scribner emphasized the importance of not only including a statement that PBT testing would be initiated in 2010, but also stating that it would be continued in subsequent years as necessary. Joe Miller asked if the Broodstock plan would incorporate the

BKD management plan from the HGMP. The BKD Plan has provisions for collecting extra fish to backfill high ELISA hatchery-origin fish that may be culled. Tonseth responded that culling applies only to hatchery fish, and that if returns are as expected, only wild fish would be used for broodstock this year. If hatchery-origin fish are collected for safety-net fish, WDFW will collect extra fish for BKD testing. Tonseth indicated that Table 8 in the Broodstock Collection Protocols allows for a 12 percent cull rate of hatchery-origin returns (HORs).

<u>Steelhead</u>

There were no comments.

<u>Summer/Fall Chinook</u>

There were no comments.

<u>Sockeye</u>

Joe Miller noted that with production changes, there may be opportunities to produce 280,000 sockeye at Lake Wenatchee, however, permit 1347 only allows for production of 200,000. Miller asked Kris Petersen about a path forward ESA coverage.Kris Petersen suggested additional conversation was necessary on this topic.. Mike Tonseth said 260,000 juveniles could be produced in the short-term,close to the HCP target of280,000.

Action items that came from these discussions include:

- Kirk Truscott will provide to Ali Wick for distribution to the Hatchery Committees, results on purse seining summer Chinook in 2009
- Kirk Truscott and Mike Tonseth will identify procedures for alternate broodstock collection for the Similkameen program
- Keely Murdoch will provide the coho broodstock collection protocols to Washington Department of Fish and Wildlife (WDFW) for inclusion in the 2009 Broodstock Collection Protocols. (Item VI-A).
- Mike Tonseth will revise the Broodstock Collection Protocols for consideration by the Hatchery Committees at the next meeting (Item VI-A).

B. Adult management

Jeff Korth updated the Hatchery Committees that he is preparing an addendum for attachment to all the Upper Columbia HGMPs that would provide guidelines for the management of surplus adult returns. He stated he plans to distribute a final draft by the end of the current week or early next week. Keely Murdoch asked about the process for finalizing the draft. Korth replied that he anticipated that it will go through the same process as the HGMP did for review. Mike Schiewe clarified that the adult management addendum is not a Hatchery Committees issue per se, but a co-manager issue brought into this forum for coordination. Kris Petersen stated that the addendum bridges the gap between the management plans and the HGMPs for the Section 10 permits for adult management activities. The addendum approach will serve as a vehicle for developing a permit for adult management rather than having to use, for example, a spring Chinook management plan and having to take that through the public review process. Korth requested a conference call to take comments and discuss the draft plan. A call was scheduled for March 31, 2010, at 9:00 am. He will distribute draft guidelines for managing surplus returning adult salmon prior to the call. Ali Wick will set up the call line. Tom Scribner noted that he would need to coordinate any adult management plans against any existing *US v Oregon* agreements. Petersen noted that the addendum would only include actions the YN already supported through their approval of the Spring Chinook Management Plan and the Wenatchee Spring Chinook HGMP.

C. Turtle Rock Subyearlings

Mike Tonseth stated that this is the last year for subyearling Chinook releases under the Turtle Rock Program. Accordingly, WDFW is proposing to transfer the subyearlings to net pens at Chelan Falls for a short acclimation prior to release. The expected transfer date would occur the first week of May and would include about 800,000 fish. Because this is a departure from the normal release location, Kris Petersen indicated the need to review the permit and the biological opinion prior to agreeing. All the other Hatchery Committees' representatives supported the proposal. Mike Tonseth will work with Kris Petersen regarding this issue and any outstanding concerns.

D. Adult Hatchery Steelhead

Mike Tonseth requested approval for surplussing (killing) excess adult male hatchery-origin Wenatchee steelhead in the 2010 broodstock presently on hand at Wells Fish Hatchery.

Historically, the surplus hatchery males were released back into the Wenatchee River above Tumwater Dam to spawn naturally. Tonseth stated that with this year's large steelhead return, WDFW feels it is important to limit additional hatchery impacts by not returning the excess hatchery steelhead to the Wenatchee River as potential spawners. At the present time, there are 1,953 steelhead above Tumwater Dam, of which approximately 700 are wild and 1,200 are hatchery-origin. The present male-to-female ratio is 1.27:1.00, with approximately 68 percent of the males being hatchery-origin. The Hatchery Committees approved the request.

E. Request for Samples

Mike Tonseth requested approval to collect anadromous fish from upper Columbia River hatchery facilities as samples for a collaborative predator study being conducted with the U.S. Geological Survey (USGS). This is the second year of the study, and the request is similar to last year's request, which was approved by the Coordinating Committees. For ESA-listed populations, samples will be composed of up to 10 natural mortalities; for non-ESA-listed populations, up to 10 individuals per population may be euthanized for sampling. The Hatchery Committees approved the request.

VII. Yakama Nation

A. East Ladder Fish Trap

Tom Scribner said he anticipates the expanded use of trapping at Wells Dam for broodstock collection and as an evaluation point for several new and expanding programs. Greg Mackey noted that a project to improve the west ladder trapping facilities was already in progress. Scribner indicated that his concern was the east ladder, and noted the potential for cost sharing of any upgrades. Scribner agreed to take the lead in coordinating with Hatchery Committees members regarding potential facility upgrades at the trap. Shane Bickford acknowledged that improvements may be needed, but reminded the group that there are constraints to be considered. For example, he noted that Douglas PUD is just beginning turbine upgrades, which will take the next 9 years to complete. Access to the east ladder trap during the rewind project is limited. He stated that there is also the issue of how who will pay for any potential improvements since Douglas PUD is not the main user of that facility. Douglas PUD's hatchery collection and M & E activities are focused on the west ladder trap.

B. Potential Capture of Steelhead Kelts at Twisp Weir

Tom Scribner updated the Hatchery Committees that the YN would like to test trapping steelhead kelts at the Twisp River Weir in 2010. Scribner provided a handout showing a preliminary design for a trap, dated March 8, 2010. Greg Mackey stated that the trap would have to be designed and constructed so as not to affect the function of the Twisp Weir for adult capture activities or put the weir at increased risk of damage. Kirk Truscott noted that staff safety should be a major concern as well. Mackey suggested using hinged panels rather than breakaway panels as currently contemplated in the design. Tonseth advised calculating panel breakaway velocities for use in the design. Mackey said he will have Douglas PUD engineers look at the draft design. Scribner will send an electronic copy of the kelt trap design along with a narrative to Ali Wick for distribution to the Hatchery Committees.

VIII. Colville Tribes

A. Colville Confederated Tribes 2010 Salmon Creek Smolt Allocation

Kirk Truscott explained that the Colville Confederated Tribes (CCT) are requesting that 40,000 steelhead smolts of the 108,000 Wells Hatchery Okanogan River Basin steelhead smolt production be allocated for release into Salmon Creek in 2010. From the 40,000 smolts, he indicated that the CCT would like to acclimate about 5,000 in an irrigation pond located at River Kilometer (RKM) 6.9 in Salmon Creek; the remaining 35,000 will be direct planted, as is all production in the Okanogan River Basin. The 5,000 smolt release into the irrigation pond will be used to evaluate what improvements are needed to the irrigation pond for acclimation without risking substantial numbers of fish. The Hatchery Committees approved the requested change.

IX. HCP Administration

A. Next Meetings

The next scheduled Hatchery Committees meetings will occur as follows: April 21 and May 19, both at the Chelan PUD offices in Wenatchee.

B. Committees Representation

Jeff Korth will send a letter to Mike Schiewe designating Mike Tonseth as the Hatchery Committees representative and himself as the alternate.

C. Meeting Agreements

The following are agreements made at the meeting that did not require SOAs to memorialize their content:

- The Hatchery Committees agreed to put the issue surrounding the Wells steelhead HGMP on hold until the full committee can support that document (Item II-A).
- The Hatchery Committees agreed that a delay for producing the 2009 final Douglas M&E report was acceptable (Item II-B).
- The Hatchery Committee agreed to a change in the Broodstock Collection Protocol to collect 26 wild steelhead at the Twisp Weir in spring 2011.
- The Hatchery Committees approved transferring the entire Eastbank Hatchery subyearling production (80,000 juveniles) to the Chelan River net pens, bypassing Turtle Rock, pending Kris Petersen's approval (Item VI-C).
- The Hatchery Committees approved surplussing (killing) excess adult male hatchery-origin Wenatchee steelhead in the 2010 broodstock presently on hand at Wells Fish Hatchery (Item VI-D).
- The Hatchery Committees approved the taking of anadromous fish from upper Columbia River hatchery facilities as samples for a collaborative predator study being conducted with the USGS (Item VI-E).
- The Hatchery Committees approved the release of 40,000 steelhead smolts (a portion of the overall planned Okanogan release) into Salmon Creek in 2010 (Item VIII-A).

List of Attachments

Attachment A – List of Attendees

Attachment B - Wells HCP-HC Statement of Agreement Regarding Collection of Adult Broodstock for Entiat National Fish Hatchery, USFWS

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor QEA, LLC
Carmen Andonaegui	Anchor QEA, LLC
Kirk Truscott *	Colville Confederated Tribes
Alene Underwood	Chelan PUD
Joe Miller *	Chelan PUD
Brian Vinci	Freshwater Institute
Sam Dilly	Chelan PUD
Pat Phillips	WDFW
Todd Pearsons	Grant PUD
Shane Bickford*	Douglas PUD
Greg Mackey	Douglas PUD
Kris Petersen *	NMFS
Dave Carie*	USFWS
Mike Tonseth*	WDFW
Tom Scribner*	Yakama Nation
Jeff Korth *	WDFW
Keely Murdoch *	Yakama Nation

* Denotes Hatchery Committees member or alternate

Attachment B

FINAL 3-17-2010

Wells HCP Hatchery Committee
Statement of Agreement
Regarding Collection of Adult Broodstock for Entiat National Fish Hatchery (USFWS)

Statement

The Wells HCP Hatchery Committee approves the collection of additional summer Chinook (60 pair) during broodstock collection efforts at the Wells Hatchery volunteer ladder trap for the 2010 brood year. This agreement is in effect for only one year. These additional brood (egg collection target = 200,000) will be transferred to the US Fish and Wildlife Service's Entiat NFH for the initiation of a new summer Chinook program. This collection is already described in the Draft Upper Columbia River Salmon and Steelhead Broodstock Objectives and Site-Based Broodstock Collection Protocols. US Fish and Wildlife Service agrees to provide staff required for these collection efforts. Currently, this includes one person to sort fish and two people to transfer fish to the truck. Should staffing needs increase in the future, USFWS will supply the required additional staff. Transportation of adults to Entiat NFH is the responsibility of US Fish and Wildlife Service. Spawning and adult holding activities will occur at Entiat NFH and are the responsibility of US Fish and Wildlife Service.

Background

The US Fish and Wildlife Service (FWS), in conjunction with other parties (Yakama Nation [YN], Confederated Colville Tribes, NOAA, WDFW, BOR) is currently in the process of developing plans to implement a new summer Chinook production program at Entiat NFH. The long-term goal of this program is to provide fish for tribal, commercial, and sport harvest, and to meet tribal trust responsibilities as mitigation for Grand Coulee Dam. A Hatchery and Genetics Management Plan (HGMP) for this program was submitted to NOAA in July of 2009. This HGMP has also been distributed to all of the relevant co-managers.

This is the final planned transition year (second of two years at partial hatchery production) of rearing 200,000 juveniles. In 2011 the FWS anticipates moving to a full program with a yearly release goal of 350-400K yearling summer Chinook smolts released into the Entiat River. The first release from this partial production will occur in spring of 2011 (brood year 2009). To initiate this production program the Service plans to use adult summer Chinook collected at Wells Hatchery as volunteer returns to the facility for broodstock. This broodstock collection effort will entail transfer of eggs in the first year of partial production (BY 2009), and transfer of adults in all subsequent years (BY 2010 and until sufficient returns to Entiat NFH). Full production will require the collection of up to 300 hatchery origin summer Chinook adults (enough to provide up to 400K eggs). As the progeny of the initial Wells Hatchery collections return as adults (to Entiat NFH), they will be used as broodstock and the number of adults needed from Wells Hatchery will be reduced. It is anticipated that by brood year 2016 the Entiat NFH program will utilize volunteers to that facility for 100% of broodstock needs. Funding for this new program will be the responsibility of the FWS and BOR.

Broodstock collection will occur concurrent with the currently planned WDFW efforts as detailed in the Draft 2010 Upper Columbia River Salmon and Steelhead Broodstock Objectives and Site-Based Broodstock Collection Protocols developed in conjunction with the HCP-Hatchery subcommittee.

Future summer Chinook broodstock management and adult holding at Entiat NFH will likely overlap with YN adult coho holding and spawning. The earliest that adult summer Chinook would be brought on station would be in brood year 2010. The FWS and YN are currently developing plans for how this will occur without impacting either program. Current options include splitting the Entiat NFH adult pond into two separate ponds, one designated for coho and the other for summer Chinook, or transferring the YN coho adult holding and spawning activities to the Leavenworth NFH. The FWS and YN plan to test the latter option in brood year 2010 and are working together to ensure that there is adequate hatchery infrastructure in place prior to coho spawning.

In addition to working with appropriate co-managers to develop agreement concerning implementation of summer Chinook production at Entiat NFH (i.e. completion of an HGMP), the Service has provided a proposal for consideration by parties to the *US vs OR* agreement. This proposal was approved by the production advisory and policy committees to the *US vs OR* agreement resulting in a revision to the Production Tables on Sept 29, 2009. Furthermore, before summer Chinook are released from Entiat NFH the Service will ensure that ESA Section 7 consultation has been completed with both NOAA and USFWS. Coordination between the interested parties has been ongoing since the fall of 2008. All coordination and consultation activities will occur during the transition from partial to full production and will be completed prior to the first smolt release in spring 2011.

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FINAL MEMORANDUM

To:	Wells, Rocky Reach, and Rock Island HCP Hatchery Committees	**Date:**	May 19, 2010
From:	Michael Schiewe, Chair, HCP Hatchery Committees		
Cc:	Ali Wick, Josh Murauskas, Pat Phillips		
Re:	Final Minutes of April 21, 2010 HCP Hatchery Committees Meeting		

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Hatchery Committees met at Chelan PUD in Wenatchee, Washington, on Wednesday, April 21, 2010, from 9:30 am to 4:30 pm. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Joe Miller will reconvene the Tumwater Dam adult trapping subgroup to discuss the potential use of carbon dioxide (CO_2) anesthesia for HCP programs (Item II-A).
- The Yakama Nation (YN) and Douglas PUD will meet to discuss kelt trapping at Twisp weir (Item II-B).
- Joe Miller will modify the Statement of Agreement (SOA) for Chelan Falls circular tanks for approval at the next meeting (Item III-A).
- Todd Pearsons will send Ali Wick his presentation regarding Grant and Chelan Hatchery Sharing (Item III-C).
- Keely Murdoch will check with Washington Department of Fish and Wildlife (WDFW) fish health staff regarding the potential to incubate progeny of live-spawned steelhead at Eastbank Hatchery (Item III-E).
- Keely Murdoch will send Ali Wick a short statement summarizing YN concerns regarding the decision to forego collecting Chiwawa wild broodstock at Tumwater Dam in 2010 as part of the Parental Based Tagging (PBT) test (Item V-A).

DECISION SUMMARY

There were no decision items at this meeting.

I. Welcome, Agenda Review, Meeting Minutes, Action Items

Ali Wick will integrate the comments to the March 17 meeting minutes and will send them to the Hatchery Committees for email approval.

II. Yakama Nation

A. Brian Zimmerman – Presentation on CO_2 Anesthesia

Tom Scribner introduced Brian Zimmerman, the Artificial Passage Supervisor for the Confederated Tribes of the Umatilla Indian Reservation. Zimmerman attended today's meeting to provide a presentation on the use of CO_2 as an anesthetic for handling adult fish. He began by describing multi-species trapping at the Threemile Dam East Bank Adult Facility on the Umatilla River. He noted that several anesthetics have been used at the trap. CO_2 became the anesthetic of choice by default due to issues with other methods or chemicals. Problems associated with CO_2 have included jumping, buffering, winter freeze-up, and sediment plugging the micropore tubing. Zimmerman said that one of the early issues with CO_2 had to do with the buffer containing silicate, which causes the fish to become extremely agitated. He used a series of pictures to describe the facility, including recovery tanks. He said that typically they will anesthetize 35 to 60 fish per batch, depending on the type of fish and the expected processing time. Responding to a question, he said that anesthesia duration is typically long enough to do radio-tagging or similar procedures. He also said that they do not monitor the water for CO_2 or oxygen (O_2) content any more, but they did when initiating the program. Procedures are: fill anesthetic tank with water, add buffer, set gauge pressure settings, pre-charge the tank with CO_2, adjust CO_2 level, and change water and recharge tank every four to five loads of fish. The Hatchery Committees discussed these methods, including sharing some early thoughts about pros and cons of potentially using the methods for managing returning adults to HCP programs. Joe Miller suggested that recommendations for anesthesia should consider input from the WDFW M&E group responsible for conducting fish collections at Tumwater. Mike Schiewe asked whether there would be any Hatchery Committees objection to reconvening the subgroup that looked at options for handing returning adults at Tumwater Dam. He suggested that the subgroup could develop a recommendation to determine if CO_2 might be used. There were no objections, and Miller agreed to reconvene the group for a discussion of CO_2 use at Tumwater.

B. Kelt Trap at Twisp Weir

Keely Murdoch updated the group about the ongoing discussions between the YN and Douglas PUD regarding a potential YN kelt trap at Twisp Weir. Douglas PUD engineers and biologists and WDFW M&E staff have informed the YN of several technical impediments and personnel safety and biological concerns with the proposed design. She would like to set up a meeting with Douglas PUD staff to discuss options. Greg Mackey said that he visited the Twisp Weir yesterday and saw that following trapping and processing by WDFW M&E staff, pre-spawn steelhead are holding in the area of the proposed kelt trap. Murdoch said that there might be a way to work with this, and so would like to set up the meeting to discuss these types of issues. Mike Tonseth mentioned that fish at Chiwawa weir after processing are often trucked upstream of the weir and this could potentially be implemented at Twisp to minimize fall-back. Tom Scribner informed the Committees that the YN trap-designer on site at the Twisp informed him that the currently proposed trap design would not work. The YN and Douglas PUD agreed to convene a meeting to discuss options for kelt trapping at the weir. Kirk Truscott emphasized the importance of not impacting spring Chinook brood collection. Bill Gale indicated that a discussion needs to occur between the Yakama Nation and USFWS Ecological Services regarding effects on bull trout.

C. Coordination with Hatchery Committees on Potential Facility Upgrades at Wells East Ladder Trap

Tom Scribner updated the group that he received responses from Douglas PUD, Chelan PUD, and the Colville Confederated Tribes (CCT) regarding coordinating funding for facility upgrades at Wells east ladder. He said that there was limited interest and thanked those who did provide responses.

III. Chelan PUD

A. SOA for Chelan Falls Circular Culture Tanks

Joe Miller distributed supplementary information on circular tanks and a rearing density index (DI) of 0.2. He invited Sam Dilly to discuss this. Dilly said that Chelan PUD has been working to develop concepts for a circular tank system for use at Chelan Falls. Dilly explained the rationale for the rearing density and flow indices proposed for the project. He invited questions and comments from the Hatchery Committees. Kirk Truscott pointed out that the chosen density index would increase the amount of waste material in the pond. Dilly agreed, but noted that the waste material would be removed faster with the shorter water residence time. There was discussion about the flow rates for these densities given four tanks versus eight tanks. Mike Schiewe asked each of the Hatchery Committees entities to weigh in on the concept of testing four circular tanks at a DI of 0.2 and the intent to compare survival of test fish against the survival of other yearling summer Chinook released above Turtle Rock. The Committees discussed possible release locations for comparison, including Similkameen, Carlton, Wells, and Entiat yearlings. The group agreed to CPUD moving forward with four circular tanks at a DI of 0.2 with the study provisions and supplementary information provided. Miller will modify the SOA for approval at the next meeting.

B. Blackbird Island: Future Plans and Decisions

Joe Miller initiated a discussion about the continued use of Blackbird Pond to acclimate Wenatchee steelhead, and Chelan PUD's continuing support. Mike Schiewe asked whether the Hatchery Committees were generally supportive of continuing to use this facility and improving this facility for this purpose. The Committees indicated that they are indeed supportive.

C. Grant and Chelan Hatchery Sharing and Development

Todd Pearsons will present a talk to the Priest Rapids Coordinating Committee (PRCC) tomorrow regarding Grant and Chelan Hatchery Sharing and Development, and will send his presentation to Ali Wick for distribution to the Hatchery Committees.

D. Skaha Sockeye SOA for Additional Discussion

Joe Miller asked for Hatchery Committees' input on what they would like to see as the endpoint for the Skaha sockeye program. Kris Petersen asked him to explain his reasoning for asking this question. Miller said that Chelan PUD would like clarity on the Committees' long-term goal for the program—whether it is to produce a certain number of hatchery smolts or to support reintroduction. Miller expressed concern that if the Committees' ultimate goal is re-introduction it should be clarified in the Statement of Agreement prior to the 2017 check-in. The Committees advised Miller that they support the reintroduction goal, but feel it would be premature to make any decision about smolt production until the scheduled 2017 check in. Miller thanked the Committees for their input.

E. Eastbank Incubation Design

Sam Dilly provided a conceptual drawing of the retrofit of the Eastbank incubation facility, showing locations for additional incubation and rearing vessels. He updated the group that the project is progressing well. Stating the YN's desire to obtain spawned-out adult steelhead from the Wenatchee Basin for the YN kelt-rehabilitation program, Keely Murdoch asked whether the facility could be used for progeny of live-spawned steelhead; to help answer this question, she agreed to contact WDFW fish health staff regarding potential security issues. At the end of the discussion, Joe Miller asked the Committees if the type of information presented for the Eastbank incubation facility was adequate for the Committees' review. Miller explained that additional modernization upgrades are coming to Eastbank and it would be important to understand the Committees' level of interest in review of projects that are not experimental or change production targets
but represent basic facility upgrades (i.e., do members want to review the detailed design of a chiller or incubation stacks). The Committees agreed that the level of information presented for the incubation building was acceptable for review purposes.

IV. Douglas PUD

A. PUD Updates

Greg Mackey updated the group that Douglas PUD has begun the survival study for this year. Also, he noted that WDFW is currently managing the passage of adult steelhead at Twisp weir consistent with the relative reproductive success study design.

B. Wells Steelhead HGMP Update

Mike Schiewe updated the group that the Wells Steelhead Hatchery Genetic Management Plan (HGMP) is still under discussion with the National Marine Fisheries Service (NMFS) and *U.S. v. Oregon* parties. Bill Gale asked whether the hold on the Wells Steelhead HGMP would keep the U.S. Fish and Wildlife Service (USFWS) HGMPs from being considered by NMFS at this time. Kris Petersen said that it would. Mike Schiewe noted that the issue of the Wells Steelhead HGMP is at a policy level that is outside the HCP Committees' control. At this time, the Wells Steelhead HGMP is on hold until discussions lead to a resolution of release locations.

V. WDFW

A. 2010 Broodstock Collection Protocols

Mike Tonseth said that he had received comments on broodstock collection protocols and sent out a second draft. He has received some further comments since that time. Kris Petersen said that she is working on a letter to WDFW that summarizes the broodstock collection protocols for the entire upper Columbia. Keely Murdoch indicated that during the PBT feasibility test, the YN would like to have any natural origin spring Chinook that are identified as Chiwawa-origin retained for broodstock at the Tumwater Dam. She indicated that all objectives of the feasibility study would still be met; return to natal tributary could still be evaluated for Nason Creek and the Little Wenatchee and White Rivers. Petersen explained that NMFS was interested in better understanding the effects of the PBT approach, and that evaluating whether fish handled multiple times were returning to the spawning area was part of the evaluation. Therefore, fish should not be retained as broodstock at Tumwater Dam. Murdoch will send Ali Wick a short statement summarizing YN concerns regarding the decision to forego collecting Chiwawa wild broodstock at Tumwater Dam in 2010 as part of the Parental Based Tagging (PBT) test (Item V-A).

B. Discussion on Status/Timeline of YN SOA for Multi-species Acclimation

Mike Tonseth asked whether there would be an SOA for multi-species acclimation that would necessitate fish being released in 2011. He wanted to verify that the necessary coordination will occur as needed between WDFW and the YN regarding Monitoring and Evaluation (M&E). Murdoch verified that it would, and asked when a finalized plan for 2011 would be needed by WDFW. Tonseth said WDFW would ideally have one prior to August 2010 so that planning for 2011 M&E needs can occur.

C. Coded-Wire Tag Data Timing

At the last Hatchery Committees meeting, Mike Tonseth agreed to look into the delays in reading scales and coded wire tags (CWT) that have delayed the annual M&E Reports. He also agreed to work with other Committees members to explore opportunities for developing a local capability to read scales and CWTs on the Eastside. He said that all of the scale data through 2009 has been completed, and the backlog has to do with agency workload.

VI. USFWS

A. Entiat Broodstock Collection Protocols

Mike Schiewe noted, for the record, that the Entiat broodstock collection protocols were approved by email between this meeting and the last meeting.

VII. HETT Report

Greg Mackey updated the group that the Hatchery Evaluation Technical Team (HETT) is working on completing baseline information for the Non-Target Taxa of Concern (NTTOC) process. Todd Pearsons said that he will be presenting his draft talk for the upcoming conference on ecological risk to the PRCC tomorrow for review and comment.

VIII. HCP Administration

A. Next Meetings

The next scheduled Hatchery Committees meetings will occur as follows: May 19, June 16, and July 14, all at the Chelan PUD offices in Wenatchee.

B. External Marking

Mike Schiewe indicated that the tagging/marking spreadsheet discussed at the last meeting was distributed to the Hatchery Committees earlier this week. He encouraged members to review and share with their staff, and provide any feedback to Ali Wick. Particularly important would be any emerging methods that were not already included in the matrix.

C. Study Plan Approval and Guidelines

Mike Schiewe said that this item will be discussed at the next meeting.

List of Attachments

Attachment A – List of Attendees

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor QEA, LLC
Ali Wick	Anchor QEA, LLC
Kirk Truscott *	Colville Confederated Tribes
Josh Murauskas	Chelan PUD
Joe Miller *	Chelan PUD
Pat Phillips	WDFW
Todd Pearsons	Grant PUD
Tom Kahler *	Douglas PUD
Greg Mackey *	Douglas PUD
Kris Petersen *	NMFS
Bill Gale *	USFWS
Brian Zimmerman (morning presentation)	Confederated Tribes of Umatilla Reservation
Mike Tonseth *	WDFW
Tom Scribner *(by phone – morning)	Yakama Nation
Keely Murdoch *	Yakama Nation
Sam Dilly	Chelan PUD

* Denotes Hatchery Committees member or alternate

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FINAL MEMORANDUM

To:	Wells, Rocky Reach, and Rock Island HCP Hatchery Committees	**Date:**	June 24, 2010
From:	Michael Schiewe, Chair, HCP Hatchery Committees		
Cc:	Ali Wick, Josh Murauskas, Pat Phillips		
Re:	Final Minutes of May 19, 2010 HCP Hatchery Committees Meeting		

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Hatchery Committees met at Chelan PUD in Wenatchee, Washington, on Wednesday, May 19, 2010, from 9:30 am to 3:00 pm. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Josh Murauskas will send the handout on the Yakama Nation (YN), Chelan PUD, U.S. Fish and Wildlife Service (USFWS), and Washington Department of Fish and Wildlife (WDFW) meeting at Tumwater Dam regarding alternative fish anesthetics to Ali Wick for email distribution (Item II-B).
- Mike Schiewe will check with Rob Jones on the potential for the National Marine Fisheries Service (NMFS) to provide Endangered Species Act (ESA) coverage to allow adult management at Tumwater to proceed this year (Item II-B).
- Josh Murauskas will review the documents that Julie Pyper had previously created regarding needs at Tumwater Dam in the Tumwater Working Group. He will reconvene the Tumwater Working Group to discuss (Item II-B).
- Mike Schiewe will draft a conflict-of-interest policy for the Hatchery Committees to consider (Item VI-C).

DECISION SUMMARY

- The Hatchery Committees approved the Statement of Agreement (SOA) titled "Rocky Reach and Rock Island HCP Hatchery Committees Statement of Agreement Regarding the use of Circular Culture Tanks at Chelan Falls" (Item II-A).

I. Welcome, Agenda Review, Meeting Minutes, Action Items

Ali Wick will send out the final March 17 and April 21 Meeting Minutes to the Hatchery Committees.

During action item review, the Committees discussed an update on steelhead kelt live-spawning. Mike Tonseth discussed WDFW's progress on developing guidelines for the management of fish-health risks associated with this live-spawning. Those guidelines would apply generally, but would require adaptation to the specific fish-health conditions at each hatchery. He reported that the WDFW Fish Health Division has created a draft that is awaiting internal comments prior to release.

Joe Miller noted that any design changes to accommodate kelts at Eastbank Hatchery would be a concern to Chelan PUD. Bill Gale requested a discussion of risks to other programs that may be posed by live-spawning steelhead.

II. Chelan PUD

A. SOA for Chelan Falls Circular Culture Tanks

Joe Miller distributed the revised SOA for Chelan Falls circular culture tanks. The current proposal is to rear and acclimate summer Chinook in four circular tanks at 0.2 density and to compare the performance of yearling summer/fall Chinook reared at the new Chelan Falls facility in circular tanks to the performance of summer/fall yearling Chinook reared in other upper-Columbia programs. Mike Schiewe asked for input from the Hatchery Committees. Tom Scribner indicated that he would like to see a comparison of fish performance in circular tanks to performance in semi-natural earthen ponds constructed at the Chelan Falls site. Miller responded that there was no space available at the Chelan Falls site for earthen ponds. Bill Gale reminded the group that the Chelan Falls production was a segregated program designed to produce fish for harvest. Kirk Truscott said he would like to see the SOA state that this is still an experimental approach. Mike Tonseth said that most of his concerns with space constraints have already been addressed. The Committees approved the SOA, with the YN abstaining (Attachment B). Scribner stated that he continued to feel strongly that a comparison of the circular tanks to semi-natural rearing ponds was important, but acknowledged that other Committees members did not support it and that his concern should not prevent the SOA from being approved.

B. Report to Hatchery Committees on Anesthesia at Tumwater Dam

Josh Murauskas introduced this topic. Keely Murdoch said that a group from YN, Chelan PUD, USFWS, and WDFW met at Tumwater Dam to discuss alternative fish anesthetics for use at the dam. Murauskas provided a handout describing the outcome of the meeting, which included preliminary testing of carbon dioxide and benzocaine. Mike Tonseth noted that benzocaine was available under a Investigational New Animal Drug (INAD), and that its use in fish required a 3-day depuration period before the fish were considered safe for human consumption. Murauskas will send this handout to Ali Wick for email distribution.

Joe Miller asked Kris Petersen if managing adults at Tumwater Dam in a manner that is consistent with the new Hatchery Genetic Management Plan (HGMP) was covered by the existing ESA permit. Petersen responded that NMFS could write a letter saying that this action is consistent with the new HGMP and the permit applied for, but would not be able to say that the activity is covered under or consistent with the existing permit. She said that for NMFS to write such a letter, the agency would need a formal request from the permit-holder(s). Miller indicated that with the existing permit not allowing adult management of Chinook at Tumwater Dam, a letter falling short of providing explicit ESA coverage was not legally sufficient for the PUD to implement the program. Greg Mackey concurred that as co-holder of the permit, adult management at Tumwater without some provision for explicit ESA coverage would not be acceptable to Douglas PUD either. Petersen also stated that although adult management would not be permisable under the current ESA permit, Chelan PUD may be accountable under ESA for allowing too many spawners upstream of Tumwater Dam. Mike Schiewe agreed to contact Rob Jones regarding options for providing ESA coverage for adult management at Tumwater Dam this year.

Keely Murdoch said today that she wanted to return to a discussion on design changes for Tumwater Dam and potential cost-shares for the project. Josh Murauskas said that Chelan PUD can compile the documents that Julie Pyper had previously created regarding needs at Tumwater for use by the Tumwater Working Group. He will reconvene the group to discuss.

C. Blackbird Pond Steelhead Update

Joe Miller said that at the last meeting, the Hatchery Committees agreed that they were supportive of continuing to acclimate fish at Blackbird Pond. He indicated that he recently completed a site visit with engineers to investigate potential improvements at the pond, including aerators, power options, outflow options, and a more robust intake-pump setup. Chelan PUD asked whether last year's letter from NMFS to Chelan PUD (dated June 17, 2009), which authorized a youth fishery on residual steelhead at Blackbird Pond, applies to this year and future years. Kris Petersen indicated that this letter applies to this year and future youth fisheries at this location.

D. Chiwawa Steelhead Circular Ponds Updates

Josh Murauskas discussed recent volitional-release testing at the Chiwawa steelhead circular ponds. He said that the release setup worked exceptionally well, allowing volitional exit for the fish from both tanks. Observations showed that approximately 90 percent of the fish exited the tanks within a 7-day period. He noted that with most other volitional-release arrangements it takes approximately 1 month for about 70 percent of the fish to exit. Approximately 90 percent of the exiting fish exhibited physical smolt characteristics at the point of exit; 85 percent of the non-exiting fish exhibited physical smolt characteristics, with the remaining fish in the transitional phase. No fish sampled were observed to be in the parr stage. Murauskas indicated that he would prepare a presentation (including a video) on the testing for the June Hatchery Committees meeting.

E. Chelan Falls ESA Update

Kris Petersen provided this update. She said that she has passed the NMFS concurrence letter for ESA coverage at Chelan Falls to upper levels within NMFS for review and signature.

III. WDFW

A. BPA Proposals (Andrew Murdoch)

Andrew Murdoch provided a presentation on some upcoming Bonneville Power Administration (BPA)-funded studies that WDFW will be implementing, in coordination with other entities (Attachment C). He encouraged parties who would like to discuss these and provide input to get in touch with him.

B. Update on PBT Test

Mike Tonseth updated the group that WDFW has acquired 125 of the 200 total samples for the parental based tagging (PBT) test. The first set of DNA results are due this Friday.

IV. Douglas PUD

A. Wells Steelhead HGMP Update

Mike Schiewe noted that the Wells Steelhead HGMP is still on hold, pending resolution of key program features including release locations and the numbers of fish released at those locations. Bill Gale indicated that the Joint Fisheries Parties (JFP) have achieved some level of agreement on a Wells steelhead program that also considered the Winthrop NFH program. He expects to update the Hatchery Committees in approximately a month.

V. Yakama Nation

A. Update on Kelt Trapping at Twisp Weir

Keely Murdoch updated the group on this topic. She said that the YN has met with Douglas PUD and WDFW to discuss options for kelt capture at the Twisp Weir. A prototype trap was tested but failed to perform properly. The current idea is to capture fish on the downstream side of the weir, but other possibilities are under discussion. The YN hope to test another prototype soon. Greg Mackey noted that Bryan Nordlund (NMFS fish passage engineer) has asked to be involved in the design conversations, and recommended that the YN contact Nordlund soon (in the early stages of development) to benefit from his technical knowledge and guidance on acceptable trap design. Bill Gale added that the YN must consult with USFWS ES regarding kelt trapping and bull trout.

B. Methow Video Footage

Tom Scribner introduced several brief underwater videos showing hatchery fish using acclimation ponds—one of coho in Biddle Pond and one of coho in Wolf Creek. Links to these videos are as follows:

- Biddle Pond: http://www.youtube.com/watch?v=pLQ-DkAmsBo
- Wolf Creek: http://www.youtube.com/watch?v=IsAStUNmY5o

VI. HCP Administration

A. Upcoming June Presentation on Mitchell Act EIS

Mike Schiewe informed the group that Allyson Purcel (NMFS) has requested an opportunity to brief the Hatchery Committees on the draft Mitchell Act Environmental Impact Statement (EIS) that will be released for public comment on August 1, 2010. This presentation would be a joint session with the Priest Rapids Coordinating Committee (PRCC)

Habitat Subcommittee (HSC) in June. Todd Pearsons said that he will call Ms. Purcell to discuss this as it applies to the PRCC HSC.

B. Potential Marking Methods

Mike Schiewe asked for any additional input on the information on potential marking methods that was developed earlier this year.

C. Approval and Implementation of Research

Mike Schiewe introduced the topic of finalizing a protocol for approval and implementation of research studies by the HCP Committees. This was a topic from last year that was deferred until after the HGMPs were complete. Mike Schiewe said that the idea is to build into the review process a formal role for the Hatchery Committees. Joe Miller indicated that it would be important to funding entities (e.g., the PUDs) that the members understand and work within their annual funding cycles for unsolicited proposals related to HCP Hatchery Monitoring and Evaluation (M&E). Studies not requiring funding could be exempt from this requirement but would still be subject to review. Greg Mackey stated that Douglas PUD was in favor of developing a process for study approval and implementation, and a conflict-of-interest policy. He also noted that PUD representatives may be in a unique position regarding conflict of interest because all decision items before the Hatchery Committees affect the PUDs, and the PUDs must participate in all decisions. Mike Schiewe asked whether the Committees want to include a conflict-of-interest policy. There was general support for such a policy. Mike Schiewe will draft a policy statement, with a focus on defining the different types of potential conflicts. He recognized that this protocol may require legal review.

D. CRITFC Letter and HGMP process

Mike Schiewe noted that Tom Scribner had forwarded a letter from Columbia River Inter-Tribal Fish Commission (CRITFC) regarding the HGMP process. This letter was tribal communication with National Oceanic and Atmospheric Administration (NOAA) as it relates to production agreements in *U.S. v. Oregon* and the potential inconsistency with HGMPs that have been submitted or will be submitted for consultation.

E. Next Meetings

The next meetings will be on June 16, July 21, and August 18, all in Wenatchee.

List of Attachments

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor QEA, LLC
Ali Wick	Anchor QEA, LLC
Kirk Truscott *	Colville Confederated Tribes
Josh Murauskas	Chelan PUD
Joe Miller *	Chelan PUD
Alene Underwood	Chelan PUD
Todd Pearsons	Grant PUD
Tom Kahler *	Douglas PUD
Greg Mackey *	Douglas PUD
Kris Petersen * (by phone)	NMFS
Bill Gale *	USFWS
Mike Tonseth *	WDFW
Andrew Murdoch (presentation)	WDFW
Pat Phillips	WDFW
Keely Murdoch *	Yakama Nation
Tom Scribner * (by phone)	Yakama Nation

* Denotes Hatchery Committees member or alternate

Attachment B

FINAL
Rocky Reach and Rock Island HCP Hatchery Committees
Statement of Agreement
Regarding the use of Circular Culture Tanks at Chelan Falls
May 19, 2010

The Rocky Reach and Rock Island Habitat Conservation Plans' (HCP) Hatchery Committees (hereafter "Committees") agree that the Chelan PUD (hereafter "District") may use circular culture tanks with a dual-drain system to rear and acclimate summer Chinook at the proposed Chelan Falls facility. The District proposes to acclimate these fish at or below 0 .2 density index (DI) unless the outcome of the 2010 evaluation of re-use at double density, scheduled for September 2010 (see 10/21/2009 SOA), indicates that fish reared at higher densities do not perform as well as single density counterparts. Under the latter scenario, fish would be reared at 0.1 DI or lower. The design would include four circular tanks to support a 0.2 DI or eight circular tanks to support a 0.1 DI. The water supplied to the acclimation tanks would be single-pass.

The following metrics for success would be met to maintain the proposed four tank design at Chelan Falls (i.e., these targets would need to be met or Chelan would build additional tanks):

- Hatchery acclimation survival rate exceeds 90% "Ponding to Release" standard from monitoring and evaluation plan.
- WDFW fish health supports post-release determination that fish health standards were met and not compromised by acclimation densities.
- The absolute survival of summer Chinook reared and acclimated in circulars at .2 DI would be compared against the performance of other smolts (from the same origin broodstock-Entiat summer Chinook) released above Rocky Reach Dam during the initial years of implementation. Key metrics would include survival from release to McNary and migration time from Rocky Reach to McNary. Success would require that Chelan Falls smolts perform as well or better than the existing programs (e.g., statistically no detectable difference or significantly better using the same parameters as the existing re-use comparisons). The overall purpose of the comparison is to measure performance against an existing, approved hatchery program.
- If Chelan Falls fish reared at 0.2 DI do not perform equal to an existing upper Columbia summer Chinook program, the District would rear fish at a lower HCP HC approved DI (e.g., .1 DI) and use net pens to hold excess fish quantities. Similar comparisons of survival and migration time to McNary (including net pens vs. low density re-use) would be performed to partition the effects of DI and location (e.g., is the survival of fish released at Chelan Falls influenced more by DI or the Chelan Falls location itself). If DI is the causative parameter in rearing success at Chelan Falls, then the District would create a 0.1 DI rearing system for the 600,000 fish.

This agreement does not change any survival targets or the District's obligation to meet NNI levels described in the HCP.

Background

The District proposes to use circular tanks for the following reasons:

- Capture of particulate waste is more efficient and rapid in dual-drain circular tanks when compared to raceways or earthen ponds. Total suspended solids (TSS) removal in a raceway is 25-51% and is mainly achieved through manual vacuuming. Comparatively, a circular bottom-drain (as a component of a dual drain system) can remove 79% of TSS. Additionally, circular tanks can self clean, removing waste within minutes of deposition[1].
  Significance: Wastewater management and effluent quality are major hatchery effects and are likely to be subject to additional regulatory control in the near future. The rapid removal of TSS prevents waste products from decomposing into soluble, toxic forms and improves effluent quality. From the District's perspective, being proactive on water quality issues is likely to be an important step to ensuring stable hatchery operations.
- The rotation of water in a dual-drain circular tank ensures uniform distribution of fish and reduction of major dissolved O_2 profiles.
  Significance: In a standard raceway dissolved O_2 levels are spatially heterogeneous resulting in microhabitats that possess variable water quality. Accordingly, fish distribute themselves in a non-homogenous fashion and experience different rearing conditions based on the relative position of a fish and the shape of the raceway.
- Opportunity to add reuse or treatment systems in the future.
  Significance: If water quantities become limited in the future, the circular tank design is amenable to re-use and subsequently, fish health treatments (e.g., UV disinfectant) that are only feasible under lower flow conditions. The water-use flexibility afforded by a circular tank design is another important consideration for program stability
- Potential for improved smolt survival and reduced precocity
  Significance: Smolts emigrating from the first year of the re-use pilot (using circular tanks) survived at 33% higher level and arrived several days sooner than their raceway counterparts migrating to McNary Dam. The incidence of male precocity was also lower among fish originating from the re-use system. The survival differential is highly significant and likely attributable to the rotational velocities and swimming performance required in the circular tanks. Precocity rates may also be related to swimming activity.
- Overall synopsis: From the District's perspective the potential benefits of using circular tanks outweigh the risks. From a water quality and survival standpoint, the District would rather take a proactive approach to achieve these benefits than adopt the standard approach which may

[1] Steven T. Summerfelt, John W. Davidson, Thomas B. Waldrop, Scott M. Tsukuda, Julie Bebak-Williams, A partial-reuse system for coldwater aquaculture, Aquacultural Engineering, Volume 31, Issues 3-4, October 2004, Pages 157-181

ensure some short term certainty but is likely to encounter major regulatory hurdles down the road.

The District proposes to rear and acclimate at 0.20 DI for the following reasons:

- Successfully rearing at higher densities in circular tanks has been empirically demonstrated by Chelan PUD and in the literature[2]. Because of the waste management, water quality and fish distribution attributes of a dual-drain circular tank, fish experience different and better rearing conditions than a standard raceway. The acclimation densities for the HCP program were chosen on the basis of a standard raceway model and do not necessarily apply to a circular design that is fundamentally different. The findings, thus far, in the re-use pilot are encouraging and suggest that circular tanks may provide an efficient means to produce high quality smolts.
- The choice to rear and acclimate fish at 0.2 DI will be dependent on the successful health assessment and outmigration of fish reared in this year's double density pilot program. The facility will be plumbed to accommodate up to four additional tanks, in the event that any issues arise as a result of culturing fish at a 0.2 DI. Additionally, the adjacent net pen facilities would be available to provide an emergency reduction in density for the initial year of implementation.
- Ultimately the District accepts any risk of not meeting HCP targets that result from the use of new technology. With this in mind, the data available to the District suggest that the current proposal will succeed and survival may improve.

Additional considerations with respect to density:

- The District is focused on density index not flow index. The flow to 4 tanks is the same flow that would go to raceways or to six or eight tanks. The flow index was set when we applied for a water right in approximately spring of 2008.

- In circular ponds water flow is used to create a better rearing environment. In this design, flow rates are relatively high and there is a low hydraulic residence time. Low hydraulic residence time correlates to exchanging water and causing entrained waste and feed to be removed. The result is better water quality. If the District were to increase the number of tanks and keep the flow rate constant we would decrease the exchange rate. Thus the fish would be at a lower density but ultimately may experience worse water quality.

[2] Ibid

Attachment C

New and Exciting Hatchery M & E Studies for 2010 and Beyond

Collaborative Regional M & E Workshops

- CBFWA and NOAA
  - Data gaps
  - Prioritize
  - Develop methods to fill gaps

Funding Sources

- BPA
  - Highest priority
  - 19 Fast Track Projects Identified
  - BiOp/RPA driven process
- NOAA
  - High priority
  - One time projects

BPA Fast Track Projects

- Upper Columbia Spring Chinook and Steelhead Juvenile and Adult Abundance, Productivity, and Spatial Structure Monitoring
  - WDFW and CCT contractors

- Monitoring the reproductive success of naturally spawning hatchery and natural steelhead in a tributary of the Methow River
  - Project funded by DCPUD and BPA

Upper Columbia VSP Project

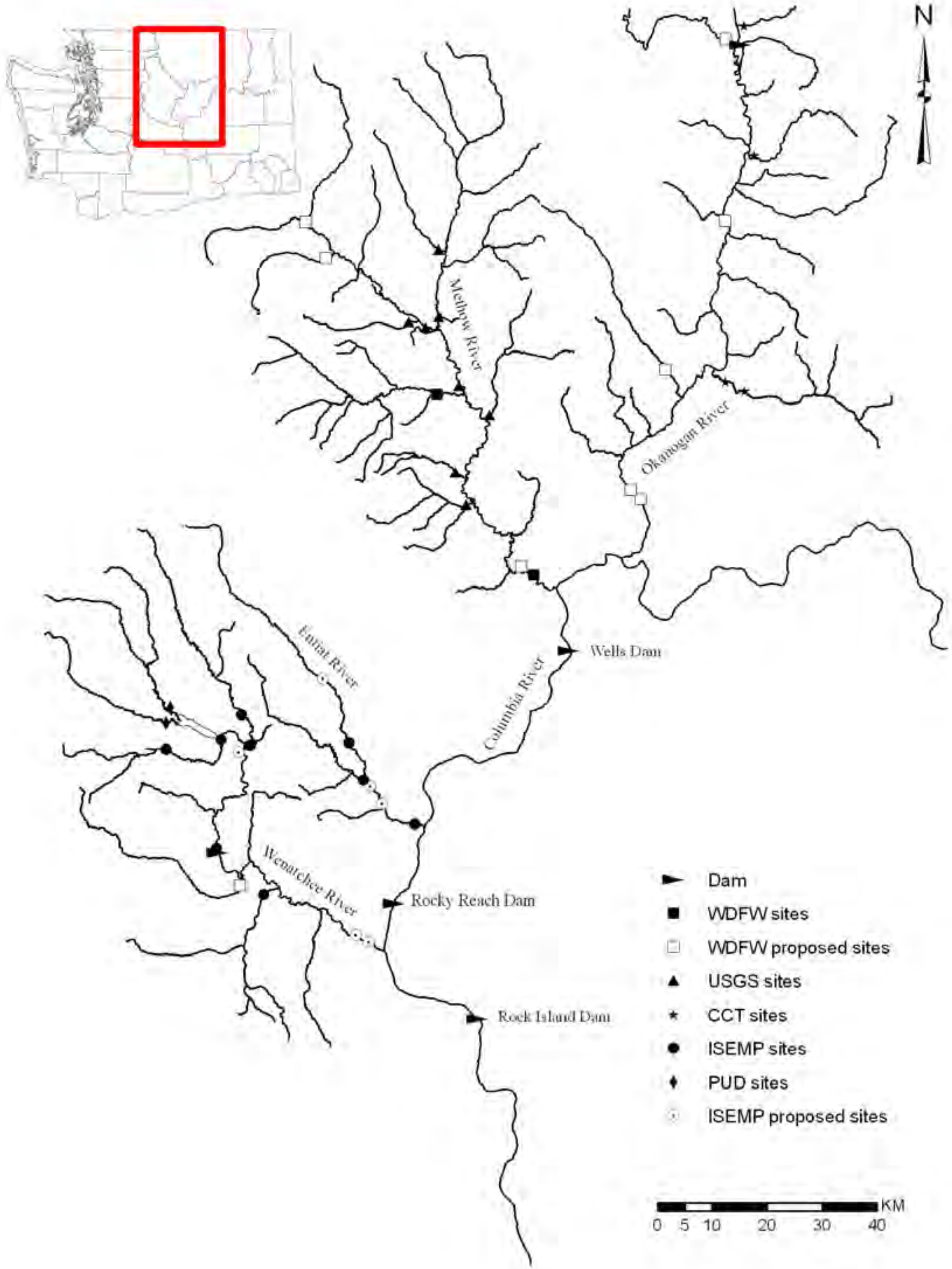
- Refinement of the variance calculation in estimating smolt abundance
- Estimate the proportion of natural and hatchery steelhead on the spawning grounds
- Estimate the abundance and distribution of steelhead spawning not covered in the current sampling scheme.
- Develop analytical tools to automate and standardize the analysis of PIT tag data from stream arrays
- Assessment and Refinement of Spring Chinook and Steelhead Spawning Grounds Surveys to include an Estimate of Observer Efficiency
- Upper Columbia steelhead radio telemetry study
- Steelhead Stock Assessment in the Upper Columbia ESU at Priest Rapids Dam

Smolt trap variance

- Variance of current method too large at low efficiency
- Develop new formula
  - Peer reviewed
- Compare methodologies
- Assist in assumption testing

Estimate the proportion of natural and hatchery steelhead on the spawning grounds

- Proportion of hatchery fish in each subbasin
- Proportion of hatchery fish in selected tributaries
- Install permanent PIT tag arrays everywhere
  - ISEMP
  - BOR/USGS
  - PUDS
  - VSP Project fills any gaps


N
Methow River
Okanogan River
Entiat River
Wells Dam
Columbia River
Wenatchee River
Rocky Reach Dam
Rock Island Dam
Dam
WDFW sites
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USGS sites
CCT sites
ISEMP sites
PUD sites
ISEMP proposed sites
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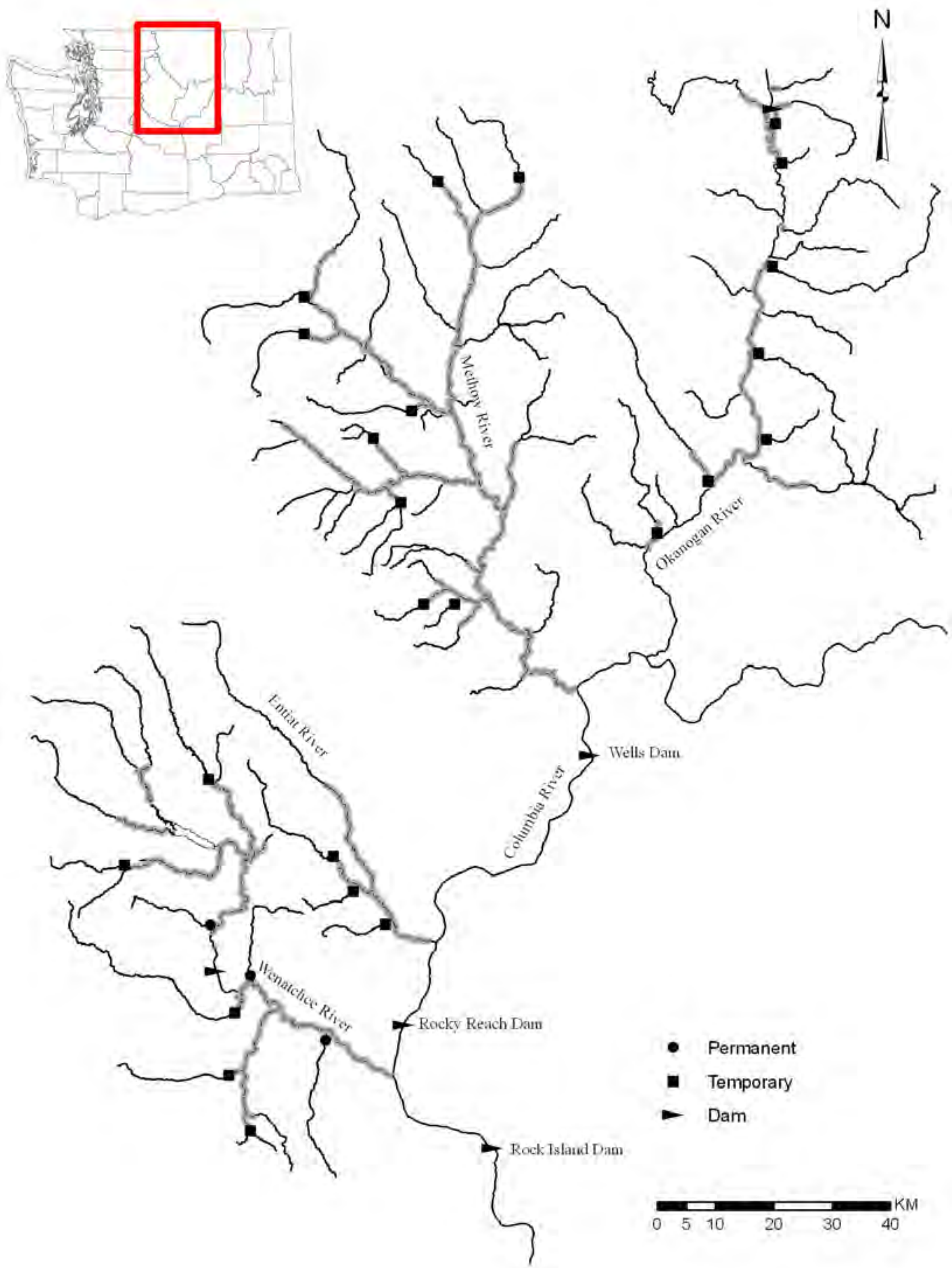
Estimate the abundance and distribution of steelhead spawning not covered in the current sampling scheme

- Estimate number of fish in streams not surveyed (e.g. lower Wenatchee)
- Estimate the proportion of fish in each surveyed stream spawning upstream of current survey areas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Wenatchee River
Rocky Reach Dam
Rock Island Dam
Permanent
Temporary
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Develop analytical tools to automate and standardize the analysis of PIT tag data from stream arrays

- Number of adult or juvenile hatchery and wild fish upstream and downstream of an array;
- Number of local and stray fish detected at the array;
- Duration fish were upstream of the array.
- Migration timing from spawning and rearing areas;
- Residence period in a tributary; and
- Individual recapture data to estimate life stage survival rates.

Assessment and Refinement of Spring Chinook and Steelhead Spawning Grounds Surveys to include an Estimate of Observer Efficiency

- Generate variance estimates for redd counts for steelhead and spring Chinook
- Model influence of environmental variables on steelhead redd observer efficiency
- Steelhead
  - Wenatchee 2010 – 2012
  - Methow 2011 – 2013
- Spring Chinook
  - Methow 2010 – 2012
  - Wenatchee 2011 – 2013

Upper Columbia steelhead radio telemetry study

- Validate PIT tag results.
- Study to start in 2013 or 2014
- Estimate pre-spawn mortality rates for the entire ESU and each population.
- Estimate the proportion of natural origin and hatchery steelhead that overwinter in tributaries versus the Columbia River;
- Determine the spawn timing and redd location of natural origin and hatchery steelhead;
- Estimate the number of redds per female;
- Estimate survival to kelting rates.

Steelhead Stock Assessment in the Upper Columbia ESU at Priest Rapids Dam

- Stock assessment
- Hatchery SAR’s
- PIT tagging
- Radio tagging
- Estimates of “wandering” fish

Twisp Steelhead RRS

- DCPUD funds adult analysis
- BPA funds juvenile analysis
- 3 brood years of 2 generations
- Age 1 parr, smolt, and adult
- Comparable to Wenatchee RSS study
- Replicate of Hood River Studies
- Test of AHA

NOAA high priority projects

- Summer Chinook radio telemetry
- Relocate upper Wenatchee smolt traps
- Lower Touchet smolt trap

Summer Chinook Radio telemetry

- Two years study starting 2010
- Potential collaboration/cost share with CCT
  - Selective harvest
  - Hooking mortality

Summer Chinook Radio telemetry

- Identify spawning areas in the Columbia River
- Determine the proportion of adult summer Chinook whose final destination is the Columbia River.
- Evaluate movement of summer Chinook between tributaries and the Columbia River.
- Pre-spawn mortality within the Methow, Okanogan, and Columbia River above Wells Dam.
- Evaluate the feasibility of quantifying the abundance of redds in Columbia River
- Genetic characteristics of summer Chinook who spawn in the Columbia River

Relocate upper Wenatchee smolt traps

- Biased mark/recapture trials
  - Behavioral
    - Released into lake and don’t emigrate rapidly
  - Predation
    - Survival to recapture not 100%


Chumstick Hwy

Relocate upper Wenatchee smolt traps

- Permanent long term monitoring location (USFS dependent)
- Accurate mark/recapture trials
- Below major steelhead spawning area
  - More PIT tags in steelhead
- Monitor fall/winter migration
- Upper Basin smolt production estimates
  - Chiwawa + Upper Wenatchee

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FINAL MEMORANDUM

To:	Wells, Rocky Reach, and Rock Island HCP Hatchery Committees	**Date:**	July 24, 2010
From:	Michael Schiewe, Chair, HCP Hatchery Committees		
Cc:	Ali Wick		
Re:	Final Minutes of June 16, 201 HCP Hatchery Committees Meeting		

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Hatchery Committees met at the Chelan PUD offices in Wenatchee, Washington, on Wednesday, June 16, 2010, from 9:30 am to 3:00 pm. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Josh Murauskas will send Ali Wick electronic copies of his presentations and video clips for distribution to the Hatchery Committees and for posting on the ftp site (Item II-C).
- Mike Tonseth will send to Ali Wick the letter from Washington Department of Fish and Wildlife (WDFW) to Kris Petersen (dated April 9, 2010) summarizing the 2009 to 2010 steelhead harvest in the upper Columbia River (Item IV-A).
- Mike Tonseth will send an email summary of progress on the Parental Based Tagging (PBT) Pilot Study to Ali Wick for distribution (Item IV-B).
- Allyson Purcell (NMFS) will send to Ali Wick electronic copies of her handouts and presentation for distribution to the Hatchery Committees (Item V-A).
- Hatchery Committees members will send written comments to Mike Schiewe on the Draft Conflict of Interest Policy and the Draft Hatchery Committees Protocol for Approval of Research flowchart (Item VI-A).
- Ali Wick will post all presentations shown at today's meeting on the ftp site.
- Joe Miller will provide the Chelan draft M&E plan for distribution to the Committees.

DECISION SUMMARY

There were no decision items at this meeting.

MEETING AGREEMENTS

- The Hatchery Committees approved transfer of surplus Wenatchee subyearling summer/fall Chinook to the Yakama Nation (YN) for use in their Yakima River fall Chinook reintroduction program (Item IV-D).

I. Welcome, Agenda Review, Meeting Minutes

The Hatchery Committee approved the May 19, 2010 Hatchery Committees meeting minutes as revised with the edits from the Committees.

II. Chelan PUD

A. Chiwawa Steelhead Releases (Josh Murauskas)

Josh Murauskas presented a summary of the first year of results of the pilot rearing study of Wenatchee steelhead at the Chiwawa facility. Murauskas noted that the purpose of the pilot program was to evaluate selected aspects of rearing, release, and post-release performance of steelhead reared in circular tanks. The presentation was entitled "Year One Evaluation of Steelhead at Chiwawa Ponds, Preliminary results." Josh Murauskas will send Ali Wick electronic copies of his presentations and video clips for distribution to the Hatchery Committees and for posting on the ftp site.

Murauskas first described the physical layout of the three circular tanks used for the test, with the center tank used to collect steelhead volitionally exiting the two outside tanks. The eight-inch overflow weir accounted for roughly 0.04% of the total wetted wall area and produced an outflow velocity of ≤ 2.0 f/s (similar to experienced velocity within the circular vessel. Preliminary results indicated that about 90 percent of the fish in the outside tanks entered the center tank within 1 week of being offered access. Furthermore, over 90 percent of the fish in the center tank were either smolted or in a transitional stage. No fish in the parr stage were observed in any samples. Murauskas indicated that results of volitional releases of steelhead in non-circular tanks typically show a lower percentage of volitional exit over considerably longer time periods. He noted that exit from the outside rearing tanks peaked in late afternoon, with a second larger peak in the late evening (at around 9:00 pm). Preliminary travel time estimates (as of June 14th) from release to McNary Dam for the steelhead reared in circular tanks were significantly shorter (nearly 6 days or 27% quicker) than for other hatchery-origin steelhead reared in conventional raceways at Turtle Rock that were drop-planted in the same general area of the Wenatchee River.

Sam Dilly reported that during rearing there had been a minor outbreak of fungal disease among the steelhead, but that it had been successfully treated with formalin. Nonetheless, Chelan PUD has purchased an ultraviolet water treatment unit, that will be available in 2011, to reduce the likelihood of disease outbreaks in the future. Mike Tonseth said Bob Rogers (WDFW Fish Health Specialist) has been monitoring dead and moribund steelhead for specific pathogens and will be preparing a report for the Hatchery Committees. Dilly noted that final data from the Freshwater Institute would be available in August 2010. Murauskas also concluded with his presentation that preliminary results suggest that steelhead reared in circular vessels at Chiwawa were of excellent health, demonstrated an outstanding propensity to begin downstream movements, and thus far exceptional in-river performance compared to similar stocks. Murauskas noted that survival estimates and more precise travel times will be available by late summer as fish are completely through the system.

B. Chiwawa Centerwall (Josh Murauskas)

Josh Murauskas described planned modifications at the Chiwawa Facility (i.e., construction of a centerwall) to accommodate rearing of Wenatchee steelhead formerly reared at Turtle Rock. Chelan PUD biologists and engineers are working closely with WDFW hatchery operators to ensure that the new modifications will provide the required accommodations. Space will be available in the existing Chiwawa ponds in the fall of 2011 when spring Chinook production is reduced to 298,000.

C. Wenatchee Sockeye Enumeration Study – 2009 (Josh Murauskas)

Josh Murauskas gave a presentation summarizing results of the 2009 Sockeye Enumeration Study (this presentation will be posted on the ftp site). The purpose of the study was to produce reliable escapement estimates of adult sockeye salmon with PIT-technlogy.. Included in the analyses were about 1,000 sockeye tagged at Tumwater (of which 90 percent were wild fish) and about 838 sockeye that had been PIT-tagged at Bonneville Dam (and whose origin was unknown). Roughly 10% (87) of the Bonneville fish were subsequently observed at Tumwater and used in analyses. About 3 percent of the fish tagged at Tumwater were detected in the Little Wenatchee River and about 35 percent were detected in the

White River. By comparison, a slightly higher but similar proportion of the fish tagged at Bonneville were detected in the White River. Preliminary results were that escapement numbers estimated from PIT-tag detections were similar to escapement numbers estimated using the AUC method and 2009 spawning survey data. Murauskas further discussed how creel survey data, analysis of potential handling effects, and observed ratios of escapement into the Little Wenatchee and White rivers can boost the precision of escapement estimates. Moreover, the second PIT-tag array has already been installed in the White River and will provide precise probability of detection estimates for the lower array, thus allowing calculation of error and confidence of the 2009 and 2010 escapement estimates. A two-year comprehensive report will be provided following the upcoming migration.

D. Skaha Sockeye SOA (Joe Miller)

Joe Miller introduced this topic, indicating that he wanted to defer a decision on the Skaha Statement of Agreement (SOA) until next meeting to provide the Hatchery Committees additional opportunity for review. Also, he noted that he felt it particularly important to have the Colville Confederated Tribes involved in the discussion, and their representative was unable to attend the meeting today. Miller explained that this revised SOA provides several clarifications, including specific details of long-term funding. He explained that the SOA states that the mitigation goal is to establish self-sustaining, natural production in Skaha Lake and potentially in Okanogan Lake, with Chelan PUD receiving production credits for naturally-produced fish. There are no requests for any changes to the program between now and 2017. Joe Miller requested that any initial comments on the SOA be sent to him prior to the next meeting. Tom Scribner said the SOA has been discussed by the Joint Fisheries Parties (JFP), with further discussion planned. Mike Schiewe said the SOA will be considered for approval at the next Hatchery Committees meeting.

E. Draft M&E Workplan (Joe Miller)

Joe Miller indicated that the draft 2010 Hatchery Monitoring and Evaluation (M&E) Implementation Workplan is now complete and would be distributed the next day to the Hatchery Committees for review. Miller asked that the Hatchery Committees pay particular attention to the various groups of fish being PIT-tagged, and to making sure that information from these groups was contributing to one or more of the M&E evaluations. He expressed concern that the PIT-tagging of certain groups may have initially served a purpose, but that the purpose is no longer clear or linked to a hypothesis in the M&E plan. Miller explained that a large number of wild fish are being PIT-tagged, and pointed out that there is growing concern about the adverse effect of PIT-tags on survival. Further, the small sample size of many of these marked groups preclude the ability to generate scientifically rigorous results. Overall, Miller suggested that continuing these efforts without a hypothesis or study plan may be potentially detrimental to the fish and lead to inconclusive results.

Mike Schiewe reminded the Hatchery Committees that the 2010 M&E monitoring completes the first 5 years of data collection, making 2011 a good time to review PIT-tagging efforts. Keely Murdoch asked if the analytical framework already addressed the PIT-tagging question raised by Chelan PUD. Schiewe explained that it is the M&E Implementation Work Plans that actually get down to the level of detail such as how many fish are PIT-tagged. Joe Miller said the PIT-tag data analysis will also help with the 2013 check-in to evaluate the degree to which hatchery production is meeting the HCP's No Net Impact (NNI) standard.

F. Chelan PUD 2009 Final M&E Report (Joe Miller)

Joe Miller said the Chelan PUD Final 2009 M&E Report has been finalized and has been posted on the ftp site.

III. Douglas PUD

A. No CWTs for Douglas PUD Summer Chinook Survival Study Fish (Greg Mackay)

Greg Mackey introduced this topic by explaining that Douglas PUD is conducting the 10-year survival verification study for juvenile spring migrants at Wells Dam this year. The purpose of this study is to confirm that Douglas PUD is continuing to meet the juvenile project survival standard of the Wells HCP for yearling Chinook and steelhead. He further noted that the study may have to be repeated next year because the low flows encountered during the study period did not meet the representative environmental conditions required by the HCP. Accordingly, Douglas PUD is rearing an extra 100,000 juvenile summer Chinook (brood year 2009) for use in a repeat study in 2011 if necessary. As with the protocol used for this year's study, these fish will not be coded wire tagged (CWT), but will receive an adipose fin clip. Should the study go forward, they will also be PIT tagged. However, if the study is not needed, the fish will not be PIT tagged.

Mike Schiewe asked about the disposition of the fish if they are not needed for a study next year. Mackey indicated that they would like to release them with the standard summer

Chinook production, but acknowledged that an additional 100,000 fish exceeds by about 68,000 the 10 percent overage allowed by the current hatchery program permit. Mackey explained that because the National Marine Fisheries Service (NMFS) had already approved the release of these fish as study fish, they should not be considered over-production. Rob Jones confirmed that this was the case, and that NMFS concurred with Douglas PUD's proposal to release these fish along with the normal production. Mike Tonseth asked about the likelihood that a survival study repeat would be needed. Tom Kahler explained that if survival targets are met under these low-flow conditions, then Douglas PUD would prefer that the study result be approved as valid. If survival targets are not met, Douglas PUD would likely repeat the study. After review of this year's study results, the HCP Coordinating Committees will make the decision. Douglas PUD will inform the Hatchery Committee when a decision is made about proceeding with the 2011 study and the disposition of the fish for that study.

IV. WDFW

A. Wenatchee Summer Steelhead Hatchery/Wild Spawn Timing/Spawner Distribution Activities (Mike Tonseth)

Mike Tonseth updated the Hatchery Committees on preliminary results of recent studies on spawn timing and distribution of hatchery and wild steelhead in the Wenatchee and Methow basins. His presentation, "Preliminary Evaluation of Steelhead Spawning Location and Timing," will be posted on the ftp site.

Tonseth explained that beginning July 1, all steelhead trapped at Priest Rapids Dam, Dryden Dam, Wells Dam, Tumwater Dam, and the Twisp Weir were PIT-tagged, with females also receiving Floy tags. Females were PIT-tagged in the peritoneal cavity and males were PIT-tagged in the pelvic girdle. During subsequent intensive spawning ground surveys, field crews documented the number of redds and their locations, the percent of redds with females present, and the percent of redds attributable to tagged females (with the latter group further separated into the percent of redds with floy tags, and the percent of redds with PIT-tags).

In summarizing some of the highlights of the study, Tonseth indicated that in both the Wenatchee and Methow basins, hatchery and wild steelhead spawned in the same general locations. He also noted that no PIT tags were detected in redds in the Wenatchee, whereas

PIT tags were detected in 12 percent of the redds in the Twisp River. On the other hand, Floy tags performed well in both basins; however, field crews reported that Floy tags implanted in the fall were more difficult to observe because of algeal growth. The detection of PIT-tags in Methow basin redds and not in Wenatchee basin redds was assumed to be related to the spring-time tagging of fish captured at Twisp Weir as opposed to the much earlier summer/fall tagging at the other locations.

Tonseth indicated that the plan for 2011 is to PIT-tag all summer/fall-run fish at all sampling locations in the pelvic girdle, and to PIT-tag spring-run females in the body cavity at Tumwater Dam and Twisp Weir. In addition, all females will receive a Floy tag at Tumwater Dam and the Twisp Weir. Lastly, the frequency of field surveys will be increased to twice a week.

Tonseth concluded by noting that the 2009 to 2010 steelhead escapement over Tumwater Dam (TWD) was one of the highest in recent years—approximately 2,000 hatchery fish and 800 natural origin fish were passed above TWD for a Proportionate Natural Influence (PNI) of about 0.4. He noted that under the new Wenatchee Steelhead Hatchery Genetic Management Plan (HGMP), the long-term goal will be to manage returning adults at TWD to achieve a PNI of 0.67 or greater, with an escapement goal of 1,094 fish. Tonseth explained that about 20 to 30 percent of the run tends to pass TWD in the spring.

Responding to a question from Rob Jones regarding recreational harvest, Tonseth indicated that a total of 245 hatchery fish were harvested and 321 unmarked steelhead were encountered and released; the estimated mortality of wild fish was 16. The allowable take for the fishery was 17 wild fish based on an estimated escapement of 2,881 total fish, of which 981 were estimated to be of natural origin. Tonseth reminded Hatchery Committees members that only 50 percent of hatchery steelhead are marked, so a count of unmarked fish may include some unknown number of wild fish. Mike Tonseth will send to Ali Wick the letter from Washington Department of Fish and Wildlife (WDFW) to Kris Petersen (dated April 9, 2010) summarizing the 2009 to 2010 steelhead harvest in the upper Columbia River, for the Committees information.

Tonseth concluded by indicating that the final Wenatchee steelhead spawning distribution study report should be completed in September 2010.

B. Update on PBT Test (Mike Tonseth)

Mike Tonseth indicated that a total of 196 spring Chinook were sampled at Priest Rapids Dam. A tissue sample was collected from each of these fish before being PIT-tagged and released to continue migration. To date, 93.9 percent of the fish have been detected at Rock Island Dam; 64.3 percent at Rocky Reach Dam; and 54.1 percent at Wells Dam. In addition, there has been 1 detection in the lower Methow River and 3 detections in the Entiat. No fish have been detected at Tumwater Dam, and 2 fish have not been detected after tagging and release. Tonseth said that genetic analyses of the tissue samples are underway. He will send an email summary of progress on the Parental Based Tagging (PBT) Pilot Study to Ali Wick for distribution.

C. Update on Chelan Falls Program (Mike Tonseth)

Mike Tonseth reported that the Turtle Rock subyearlings transferred to Chelan Falls net pens in May were released on June 7. This earlier-than-planned release was precipitated by the loss of about 8,000 fish per day. The cause of the mortality appeared to be impingement on the nets caused by the increased flows from Chelan Falls Powerhouse when a second turbine was brought on-line. Steve Hays noted that lake surface temperatures had also been increasing, and that this may have contributed to the mortality. Temperatures in the upper layer of Lake Chelan were in the upper 50 degrees. Tonseth said that the descaling and observed billowing of nets indicate high water velocity was likely the primary cause. This is the last year that subyearling Chinook will be reared at Chelan Falls in net pens.

D. Disposition of surplus 09BY Wenatchee summer Chinook (Mike Tonseth)

Mike Tonseth briefed the Hatchery Committees that there were about 100,000 excess brood year 2009 (BY09) Wenatchee subyearling summer Chinook that are part of the production destined for Dryden Pond. He explained that the excess production occurred because of the large numbers of returning 5-year-old fish in the brood and their high fecundity. WDFW is now recommending that these fish be transferred to the YN for use in the Yakima River fall Chinook reintroduction program. Mike Schiewe asked if anyone on the Committees knew of a beneficial use for these fish in the upper Columbia River basin within the HCP program. No one was aware of an existing need, and the transfer to the YN was approved by the Committees. Tonseth indicated that he was working with Joe Miller to draft guidelines for dealing with production overages that are likely to periodically occur in the future.

V. NMFS

A. Draft EIS for Mitchell Act Hatcheries (Allyson Purcell)

Allyson Purcell (NMFS) briefed the Hatchery Committees on the soon-to-be-released Draft Mitchell Act Environmental Impact Statement (EIS). She explained that the EIS will cover all 178 hatchery programs in the Columbia River basin, identifying five alternative actions but not selecting a preferred alternative. Purcell explained that although the Mitchell Act provides funding for only 68 of the 178 programs, NMFS has determined that consideration of the basin-wide programs was necessary to provide context for evaluating cumulative effects.

Purcell briefly described the five EIS alternatives: 1) Alternative 1– no action, baseline is 2007 program status; 2) Alternative 2 – all Mitchell Act programs are terminated and other hatchery programs are modified to achieve intermediate goals; 3) Alternative 3 – maintain existing Mitchell Act production goals, and other hatchery programs are modified to achieve intermediate goals; 4) Alternative 4 – lower river hatchery programs are modified to achieve stronger performance standards; and 5) Alternate 5 –similar to Alternative 4, but with the focus of stronger performance goals on hatchery programs upstream of Bonneville (upper river).

Purcell emphasized that the EIS will not include a directive on how individual programs should be implemented, nor will it likely affect programs with new HGMPs. If new HGMPs are needed or if an HGMP is being revised, the EIS will support those HGMPs that are consistent with the EIS preferred alternative. The EIS is intended to meet National Environmental Policy Act (NEPA) requirements for new HGMPs and for HGMPs not yet final prior to the time the EIS becomes final. For HGMPs in progress and completed before the Mitchell Act NEPA process is completed, a separate NEPA review will be needed. In these cases, NMFS will prepare a program-specific EIS. Purcell explained that the draft EIS will be released for a 90-day public comment period beginning about August 1, and will be finalized by spring 2011.

Mike Tonseth asked what will happen if the EIS analysis shows a change is needed in an existing production agreement. Rob Jones said NMFS is committed to working through existing processes (e.g., *U.S. vs Oregon*, Mid-Columbia HCPs) if the EIS analyses indicate changes are necessary. He emphasized that NMFS's goal is to put existing hatchery programs in a position of non-jeopardy.

Purcell (NMFS) said that she will send to Ali Wick electronic copies of her handouts and presentation for distribution to the Hatchery Committees.

VI. HCP Administration

A. Conflict-of-Interest Policy and Protocol for Approval and Implementation of Research (Mike Schiewe)

Mike Schiewe presented a revised flow chart showing the pathway for developing and approving research plans, and a draft policy for addressing conflicts of interest in the Hatchery Committees. He explained that he built the conflict-of-interest policy on the principles used by the HCP Tributary Committees. He explained that the different types of conflicts are typical of those identified by the National Science Foundation. Schiewe further noted that the Hatchery Committees might want to pay particular attention to the section on the unique position of the PUDs as the funding entity. He also noted the need for Committees members to consider how disputes regarding conflicts would be resolved.

Schiewe requested feedback on the policy and protocol. He suggested that the Hatchery Committees, when ready, may want to approve a conflict–of-interest policy on an interim basis to provide a trial period. Tom Kahler and Joe Miller both said they thought these were good drafts. Mike Tonseth said he will send written comments to Schiewe. Tom Scribner said he had no comments; Rob Jones also had no comments. At the close of this discussion, Hatchery Committees members agreed to send written comments to Mike Schiewe on the Draft Conflict-of-Interest Policy and the Draft Hatchery Committees Protocol for Approval of Research flowchart.

B. Wells Methow Steelhead HGMP update (Mike Schiewe)

Mike Schiewe said he talked with Steve Parker of the YN regarding Methow HGMP production goals. He said Parker indicated that considerable progress had been made during ongoing discussions among NMFS, YN, Columbia River Inter-Tribal Fish Commission (CRITFC), and U.S. Fish and Wildlife Service (USFWS). Schiewe said Parker indicated that there were still several issues that were being vetted within CRITFC, but that it was likely that the agreed-upon production goals will be similar to HGMP production goals as drafted by the Hatchery Committee—250,000 smolt release with 50,000 in Twisp and 100,000 each in the Upper Methow and the Chewuch River, with some reduced number in the lower Methow River that would eventually be phased out. Schiewe also indicated that the Winthrop Steelhead HGMP may require more work as a result of this process. Parker indicated that he thought all remaining issues could be resolved by September 2010.

B. Next Meetings

The next scheduled Hatchery Committees meetings will occur as follows: July 21, August 18, and September 15, all in Wenatchee.

List of Attachments

Attachment A – List of Attendees
Attachment B – Skaha Sockeye SOA

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor QEA, LLC
Carmen Andonaegui	Anchor QEA, LLC
Joe Miller*	Chelan PUD
Josh Murauskas*	Chelan PUD
Sam Dilly	Chelan PUD
Steve Hays	Chelan PUD
Tom Kahler*	Douglas PUD
Greg Mackey*	Douglas PUD
Todd Pearsons	Grant PUD
Allyson Purcell	NMFS
Rob Jones* (by phone)	NMFS
Mike Tonseth*	WDFW
Tom Scribner* (by phone)	Yakama Nation
Keely Murdoch*	Yakama Nation

* Denotes Hatchery Committees member or alternate

Rocky Reach and Rock Island HCP Hatchery Committees
Statement of Agreement
Regarding Skaha Lake and Okanogan Lake Sockeye Reintroduction
For approval at June 16th, 2010 meeting

Background

The Rocky Reach and Rock Island Habitat Conservation Plans' (HCPs) require Chelan PUD to mitigate for sockeye. The current goal is 591,040 hatchery smolts annually. Unfortunately, hatchery sockeye production has met with mixed success and rarely supports returns that justify the use of broodstock from natural habitats[1] (i.e., allowing broodstock to spawn in natural habitats yields a higher rate of recruits/spawner than bringing them into a hatchery). Acknowledging this, the Hatchery Committees (HC) approved Chelan PUD funding the ONA experimental introduction of sockeye in Skaha Lake *in lieu* of a prescribed smolt release. Paradoxically, however, the hatchery production from the Skaha program may be the key to unlocking major habitats for natural production

While the focus of the Skaha Lake experiment is limited to determining whether a self sustaining population can be reestablished in Skaha Lake, the experiment is in many respects a proof of concept for reestablishing a self sustaining population in the larger Okanagan Lake as well. These two lakes represent major sources of potential lake-rearing habitat not currently available to juvenile sockeye in the Columbia River Basin. The predicted juvenile rearing capacity of Skaha Lake [2,010 (ha)] is 1,977 smolts/ha, which translates to 3.9 million smolts,[2] while the potential for Okanogan Lake is much higher (35,100 ha). Okanogan Lake alone has over seven times the rearing habitat of all the existing sockeye producing lakes in the Columbia River Basin *combined* (including Wenatchee and Osoyoos)[3].

Because the HC has agreed that the sockeye mitigation is best achieved by reestablishing natural production; and because fry releases are the most appropriate life stage for reestablishing natural production; HCP compliance should initially be evaluated in terms of fry planted annually, rather than production of hatchery smolts. This distinction is important because the success of the reintroduction program may be completely independent of the number of hatchery smolts produced. Alternatively, using a hatchery smolt target as a compliance metric could lead to the early abandonment of an otherwise promising program: If the Skaha reintroduction program is successful at providing the ecological justification for opening Skaha Lake, but does not regularly produce the HCP target of 591,040 smolts, the program could be considered a failure by the HC (i.e., under the strict interpretation of the

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[1] Kim D. Hyatt, Karin L. Mathias, Donald J. McQueen, Brian Mercer, Patrick Milligan, D. Paul Rankin. 2005. Evaluation of Hatchery versus Wild Sockeye Salmon Fry Growth and Survival in Two British Columbia Lakes
North American Journal of Fisheries Management 25:3, 745-762

[2] Fisher, Christopher, Deanna Machin, Howie Wright, Karilyn Long, "Evaluation of an Experimental Re-introduction of Sockeye Salmon into Skaha Lake; Year 2 of 3", 2001 Technical Report, Project No. 200001300, 269 electronic pages, (BPA Report DOE/BP-00005136-2): Objective 3, Task D: Assessment of Juvenile Oncorhynchus nerka (Sockeye and Kokanee) Rearing Capacity of Skaha Lake, Vaseux Lake and Osoyoos Lake 2001. Final Report, April 17 2002.

[3] P. 3 of Mullan, J.W. 1986. Determinants of sockeye salmon abundance in the Columbia River, 1880's-1982: a review and synthesis. Biological Report 86(12) September, 1986. Fish and Wildlife Service U.S. Department of Interior

HCP production tables) in 2017. For this reason, a more appropriate interim metric is number of fry planted annually, and ultimately the establishment of a self sustaining population.

Evaluating reintroduction potential requires a larger number of sockeye fry than are currently available, and Chelan PUD is considering funding the construction and operation of a new multimillion dollar Penticton Hatchery (in collaboration with Grant PUD) to greatly increase current fry production. In order for Chelan to proceed with funding hatchery construction, the District needs assurance that the HC will support the annual fry plant target for the course of experimental reintroduction program (2017) and beyond, if supported by the Canadian Okanagan Basin Technical Working Group [COBTWG; Fisheries and Oceans Canada, Okanagan Nation Alliance Fisheries Program, and the B.C. Ministry of Environment]. If after 2017, COBTWG no longer supports the reintroduction program, the HC has no obligation to support the hatchery program.

In summary, the HC requires that the District meet its mitigation requirements for production but would also presumably support the District's funding of a program that has potential to influence the decision to reopen major sockeye habitats of the Upper Columbia River. The problem is that, up to this point, the District and HC parties have agreed on a hatchery smolt production target that is not necessarily aligned with the intended purpose of the program the District is currently funding. Both the District and the HC parties are at some risk of not achieving the maximum benefit of the Skaha Program if there is not a clear linkage between HCP NNI credit and the implementation of the reintroduction program.

Statement of Agreement

The Rocky Reach and Rock Island Habitat Conservation Plans' (HCP) Hatchery Committees agree that:

1. The "mitigation goal" of the Skaha Program is establishing self sustaining natural production in Skaha and potentially Okanogan lakes.

2. The Skaha Program and a new hatchery (and fry production) are intermediate steps toward achieving that goal and will be evaluated in 2017 by COBTWG and the HCP HC. This agreement does not obligate the HC or PUD resources after the 2017 evaluation unless the program is determined to be successful by the COBTWG and continued fry planting is approved for reintroduction efforts (e.g., additional studies of Skaha or Okanogan Lakes, seeding new habitats). In short, the HC only agrees to proceed with the Skaha program if it is succeeding.

3. The District, in collaboration with Grant PUD, will provide funding for hatchery operations, monitoring and evaluation, and construction of a hatchery in Penticton to produce sufficient quantities of fry to support reintroduction efforts (interim annual target of 5 million fry, subject to 10 year HCP recalculations and approval by COBTWG).

4. In the event reintroduction is successful, the District would receive No Net Impact (NNI) credit for natural smolts produced in Skaha and Okanogan Lakes (in addition to fry produced by the Penticton Hatchery).

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FINAL MEMORANDUM

To:	Wells, Rocky Reach, and Rock Island HCP Hatchery Committees	**Date:**	August 23, 2010
From:	Michael Schiewe, Chair, HCP Hatchery Committees		
Cc:	Carmen Andonaegui		
Re:	FINAL Minutes of July 21, 2010 HCP Hatchery Committees Meeting		

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Hatchery Committees met at the Chelan PUD offices in Wenatchee, Washington, on Wednesday, July 21, 2010, from 9:30 am to 3:00 pm. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Mike Tonseth will revise Washington Department of Fish and Wildlife's (WDFW's) proposal to implement adult steelhead management above Tumwater Dam in 2010/2011, as agreed to by the Hatchery Committees. He will send the revised proposal to Ali Wick for distribution to the Committees (Item II-B).
- Mike Tonseth will provide an update on summer steelhead disposition at Tumwater Dam (Item II-B).
- Mike Tonseth will provide an update on the disposition of spring Chinook Passive Integrated Transponder tagged (PIT-tagged) to date at Priest Rapids Dam in a short email to Ali Wick for distribution to the Hatchery Committees (Item II-C).
- Alene Underwood will provide to Ali Wick for distribution to the Hatchery Committees the June 17, 2009, letter from Kris Petersen, of NMFS, to Chelan PUD, authorizing a youth fishery on residual steelhead at Blackbird Pond for 2009 and future youth fisheries at Blackbird Pond (Item III-A).
- Greg Mackey will provide the draft Wells Summer Steelhead Hatchery Genetic Management Plans (HGMPs) to the National Marine Fisheries Service (NMFS) for review of non-*U.S. v Oregon* elements with the understanding that the *U.S. v Oregon*-related elements are not finished (Item III-B).

- Tom Scribner will provide an estimated date at the next Hatchery Committees meeting for when the expanded acclimation plans for 2011 will be finalized (Item IV-A).
- Josh Murauskas will make revisions to the Statement of Agreement (SOA) for adoption of new target sizes for overwintered Wenatchee summer Chinook at Dryden Pond as discussed, and send to Ali Wick for distribution to the Rock Island Hatchery Committee for final approval by email (Item VI-A).
- Josh Murauskas will provide an electronic copy of the memo on preliminary Wenatchee steelhead survival estimates to McNary, which was handed out at today's Hatchery Committees meeting, to Ali Wick for distribution to the Committees (Item VI-B).
- Alene Underwood will provide a draft letter of support for submission to Washington State Department of Ecology (Ecology) regarding the Chiwawa River water right application, to WDFW, Colville Confederated Tribes (CCT), U.S. Fish and Wildlife Service (USFWS), and the Yakama Nation (YN), as requested (Item VI-C).
- Alene Underwood will provide to Rob Jones the USFWS letter of support to Ecology on the Chiwawa River water right application (Item VI-C).
- Greg Mackey will provide to the Hatchery Committees for review the draft manuscript on the Non-Target Taxa of Concern (NTTOC) risk analysis for submission to the journal *Environmental Biology of Fishes* (Item VII-A).
- Mike Schiewe will distribute Mike Tonseth's comments on the conflict of interest policy to the Hatchery Committees (Item VIII-A).
- Hatchery Committees members will provide comments on the draft Conflict of Interest policy to Mike Schiewe by Friday, August 6 (Item VIII-A).
- Chelan PUD will provide the Grant PUD sockeye program annual implementation plan to Ali Wick for distribution to the Hatchery Committees (Item VIII-C).

DECISION SUMMARY

- The June 16, 2010 meeting minutes were approved, as revised (Item I).
- The Committees approved the proposal for collection of up to four adult hatchery fish for WDFW's egg-to-fry survival study (Item II-A).
- WDFW's proposal for managing adult Wenatchee steelhead above Tumwater Dam for 2010/2011 was approved with revisions. Mike Tonseth will make changes to the

proposal request and send it to Ali Wick for distribution to the Hatchery Committees (Item II-B).

- The Rock Island Hatchery Committee approved new target sizes for overwintered Wenatchee summer Chinook at Dryden Hatchery; final approval of the revised SOA will be by email (Item VI-A).

I. Welcome, Agenda Review, Meeting Minutes

The Hatchery Committees approved the June 16, 2010 Hatchery Committees meeting minutes, as revised. Ali Wick will finalize the meeting minutes and distribute them to the Committees.

II. WDFW

A. Decision Item – 2010 Egg-to-Fry Proposal (Mike Tonseth)

Mike Tonseth requested up to 6,500 hatchery-origin eggs from the 2010 Chiwawa spring Chinook broodstock for use in Year 2 of the Wenatchee spring Chinook egg-to-fry survival study. WDFW plans to collect up to 4 additional hatchery adults (2 females) for this purpose. The study will not affect Monitoring and Evaluation (M&E) for this group. The request was approved.

B. Decision Item – Proposal for Managing Adult Wenatchee Steelhead above Tumwater Dam 2010/2011 (Mike Tonseth)

Mike Schiewe reminded the Hatchery Committees that at the June Committees meeting, adult steelhead management at Tumwater Dam was discussed. Mike Tonseth reported that last year, without management of adults at Tumwater Dam, 1,520 adult hatchery-origin steelhead were passed upstream of Tumwater Dam resulting in a Proportionate Natural Influence (PNI) of 0.43. In the current HGMP, adult steelhead escapement is managed to a target of 1,094. If adult management had been implemented according to the adult escapement target, a PNI of 0.8 could have been attained for the 2010 brood return. Given escapement at downstream dams to date, the 2011 brood return is likely to be similar to last year's run, resulting in the same situation at Tumwater Dam with excess hatchery-origin steelhead. WDFW would like to implement adult steelhead management at Tumwater Dam consistent with current HGMP goals, for this next return cycle.

Bill Gale said that as long as the proposal to manage adult steelhead at Tumwater Dam matches up with the HGMP, it will be required anyway and he is in support of it. Keely Murdoch indicated that the YN would like the flexibility to evaluate different escapement targets, both potentially greater than or less than the 1,094 currently in the draft HGMP. Gale suggested that the 1,094 adult escapement goal could be considered a baseline from which any future changes could be measured. Murdoch agreed and requested that the draft HGMP include a statement that additional escapement targets may be tested in future years. Rob Jones said it is not too late to introduce changes to the HGMP. He said NMFS is meeting next Tuesday with WDFW and Chelan PUD to follow up on the Endangered Species Act (ESA) consultation on the HGMP and to discuss any changes to the HGMP. Jones indicated that NMFS must have escapement numbers in the HGMP for the purposes of issuing an Incidental Take Statement; however, he said this may not be a concern if the permit is issued for 5 years. He stated that 5-year permits are standard although 10-year permits are sometimes allowed, but that he was not certain which time period was being requested for this permit. The Committees discussed whether implementing the current escapement number of 1,094 adults at Tumwater Dam for the next 5 years with an option to adjust after 5 years was acceptable. Jones will confirm whether the permit being sought is for 5 or for 10 years.

Tonseth said his understanding is that permit 1395 allows for adult management at Tumwater Dam and that the draft HGMP incorporates this adult management. Schiewe asked Tonseth to include in his proposal language that states that the current request is consistent with permit 1395 and the new draft HGMP.

Murdoch asked for WDFW's plan for disposition of excess hatchery steelhead at Tumwater Dam this year. Tonseth said this has not yet been determined. They are considering various alternatives, including harvest opportunities; contribution to local food banks; and surplusing to tribes. The Committees discussed the pros and cons of the various ideas. Kirk Truscott indicated the CCT would be interested in surplus adult fish.

Tom Scribner asked for resolution on the issue of flexibility in the HGMP for evaluating different escapement targets. Tonseth said he will be participating in next Tuesday's meeting between NMFS, WDFW, and Chelan PUD and will see that the changes are made to the HGMP that are being recommended by the Committees.

Truscott asked whether there is a reasonable way to manage adult removal so as not to focus on the first 50 percent passing Tumwater Dam, as currently managed. Murdoch asked if adult removal can be managed weekly. Tonseth explained that the prolonged nature of the steelhead run makes it difficult to manage for both PNI and escapement. There were no recommendations for how adult removal might be handled differently than as it is being proposed, given the prolonged run period. Truscott asked if there is a way to use Priest Rapids Dam run estimates rather than just using Tumwater Dam numbers, in order to obtain an estimate of run-timing between wild and hatchery fish, and help anticipate arrival of wild fish at Tumwater Dam. Tonseth agreed to follow up on this with Truscott.

Schiewe summarized the Committees' requests for revisions to the proposal, including: 1) state that it is consistent with the HGMP; 2) state that it is consistent with permit 1395; 3) state that the Joint Fisheries Parties (JFP) will develop a plan for disposition of excess hatchery fish at Tumwater Dam; 4) incorporate language to allow for flexibility to evaluate different adult steelhead escapement numbers at Tumwater Dam in future years; and 5) state that WDFW will provide an annual report on adult management to the Committees. The proposal was approved by the Committees contingent on these revisions to the proposal.

C. Parental Based Tagging (PBT) update (Mike Tonseth)

Mike Tonseth reported that a total of 174 wild spring Chinook were sampled and PIT-tagged at Priest Rapids Dam. Tonseth will provide an update on the disposition to date of PIT-tagged fish in a short email for distribution to the Hatchery Committees.

III. USFWS

A. Update on Blackbird Pond Steelhead Acclimation (Bill Gale and Mike Tonseth)

WDFW proposed closing the outlet gate at the Blackbird Pond Acclimation Pond because fish are no longer being observed exiting the pond. Bill Gale indicated that PIT-tag detection data obtained this year do not provide an accurate estimate of numbers of steelhead exiting the pond. Data were also lost for one day as a result of minor vandalism, which left the detector antenna unplugged. No one objected to closing the outlet gate at this time, agreeing that any juvenile steelhead remaining in the pond would not migrate at this late date. Mike Tonseth said that any remaining fish will be used in a Kids' Fishery. The use of residual steelhead in a Kids' Fishery was previously authorized in a June 17, 2009, letter from NMFS to Chelan PUD. Alene Underwood will provide the authorization letter to Ali Wick for distribution to the Hatchery Committees.

B. Methow Basin HGMPs (Bill Gale)

Bill Gale reported that USFWS has been working with the YN and WDFW to develop *U.S. v. Oregon* guidelines for steelhead and spring Chinook management in the Methow Basin. He indicated that these guidelines, if adopted, may result in changes to the Winthrop National Fish Hatchery (NFH) and Wells Steelhead HGMPs. He explained that they hope to have steelhead guidelines ready for next week's PAC meeting. Tom Scribner stated that a key point in developing the management guidelines is that the Methow steelhead and spring Chinook programs are linked. Mike Tonseth added that the link is related to facility space for production, and not a biological link. Gale described the guidelines as a set of bulleted statements of how steelhead management should occur in the Methow Basin, with sideboards and a framework that would allow support by all *U.S. v. Oregon* participants (i.e., releases in upper Methow and tributaries will be for the primary purpose of recovery). These will include specific numbers of fish and will stipulate which programs release fish in which locations.

Rob Jones asked if the guidelines are limited to juvenile release numbers, release location, and marking, which he explained were issues over which the *U.S. v. Oregon* process had concern. He stated that details on broodstock and adult management are the purview of the HCP. Gale stated that for the most part this was the case. He said the plan is to have the guidelines ready by September or October of 2010, with a worst-case scenario of January 2011. Jones asked about the timing of submitting the draft HGMPs to NMFS. Mike Schiewe said that NMFS already had a near-final draft of the Wells Steelhead HGMP, as Kris Petersen, as member of the Hatchery Committees at that time, was involved in its development. Schiewe asked Jones whether he would like a copy of the draft Wells Steelhead HGMP so that NMFS could begin considering the sections on broodstock and adult management. The Committee agreed that it would be useful to have NMFS proceed with reviewing the non-*U.S. v. Oregon* issues in the Wells Steelhead HGMP, rather than wait until any changes resulting from the *U.S. v. Oregon* work on juvenile release numbers, release location, and marking were approved by the Committee. Jones agreed that NMFS will look at the draft HGMP as requested with the understanding that the elements affected by *U.S. v. Oregon* are not ready for review. Douglas PUD agreed to provide the draft Wells Steelhead HGMP to NMFS for review.

IV. Yakama Nation

A. Wenatchee/Methow Expanded Acclimation Project Update (Tom Scribner)

Tom Scribner said the YN is planning to expand acclimation of steelhead and spring Chinook in the upper Methow from one site at the Winthrop NFH back channel in 2010/2011, to two or maybe three additional sites in 2011/2012. Scribner said acclimation in the back channel at Winthop NFH went well this year. Acclimation at the Nason Creek site in the Wenatchee with both coho and and steelhead, separated by a net, also went well. They want to repeat acclimation at the upper Nason Creek site, but with smaller-sized juvenile steelhead, with plans to co-mingle the steelhead and coho during acclimation rather than separate the species. The plan is then to repeat acclimation in 2012/2013 as implemented in 2011/2012, but with expansion of sites again. Bill Gale said that the USFWS has spring Chinook juveniles that they plan to acclimate in the Winthrop NFH back channel next year, and that the USFWS plans to install at least three PIT-tag antennae at the back channel to evaluate juvenile emigration. No concerns were expressed by Hatchery Committees' members regarding the YN's plans to expand acclimation. Scribner agreed to provide an estimated date to the Committees for when expanded acclimation plans for 2011/2012 will be finalized.

Bill Gale noted that broodstock collected by hook-and-line in the upper Methow in the spring, would provide progeny that are smaller, and may be better suited to mixed acclimation as compared to the progeny of broodstock collected earlier in the year at Wells Dam.

V. CCT

A. Update on Broodstock Collection (Kirk Truscott)

As of July 21, Kirk Truscott reported that WDFW had collected 65 brood summer Chinook at the mouth of the Okanogan River. Twenty-four or 25 brood fish were collected on July 21 alone; the target is 167 fish. To meet that target, the CCT estimate they are about 40 fish behind schedule but are confident they will make up the shortfall. Collection efforts started July 1; however, the late onset of summer conditions delayed warm water temperatures at the mouth of the Okanogan for this time of the year (water temperatures in June ranged from 16 to 18 degrees Celsius). The lack of fish stacking up at a thermal barrier at the mouth limited collection efforts. Fish are now holding at the mouth with temperatures close to 23 degrees Celcius in the Okanogan. All fish collected at Wells and at the mouth of the Okanogan River are PIT-tagged. He noted that no differential in mortality between fish captured at Wells and fish captured by purse seine at the mouth of the Okanogan River has been observed.

VI. Chelan PUD

A. Decision Item – Adoption of New Size Targets for Overwintered Wenatchee Summer Chinook (Josh Murauskas)

Josh Murauskas introduced this topic by stating that Chelan PUD is requesting approval to adjust the current size-at-release for any future summer Chinook overwintered at Dryden from 10 fish per pound (fpp) to 13 to 17 fpp. This change is being requested because Grant PUD is currently planning a fall transfer of their summer Chinook production from Eastbank Hatchery to Dryden for overwinter acclimation and release. The release size target for Grant PUD's production is 13 to 17 fpp. Thus, this change would create a uniform release size if in the future Chelan PUD should overwinter their summer Chinook production at Dryden as well. Alene Underwood stated that a new water right will be required at the Dryden Hatchery to accommodate overwintering summer Chinook; the current water right is an irrigation right and not year-round. Mike Tonseth pointed out that without a new surface water right allowing for an intake and year-round use, additional overwinter acclimation can not be accommodated. The Hatchery Committees agreed that if overwintering is implemented for Grant PUD's Wenatchee summer Chinook component at Dryden Hatchery, then the Rock Island Committee approves a uniform size target for Chelan PUD production if overwintered. Chelan PUD agreed to make the changes to the SOA requested by the Committee, and will provide the revised SOA to Ali Wick for distribution to the Committee for final email approval (Attachment B).

B. Preliminary Post-Release Survival Estimates for Chelan PUD Rearing Studies (Josh Murauskas)

Josh Murauskas distributed a memo summarizing preliminary survival estimates for several Chinook and steelhead rearing studies being conducted by Chelan PUD. The estimates were for survival from release to McNary Dam. Table 1 is a summary of the survival estimates presented in the July 20 memo.

Table 1
Summary of Preliminary Survival Estimates

Preliminary survival estimates to McNary Dam for hatchery-reared steelhead released in the Wenatchee River, 2010.

Final Acclimation Site	% Survival
Black Bird Island 1	**30**
Turtle Rock Island	**49**
Chiwawa Circulars	**74**

Preliminary survival estimates to McNary Dam for hatchery-reared Chinook released in the Chelan River, 2010.

Rearing vessel	% Survival
Raceway	**58**
Circular	**63**

Preliminary survival estimates to McNary Dam for hatchery-reared Chinook released in the Okanogan River, 2010.

Rearing density	% Survival
Low density	**43**
High density	**45**

Murauskas pointed out that the survival estimates for steelhead leaving Blackbird Pond were low in part because release time includes time from when fish were placed in the pond and not from when they exited the pond. Bill Gale asked that estimates of survival to Rocky Reach be incorporated into the survival estimates where appropriate. Murauskas said Chelan PUD will provide a full report on survival estimates later in the year. Mike Tonseth stated that both raceway and circular-reared summer Chinook yearlings were released from the Chelan River net pens. Tom Scribner asked if survivals of Chelan Falls summer Chinook could be compared to fish reared in net pens. Tonseth responded that subyearlings are too small to withstand the velocities in the net pens during the spring. Steve Hays stated that summer temperatures of up to 25 degrees Celsius were too high for acclimating fish. Kirk Truscott noted that the volitional release-dates for the Okanogan fish at Bonaparte Pond were influenced by irrigation withdrawals for frost control in early spring. This caused fish to be attracted to the opposite end of the pond from the exit, so they did not volitionally emigrate in a timely manner. Murauskas agreed to provide an electronic copy of the memo on preliminary survival estimates to McNary, which was handed out at today's Hatchery

Committees meeting, to Ali Wick for distribution to the Committees. The memo has been provided to Wick and is included as Attachment E to these meeting minutes.

C. Confirmation of support letters for Chiwawa water right application (Alene)

Alene Underwood informed the Hatchery Committees that the application for an expanded water right for the Chiwawa Ponds was being processed by Ecology and that a letter of support from individual Hatchery Committees' members would help facilitate moving the application forward. She agreed to send the YN, WDFW, CCT, and NMFS a draft letter that could be used for this purpose. Underwood also agreed to send Rob Jones, of NMFS, the letter previously sent to Ecology by USFWS.

VII. HETT Update

A. Manuscript for Environmental Biology of Fishes on NTTOC Risk Analysis (Greg Mackey)

Greg Mackey said Todd Pearsons had taken the lead in drafting a paper on the background and methods used by the Hatchery Evaluation Technical Team (HETT) in the NTTOC risk analysis for submission to the *Environmental Biology of Fishes*. He requested an expedited review of the draft manuscript by the Hatchery Committees to meet a deadline of submittal by the end of July. Responding to questions from the Committees, Mackey said that the deadline to finish the NTTOC study is March 2011. Pearsons said the manuscript will provide a good idea of what the HETT thinks is needed to complete the NTTOC risk analysis. The HETT has prepared a letter asking potential outside participants for input on the risk analysis. Prior to the end of 2010, the HETT plans to send out the letter and the manuscript to potential participants in order to summarize the information that will be needed. By March 2011, the HETT plans to complete the analysis so it can be included in the 5-year M&E Summary Report. Mackey agreed to send the draft manuscript to Ali Wick for distribution to the Committees for review.

B. Reference Streams (Greg Mackey)

Greg Mackey said Tracy Hillman, of BioAnalysts, has completed analysis of the Chiwawa spring Chinook population as part of the HETT's effort to determine which streams are useful as reference or control populations. Mackey said that information on the spring Chinook still needs to be evaluated by HETT for its value in making inferences and informing management decisions. Meanwhile, the HETT has moved on to evaluating potential control populations for steelhead. Keely Murdoch said it has been very difficult to identify reference streams. Mike Schiewe said this exercise needs to be completed by mid-2011.

VIII. HCP Administration (Mike Schiewe)

A. Conflict of Interest Policy

Mike Schiewe reminded the Hatchery Committees that he introduced the Conflict-of-Interest policy at the last Committees meeting. He has received only one comment to date, from Mike Tonseth, and he requested additional comments from the Committees. Schiewe noted that Tonseth had commented about the implications of a resource manager having to recuse himself/herself on issues that might affect resource management. Tonseth noted that this is different from what happens in the Tributary Committee, where decisions do not affect resources at the same scale. The Committees discussed extensively the issue of how to decide when a Committee member has a conflict of interest and the implications of a Committee member having to recuse himself/herself. Schiewe suggested that once the policy is fine-tuned, it can be implemented on an interim basis for a year to see how it works.

Schiewe asked that Committee members submit comments in track changes on the draft policy, especially the section on decision-making. Schiewe agreed to distribute Tonseth's comments on the policy to the Committees for their consideration. Schiewe asked that if a Committee member does not have comments, to please respond to that effect. Schiewe also asked if PUD representatives would provide their fiscal-year funding cycles to him to assist the Committees in understanding the appropriate timeline for funding requests. Committees members were asked to provide comments on the draft Conflict-of-Interest policy by Friday, August 6.

B. Agenda Items

Mike Schiewe reminded the Hatchery Committees of the 10-day rule for requesting that items be added to the meeting agenda. He requested that Committees members have agenda items to Ali Wick by the Friday preceding the full week prior to the next scheduled meeting date.

C. Upcoming Sockeye Presentations

Mike Schiewe informed the Hatchery Committees that both Kim Hyatt, of the Canadian Department of Fisheries and Oceans (DFO) Nanaimo, and Okanagan Nation Alliance (ONA) staff will present their annual report on the Skaha Lake Sockeye Reintroduction Program and the Implementation of the Okanagan Fish-Water Management Tool model at a joint session of the August HCP Hatchery Committees and the Grant PUD Hatchery Subcommittee (HSC) meetings. Presentations will be either the last agenda item on Wednesday, August 18, or the first agenda item the morning of August 19. Schiewe is awaiting word from Kim Hyatt to provide a firm date. (Note: Since the meeting, it has been decided that the presentation will be the first agenda item at the August 19 HSC meeting.) In preparation for the sockeye presentations, Chelan PUD will provide the Grant PUD sockeye program annual implementation plan to Ali Wick for distribution to the Committees.

D. Next Hatchery Committees Meetings

The next scheduled Hatchery Committees meetings are: August 18 and September 15, both in Wenatchee.

List of Attachments

Attachment A – List of Attendees
Attachment B – Summer Chinook Target Size SOA

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor QEA, LLC
Carmen Andonaegui	Anchor QEA, LLC
Josh Murauskas*	Chelan PUD
Alene Underwood	Chelan PUD
Steve Hays	Chelan PUD
Tom Kahler *	Douglas PUD
Greg Mackey*	Douglas PUD
Todd Pearsons	Grant PUD
Rob Jones* (by phone)	NMFS
Kirk Truscott*	CCT
Mike Tonseth*	WDFW
Bill Gale*	USFWS
Tom Scribner *	Yakama Nation
Keely Murdoch *	Yakama Nation

* Denotes Hatchery Committees member or alternate

Rock Island HCP Hatchery Committee
FINAL Statement of Agreement
Adoption of new size targets for overwintered Wenatchee summer Chinook
July 21, 2010

If overwinter acclimation of Chelan PUD's Wenatchee R. summer Chinook is implemented at Dryden, the Rock Island Habitat Conservation Plan's (HCP) Hatchery Committee (hereafter "Committee") agrees that the size-at-release target for Wenatchee summer Chinook will change to 13-17 fish per pound and a fork length of 132-142 mm. These size criteria would apply to both Chelan and Grant PUD programs overwintered at the Dryden acclimation site.

Background

The Committee has requested that Chelan PUD investigate the potential for overwinter acclimation of Chelan and Grant PUD summer Chinook programs at the Dryden acclimation site. The co-mingling of two overwintered programs at Dryden would require the establishment of a single size-at-release target for both programs. The size targets in this SOA are consistent with those identified in the Grant PUD Wenatchee summer Chinook HGMP, which in turn, approximate the size-at-release data observed at Chelan PUD's Simalkameen (Okanogan River) acclimation facility.

Table 1. Ten year averages of fork length (FL; mm), weight (g), and fish per pound (FPP) for Okanogan River releases of Chelan PUD summer Chinook.

Release Year	FL	weight	FPP
1999	144	36.0	13
2000	148	41.0	11
2001	141	35.4	13
2002	121	20.4	22
2003	132	25.7	18
2004	119	20.8	22
2005	133	28.9	16
2006	132	29.8	15
2007	132	25.9	18
2008	120	20.9	22
2009	124	21.9	21
Average	**131.5**	**27.9**	**17.4**

Agreement on a common size-at-release target is necessary for planning and designing adequate acclimation space (e.g., pond volume & density index) for an overwinter facility at Dryden.

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FINAL MEMORANDUM

To:	Rocky Reach and Rock Island HCP Hatchery Committees	**Date:**	September 17, 2010
From:	Michael Schiewe, Chair, HCP Hatchery Committees		
Cc:	Carmen Andonaegui		
Re:	FINAL Minutes of the August 26, 2010 HCP Rock Island and Rocky Reach Hatchery Committees Conference call		

The Rocky Reach and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Coordinating Committees met via conference call on August 26, 2010, from 10:30 am to 11:00 am. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Josh Murauskas will combine the Background write up with the approved Statement of Agreement (SOA) Regarding Skaha Lake and Okanogan Lake Sockeye Reintroduction and provide to Carmen Andonaegui for distribution to the Coordinating Committees as final.

DECISION SUMMARY

- The Rock Island and Rocky Reach Hatchery Committees approved the SOA Regarding Skaha Lake and Okanogan Lake Sockeye Reintroduction (Attachment B).

I. Welcome

Mike Schiewe opened the call by stating that the purpose of the meeting was to discuss and vote on a revised Skaha sockeye salmon program SOA (Skaha SOA).

II. Skaha Sockeye Salmon Program SOA

Joe Miller and Josh Murauskas (Chelan PUD) and Keely Murdock (Yakama Nation) summarized their edits to the draft version of the Skaha SOA. All members of the Rock Island and Rocky Reach Hatchery Committees present voted to approve the amended SOA as final.

List of Attachments

Attachment A – List of Attendees

Attachment B – Statement of Agreement Regarding Skaha Lake and Okanogan Lake Sockeye Reintroduction

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor QEA, LLC
Joe Miller *	Chelan PUD
Josh Murauskas *	Chelan PUD
Tom Kahler *	Douglas PUD
Keely Murdock*	YN
Kirk Truscott*	CCT
Bill Gale*	USFWS
Mike Tonseth *	WDFW

* Denotes Coordinating Committees member or alternate

Rocky Reach and Rock Island HCP Hatchery Committees
Statement of Agreement
Regarding Skaha Lake and Okanogan Lake Sockeye Reintroduction
Approved via conference call on 8/26/2010

Background

The Rocky Reach and Rock Island Habitat Conservation Plans' (HCPs) require Chelan PUD to mitigate for Okanogan sockeye. The current goal is 591,040 hatchery smolts annually (300,000 for Rocky Reach and 291,040 for Rock Island). Unfortunately, artificial production of sockeye has been largely unsuccessful in the Columbia River Basin and contributes a negligible number of returning adults (< 1% of the 2010 Columbia Basin run).[1, 2] In British Columbia, artificial propagation of sockeye has been successful in some instances, but results are variable across habitats.[3] One of the primary obstacles is that hatchery return rates are often equivalent or lower than natural return rates of sockeye, thus negating the hatchery production benefit associated with removing adults (broodstock) from the natural environment. For example, hatchery return rates for Lake Wenatchee sockeye program have only exceeded natural return rates in 8 of the 15 years examined and are statistically equivalent.[4] Therefore, allowing broodstock to spawn in natural habitats often yields a higher rate of recruits/spawner than hatchery production. The Hatchery Scientific Review Group (HSRG) acknowledged that lower replacement rates of hatchery-origin fish greatly limits the options available for meeting both conservation and harvest goals and offered no recommendations for changes to the Lake Wenatchee sockeye program.[5]

Acknowledging the difficulties associated with artificial production of sockeye, the Hatchery Committees (HC) approved Chelan PUD (District) funding the Okanogan Nation Alliance (ONA) experimental reintroduction of sockeye in Skaha Lake *in lieu* of a prescribed smolt release. This re-introduction program includes hatchery fry production and a monitoring and evaluation program to evaluate the efficacy of reopening significant habitats in Skaha and, potentially, Okanogan Lake for natural sockeye rearing/production. The primary concern with re-introduction is the potential for deleterious ecological interactions between anadromous sockeye and resident kokanee:

"The central question in this investigation relates to the performance of the resident kokanee population during the reintroduction of their anadromous counterparts. Investigators must decide how great a

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[1] Mahnken, C., G. Ruggerone, W. Waknitz, and T. Flagg. 1998. A historical perspective on salmonid production from Pacific Rim hatcheries. N. Pac. Anadr. Fish Comm. Bull. No. 1: 38-53.
[2] Columbia River DART. Data Access in Real Time. Columbia Basin Research. School of Aquatic & Fishery Sciences, University of Washington. Number based on extrapolation of adult PIT returns from Lake Wenatchee hatchery production.
[3] E.g., Hyatt, K.D., K.L. Mathias, D.J. McQueen, B. Mercer, P. Milligan, and D.P. Rankin. 2005. Evaluation of Hatchery versus Wild Sockeye Salmon Fry Growth and Survival in Two British Columbia Lakes North American Journal of Fisheries Management 25:3, 745-762.
[4] Hillman, T., J. Miller, M. Tonseth, T. Miller, and A. Murdoch. Monitoring and evaluation of the Chelan County PUD Hatchery Programs. Wenatchee, WA. pp. 82-83 (1989-2003 brood years); Wilcoxon/Kruskal-Wallis Tests used for comparison.
[5] HSRG (Hatchery Scientific Review Group). 2009. Columbia River Hatchery Reform System-Wide Report. Columbia River Hatchery Reform Project, Final Systemwide Report.

change in growth and survival of kokanee (particularly juveniles), and over how long, should be accepted as clear evidence of success or failure of the reintroduction experiment."[6]

The hatchery fry plants and M&E program (funded by the District and Grant PUD) will allow Canadian managers to address this issue and ultimately make a determination on whether or not to open Skaha Lake to anadromous sockeye. The initial emphasis on Skaha Lake is intended as a "proof of concept" for reintroducing sockeye to the much larger Okanagan Lake:

"*A longterm restoration goal is to reintroduce sockeye into Okanagan Lake in order to increase lake habitat for adult holding and juvenile rearing. It has been proposed to first reintroduce sockeye into Skaha Lake*."[7]

The rationale for re-introducing sockeye to Skaha and Okanogan Lakes is based primarily on the magnitude of rearing habitat they represent and the potential deterioration of existing rearing habitat in Osoyoos Lake. The predicted juvenile rearing capacity of Skaha Lake [2,010 (ha)] is 1,977 smolts/ha, which translates to 3.9 million smolts[8] (roughly equivalent to Osoyoos Lake), while the potential for Okanogan Lake is much higher (35,100 ha). Okanogan Lake alone has over seven times the rearing habitat of all the existing sockeye producing lakes in the Columbia River Basin *combined* (including Wenatchee, Osoyoos, and Redfish lakes)[9]. Moreover, additional rearing habitat compliments improved spawning habitats (e.g., Douglas PUD's Okanagan Basin Fish Water Management Tool) that have already increased the survival of juvenile sockeye within the Okanogan Basin.

Because the HC has agreed that sockeye mitigation is best achieved by reestablishing natural production; and because fry releases are necessary for making a decision whether to open passage to Skaha Lake (i.e., reestablishing natural production); HCP compliance should initially be evaluated in terms of fry planted annually in the context of the reintroduction program, rather than production of hatchery smolts. This distinction is important because the success of the reintroduction program may be completely independent of the number of hatchery smolts produced. Alternatively, using a hatchery smolt target as a compliance metric could lead to the early abandonment of an otherwise promising program: If the Skaha reintroduction program is successful at providing the ecological justification for opening Skaha Lake, but does not regularly produce the HCP target of 591,040 smolts, the program could be considered a failure under the strict interpretation of the HCP production tables. For this reason, a more appropriate interim metric would be the number of fry planted necessary to properly implement the reintroduction evaluation.

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[6] Wright, Howie, and Howard Smith, Editor. 2003. Management Plan for Experimental Reintroduction of Sockeye into Skaha Lake: Proposed Implementation, Monitoring, and Evaluation. Prepared by Okanagan Nation Alliance Fisheries Department, Westbank, BC.

[7] Wright, H., S. Lawrence, and B. Rebellato. 2003. Evaluation of an Experimental Reintroduction of Sockeye Salmon into Skaha Lake; Year 3 of 3; Addendum to the Assessment of Juvenile Oncorhynchus nerka (Sockeye and Kokanee) Rearing Conditions of Skaha and Osoyoos Lakes 2002 Section of the 2002 Technical Report. Project No. 200001300. BPA Report DOE/BP-00005136-5.

[8] Fisher, C., D. Machin, H. Wright, and K. Long. 2002. Evaluation of an Experimental Re-introduction of Sockeye Salmon into Skaha Lake; Year 2 of 3. Project No. 200001300. BPA Report DOE/BP-00005136-2.

[9] Mullan, J.W. 1986. Determinants of sockeye salmon abundance in the Columbia River, 1880's-1982: a review and synthesis. Biological Report 86(12) September, 1986. Fish and Wildlife Service U.S. Department of Interior

Evaluating reintroduction potential requires a larger number of sockeye fry than are currently available, and the District, in collaboration with Grant PUD, is considering funding the construction and operation of a new multimillion dollar Penticton Hatchery to meet production required for reintroduction efforts. In order for the District to proceed with funding hatchery construction, the District needs assurance that the HC will support the annual fry plant target for the course of the experimental reintroduction program and beyond, if supported by the Canadian Okanagan Basin Technical Working Group [COBTWG; Fisheries and Oceans Canada, Okanagan Nation Alliance Fisheries Program, and the B.C. Ministry of Environment]. On July 2nd, 2010, COBTWG provided approval in principle to a five year extension (i.e., to the 2020 brood-year with releases in 2021) of the experimental use of the hatchery-origin sockeye in Skaha Lake based upon the success of the program to date.

In summary, the HC requires that the District meet its mitigation requirements for sockeye production but would also presumably support the District's funding of a program that has potential to influence the decision to reopen major sockeye habitats of the Upper Columbia River, potentially increasing natural production that could greatly exceed current hatchery production. The limiting factor is that, up to this point, the District and HC parties have agreed on a hatchery smolt production target that is not necessarily aligned with the intended purpose of the program the District is currently funding. Both the District and the HC parties are at some risk of not achieving the maximum benefit of the Skaha Program if there is not a clear linkage between HCP mitigation credit and the implementation of the reintroduction program.

Statement of Agreement

The Rocky Reach and Rock Island Habitat Conservation Plans' (HCP) Hatchery Committees agree that:

1. The "mitigation goal" of the Skaha Program is establishing natural production and significant new rearing habitats in Skaha Lake and potentially Okanogan Lake.

2. The District, in collaboration with Grant PUD, will provide funding for hatchery operations, monitoring and evaluation, and construction of a hatchery in Penticton to produce sufficient quantities of fry to support reintroduction efforts. COBTWG has agreed in principle to an additional 5 years of fry production through broodyear 2020.

3. The HC agrees to support the District's funding and implementation of the Skaha program, from 2010 through 2021 (i.e., release of the 2020 brood year), in order to meet the District's No Net Impact (NNI) sockeye obligation for the Okanogan Basin.

4. In the event reintroduction is successful, the District will receive NNI credit for Rocky Reach and Rock Island projects from (1) natural-origin smolts emigrating from Skaha and Okanogan lakes <u>and</u> (2) fry produced by the District-funded hatchery.

5. In the event that reintroduction is not successful, as defined by (1) discontinued support by COBTWG, or (2) a determination made by the HC following a comprehensive program assessment in 2021, the District will implement alternative mitigation measures determined by

the HC to satisfy NNI obligations for sockeye salmon. Alternative mitigation options could include, but are not limited to, funding an NNI account earmarked for sockeye enhancement or a production swap involving another species.

6. As a contingency for additional production at the Penticton hatchery in the future, the District will acquire the space and core infrastructure necessary to construct hatchery capacity for an 8 million egg program (i.e., 3 million more eggs than is currently approved). The program has approval from COBTWG for 5 million eggs until broodyear 2020.

7. If the Skaha Program is determined to be successful prior to 2021, the HC may require the District to expand the Penticton hatchery program to 8 million eggs, and reallocate all or a portion of the resulting fry production for use in Okanogan Lake until 2021, pending COBTWG approval of an Okanogan Lake reintroduction program.

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FINAL MEMORANDUM

To:	Wells, Rocky Reach, and Rock Island HCP Hatchery Committees	**Date:**	October 20, 2010
From:	Michael Schiewe, Chair, HCP Hatchery Committees		
Cc:	Carmen Andonaegui		
Re:	Final Minutes of September 15, 2010 HCP Hatchery Committees Meeting		

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Hatchery Committees met at the Chelan PUD offices in Wenatchee, Washington, on Wednesday, September 15, 2010, from 9:30 am to 3:00 pm. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Hatchery Committees members will provide comments on the draft Wells Hatchery Steelhead Hatchery Genetic Management Plan (HGMP) to Douglas PUD and copy all Committee members. Comments are due October 8 (Item II-B).
- Josh Murauskas will convene a group of Hatchery Committee members to report back to the Committees on proposed changes to Chelan PUD's PIT tag program for 2011, no later than the next Hatchery Committees meeting on October 20 (Item III-A).
- Douglas PUD's Draft 2008 Monitoring and Evaluation (M&E) report is out for review and comments are due October 18 to Douglas PUD with copies to the Hatchery Committees (Item VIII-D).

DECISION SUMMARY

- The Hatchery Committees approved Douglas PUD's request for access to excess rearing capacity at Wells and Methow hatcheries for Grant PUD production needs as per Interlocal Cooperative Agreement 430-1217 (Item II-A).

MEETING AGREEMENTS

- The Hatchery Committees agreed that there is limited value in the use of elastomer tags in steelhead programs and will discontinue their use. Chelan PUD, working with the Committees, will develop an alternative external marking plan for the 2012 brood for the Wenatchee steelhead hatchery program (Item III-C).

I. Welcome, Agenda Review, Meeting Minutes

The Hatchery Committee approved the August 26 conference call minutes and the August 18 Hatchery Committee meeting minutes, as revised.

II. Douglas PUD

A. Decision Item – Request by Grant PUD for Access to Excess Rearing Capacity (Greg Mackey)

Greg Mackey provided copies of a letter from Grant PUD requesting access to excess rearing capacity (Attachment B). The amount of rearing capacity needed will be determined in discussion by the Priest Rapids Coordinating Committee (PRCC). The Committees discussed whether rearing these steelhead and spring Chinook would impact HCP production, and concluded that it would not. The Committees approved the request.

B. Discussion of Wells Hatchery Steelhead HGMP SOA (Greg Mackey)

Greg Mackey reported that the draft Wells Hatchery Steelhead HGMP was originally introduced last winter to the Hatchery Committee meeting but that Committee members were not able to resolve issues related to how many juvenile fish will be released and at what locations. Mackey provided a list of key points of the Wells Hatchery steelhead HGMP (Attachment C). Mackey stated that no further substantive changes have been made to the HGMP since the draft discussed by the Committee in the March 2010 Hatchery Committee meeting, only formatting and editorial changes. The draft HGMP specifies a total Methow Basin release of 250,000 smolts in combination with Winthrop National Fish Hatchery (NFH) production. Douglas PUD production would include the 48,858 Twisp smolts, plus up to 100,000 additional smolts in the mainstem Methow River as required to achieve 250,000 smolts in combination with the Winthrop NFH production. Wells steelhead not released in the Methow Basin will be released from Wells Hatchery, downstream of Wells Dam, and be available for down-river fisheries. Mackey indicated that Douglas PUD will be requesting a vote by the Committee in October on a Statement of Agreement (SOA) approving the HGMP (Attachment D) and they are asking for comments on the draft at this time.

Bill Gale asked if the current version of the HGMP anticipates an immediate reduction from the current 450,000 juvenile steelhead release level to the 250,000 release level. Mackey responded that the draft HGMP does not contain a phased transition from current production levels. Keely Murdoch asked Mackey whether Douglas PUD was aware that the Yakama Nation (YN), Washington Department of Fish and Wildlife (WDFW), and U.S. Fish and Wildlife Service (USFWS) were working on a steelhead management plan for the Methow Basin. Mackey responded that the current draft HGMP addresses Douglas PUD's plan for implementing the Wells Hatchery steelhead program, and that Douglas PUD is committed to moving the HGMP forward through a HC Committee vote in October. He reminded the Committee that National Marine Fisheries Service (NMFS) had requested a revised HGMP in October 2008, and that Douglas PUD, with their new Federal Energy Regulatory Commission (FERC) license pending, is reluctant to delay action any longer. If the HGMP is not approved by the Hatchery Committee, Douglas PUD would likely elevate the issue to the Coordinating Committee for dispute resolution. Mike Schiewe said the HCP dispute-resolution process could take up to 2 to 3 months. Mackey said Douglas PUD's goal is to get an Incidental Take permit no later than 2013. To do this, they need to submit a draft HGMP to National Oceanic and Atmospheric Administration (NOAA) to start the permitting process.

Gale asked Rob Jones whether NOAA will require the HGMP to be consistent with agreements reached under *U.S. v Oregon*. Gale referred to an April 28, 2010, letter signed by Rob Walton (NOAA) that describes incorporating the *U.S. v Oregon* process into the Incidental Take permitting process. Jones responded that NOAA is committed to working within *U.S. v Oregon*, but also noted that a proposal to produce 350,000 juvenile steelhead was made to NOAA at a recent Production Advisory Committee meeting by WDFW, USFWS, and YN, and that NOAA expressed concern over adult management at that level of juvenile steelhead production. Jones further noted that NOAA has discussed with Douglas PUD (as the action agency) the need for a HGMP to move forward with the permitting process if the *U.S. v Oregon* parties cannot reach resolution.

The Committee discussed timelines for getting a HGMP to NOAA. Jones said it is NOAA's intent is to work through *US v OR*, the Production Advisory Committee (PAC), and the PAC Policy Committee, and to review HGMPs under Section 1.B(2) under the *US v OR* agreement. Tom Kahler asked how the proposed HGMP is not in agreement with the *U.S. v*

Oregon process. Gale responded it is not in agreement regarding juvenile release location. The Committee discussed the authorities covered by the *U.S. v Oregon* and the Incidental Take permitting process. Gale stated that USFWS is trying to mesh issues being addressed under *U.S. v Oregon* and the Wells Project HCP. Kahler stated that Douglas PUD must meet their HCP obligations and obtain Endangered Species Act (ESA) coverage. Schiewe reminded Mike Tonseth that WDFW is currently listed as a co-permittee on the draft HGMP. Mike Tonseth stated that if Douglas PUD moved forward with submitting the steelhead HGMP without concurrance of the committee that WDFW would likely request that they be removed as a co-applicant. To remain as a co-applicant with out concurrence could be viewed as being in support of the content of the HGMP when in fact it is presently in discussions/negotiations with other co-managers. Kahler pointed out that the HCPs require re-evaluation and adjustment of production levels in 2013. He expressed concern about how the HCP signatories intend to meet the requirements of the HCP since the adjusted numbers may not be consistent with current *U.S. v Oregon* production numbers. Schiewe stated that the re-evaluation in 2013 will be an issue for both Chelan and Douglas PUDs.

Gale said he has several suggested changes to the HGMP, and would like to see a transition period for going from current production to new production levels. He requested more time to allow for revisions to the HGMP. Kahler reminded the Committees that, with the exception of the YN, the Committees had previously preliminarily agreed to a release of 250,000 smolts as proposed in the draft Wells HGMP. His concern is that a change in production levels would lead to an HGMP that NOAA would not approve and that would not be biologically supportable. Gale stated that a revised steelhead HGMP had been under discussion in *U.S. v Oregon* Committees since February 2010, and he would like the opportunity to incorporate that information into the draft HGMP. Jones said he wants to move forward both in *U.S. v Oregon* and HCP processes, and that NOAA is ready to provide a formal analysis of the HGMP if submitted to NOAA along with a request for a permit. With NOAA's analysis, *U.S. v Oregon* parties would then have something concrete to respond to. Gale stated that the Hatchery Scientific Review Group (HSRG) recommendation for Wells steelhead allowed for smolt production of up to 320,000 juveniles. Kahler responded that the HSRG recommendation is for an integrated program of 100,000 smolts for the entire Methow Basin, with additional production of approximately 300,000 smolts. The additional production is only recommended under the condition that effective adult management would be in place to meet a 0.67 proportionate natural influence (PNI) for the population, which would require removal of 90 percent of the returning adults. Gale suggested that under the Risk Aversion section of the HGMP that the Committee could include guidelines that specified reduced production if adults cannot be managed to meet PNI goals.

Jones reminded the Committees that the high numbers of hatchery steelhead in the Methow were identified as a limiting factor to recovery in the Federal Columbia River Power System (FCRPS) Biological Opinion. NOAA would like to see the HGMP move forward. Regarding timelines for reaching resolution in the *U.S. v Oregon* process, Gale says they intend to have a guidance document ready no later than January 2011 for steelhead management. Kirk Truscott said there might need to be changes to the HGMP to reflect Grant PUD changes in production. Kahler indicated such changes could be incorporated in the HGMP. Truscott said he also would like to see language in the SOA and the HGMP regarding the possibility of smolt releases above Wells Dam, consistent with adult steelhead management strategies, to allow harvest opportunities for Colville Confederated Tribes (CCT). Mackey agreed, and Kahler believed that such language was already in the current draft. Murdoch stated that adult management needs to be discussed not only for steelhead but also for spring Chinook. Gale said setting targets for adult management actions with deadlines for implementing them, and then, under Risk Aversion, identifying actions that would be taken if adult management actions are not implemented, might be a solution. Gale requested that the vote for approval of the SOA be deferred to November to allow parties to provide comments on the proposed HGMP, with discussion in October. Tonseth and Truscott supported the delay until November. Schiewe clarified that the Committee is being asked to comment on the HGMP as proposed for submittal by Douglas PUD to NOAA. Committee members' comments should incorporate their respective agency positions being provided in the *U.S. v Oregon* workgroup to the extent that is possible. Jones said he supported deferring a vote on the Wells Steelhead HGMP SOA until November. Douglas agreed to delay a vote until November. Comments on the HGMP are due to Douglas PUD on October 8, with copies to the Committees members. There will be discussion of the HGMP at the next Hatchery Committees meeting, on October 20.

C. Update on Douglas PUD Participation in the New Chief Joseph Hatchery (Greg Mackey)

Greg Mackey provided a draft SOA for discussion and approval at the next Hatchery Committees meeting in October (Attachment E). Douglas PUD has met repeatedly with the CCT and Bonneville Power Administration (BPA) regarding their participation in the Chief Joseph Fish Hatchery programs. The SOA captures the points of these discussions. Once fish are on station at the Hatchery, Douglas PUD will participate in rearing at levels consistent with their No Net Impact (NNI) level for Okanogan Basin spring and summer Chinook. Mike Schiewe suggested including language in the SOA explaining how production will be adjusted consistent with NNI, rather than providing finite production numbers.

Kirk Truscott said the CCT supports the SOA as it provides a tangible mitigation effort for Chinook in the Okanogan Basin, which is currently not being addressed by the summer Chinook production in Carlton Pond. Joe Miller commented that Chelan PUD's summer Chinook NNI obligation is accounted for by production at Simalkameen. Mackey said the SOA will be a decision item at the next meeting.

D. Update on Adjustments to the 2010 Methow Spring Chinook Broodstock (Greg Mackey)

At Greg Mackey's request, Mike Tonseth updated the Hatchery Committees on the adjustment to 2010 spring Chinook production in the Methow. Tonseth said the adjustments are tied to the YN multi-species acclimation plan. Production of Twisp stock has been downsized to approximately 100,000 juveniles, (consistent with the production level identified in the Methow springdraft Spring Chinook HGMP for the Twisp River submitted to NOAA,), and MetComp production was increased in the rest of the Methow Basin to compensate for the lower Twisp production. Mike Schiewe asked if this was part of the Broodstock Protocols. Tonseth said it was not. The adjustments were made to support fish availability and marking schemes for the Yakama Nation-requested juvenile Chinook. HGMP production of 550,000 spring Chinook will be met. The balance of fish will be released from the Methow Hatchery (283,000) and in the Chewuch and Methow rivers.

E. Update on Approaching Recalculation for NNI under the HCPs (Joe Miller and Greg Mackey)

Greg Mackey reported that in 2013, recalculation of NNI is required under the HCPs. Mackey noted that as an example, the current NNI spring Chinook produced by Douglas is mitigating for 1.6 milion smolts when back-calculated. In order to have the number of juveniles in 2013 for release at the recalculated numbers, Douglas PUD has begun looking at production and considering how new production levels will be achieved. Joe Miller provided a draft document that summarized “Key Points for Recalculation” (Attachment F). The Wells Project HCP states NNI will be adjusted in 2013 . Chelan PUD’s Rocky Reach and Rock Island HCPs state that hatchery production levels, except for original inundation mitigation, shall be adjusted in 2013. Joe Miller indicated that the District’s current Section 10 permits provide coverage through 2013 (notwithstanding HGMP applications), representing 10 years of releases. Miller suggested that the recalculations should affect releases after 2013 based on the HCP language and the existing Section 10 permits. Steve Hays, who participated in the development of the HCPs, said that during development, it was not clearly defined when the recalculation should be implemented due to limitations associated with increasing or decreasing production based on the recalculation. Hays said there is no binding recalculation method in the HCPs.

Miller stated that many of Chelan PUD’s current programs are operating above the 7 percent production levels required to achieve NNI. Inundation impact mitigation will remain the same. He asked Hatchery Committees members to look carefully at the HCP language and begin to consider how production will be recalculated. Miller noted the production tables in the HCPs that were used to calculate initial production levels. Miller is looking for input from the Committees on how to move forward with recalculations. Mike Schiewe stated that it would be helpful to have one method for recalculation for all three HCPs. Miller said the method or methods will depend on the available data. Schiewe suggested providing some examples for the Committees. Miller is expecting to have a case study available for the October meeting. Schiewe requested some examples for Douglas PUD’s programs in the Methow as well. He said the goal will be to come up with a uniform recalculation method.

Kirk Truscott asked how the 7 percent yearling survival for Chelan PUD projects and the 3.8 percent survival for the Wells Project relate to subyearling survivals. Schiewe responded that the issue of subyearling Chinook survival testing has been the subject of ongoing review by the Coordinating Committees. The Coordinating Committees held a workgroup early in 2010 bringing in outside experts on subyearling survival studies. The consensus was that current technology is not sufficiently developed to accurately evaluate subyearling survival. The Coordinating Committees are continuing to monitor this situation, and in the interim, they are asking the PUDs to compile information on life history diversity of summer/fall

Chinook using passive integrated transponder tag (PIT-tag) data from the new Rocky Reach detection site.

III. Chelan PUD

A. Preliminary Results from 5-year Hatchery PIT-tag Evaluations (Josh Murauskas)

Josh Murauskas reported that Chelan PUD has released more than one million PIT-tagged salmon and steelhead since the 1980s. These fish were tagged to address numerous research questions and evaluate a variety of rearing and release strategies. Murauskas provided a summary of a preliminary evaluation of these tagged fish (Attachment G).

Murauskas said Chelan PUD would like to work with the Hatchery Committees to evaluate the continuing need for each of these tag groups, and develop formal study plans for those for which a continuing need exists. Prior to the next Committees meeting, Chelan PUD would like to convene a subset of Committee members to prepare a proposal for possible changes to Chelan PUD's PIT-tag program beginning in 2011. The proposal would be circulated by email to Committees members prior to the next meeting, if possible. The Committees expressed their support of a proposal for a 2011 PIT-tag study plan.

B. Carlton Pond and Methow Hatchery (Josh Murauskas)

Josh Murauskas reported that when Douglas PUD reduced their summer Chinook production at Carlton Pond based on 3.8 percent project survival results, Chelan PUD agreed to maintain Douglas PUD's original summer Chinook production level at Carlton Pond through 2013. Chelan PUD also agreed to maintain full capacity of spring Chinook production at the Methow Hatchery through 2013. Chelan PUD's NNI obligation is production of 90,000 spring Chinook at the Methow Hatchery. Chelan PUD has agreed to produce 288,000 through 2013 to maintain full production at the facility. Murauskas provided a memo explaining the production agreements through 2013 (Attachment H). Beginning with the brood year 2011, Chelan PUD will adjust production at both Carlton Pond and the Methow Hatchery consistent with the 2013 adjustment.

C. Steelhead Marking Plans for 2011 (Joe Miller)

Joe Miller reported that the Wenatchee steelhead program has evolved over time and will likely undergo additional changes in the future. He said that Chelan PUD has been using elastomer tags to externally mark hatchery steelhead for several years, but that problems with the reliability of elastomer tags compromises data derived from these tags which may be shed and are difficult to see. In particular, SAR calaculations for steelhead may have been compromised. Additionally, the interrogation of fish withelastomer tags requires the same amount of handling as fish marked with internal tags. Miller suggested that the combination of poor performance and a high degree of handling makes elastomer tagging an undesirable choice for marking listed steelhead. With new HGMP requirements to manage adult steelhead, Chelan PUD would like the Hatchery Committees to consider the use of ventral fin clips rather than elastomer tags for hatchery-origin wild-by-wild (WxW) fish (see proposal in Attachment I). Miller suggested that without readily visible external marks, any tributary adult management scheme would rely on weir removal rather than anglers removing fish. Miller suggested that the public would not view this favorably.

Mike Tonseth stated that he thinks ventral clips would be more acceptable than adipose clips, citing Shuck et al., in which it was concluded that ventral clips do not negatively affect survival. Keely Murdoch stated that the YN is aware of research that ventral clips on coho may have negative survival effects and is not prepared to agree to ventral clips, especially for steelhead. Joe Miller said Chelan PUD will look more closely into the effects of ventral clip marking on fish, and they are open to any effective alternatives. Committees members agreed to review external tagging alternatives in preparation for further discussion. Mike Tonseth stated the need for broader consideration of external marking schemes for steelhead to distinguish among supplementation programs in the Upper Columbia.

The Committees agreed that there was limited value in the continued use of elastomer tags, and agreed to discontinue their use. Chelan PUD, working with the Committees, will develop an alternative external marking plan for the 2012 brood for the Wenatchee steelhead program.

D. NOAA Letter of Support for Chelan PUD Request for Chiwawa Water Rights (Joe Miller)

Joe Miller asked Rob Jones if he had received from Alene Underwood a copy of the letter previously sent to Washington State Department of Ecology (Ecology) by USFWS regarding their support for Chelan PUD's application for an expanded water right for the Chiwawa Ponds. Miller explained that before Ecology will process Chelan PUD's request, they require a letter of support from NOAA. Jones said he would look into this and get back to Chelan PUD. Miller stated that if NOAA had not received the letter, he will send resend it.

IV. Yakama Nation

A. Multi-species Acclimation Project 2011 and Presentation of 2009 Acclimation Results (Cory Kamphaus)

Cory Kamphaus presented preliminary results from the 2010 expanded acclimation project (Attachment J). Kamphaus reported that in-pond steelhead growth rates were positive in Rohlfing's Pond. Although the original intent was to evaluate Rohlfing's Pond as a multi-species acclimation site, the size discrepancy and potential for predation between the larger juvenile steelhead and the smaller juvenile coho required the use of a seine net to divide the pond and separate the species. For reference purposes, steelhead reared at the Chiwawa Acclimation Facility were used as the control for the acclimated steelhead; coho acclimation results were compared to coho acclimated at Butcher Creek Pond. Positive growth rates were demonstrated for both species. Sample sizes were small and, consequently, in-pond survival estimates had high variability. The rate of steelhead in-pond residualism was 0.27 percent at Rohlfing's Pond.

At Winthrop NFH, spring Chinook and coho were acclimated in a single rearing environment (the back channel) without partitioning. Positive and comparable growth rates were observed for both species. Target release sizes were obtained for both species. No apparent negative interactions occurred during acclimation between the two species.

The Hatchery Committees discussed the preliminary results. Keely Murdoch said the 2010 multi-species comparisons were intended largely to provide a gross indicator of whether multi-species acclimation is problematic. Mike Tonseth said it is important to document growth dynamics under multi-species acclimation conditions. The Committees discussed the importance of growth as an indicator of likely survival.

The Hatchery Committees reviewed comments that had been provided to the YN on the draft 2011 multi-species acclimation study plan. Murdoch said they have not yet revised the plan based on comments received. The YN received comments from Douglas PUD, Chelan PUD, and USFWS. Murdoch said some concerns expressed by Douglas PUD were larger than the objectives covered by the multi-species acclimation program. Kamphaus said multi-species acclimation is seeking to maximize limited opportunities for in-basin acclimation.

Greg Mackey stated that Douglas PUD's position on the multi-species acclimation program was to avoid altering management actions in the Twisp drainage during their steelhead relative reproductive success (RRS) study. The concern is that changing the rearing conditions of hatchery steelhead would introduce an uncontrolled variable that could compromise the ability to unambiguously compare the reproductive performance of hatchery versus wild fish. The Committees discussed the effects of the multi-species acclimation program on the steelhead reproductive success study. Murdoch stated that experimental conditions had already been changed with the change in broodstock. Mackey responded that this change had been intergrated into the study and approved by the Committees with the understanding that the broodstock change would occur, but not with any understanding that additional changes were planned. Tom Kahler stated the concern that introducing more variability, mid-study, will confound results. Because the reproductive success study was in an early phase, Mike Schiewe asked whether Douglas PUD would find it acceptable if the Lincoln Pond acclimation could be consistently used from this point on until the end of the experiment in 2021. Murdoch responded that the YN had assured funding only through 2017, and that there was no assurance that, even with funding, Lincoln Pond would be found a suitable acclimation site and continued beyond preliminary testing. Kahler said that the uncertainty of suitability of the Lincoln Pond for steelhead acclimation was his primary concern, and that testing that suitability during the ongoing RRS study presented a greater risk of confounding the study than starting acclimation at the outset and continuing throughout the study. Whatever was to be the release method for steelhead in the Twisp should be settled upon and not turned off and on or switched around during the course of the study.

Mike Tonseth stated a concern that Douglas PUD's comments suggested a lack of support for in-basin acclimation in general. Mackey responded that this was not Douglas PUD's intent, but that they were only seeking to protect the scientific integrity of the reproductive success study. Tonseth said that without acclimation, he was concerned that the reproductive success study might be using a hatchery program for comparison that will no longer be relevant by the time the study is completed. Tonseth said he sees the multi-species acclimation program as an opportunity to investigate acclimation options for steelhead, and that in-basin acclimation in the Twisp will eventually be required. Currently, Wells Hatchery Program juvenile steelhead are truck-planted at the Twisp Weir and upstream at Buttermilk Bridge. Kahler indicated that the draft HGMP covers acclimation of steelhead in the Twisp, and that Douglas PUD's Twisp acclimation pond was the site contemplated. The suitability of Twisp acclimation pond is known, with the only outstanding question one of whether to comingle steelhead with spring Chinook, to divide the pond with netting or screens, or to double-crop spring Chinook and steelhead. Kahler stated that Douglas PUD is wary of establishing an acclimation arrangement involving BPA with the possibility that BPA could discontinue funding in the future leaving Douglas PUD with a perceived or real obligation to support the funding in lieu of BPA, especially when we own a functional acclimation facility that could fulfill the acclimation objective.

Kamphaus said that a final decision on acclimation sites and species needs to be reached by the Committees by the spring of 2011 in time for the 2012 acclimation period. Murdoch indicated that she had asked some of the researchers conducting the reproductive success study whether changing acclimation conditions would confound results; she indicated that they said they did not believe that would be the case. Schiewe asked Rob Jones whether NMFS science center staff who had initially reviewed the experimental design for the study had been advised of this potential change and if they had further evaluated the effects of changing acclimation condition. Jones indicated that they had not but said he would request review. Kirk Truscott said he would want assurance that the reproductive success study would evaluate a fish supplementation program that will be implemented. Murdoch will talk to YN staff regarding changing juvenile acclimation from Lincoln Pond to the Twisp Pond. Parties still in disagreement on any portions of the YN 2011 Multi-species Acclimation Plan will discuss their issues further with the YN and seek resolution.

V. Colville Confederated Tribes

A. Bonaparte Summer Chinook (Kirk Truscott)

Kirk Truscott reported that the transfer of 200,000 summer Chinook to Bonaparte Pond is on schedule.

VI. WDFW

A. Blackbird Island Pond (Mike Tonseth)

Mike Tonseth reported that excess adult steelhead removed at Tumwater Dam have been distributed to area food banks and tribes. Some have also been relocated to Blackbird Pond for harvest in the kid's fishery.

VII. HETT

A. Update (Mike Schiewe)

Mike Schiewe reported that Carmen Andonaegui will begin facilitating the Hatchery Evaluation Technical Team (HETT) until it completes its assigned tasks. The next meeting date is October 12. The HETT did not meet this month, so there is no update.

VIII. HCP Administration

A. Next Meetings

The next scheduled Hatchery Committees meetings will occur as follows: October 20, November 17, and December 15, all in Wenatchee.

B. Presentation to the USCRB (Mike Schiewe)

Mike Schiewe reported he sent out a near final draft of a presentation on the HCPs he will give to the Upper Columbia Salmon Recovery Board (UCSRB) at their request on September 23. He last presented to the UCSRB about 2 years ago; this presentation is a refresher. Comments are welcome by the end of this week.

C. Conflict-of-Interest Policy (Mike Schiewe)

Mike Schiewe reported he had received no additional comments on the draft Hatchery Committees Conflict-of-Interest Policy. He stated he will accept changes that were already submitted, finalize the Policy, and distribute a SOA for implementing the Policy on a 2-year trail basis.

D. Douglas PUD Draft M&E Report (Mike Schiewe)

Douglas PUD's draft 2008 M&E report is out for review. Comments are due October 18 to Douglas PUD with copies to the Hatchery Committees. Douglas PUD can finalize the report if it receives no comments by the comment due date.

List of Attachments

Attachment A – List of Attendees
Attachment B – Grant PUD Request for Excess Rearing Capacity letter
Attachment C – Wells Steelhead HGMP Key Points
Attachment D – 2010 Wells Steelhead Hatchery and Genetics Management Plan SOA

Attachment E – Douglas PUD draft SOA Chief Joseph Okanogan Chinook Hatchery Mitigation Program

Attachment F – Chelan PUD NNI Recalculation Key Points

Attachment G – PowerPoint Presentation: Preliminary Results of a 5-year PIT-tag Evaluation

Attachment H – 2013 Carlton-Methow Production Memo

Attachment I – Chelan PUD Adult External Marking proposal

Attachment J – 2010 Preliminary Results of the YN Expanded Acclimation Project

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor QEA, LLC
Carmen Andonaegui	Anchor QEA, LLC
Joe Miller*	Chelan PUD
Josh Murauskas*	Chelan PUD
Tom Kahler*	Douglas PUD
Greg Mackey*	Douglas PUD
Rob Jones*	NOAA
Kirk Truscott*	CCT
Todd Pearsons	Grant PUD
Pat Phillips	WDFW
Bill Gale*	USFWS
Mike Tonseth*	WDFW
Cory Kamphaus	Yakama Nation
Keely Murdoch*	Yakama Nation
Steve Hays	Chelan PUD

* Denotes Hatchery Committees member or alternate

Attachment B

Grant County PUBLIC UTILITY DISTRICT

Excellence in Service and Leadership

August 26, 2010

Greg Mackey, Fisheries Biologist
Public Utility District No. 1 of Douglas County
1151 Valley Mall Parkway, East Wenatchee, WA 98802

Subject: Request for excess rearing capacity per Interlocal Cooperative Agreement 430-1217

Dear Greg,

In August 2004, the Public Utility District No. 1 of Douglas County (Douglas PUD) and the Public Utility District No. 2 of Grant County (Grant PUD) jointly entered into an Interlocal Cooperative Agreement 430-1217 (Agreement) intended to provide Grant PUD with access to excess capacity at Douglas PUD's existing Methow and Wells fish hatcheries.

Under Agreement 430-1217, Douglas PUD allows Grant PUD to utilize excess rearing capacity at the Wells and Methow fish hatcheries, owned by Douglas PUD and operated by WDFW, to rear UCR steelhead, UCR spring Chinook salmon, summer Chinook salmon, and survival study fish. The term of Agreement is 10 years, signed August 9, 2004. Under the Agreement, Grant PUD has the opportunity to request use of the excess rearing capacity for five groups of fish (not all groups can be reared during the same annual cycle), which are summarized below.

- Group 1 – Access to Douglas PUD's excess rearing capacity at the Wells Fish Hatchery (120,000 fish). The group 1 strategy only provides fish to Grant PUD for annual survival studies;
- Group 2 – Access to Douglas PUD's excess rearing capacity at the Wells Fish Hatchery for up to 200,000 yearling summer Chinook;
- Group 3 – Access to Douglas PUD's excess rearing capacity at the Wells Fish Hatchery for up to 100,000 yearling steelhead;
- Group 4 – Access to Douglas PUD's excess rearing capacity at the Methow Fish Hatchery for up to 201,000 yearling spring Chinook; and
- Group 5 – Access to Douglas PUD's excess rearing capacity at the Methow Fish Hatchery for up to an additional 188,000 yearling spring Chinook.

At this time, Grant PUD is requesting formal approval from Douglas PUD to implement the following two groups at Methow and Wells hatchery facilities for brood years 2011 (spring Chinook) and 2012 (steelhead), respectively. We recommend this request be presented in the Habitat Conservation Plan for approval in the September meeting as Grant PUD is planning to present this letter in the Priest Rapids Coordinating Committee Hatchery Subcommittee meeting on September 16.

- **Group 3 – Between 60,000 and 100,000 summer steelhead (brood year 2012) from the Wells Hatchery, with written notification from Grant PUD six months prior to brood collection for the desired amount.**

- **Group 4 – Up to 201,000 spring Chinook (brood year 2011) from the Methow Hatchery.**

This request does not limit Grant PUD's ability to request production levels for other species (such as yearling summer Chinook) in out-years at the Wells or Methow facilities. Specific details contained in the Interlocal Cooperative Agreement can be reviewed at http://www.gcpud.org/resources/resdocs/index.htm

Following formal approval by the Priest Rapids Coordinating Committee and Priest Rapids Hatchery Subcommittee and pursuant to Section 8 (Notification) of the Interlocal Cooperation Agreement, Grant PUD will submit to Douglas PUD written notification of the production levels required to meet Grant PUD's requirements under the Biological Opinion issued for the Priest Rapids Hydroelectric Project (FERC No. 2114) by NMFS on February 1, 2008 and included in FERC License Order issued on April 17, 2008.

Sincerely,

Tom Dresser

Tom Dresser, Manager Fish, Wildlife, Water Quality

Cc: NR-Records
430-1217 contract file
Shane Bickford
Jeff Grizzell
Priest Rapids Coordinating Committee
Elizabeth McManus for Priest Rapids Coordinating Committee HSC

HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Wells Hatchery Summer Steelhead Program

2 September 2010 Wells HCP Hatchery Committee

Key points of the HGMP

1. Size of the Steelhead Smolt Programs
   - Twisp Integrated: 48,858 WxW smolts. This is the current NNI smolt program size. Number of fish needed to achieve NNI may adjust based upon the results of future survival studies at Wells.
   - Lower Methow Integrated: 100,000 HxW smolts. Fixed Hatchery Compensation.
   - Segregated Harvest Enhancement Program: 200,000 HxH smolts. Fixed Hatchery Compensation.
2. Phases I and II
   - Twisp Integrated: 48,858 WxW smolts in both Phases I and II.
   - Lower Methow: capped at 100,000 HxW Integrated smolts in Phase I and will augment total Methow Basin smolt production to achieve 250,000 smolts from Wells and Winthrop hatcheries combined. If total Methow Basin steelhead production is anticipated to exceed 250,000 smolts per year, then the Wells Fish Hatchery contribution to the Lower Methow will be reduced by transitioning to a HxH Segregated smolt release in the Columbia River below Wells Dam (Phase II) where adults can be properly segregated from the three integrated recovery programs proposed for the rivers upstream of Wells Dam.
   - Columbia Mainstem Segregated (200,000 HxH smolts). Released from Wells Hatchery. Phase I: 200,000 smolts. In Phase II, component releases may increase up to 300,000 smolts dependent on decreases in the Lower Methow component.
   - Up to 80,000 smolts for Grant PUD Okanogan mitigation, transitioning to Cassimer Bar Hatchery.
3. Broodstock Collection:
   - Twisp Integrated: 26 wild fish collected at the Twisp weir.
   - Lower Methow Integrated: 26 wild and 26 hatchery-origin collected in the Methow Basin.
   - Segregated Harvest Enhancement Program: 104 hatchery-origin fish collected at Wells Hatchery volunteer channel (1st option) and Wells Dam (if needed).
   - Grant PUD mitigation: 42 adult steelhead of hatchery or natural-origin collected from Wells Hatchery, Wells Dam, or from the Okanogan Basin.
4. Management of Excess Adult Hatchery Steelhead
   - Expected Range of Hatchery Adult Returns:
     Twisp River (48,858 smolts) – maximum (1,011), average (484), minimum (132)
     Lower Methow (100,000 smolts) – maximum (2,070), average (990), minimum (270)
     Mainstem Columbia (200,000 smolts) - maximum (4,140), average (1,980), minimum (540)
   - Columbia Mainstem Segregated (below Wells Dam): Fish will be removed via the Wells Hatchery volunteer channel. We expect high fidelity to the volunteer channel and expect, based on past experience, that this will effectively remove a large proportion of the excess hatchery fish.
   - Twisp Integrated: Hatchery fish will be removed at the Twisp Weir according to management plan that identifies target spawning escapement and proportion of hatchery-origin spawners directed at a pHOS of 0.5 and an average PNI of 0.67, consistent with the Relative Spawning Success Study.
   - Methow Basin: Control pHOS to the extent practicable, with near-term goal of achieving PNI = 0.5, and long-term goal of 0.67.
   - Conservation Fishery: May be implemented by WDFW to control pHOS and work toward PNI targets.
   - Wells Dam: Wells Dam may be used to control escapement of hatchery-origin fish that were released as juveniles downstream of Wells Dam, only.
5. Monitoring and Evaluation
   - The *Conceptual Approach to Monitoring and Evaluation for Hatchery Programs* funded by Douglas PUD will be used as the HGMP assessment program. Results will be used to adaptively manage under the HGMP.

Wells HCP Hatchery Committee
Statement of Agreement
2010 Wells Hatchery Steelhead Hatchery and Genetics Management Plan

September 2, 2010

Statement

The Wells HCP Hatchery Committee approves the Hatchery and Genetic Management Plan (HGMP) for the Wells Hatchery Summer Steelhead Program, dated September XX, 2010.

Background

The Wells HCP requires Douglas PUD to produce hatchery steelhead toward achieving the NNI goal of the HCP. Steelhead passage survival at Wells has been measured to average 96.2% during three years of study. The release of 48,858 integrated WxW steelhead smolts[1] in the Twisp River is mitigation for the unavoidable loss of 3.8% of the juvenile steelhead migrating through the Wells Project.

The Wells HCP also requires Douglas PUD to produce 300,000 steelhead smolts to satisfy fixed hatchery production requirements in the Wells Project license. Currently, all 300,000 of the harvest-enhancement smolts are released into the Methow and Okanogan rivers. The ICTRT and HSRG recommend significant reductions in the production of hatchery steelhead upstream of Wells Dam. The HSRG concluded that the Methow Basin could support an integrated program of approximately 100,000 smolts produced from locally adapted steelhead, provided that the program was managed to achieve an average PNI of 0.67 or greater. The HSRG also recommended the segregation of any production programs in excess of the 100,000 integrated smolts. The Wells Steelhead HGMP specifies release of up to 100,000 HxW steelhead smolts in the lower Methow River to augment a combined Methow Basin Wells and Winthrop hatcheries release of 250,000 smolts. The remaining 200,000 smolts will be released below Wells Dam as a segregated harvest-enhancement program. Lower Methow smolts in excess of those needed to achieve 250,000 smolts for the Methow Basin will be transitioned to the segregated harvest-enhancement program below Wells Dam.

Grant PUD is required to produce up to 100,000 steelhead smolts in the Okanogan River toward achievement of current NNI goals for the Priest Rapids Hydroelectric Project. During Phase I of the Wells Steelhead HGMP, Douglas PUD will continue rearing up to 80,000 Okanogan River steelhead smolts on behalf of Grant PUD under a hatchery sharing agreement. During Phase II of the Wells Steelhead HGMP, Grant PUD's steelhead program will transition to operating under the Colville Tribe's Okanogan Basin steelhead HGMP.

[1] Initial production levels subject to recalculation every 10 years beginning in 2013.

The Colville Tribes have submitted an HGMP to develop a 200,000 smolt integrated steelhead program in the Okanogan Basin, and the USFWS has submitted an HGMP to develop a 200,000 smolt integrated steelhead program at the Winthrop National Fish Hatchery (WNFH) on the Methow River. Douglas PUD's steelhead HGMP is intended to complement those two HGMPs by providing appropriate interim production while the Twisp, Winthrop, and Colville integrated programs are tested and developed. Once these integrated programs achieve release criteria specified in the Wells Hatchery Summer Steelhead Program HGMP, then all 300,000 of the Wells hatchery harvest-enhancement smolts will be released directly from the Wells Hatchery where returning adults can be properly segregated from the integrated programs upstream of Wells Dam.

Historically up to 550,000 smolts have been released annually above Wells Dam from the Wells Hatchery, WNFH, and the Grant PUD and Colville programs. During Phase II of the Wells Hatchery steelhead HGMP, an average of 450,000 steelhead smolts will be released above Wells Dam (50,000 Twisp, 200,000 Winthrop, 200,000 Okanogan), and an additional 300,000 steelhead will be released directly from the Wells Hatchery, bringing to 750,000 the total number of steelhead smolts released annually into the Wells Project.

Attachment E

Wells HCP Hatchery Committee
Statement of Agreement

Douglas County PUD Okanogan Basin Chinook Salmon Mitigation Strategy at Chief Joseph Hatchery

Revised 8-26-2010

Statement

The Wells HCP Hatchery Committee approves the Douglas PUD Okanogan Basin Chinook mitigation strategy that will provide compensation for unavoidable passage losses at Wells Dam for Okanogan Basin spring Chinook and for Okanogan Basin summer/fall Chinook consistent with the requirements of the Wells HCP.

To satisfy the No Net Impact commitment in the Okanogan Basin, Douglas PUD agrees to provide funding equivalent to 3.8% of the operation, maintenance, monitoring, and evaluation costs for the yearling spring Chinook and yearling summer/fall Chinook programs and 7% of those costs for the proposed subyearling summer/fall Chinook program at the new Chief Joseph Fish Hatchery. The 3.8% compensation level will also apply to the future conversion of the subyearling program to yearling production.

Background

On December 12, 2007 the Wells HCP Hatchery Committee approved a Statement of Agreement (SOA) that addressed Douglas PUD's Okanogan Basin spring Chinook obligation. The 3.8% level of production approved in this SOA reflects the current average survival rate for yearling fish migrating through the Wells Project (96.2%). The 3.8% level of passage-loss compensation is based upon the results of three years of survival studies conducted during Phase I of the Wells HCP. The results of future survival studies will be used to periodically adjust Douglas PUD's hatchery compensation programs starting in 2013 and then every ten years thereafter, as described in Section 8.4.5 of the Wells HCP.

At passage losses of 3.8% for yearling Chinook and an assumed 7% rate of loss for sub-yearling summer/fall Chinook, Douglas PUD would provide funding sufficient to rear up to 34,200 yearling spring Chinook smolts, up to 49,400 yearling summer/fall Chinook smolts, and up to 49,000 subyearling summer/fall Chinook for release upstream of Wells Dam in areas deemed appropriate by the Colville Confederated Tribes.

The number of fish funded by Douglas PUD is directly proportional to the number of fish produced at the Chief Joseph Hatchery on an annual basis. At full production the Chief Joseph Hatchery is expected to produce 900,000 spring Chinook smolts (34,200 yearlings for 3.8% NNI), 1,300,000 new yearling summer/fall Chinook smolts[1] (49,400 yearlings for 3.8% NNI), and 700,000 subyearling summer/fall Chinook (49,000 subyearlings for 7% NNI). Should the 700,000 subyearlings (40 fish per pound) be converted to 175,000 yearling smolts (10 fish per pound), then compensation levels for these new yearlings will be adjusted to the 3.8% level resulting in the production of 6,650 additional yearling smolts (3.8% x 175,000 smolts = 6,650 yearling smolts).

Douglas PUD's funding obligation will begin upon completion of the Chief Joseph Hatchery and once fish are being held within the newly constructed facility.

[1] This SOA assumes 1,300,000 new yearling summer/fall Chinook smolts; which represent a total of 1,500,000 summer/fall Chinook produced at the Chief Joseph Hatchery (CJH) with 200,000 of the 1,500,000 total CJH fish being reprogrammed Similkameen fish that were already covered by the original Wells HCP hatchery compensation package.

Recalculation 2013

September 15, 2010 Submitted by Joe Miller

Key Points

- 2013 is around the corner. 2011 Brood year = releases in 2013
- "Initial production levels" for NNI programs expire in 2013
- Survival study results should be available for most programs to define NNI levels
- "Inundation" production remains constant

Moving Forward

- The HCPs provide background. Tables in Rocky Reach and Rock Island HCPs define default 7% calculations
- The District would like to come to agreement with Hatchery Committee on a path forward to recalculate production
- In coming months we will offer some approaches for consideration and hope to get input from Hatchery Committee as early as possible –on any aspect of the 2013 recalculation

Attachment G

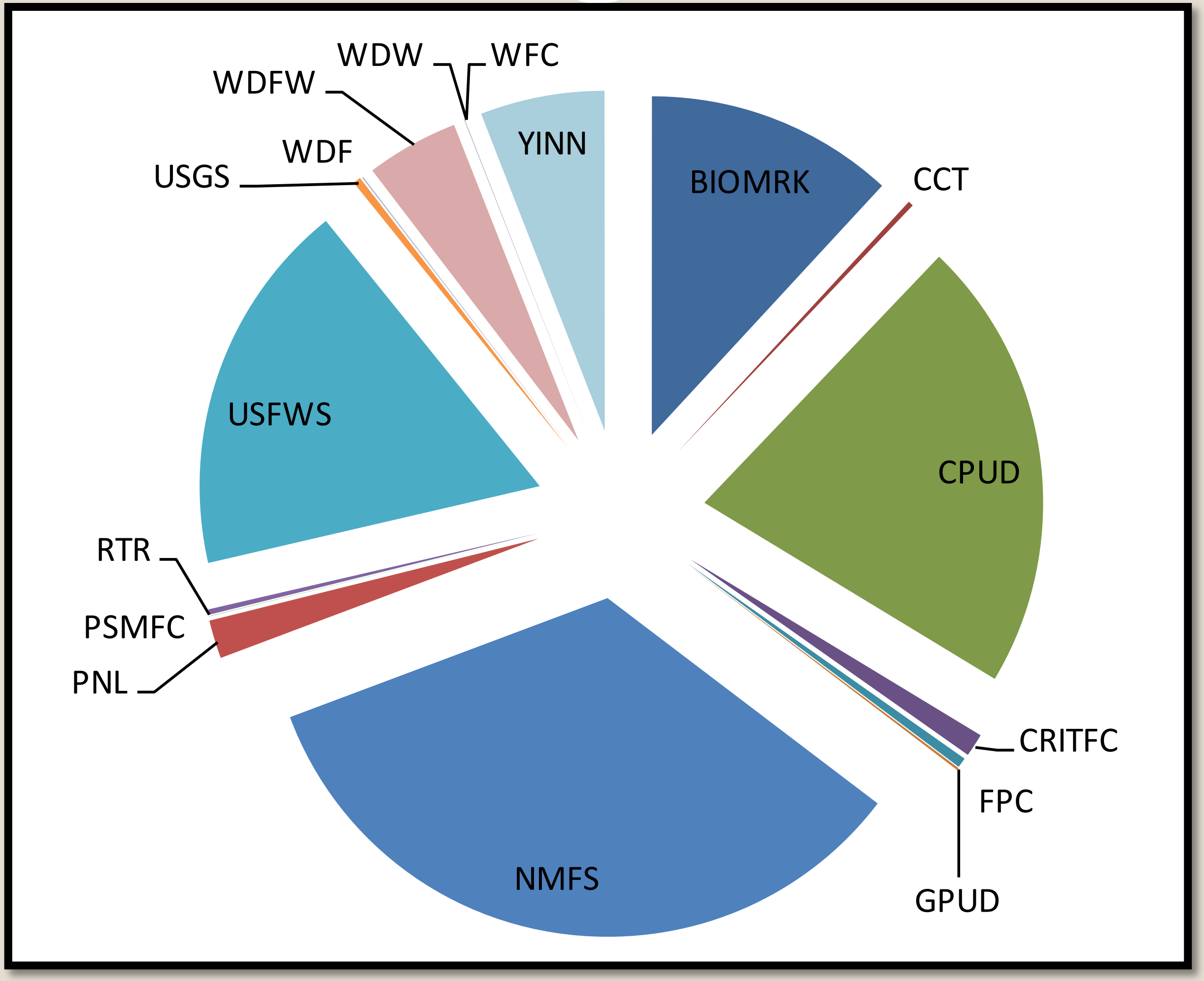
Five-Year Evaluation of Hatchery Program PIT Data

PRELIMINARY RESULTS
PRESENTED BY
J. MURAUSKAS
SEPTEMBER 15TH, 2010

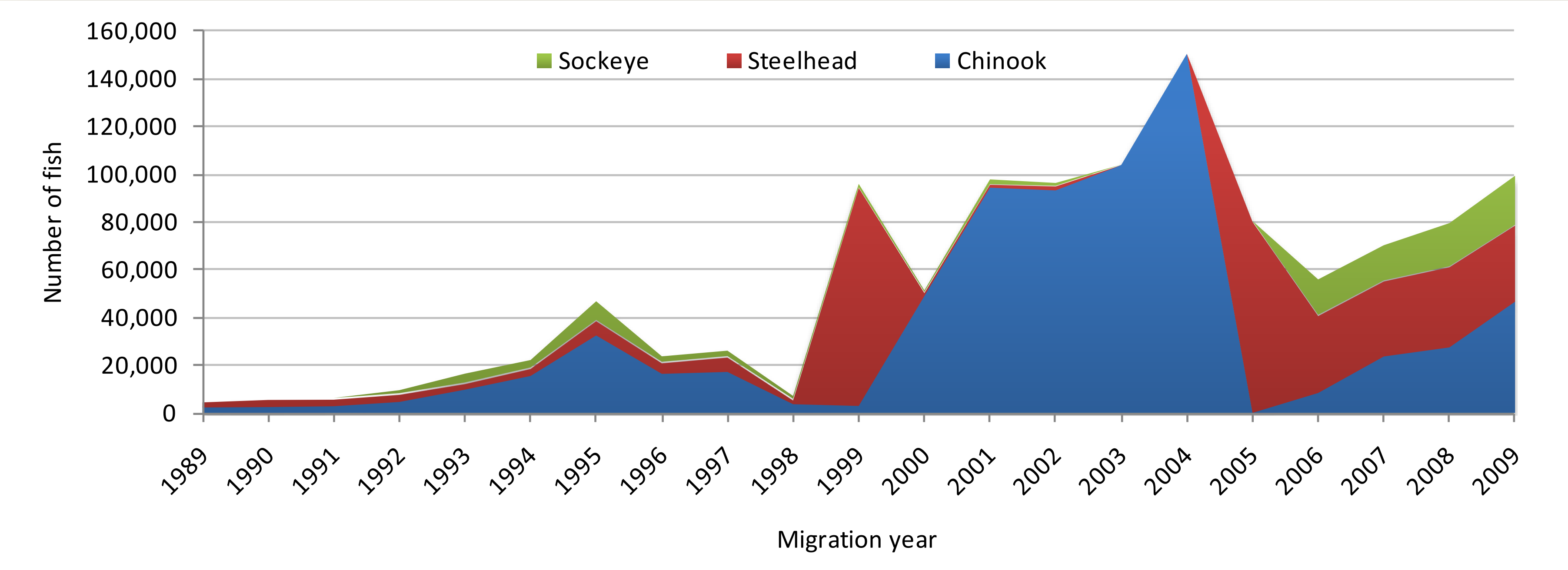
History of PIT-tagging in the Basin

- Onset of PIT-tagging in the 1980s
- Chelan has released over 1,000,000 tags
- Increase for survival studies in late '90s
- Five year hatchery program evaluation
  - Initiated in 2006
  - Focus on key hatchery programs

Upper Columbia PIT tags, 1987-2009



Chelan PIT-tagging, 1989-2009



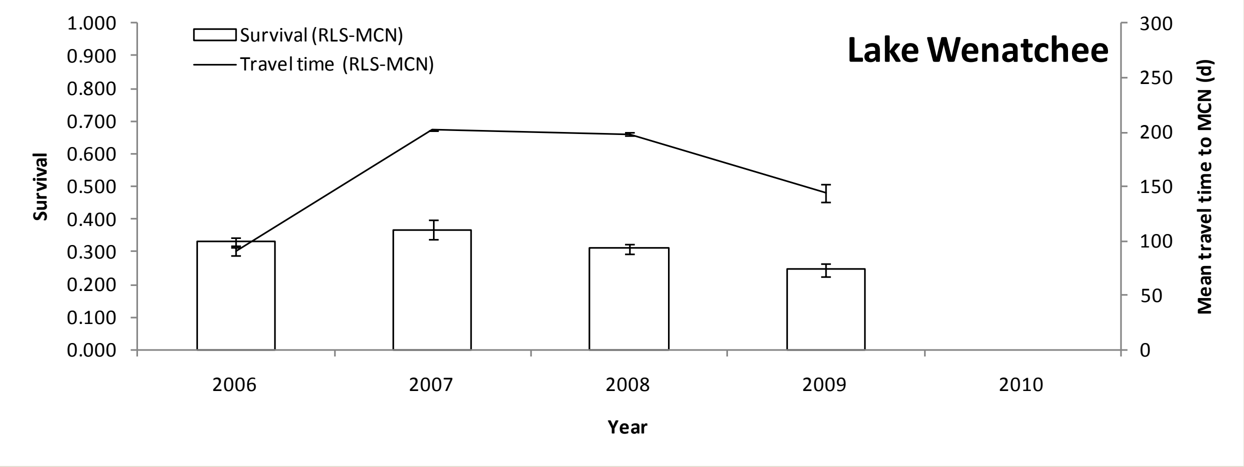
Five-Year Hatchery PIT Evaluation

- Downstream performance
  - Migratory distribution, travel time, & survival to McNary
- Comparisons by species, rear type, & release location
- Returning adult information
  - Steelhead SARs and stray rates
- Select regional and historical data for context

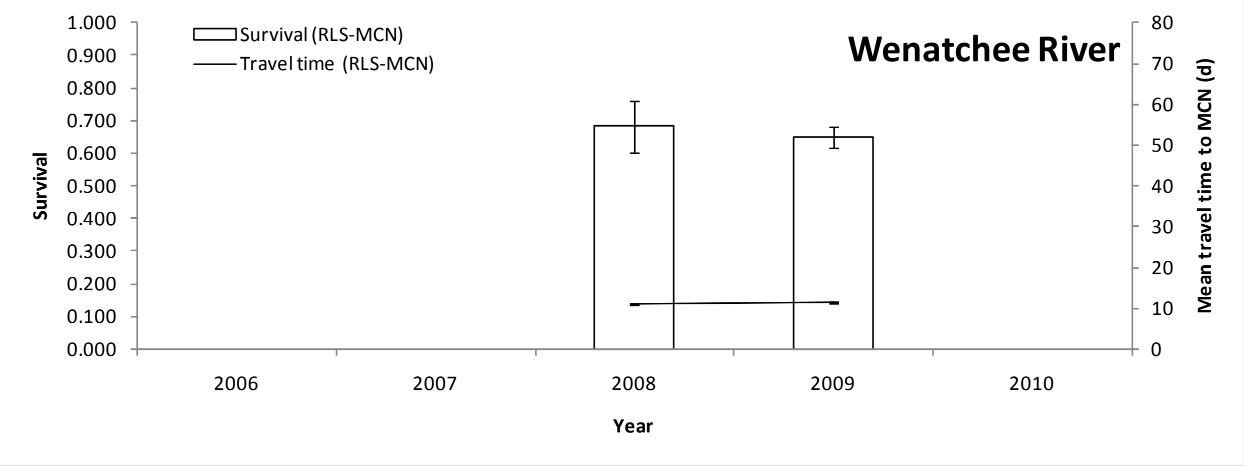
Species Overview

- Sockeye
  - Hatchery – Lake Wenatchee
  - Wild – Wenatchee R.
- Spring Chinook
  - Hatchery – Chiwawa Ponds
  - Wild – Chiwawa Trap and Chiwawa R.
- Steelhead
  - Hatchery – Nason C., Chiwawa R., Wenatchee R.
  - Wild - Chiwawa Trap, Wenatchee R.

Sockeye



Lake Wenatchee
Survival (RLS-MCN)
Travel time (RLS-MCN)
Survival
Mean travel time to MCN (d)
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
300
250
200
150
100
50
0
2006
2007
2008
2009
2010
Year

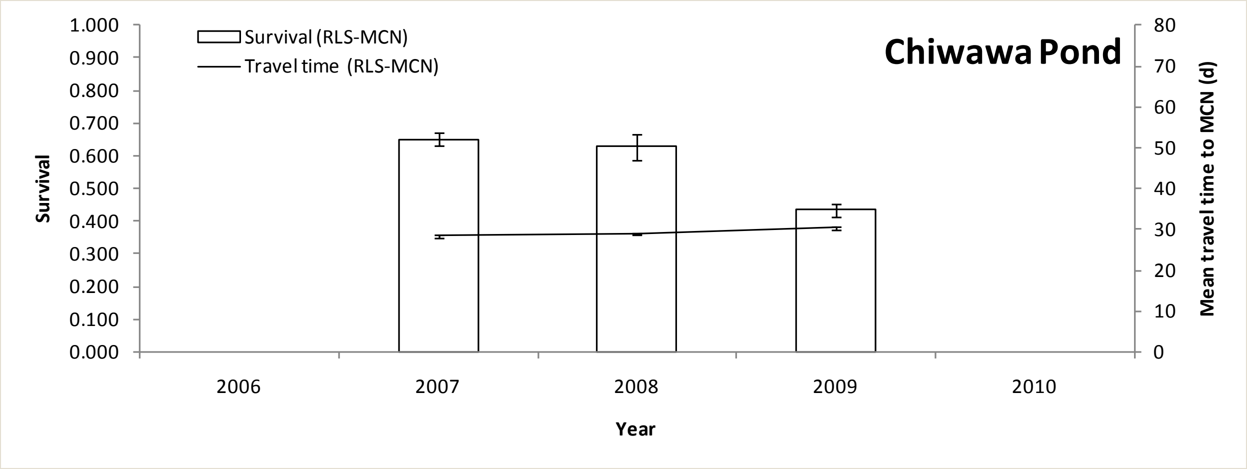


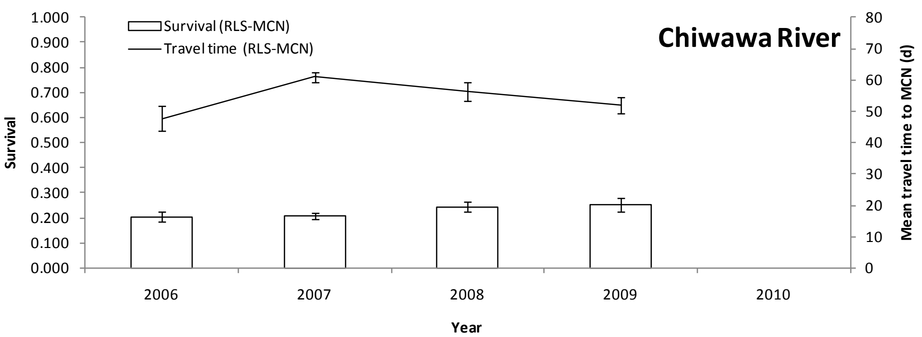
Wenatchee River
Survival (RLS-MCN)
Travel time (RLS-MCN)
Survival
Mean travel time to MCN (d)
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
80
70
60
50
40
30
20
10
0
2006
2007
2008
2009
2010
Year

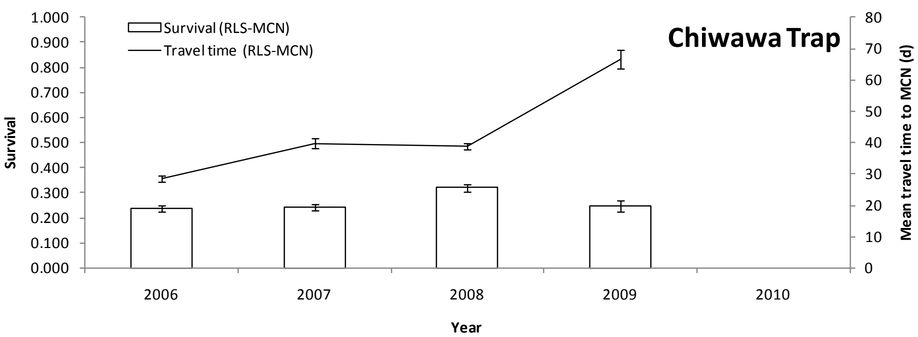
Sockeye

- Consistent results
  - ± 5% for hatchery fish; ± 2% for wild fish
- Outmigrants outperform overwintered fish
  - Does not account for overwinter, lake mortality, & residuals
- Excellent downstream performance of wild fish
  - 67% survival to MCN; 11 days to MCN

Spring Chinook



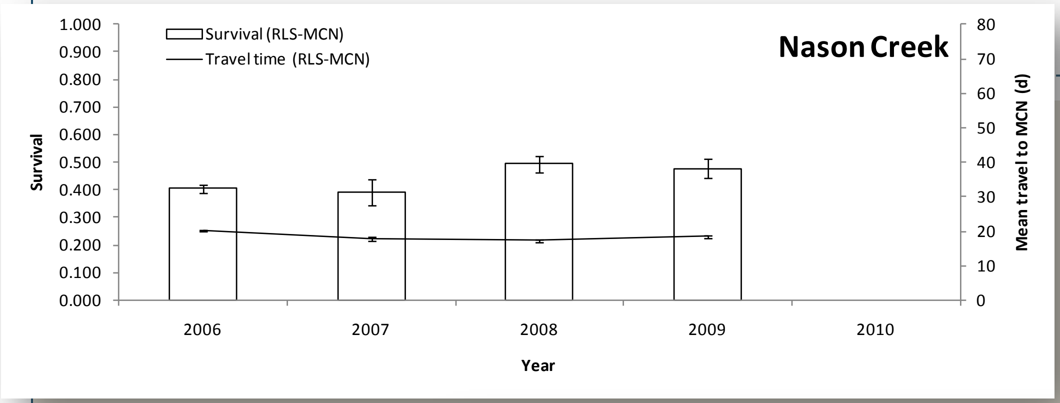




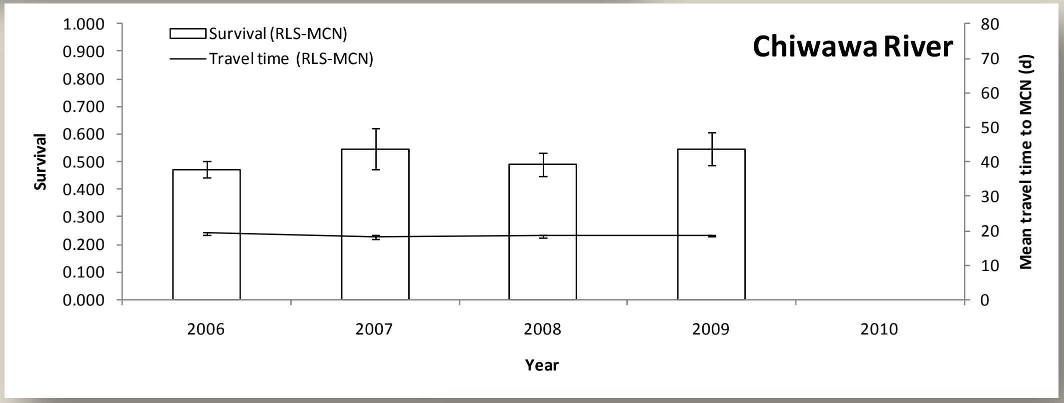
Spring Chinook

- Consistent results
    - ± 1.5% (excluding ’09); ± 2.5 to 4.0% for wild fish
- High performance compared to wild fish
- High performance compared to other programs
  - Hatchery fish from Leavenworth, Methow, Twisp, etc.
    - Multi-year averages from 0.282 to 0.550
  - Wild fish from Entiat R. and Nason C.
    - Single-year results from 0.090 to 0.144

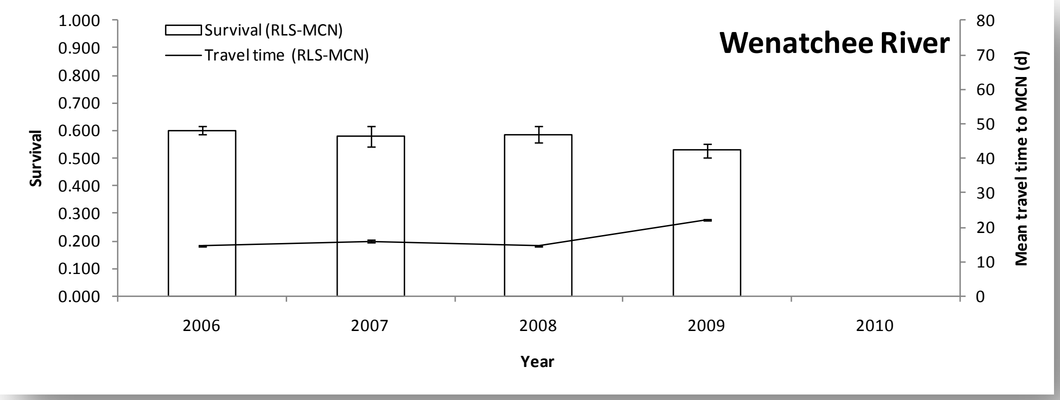
Steelhead



average = 0.442



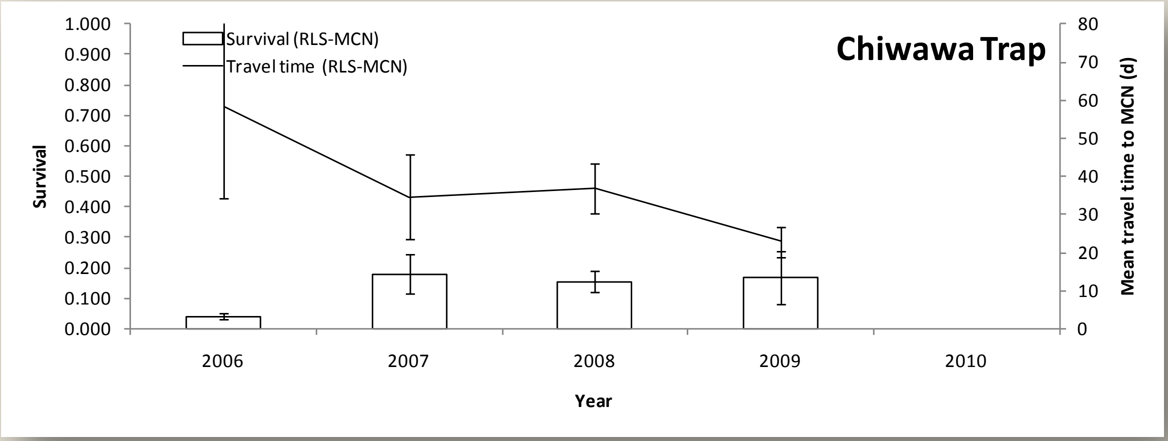
average = 0.514



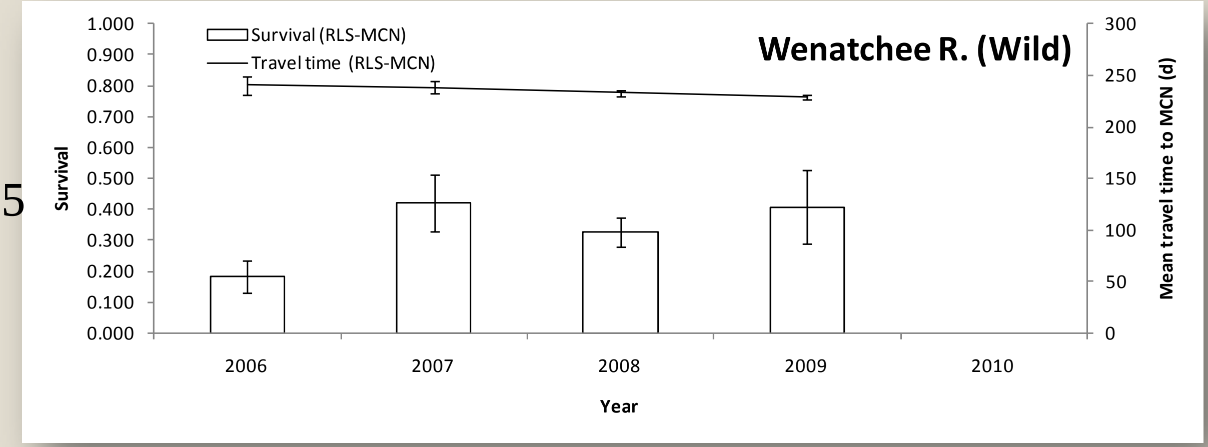
average = 0.575

Steelhead

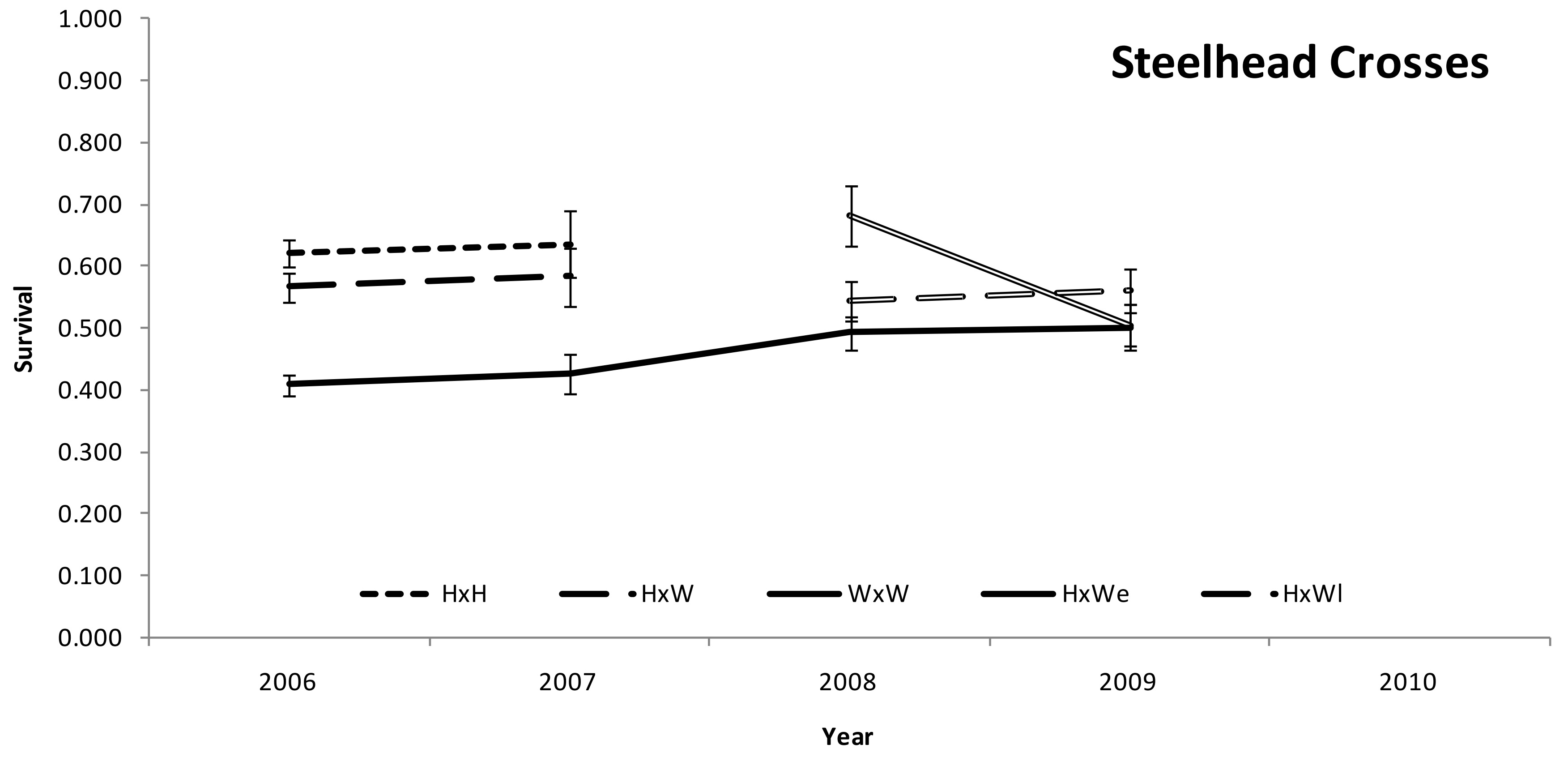
average = 0.136



average = 0.335



Steelhead


Steelhead Crosses
Survival
1.000
0.900
0.800
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
HxH
HxW
WxW
HxWe
HxWl
2006
2007
2008
2009
2010
Year

Steelhead

		Migration year			
Cross-type	**Release site**	**2006**	**2007**	**2008**	**2009**
HxH	WENATR	9,705	8,610	0	0
HxW	CHIWAR	2,439	3,448	0	0
	WENATR	7,379	5,021	0	0
HxWe	WENATR	0	0	8,215	9,280
HxWl	CHIWAR	0	0	2,882	2,008
	WENATR	0	0	6,456	6,710
WxW	CHIWAR	1,377	717	785	1,457
	NASONC	7,864	7,306	8,065	6,180

Steelhead

			Migration year			
Comparison	**Cross-type**	**Release site**	**2006**	**2007**	**2008**	**2009**
Release site	HxW	CHIWAR	*0.476 (0.0370)*	0.512 (0.0611)	-	-
		WENATR	*0.597 (0.0285)*	0.643 (0.0738)	-	-
	HxWl	CHIWAR	-	-	0.504 (0.0540)	0.572 (0.0812)
		WENATR	-	-	0.563 (0.0423)	0.557 (0.0399
Cross-type	HxWe	WENATR	-	-	0.681 (0.0495)	0.505 (0.0340)
	HxWl		-	-	0.563 (0.0423)	0.557 (0.0399)
	HxH	WENATR	0.621 (0.0223)	0.635 (0.0539)	-	-
	HxW		0.597 (0.0285)	0.643 (0.0738)	-	-

Steelhead

- Consistent results
- High performance compared to wild fish
- High performance compared to other programs
  - Hatchery fish from Methow and Okanogan rivers
    - Single year results from < 0.010 to 0.543
  - Wild fish from Nason, Entiat, and Methow
    - Single-year results from 0.056 to 0.409

Steelhead

- Results from wild fish
  - Sample size
  - Biased results
  - Potential impact on listed species
- Release strategy/study design of hatchery fish

Additional Studies

- Summer Chinook
  - Chelan Falls
    - Raceway(0.585)
    - Reuse (0.632)
  - Bonaparte
    - High density (0.448)
    - Low density (0.427)
  - Carlton (...)
  - Dryden (0.6884)
- Steelhead
  - Chiwawa circular (0.745)
  - Turtle Rock (0.492)
  - Blackbird (0.297)

Path Forward

- Conclude 5-year efforts
- Develop comprehensive report
- Develop study plans for continued research
  - Beginning with 2011 tagging
  - Adjusted sample sizes with RRH Juvenile Detector
  - Steelhead
    - Release strategy to maximize value
      - Release and cross-type comparisons
    - Stray rate of returning adults
    - Continue pursuit of SARs in place of elastomer tags

Questions or Comments?

Memorandum

To: Rocky Reach and Rock Island HCP Hatchery Committees
From: Josh Murauskas, Chelan PUD
Date: September 15, 2010
Re: Post-2013 Chinook production at Carlton and Methow hatcheries

The Federal Energy Regulatory Commission (FERC) approved separate Anadromous Fish Agreement and Habitat Conservation Plans (HCPs) for Rock Island, Rocky Reach, and Wells hydroelectric projects (Projects) owned and operated by the Public Utility Districts No. 1 of Chelan and Douglas counties (Chelan and Douglas). The HCPs constitute comprehensive and long-term adaptive management plans for anadromous salmonids affected by the Projects. The objective of the HCPs is to achieve No Net Impact (NNI) for Plan Species affected by the Projects and maintain the same for the duration of the agreement. NNI is achieved through 91% combined adult and juvenile Project survival and 9% compensation for unavoidable Project mortality (7% compensation through hatchery programs and 2% through tributary programs).

Initial production levels for both Chelan and Douglas are defined in Section 8 of their respective HCPs ("Hatchery Compensation Plan"). Chelan and Douglas are required to produce spring and summer Chinook, respectively, in the Methow River to compensate for passage losses consistent with the HCPs. Chelan's spring Chinook production "*required to compensate for Unavoidable Project Mortality*" is calculated at 90,000 smolts (at 7% project mortality). However, during HCP negotiations Chelan agreed to maintain additional spring Chinook production totaling 288,000 smolts at the Methow Fish Hatchery (Methow) "*from the effective date of the Agreement through 2013*" as a component of initial production "*greater than that required to compensate for 7% unavoidable project mortality*"[1]. Likewise, Douglas' summer Chinook passage losses were initially mitigated with 400,000 summer Chinook smolts produced at Carlton Acclimation Pond (Carlton).[2] Douglas' hatchery compensation was subsequently adjusted to reflect results of juvenile project survival studies: summer Chinook production was adjusted to 108,570 smolts (at 3.8% project mortality). Similar to the additional spring Chinook production at Methow, Chelan agreed to maintain full summer Chinook production at Carlton (400,000 smolts) "*from the effective date of the Agreement through 2013*" as a component of initial production "*greater than that required to compensate for 7% unavoidable project mortality*"[3]. In both cases, the initial production funded by Chelan was intended to maintain full production levels at Methow and Carlton, and potentially provide fish for survival studies until 2013.

Based on HCP requirements, production funded by Chelan will therefore be adjusted from the initial production levels after 2013 (brood year 2011) at both Carlton and Methow, potentially providing an opportunity for other organizations to utilize the vacated space.

[1] Rocky Reach HCP pg. 25 & 49; Rock Island HCP, pg. 23,24 & 47.
[2] Wells HCP pg. 30.
[3] Rocky Reach HCP pg. 25 & 49; Rock Island HCP, pg. 23,24 & 47.

Wenatchee Steelhead Marking

September 15, 2010 Submitted by Joe Miller

Background

The District currently funds elastomer tagging, CWT Tagging, PIT Tagging and ad-clipping on hatchery steelhead. All hatchery steelhead receive some combination of these marks but the purpose of the marking is not always clear or ideal for informing the monitoring evaluation program. The purpose of this discussion is to clarify our tagging approach for steelhead. This is a good time to make changes because we have modified the program from 3-4 crosstypes (WxW, HxW Late, HxW early and HxH) to 2 crosstypes (WxW and HxH), and the new HGMP requires adult management which will require rapid detection of hatchery origin fish for success implementation.

Problem

The current use of multiple tagging systems represents an unconsolidated implementation of several M&E goals and permit conditions. Specifically, the use of elastomer tags is problematic because they do not fulfill their intended roll as an external mark. Elastomer tags are only visible by trained technicians and require full anesthesia for detection. Additionally, they have high shed rates and are not supported by the current M&E program operators. The reliance on these tags makes accurate stock assignments difficult and perpetuates low confidence in smolt to adult return (SAR) estimates. At the same time, the use of PIT tags may be satisfactory as an alternative means of obtaining stock assignments and SARs. However, even, with PIT tags, the problem remains that hatchery fish marked only with internal tags or elastomer tags are not identifiable as “hatchery” fish without a better external mark. This creates an issue for adult management as unmarked hatchery fish are not available for harvest in tributary fisheries and therefore must be removed at weirs. In short, a better external mark coupled with PIT tags and CWTs will provide better M&E data and allow for the full implementation of adult management that emphasizes fisheries.

Proposal

To improve the effectiveness of the M&E program and to successfully implement adult management, the District suggests that elastomer tagging should be replaced by a ventral fin clip on WxW crosses (in addition to CWT). Under this scenario, all WxW fish would receive a CWT, ventral fin clip and a subsample would be PIT tagged. HxH fish would be marked with an adipose fin clip, CWT and a subsample would be PIT tagged. The final, refined marking design, including all marks would be developed by the Hatchery Committees.

July 29, 2010

Expanded Multispecies Acclimation in the Methow and Wenatchee 2010

Results

Rohlfing's Pond

Steelhead juveniles were transported by Washington Department of Fish and Wildlife (WDFW) to Rohlfing's Pond on March 25, 2010. Coho were transported by Oregon Department of Fish and Wildlife (ODFW) on March 24, 2010. Prior to the acclimation season, YN and WDFW decided that 2010 would be viewed more as a feasibility study to determine if two species could rear simultaneously within one semi-natural rearing unit. This ACCORD project was not officially approved until late fall 2009, which did not allow for adequate time to coordinate the full complement of monitoring and evaluation performance indicators that the proposal outlined. YN and WDFW decided that a partition would be placed at the site, using a seine net, due to the size discrepancy between the two species. Approximately 85,717 coho (5,815 PIT tagged) and 10,364 steelhead (566 PIT tagged) were acclimated at this location. The PIT tagged steelhead assigned to Rohlfing's Pond were a small proportion of the overall wild x wild parental crosses (WxW) released in Nason Creek. Below are the M&E results that were applicable during the feasibility acclimation period in 2010. The steelhead release began on April 22 followed by the coho release on May 7. The coho release was concluded on June 12 while 28 steelhead still resided in the pond and were being monitored on a regular basis.

While a positive growth rate was established for both steelhead and coho at Rohlfing's Pond, determining if a correlation between growth and multiple species interactions was not possible at this location. The segregated acclimation, due to the discrepancy in size between species at the time of transfer, essentially lent this site to function as a single species, semi natural acclimation pond. Figures 1 and 2 demonstrates positive growth rates for steelhead at Rohlfing's Pond, both individually within the multispecies site and when compared to a conventional, single species rearing environment (Chiwawa Acclimation Facility). While growth rates were different between the two groups, many factors may have contributed to this disparity (e.g.- parental crosses, water temperatures, duration of acclimation, daily feeding requirements, etc.).

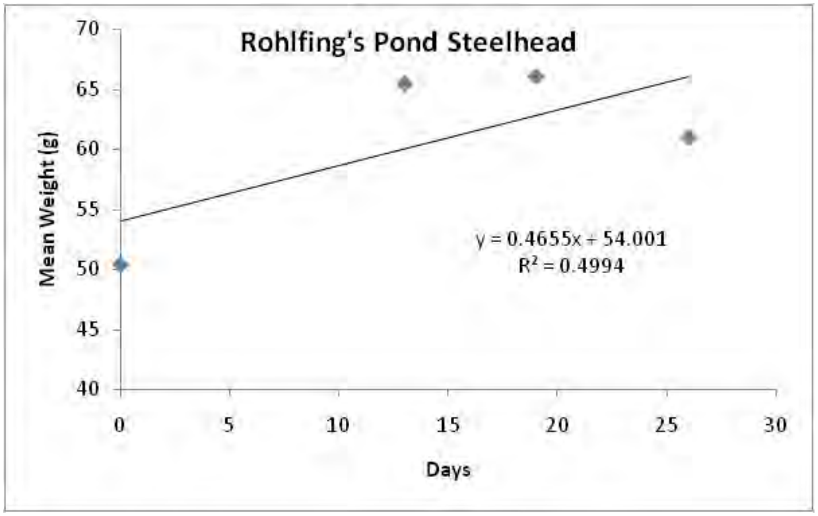


Figure 1. Steelhead growth during acclimation at Rohlfing's Pond, 2010.

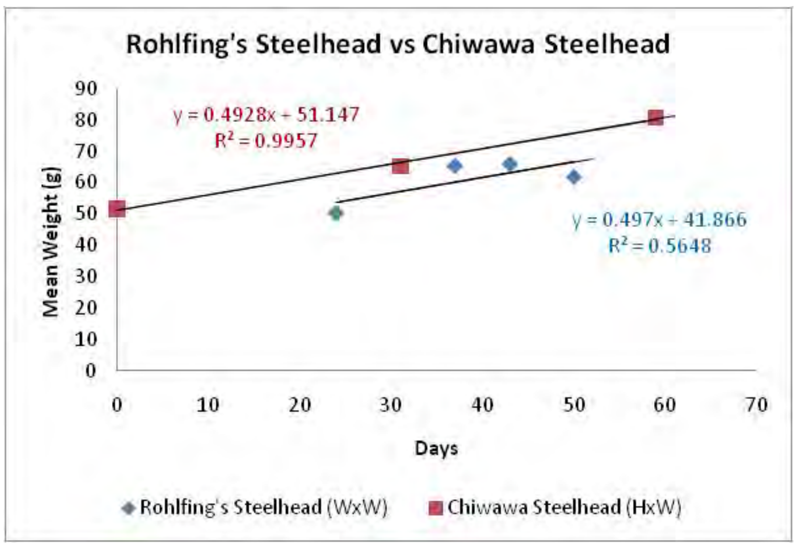


Figure 2. Steelhead growth comparison between Rohlfing's Pond (WxW) and Chiwawa Acclimation Facility (HxW).

Coho growth rates were comparable between the multispecies rearing at Rohlfing's Pond and other single species sites used within the Mid-Columbia Coho Reintroduction Program (MCCR) during the 2010 acclimation and between years within the same site (Figure 4 and 5).

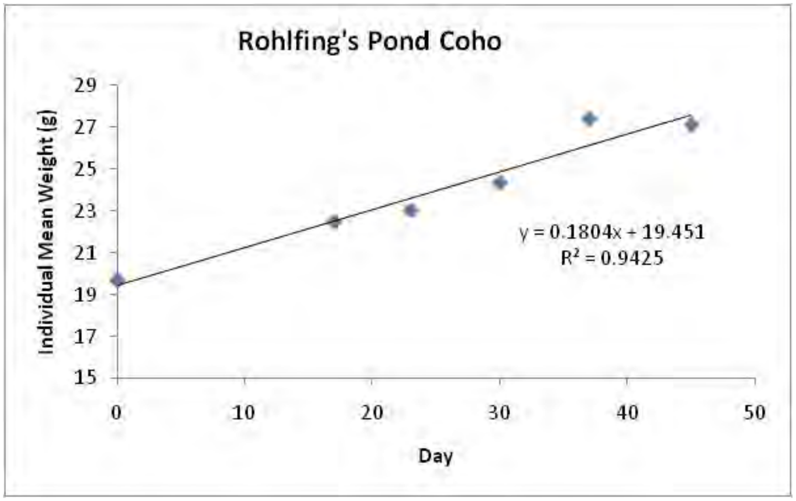


Figure 3. Coho growth during acclimation at Rohlfing's Pond, 2010.

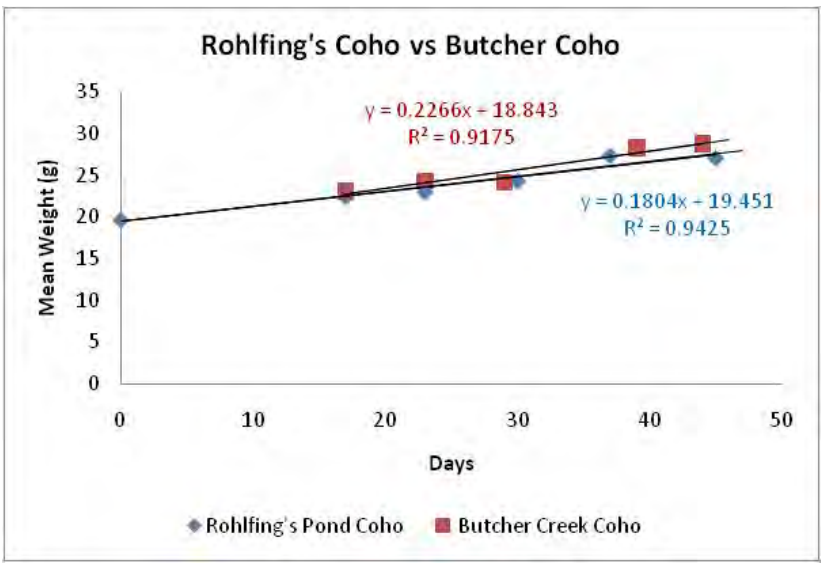


Figure 4. In-pond growth comparison of coho between multispecies site (Rohlfing's Pond) and single species site (Butcher Creek Pond) during 2010 acclimation.

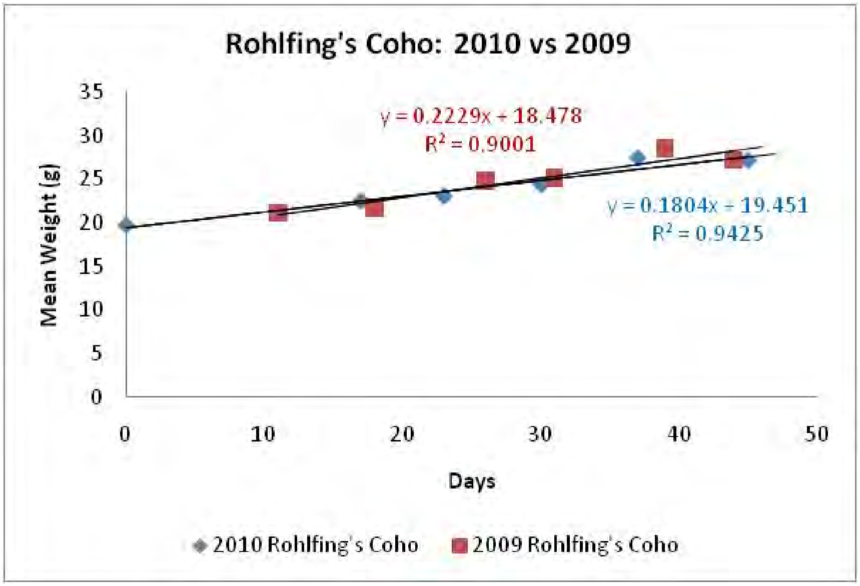


Figure 5. In-pond growth comparison at Rohlfing's Pond for coho in 2010 (multispecies site) and 2009 (single species site).

In-pond survival presented for steelhead at Rohlfing's Pond, when compared to coho, demonstrated a high level of inaccuracy likely due to the small PIT tag sample size (*n*=566) and unique outlet (*n*=512) and downstream detections (*n*=85). In comparison, coho at the same location observed 5,396 unique outlet detections with 1,981 total downstream detections (Table 1). It would be presumable that in-pond survival for steelhead would have been similar to what was observed for coho if PIT tag sample sizes (*n*=10,000) were consistent with what is being proposed for 2011. Release to McNary juvenile survival will only be available for coho at Rohlfing's Pond due to the small sample size of PIT tagged steelhead. The inability to measure many of these performance indicators was to be expected since Rohlfing's Pond was testing the feasibility of the site in 2010.

Table 1. PIT tag release summary for Rohlfing's Pond acclimation, 2010.

Acclimation Site	Outlet Detections	Total Downstream Detections	Detection Efficiency	In-pond Survival
Rohlfing's Pond – Coho	5,396	1,981	98.13%	94.56%
Rohlfing's Pond - Steelhead	512	85	***84.71%***	***106.79%***
Rohlfing's Pond - Steelhead	***In-pond survival was calculated using predation estimate***			99.31%

After all actively migrating individuals were observed, a total of 28 steelhead were identified still residing in the pond. This identification was conducted through repeat snorkel surveys at the site. The steelhead juveniles were allowed to remain in the pond until connectivity between the outlet and Nason Creek dissipated. Although dissolved oxygen and temperature measurements were adequate and inflow was still entering the pond, YN implementing a fish rescue plan to remove the remaining individuals and place them into Nason Creek. The rate of residualism for the 2010 steelhead acclimated at Rohlfing's Pond was 0.27%. Average residence time in Nason Creek for steelhead released from Rohlfing's Pond was 6.7 days (Table 2).

Table 2. Residence timing for steelhead exiting Rohlfing's Pond acclimation, 2010.

Detection Location	Avg. Pond Outmigration	Avg. Residence Time (days)	Minimum Res. Time (days)	Maximum Res. Time (days)
Rohlfing's Pond (RFP)	5/1/2010 17:35	n/a	n/a	n/a
Nason Upper Antenna Array (NAU)	5/3/2010 0:21	1.66	0.32	33.30
Nason Lower Antenna Array (NAL)	5/9/2010 15:27	6.71	0.05	36.02

Winthrop National Fish Hatchery

Approximately 49,890 spring Chinook juveniles were transported by US Fish and Wildlife Service (USFWS) to Winthrop NFH back channel on March 23, 2010. Approximately 59,115 coho were transported by Oregon Department of Fish and Wildlife (ODFW) also on March 23, 2010. Prior to the acclimation season, YN and USFWS decided that 2010 would be viewed more as a feasibility study to determine if two species could rear simultaneously within one semi-natural rearing unit. This ACCORD project was not officially approved until late fall 2009, which did not allow for adequate time to coordinate the full complement of monitoring and evaluation performance indicators that the proposal outlined. Since there were not PIT tags available for the spring Chinook component of the back channel multispecies rearing, the primary emphasis was to compare growth rates and determine if there was a negative result from this commingling. Below are the M&E results that were applicable during the feasibility acclimation period in 2010. The back channel release began on April 29. This multispecies release was concluded on June 14 when the pond was observed, through snorkel surveys, to be empty.

Figure 6 demonstrates positive growth rates for both spring Chinook and coho within the back channel acclimation site. Figures 7 and 8 compares coho and spring Chinook growth rates achieved within the multispecies site to their on-station counterparts reared separately in a conventional, single species rearing environment (Winthrop NFH raceways). While growth rates differ between treatment (back channel; multispecies) and control (on-station; single species) groups, results demonstrate that the achieved release size was obtained for both coho and spring Chinook in the back channel acclimation site, when compared to the on-station groups while no apparent negative interactions occurred during this time period.

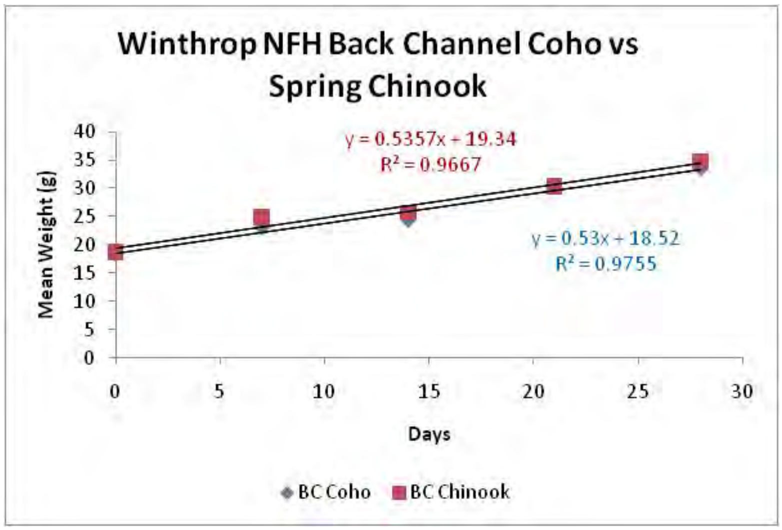


Figure 6. In-pond growth comparison of spring Chinook versus coho in a multispecies site (WNFH BC) during 2010 acclimation.

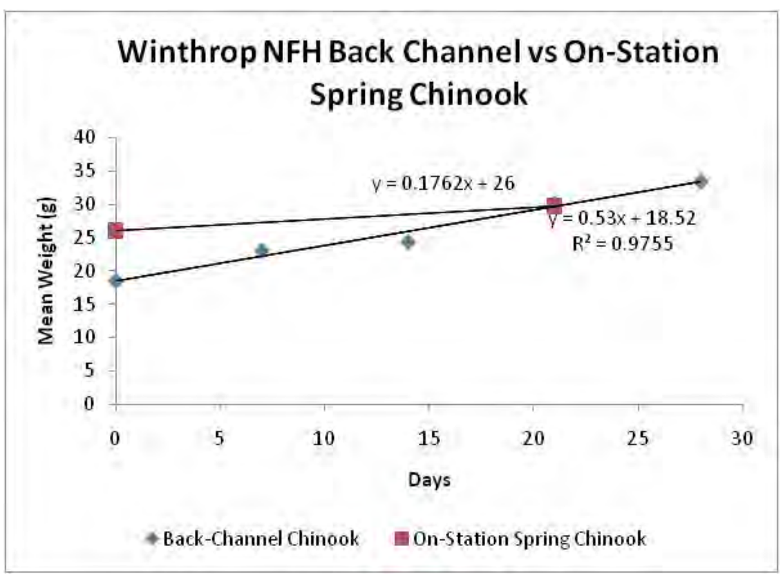


Figure 7. In-pond growth comparison of spring Chinook between multispecies site (WNFH BC) and single species site (WNFH on-station) during 2010 acclimation.

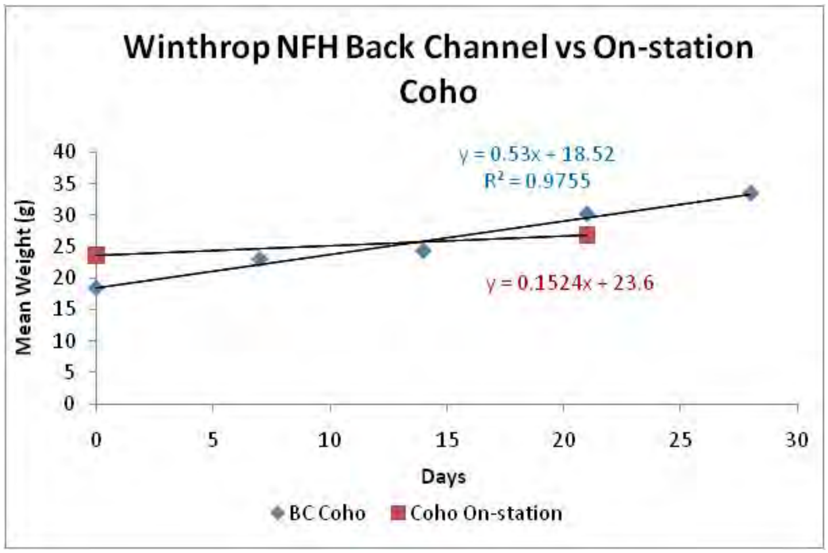


Figure 8. In-pond growth comparison of coho between multispecies site (WNFH BC) and single species site (WNFH on-station) during 2010 acclimation.

In-pond survival using PIT tag detections was not possible for spring Chinook in the back channel so a predator consumption estimate was derived from documentation of various piscivorous animals observed at the site. This consumption model has been demonstrated to underestimate predation levels at some locations while being vary comparable at others when applied to many of the sites in the Wenatchee basin. Accuracy depends on visible predators and type of predators encountered (i.e.- otters can become nocturnal feeders and become absent at regular site operations). At a minimum, the model serves as an indicator of predator presence and dictates changes made at certain locations; making sites more secure. The in-pond survival estimate for the back channel was 98.7%. Release to McNary juvenile survival will only be available for coho due to the absence of PIT tagged spring Chinook.

Table 3. In-pond survival estimates for Winthrop National Fish Hatchery back channel and on-station releases, 2010.

Acclimation Site	Outlet Detections	Total Downstream Detections	Detection Efficiency	In-pond Survival
WNFH BC – Coho	5,450	2,179	98.35%	92.47%
WNFH BC- Spring Chinook	***In-pond survival was calculated using predation estimate***			98.66%

WNFH on-station-Coho	5,501	3,025	93.12%	99.15%

Biddle Pond

Approximately 25,591 spring Chinook juveniles were transported by WDFW to Biddle Pond on March 26, 2010. This acclimation site, while falling under the scope of work provided by the ACCORD project, was a separate agreement between YN and Grant CPUD as a part of their mitigation obligations for a portion of the Methow spring Chinook program. PIT tags were implanted in both the Biddle Pond group (*n*=9,999) and a portion of the Methow Composite stock (*n*=9,850) being reared at Methow FH. The primary emphasis was to compare growth rates and subsequent release to McNary survival between the two release locations while determining in-pond survival at Biddle Pond. The Biddle Pond release began on April 19 while Methow FH released four days prior on April 15. This single species release was concluded on June 3 when the pond was observed, via snorkel surveys, to be empty.

Figure 9 demonstrates a slight increase in growth but is comparable to the growth achieved at Methow FH; a conventional, hatchery rearing environment. While growth rates at Biddle Pond were less than expected, results demonstrated that these growth rates were comparable to Methow FH and release sizes were obtained for spring Chinook at both locations.

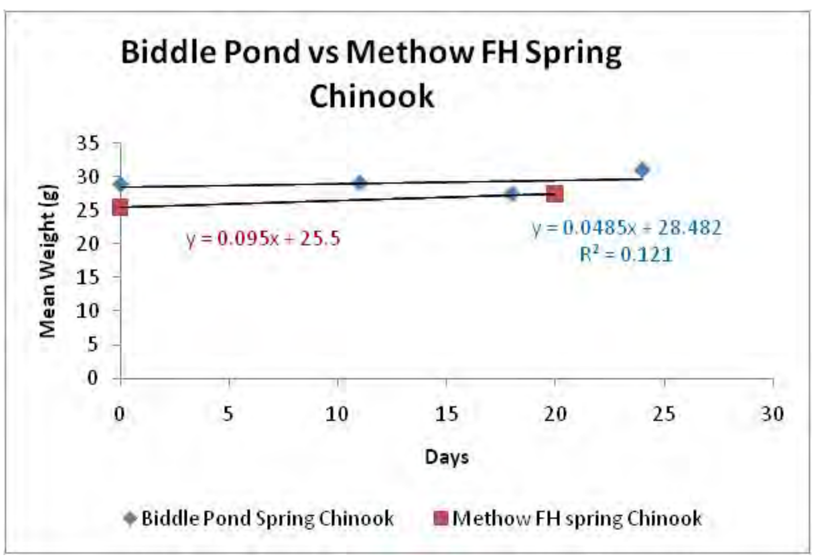


Figure 9. Spring Chinook growth comparison between Biddle Pond and Methow FH.

In-pond survival presented for spring Chinook at Biddle Pond demonstrated a high level of inaccuracy due to the poor detection efficiency from the interrogation system installed at this site. Although there were more than sufficient numbers of tags available at the onset of acclimation and subsequent downstream detections, outlet detections were compromised due to the fashion in which the fish left the pond. Although the release was volitional, a high level of smolting was observed on the pre-release sample and more than 85% of the known outlet detections occurred the first night of release. With a large volume of PIT tags exiting in a short duration, collision rates were expected to be high. Modifications to future releases at this location will need to occur and discussions have already identified a possible solution in opening up the upper portion of the pond and inserting another detection system in series. An estimated in-pond survival was calculated using the predation model of 98.1% (Table 4). Release to McNary juvenile survival will be available for spring Chinook but at a later date.

Table 4. PIT tag release summary from Biddle Pond in 2010.

Acclimation Site	Outlet Detections	Total Downstream Detections	Detection Efficiency	In-pond Survival
Biddle Pond-Spring Chinook	1,590	5,044	***15.42%***	***103.1%***
Biddle Pond-Spring Chinook	***In-pond survival was calculated using predation estimate***			98.10%

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FINAL MEMORANDUM

To:	Wells, Rocky Reach, and Rock Island HCP Hatchery Committees	**Date:**	November 17, 2010
From:	Michael Schiewe, Chair, HCP Hatchery Committees		
Cc:	Carmen Andonaegui		
Re:	Final Minutes of October 20, 2010 HCP Hatchery Committees Meeting		

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Hatchery Committees met at the Chelan PUD offices in Wenatchee, Washington, on Wednesday, October 20, 2010, from 9:30 am to 3:00 pm. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Joe Miller will send to Hatchery Committees members a revised Statement of Agreement (SOA) for Year 2 of the Steelhead Pilot Reuse Study. Committees' members will contact Mike Schiewe if they do not approve of the revised language of the SOA (Item II-C).
- Josh Murauskas will provide to the Hatchery Committees members background information he compiled on the No Net Impact (NNI) calculation method used in the Biological Assessment and Management Plan (BAMP) (Item III-B).
- Greg Mackey will send the draft Douglas 2011 Hatchery Monitoring and Evaluation (M&E) Work Plan to the Hatchery Committees members within about one week for a 30-day review (Item III-C).
- Tom Kahler and Bill Gale will set a date to discuss U.S. Fish and Wildlife Service (USFWS) comments on the Wells Hatchery steelhead Hatchery Genetic Management Plan (HGMP). If other members would like to participate in a discussion of USFWS comments, they should contact Carmen Andonaegui or Mike Schiewe to request that a conference call be arranged (Item III-D).
- Josh Murauskas will review Chelan PUD's Tumwater Dam fish trap facility improvements list with Cory Kamphaus, copying email correspondence to Keely Murdoch and Tom Scribner (Item V-A).

- Mike Schiewe requested that, prior to the next Hatchery Committees meeting, Douglas PUD and Chelan PUD develop a schedule for when they need the control group analysis completed for use in their 5-year M&E reports (Item VI-A).
- Douglas PUD will finalize the draft 2008 M&E Report and send a copy to Carmen Andonaegui for posting on the ftp site (Item VII-E).

DECISION SUMMARY

- The Rocky Reach and Rock Island Hatchery Committees conditionally approved the SOA for rearing and acclimation of Wenatchee River steelhead for a second year at the Chiwawa Acclimation Facility as part of the Steelhead Water Reuse Pilot Study (Item II-C).
- The Hatchery Committees approved the Conflict of Interest Policy SOA (Item VII-B).

MEETING AGREEMENTS

- The Rocky Reach and Rock Island Hatchery Committees approved by email on November 5, 2010, the SOA for rearing and acclimation of Wenatchee River steelhead for a second year at the Chiwawa Acclimation Facility as part of the of the Steelhead Water Reuse Pilot Study (Item VII-E).

I. Welcome, Agenda Review, Meeting Minutes

The Hatchery Committees reviewed the agenda. Tom Scribner added a discussion of Tumwater Dam trap modifications to the agenda. Greg Mackey added the 3-year review of Mike Schiewe and Anchor QEA as facilitators of the HCP HCs meetings to the agenda. The Committees approved the September 15, 2010 Hatchery Committees meeting minutes, as revised. Carmen Andonaegui will finalize the September 15, 2010 meeting minutes and distribute them to the Committees.

II. Chelan PUD

A. 2013 Adjustment of Hatchery Production Levels (Joe Miller/Josh Murauskas)

Joe Miller introduced this topic by presenting background information on Chelan PUD's NNI obligation under the HCP, which includes: calculated 7 percent production levels; initial production levels, which expire in 2013; and recalculated releases that begin in 2014 (see Attachment B for his presentation slides). Miller emphasized that inundation production is not subject to recalculation, and that current production includes both inundation and initial production levels, in excess of calculated 7% production levels,, that will expire after 2013. Miller also mentioned there were several ways to calculate the required smolt production, and stressed using the best available approach given available data. The initial NNI production was calculated using the BAMP method[1] .

Miller provided a handout (see Attachment C) that listed some potential methods for recalculating Chelan PUD's hatchery obligation. Miller suggested that the committees would benefit from resolving the recalculation issue sooner than later because (1) broodstock collection is not that far away for 2014 and (2) it is impossible to know adequacy of hatchery facilities in the future without understanding required production levels. Miller also indicated that Chelan intends to bring recalculation methodologies forward to facilitate the decision making process and suggested that other HCP members should also bring forward analyses that would contribute to the recalculation efforts. Josh Murauskas stated that the best method for recalculating NNI production may be a combination of available approaches. He stressed the importance of developing a technical justification for whichever method is selected to recalculate NNI. Miller reiterated that the default NNI mitigation level after 2013 is the 7 percent NNI documented within the HCPs, adjusted for approved survival study results, and that current production reflects a negotiated production level above the 7 percent NNI level. Chelan PUD is currently producing at a 14 percent or greater production level until 2013, as agreed to in the initial production phase of the HCP. Steve Hayes explained that higher smolt production levels were agreed to by Chelan PUD during HCP negotiations to mitigate for dam mortality because there was no juvenile bypass in place at Rocky Reach, and to mitigate for unknown juvenile dam passage mortality at both Chelan PUD projects until dam passage could be estimated. Chelan PUD asked the committee if there was any confusion about the presentation on initial production.

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[1]Although during the Hatchery Committee discussion it was said that intial NNI production was calculated using the method in the BAMP, initial NNI Phase I hatchery production numbers were actually established in the 1987 settlement for the Rock Island Project and the 1990 settlement for Wells Project. Production was calculated using the average adult return to smolt method, which uses a series of life stage-specific assumptions for survival, fecundity, and sex ratio to estimate smolt production.

B. Recalculation Case Study: Wenatchee Spring Chinook and Carrying Capacity (Tracy Hillman)

Joe Miller introduced Tracy Hillman who described how fish production-productivity functions (e.g., Ricker, Beverton- Holt, Smooth Hockey Stick, etc.) could be use to estimate smolt production. He explained that he focused his analyses on Chiwawa spring Chinook because of the availability of comprehensive data, but expanded his estimates to the entire Wenatchee Basin. Hillman provided a handout summarizing his analysis (see Attachment D) and noted that that his productivity estimates for Wenatchee Spring Chinook were nearly identical to estimates from Tom Cooney from NOAA's Northwest Fisheries Science Center (NWFSC).

Bill Gale asked about the reliability of spawner estimates, which are expanded from redd counts, citing the typically unreliable estimates for steelhead redds. Hillman agreed that steelhead redd counts were problematic and said estimating smolt production for steelhead is also complicated by variation in life history in the Upper Columbia. Miller emphasized that Chelan PUD was not looking for one, and only one, method to apply to all species, but to decide on the best method, depending on data availability and reliability, for each species independently.

Tom Scribner asked Hillman if there has been any effort to incorporate the effects of habitat improvements on productivity. Hillman said there has not been, and that intrinsic potential calculations do not include habitat changes. To estimate effects of habitat improvements on smolt productivity, a model would need to be developed to capture fine-scale habitat changes. Another major problem is the lack of data correlating habitat changes to survival.

C. DECISION ITEM: SOA – Conduct Year 2 of the Steelhead Water Reuse Pilot Study (Joe Miller)

Joe Miller introduced the SOA saying that Chelan PUD was requesting Hatchery Committees approval to repeat the pilot Steelhead Water Reuse Pilot Study at the Chiwawa Acclimation Facility for a second year (see Attachment E). Josh Murauskas said he has a draft report for the first year of the study near completion, and anticipates distributing it to the Committees in November. Murauskas reported that the preliminary findings for growth and survival from Year 1 acclimation were comparable between raceway and reuse acclimation. The proposal for Year 2 is to use 25,000 fish, which is the same number as was used in Year 1.

Tom Scribner asked Miller to edit the SOA to clarify that the study was a "juvenile-based study" and also to read that "the long-term use of this rearing strategy would require a consideration of adult returns." Miller agreed to these changes. Bill Gale asked about the statistical power of a study with 10,000 of the 25,000 Passive Integrated Transponder tagged (PIT-tagged). Murauskas said 10,000 PIT tags will allow for a reliable estimate of smolt-to-adult return (SAR), although it would be one single point estimate. Schiewe recommended that Chelan PUD think about what data will be needed if the success of the pilot were to be based on adult returns. Mike Tonseth stated that the pilot project is intended to test whether reuse is a successful acclimation method. Scribner recommended that the last sentence of the Background Section of the SOA be deleted. All Committees members agreed. The Committees conditionally approved the SOA, subject to these revisions and concurrence by Colville Confederated Tribes (CCT) who were unable to attend the meeting. Chelan PUD agreed to make the recommended revisions and send the SOA to Andonaegui for distribution to the Committees for final approval.

III. Douglas PUD

A. DECISION ITEM: Chief Joseph Hatchery-Douglas PUD Particpation SOA (Greg Mackey)

Greg Mackey said Douglas PUD is delaying a request for a decision on this SOA (see Attachment F), pending the results of the survival study and hatchery NNI recalculation. This will determine the Douglas PUD level of participation for Okanogan spring and summer/fall Chinook that will be raised at the Chief Joseph Hatchery for Wells NNI mitigation. Douglas PUD will wait until the November meeting, when the Wells Project survival study results will likely be approved by the Coordinating Committees. Mackey stressed that Douglas PUD is still on board with participating in smolt production at the Chief Joe Hatchery.

B. Presentation on the HCP NNI Recalulation (Greg Mackey)

Greg Mackey presented information on recalculation of NNI for the Wells Project (see Attachment G). Mackey explained that Douglas PUD currently has a 3.8 percent hatchery compensation requirement for steelhead, spring Chinook, and summer Chinook. Mackey reviewed several available approaches/methods for calculating smolt production; these included the method used in the BAMP, and other approaches incorporating estimates of adult returns or spawners, life stage-specific survival rates, and direct estimates of smolt production. He explained that the HCP specifies using population dynamics information to adjust NNI, and that the NNI calculation requires knowledge of how many smolts move through a project, and their survival rate through the project. He explained some advantages and disadvantages of various approaches to estimating how many smolts move through a project. The BAMP method uses adult returns and SAR estimates to back-calculate the number of smolts that moved through a project. The 1990 Settlement Agreement calculated the number of smolts based on a 5-year adult return average and applying a life-cycle approach that can incorporate density dependence. Another possible method uses the Rotary Screw Trap smolt-population estimates from the M&E program(s). Lastly, he explained that smolt populations can be estimated from egg deposition estimates from the M&E programs combined with egg-to-smolt survivals derived from the literature or empirical data.

Mike Schiewe asked about expected timelines for moving forward on deciding how to calculate NNI. Joe Miller said Chelan PUD hopes to move forward as soon as possible. Miller said that based on Chelan PUD's interpretation of the HCP, recalculated NNI obligations begin with 2014 releases, which would affect 2012 broodstock collections. The Hatchery Committees agreed to continue discussions of NNI recalculations at the next meeting. Tom Scribner asked about assigning the Hatchery Evaluation Technical Team (HETT) to assess the available methods and data and make a recommendation to the Committees. Schiewe explained that the HETT could do so if the Committees would like, but that right now the HETT has a full plate with completing an analysis of reference streams in time for the 5-year HCP report, and completing the Non-Target Taxa of Concern (NTTOC) assignment. Mike Tonseth said a final broodstock collection plan for 2012 is due April 15, 2012, but development of the plan will begin January 1, 2012 or sooner. He said Washington Department of Fish and Wildlife (WDFW) would like to have the recalculation completed by October 2011.

Keely Murdoch reminded the Committees that the HCP states that a method "like BAMP" is to be used to recalculate NNI (Section 8.4.3 of the Rocky Reach Project HCP says, "The Hatchery Committees will be responsible for determining program adjustments considering the methodology described in BAMP…"). Accordingly, she suggested the Committees initially review the BAMP method of calculating NNI and determine whether it is an appropriate method to use, and if it is not, then why not. After that step, if the BAMP method is determined to be problematic, the Committees would then look at other methods.

In addition, Murdoch asked if any Committees members knew why the language in the HCP was vague regarding the use of the BAMP method. Josh Murauskas said that he researched the BAMP method and that at the next Hatchery Committee meeting, he can provide the Committees members with the background information he compiled. Joe Miller noted that it was his understanding that the group that negotiated the HCP could not agree on a method and did not want to lock in on a specific method because there may be better information or methods available when the 10-year recalculation is required. He cited, for example, data on smolt survival collected as part of the Hatchery M&E programs. Schiewe recommended that the Committees review the methods for calculating hatchery production, consider what changes would occur to NNI levels considering the current 3.8 percent rate of unavoidable project mortality for the Douglas project and with reductions to the 7 percent rate of unavoidable project mortality for Chelan PUD projects, and come back at the next meeting in November prepared to discuss this issue. Tonseth said that identifying the assumption used in the BAMP approach will be helpful. Chelan PUD agreed to come back to the next meeting with examples of BAMP calculations.

C. Douglas M&E Work Plan for 2011 (Greg Mackey)

Greg Mackey reported that WDFW provided Douglas PUD with a draft 2011 M&E work plan, and Douglas PUD and WDFW are working through a few issues before seeking Committee approval. He will send it to the Hatchery Committees in about a week for a 30-day review period. For contracting purposes, it needs to be finalized by first of the New Year.

D. Discussion Item: Wells Steelhead HGMP SOA (Greg Mackey)

Mike Schiewe provided background on the history of the Wells steelhead draft HGMP to date. He said the USFWS provided the only comments on the HGMP. Greg Mackey reported that Douglas PUD had reviewed Bill Gale's comments, and they were developing a response, but had not completed internal review of that response. Tom Kahler said they had copies of a draft of the response document with them and were willing to discuss their responses with the Hatchery Committees now. They were considering sending a response letter to USFWS when it is finalized, since Bill's comments were provided as an official letter from the USFWS.

Tom Scribner asked if the draft HGMP reflects what the fisheries managers are deciding in the *US v OR* working group. Kahler responded that Douglas PUD has not been informed of fisheries managers' decisions in *US v OR*. Scribner asked what process is driving Douglas PUD's intent to get the HGMP submitted to National Oceanic Atmospheric Administration (NOAA) in November. Mackey responded that after having preliminary approval by the Committees for the draft HGMP in February 2010, and shortly thereafter having the Hatchery Committees became deadlocked over the HGMP, they began hearing that the *US v OR* process was moving towards a steelhead management plan with production levels in the Methow that NOAA was indicating they would not support. Also, it was sounding like there was disagreement within the *US v OR* forum over steelhead production levels and that the issue would not be resolved soon. Douglas PUD is required to submit a draft HGMP to NOAA so that their hatchery program can be permitted under the Endangered Species Act (ESA). To move forward with permitting, Douglas PUD has decided to submit the draft HGMP to the Committees for approval. If not approved, Douglas PUD intends to use the HCP dispute resolution process to seek resolution. After working through the dispute resolution process, if resolution is not achieved, Douglas PUD will have the option of independently submitting the draft HGMP to NOAA. NOAA would then be able to comment on the draft HGMP to guide the finalization of a Wells steelhead HGMP. Scribner questioned why NOAA, who is a party to the *US v OR* forum and is aware of the *US v OR* steelhead management proposal, would be asking Douglas PUD to submit a draft HGMP to them. Rob Jones responded that he hopes the submission of a draft HGMP by Douglas PUD to NOAA will help move toward an agreement on steelhead production levels.

Scribner encouraged Committees members to wait until the *US v OR* Production Advisory Committee (PAC), and the PAC Policy Committee resolve the Methow steelhead production levels prior to NOAA's review of the Wells steelhead HGMP. The PAC Policy Committee will meet Friday, October 29, 2010, to discuss Methow steelhead production levels. Mike Schiewe explained that it will take at least through January 2011 before Douglas can work through the HCP dispute resolution process and submit a draft HGMP to NOAA. Mackey said if the *US v OR* forum can agree to a steelhead production level for the Methow prior to the HCP dispute resolution process being completed, Douglas PUD could potentially revise the draft Wells steelhead HGMP to be consistent with what the fisheries managers decide.

Jones reminded the Committees that the spring Chinook and steelhead fisheries management plans that emerge from the *US v OR* process are subject to ESA section 7 consultations, and that NOAA may require changes to the HGMPs. Jones explained that the strategy since 2008 has been to look at all the hatchery programs in the Methow before evaluating individual programs. Mackey reiterated that Douglas PUD is still on track to bring the draft HGMP before the Committees for approval at the November meeting. Kahler added that if there is sufficient progress at the PAC Policy Committee meeting on October 29, Douglas PUD is open to revising the draft HGMP and providing time for the Committees to review any changes. However, if no progress is made within the PAC, Douglas PUD will ask for approval in November and go to the HCP dispute resolution process in order to meet their HCP obligations. Rather than spend additional time during this meeting, Kahler and Gale agreed to set up a date to discuss USFWS comments on the draft HGMP. If other Committees members would like to participate in a discussion of the comments, they should call Carmen Andonaegui to arrange a conference call.

IV. WDFW

A. Electro Anesthesia (Mike Tonseth)

Mike Tonseth reported that a prototype field unit for anesthetizing and handling returning adult fish intended for consumption has been developed. WDFW is testing a DC electro anesthesia (EA) unit that can be used to anesthetize fish in water, without a requirement that the operator wear insulating gloves. He said the highest amperage required is 0.02 amp. WDFW is conducting a study on steelhead using EA. The effects of exposing hatchery summer Chinook to EA is being studied at Wells Hatchery. Tonseth said the electrical current used in EA does not interfere with PIT-tag detectors. WDFW plans to evaluate EA on both males and females to look for any effects on gametes. If there are no indications of negative effects on fish using EA, WDFW will put a request before the Hatchery Committees for using EA on fish at Tumwater Dam. Bill Gale asked if WDFW has looked at tissue hemorrhaging; Tonseth said they have not looked at this issue. Pat Phillips said they have seen no differences between fish spawned that were exposed to EA and fish spawned that were not exposed to EA. Tonseth showed a video of a hatchery summer Chinook being anethesized using EA, and recovering as the current was reduced. Tonseth explained that the effect of EA is instantaneous, as is recovery. He said that the fish has to be oriented with its head toward the anode. Gale suggested evaluating EA in waters with different conductivities to see if EA works differently. Gale asked if fish would recover from the anesthesia if taken out of the water and put on a measuring board. Tonseth said they have not tried this because ESA-listed fish are required to be kept in water at all times, allowing only for water-to-water transfers. Tonseth said WDFW intends to conduct additional testing before implementing the use of EA, and he will keep the Committees updated.

V. Yakama Nation

A. Tumwater Trap Modifications (Tom Scribner)

Tom Scribner said fisheries managers are interested in ensuring that Tumwater Dam is a functional facility fully capable of supporting implementation of the spring Chinook management plan. Scribner said that both Chelan and Grant PUDs are using Tumwater to meet their hatchery program requirements, and wants reassurance that all necessary facility improvements are implemented. Josh Murauskas responded that Chelan PUD, along with fisheries managers, has developed a list of proposed facility improvements at Tumwater Dam and that Chelan is funding nearly all of the facility improvements that have been requested on the funding list, particularly those suggested by the co-managers The criteria that Chelan PUD uses for deciding whether or not to fund a facility improvement is based on acheiving regulatory compliance or operator safety as the highest priorities. Murauskas said Chelan PUD has maintained an open dialogue with anyone interested in facility modifications at Tumwater and will continue to do so. Keely Murdoch said she would like to review Chelan PUD's list of proposed improvements at Tumwater Dam. Murauskas said he had met with Cory Kamphaus, Yakama Nation, on multiple occasions and had discussed at length and agreed to a list of improvements proposed for Tumwater Dam. The list shows which items are in the Work Plan. If an improvement is not listed for funding, then Chelan PUD has determined that it was not a critical need and therefore would not be sent on to Grant PUD eitherMurauskas said that necessary improvements are already lined up for design and implementation. He further stated Chelan Chelan PUD is willing to go over the list and review funding status with fisheries managers. Murauskas agreed to talk again with Kamphaus about the list, copying Murdoch and Scribner with any written correspondence. Joe Miller expressed concern that PUD staff had been working very closely with the WDFW operators at Tumwater as well as the Yakama Nation and was surprised that the funding issue was coming up repeatedly. Miller suggested that there appeared to be a disconnect between the information shared by staff on-the-ground and in the HCP meeting.

VI. HETT

A. Update (Carmen Andonaegui)

Carmen Andonaegui provided an update on the last meeting of the HETT. The HETT met on October 12 to discuss the status of the NTTOC analysis and control group analysis, and to hear a presentation on a fish disease model developed by Karl Polivka, USFS Research Station.

The HETT will begin preliminary model runs of the EcoRisk Assessment model for hatchery programs. The request to experts to provide input on risks will go out after January 2011, when preliminary model runs are complete and comments on the Todd Pearsons et al. manuscript on the Upper Columbia Risk Assessment are received.

The analysis of potential control populations for the Chiwawa spring Chinook population has been completed for Chelan PUD by Tracy Hillman. Hillman is contracted to do the summer Chinook analysis for Chelan PUD. The HETT Douglas and Chelan PUD members agreed to check on the status of PUD funding for the analysis of control populations for populations supplemented by their respective entities.

Mike Schiewe stated that it was important that the HETT stay focused on the reference population analysis and NTTOC assignments in order to complete them in time for the 5-Year Hatchery M&E Reports due in mid-2011. He was concerned that work on M&E Objective 9 (disease) would delay completion, and did not recall it had been assigned to the HETT. Keely Murdoch said the HETT was originally tasked with addressing Objective 9. Tom Kahler said that the Hatchery Committees meeting minutes from September 2006 directed the HETT to address both Objective 9 and 10. Schiewe reiterated the importance of completing the control group analysis for use in the 5-year reports. He asked the PUDs to develop a schedule for developing, reviewing, and finalizing the 5-Year Hatchery M&E Reports for Hatchery Committees review, including dates for when the required reference population analyses need to be completed.

VII. HCP Administration

A. Next Meetings

The next scheduled Hatchery Committees meetings will occur as follows: November 17, December 15, and January 19, all in Wenatchee.

B. Conflict-of-Interest Policy (Mike Schiewe)

Mike Schiewe read the Conflict-of-Interest Policy SOA to the Hatchery Committees. The Committees approved the SOA (Attachment H).

C. Three year Anchor QEA review (Greg Mackey)

Greg Mackey reported that there was unanimous, positive support for continuing the contract with Anchor QEA for facilitation of the HCP Hatchery Committees (Attachment I – HCP HC Facilitator 3 Year Review Memo 2010).

D. Chelan PUD Hatchery Committee Alternate Designation(Joe Miller)

Joe Miller stated that Josh Murauskas is the new Hatchery Committee alternate for Chelan PUD.

E. Douglas PUD Draft M&E Report (Mike Schiewe)

Greg Mackey reported that no comments were received from Hatchery Committees members by the October 18 deadline on the draft 2008 Douglas PUD Hatchery M&E Report. Douglas PUD will finalize the report and send a copy to Carmen Andonaegui for posting on the ftp site.

List of Attachments

Attachment A – List of Attendees
Attachment B – Chelan Initial Production and Recalculation for 2013 (Item II-A)
Attachment C – Chelan PUD Hatchery Recalculation handout (Item II-A)
Attachment D – Smolt Estimates (Item II-B)
Attachment E - SOA – Conduct Year 2 of the Steelhead Pilot at Chiwawa (Item II-C)
Attachment F – SOA – Chief Joseph Hatchery-Douglas PUD Participation (Item III-A)
Attachment G – Wells HCP Recalculation (Item III-B)
Attachment H – SOA – Conflict of Interest (Item VII-B)
Attachment I – HCP HC Facilitator 3 Year Review Memo 2010 (Item VII-C).

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor QEA, LLC
Carmen Andonaegui	Anchor QEA, LLC
Joe Miller*	Chelan PUD
Josh Murauskas*	Chelan PUD
Steve Hays	Chelan PUD
Tom Kahler*	Douglas PUD
Greg Mackey*	Douglas PUD
Rob Jones*	NOAA
Todd Pearsons	Grant PUD
Pat Phillips	WDFW
Bill Gale*	USFWS
Mike Tonseth*	WDFW
Tracy Hillman	BioAnalysts
Tom Scribner*	Yakama nation
Keely Murdoch*	Yakama Nation

* Denotes Hatchery Committees member or alternate

Attachment B

Initial production and hatchery recalculations scheduled for 2013

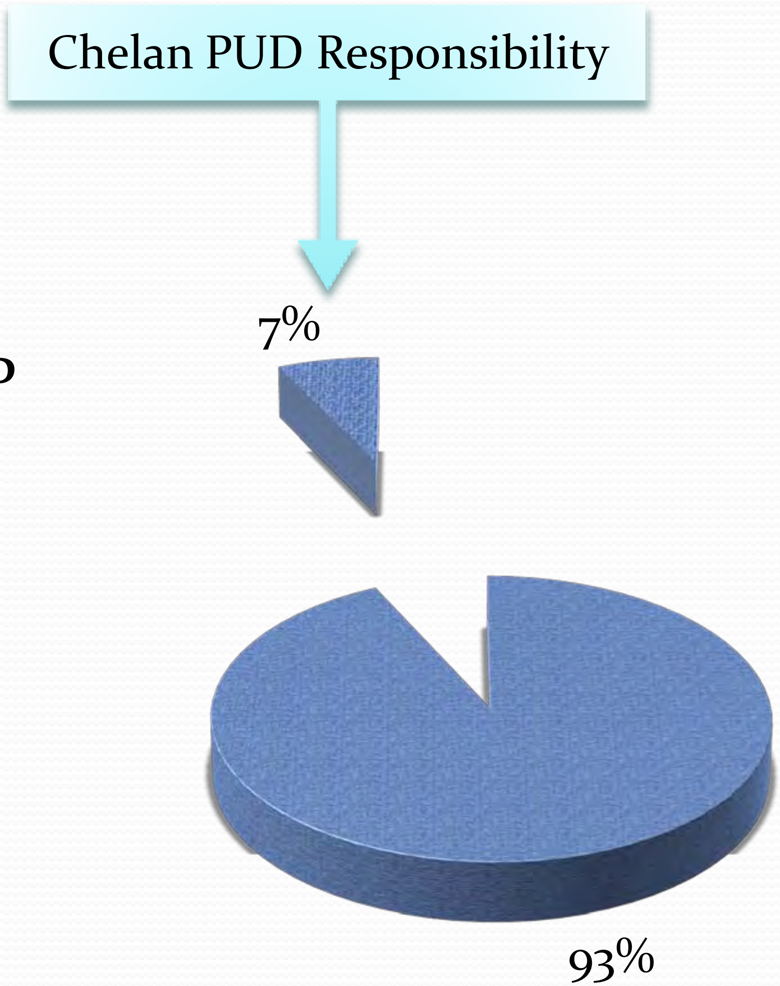
Chelan PUD Natural Resources Department

Hatchery Program

October 20th, 2010

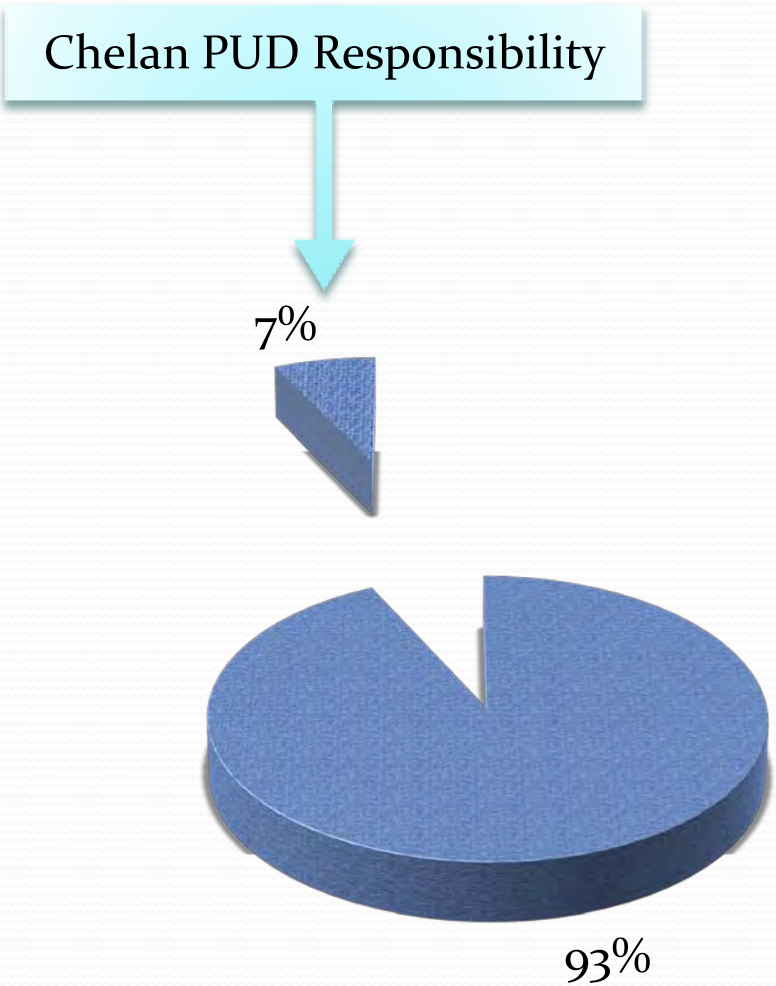
Background

- What is NNI?
- Initial production
  - Expires in 2013
  - “NNI” production in HCP
  - Releases to begin in 2014



Background

- Regulatory context
  - Settlement
  - BAMP
  - HCP
- Technology
- Urgency



Proposed Path Forward

- Examine M&E data quality and availability
- Examine potential applications to determine NNI
  - Settlement calculations
  - BAMP
  - Carrying capacity
  - Smolt abundance
  - Others
- Use of best science available

Memorandum

To: HCP Hatchery Committee
From: Chelan NRD Hatchery Program
Re: 2013 Hatchery Production Adjustments
Date: October 8, 2010

The Anadromous Fish Agreement and Habitat Conservation Plans (HCPs) for Rock Island and Rocky Reach hydroelectric projects were offered for signing in 2002 and approved by the Federal Energy and Regulatory Commission in 2004. The respective HCPs define hatchery compensation requirements in Section 8 (Hatchery Compensation Plan). Hatchery compensation requirements are defined under two categories: *Initial Production* and *Calculated 7% Production*[1]. Initial Production includes hatchery levels "*greater than that required to compensate for 7% Unavoidable Project Mortality*" and was scheduled to occur from "*the effective date of the Agreement through 2013*[2]." Thus, production greater than that required to compensate for Project Mortality will be adjusted to reflect "No Net Impact" (NNI) following the 2013 releases. Similarly, the periodic adjustment of hatchery levels to compensate for passage losses (to achieve NNI) was scheduled for the first adjustment in 2013 (Section 8.4.3). These dates of production (i.e., smolt releases) are consistent with the "10 years" of releases defined in the HCPs. Further, Chelan PUD is required under Section 8.3 of the HCPs to operate hatchery facilities according to these terms of planned compensation and ESA Section 10 permits that coincide with the 2004-2013 releases[3]. Table 1 depicts (1) *Initial Production* levels which conclude after the 2013 release year, and (2) the *Calculated 7% Production* levels that will be amended by *Juvenile Project Survival* estimates[4] and serve as the default production levels for post-2013 releases and Periodic Adjustment of District Hatchery Levels (i.e., subject of recalculation).

Table 1. Inundation, initial production, calculated 7% NNI, and current Project Survival of Plan Species scheduled for artificial production adjustments after 2013 (release year 2014) according to the Rock Island and Rocky Reach HCPs.

Species/Run	Project	Inundation	Initial Production	Calculated 7%	Project Survival
Summer Chinook	Rock Island	0	1,640,000	541,385	0.9375
	Rocky Reach	400,000	400,000	200,000	TBD
	Sum	400,000	2,040,000	741,385	-
Spring Chinook	Rock Island	0	816,000	298,853	0.9375
	Rocky Reach	0	144,000	90,000	TBD
	Sum	0	960,000	388,853	-
Steelhead	Rock Island	0	200,000	51,275	TBD
	Rocky Reach	165,000	35,000	30,000	0.9579
	Sum	165,000	235,000	81,275	-
Sockeye	Rock Island	0	200,000	571,040	0.9327
	Rocky Reach	0	0	300,000	TBD
	Sum	0	200,000	871,040	-

[1] Compensation for original inundation is included in both of these requirements and are not subject to recalculation.
[2] RI HCP p 47 and RR HCP p 49.
[3] Section 10(a) Permit for Take of Endangered/Threatened Species. Permits 1196, 1347, 1395.
[4] RR &RI HCPs Section 8.4.2: "*Juvenile Project Survival estimates, when available, will be used to adjust hatchery based compensation programs*"

Table 1

HCP Production Commitments for Rock Island Project

Species	Initial Production Levels: Original Inundation[1]	Passage Losses[2]	Total	Calculated 7% Production Levels[3]	Rearing Facility
Spring chinook		672,000	672,000	298,853	EB
		144,000	144,000		Methow
Steelhead		200,000	200,000	51,275	EB
Summer/fall chinook					
Yearlings		1,640,000	1,640,000	541,385	EB
Subyearlings					
Sockeye		200,000	200,000	571,040	EB

EB=Eastbank

[1] Compensates for original inundation by the Project. These amounts are not subject to recalculation, and are provided in addition to the levels necessary to compensate for Unavoidable Project Mortality.
[2] Agreed to production levels to compensate for Unavoidable Project Mortality. These hatchery levels are greater than that required to compensate for 7% Unavoidable Project Mortality. These hatchery levels will be produced from the Effective Date of the Agreement through 2013. These amounts are subject to recalculation every 10 years beginning in 2013.
[3] These are the hatchery levels that are required to compensate for 7% Unavoidable Project Mortality. Original inundation levels must be produced in addition to the hatchery levels in this column.

Table 2

HCP Production Commitments for Rocky Reach Project

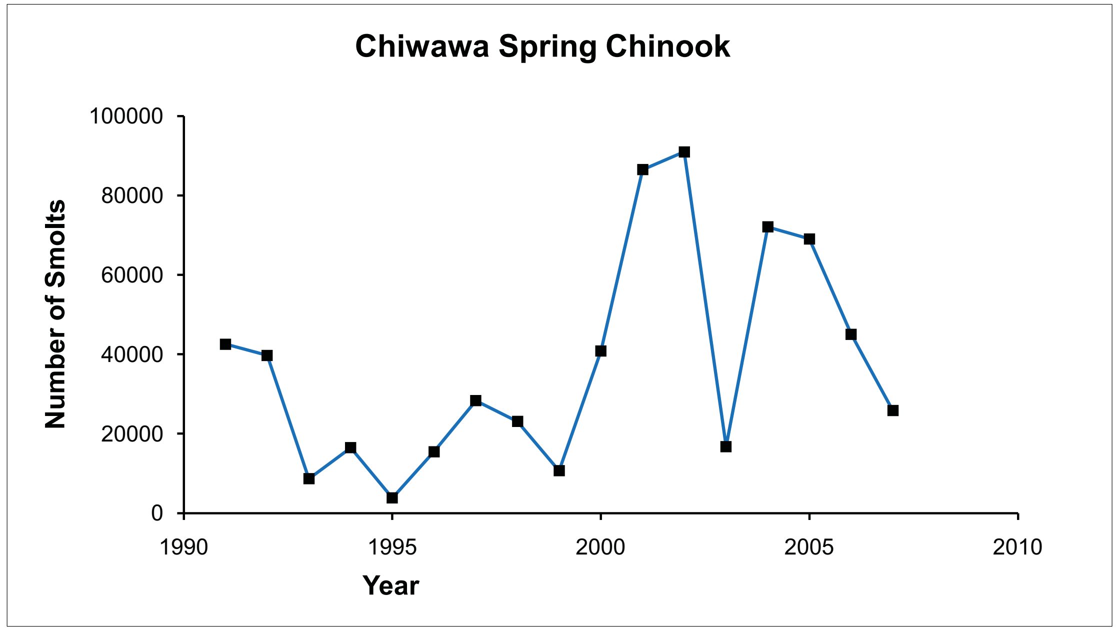
Species	Initial Production Levels: Original Inundation[1]	Passage Losses[2]	Total	Calculated 7% Production Levels[3]	Rearing Facility
Spring chinook				90,000	New program
		144,000	144,000		Methow
Steelhead	165,000	35,000	200,000	30,000	EB, TR, CF
Summer/fall chinook[4]					
yearlings		400,000	400,000	200,000	EB, RRA, TR
sub-yearlings	1,620,000		1,620,000		EB, RRA, TR
Sockeye				300,000	New program

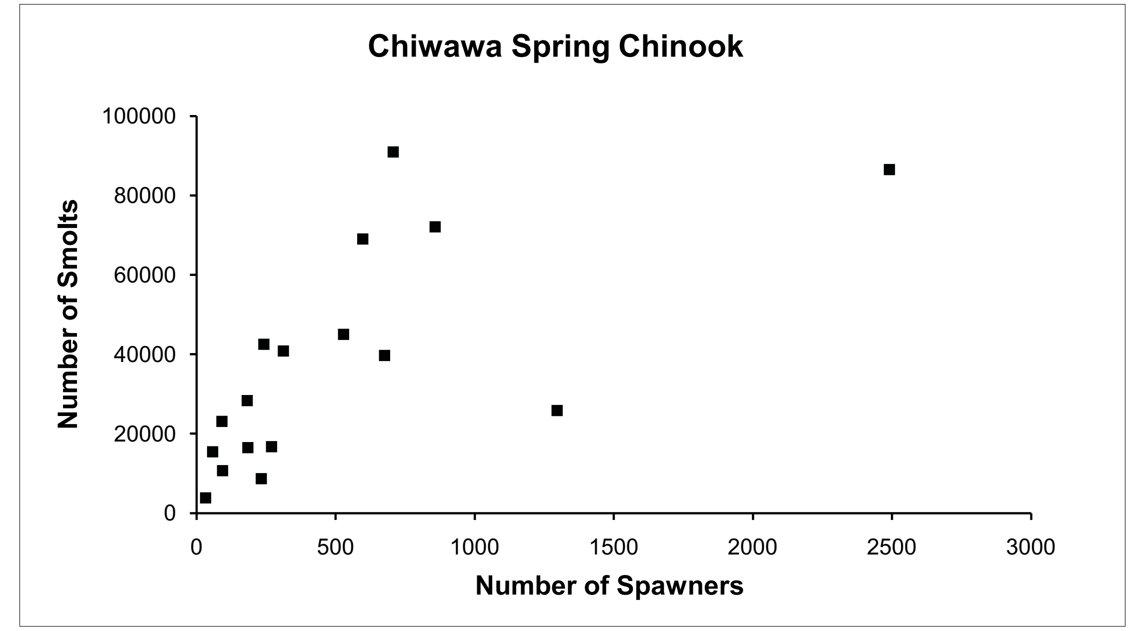
EB=Eastbank
TR=Turtle Rock
CF=Chelan Falls
RRA=Rocky Reach Annex

[1] Compensates for original inundation by the Project. These amounts are not subject to recalculation, and are provided in addition to the levels necessary to compensate for Unavoidable Project Mortality.
[2] Agreed to production levels to compensate for Unavoidable Project Mortality. These hatchery levels are greater than that required to compensate for 7% Unavoidable Project Mortality. These hatchery levels will be produced from the Effective Date of the Agreement through 2013. These amounts are subject to recalculation every 10 years beginning in 2013.
[3] These are the hatchery levels that are required to compensate for 7% Unavoidable Project Mortality. Original inundation levels must be produced in addition to the hatchery levels in this column.
[4] There is potential for program shifts from sub-yearling production to more yearling production.

Chiwawa Basin Smolt Data

BY	Stock (Spawners)	Number of Yearlings (Smolts)
1991	242	42525
1992	676	39723
1993	233	8662
1994	184	16472
1995	33	3830
1996	58	15475
1997	182	28334
1998	91	23068
1999	94	10661
2000	312	40831
2001	2490	86482
2002	707	90948
2003	270	16755
2004	858	72080
2005	598	69064
2006	529	45050
2007	1296	25809
2008		





Attachment E

Rocky Reach and Rock Island HCP Hatchery Committees
Statement of Agreement
Regarding the Evaluation of Water Reuse for Steelhead Rearing and Acclimation at Chiwawa Acclimation Facility
For Decision at October 20 meeting

Statement

The Rocky Reach and Rock Island Habitat Conservation Plans' (HCP) Hatchery Committees (hereafter "Committees") agree that the Chelan PUD (hereafter "District") may rear and acclimate Wenatchee River steelhead at the Chiwawa Acclimation Facility using a partial water reuse system for a second year (i.e., for release in 2011) to replicate the 2009-10 pilot. The operational conditions and protocols will be repeated from the 2009-10 pilot (i.e., approximately 25,000 HxH steelhead at 0.24 lbs./cu.ft DI). The District will present the results of the pilot in the summer of 2011 as soon as survival estimates to McNary are obtained.

Background

The application of water reuse technology has been previously tested at Eastbank Hatchery (summer Chinook) and the Chiwawa Acclimation Facility (steelhead). The adoption of water reuse as a tool, however, requires empirical results obtained through "piloting" the technology.

With the Committees' approval, the District will conduct a second reuse pilot using Wenatchee River steelhead to replicate the first year conducted in 2009-2010. The purpose of the pilot is to determine if circular ponds with water reuse technology (at 0.24 lbs./cu. ft DI) can effectively rear and acclimate steelhead in the Wenatchee River. The pilot will be conducted from fall 2010, through release in May 2011, at the Chiwawa Acclimation Facility.

The success or failure of the second year pilot will be determined through outmigration analysis, fish health monitoring, and evaluation of within hatchery growth parameters (length, weight and coefficient of variation) as performed in the first year pilot. A statistically valid number of reuse steelhead will be PIT tagged prior to release for comparisons against other release groups in the Wenatchee River and its tributaries. Success would be defined as (1) survival to McNary by reuse steelhead is equal or better than the average of the District's other Wenatchee steelhead releases, (2) within hatchery survival is equal to or better than the average of the District's other Wenatchee steelhead releases. In the event the Committees are satisfied with the success of the second year pilot, the District will request that the Committees adopt the water-reuse technology as a tool for future use at Chiwawa for steelhead. If adopted as a tool, the District would remain responsible for the outcome of fish reared using reuse. If the Committees determine that the reuse pilot is unsuccessful, the District will request that the Committees allow an additional pilot year.

Attachment F

Wells HCP Hatchery Committee
Statement of Agreement

Douglas County PUD Okanogan Basin Chinook Salmon Mitigation Strategy at Chief Joseph Hatchery

Revised 8-26-2010

Statement

The Wells HCP Hatchery Committee approves the Douglas PUD Okanogan Basin Chinook mitigation strategy that will provide compensation for unavoidable passage losses at Wells Dam for Okanogan Basin spring Chinook and for Okanogan Basin summer/fall Chinook consistent with the requirements of the Wells HCP.

To satisfy the No Net Impact commitment in the Okanogan Basin, Douglas PUD agrees to provide funding at the current HCP passage loss rate (currently 3.8%) of the operation, maintenance, monitoring, and evaluation costs for the yearling spring Chinook and yearling summer/fall Chinook programs and 7% of those costs for the proposed subyearling summer/fall Chinook program at the new Chief Joseph Fish Hatchery. The HCP passage loss rate compensation level will also apply to the future conversion of the subyearling program to yearling production.

Background

On December 12, 2007 the Wells HCP Hatchery Committee approved a Statement of Agreement (SOA) that addressed Douglas PUD's Okanogan Basin spring Chinook obligation. The 3.8% level of production approved in this SOA reflects the current average survival rate for yearling fish migrating through the Wells Project (96.2%). The 3.8% level of passage-loss compensation is based upon the results of three years of survival studies conducted during Phase I of the Wells HCP. The results of future survival studies will be used to periodically adjust Douglas PUD's hatchery compensation programs starting in 2013 and then every ten years thereafter, as described in Section 8.4.5 of the Wells HCP.

At passage losses of 3.8% for yearling Chinook and an assumed 7% rate of loss for sub-yearling summer/fall Chinook, Douglas PUD would provide funding sufficient to rear up to 34,200 yearling spring Chinook smolts, up to 49,400 yearling summer/fall Chinook smolts, and up to 49,000 subyearling summer/fall Chinook for release upstream of Wells Dam in areas deemed appropriate by the Colville Confederated Tribes.

The number of fish funded by Douglas PUD is directly proportional to the number of fish produced at the Chief Joseph Hatchery on an annual basis. At full production the Chief Joseph Hatchery is expected to produce 900,000 spring Chinook smolts (34,200 yearlings for 3.8% NNI), 1,300,000 new yearling summer/fall Chinook smolts (49,400 yearlings for 3.8% NNI), and 700,000 subyearling summer/fall Chinook (49,000 subyearlings for 7% NNI). Should the 700,000 subyearlings (40 fish per pound) be converted to 175,000 yearling smolts (10 fish per pound), then compensation levels for these new yearlings will be adjusted to the 3.8% level resulting in the production of 6,650 additional yearling smolts (3.8% x 175,000 smolts = 6,650 yearling smolts).

Douglas PUD's funding obligation will begin once gametes or fish are being held within the newly constructed facility.

Attachment G

Wells HCP Recalculation

NNI for the Wells Project

Douglas PUD
October 20, 2010

NNI

- Replaces smolts lost due to project impacts.
- Requires:
  - Knowledge of how many smolts move through the project
  - Smolt survival estimates (survival studies)

Baseline returns	**÷**	**Survival rate**	**X**	**NNI component**	**=**	**Hatchery production**
Returns to project	÷	Adults per smolt	X	Project related mortality rate	=	NNI

Biological Assessment and Management Plan, Mid-Columbia River Hatchery Program. 1998.

Current Conditions

3.8% Hatchery Compensation Level

Species	**NNI**
Steelhead	48,858
Spring Chinook	61,071
Summer Chinook	108,570
Coho	Proportional Funding
Sockeye	Flow Management Tool

Anadromous Fish Agreement and Habitat Conservation Plan, The Wells Hydroelectric Project, FERC License No. 2419. 2002.

Current Conditions

3.8% Hatchery Compensation Level

Species	NNI		Assumed NNI Smolt Population
Steelhead	48,858	÷ 3.8%	1,285,737
Spring Chinook	61,071	÷ 3.8%	1,607,132
Summer Chinook	108,570	÷ 3.8%	2,857,105

Approaches

- Returns/SAR (BAMP)
  - Population dynamics from HCP
- Adult to Smolt (1990 Settlement Agreement)
  - Plug numbers for HCP
- Smolt Estimates: RST (M&E)
- Egg to Smolt (M&E)

Returns/SARs
BAMP

Returns	÷	Returns/Smolt	=	Smolts

Advantages	**Disadvantages**
Includes population dynamics	Unworkable for multiple dams
	Asynchronous parameters
	Lag time for SARs
	Doesn’t incorporate density dependence
	Includes mitigation fish
	Affected by mortality outside of the project (other dams, fisheries)
	Focus on hatchery fish, not natural production

Adult to Smolt
1990 Settlement Agreement

5-Year Adult Return Average		Wells Dam to Spawner Survival		Sex Ratio		Fecundity		Egg to Smolt Survival		
	X		X		X		X		=	Smolts

Advantages	Disadvantages
Life cycle approach	Unworkable for multiple dams
Includes density dependence	Includes mitigation fish
Tuned to natural systems	Two survival assumptions
Uses M&E data	

Smolt Estimate (RST)
M&E Program

Smolt Estimate	**=**	**Smolts**

Advantages	**Disadvantages**
Directly estimates smolts	Some key estimates are suspect
Includes density dependence	Estimates not available for all locations
Uses M&E data	

Egg to Smolt
M&E Program

Egg Deposition X Egg to smolt survival = Smolts

Advantages	**Disadvantages**
Life cycle approach	One literature-based survival assumption
Includes density dependence	
Uses M&E data	
Comprehensive coverage	

What method to use?

- What makes sense?
- Are the data available and reliable?
- Other ideas?

Conflict of Interest Policy
HCP Hatchery Committees
20 October 2010

Introduction

Members of the Wells, Rocky Reach, and Rock Island Habitat Conservation Plans Hatchery Committees (HC members) represent a variety of federal, state, and tribal governments, and Douglas and Chelan County Public Utility Districts (PUDs). In the normal course of business, HC members are periodically called upon to prepare Requests for Proposals (RFPs), and review and recommend funding for research, monitoring, or evaluation proposals and study plans; some of which may have been prepared by HC members, their professional colleagues, persons with whom they may share a personal relationship, or where there may be a financial interest. Because the HC members recognize that such relationships may influence or appear to influence a member's judgment or views regarding the merits of a proposal or study plan, or the capability of an organization or individual to undertake a study, the HC has established the following policy for managing conflicts of interest.

Conflict of Interest Policy

General Approach

HC members have a personal responsibility to alert the HC of any possible conflict of interest that may influence or appear to influence their position on a proposed study or program. The HC Chair will request disclosure of possible conflict of interest by the committee members prior to discussion or decisions on proposed studies or programs. On a case-by-case basis, the HC shall determine whether a particular situation presents a potential conflict of interest that needs to be addressed, and the HC may require HC members to recuse themselves from the discussion of a proposal or study plan, from formal review of a proposal or study plan, or from a decision to approve or reject a proposal or study plan. The HC may decide to allow a member with a potential conflict of interest to participate by a simple majority vote. HC members may employ an alternate HC member in cases where such action removes the conflict, avoiding disenfranchisement of his/her member organization. Among the HC members, the PUD representatives are in the unique position of responsibility for, and funding of, all HCP studies and programs, and thus have an interest in all outcomes of the HC. For purposes of this policy, this position will not be considered a conflict of interest, and therefore, the PUD representatives shall participate in all funding decisions within the HC.

Definitions

For the purposes of this policy, conflicts of interest may include the following situations:

Employment: The situation where Principal Investigator (PI) or key personnel are employees of a HC member's employing organization

Personal relationships: The situation where PI or key personnel are the spouse or domestic partner, parent, sibling, child, father-in-law, mother-in-law, brother-in-law, sister-in-law, son-in-law, or daughter-in-law of a HC member

Professional relationships: The situation where PI or key personnel have a history of regular professional collaboration with a HC member

Financial benefit: The situation where a HC member has a financial interest in the approval and award of a proposal

Preparation of RFPs

HC members or third parties involved in developing a RFP shall not submit a proposal for that RFP as a PI or key personnel. HC members will automatically recuse themselves from the RFP development process if they plan to submit a proposal.

Review of Proposals

HC members shall not participate in the HC review of proposals prepared by a PI or key personnel where there is a conflict of interest due to employment, personal relationships, professional relationships, or financial benefit (as defined in the Definitions section). HC members will automatically recuse themselves from voting on these studies. However, at the discretion of the HC, a HC member with a conflict of interest may on a case-by-case basis participate in discussion of a proposal or study plan.

Attachment I

MEMORANDUM

TO: HCP Hatchery Committees

FROM: Greg Mackey

DATE: October 20, 2010

SUBJECT: 3-Year Review of Mike Schiewe and Anchor QEA as facilitator of the HCP HCs

The Wells, Rocky Reach and Rock Island HCP Hatchery Committees conducted a three year review of Mike Schiewe and Anchor QEA as facilitators of those committees. The 3-year review was conducted by email and completed by end of September, 2010.

Responses to the review cited well organized meetings, efficient and timely dissemination of material and information, and effective facilitation, and a high level of professionalism.

The Committees have unanimously agreed to ask Mike Schiewe and the Anchor QEA support team to continue in this capacity for the next 3 years.

ANCHOR QEA

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FINAL MEMORANDUM

To:	Wells, Rocky Reach, and Rock Island HCP Hatchery Committees	**Date:**	December 15, 2010
From:	Michael Schiewe, Chair		
Cc:	Carmen Andonaegui		
Re:	Final Minutes of November 17, 2010 HCP Hatchery Committees Meeting		

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Hatchery Committees met at the Chelan PUD offices in Wenatchee, Washington, on Wednesday, November 17, 2010, from 9:30 am to 3:00 pm. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Mike Tonseth will check with Andrew Murdoch (Washington Department of Fish and Wildlife [WDFW]) about providing an alternative analysis and proposal on Passive Integrated Transponder tagging (PIT-tagging) spring Chinook for use in forecasting returns to Tumwater Dam, prior to the December Hatchery Committees meeting
(Item II-A).
- Hatchery Committees' members will provide written feedback on Chelan PUD's spring Chinook PIT-tag analysis or provide alternate proposals to Chelan PUD for continuing to PIT-tag spring Chinook for use in forecasting Percent Natural Influence (PNI) at the Tumwater Dam Fish Facility (Item II-A).
- Joe Miller will finalize the Statement of Agreement (SOA) on hatchery sharing between Chelan and Grant PUDs, as agreed to by the Hatchery Committees, and send to Carmen Andonaegui for distribution and posting on the ftp site (Item II-D).
- Joe Miller will provide Carmen Andonaegui with a copy of the email from WDFW regarding plans to modernize Eastbank Hatchery, for distribution to the Hatchery Committees (Item II-E).
- Greg Mackey emailed the Douglas PUD 2011 Monitoring and Evaluation (M&E) Implementation Plan to the Hatchery Committees on November 8 for a 30-day review period. Comments are due by December 10 (Item III-A).

- Chelan and Douglas PUDs will prepare draft smolt production recalculations for HCP species for discussion at the February 2011 meeting (Item III-B).
- Carmen Andonaegui will set up a conference call for December 7, 2010, at 1:00 pm for the Hatchery Committees to discuss the revised draft Hatchery Genetic Management Plan (HGMP) 1-page handout, and will email the conference call notice out to the Committees (Item III-C).
- Greg Mackey will revise the Wells steelhead HGMP key points 1-page handout, based on discussion during the December 7 Hatchery Committees conference call, for a vote on approval in principle at the December 15 Hatchery Committees meeting. If approved, Mackey will revise the draft HGMP for formal approval at the February 2011 Hatchery Committees meeting (Item III-C).

DECISION SUMMARY

- The Hatchery Committees approved the SOA for Chelan and Grant PUDs' Hatchery Sharing, as modified (Item II-D).
- The Wells Hatchery Committee approved the SOA for Douglas PUD's participation in the Chief Joe Hatchery Program (Item III-D).
- The Hatchery Committees gave final approval by email on November 5 of the SOA for Chelan PUD's Year 2 Chiwawa Steelhead Reuse Pilot Study.

MEETING AGREEMENTS

- The Hatchery Committees agreed to release the 11,000 surplus spring Chinook currently on-station at the Methow Hatchery, into the pond on the Chewuch just upstream of Eightmile Creek, if the outlet and inlet are open (Item IV-A).

REVIEW ITEMS

- Douglas PUD 2011 M&E Implementation Plan review comments are due by December 10, 2011.

I. Welcome, Agenda Review, Meeting Minutes, and Action Items

The Hatchery Committees reviewed the agenda and the October 20 meeting minutes. Mike Tonseth added an agenda item on discussion of surplus spring Chinook juveniles at the

Methow Hatchery. The Hatchery Committees approved the October 20 meeting minutes, as revised.

The review of Action Items generated the following additional discussion:

- Tumwater Dam Fish Facility: Josh Murauskas will contact Cory Kamphaus (Yakama Nation) and Travis Maitland (WDFW) to resolve any outstanding differences on the list of improvements at Tumwater Dam Fish Facility. Murauskas will provide to the Hatchery Committees a written list of improvements that have been identified as necessary and agreed to by the parties.
- Schedule for completing the 5-Year M&E reports: Tracy Hillman, BioAnalysists, will prepare the report for Chelan PUD; Andrew Murdoch and Charlie Snow, WDFW, will prepare the report for Douglas PUD. The PUDs agreed to deliver the draft 5-year M&E Reports for Hatchery Committees review by September 1, 2011. Preceding this, the draft 2010 Annual M&E Reports will be completed and distributed by July 1, 2011, for Committees review.

II. Chelan PUD PUD

A. Update – Spring Chinook PIT-tag Numbers (Josh Murauskas)

Josh Murauskas opened the discussion by stating that Chelan PUD had completed an analysis addressing whether the current program of PIT-tagging juvenile spring Chinook in the Wenatchee Basin could be used to forecast the PNI of spring Chinook returning to Tumwater Dam. To support the discussion, Murauskas distributed a document summarizing the analysis of PIT-tagged hatchery and wild Chiwawa spring Chinook released in 2006 and 2007 (see Attachment B). Of about 30,000 juvenile spring Chinook PIT-tagged in 2006 and 2007, 95 returning adults were detected at Tumwater Dam. Murauskas reported that variation in number of years at sea (i.e., jacks, two-ocean returning adults, three-ocean returning adults, etc.), and annual variability of juvenile and adult in-river losses confounded the analysis. He reported that adult conversion rates of spring Chinook between Bonneville and Rock Island dams ranged from a low of 31 percent in 2003 to a high of 72 percent in 2007. Murauskas concluded that PIT-tagging is not a feasible way to forecast returns of adult wild- and hatchery-origin spring Chinook to Tumwater Dam.

Bill Gale reminded the Hatchery Committees that this program of PIT-tagging juveniles was not intended to generate highly accurate and precise information, but was useful as a general forecasting tool. He said PIT-tags allow fishery managers to know Chelan PUD fish are passing dams downstream. Mike Tonseth said he would like to discuss the analysis with Andrew Murdoch, WDFW, before commenting on Murauskas' analysis and conclusion. Murauskas stated he welcomed comments on his analysis, particularly if it changed his conclusion and supported continued PIT-tagging of spring Chinook for the purpose of forecasting PNI upstream of Tumwater Dam. Joe Miller said that Chelan PUD could not continue PIT-tagging spring Chinook juveniles unless there is a clear rationale and a technical proposal to support it. Tonseth said he will talk with Andrew Murdoch about alternative analyses and a proposal for PIT-tagging spring Chinook, prior to the December Committees meeting.

Kirk Truscott asked about comparing actual adult returns in past years to forecast adult returns using PIT-tag data as an adjustment factor. Gale said PIT-tags can be useful in making informed decisions about how many adult fish to hold back as a safety net for broodstock needs. Without PIT-tags, he said, it would be hard to estimate how many returning wild versus hatchery adults could be held. Keely Murdoch said the spring Chinook management plan mentions the use of a PIT-tag-based method of pre-season and in-season forecasting. She said a detailed approach was not described but that WDFW would provide the methodology. Craig Busack asked if anyone knows of a model for predicting run profile at a more downstream location that could be used to predict run components at Tumwater Dam. Busack said he does not see how adult run forecasts at Tumwater Dam could be made without PIT-tags. Miller closed the discussion by asking for written feedback from Committees' members justifying the need to continue PIT-tagging Wenatchee spring Chinook.

B. Update – BAMP Calculations (Josh Murauskas)

Josh Murauskas provided background on the Biological Assessment and Management Plan (BAMP) smolt production calculation to the Hatchery Committees. He emphasized that the purpose of his presentation was to generate discussion. Murauskas explained that the BAMP estimates were interim production objectives for Rocky Reach, Wanapum, and Priest Rapids dams (since Wells and Rock Island production was agreed to in the Settlements), and it was anticipated that they would change over time. In its simplest form, the BAMP equation states the following: adult returns divided by smolt-to-adult returns (SAR) times No Net Impact (NNI) is equal to required smolt production. Murauskas explained that with this approach, as adults increase there is more production; however, increased production is offset by changes in survival.

Murauskas identified several limitations of the BAMP approach, including changing SARs and data integrity. In any given year, up to five year classes may return. Using SARs to calculate production can result in over- or under-compensation. Regarding data integrity, Murauskas referred to the use of elastomer tags as examples where there is an underestimate of adult returns due to tag loss. An additional issue is extrapolation of returns to one geographic location being applied to estimate returns at another location. Also, Murauskas said that pre-spawn loss and harvest need to be included in the SAR calculations. Kirk Truscott confirmed that tributary SARs typically include harvest loss of adults; however, Murauskas stated that pre-spawn losses are a form of additional unaccounted for mortality. Mike Tonseth said assumptions used in the original BAMP calculation need to be identified. Murauskas said a bigger issue is the logic behind the SAR calculation and SAR variability, and particularly the issue of similar production rates since adult returns are often positively coorelated with survival. Bill Gale suggested the Hatchery Committees could invite Jerry Marco (Colville Confederated Tribes [CCT]), Brian Cates (U.S. Fish and Wildlife Service [USFWS]), and Steve Hays (Chelan PUD) to speak to the Committees about the reasoning behind the BAMP method, as they were involved with the original HCP negotiations.

Keely Murdoch said the Committees need to use a method of estimating production that has the fewest assumptions and the most confidence in the assumptions. She said the goal is to come up with a reliable production estimate. Murauskas said the BAMP uses a 5-year running average with production recalculated every 10 years, where increases in adult returns (productivity) offset decreases in hatchery production.

Murauskas stated that another issue with the recalculation process, involves calculating NNI production levels based on adult losses counted at multiple projects. For example, adults that pass Wells Dam have already been compensated for at Rocky Reach and Rock Island dams. Truscott said that presently there is no correlation netween the number of adults counted at Rock Island Dam and the number of adults that return to the Wenatchee, Methow, and Okanogan rivers. Another question is whether the PUDs have to compensate for steelhead strays. There are also losses outside of the hydroelectric project area for which the PUDs provide compensation. Tom Kahler mentioned possibly using the tributary SARs rather than the dam SARs.

C. Update – Summer Chinook Physiology Year 2 Results (Beckman and Larsen, NOAA)

Joe Miller introduced Brian Beckman, Don Larsen (National Oceanic and Atmospheric Administration's [NOAA's] Northwest Fisheries Science Center), and Deborah Harstad (University of Washington). Beckman, Larsen, and Harstad were invited by Chelan PUD to present results of the physiology testing of summer Chinook reared in 2008 in the water-reuse tanks at the Eastbank Facility (see Attachment C). Beckman defined the study objective, which was to determine if rearing under different conditions affected the quality and performance of smolts. Physiological differences between summer Chinook reared in reuse tanks versus summer Chinook reared in traditional rearing tanks were assessed. Growth, smolting, and early male maturation were compared.

Beckman reviewed the first-year's findings for broodyear (BY) 2007 study fish. The results were that there were no differences in growth or smolting between the treatment (reuse) and control (raceway) groups. Both groups displayed a similar bimodal distribution in sizes, and there were within-group differences in physiological parameters between the large- and small-mode fish. There was a difference in male maturation (mini-jacks) rates between control (9% of males) and treatment (3%), although the difference was not statistically testable due to lack of replication in rearing.

For the BY 2008 study, body lipid levels and condition factor were added to the list of physiological parameters assessed. Also, the time that study fish were reared in net pens was longer for the BY 2008 fish than for BY 2007 study fish. Both test and control groups displayed a bimodal size distribution, although there was no difference in the range of sizes between the two groups. The plasma insulin-like growth factor-I (IGF-I, -an endocrine indicator of growth) samples are still being analyzed, so no results were included in this presentation; the analysis will be completed by early spring. The condition factors for BY 2008 study fish were similar between treatment and control, and generally lower in small-mode fish; the within-group bimodal distribution of condition factor was only evident after net pen-rearing. There were no differences in lipid levels between test and controls, but within-group lipid levels in large-mode fish were higher than in small-mode fish. Based on gill ATPase levels, there was evidence of fall smolting in both treatment and control fish from both size modes; however, levels were much higher in the large size-mode. Larsen observed that fish in circular reuse ponds from the previous fall to spring were silvered like smolts, throughout the entire rearing regime (circulars and pens). The fish in the raceways, however, did not take on the silvered smolt appearance until after they moved to the pens. Larsen believed the rearing fish in the circular tanks were matching the coloring from the tanks as a form of camouflage. Finally, Beckman noted that the mini-jack rate (26% of males) in the BY 2008 control group was higher than the mini-jack rate for the treatment (reuse) group (13%).

Larsen presented the results of an assessment of physiological condition among different summer/fall Chinook groups reared at four different acclimation sites: Carlton, Dryden, Similkameen, and Bonaparte ponds. The Carlton fish had the highest mini-jack rate and grew to the largest size, a result consistent with the three previous years of evaluation (BY 2006 through 2008). Mini-jack rates were consistently low at Similkameen Pond (BY 2006 through 2008) and at Bonaparte Pond (2008). The Dryden mini-jack rates varied, and fish in Dryden pondwere consistently in poor condition. Hatchery Committees' members discussed the relationship between condition, mortality, and the mini-jack rate. Bill Gale suggested that river water versus well water for acclimation complicates assessment of the mini-jack rate. Larsen stated that there was no correlation between fish length and mini-jack rates among groups. He also said that it was important to keep in mind that the different rearing environments were not replicates, and that there were obvious physical and chemical differences.

Larsen explained that they compared condition factors among selected rearing groups (Carlton, reuse test, and reuse control). The Carlton fish had the highest condition factor and the highest mini-jack rate. At release, the Carlton fish were larger and less variable in size than the fish in the reuse and control groups. Lipid levels showed little variation among the three groups compared. Winter growths rate were markedly different. The growth rates of the Carlton fish were two times higher than the growth-rates of reuse or control group fish. Larsen said he has seen other study results where high winter growth rates were correlated with high mini-jack rates. He said the smolting pattern in the Carlton fish were noteworthy. He said that a large proportion of the larger Carlton fish smolt in the fall (based on gill ATPase level), but see a marked decline in gill ATPase when they are transferred to the rearing ponds, which are a much colder environment. Pat Phillips and Mike Tonseth explained that Bonaparte, Similkameen, and Carlton juveniles are all from the same stock (Methow/Okanogan natural origin stock), which are from the Eastbank Hatchery Facility. Eastbank fish are raised on well water, which has highest rearing temperatures in mid-winter when water temperatures of non-well water sources would be at their lowest. Dryden fish are of natural origin from summer/fall Chinook returning to the Wenatchee. Larsen said the winter growth-rate for the Carlton fish seems to be an indicator of mini-jack rates more than for the other groups studied.

In summary, Larsen said that the size distribution and smolting physiology of BY 2008 reuse and control fish were similar to that of BY 2007 study fish; there was, however, high variability in size, growth, and smolting within the different groups. BY2008 reuse fish had a lower mini-jack rate than the Carlton fish; the mini-jack rate was higher in BY 2008 reuse fish than it was in the BY2007 reuse fish. In broader comparisons among the different rearing locations, mini-jack rates were highest in the Carlton fish and lowest in the Similkameen fish over three broodyears. For the Carlton fish, high winter growth was correlated with high mini-jack rate; temporal pattern of ATPase production was atypical compared to naturally rearing fish, showing high levels in fall with decreases in spring.

For the BY 2009 study, Larsen said they will compare reuse and control groups of Wenatchee stock summer Chinook reared at Eastbank and then released from Dryden Pond in the spring. Growth, smolting, and mini-jack rates will be evaluated.

D. DECISION ITEM – SOA for Chelan and Grant PUDs Hatchery Sharing (Joe Miller)

Joe Miller introduced the SOA by saying it is an effort to formalize the hatchery sharing agreement with Grant PUD. He stated the SOA explains how HCP production capacity would be maintained while providing hatchery space for Grant PUD. Miller stated that Chelan PUD's production obligations will decrease consistent with the HCP which says that initial production levels will be maintianed through 2013 . Grant PUD would build their own incubation and holding facilities. Space for additional summer Chinook would be created by using reuse facilities for summer Chinook, once approved by the Hatchery Committees, and by moving spring Chinook into raceways. The proposed changes will not increase water withdrawal; Chelan PUD is limited to withdrawing no more than 10 percent of the aquifer use. Mike Schiewe asked if any anticpated sharing will impact HCP production, and Miller replied it would not. There was discussion about adding a provision in the SOA for changes to the agreement if needed to protect HCP production requirements. Chelan PUD agreed to add to the following statement to the SOA: "This agreement does not change any of Chelan PUD's existing or future HCP production obligations."

Kirk Truscott asked about the possibility that Grant PUD production may require water reuse facilities. He asked whether the HCP Hatchery Committees and the Priest Rapids Coordinating Committee (PRCC) Hatchery Subcommittee would be involved in these decisions. Bill Gale suggested that both the HCP and PRCC committees would need to be involved in approving changes to production at the facility. Schiewe suggested adding text to the SOA to the effect that the SOA will not alter Chelan PUD's "obligations to manage its facility through the Hatchery Committees." Gale suggested adding language that refers to the PRCC's involvement in the use of Chelan PUD facilities as well. Schiewe suggested the following: "Decisions made about Grant PUD's hatchery programs are made in the PRCC Hatchery Subcommittee; decisions made regarding the HCP hatchery programs are made in the HCP Hatchery Committees. Where there is overlap between Grant and Chelan PUD programs, there will be coordination." The SOA was approved with these modifications. Miller will finalize the SOA and send to Carmen Andonaegui for distribution and posting on the ftp site.

E.   Update – Eastbank Modernization, Spring 2011 Schedule (Joe Miller)

Joe Miller said modernization activities at the Eastbank Hatchery will require power and water being temporarily shut off to to the chiller (see Attachment C). Steelhead green eggs in Eastbank will be moved out to their respective programs before May 1, when power and water to the chiller will be interrupted. Power has to be restarted by August 1, 2011, to accommodate spring Chinook spawning. WDFW will schedule to have most spawning completed by early April by using hormones to manipulate spawn time. Miller will provide Carmen Andonaegui with a copy of the email from WDFW regarding plans to modernize Eastbank Hatchery, for distribution to the Hatchery Committees.

III. Douglas PUD

A.   Douglas 2011 M&E Implementation Plan (Greg Mackey)

Greg Mackey reported that he sent the Douglas PUD 2011 M&E Implementation Plan to the Hatchery Committees by email on November 8 for a 30-day review period. Comments are due by December 10.

B. Recalculation – A Look at the BAMP Method (Greg Mackey)

Greg Mackey presented a brief review of methods for calculating smolt production (see Attachment D); returns per SAR (BAMP method); adult-to-smolt (1990 Settlement Agreement); smolt estimates (RST); and eggs-to-smolt (M&E), and presented the BAMP method in more detail.

Mackey noted that when using the BAMP formula, SARs and adult returns need to be matched geographically. He said that some SARs are estimated at the tributary level and that tributary adult returns estimates should be used in these cases (as opposed to SARs estimated at mainstem Columbia River dams). Mackey stated that the SAR estimate is the metric most likely to be in error. He stated that the SAR metric is usually an underestimate of true SAR, which, if used in the BAMP calculation,would result in an overestimation of the number of smolts required for NNI.

Mackey presented estimates of the number of smolts passing through the Wells Project for steelhead, spring Chinook, and summer/fall Chinook using the BAMP method. Each estimate included citations for SARs and adult returns used in the calculations. As a means to check the integrity of the estimates, the known hatchery releases for each species were subtracted from the smolt estimates to estimate wild smolt production. Using the BAMP method for calculating smolt production upstream of the Wells Project, smolt production estimates were: steelhead – 770,718 (179,281 wild); spring Chinook – 1,030,645 (320,746 wild); and summer/fall Chinook – 2,272,817 (1,488,505 wild). Mackey said he believes the steelhead smolt-production estimate is an overestimate. He said spring Chinook smolt production for the Methow subbasin assumes there is no spring Chinook production from the Okanogan subbasin. Mackey stated he believes the spring Chinook smolt production estimate is also an overestimate. Hatchery Committees' members discussed BAMP estimates and the wild smolt estimates derived from them, and noted that they are not grossly off. Craig Busack asked if there is any adjustment made for differential survival rates between hatchery and wild fish. Mackey answered that no adjustment was made, and that the estimates were based on hatchery fish SARs. For summer/fall Chinook, separate SARs and adult-return estimates were used for Methow and for Okanogan fish, with the smolt estimates added together for a total smolt production for summer/fall Chinook. Bill Gale asked how the recently calculated smolt-production estimates compare to the original smolt production estimates. Mackey responded that the estimates based on current calculations of adult returns and SARs are lower than what are now being mitigated for based on methods used in the Wells HCP (the 1990 Wells Settlement Agreement). For example, current spring Chinook mitigation production is based on a 1.6 million smolt production estimate and the smolt production estimate presented today is 1.0 million smolts.

Based on the presentations by Chelan and Douglas PUDs, Mike Schiewe asked the Committees' members how they would like to move forward on recalculation. Joe Miller said he would like to get a more thorough understanding of the pros and cons of the various smolt-production-calculation methods. He cited the use of SARs in estimating smolt production as one area that he sees as problematic given the lack of confidence in SAR estimates, especially for steelhead. Schiewe suggested that the PUDs develop a proposal for the Hatchery Committees for recalculating smolt production. Mike Tonseth said he would like a firm timeline for agreement by the Committees on a recalculation method, such that if the Committees cannot agree to a recalculation method by a specific date, the default should be the BAMP method. He reminded the Committees that an October 2011 completion date was discussed at the last meeting. Keely Murdoch said that although the BAMP approach includes assumptions, she is more comfortable with these than with the uncertainties used in other smolt-production estimates. Gale said that he is concerned with using SARs for estimating steelhead smolt production. Tonseth stated that SARs are minimum estimates, which results in an overestimate of smolt production; therefore, they represent a conservative approach to mitigating for passage and survival losses erring in favor of production. Tonseth stated that SARs for steelhead will remain problematic given the life history of this species. Schiewe asked the PUDs to calculate smolt production for HCP species using the BAMP method (and alternative methods as appropriate), and to bring these estimates to the Committees for discussion. Miller said he was not prepared to agree to a default recalculation method at this time because there is no default recalculation method. Miller suggested that the default 2013 production level for Chelan would be (1) post initial production levels as adjusted by (2) project survival. Schiewe suggested waiting to agree to a default until after the PUDs have provided smolt-production calculations and said that a default method would have to be agreed to by the Committees. The PUDs agreed to provide to the Committees draft smolt-production-recalculation proposals for HCP plan species for discussion at the February 2011 meeting.

C. Wells Steelhead HGMP (Greg Mackey)

Greg Mackey provided an update on the draft Wells Steelhead HGMP, saying that Douglas PUD was not asking for a vote today as previously planned because some progress had been made in resolving an impasse concerning the HGMP. Instead, he handed out a 1-page summary of the key points of a revised draft HGMP (see Attachment E) . Mackey said that Douglas PUD had been waiting since February 2010 for a decision on Methow (Wells) steelhead release numbers from the *US v OR* forum, but that agreement agreement on this issue had not been addressed, nor did it seem likely to be addressed in the foreseeable future. Shane Bickford said he and Steve Parker, Yakama Nation, had recently discussed Wells Hatchery steelhead production, and the program described in the 1-page summary was consistent with their discussion. The revised HGMP would not change the Douglas PUD's HCP steelhead production requirement (currently about 350,000 smolts). Wells steelhead will be used to obtain a release of 350,000 steelhead smolts, combined with Winthrop NFH releases, in the Methow Basin in 2011 and 2012. After 2012, Douglas PUD would provide 150,000 steelhead smolts for release in the Methow Basin, with the remaining 200,000 smolt production for release below Wells Dam. The approach leaves open the possibility of moving steelhead releases into the the Okanogan River if the CCT agrees. Wells Hatchery steelhead releases into the Twisp River will remain continue for NNI fish, adjusted to 3.7 percent. Approximately 100,000 steelhead smolts would be released into lower Methow River to support a conservation fishery. Keely Murdoch said Steve Parker had a few suggested edits to the 1-page handout of key points of the revised Wells steelhead HGMP, but that they provide only clarifications and do not substantively change the proposal (she provided the edits to Douglas PUD).

Kirk Truscott said that the CCT is now releasing 100,000 steelhead smolts into the Okanogan Basin, and that the possibility of Douglas PUD's release of up to 100,000 smolts in the Okanogan River would bring the total to 200,000. He said the CCT did not want this large number of steelhead smolts released into the Okanogan Basin at this time. Moreover, he said the CCT is concerned that releases below Wells Dam do not provide a potential harvest opportunity for the CCT. Bickford said the proposed steelhead releases in the Okanogan Basin were to provide a harvest opportunity for the CCT. Truscott said the CCT prefers segregated steelhead smolts be released into the Columbia River above the confluence with the Okanogan River with possibly an acclimation site constructed at the base of Chief Joseph Dam. Bill Gale said an approach setting up a segregated stock would create issues for other stocks related to straying of the segregated stock. Mike Tonseth said the concern creating a stock of steelhead that could not be segregated is consistent with discussion by WDFW in the Production Advisory Committee (PAC). Gale said USFWS is open to rearing more than 100,000 steelhead smolts at Winthrop National Fish Hatchery (NFH). He said the revised HGMP proposal brings the Wells steelhead program much closer to what the *US v OR* parties had been discussing. WDFW and Douglas PUD reiterated their goal of jointly submitting a draft HGMP to NOAA.

Rob Jones encouraged the Hatchery Committee to move forward on submitting the draft HGMP to NOAA. He said NOAA staff have provided guidance to the applicants and advice on how NOAA will evaluate the proposal, both in writing and orally, and he would like a HGMP to be submitted. NOAA will evaluate the ecological effects of the program in the Methow Basin, including issues of over-escapement and reducing risk to existing populations, and they will also look at how the HGMP approaches adult management. He said that ultimately NMFS needs to conclude that the program is consistent with Endangered Species Act (ESA) recovery of steelhead in the Methow.

Bickford asked Truscott if releasing steelhead in the Okanogan Basin would better facilitate adult management, such as allowing capture of adults at weirs. Truscott said being able to support an integrated steelhead program with a 100,000 smolt production level is years away. Bickford asked if Enloe Dam might serve as a terminal fisheries point to separate natural production from hatchery production. He said Douglas PUD does not have an obligation to develop redundant hatchery facilities for the Wells steelhead segregated mainstem releases. Truscott said he would like to arrange further discussion of this issue with Joe Peone and Bickford, saying he believes there is a workable solution.

As a first step, Bickford said Douglas PUD would like agreement on the key provisions of the draft steelhead HGMP, and particularly the smolt production numbers, before revising the full HGMP for Committees approval. Schiewe asked if the Committees could be prepared to agree in principal to the modified HGMP at the December meeing. If so, Mackey could then redraft the full HGMP based on the December agreement, and formal approval of the HGMP could be on the agenda for January or February. The Committees agreed to schedule a conference call to discuss the 1-page handout on December 7, at 1 pm. Carmen Andonaegui will set up a conference call line and email the conference call notice out to the Committees.

Jones reiterated that the HGMP will need to show persuasively how the program enhances the status of the natural population and describe the program's contribution to the natural population in measurable terms such as Viable Salmonid Population (VSP) parameters. Bickford and Mackey asked how this standard can be met for a segregated hatchery program. Jones responded that in his opinion the segregated program functions as a reserve in case it is needed in the future for recovery. He said the purpose of a hatchery program is to increase the abundance of natural-origin fish and that this can be demonstrated with measureable parameters. In response to a question about the difference between threatened and endangered listings, Jones said the bar to enhance natural populations is the same for both threatened and endangered species.

D. DECISION ITEM – Chief Joseph Hatchery Participation SOA (Greg Mackey)

Greg Mackey introduced the Chief Joseph Hatchery Participation SOA (see Attachment F), saying that it describes how Douglas PUD intends to participate in the new Chief Joseph Hatchery program at the new NNI hatchery production level of 3.7 percent. Under the SOA, Douglas PUD would provide funding to rear up to 33,300 yearling spring Chinook smolts, up to 48,100 yearling summer/fall Chinook, and up to 49,000 subyearling summer/fall Chinook. The subyearlings may eventually be converted to an additional 6,475 yearling smolts.

Kirk Truscott said the hatchery participation will result in a consolidated summer Chinook program in the Okanogan Basin. This would avoid competition for broodstock and redundant M&E programs. It is also an opportunity for Douglas PUD to establish an NNI spring Chinook program for the Okanogan. The Hatchery Participation Agreement also offsets costs to Bonneville Power Administration (BPA) for production. Truscott noted the reference in the SOA to subtracting Douglas PUD's Chief Joseph yearling summer/fall Chinook production (up to 54,575 fish) from their Methow production of approximately108,000. He stated that although this will result in a short-term reduction in the Methow summer/fall Chinook production, Grant PUD will soon start producing summer Chinook for release in the Methow Basin. Tom Kahler took this opportunity to inform the Committees of the implications of the Wells Coordinating Committee decision on November 16, accepting the results of Douglas PUD's 2010 survival verification study of yearling spring migrants. This acceptance resulted in a revised NNI compensation level of 3.7 percent for spring and summer Chinook yearlings and summer steelhead—effective immediately. At the

3.7 percent compensation level, Douglas PUD's NNI production numbers for steelhead will be 47,571; for spring Chinook, 59,464; and for yearling summer Chinook, 105,714.

Kirk Truscott said the Hatchery Participation Agreement SOA is similar in concept to the hatchery sharing agreement the CCT has with Grant PUD for participation at Chief Joseph. The CCT is also having discussions with Chelan PUD on a hatchery sharing agreement. The option for rearing spring Chinook is a new element and presents an opportunity for Chelan PUD to produce spring Chinook without having to build a new hatchery.

Tom Scribner commented that he wanted to make sure that the production sharing agreement in the SOA is coordinated with *US v OR*, and would be willing to take this information to the *US v OR* to facilitate this coordination. Scribner suggested that Truscott review the *US v OR* production tables to see if there are any major differences. Mike Schiewe suggested that if the Hatchery Committees agree to the production arrangements in the hatchery participation SOA, then the Committees' members who are also *US v OR* participants need to take changes to the *US v OR* forum.

Douglas PUD is anticipating broodstock collection in 2012 for production at the Chief Joseph Hatchery.

The Hatchery Committees approved the SOA for Douglas PUD's participation in the Chief Joseph Hatchery Program.

IV. WDFW

A. Discussion: Surplus Spring Chinook at the Methow Hatchery (Mike Tonseth)

Mike Tonseth said there are about 11,000 surplus Chewuch spring Chinook from BY 2009 at Methow Hatchery. All are coded-wire-tagged (CWT). Tonseth said that if the surplus fish continue to be held at the Methow Hatchery, rearing densities for the program will be exceeded before transfer can occur to Chewuch Pond in the spring. He said the surplus fish can be rolled into the balance of the Chewuch Program fish, but this increases the risk of a bacterial kidney disease (BKD) outbreak as result of increased rearing densities.

Tonseth explained that WDFW was not aware of the excess until marking occurred and that the 11,000 juveniles are above and beyond production requirements. There are 577,000 spring Chinook on-station with a production requirement of 550,000. Tonseth says one option for dealing with the surplus would be to ad-clip the fish and release them now as subyearlings. Another option would be to keep the surplus spring Chinook on-station, put them in with rest of Chewuch group, and release them all at a smaller size (18 fish per pound [fpp] instead of 15 fpp). Tonseth said the issue of how to deal with the surplus fish is time-sensitive in that the pond is needed for fish that are coming out of early brood, which will occur in 1 week. Tonseth said that for the Chewuch Program production alone, the 11,000-fish surplus is about 10% of total production. Pat Phillips said the coefficient of variation (CV) is in the 7.5 to 8.0 range. The Hatchery Committees discussed the risk of a BKD outbreak with higher densities and any concern with releasing at 18 fpp versus at 15 fpp. Shane Bickford noted that 18 fpp is closer to the natural size. Mike Schiewe asked NOAA for their recommendation for handling the surplus spring Chinook given their ESA status. Craig Busack asked if there were data on adult returns from early releases. Tonseth said the early returns can not be differentiated from other CWT adult returns. Bill Gale said he was concerned that an early release has the potential for negative ecological interactions. The Committees agreed to defer discussion on this topic until the end of the meeting in order to allow members to confer with staff within their agencies.

When the discussion was continued, Tom Scribner described a pond on the Chewuch River just past Eightmile Creek where the surplus fish could possibly be released. It would be an uncultured acclimation. The Committees discussed that the pond would need to be looked at to confirm that the outlet and inlet are open. If open, the Committees agreed to release the 11,000 surplus spring Chinook into the pond.

V. HETT

A. Update (Carmen Andonaegui)

Carmen Andonaegui reported that the the Hatchery Evaluation Technical Team (HETT) will meet on November 23, so there is no update this month.

VI. HCP Administration

A. Next Meetings

The next scheduled Hatchery Committees meetings will occur as follows: December 15, January 19, and February 16, all in Wenatchee.

List of Attachments

Attachment A – List of Attendees
Attachment B – Forecasting PNI for Spring Chinook at Tumwater
Attachment C – Email from WDFW regarding Accommodating Modernization Activities at Eastbank Hatchery
Attachment D – Wells HCP Recalculation (PowerPoint presentation)
Attachment E – 2010_11_08 One Page Wells Steelhead HGMP Key Points
Attachment F – Douglas PUD Chief Joe Hatchery Participation SOA

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor QEA, LLC
Carmen Andonaegui	Anchor QEA, LLC
Joe Miller*	Chelan PUD
Josh Murauskas*	Chelan PUD
Tom Kahler*	Douglas PUD
Shane Bickfore (afternoon)	Douglas PUD
Greg Mackey*	Douglas PUD
Craig Busack (phone)	NOAA
Rob Jones* (phone)	NOAA
Kirk Truscott*	CCT
Todd Pearsons	Grant PUD
Pat Phillips	WDFW
Bill Gale*	USFWS
Mike Tonseth*	WDFW
Don Larsen	NOAA
Brian Beckman	NOAA
Deborah Harstad	University of Washington
Tom Scribner* (phone)	Yakama Nation
Keely Murdoch*	Yakama Nation

* Denotes Hatchery Committees member or alternate

CAN PIT-DETECTIONS OF CHIWAWA-ORIGIN SPRING CHINOOK PROVIDE A MEANS TO FORECAST FOR PNI AT TUMWATER DAM?

Prepared by J.G. Murauskas
November 2, 2010

Background*:* With the conclusion of the 2010 spring-run Chinook adult migration, returns from hatchery- and wild-origin PIT-tagged fish released in the Chiwawa River Basin in 2006 and 2007 can be analyzed to determine if these detections can provide a useful means to forecast the proportion of natural-origin adults that reach Tumwater Dam (TUM). Hatchery-origin fish were released from Chiwawa Ponds (CHIP) in 2007, including 9,981 PIT-tagged individuals. Wild-origin fish were released in the Chiwawa River (CHIWAR) and Chiwawa Trap (CHIWAT) during 2006 and 2007, including 8,039 and 10,828 PIT-tagged individuals, respectively. Ninety-five (95) of these fish were detected as adults at Tumwater Dam (TUM) over a four-year period, including 42 hatchery-origin fish (SAR = 0.0042) and 53 natural-origin fish (SAR = 0.0028; Table 1). Variation in the difference between release and return year (i.e., years at sea) by release site was observed: fish released from CHIP returned in one (36%), two (62%), and three (2%) years at sea; CHIWAR fish returned in two (28%) and three (72%) years at sea; CHIWAT fish returned in one (4%), two (44%), and three (52%) years at sea. Although the conversion rate from Bonneville Dam (BON) to TUM was 76% with all groups combined, many individual groups showed low or zero conversion between downstream and upstream observation sites. Further, conversion rates varied by age, or years at sea, with older fish converting at higher rates overall, with the exception of the relatively high conversion of jacks between BON and McNary Dam (MCN; 91%). A greater sample size to examine conversion through the lower Columbia River is available through University of Washington's Data Access in Real Time (DART): the conversion rates of adult Wenatchee River Basin-origin spring Chinook between BON and Rock Island Dam (RIS) has been 53% between 2003 and 2009, ranging from 31% in 2003 to 72% in 2007 (Figure 1).

Conclusion: These results collectively suggest that detections of PIT-tagged adult spring Chinook would not be able to provide a forecasting mechanism to infer population-wide returns at upstream locations. The primary reasons supporting this conclusion are as follows: (1) the variation in years at sea confounds the use of a SAR ratio to the entire population of hatchery-origin fish; (2) the varying degree of in-river losses of particular groups (e.g., SD ± 34% in data presented in Table 1) is unpredictable; (3) the high in-river loss of adult spring Chinook (e.g., up to 69%, Figure 1) further restricts already limited sample sizes; (4) low SARs (e.g., 0.0042 in wild fish) lead to statistically invalid results based on sample size; and, (5) the lack of estimated adult returns of wild-origin fish precludes the application of hatchery-origin predictions to manage for PNI or brood collection. These results all suggest that the use of PIT-detections to forecast upstream returns of wild- and hatchery-origin fish is not feasible.

Table 1. Unique detections of Chiwawa-origin spring Chinook salmon by release site, migration year, return year, and detection site, 2006 and 2007 releases.

Release Site	Migration Year	Return Year	BON	MCN	RIS	TUM
CHIP (Hatchery)	2007	2008	20	18	16	15
		2009	34	32	29	27
		2010	1	1	1	0
CHIWAR (Wild)	2006	2008	1	1	0	1
		2009	2	2	2	2
	2007	2009	4	4	4	3
		2010	11	10	9	9
CHIWAT (Wild)	2006	2007	2	2	0	0
		2008	13	11	12	8
		2009	11	10	10	10
	2007	2009	10	7	5	7
		2010	16	16	15	13

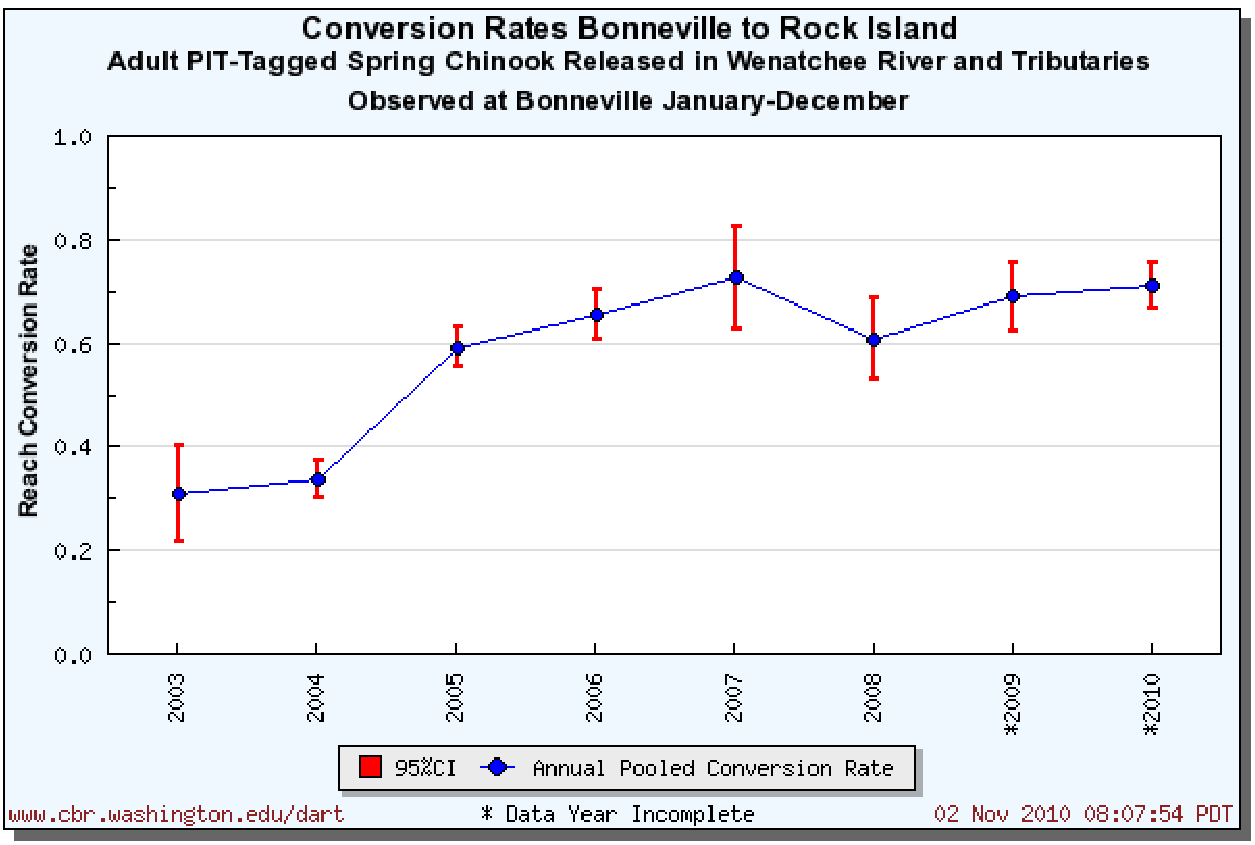


Figure 1. Conversion rates or Wenatchee River Basin-origin spring Chinook salmon between Bonneville and Rock Island dams, observations years 2003-2010. Data obtained from DART.

Attachment C

From: Miller, Joseph
To: Carmen Andonaegui
Subject: Action Item
Date: Monday, December 06, 2010 3:27:57 PM

Carmen,
Here is the email regarding Eastbank modernization (one of my action items from last HCP meeting)

From: Penny, John C (DFW) [mailto:John.Penny@dfw.wa.gov]
Sent: Tuesday, November 02, 2010 9:58 AM
To: Miller, Joseph; Rogers, Robert W (DFW)
Cc: Morrison, Cory L (DFW); Osborne, Gary (DFW); Korth, Jeffrey (DFW); Tonseth, Michael A (DFW)
Subject: RE: Steelhead movements and Eastbank modernization

Joe,

We can still start all the green eggs here. Any of the hatchery group that would not be large enough to pond by May 1st (if that is the date we have to shut down the incubation system), would have to be shipped to Chelan as eyed eggs, so they could be reared to about 1200 to 800 per pound, before they could be shipped back for ponding at Eastbank. The wild group would remain at Chelan. We would have the viral results when the eggs were eyed and shocked (before shipping to Chelan), so we would be able to segregate the groups as needed.

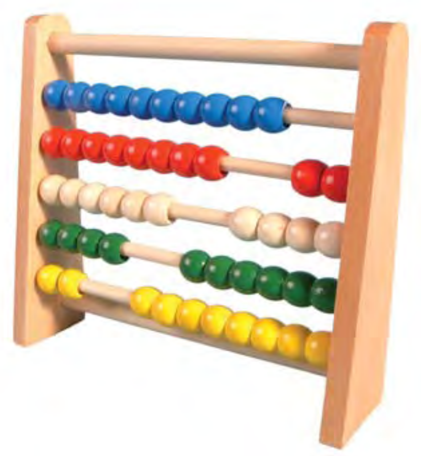
We can induce earlier spawning times by injecting pituitary hormones. This would allow us to receive our green eggs early enough to eye them up before shutting down the incubation system.

We generally go through the Spring Chinook the first week of August, in case we have some early ripe females. But, our first spawn is generally the second week of August. We can't control this, so we do need to have the incubation system in operation for those eggs. If that means we have to have a May 1st exodus of the incubation room, we will meet that deadline, so that the August 1st deadline for startup of the incubation system can be met.

John

Attachment D

Wells HCP Recalculation



NNI for the Wells Project

Douglas PUD
November 17, 2010

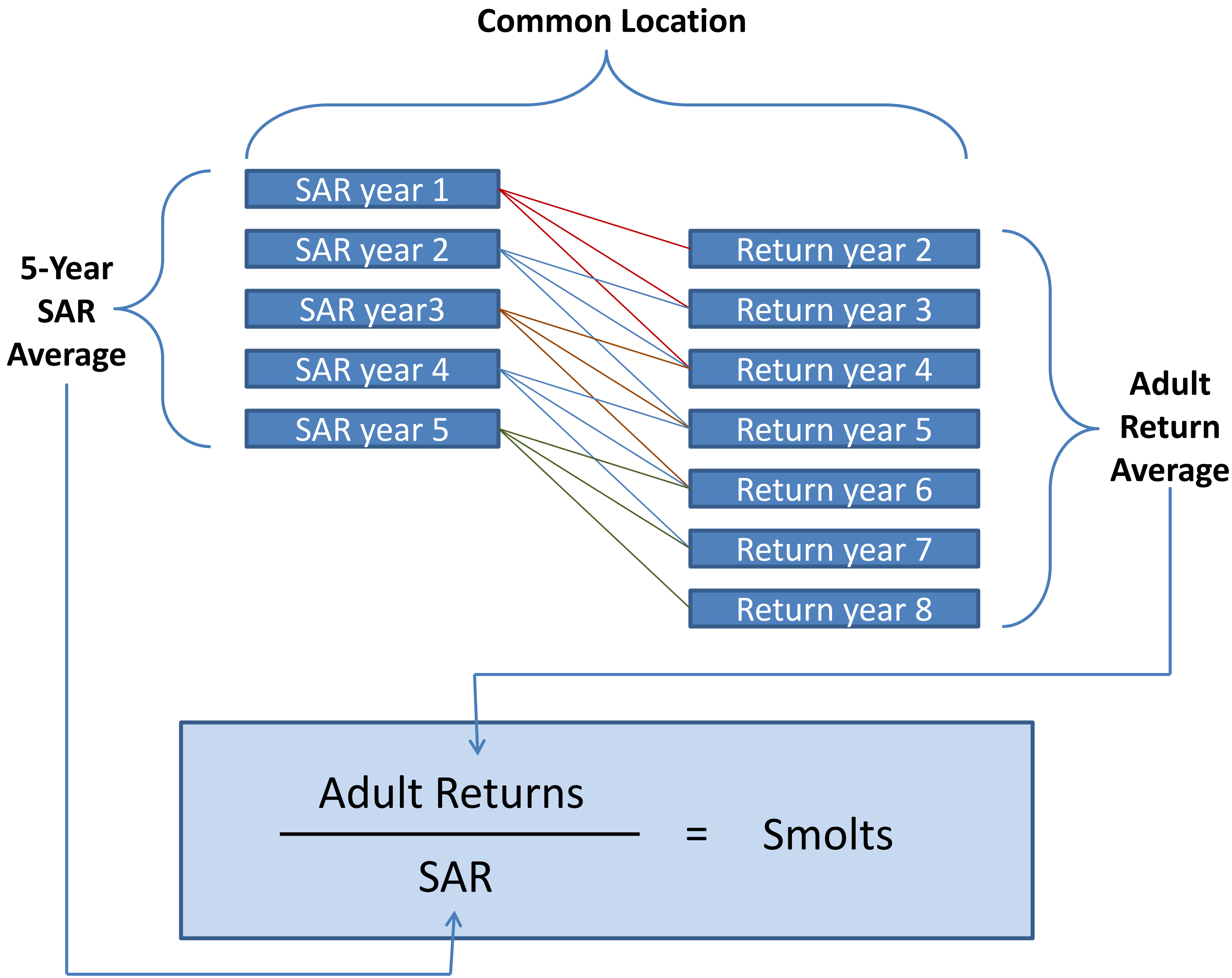
How many smolts?

- Returns/SAR (BAMP)
  - Population dynamics from HCP
- Adult to Smolt (1990 Settlement Agreement)
  - Plug numbers for HCP
- Smolt Estimates: RST (M&E)
- Egg to Smolt (M&E)

Returns/SARs
BAMP

Returns	**÷**	**Returns/Smolt**	**=**	**Smolts**

1. SAR and Adult Returns must match in time and space
   - Geographic location of the SAR = geographic location of the adult returns
   - SAR and adult returns must align temporally
2. The formula is self-leveling
   - SAR and adult returns tend to offset
3. BAMP should be calculated for each individual population (where possible) and then summed
4. Estimates hatchery and wild smolts, combined
5. Source of error is most likely under-estimate in the SAR component, resulting in an over-estimate of smolts.
6. SAR dictates using data that are about 5 years old, and older
7. Assumes hatchery SAR applies to wild fish


Common Location
5-Year
SAR
Average
SAR year 1
SAR year 2
SAR year3
SAR year 4
SAR year 5
Return year 2
Return year 3
Return year 4
Return year 5
Return year 6
Return year 7
Return year 8
Adult
Return
Average
Adult Returns
SAR
=
Smolts

Steelhead

- SAR (Wells Dam): 1999-2003 (Appendix B, 2009 DPUD M&E)
- Adult Returns (Wells Dam): 2001-2007 (Appendix A1, 2009 DPUD M&E)

$$\frac{10{,}015 \text{ returns}}{0.012994 \text{ SAR}} = 770{,}718 \text{ smolts}$$

Known Hatchery Releases	**Wild Smolts (by subtraction)**
591,437	179,281

Spring Chinook

- SAR (Methow Basin): 1999-2003 (Appendix B, 2009 DPUD M&E)
- Adult Returns (Methow Basin): 2002-2008 (Table 1-10, Methow Spring Chinook HGMP draft)

$$\frac{\text{1,505 returns}}{\text{0.00146 SAR}} = \text{1,030,646 smolts}$$

Known Hatchery Releases	Wild Smolts (by subtraction)
709,900	320,746

Summer/Fall Chinook

- SARs (Methow and Okanogan Basins): 1999-2003 (Tables 7.27; 8.21, 2009 Chelan PUD M&E)
- Adult Returns (Methow and Okanogan Basins): 2002-2008 (Tables 7.14; 8.8, 2009 Chelan PUD M&E)

Methow

$$\frac{2{,}765 \text{ returns}}{0.00190 \text{ SAR}} = 1{,}453{,}658 \text{ smolts}$$

Okanogan

$$\frac{7{,}554 \text{ returns}}{0.00922 \text{ SAR}} = 819{,}159 \text{ smolts}$$

Total Above Wells

2,272,817 smolts

Known Hatchery Releases	Wild Smolts (by subtraction)
784,312	1,488,505

HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Wells Hatchery Summer Steelhead Program

8 November 2010 Wells HCP Hatchery Committee

Key points of the HGMP

1. Smolt Releases:
   - 2011 and 2012: Wells steelhead releases will ensure a 350,000 smolt total release in the Methow Basin.
     - The remainder of the fish will be released below Wells Dam, or up to 100,000 in the Okanogan Basin if requested by the Colville Confederated Tribes.
   - 2013 and beyond: Wells Steelhead smolts releases in the Methow Basin will total 150,000 smolts.
     - 48,858 NNI smolts released in the Twisp River (Twisp Acclimation Pond).
     - 100,000 harvest enhancement smolts released in the lower Methow River
     - 200,000 harvest enhancement smolts will be released below Wells Dam
       - Up to 100,000 of these fish may be released in the Okanogan Basin if requested by the Colville Confederated Tribes.
   - Up to 100,000 smolts released in the Okanogan Basin for Grant PUD mitigation.
2. Broodstock Collection:
   - Twisp Integrated: 26 wild fish collected at the Twisp Weir.
   - Lower Methow: 52 hatchery-origin collected in the Methow Basin.
   - Segregated Harvest Enhancement Program: 104 hatchery-origin fish collected at Wells Hatchery volunteer channel (1st option) and Wells Dam (if needed).
   - Grant PUD mitigation: 42 adult steelhead of hatchery or natural-origin collected from Wells Hatchery, Wells Dam, or from the Okanogan Basin.
3. Management of Excess Adult Hatchery Steelhead:
   - Expected Range of Hatchery Adult Returns:
     Twisp River (48,858 smolts) – maximum (1,011), average (484), minimum (132)
     Lower Methow (100,000 smolts) – maximum (2,070), average (990), minimum (270)
     Mainstem Columbia (200,000 smolts) - maximum (4,140), average (1,980), minimum (540)
   - Columbia Mainstem Segregated (below Wells Dam): Fish will be removed via the Wells Hatchery volunteer channel. We expect high fidelity to the volunteer channel and expect, based on past experience, that this will effectively remove a large proportion of the excess hatchery fish.
   - Twisp Integrated: Hatchery fish will be removed at the Twisp Weir according to management plan that identifies target spawning escapement and proportion of hatchery-origin spawners directed at a pHOS of 0.5 and an average PNI of 0.67, consistent with the Relative Spawning Success Study.
   - Methow Basin: Control pHOS to the extent practicable, with near-term goal of achieving PNI = 0.5, and long-term goal of 0.67.
   - Conservation Fishery: May be implemented by WDFW to control pHOS and work toward PNI targets.
   - Wells Dam: Wells Dam may be used to control escapement of hatchery-origin fish that were released as juveniles downstream of Wells Dam, only.
4. Monitoring and Evaluation
   - The *Conceptual Approach to Monitoring and Evaluation for Hatchery Programs* funded by Douglas PUD will be used as the HGMP assessment program. Results will be used to adaptively manage under the HGMP.

Wells HCP Hatchery Committee
Statement of Agreement

Douglas County PUD Okanogan Basin Chinook Salmon Mitigation Strategy at Chief Joseph Hatchery

Revised 8-26-2010

Statement

The Wells HCP Hatchery Committee approves the Douglas PUD Okanogan Basin Chinook mitigation strategy that will provide compensation for unavoidable passage losses at Wells Dam for Okanogan Basin spring Chinook and for Okanogan Basin summer/fall Chinook consistent with the requirements of the Wells HCP.

To satisfy the No Net Impact commitment in the Okanogan Basin, Douglas PUD agrees to provide funding at the current HCP passage loss rate (currently 3.8%) of the operation, maintenance, monitoring, and evaluation costs for the yearling spring Chinook and yearling summer/fall Chinook programs and 7% of those costs for the proposed subyearling summer/fall Chinook program at the new Chief Joseph Fish Hatchery. The HCP passage loss rate compensation level will also apply to the future conversion of the subyearling program to yearling production.

Background

On December 12, 2007 the Wells HCP Hatchery Committee approved a Statement of Agreement (SOA) that addressed Douglas PUD's Okanogan Basin spring Chinook obligation. The 3.8% level of production approved in this SOA reflects the current average survival rate for yearling fish migrating through the Wells Project (96.2%). The 3.8% level of passage-loss compensation is based upon the results of three years of survival studies conducted during Phase I of the Wells HCP. The results of future survival studies will be used to periodically adjust Douglas PUD's hatchery compensation programs starting in 2013 and then every ten years thereafter, as described in Section 8.4.5 of the Wells HCP.

At passage losses of 3.8% for yearling Chinook and an assumed 7% rate of loss for sub-yearling summer/fall Chinook, Douglas PUD would provide funding sufficient to rear up to 34,200 yearling spring Chinook smolts, up to 49,400 yearling summer/fall Chinook smolts, and up to 49,000 subyearling summer/fall Chinook for release upstream of Wells Dam in areas deemed appropriate by the Colville Confederated Tribes.

The number of fish funded by Douglas PUD is directly proportional to the number of fish produced at the Chief Joseph Hatchery on an annual basis. At full production the Chief Joseph Hatchery is expected to produce 900,000 spring Chinook smolts (34,200 yearlings for 3.8% NNI), 1,300,000 new yearling summer/fall Chinook smolts (49,400 yearlings for 3.8% NNI), and 700,000 subyearling summer/fall Chinook (49,000 subyearlings for 7% NNI). Should the 700,000 subyearlings (40 fish per pound) be converted to 175,000 yearling smolts (10 fish per pound), then compensation levels for these new yearlings will be adjusted to the 3.8% level resulting in the production of 6,650 additional yearling smolts (3.8% x 175,000 smolts = 6,650 yearling smolts).

Douglas PUD's funding obligation will begin once gametes or fish are being held within the newly constructed facility.

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FINAL MEMORANDUM

To:	Wells, Rocky Reach, and Rock Island HCP Hatchery Committees	**Date:**	January 20, 2011
From:	Michael Schiewe, Chair, HCP Hatchery Committees		
Cc:	Carmen Andonaegui		
Re:	Final Minutes of December 7, 2010 Wells HCP Hatchery Committee Conference Call; Call in Number: (866) 751-5725, Room No. *1162013*, Moderator No. *1792*		

The Wells Hydroelectric Project Habitat Conservation Plan (HCP) Hatchery Committee held a conference call on Tuesday, December 7, 2010, from 1:00 pm to 1:45 pm. Participants are listed in Attachment A to these Minutes.

I. Welcome

Mike Schiewe began the conference call by stating the purpose of the call was to review and resolve any differences regarding the key features of the draft Wells steelhead Hatchery Genetic Management Plan (HGMP) in preparation for a vote to "approve-in-principle" at the December 15 Hatchery Committees meeting. To facilitate this discussion, Greg Mackey had provided a draft Wells steelhead HGMP one-page summary of key points to the Wells Hatchery Committee, modified December 7, 2010, and emailed to the Hatchery Committees. If approved-in-principle by the Wells Hatchery Committee at the December 15 HCP Hatchery Committees' meeting, Douglas PUD will revise the full HGMP for review by the Committees in January, and a vote on approval and then submission to National Marine Fisheries Service (NMFS) will occur in February.

ACTION ITEM SUMMARY

- Greg Mackey will revise the draft key points one-page summary to reflect the key features as agreed to in today's conference call. This revised summary will be up for approval-in-principle at the December 15 Hatchery Committees' meeting. If approved, Douglas PUD will redraft the full HGMP based on the December agreement for review in January and for formal approval at the February Hatchery Committees' meeting.

AGREEMENTS

- The Wells Hatchery Committee expressed its support of the key features of the Wells Steelhead HGMP as contained in the key points one-page summary (Attachment B) and as modified during today's conference call.

II. Douglas PUD Draft Wells Steelhead HGMP Key Points (Greg Mackey)

Greg Mackey stated that the revised draft Wells steelhead HGMP key points one-page summary incorporated Steve Parker's (Yakama Nation) comments on the December 2, 2010 version. Mackey stated that Parker's comments were clarifying in nature. He reported that the revised one-page summary (modified December 7) also included edits based on a discussion with Kirk Truscott. Mackey said that the revisions included an option to release up to 100,000 smolts into the Columbia River upstream of the confluence of the Okanogan River after 2012, if adult acclimation and extraction capabilities are developed by an entity other than Douglas PUD (second bullet, Section 1, Smolt Releases). To make the text in Section 3 (Management of Excess Adult Hatchery Steelhead) consistent with revisions on smolt releases in Section 1, text was added in the second bullet of Section 3. The added text indicates that releasing steelhead into the mainstem Columbia River upstream of the Okanogan confluence will be allowed only if acclimation facilities and adult management capabilities exist. For 2011 and 2012, 350,000 smolts (combined Wells and Winthrop National Fish Hatchery production) will be released in the Methow Basin. For 2013 and beyond, 150,000 Wells steelhead smolts will be released into the Methow Basin and 200,000 smolts will be released below Wells Dam. Up to 100,000 of the below-Wells-Dam smolt releases could go into the Okanogan Basin or the Columbia River upstream of the Okanogan River confluence.

Mike Tonseth asked how the 52 hatchery-origin broodstock for lower Methow River releases would be collected. Mackey said capture at the Twisp weir would be one possibility, but he also envisioned capture by hook-and-line in the lower Methow River. He stated that if a Twisp stock gets developed, incorporating these fish into the stock might also be considered. Bill Gale suggested using a combination of adult collection methods to avoid relying on only one method. Tonseth suggested using hook-and-line in the fall to make sure there are enough hatchery steelhead adult broodstock for the program. Excess adults from hook-and-line could later be surplused if enough Twisp-progeny adults are captured at the Twisp weir in the spring.

Kirk Truscott asked if there was a reason for limiting smolt releases upstream of the Okanogan River, in 2013 and beyond, to 100,000. He said the Colville Confederated Tribes (CCT) might want the option for up to 200,000 smolts for release upstream of Okanogan River. Shane Bickford stated that putting 200,000 smolts into the reservoir without effective adult management would likely result in adult straying. Truscott responded that the condition that adult extraction capabilities be available prior to releasing adults into the Columbia River upstream of the Okanogan River confluence was intended to address the straying issue, and that he prefers not to limit the option of releasing up to 200,000 smolts upstream of the Okanogan confluence. Mackey agreed to modify the text to indicate that up to 200,000 smolts could be released upstream of the Okanogan confluence, if approved by the Hatchery Committees and if adult extraction capabilities are in place. Mackey expressed concern with the use of "and/or" in the second bullet of Section 3 in reference to smolt releases. Truscott agreed to change "and/or" to "and." In Section 1, Tom Kahler suggested revising the second bullet to say that up to 200,000 smolts may be released should acclimation ponds and adult extraction capabilities be developed "by others."

Gale asked Mike Schiewe what NMFS's position was on the HGMP key points. Schiewe said his understanding was that NMFS will abstain from commenting on the HGMP at this time; NMFS will provide their comments on the HGMP when they conduct their review once it has been formally submitted. Gale stated that he hopes the Winthrop National Fish Hatchery (NFH) program is able to move forward concurrently with the 2013 timeline for an adjusted production level. He suggested including some language in the HGMP stating that the Wells Hatchery steelhead 2013 production transition be contingent on Winthrop NFH starting their new production levels. Mackey said the transition date for Douglas PUD is set because 2013 is the date their current Endangered Species Act (ESA) take permit ends and that they need to stay on schedule for this reason. Schiewe said that if NMFS rolls the HGMP into a new permit, the permit would likely consider Winthrop NFH production as well as Wells Hatchery production. Tonseth said NMFS has typically been supportive of implementing those portions of HGMPs not covered in a permit when and where possible prior to a permit being issued. Bickford pointed out that to his knowledge, this is the case only as long as actions are consistent with the existing permit.

Keely Murdoch stated that the Yakama Nation is supportive of the draft Wells steelhead HGMP key points, as revised to include Parker's edits, and does not support changing the 2011/2012 and 2013-and-beyond timelines. Murdoch expressed her approval of the edits recommended by Truscott and the modifications from today's meeting. She asked for verification that agreeing to the one-page summary did not mean agreement with the entire HGMP, saying the Yakama Nation will want to review the entire draft HGMP. Schiewe explained that if there is agreement by the Committee today with the HGMP key points one-page summary as modified, Mackey will incorporate the modified key points into a revised one-page summary for approval-in-principle at the December 15 Hatchery Committees' meeting. Mackey will then revise the HGMP to incorporate the agreed upon key features, and the HCP Hatchery Committees will then have the opportunity to review the revised draft HGMP in January. There will be a final vote on approval of the draft Wells steelhead HGMP at the February Committees meeting. Murdoch said she supports the key points one-page summary as discussed today.

Schiewe asked if anyone had substantive concerns with the key features of the Wells Hatchery steelhead program as articulated on today's conference call. He summarized that the major change is for release of up to 200,000 steelhead smolts in the Columbia River upstream of the Okanogan River confluence if a means to manage returning adults was in place and approved by the Hatchery Committees. Kahler asked how recalculation of No Net Impact (NNI) smolt production (Twisp steelhead) would be incorporated into the new Wells steelhead HGMP. Schiewe said that if production levels change dramatically with recalculation in 2013, the Committees will need to consider options once the magnitude of the change is known.

Schiewe asked the Committees' members for their position on the key points one-page summary as discussed today. All were in support of the key points one-page summary as modified. Mackey said he will incorporate into a revised draft key points one-page summary the modifications agreed to at today's conference call, for a vote on approval-in-principle at the December HCP Hatchery Committees' meeting. Schiewe requested that if Committee members have any additional key points to flag, they provide those comments to Mackey immediately rather than waiting until the HGMP is being revised.

List of Attachments

Attachment A – List of Attendees

Attachment B – Wells Hatchery Steelhead HGMP Key Points One-page Summary (modified December 7, 2010)

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor QEA, LLC
Carmen Andonaegui	Anchor QEA, LLC
Shane Bickford	Douglas PUD
Tom Kahler*	Douglas PUD
Greg Mackey*	Douglas PUD
Bill Gale*	USFWS
Kirk Truscott*	CCT
Mike Tonseth*	WDFW
Keely Murdoch*	Yakama Nation

* Denotes Hatchery Committees member or alternate

Attachment B

HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Wells Hatchery Summer Steelhead Program

07 December 2010 Wells HCP Hatchery Committee

Key points of the HGMP

1. Smolt Releases:
   - 2011 and 2012: Wells steelhead releases will be combined with Winthrop NFH releases to ensure a 350,000 smolt total release in the Methow Basin.
     - Combined releases in the upper Methow watershed will total 47,571 NNI smolts in the Twisp and 100,000 each in the Chewuch and upper Methow rivers.
     - The remainder of the fish will be released below Wells Dam, or up to 100,000 in the Okanogan Basin, if requested by the Colville Confederated Tribes.
   - 2013 and beyond: Wells Steelhead smolts releases in the Methow Basin will total 150,000 smolts.
     - 47,571 NNI smolts released in the Twisp River (Twisp Acclimation Pond).
     - 100,000 harvest enhancement smolts released in the lower Methow River
     - Up to 200,000 harvest enhancement smolts will be released below Wells Dam
       - Up to 100,000 of these fish may be released in the Okanogan Basin if requested by the Colville Confederated Tribes.
       - Alternatively, up to 100,000 may be released from acclimation ponds in the Columbia River mainstem, upstream from the Okanogan River once acclimation ponds and adult extraction capabilities are developed.
   - Up to 100,000 smolts released in the Okanogan Basin for Grant PUD mitigation.
2. Broodstock Collection:
   - Twisp Integrated: 26 wild fish collected at the Twisp Weir.
   - Lower Methow: 52 hatchery-origin fish collected in the Methow Basin.
   - Segregated Harvest Enhancement Program: 104 hatchery-origin fish collected at Wells Hatchery volunteer channel (1st option) and Wells Dam (if needed).
   - Grant PUD mitigation: 42 adult steelhead of hatchery or natural-origin collected from Wells Hatchery, Wells Dam, or from the Okanogan Basin.
3. Management of Excess Adult Hatchery Steelhead:
   - Expected Range of Hatchery Adult Returns:
     Twisp River (47,571 smolts) – maximum (984), average (471), minimum (129)
     Lower Methow (100,000 smolts) – maximum (2,070), average (990), minimum (270)
     Mainstem Columbia (200,000 smolts) - maximum (4,140), average (1,980), minimum (540)
   - Columbia Mainstem Segregated (below Wells Dam and/or releases in the mainstem Columbia River above the confluence of the Okanogan River): Fish will be removed via the Wells Hatchery volunteer channel (below Wells Dam releases) or via selective harvest and or extraction at or near the acclimation release sites (mainstem Columbia releases above Wells Dam). We expect high fidelity to the acclimation/release sites (volunteer channel for below Wells Dam releases, and acclimation sites above Wells Dam for above Wells Dam releases) and expect, based on past experience, that this will effectively remove a large proportion of the excess hatchery fish.
   - Twisp Integrated: Hatchery fish will be removed at the Twisp Weir according to management plan that identifies target spawning escapement and proportion of hatchery-origin spawners directed at a pHOS of 0.5 and an average PNI of 0.67, consistent with the Relative Spawning Success Study.
   - Methow Basin: Control pHOS to the extent practicable, with near-term goal of achieving PNI = 0.5, and long-term goal of 0.67.
   - Conservation Fishery: May be implemented by WDFW to control pHOS and work toward PNI targets.
   - Wells Dam: Wells Dam may be used to control escapement of hatchery-origin fish that were released as juveniles downstream of Wells Dam, only.
4. Monitoring and Evaluation:
   - The *Conceptual Approach to Monitoring and Evaluation for Hatchery Programs* funded by Douglas PUD will be used as the HGMP assessment program. Results will be used to adaptively manage under the HGMP.

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REVISED MEMORANDUM

To:	Wells, Rocky Reach, and Rock Island HCP Hatchery Committees	**Date:**	January 20, 2011
From:	Michael Schiewe, Chair		
Cc:	Carmen Andonaegui		
Re:	Final Minutes of December 15, 2010 HCP Hatchery Committees Meeting		

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans (HCPs) Hatchery Committees met at the Chelan PUD offices in Wenatchee, Washington, on Wednesday, December 15, 2010, from 9:30 am to 11:30 am. Attendees are listed in Attachment A to these Meeting Minutes.

ACTION ITEM SUMMARY

- Josh Murauskas will provide to the Hatchery Committees a written list of improvements that have been identified as necessary and agreed to by Cory Kamphaus (Yakama Nation) and Travis Maitland (WDFW) (Item I).
- Douglas PUD will provide a revised draft Wells steelhead HGMP for distribution to the Hatchery Committees prior to the January 2011 Committees meeting (Item II-A).
- Rob Jones and Craig Busack will provide a copy of NMFS' comments to the USFWS on the Winthrop NFH programs to Carmen Andonaegui for distribution to the Hatchery Committees (Item II-A).
- Joe Miller will provide a draft 2011 Chelan PUD Action Plan to Carmen Andonaegui for distribution to the Hatchery Committees prior to the January meeting (Item II-E).
- Joe Miller will provide to the Hatchery Committees a table showing HCP Plan Species survival study results for Rocky Reach and Rock Island Projects (Item III-A).
- Carmen Andonaegui will distribute Kirk Truscott's memo to the Hatchery Committees regarding summer Chinook mortalities at Bonaparte Pond (Item IV-A).

REVIEW ITEMS

- Draft 2009 Douglas PUD M&E Report: 60-day review period with comments due February 7, 2011.

- Draft Wells HCP 2011 Action Plan: comments due prior to the next Hatchery Committees meeting January 19.
- Draft Wells HCP 2010 Hatchery Compliance Report: comments due prior to the next Hatchery Committees meeting January 19.

I. Welcome, Agenda Review, Meeting Minutes, and Action Items

The Hatchery Committees reviewed the agenda and the November 17 meeting minutes. Greg Mackey added a discussion of the Wells HCP 2011 Action Plan and the Draft Wells HCP Hatchery Compliance Report to the agenda. Josh Murauskas reported he had spoken with both by Cory Kamphaus (Yakama Nation) and Travis Maitland (WDFW) and that he will provide a written list of Tumwater Facility improvements agreed upon. The Hatchery Committees approved the November 17 meeting minutes, as revised. Busack informed the Committees that NMFS would not be able to participate in the Committees meetings in person every month, but will participate in monthly meetings by phone. Mike Schiewe suggested NMFS try to attend the meetings in-person at least a couple of times per year. Carmen Andonaegui will finalize meeting minutes and distribute them to the Committees.

II. Douglas PUD

A. DECISION ITEM: Wells Steelhead HGMP Key Points One-pager – vote on agreement-in-principle (Greg Mackey)

Greg Mackey reported that he had incorporated all edits from the December 7 conference call into the revised Hatchery and Genetics Management Plan (HGMP) one-page summary (Attachment B). He said Douglas PUD is seeking buy-in on the key points of the HGMP before editing the full draft HGMP, and submitting it back to the HCP HC for final review. Mike Schiewe reiterated that an agreement-in-principle, during today's meeting, of the HGMP key points contained in the one-page summary does not imply approval of the full HGMP. He asked that if there were items in the draft HGMP that Committees' members would like Douglas PUD to approach differently, they should provide those comments as early as possible to Greg Mackey.

Schiewe asked for comments on the HGMP summary. All present provided their agreement-in-principle with the one-page summary with the exception of Craig Busack, who abstained from voting but remarked that NMFS had previously provided guidance in the development of the HGMP. Kirk Truscott, who was not present, provided his agreement in principle by email on December 14. Bill Gale said he would provide help to Douglas PUD in drafting the section of the HGMP concerning how the Wells steelhead program relates to the existing Winthrop National Fish Hatchery (NFH) programs. Keely Murdoch said Steve Parker (Yakama Nation) would like adaptive management language included in the HGMP similar to what is in the Wenatchee steelhead HGMP regarding balancing adult escapement with PNI.

Schiewe asked if the Wells steelhead HGMP would propose harvest as a tool for managing PNI, and if so, how would it be addressed. Mike Tonseth said the Wenatchee spring chinook HGMP used an addendum to described management of PNI. The Wenatchee steelhead HGMP contains a paragraph that allows for the use of recreational harvest as a tool to manage surplus hatchery fish. Mackey said conservation fisheries are discussed in the current draft HGMP as a method for meeting PNI, including text about the effectiveness of the method.

Schiewe summarized that the Committees had approved in principle the key points of the HGMP one-page summary, and that Douglas PUD would now begin drafting the revised HGMP to reflect the changes agreed to in the steelhead HGMP one-pager. The Hatchery Committees should expect a new, full draft HGMP in time for the January meeting for approval at the February Committees' meeting. If approved, Douglas PUD will transmit the draft HGMP to NMFS. Rob Jones said NMFS had a very productive meeting last week with the USFWS regarding the Winthrop NFH programs. He agreed to provide a copy of NMFS comments on the Winthrop NFH programs to Carmen Andonaegui for distribution to the Committees.

B. Update: Methow Hatchery Surplus Spring Chinook – status of the pond on the Chewuch River near Eightmile Creek (Greg Mackey)

Reading from Charlie Snow's November Monitoring and Evaluation (M&E) report, Greg Mackey reported that 11,379 excess Methow composite spring chinook were transferred on November 22 from the Methow Hatchery to a side channel pond on the Chewuch River upstream of the Eightmile Creek confluence. About 496 of the transferred fish were PIT-tagged prior to release. Pat Phillips said that he and Rick Alford, Yakama Nation, had examined the site and determined it would provide good egress; it was about four-ft deep with groundwater influence keeping the head-end of the side channel open in winter. The water temperature in the side channel was about 37 degrees; the fish were acclimated for about one hour prior to release.

C. Update: Wells Survival Study Summer Chinook release (Greg Mackey)

Greg Mackey stated that he provided a memo on the disposition of the Wells survival study summer Chinook to Carmen Andonaegui for distribution to the Hatchery Committees (Attachment C). He reiterated that because the study would not be implemented, the summer Chinook juveniles were folded into the general Wells Hatchery yearling Chinook release. The Wells survival study summer Chinook are in excess of the normal release, representing an additional 100,000 yearling Chinook for release. There are currently a total of 440,000 yearling summer chinook on-hand.

D. Update: Twisp Steelhead Acclimation Plans for 2011 (Greg Mackey)

Greg Mackey said Keely Murdoch had requested an update on Douglas PUD's plans for Twisp steelhead acclimation. He said Douglas PUD staff had talked about using the Twisp Pond for acclimation of both steelhead and spring Chinook. They examined the pond in the early fall, discussing how the pond might be divided for acclimation use in the spring. Mackey said Douglas PUD will need to have an HCP HC-approved Wells steelhead HGMP prior to release of steelhead into Twisp Pond. If approved, he said Douglas PUD believes they can have the pond ready for acclimation in 2011 using a net structure to partition the pond.

E. Wells HCP Action Plan (Greg Mackey)

Greg Mackey said Douglas PUD is looking for comments on the 2011 Action Plan (Attachment D) prior to the next Hatchery Committees meeting, so that it could be approved at the January meeting. He said the purpose of the Action Plan is to provide a concise list of planned actions for 2011. Mike Schiewe said the Action Plan had also been provided to the Coordinating Committees at their December meeting. Schiewe and Joe Miller discussed Chelan PUD's Action Plan. Miller will provide a draft 2011 Chelan PUD ActionPlan to Carmen Andonaegui for distribution to the Hatchery Committees prior to the January meeting.

F. Wells HCP Annual Hatchery Compliance Report (Greg Mackey)

Greg Mackey said the HCP Hatchery Compliance Report (Attachment E) is intended to document how Douglas PUD has met their HCP hatchery obligations for the past year. The report provides production numbers achieved relative to production targets. Douglas PUD would like comments prior to the January Hatchery Committees meeting, so the report can be approved at the January meeting. Mackey said he has added a row for coho under NNI compensation stating that NNI was achieved through 2017 via a payment to the Yakama Nation for the Yakama Nation Coho Restoration Program. Bill Gale suggested that Osoyoos sockeye should be handled in a similar fashion by stating that NNI compensation is met by funding the Fish and Water Management Tool. Mackey agreed to edit the row in the Hatchery Compliance Plan for the Fish Water Management Tool Program that provides NNI for sockeye. Schiewe said production levels achieved will be included in the Wells Project 2010 annual report, which is submitted to FERC in the spring.

III. Chelan PUD

A. Update: Survival Study Reports (Josh Murauskas)

Joe Miller reported that the Coordinating Committees had approved Statement of Agreements (SOAs) on Phase III Standards Achieved designations for yearling Chinook and for steelhead at Rock Island Dam at 10 percent spill. He provided handouts of the approved SOAs to the Hatchery Committees. Mike Schiewe said that a third SOA had been approved by the Coordinating Committees last year designating sockeye as Phase III Standards Achieved at 10 percent spill. Schiewe said that Chelan PUD had achieved Phase III Designation for Plan Species at 20 percent spill at Rock Island by 2006 and that the HCP allows for an option to test HCP Plan species survival at a reduced spill level. The reduced spill survival study results will be used in the recalculation of hatchery production levels for Rock Island. Murauskas reported that Chelan PUD is planning survival studies for yearling Chinook at Rocky Reach Dam, the last species for which Chelan PUD has yet to demonstrate Phase III Standard Achieved, beginning in 2011. Currently yearling Chinook at Rocky Reach Dam are designated Phase III Additional Tools. Murauskas reported that the Coordinating Committees approved restarting survival testing of yearling Chinook in 2011 for up to 3 additional years. Miller said Chelan PUD will provide to the Hatchery Committees a table showing HCP Plan Species survival study results for Rocky Reach and Rock Island Projects.

IV. CCT

A. Update: Acclimation Fish at Bonaparte Pond (Kirk Truscott)

Mike Schiewe said that Kirk Truscott could not be present at today's meeting but that he had provided by email a memo regarding summer Chinook mortalities at Bonaparte Pond

(Attachment F). Carmen Andonaegui will distribute the memo to the Hatchery Committees. Mike Tonseth reported that there has been an outbreak of Bacterial Gill Disease (BGD) in Bonaparte Pond. WDFW initiated Chloramine-T treatments following initial treatments with Potassium Permanganate, which were unsuccessful. Yesterday's daily loss at the pond was 158 fish. Of a total of 200,000 summer Chinook juveniles, about 17 percent have been lost to-date. WDFW considers the disease to be under control at this time. Tonseth said difficulties with acclimation at Bonaparte Pond are associated with its design to serve primarily as an irrigation settling pond. He said BGD has routinely been a problem at Bonaparte Pond, even at 100,000-fish density. Densities were increased to 200,000 summer Chinook juveniles three years ago.

V. HETT

A. Update (Carmen Andonaegui)

Carmen Andonaegui reported that the the Hatchery Evaluation Technical Team (HETT) met on November 23 and discussed the following items:

NTTOC Analysis

- The Risk Assessment data sheets were reviewed and updated and outstanding data gaps were identified. HETT members were assigned to compile data and add to the Risk Template.
- Model runs will begin when the templates are completed. Grant PUD has identified a staff person to conduct the model runs for all the risk assessment species except for coho. Keely Murdoch has agreed to conduct the model run for coho. Model runs will start with spring Chinook as soon as the risk templates are complete.
- Todd Pearsons is working through the reviewer comments on the NTTOC Risk Manuscript. He will prepare a response and distribute it to the HETT for their help in addressing the comments. The response is due to the review committee December 28, 2010.

Control Group Analysis

- <u>Spring Chinook and summer Chinook</u>. Tracy Hillman has completed the control/treatment group evaluation for the Chiwawa spring Chinook population and is starting the Wenatchee summer Chinook evaluation. Tracy will begin the Grant

PUD and Douglas PUD control/treatment group evaluations for their hatchery programs as soon as contracts are in place. The evaluations are due February 2011.

- Steelhead: the identification of control populations for supplemented steelhead populations are on hold until reliable abundance information for target steelhead populations is available.
- Sockeye: no suitable reference populations are available.

The next HETT meeting will be December 21. Mike Schiewe asked how the model runs are related to the NTTOC expert panel review. Greg Mackey said the model runs are intended as preliminary exercises to work any bugs out of the models prior to sending requests to Delphi Panel members.

VI. HCP Administration

A. Next Meetings

The next scheduled Hatchery Committees meetings will occur as follows: January 19, February 16, and March 16, all in Wenatchee.

List of Attachments

Attachment A – List of Attendees
Attachment B – Revised Hatchery and Genetics Management Plan (HGMP) one-page summary
Attachment C – Wells Survival Study Summer Chinook Disposition Memo
Attachment D – Draft 2011 Wells HCP Action Plan
Attachment E – Draft 2010 Wells HCP Hatchery Compliance Report
Attachment F – Bonaparte Pond Summer Chinook mortality Memo

Attachment A
List of Attendees

Name	Organization
Mike Schiewe	Anchor QEA, LLC
Carmen Andonaegui	Anchor QEA, LLC
Joe Miller*	Chelan PUD
Josh Murauskas*	Chelan PUD
Tom Kahler*	Douglas PUD
Greg Mackey*	Douglas PUD
Craig Busack (phone)	NOAA
Rob Jones* (phone)	NOAA
Russell Langshaw (phone)	Grant PUD
Pat Phillips	WDFW
Bill Gale*	USFWS
Mike Tonseth*	WDFW
Keely Murdoch*	Yakama Nation

* Denotes Hatchery Committees member or alternate

HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Wells Hatchery Summer Steelhead Program

09 December 2010 Wells HCP Hatchery Committee

Key points of the HGMP

1. <u>Smolt Releases:</u>
   - 2011 and 2012: Wells steelhead releases will be combined with Winthrop NFH releases to ensure a 350,000 smolt total release in the Methow Basin.
     - Combined releases in the upper Methow watershed will total 47,571 NNI smolts in the Twisp and 100,000 each in the Chewuch and upper Methow rivers.
     - The remainder of the fish will be released below Wells Dam, or up to 100,000 in the Okanogan Basin, if requested by the Colville Confederated Tribes.
   - 2013 and beyond: Wells Steelhead smolts releases in the Methow Basin will total 150,000 smolts.
     - 47,571 NNI smolts released in the Twisp River (Twisp Acclimation Pond).
     - 100,000 harvest enhancement smolts released in the lower Methow River
     - Up to 200,000 harvest enhancement smolts will be released below Wells Dam
       - Up to 100,000 of these fish may be released in the Okanogan Basin if requested by the Colville Confederated Tribes.
       - Alternatively, up to 200,000 may be released from acclimation ponds in the Columbia River mainstem, upstream from the Okanogan River, should acclimation ponds and adult extraction capabilities be developed, by others.
   - Up to 100,000 smolts released in the Okanogan Basin for Grant PUD mitigation.
2. <u>Broodstock Collection:</u>
   - Twisp Integrated: 26 wild fish collected at the Twisp Weir.
   - Lower Methow: 52 hatchery-origin fish collected in the Methow Basin (hook-and-line and Twisp Weir).
   - Segregated Harvest Enhancement Program: 104 hatchery-origin fish collected at Wells Hatchery volunteer channel (1st option) and Wells Dam (if needed).
   - Grant PUD mitigation: 42 adult steelhead of hatchery or natural-origin collected from Wells Hatchery, Wells Dam, or from the Okanogan Basin.
3. <u>Management of Excess Adult Hatchery Steelhead:</u>
   - Expected Range of Hatchery Adult Returns:
     Twisp River (47,571 smolts) – maximum (984), average (471), minimum (129)
     Lower Methow (100,000 smolts) – maximum (2,070), average (990), minimum (270)
     Mainstem Columbia (200,000 smolts) - maximum (4,140), average (1,980), minimum (540)
   - Columbia Mainstem Segregated (below Wells Dam and/or releases in the mainstem Columbia River above the confluence of the Okanogan River): Fish will be removed via the Wells Hatchery volunteer channel (below Wells Dam releases) or via selective harvest and extraction at or near the acclimation release sites (mainstem Columbia releases above Wells Dam). We expect high fidelity to the acclimation/release sites (volunteer channel for below Wells Dam releases, and acclimation sites above Wells Dam for above Wells Dam releases) and expect, based on past experience, that this will effectively remove a large proportion of the excess hatchery fish.
   - Twisp Integrated: Hatchery fish will be removed at the Twisp Weir according to management plan that identifies target spawning escapement and proportion of hatchery-origin spawners directed at a pHOS of 0.5 and an average PNI of 0.67, consistent with the Relative Spawning Success Study.
   - Methow Basin: Control pHOS to the extent practicable, with near-term goal of achieving PNI = 0.5, and long-term goal of 0.67.
   - Conservation Fishery: May be implemented by WDFW to control pHOS and work toward PNI targets.
   - Wells Dam: Wells Dam may be used to control escapement of hatchery-origin fish that were released as juveniles downstream of Wells Dam, only.
4. <u>Monitoring and Evaluation:</u>
   - The *Conceptual Approach to Monitoring and Evaluation for Hatchery Programs* funded by Douglas PUD will be used as the HGMP assessment program. Results will be used to adaptively manage under the HGMP.

Attachment C

MEMORANDUM

TO: Wells HCP Hatchery Committee

FROM: Greg Mackey

DATE: December 6, 2010

SUBJECT: Update on Disposition of Wells Survival Study Summer Chinook

In June 2010, the Wells HCP Hatchery Committee (HC) discussed the disposition of approximately 100,000 yearling summer Chinook that Douglas PUD was rearing at Wells Hatchery for an upcoming survival study in 2011. Douglas PUD notified the HC at this time that the 2011 survival study may not be necessary depending on the results of the 2010 study. The HC concluded that the survival study fish could be released with the production summer Chinook yearlings if not needed for the 2011 survival study. The HCP Coordinating Committee has since determined that the 2010 survival study results are valid, and that a 2011 survival study is not needed. Therefore, the 100,000 survival study Chinook will be released with the production summer Chinook yearling fish in 2011.

DRAFT 2011 ACTION PLAN
WELLS HCP

WELLS HCP COORDINATING COMMITTEE

1. Bypass Operating Plan
   a. Draft to Coordinating Committee (CC): .... February 2011
   b. Approval Deadline: .... March 2011
   c. Period Covered: .... April to August 2011
   d. Report Deadline: .... October 2011

2. Bull Trout Monitoring and Management Plan
   a. Period Covered: .... January – December 2010
   b. Report Deadline: .... March 2011

3. Predator Control Programs
   a. Pikeminnow Removal – Wells Project: .... March – August 2011
   b. Draft 2011 Pikeminnow Report to DCPUD: .... December 2011
   c. Avian Predator Hazing at Wells: .... October 2010 – May 2011

4. Sub-yearling Chinook Life-history Study
   a. Develop Study Plan: .... January 2011
   b. Tag and Release Study Fish: .... April-June 2011
   c. Monitor Study Fish: .... April 2011-June 2012
   d. Draft Report to Committee: .... August 2012
   e. Final Report: .... October 2012

5. Fishway Entrance Velocity Testing
   a. Testing: .... March 2011
   b. Draft Results to DCPUD: .... April 2011
   c. Results to CC: .... June 2011

6. Juvenile Migration Run-timing Verification Study
   a. Work with CC to Develop Study Plan: .... January 2011
   b. Draft Study Plan to CC: .... February 2011
   c. Approval of Final Study Plan by CC: .... March 2011
   d. Implement Study: .... April – August 2011
   e. Draft Results to CC: .... October 2011
   f. Final Report to CC for Approval: .... December 2011

7. Develop Contingency Plan for Emergency Bypass Operations
   a. Draft to CC: .... February 2011
   b. Approval of Final by CC: .... April 2011

WELLS HCP HATCHERY COMMITTEE

1. Implement 5-year Hatchery Monitoring and Evaluation (M&E) Plan

a. Ongoing Implementation: ....January – December 2011
b. Draft Annual Report for 2010 to Douglas PUD: .... April 2011
c. Draft Annual Report to Hatchery Committee (HC):... June 2011
d. Draft 5-year Synthesis/Analysis Report: ....October 2011
e. Draft 2012 Implementation Plan to HC:..October 2011

2. Update 5-year M&E plan (per Wells HCP §8.5.1)

a. Draft to HC: ....July 2011
b. Final to HC:...October 2011

3. HCP Annual Hatchery Production Compliance Report

a. Period Covered: ....January 2011 – December 2011
b. Draft to Committee: ....November 2011
c. Submission Deadline: ....December 2011

4. 2010 Broodstock Collection Protocol

a. Draft to HC: ....March 2011
b. Approval Deadline:..April 2011
c. Implementation: ....May 2011 to April 2012

5. Annual Implementation Report - Sockeye Fish/Water Management Tools

a. Period Covered: ....Water Year 2010-2011 (October – September)
b. Draft to HC: ....*to be determined*
c. Presentation to HC:..August of September 2011

6. HGMP – Methow Spring Chinook

a. Draft Spring Chinook HGMP to HC: ....November 2009
b. Final Spring Chinook HGMP to NMFS: ....March 2010
c. NMFS Approval of spring Chinook HGMP:...*to be determined*

7. HGMP – Wells Steelhead

a. Draft Steelhead HGMP to HC: ....February 2011
b. Final Steelhead HGMP to NMFS: ....March 2011
c. NMFS Approval of Steelhead HGMP: ....*to be determined*

8. Methow Steelhead Relative Reproductive Success Study

a. Implementation: .... March 2010 - December 2021
b. Interim Reports: .... September 2011
c. Final Report: 2021/2022

9. Population Dynamics Recalculation of NNI Hatchery Production

a. Proposal to Committee:...February 2011
b. HC Decision on Final Recalculation Methods: ....*to be determined*

WELLS HCP TRIBUTARY COMMITTEE

1. Plan Species Account Annual Contribution

a. $176,178 in 1998 dollars.. January 2011

2. Annual Report - Plan Species Account Status

a. Draft to Committee: .... February 2011
b. Approval Deadline:.. March 2011
c. Period Covered: ....January to December 2010

3. 2011 Funding-round – General Salmon Habitat Program

a. Request for Project Pre-proposals:........................... *To be determined* (typically in March)
b. Pre-proposals to Tributary Committee (TC):..... *To be determined* (typically in early June)
c. Tours of Proposed Projects: ....*To be determined* (typically in late June)
d. Project Sponsor Presentations to TC: .... *To be determined* (typically in early July)
e. Final Project Proposals to TC: .... *To be determined* (typically in late July)
f. RTT Project Rating Decisions: .... *To be determined* (typically in early August)
g. Supplemental Sponsor Presentations ....*To be determined* (typically in September)
h. TC Final Funding Decisions: .... *To be determined* (typically in December)

4. Small Project Program

a. Project Review and Funding Decision................................ Applications accepted any time

Wells HCP Hatchery Production Compliance Report
2010 Wells HCP Action Plan
HCP Hatchery Committee

Inundation Compensation Program

The FERC license to operate the Wells Hydroelectric Project requires Douglas PUD to raise and release fish to compensate for original impacts associated with the development of the Wells Reservoir. All of the fish for this program are raised at the Wells Fish Hatchery. The number of fish to be release each year, for the Inundation Compensation Program, can be found in Section 8.4.6 of the Wells HCP Agreement.

Inundation Compensation Program	Numeric Target	Target Wt.	Number Released	Fish per Pound
Yearling Summer/Fall Chinook (2008 BY)	320,000	10 fpp	336,881	8.1
Subyearling Summer/Fall Chinook (2009 BY)	484,000	50 fpp	471,286	67.5
Yearling Summer Steelhead (2009 BY)	300,000	6 fpp	275,699	6.75

No Net Impact Compensation Program

Section 8.4.3 of the Wells HCP contains specific numbers of juvenile Plan Species to be produced to meet Douglas PUD's No Net Impact production levels for unavoidable juvenile losses at the Wells Project. Juvenile passage losses are off-set through the production of juvenile Plan Species at three facilities (Wells Fish Hatchery, Methow Fish Hatchery and Eastbank Fish Hatchery) and through the implementation of mitigation options identified in the Sockeye Enhancement Decision Tree.

No Net Impact Compensation Program	Numeric Target	Target Wt.	Number Released	Fish Per Pound
Yearling Summer Steelhead (2009 BY)	48,858	6 fpp	44,963	6.75
Yearling Summer/Fall Chinook (2008 BY)	108,570	10 fpp	107,906	8.1
Yearling Spring Chinook (2008 BY)	61,071	15 fpp	57,646	15
Yearling Osoyoos Lake Sockeye[1]	7%	NA	55%	NA
Coho	NNI achieved by payment to the YN for their coho program			

[1] Okanogan Sockeye obligation for NNI is met through the Fish/Water Management Tool program managed through the Okanagan Nation Alliance. The HCP Hatchery and Coordinating committees agreed that the continued implementation of this program will satisfy Douglas PUD's 7% hatchery compensation requirement for sockeye.

Attachment F

Confederated Tribes of the Colville Reservation
Fish and Wildlife Division

Wenatchee Field Office, 470 9th Street N.W, East Wenatchee WA. 98802
(509) 978-8031

To: HCP Hatchery Committee Members

From: Kirk Truscott, CCT

Subject: Summer Chinook Mortality at Bonaparte Pond

Date: December 14, 2010

Due to scheduling conflicts I will not be able to attend the December 15th HCP Hatchery Committee meeting.

Although I will not be at the December 15th meeting, I wanted to apprise the Committee of the current status to the summer Chinook being reared at the Bonaparte Acclimation Pond.

Beginning in early December 2010, mortality of summer Chinook at Bonaparte Acclimation Pond increased significantly. From December 1-13, a total of 34,483 summer Chinook juveniles have died at the Bonaparte Pond.

Mortality is a function of Bacterial Gill Disease (BGD). Per Bob Rogers (WDFW Fish Health) initial treatments were conducted with Potassium Permanganate at 1.0-1.5 ppm with little effect. Subsequently a three-day treatment with Chloramine-T was initiated on December 10-12 at 15 ppm (1-hour drip treatment). Prior to the Chloramine-T treatments, mortality ranged from approximately 3,000-7,000 fish per day. The mortality on Monday, December 13th was approximately 1,400 fish, representing a substantial reduction from prior mortality.

Future treatments will include one additional 3-day treatment (Dec. 15-17) with Chloramine-T at 15 ppm (1-hour drip treatment), per direction from Bob Rogers (WDFW Fish Health). Bob Rogers will assess the extent of the BGD after the second 3-day treatment ending December 17th and will provide future treatment recommendations.

APPENDIX C
HABITAT CONSERVATION PLAN TRIBUTARY COMMITTEES MEETING MINUTES

Note: The Tributary Committees did not meet in September and December of 2010.

Wells, Rocky Reach, and Rock Island HCP Tributary Committees Meeting Notes 14 January 2010

Members Present: Dale Bambrick (NOAA Fisheries), Dennis Beich (WDFW), Chris Fisher (Colville Tribes), Tom Kahler (Douglas PUD), David Morgan (USFWS), Lee Carlson (Yakama Nation), Keith Truscott (Chelan PUD), and Tracy Hillman (Committees Chair).

Others Present: Becky Gallaher (HCP Project Coordinator). Denny Rohr (PRCC Habitat Subcommittee facilitator) joined the meeting at 10:30 am.

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans Tributary Committees met at the Chelan PUD Auditorium in Wenatchee, Washington, on Thursday, 14 January 2010 from 9:00 am to 12:15 pm.

I. Review and Adopt Agenda

Tracy Hillman welcomed everyone to the meeting, and the Committees adopted the proposed agenda with the following additions:

- Information update from members that attended the UCRTT Analysis Workshop.

II. Review and Approval of Meeting Minutes

The Committees reviewed and approved the 5 November 2009 meeting notes with edits offered by David Morgan and Tom Kahler.

III. Monthly Update on Ongoing Projects

Becky Gallaher gave an update on funded projects.

- For the *Below the Bridge* project, Cascadia Conservation District completed instream work on 2 October 2009. Award Construction out of Ferndale, WA, installed the control slide gate on the diversion control structure on 23 November 2009. Riparian restoration work began on 12 November, but stopped on 17 November because of unfavorable weather conditions. About half of the riparian work is complete. The rest of the work will be completed in spring. Anchor QEA LLC provided the as-built report on 7 January 2010. This information will be added to the Below the Keystone Bridge Habitat Restoration Project Final Report. Cascadia also hired Award Construction to upgrade the irrigation system for the project. The Salmon Recovery Funding Board and Bonneville Power Administration will fund this work. Finally, Cascadia is completing the Keystone Irrigation Structure (this is the upland or out-of-stream portion of the Below the Bridge Project). This includes construction of the settling basin, placement of the sump pump, construction of the fish bypass channel, and new pump and electrical/piping hook ups.

- Under the *Entiat PUD Canal System Conversion* project, drilling of Test Well #1 was completed on 16 October. The pump test yielded a maximum production rate of 62.5 gallons per minute (gpm), which fell short of the 73-gpm goal for this well. Based on these results, the engineer recommended drilling two additional test wells. Drilling on Test Well #2 began in November. Drilling went to a depth of 120 feet. A bale test estimated production at 75 gpm with a 20-foot drawdown. The recommendation by Ground Affect, Inc. and Bach Drilling is to continue drilling to a depth of about 150 feet, unless they encounter hard bedrock. In February, they plan to screen and conduct a pump test on Test Well #2, possibly drill Test Well #1 deeper and retest, and confirm the location of Test Well #3.
- Under the *Roaring Creek Flow Enhancement and Barrier Removal* project, the Categorical Exclusion was sent to the U.S. Fish and Wildlife Service for review. After the review is complete, the Fish and Wildlife Service will complete an assessment on the two parcels involved in the land exchange.
- The *Poorman Creek Barrier Removal* project is complete. The Methow Salmon Recovery Foundation will be submitting a final report to the Wells Tributary Committee soon.

IV. Review of 2009 General Salmon Habitat Program Proposals

The Committees received 12 General Salmon Habitat Program applications. Two applications, *Driscoll Island Restoration* and *Lower Wenatchee River CMZ 6 Side Channel,* were withdrawn by the project sponsors.

Before reviewing the proposals, Becky Gallaher reported that currently there is $1,455,460 in the Rock Island Plan Species Account (~$600,000 will be added in January), $1,117,540 in the Rocky Reach Plan Species Account (~$300,000 will be added in January), and $489,305 in the Wells Plan Species Account (~$230,000 will be added in January).

White River Nason View Acquisition

The Chelan-Douglas Land Trust is the sponsor of the White River Nason View Acquisition. The purpose of this project is to purchase and protect about 117 acres of unconfined floodplain and undisturbed riparian habitat along the White River (between RM 4.3 and 5.4). The property contains about 6,200 feet of riverbank. This land is surrounded by property owned by the Forest Service, WDFW, and the Chelan-Douglas Land Trust. The total cost of the project is $545,000. The sponsor is requesting $76,635 from HCP Tributary Funds. ***The Rock Island Committee approved funding for this project.***

Upper Methow II (Tawlks) Riparian Protection Project

The Methow Conservancy is the sponsor of the Upper Methow II (Tawlks) Riparian Protection Project. The purpose of this project is to obtain a conservation easement along the upper Methow River. The easement would include about 36.6 acres (27.2 acres of riparian habitat and 9.4 acres of uplands), including 1,190 feet of riverbank. Including this property and the other 20 properties already conserved by the Methow Conservancy, a total of 10.1 riverfront miles along the 23-mile upper Methow River Assessment Unit (from the confluence with the Chewuch River to the confluence with the Lost River) would be protected. The total cost of the project is $411,943. The sponsor is requesting $61,948 from HCP Tributary Funds. ***The Rock Island Committee approved funding for this project.***

Nason Creek UWP Floodplain Reconnection Levee Breach

The Chelan County Natural Resource Department is the sponsor of the Nason Creek UWP Floodplain Reconnection Levee Breach. The intent of this project is to breach a levee to reconnect 25 acres of off-channel habitat and floodplain within the Upper White Pine Reach of Nason Creek. The project area encompasses a 0.5-mile-long segment between RM 13.3 and 13.8. Breaching the levee will increase refuge and rearing habitat and improve the ability of the stream to recruit large woody debris. The total cost of the project is $35,000. The sponsor is requesting $5,250 from HCP Tributary Funds. ***The Rock Island Committee approved funding for this project.***

Upper Methow III (Hardy) Riparian Protection Project

The Methow Conservancy is the sponsor of the Upper Methow III (Hardy) Riparian Protection Project. The purpose of this project is to obtain a conservation easement along the upper Methow River. The easement would include about 27.4 acres (19.2 acres of riparian habitat and 8.2 acres of uplands), including 1,000 feet of riverbank. Including this property and the other 20 properties already conserved by the Methow Conservancy, a total of 10 riverfront miles along the 23-mile upper Methow River Assessment Unit (from the confluence with the Chewuch River to the confluence with the Lost River) would be protected. The total cost of the project is $423,402. The sponsor is requesting $63,520 from HCP Tributary Funds.

The Committees acknowledge the importance of protecting riparian and off-channel habitat; however, they struggled with the limited amount of protection for the cost of this easement. Based on this concern, ***the Tributary Committees elected not to fund this project***.

Foreman Floodplain Reconnection Side Channel

The Chelan County Natural Resource Department is the sponsor of the Foreman Floodplain Reconnection Side Channel Project. The intent of this project is to remove portions of two levees and excavate a 1,100-linear-foot side channel to restore fish access and flows to off-channel habitat and floodplain. The project will increase refuge and rearing habitat, improve the ability of the river to recruit large woody debris, and continue to restore habitat-forming processes in the lower Entiat. The total cost of the project is $208,592. The sponsor is requesting $104,296 from HCP Tributary Funds. ***The Rocky Reach Committee approved funding for this project.***

White River Tall Timber Ranch Conservation Easement

The Chelan-Douglas Land Trust is the sponsor of the White River Tall Timber Ranch Conservation Easement. The purpose of this project is to obtain a conservation easement along the White and Naqeequa Rivers. The easement would include about 40 acres of riparian habitat on the Tall Timbers Ranch (RM 11). The total cost of the project is $462,000. The sponsor is requesting $43,000 from HCP Tributary Funds.

Although the Committees acknowledge the importance of protecting riparian and off-channel habitat, they believe that the risk of development to this property is low. In addition, they believe that protection of this property will have limited benefit to Plan Species. Based on these concerns, ***the Tributary Committees elected not to fund this project***.

McLoughlin Falls Conservation

The Washington Department of Fish and Wildlife is the sponsor of the McLoughlin Falls Conservation Project. The purpose of this project is to purchase the Pariseau Property and obtain a conservation easement on the Voelker Property. These properties are located within the middle reach of the Okanogan River. The Pariseau Property consists of 616 acres, including 150 acres of floodplain and riparian habitat and 1.2 miles of riverbank. The Voelker Property consists of 275 acres, including 75 acres of floodplain and riparian habitat and 1.5 miles of riverbank. The total cost of the project is $700,000. The sponsor is requesting $200,000 from HCP Tributary Funds.

Although the Committees understand the importance of protecting riparian and off-channel habitat, they believe that this proposal is premature. It was not clear what the terms of the easement and acquired property would be and the intended use of the land after purchase. In addition, it is unknown if the landowner would accept the appraised value for the land. Based on these concerns, ***the Tributary Committees elected not to fund this project***.

Entiat River Troy Acquisition

The Chelan-Douglas Land Trust is the sponsor of the Entiat River Troy Acquisition. The purpose of this project is to purchase and protect about 65 acres of land along the Entiat River (RM 20.2-20.7). The property is within the Stillwaters area of the Middle Entiat. The 65 acres includes about 40 acres of riparian and floodplain habitat and 25 acres of uplands. The total cost of the project is $406,770. The sponsor is requesting $325,909 from HCP Tributary Funds.

Although the Committees understand the importance of protecting riparian and off-channel habitat, they believe that the risk of development on this property is low. Therefore, ***the Tributary Committees elected not to fund this project***.

Entiat National Fish Hatchery Habitat Improvement Project

Cascadia Conservation District is the sponsor of the Entiat National Fish Hatchery Habitat Improvement Project. The intent of this project is to increase channel complexity, provide high-water refugia and juvenile rearing habitat for native salmonids, increase recruitment of large woody debris, activate existing floodplain, and increase the spatial extent of the floodplain through levee removal and breaching. This project will occur on about 12 acres of federal land between RM 6.8 and 7.1 on the Entiat River. The total cost of the project is $285,886. The sponsor is requesting $61,373 from HCP Tributary Funds. ***The Rocky Reach Committee approved funding for this project.***

Nason Creek LWP Floodplain Reconnection Assessment

The Chelan County Natural Resource Department is the sponsor of the Nason Creek LWP Floodplain Reconnection Assessment. The purpose of this project is to further develop coordination with the BNSF Railway Company, conduct a project alternatives analysis, and prepare 30% designs in order to reconnect a combined 109 acres of historic channel and floodplain habitat and 10,249 linear-feet of stream channel at two sites on Nason Creek. Reconnection will increase refuge and rearing habitat, increase floodplain connectivity, reconnect tributaries, and improve the ability of the river to recruit large woody debris within the 2.1-mile-long project reach. The total cost of the project is $99,166. The sponsor is requesting $49,583 from HCP Tributary Funds.

Although the Committees recognize the importance of conducting floodplain reconnection assessments in Nason Creek, they believe that the Bureau of Reclamation should complete the alternative analysis and conceptual design. Therefore, ***the Tributary Committees elected not to fund this project***.

The Committees directed Tracy Hillman to invite Chelan County Natural Resource Department and the Bureau of Reclamation to the February meeting to discuss the reconnection assessment and the possibility of the Bureau of Reclamation conducting the assessment.

Lower Wenatchee Instream Flow Enhancement Project

The Washington Rivers Conservancy is the sponsor of the Lower Wenatchee Instream Flow Enhancement Project. The purpose of this project is to add 15 cfs of flow to the lower 7.5 miles of the Wenatchee River. The sponsor intends to decommission the PWUA diversion, change the point of diversion to the Columbia River, and improve the efficiency of the conveyance system. The total cost of the project is $4,954,466. The sponsor is requesting $167,500 from HCP Tributary Funds. ***The Rock Island Committee approved funding for this project.***

Peshastin Creek Reconnection Alternatives Analysis

The Chelan County Natural Resource Department is the sponsor of the Peshastin Creek Reconnection Alternatives Analysis. The purpose of this project is to assess landowner willingness, conduct a project alternatives analysis, and prepare 30% designs in order to reconnect 2,400 linear-feet of historic channel and floodplain habitat in Peshastin Creek. Reconnection will increase refuge and rearing habitat, increase floodplain connectivity, and improve natural channel processes in Peshastin Creek. The project includes 1,800 feet of existing channel and about 2,400 feet of dislocated channel between RM 3.56 and 3.90. The total cost of the project is $84,606. The sponsor is requesting $12,690 from HCP Tributary Funds.

The Committees understand the importance of reconnecting Peshastin Creek with its floodplain and increasing its channel length. However, the Committees were concerned that not all potentially affected landowners are on board with reconnection and that the present assessment may not consider all possible methods of connecting the channel. That is, it was not clear if the assessment would consider, for example, culverts, and not just bridges as a means to reconnect the channel. Based on these concerns, ***the Tributary Committees elected not to fund this project***.

The Committees directed Tracy Hillman to invite Chelan County Natural Resource Department to the February meeting to discuss the Peshastin Creek alternatives analysis.

Summary of review of 2009 General Salmon Habitat Program Projects.

Project Name	Sponsor[1]	Total Cost	Request from T.C.	Plan Species Account[2]
White River Nason View Acquisition	CDLT	$545,000	$76,635	RI
Upper Methow II (Tawlks) Riparian Protection	MC	$411,943	$61,948	RI
Nason Creek UWP Floodplain Reconnection	CCNRD	$35,000	$5,250	RI
Upper Methow III (Hardy) Riparian Protection	MC	$423,402	$63,520	-
Foreman Floodplain Reconnection Side Channel	CCNRD	$208,592	$104,296	RR
White River Tall Timber Ranch Conservation Easement	CDLT	$462,000	$43,000	-
McLoughlin Falls Conservation	WDFW	$700,000	$200,000	-
Entiat River Troy Acquisition	CDLT	$406,770	$325,909	-
Entiat NFH Habitat Improvement Project	CCD	$285,886	$61,373	RR
Nason Creek LWP Floodplain Reconnection Assessment	CCNRD	$99,166	$49,583	-
Lower Wenatchee Instream Flow Enhancement	WRC	$4,954,466	$167,500	RI
Peshastin Creek Reconnection Alternatives Analysis	CCNRD	$84,606	$12,690	-

[1] CDLT = Chelan-Douglas Land Trust; MC = Methow Conservancy; CCNRD = Chelan County Natural Resource Department; WDFW = Washington Department of Fish and Wildlife; CCD = Cascadia Conservation District; WRC = Washington Rivers Conservancy.

[2] RI = Rock Island Plan Species Account; RR = Rocky Reach Plan Species Account; W = Wells Plan Species Account.

V. Information Updates

The following information updates were provided during the meeting.

1. Approved Payment Requests in November, December, and January:

   Rock Island Plan Species Account:

   - $192,766.65 to the Chelan County Treasurer for construction and re-vegetation work on the Cashmere Pond Off-Channel Habitat project.
   - $387.12 to Chelan County PUD for project coordination for fourth quarter 2009.
   - $1,166.66 to Cordell, Neher, & Company, PLLC for financial review (progress billing) of Plan Species Account.

   Rocky Reach Plan Species Account:

   - $1,290.22 to Cascadia Conservation District for staff time and administration of the Below the Bridge project.
   - $69,590.74 to Award Construction for work on the Below the Bridge project.
   - $1,511.85 to Cascadian Conservation District for contractor work review and initial planning for restoration/riparian work under the Below the Bridge project.
   - $2,200.70 to the Chelan County Treasurer for project oversight and re-vegetation work on the Harrison Side Channel project.
   - $618.81 to Chelan County PUD for project coordination for fourth quarter 2009.
   - $1,166.66 to Cordell, Neher, & Company, PLLC for financial review (progress billing) of Plan Species Account.

   Wells Plan Species Account:

   - $1,795.64 to the Methow Conservancy for a site visit to the WDFW property, purchase of materials, and caging of 80 seedlings on the WDFW property under the Riparian Regeneration and Restoration Initiative.
   - $620.06 to Chelan County PUD for project coordination for fourth quarter 2009.
   - $1,166.66 to Cordell, Neher, & Company, PLLC for financial review (progress billing) of Plan Species Account.

2. Becky Gallaher reported that Cordell, Nehr, & Company, PLLC are completing their financial review of the Plan Species Accounts and will submit a report to the Committees in late January or early February.

3. Tracy Hillman reported that he received an email from Mike Kaputa with Chelan County NRD requesting time to discuss with the Committees the County's ongoing discussions and progress with BNSF Railways in Nason Creek. The Committees agreed to have Mike update the Committees in February.

4. Tracy Hillman and Chris Fisher gave a brief update on the status of McIntyre Dam. Chris shared with the Committees a letter he received from Dr. Newbury describing fish passage improvements at McIntyre Dam. In sum, the letter identified three passage improvements that need to be tested. First, there is a need to test the best gate setting for launching fish jumps from solid water (not from the bubble cloud). The best setting appears to be in the range of 2 m^3/s. Second, there is a need to test the effect of reducing

the zone of aeration by attaching inserts to the corners of the gates. The study will test several different angles and insert heights. Finally, in an attempt to reduce injuries to fish jumping into the concrete piers, tapered deflectors will be installed on the pier faces to change the dead, knock-out collisions into glancing blows. Dr. Newbury estimates that two days with a gate operator are needed to test the gate settings and insert options. He will also take video recordings of the surface flow patterns and use an underwater camera to show the dimensions of the bubble cloud at different discharges.

An email from Karilyn Long to Chris Fisher provided additional updates on McIntyre Dam. Karilyn noted that aluminum fillers have been placed in the cavities of the I-beams on the gates. This should prevent fish from getting captured in the cavity of the I-beam. And because of the concern that only larger fish were successfully passing the dam, they conducted fish surveys upstream of the dam to assess the size of the fish passing the dam. Those analyses are in progress.

5. Tom Kahler, Chris Fisher, Dale Bambrick, Dennis Beich, Lee Carlson, and Tracy Hillman reported briefly on the results of the Upper Columbia Regional Technical Team Analysis Workshop. The workshop was held on 12-13 January at the Red Lion in Wenatchee. Attendees heard updates on the status of abundance, productivity, spatial structure, and diversity of ESA-listed Chinook and steelhead in the Upper Columbia Basin. In short, abundance and spatial structure have improved slightly, while productivity and diversity have remained the same or decreased slightly. The status of limiting factors and threats were also discussed and the Upper Columbia Salmon Recovery Board has software that tracks implementation of projects. Habitat status and trend is being monitored in the Wenatchee, Entiat, and Okanogan basins and will soon be monitored in the Methow Basin. In general, data are being collected on several different habitat metrics in a spatially balanced design. However, it is not clear at this time how to synthesize the data (e.g., how to combine the data into a few useful, understandable indices that indicate overall habitat quality). With regard to habitat action effectiveness monitoring, there were presentations describing fish responses at different spatial and temporal scales. Although most studies showed some response in fish abundance or performance, there was no clear indication of which habitat actions did not work. In general, presenters indicated that more time is needed to assess the effects of habitat actions on population survival.

VI. Next Steps

The Committees will next meet on Thursday, 11 February 2010 at Chelan PUD in Wenatchee. Tentative agenda items include:

- Review the results of the financial review.
- Determine whether hatchery facilities can be placed on lands acquired with Tributary Funds.
- Discuss assessments and alternative analysis with Chelan County Natural Resource Department and the Bureau of Reclamation.

Meeting notes submitted by Tracy Hillman (tracy.hillman@bioanalysts.net).

Wells, Rocky Reach, and Rock Island HCP Tributary Committees Meeting Notes 11 February 2010

Members Present: Dale Bambrick (NOAA Fisheries), Dennis Beich (WDFW), Chris Fisher (Colville Tribes), Tom Kahler (Douglas PUD), David Morgan (USFWS), Lee Carlson (Yakama Nation), Keith Truscott (Chelan PUD), and Tracy Hillman (Committees Chair).

Others Present: Becky Gallaher (HCP Project Coordinator) and Steve Hays and Jeff Osborn (Chelan PUD). Mike Kaputa and Mike Kane (Chelan County Natural Resource Department), Steve Kolk (Bureau of Reclamation), Roy Beaty (Bonneville Power Administration), Julie Morgan (Upper Columbia Salmon Recovery Board), and Denny Rohr (PRCC Habitat Subcommittee facilitator) joined the meeting at 11:00 am.

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans Tributary Committees met at the Chelan PUD Auditorium in Wenatchee, Washington, on Thursday, 11 February 2010 from 9:00 am to 12:20 pm.

I. Review and Adopt Agenda

Tracy Hillman welcomed everyone to the meeting, and the Committees adopted the proposed agenda. Dale Bambrick indicated that he would provide an information update on the White River if time permitted.

II. Chelan PUD Representatives

Tracy Hillman informed the Committees that he received a letter from Gregg Carrington, Managing Director-Energy Resources at Chelan PUD, indicating that Steve Hays will be the Chelan PUD representative on the Rocky Reach and Rock Island Tributary Committees. Jeff Osborn will be the alternate. The Committees welcomed Steve and Jeff to the Committees and offered their best to Keith Truscott, who will no longer serve as the PUD’s representative on the Committees.

III. Review and Approval of Meeting Minutes

The Committees reviewed and approved the 14 January 2010 meeting notes with edits offered by Tom Kahler.

IV. Monthly Update on Ongoing Projects

Becky Gallaher gave an update on the following projects.

- Under the *Entiat PUD Canal System Conversion* project, drilling of Test Well #2 began in November. The well is currently 130-feet deep and drilling will continue until bedrock is encountered or the well is 150-feet deep. A pump test will be conducted in March. There has also been some discussion about drilling Test Well #1 to a greater depth based on information learned from Test Well #2. Drilling to a greater depth at Test Well #1 may provide the required 71 gallons per minute.

V. Conservation Easements and Hatchery Facilities

Becky Gallaher reported that Julie Grialou with the Methow Conservancy contacted her to see if hatchery facilities could be placed on lands in which the Committees had provided funding for a conservation easement. Presently, the landowner of the Buckley Property is entertaining the idea of allowing the Yakama Nation to place a coho salmon acclimation site on the property. Tracy Hillman reminded the Committees that the Buckley Property was part of the 2008 Twisp River Riparian Protection Project submitted by the Methow Conservancy. The Buckley Property was one of five properties included in the proposal. The conservation easement on the Buckley Property would protect 41 acres, mostly floodplain habitat (14 acres of high terrace). In 2008, the Rocky Reach Committee elected to fund the conservation easement on the Buckley Property. The total cost of the easement was $299,418. The Committees portion of that was $89,825.

David Morgan indicated that he spoke with John Sunderland with the Methow Conservancy about the Buckley Property. John told David that the owner of the Buckley Property is considering building a road on the property. The Methow Conservancy is now thinking about purchasing the property. This would eliminate the likelihood that the owner of the property would build a road on the property. David stated that the Methow Conservancy may submit a proposal to the Tributary Committees requesting money to purchase the property.

After a long and thoughtful discussion, the Committees agreed that all conservation easements or lands acquired with Tributary Funds must follow the management guidelines identified in Sections 3.8 (Management Guidelines for Conservation Easements/Acquired Lands) and 4.3 (Ineligible Projects and Elements) of the Policies and Procedures for Funding Projects. Section 4.3 specifically singles out remote site incubation systems as being ineligible for Tributary Funds. Section 3.8 includes a series of clauses that are generally incompatible with acclimation. For example, any alteration of the protected area, including construction of hatchery facilities, is not allowed. However, the Committees agreed that language should be drafted, considered, and possibly added to Section 3.8 and to contracts with sponsors stating that any proposed change in management actions or uses on the property for which the Committees provided funds for acquisition or conservation easements must be reviewed and approved by the Committees. Thus, if a sponsor or landowner wants to place an acclimation facility or any other ineligible project that may contradict Section 3.8 or 4.3 on lands protected with a conservation easement that was funded in any part by the Tributary Committees, the sponsor must submit to the Committees a detailed description of the proposed action. The Committees will then review the action and determine if the action should proceed. ***The Committees directed Tracy Hillman to draft the proposed language for Section 3.8. The Committees will review the proposed language during the March meeting.***

David Morgan pointed out several reasons why it is unlikely that the USFWS would support such a proposal, including: (1) in practice it would be extremely difficult for an acclimation facility to comply with the intent of the HCP Tributary Committees accounts as well as several clauses in

Section 3.8, which should not change; (2) hatchery and acclimation projects are forms of mitigation, which Section 4.3 states are ineligible for Tributary Funds and should not change; (3) the Tributary Committees have been given no information from the Hatchery Committees to suggest that they have an acclimation plan (there is at least one Tributary Committee member who also serves on the Hatchery Committee who can coordinate between committees if an when a plan is developed; and (4) if the Hatchery Committees decide acclimation sites and other mitigation projects are necessary to meet the HCP commitments, there is nothing to stop the Hatchery Committees from purchasing suitable land. As for the financial transaction, Tributary Committees involvement is not necessary.

Tom Kahler noted that, so far, the Hatchery Committees have not discussed a strategy or plan for establishing new acclimation facilities in the Methow, nor have they contemplated the use of Plan Species Accounts for the acquisition of sites for acclimation facilities. The Yakama Nation has engaged the Hatchery Committees on their strategy for developing multiple acclimation sites as part of their Mid-Columbia Coho Restoration Master Plan, including co-mingling of coho with spring Chinook and steelhead. To date, the purpose of these discussions has been to inform the Hatchery Committees and request permission to acclimate fish from the HCP programs. The Hatchery Committees would be surprised and baffled by a request from the Tributary Committees for a meeting at which the Tributary Committees ask them to disclose their plan for acclimation facilities, since they have no such plan.

Dennis Beich moved that the Tributary Committees send a letter to the Hatchery Committees requesting that the Hatchery Committees describe their strategies and plans for acclimation facilities, including the number and locations of sites. There was no second to the motion and therefore it died without discussion.

VI. Review of Policies and Procedures Documents

Tracy Hillman asked if the Committees had any changes or edits to the Policies and Procedures for Funding Projects and the Tributary Committee Operating Procedures documents. The Committees agreed that language may be added to Section 3.8 of the Policies and Procedures for Funding Projects reflecting the discussion above (Item V). In addition, Tracy noted the need to update the names of voting members in the Operating Procedures document. ***The Committees directed Tracy to make the edits in track changes. They will review the changes during the March meeting.***

VII. Information Updates

The following information updates were provided during the meeting.

1. Approved Payment Requests in January and February:

   Rock Island Plan Species Account:

   - $268.00 to LeMaster and Daniels for fourth-quarter administration in 2009.
   - $14,858.74 to Chelan PUD for project management (19 April to 31 December 2009) on the Entiat PUD Canal System Conversion Project.
   - $1,416.66 to Cordell, Neher, & Company, PLLC for financial review of Plan Species Account.

   Rocky Reach Plan Species Account:

- $268.00 to LeMaster and Daniels for fourth-quarter administration in 2009.
- $1,416.66 to Cordell, Neher, & Company, PLLC for financial review of Plan Species Account.

Wells Plan Species Account:

- $4,780.78 to the Methow Salmon Recovery Foundation for selective weeding, mortality assessment, re-vegetation work, and establishment of monitoring photo-points on the Heath Floodplain Restoration Project.
- $28,683.26 to the Okanagan Nation Alliance for project coordination, planning, and outreach from 1 June to 31 December 2009.
- $1,416.66 to Cordell, Neher, & Company, PLLC for financial review of Plan Species Account.

2. Tracy Hillman reported that he has completed Section 2.6 (Tributary Committees and Plan Species Accounts) for the Annual Report of Activities under the Anadromous Fish Agreement and Habitat Conservation Plan for each hydroelectric project. Becky Gallaher will update the Fiscal Management sections for each plan. Members of the Committees should soon receive the draft reports for their reviews. The final reports will be submitted to the Federal Energy Regulatory Commission in April.
3. Becky Gallaher shared with the Committees the letter submitted by Cordell, Neher, and Company, the accounting firm who conducted the financial review of the Plan Species Accounts. Becky pointed out that the letter identified two expenditures from the Wells Account that did not have necessary authorizations. Becky will follow up with Cordell, Neher, and Company so she can provide the necessary authorizations and then request a revision to the letter.

   Members reviewed the letter and concluded that there are no issues with the handling of incoming funds, the budgeting process, or the allocation and approval of funds. The Committees were satisfied with the financial performance and position of the financial accounts managers for each Plan Species Account. The Committees will conduct another review in 2014.
4. Tracy Hillman stated that Mike Schiewe (Chair of the HCP Coordinating Committees) sent letters to the Confederated Tribes of the Umatilla Indian Reservation and American Rivers inquiring about their interest in participating in a meeting with members of the HCP Coordination, Hatchery, and Tributary Committees. These parties were involved in negotiating the HCPs, but elected not to sign the HCPs. This is an opportunity for the Committees to provide them with a progress report on implementation, as well as give them an opportunity to ask questions of the Committees members. The two entities are to provide a formal response to the invitation by 31 March.
5. Tracy Hillman reported that he received an email from Mike Schiewe, Chair of the HCP Hatchery Committees, indicating that the Hatchery Committees are finishing the HGMPs and will be ready to talk about a joint meeting with the Tributary Committees.
6. Tracy Hillman informed the Committees that he received from Douglas PUD and Chelan PUD the 2010 Action Plans for the Wells, Rocky Reach, and Rock Island HCPs. The 2010 Action Plan for the Wells Tributary Committee is as follows:

   Plan Species Account Annual Contribution

   - $176,178 in 1998 dollars: January 2010

Annual Report – Plan Species Account Status

- Draft to Committee: February 2010
- Approval Deadline: March 2010
- Period Covered: January to December 2010

2010 Funding-Round Review and Funding Decisions

- RFP: To be determined (typically March)
- Approval Deadline: To be determined (typically December)

The 2010 Action Plan for both Rocky Reach and Rock Island Tributary Committees is as follows:

- Plan Species Account Deposit: January 2010
- Project solicitation: To be determined (typically March)
- Project approval deadline: To be determined (typically December)
- Implementation: Ongoing

Tracy will distribute the Action Plans to the Committees for review. Members need to send comments on the Wells Action Plan to Tom Kahler and comments on the Rocky Reach and Rock Island Action Plans to Keith Truscott.

7. Tracy Hillman indicated that he and Becky Gallaher are updating the funded projects tables for each Plan Species Account. Tracy will provide the tables to the Committees as soon as possible.
8. Becky Gallaher reported that money was deposited into each of the Plan Species Accounts at the end of January. The amounts deposited were:
   - Rock Island $653,958
   - Rocky Reach $309,727
   - Wells $237,455
9. David Morgan shared with the Committees a White Paper on Recommendations to the Upper Columbia Implementation Team on the Upper Columbia Project and Funding Coordination Approach for BPA Non-Accord Funds. The paper describes the selection process for non-Accord BPA-funded projects, discusses how the money could be directed towards projects, describes an allocation process for non-Accord funds by subbasin per year, and discusses pros and cons of contracting administration. The paper identifies several funding sources, including Tributary Funds, and how they may fit in or fill in possible funding gaps.

   Roy Beaty, BPA, noted that the non-Accord project proposals are due to the Independent Scientific Review Panel in about three weeks.

VIII. Meeting with Chelan County NRD and the Bureau of Reclamation

<u>Nason Creek Floodplain Reconnection Assessment</u>

Mike Kane, Chelan County NRD, began by describing the status of the Nason Creek Lower White Pine Floodplain Reconnection Assessment Project. Currently the railway has disconnected several channels and side channels along Nason Creek. Part of the proposed project is on private land and the rest is on public (Forest Service) land. The intent of the project is to conduct alternatives analysis and develop 30% designs to reconnect the channels. The Salmon Recovery Funding Board has agreed to fund about half of the total cost of the assessment (total cost = $99,166).

An issue raised by the Tributary Committees was whether the Bureau of Reclamation could fund the alternatives assessment and preparation of the designs. Steve Kolk, BOR, indicated that they have money (~$350,000), but it would not be available in time to complete the assessment and 30% designs. The Railroad has given the "green light" to proceed with the project, but implementation must begin in 2011. This means that the assessment and design plan must be completed as soon as possible. Steve indicated that the BOR will fund the development of the designs from 30% to 75%, but because of contracting and scoping issues, they would not be able to complete the assessment and 30% designs in a reasonable time. Therefore, a contractor will need to do the assessment and 30% designs. Steve also noted that the BOR will be able to construct detailed topos and conduct hydraulic modeling.

The Committees asked if the County and BOR can use the same contractor. Steve Kolk and Mike Kaputa indicated that they can. Mike Kaputa noted that the Railroad has a list of approved contractors. The County will select a Railroad-approved contractor to do the alternatives assessment and design plans. Mike Kaputa also noted that the Railroad has made it clear that they are a private company and will not contribute any money to the project.

Mike Kaputa noted that although the Railroad has given the green light to proceed with the project, the County must implement the project in 2011. If the project cannot be implemented in 2011, they would have to wait 3-5 years to implement the proposed actions. This is because of Railroad schedules and the fact that the Railroad requires the use of their own flaggers, road-crossing guards, etc. Thus, there is a relatively small window to complete the assessment and design plans. Mike Kaputa also stated that they will hold a meeting with interest groups in early March to further discuss landowner outreach, funding, project organization, and timelines.

The Committees asked if the Forest Service can complete its NEPA obligations within the timeline. Mike Kaputa indicated that they met with the Forest Service and discussed timelines. Even if the Forest Service completes a full EIS, they would still be able to meet the timeline. Indeed, the Forest Service believes they can complete a full EIS by August. Roy Beaty, BPA, indicated that the BPA Environmental Compliance folks will need to be involved.

The Committees asked when they or other funders would see a total cost estimate for the entire project. Mike Kaputa indicated that the total cost of the project is based on the final design of the project, and because they do not know which design will be used, it is difficult to estimate the total cost at this time. However, the meeting in early March should help with estimating the total cost. Mike guessed that they should have a total cost estimate in May.

The Committees asked if there was any opposition to the project. Mike Kaputa stated that they have received no opposition to the project and do not expect any. However, Mike indicated that they need to fully discuss the project with private landowners. Phase I of the project includes landowner outreach.

As a final note, Mike Kaputa indicated that he will ask members of the Upper Columbia Regional Technical Team to participate on the design team.

Peshastin Creek Reconnection Analysis

Mike Kane indicated that the County is seeking money to conduct an alternatives analysis and preparation of 30% designs to reconnect about 2,400 feet of disconnected channel between RM

3.56 and 3.90 on Peshastin Creek. The total cost of the project is $84,606. Currently the County has support from seven landowners on the inside of the oxbow. They have not secured support from the last owner, who uses his property to store junk. Mike noted that the Yakama Nation is conducting a reach assessment and some modeling work.

Dale Bambrick noted that he is not opposed to actions that increase stream length by reconnecting channels; however, the final cost of this reconnection project would be very high if bridges are used. The County should consider other cost-effective options, such as reconnecting the channel as a high-flow channel or off-channel habitat. In addition, the County should look at restoration projects in Peshastin Creek at a more coarse scale (not just at the reach scale). That is, rather than focus on this one reach, evaluate reconnection options throughout lower Peshastin Creek. Lee Carlson noted that the Yakama Nation has likely not started the reach assessment and therefore may be able to conduct the assessment at a larger scale.

Following the meeting with the County and BOR, the Committees concluded that they would not re-evaluate their funding decision on the two projects.

Finally, Tracy Hillman indicated that he was approached by Mike Kaputa, who asked if sponsors could submit General Salmon Habitat Program (GSHP) proposals at any time during the year. After a brief discussion, the Committees agreed that the call for GSHP proposals will continue to follow the same schedule as the SRFB, and that decision will not change anytime soon.

IX. Next Steps

The Committees will next meet on Thursday, 11 March 2010 at Chelan PUD in Wenatchee. Tentative agenda items include:

- Review changes to the Policies and Procedures documents.
- Update from the Upper Columbia Salmon Recovery Board.

Meeting notes submitted by Tracy Hillman (tracy.hillman@bioanalysts.net).

Wells, Rocky Reach, and Rock Island HCP Tributary Committees Meeting Notes 11 March 2010

Members Present: Casey Baldwin (WDFW), Dale Bambrick (NOAA Fisheries), Chris Fisher (Colville Tribes), Steve Hays (Chelan PUD), Tom Kahler (Douglas PUD), David Morgan (USFWS), Lee Carlson (Yakama Nation), and Tracy Hillman (Committees Chair).

Others Present: Becky Gallaher (HCP Project Coordinator). Denny Rohr (PRCC Habitat Subcommittee facilitator) joined the meeting at 11:15 am.

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans Tributary Committees met at the Chelan PUD Auditorium in Wenatchee, Washington, on Thursday, 11 March 2010 from 10:00 am to 12:20 pm.

I. Review and Adopt Agenda

Tracy Hillman welcomed everyone to the meeting, and the Committees adopted the proposed agenda with the following three additional items added to Information Updates:

- SRFB/GSHP proposal development, submission, and review schedule.
- Project/Program Development and Implementation process.
- Meeting schedule.

II. Review and Approval of Meeting Minutes

The Committees reviewed and approved the 11 February 2010 meeting notes with edits offered by David Morgan and Tom Kahler.

III. Monthly Update on Ongoing Projects

Becky Gallaher gave an update on the following projects:

- Under the *Keystone Canyon Habitat Restoration* project, Cascadia Conservation District could not reach agreement with the Salmon Recovery Funding Board on the design of the project. Therefore, funds for this project will be returned to the SRFB and the Rock Island Plan Species Account. Lee Carlson noted that the Yakama Nation will fully fund the project.
- Chris Fisher reported that the Okanagan River Restoration Initiative (ORRI) Phase IV project is over budget by about $90,000. Chris indicated that this was in part related to the currency exchange rate between the U.S. and Canada.

IV. Conservation Easements and Hatchery Facilities

Tracy Hillman gave a brief overview from genesis to present on the issue of hatchery facilities possibly being constructed on lands acquired with Tributary Committees funds or on lands protected with conservation easements that were funded with Tributary Committees funds. Tracy also reported that he talked with Mike Schiewe, Hatchery Committees Chair, about the need for a joint meeting with the Hatchery Committees. Tracy recommended to Mike that a joint meeting would not be wise until the Tributary Committees resolve this issue internally. Mike agreed and noted that the Hatchery Committees have no plans at this time to develop additional acclimation sites or hatchery facilities. Tom Kahler agreed and stated that the Hatchery Committees are oblivious to the Tributary Committees discussions on this topic and would be quite surprised to have us request their "plans" for additional acclimation facilities. They have no plans.

Dale Bambrick asked what discussions the Hatchery Committees have had with regard to steelhead acclimation in the Methow Basin. Tom indicated that the Hatchery Committees have discussed the following:

- The development of dispersed facilities by the Yakama Nation in support of coho reintroduction; this includes Accord projects that would commingle rearing of coho with spring Chinook or steelhead. An example is Bibble Pond on Wolf Creek in the upper Methow, where spring Chinook from the Methow Hatchery produced for Grant PUD will be acclimated with coho this spring as a test of both the pond and commingled acclimation.
- Acclimation associated with Chelan PUD's move of Turtle Rock steelhead into the Wenatchee Basin.
- Modifying existing PUD facilities at Dryden and Carlton to accommodate the acclimation of Grant PUD summer Chinook.
- The use of Colville facilities in the Okanogan to acclimate summer Chinook that would otherwise have been reared in Chelan PUD's Similkameen pond.
- The desirability of extending the duration of acclimation (i.e., overwinter) to reduce straying.
- The possibility of granting a Yakama Nation request for multi-species acclimation in their coho sites for Plan Species.

Tom stated that the Hatchery Committees have no open interest in usurping the Tributary Committees and the Plan Species Accounts to obtain additional sites for acclimation facilities. Dale noted that this is really an issue with WDFW, the Yakama Nation, and Grant PUD, and is not an issue specifically with the Tributary Committees. Tom added that, as far as Douglas PUD is concerned, these other entities are welcome to acclimate PUD mitigation fish in other facilities, provided that the PUD receives their mitigation credit and relinquish take responsibility for those fish when they leave the custody of the PUD. The entity running the facilities must assume responsibility for those fish.

Steve Hays noted that the HGMP does allow the Yakama Nation to develop semi-natural, low-impact acclimation facilities for spring Chinook, but there are no plans that currently identify acclimation sites. Tom commented that it would be very difficult for any acclimation facility that receives fish from the Methow Hatchery to meet approved flow and density indices and predator control standards without significantly altering the site.

Casey Baldwin indicated that, in light of Tracy's conversation with the Chair of the Hatchery Committees, this does not appear to be an issue with the Hatchery and Tributary Committees, but that there should be coordination between WDFW and the Yakama Nation.

Chris Fisher asked how many coho facilities the Yakama Nation had proposed in the Methow Basin. Tom indicated that they have proposed several in the Twisp, Chewuch, and Upper Methow, but did not know the exact number. David Morgan noted that BPA, the federal funding source for the coho reintroduction program, sent a letter (dated December 2009) to the USFWS and others indicating that there would be 20 to 30 sites in the Methow and Wenatchee basins.

Steve Hays asked if anyone was monitoring the conservation easements. Lee Carlson indicated that the sponsors are supposed to monitor the easements, but that probably is not happening because of a lack of funding. David Morgan added that in past years the Tributary Committees have asked this question several times and the answer has been that the sponsors (Methow Conservancy and Chelan-Douglas Land Trust) have robust monitoring requirements. They have provided monitoring plans that are several pages long and they follow up rigorously to make sure they are legitimate.

Decision: The Committees unanimously agreed that hatchery facilities that are not consistent with the management guidelines in Section 3.8 of the Tributary Fund Policies and Procedures are not allowed on lands acquired with Tributary Funds or on lands protected with conservation easements that were funded in any part with Tributary Funds.

Decision: The Committees unanimously agreed that there is not currently a need to meet with the Hatchery Committees to discuss hatchery facilities and conservation easements.

V. Review of Policies and Procedures Documents

During the February meeting, the Committees directed Tracy Hillman to add draft language to Section 3.8 (Management Guidelines for Conservation Easements/Acquired Lands) in the Policies and Procedures for Funding Projects document. The proposed draft language at the end of Section 3.8 reads:

> "Any changes in management actions or uses on properties for which the Committees provided funds for acquisition or conservation easements must be reviewed and approved by the Committees."

Decision: The Tributary Committees unanimously agreed to include the language in Section 3.8.

The Committees also reviewed the edits to the Tributary Committees Operating Procedures. Edits included updating the names of voting members on the Committees (i.e., Lee Carlson represents the Yakama Nation and Steve Hays represents Chelan PUD).

Decision: The Tributary Committees unanimously agreed to the changes in the Tributary Committees Operating Procedures.

VI. Information Updates

The following information updates were provided during the meeting.

1. Approved Payment Requests in February and March:

   Rock Island Plan Species Account:

   - $44,101.71 to Chelan County Treasurer for project materials for the Cashmere Pond Off-Channel Project.

- $250.01 to Cordell, Neher, & Company, PLLC for financial review of Plan Species Account (final billing).

Rocky Reach Plan Species Account:

- $10,105.14 to Cascadia Conservation District for salaries, benefits, and materials on the Below the Bridge Project.
- $250.01 to Cordell, Neher, & Company, PLLC for financial review of Plan Species Account (final billing).

Wells Plan Species Account:

- $250.00 to Cordell, Neher, & Company, PLLC for financial review of Plan Species Account (final billing).

2. Tracy Hillman asked if everyone provided the PUDs with comments on the 2010 Rocky Reach, Rock Island, and Wells Action Plans. Tom Kahler noted that the Hatchery Committees provided some edits to the Wells Action Plan. Tom indicated that the Draft to Committees on the broodstock protocol was changed from February 2010 to March 2010. In addition, final HGMPs to NMFS are due March 2010 rather than February 2010. The date by which NMFS approves the HGMPs is to be determined.
3. On 3 March, Chelan County held a Strategy Session on the BNSF Nason Creek Project. Tracy Hillman asked for an update from those who were able to attend the session. What follows are some of the salient points shared during the discussion:
   - It was not clear what actions the money will address.
   - An additional $100,000 is needed to complete the design.
   - Chelan County requested that someone from the Tributary Committees participate on the Funding Committee. Members agreed that this was not appropriate.
   - The County expects to have about $7 million to do the work, although the County has not yet secured the money to do the project.
   - If the County provides a good design, the Yakama Nation may be able to help fund the project.
   - There is a window in 2011 to complete the work (because of proposed tunnel work in 2011). If the project cannot be implemented in 2011, then the County would have to wait until 2016 to implement the project.
   - If bridges are the preferred alternative for reconnecting the channel, BNSF will likely want the bridges built for two rails, which would significantly increase the cost of the project.
   - If culverts are used, they may have to be placed at 90° angles to the railway. This could limit the effectiveness of the reconnection. [David Morgan indicated that he spoke with the Railroad’s consultant after the session and the consultant indicated that other angles may also work.]
   - The timeframe for developing the design and implementing the project seems too compressed.
   - It was apparent during the Strategy Session that the County had not considered basic environmental impact questions.

Casey Baldwin shared with the Committees that Mike Kane with Chelan County NRD presented an overview of the project to the Regional Technical Team (RTT). Casey indicated that the County plans to present alternatives to the RTT in April. The County plans to select a preferred alternative in May and they plan to have the 30% design completed in July. Casey also pointed out that the RTT recommended that the County focus on Nason Creek, because it is a biological priority, and that they should consider a large project (this is consistent with the Recovery Plan). Although members recognize that there are problems with the project and the planning process, especially the timeframe and funding strategy, Casey recommended that it would be premature for the Committees to disengage from the project at this time. We should know in the next couple of months if all or part of this project has a chance.

4. Tracy Hillman reported that he received an email from Derek Van Marter asking if the Tributary Committees would like to continue its timeline association with the regional SRFB process and if the Committees want to continue to use the pre-proposal forms and SRFB applications.

   Decision: The Committees agreed to follow the regional SRFB process and timeline.

   Decision: The Committees agreed to continue to use the pre-proposal forms and the SRFB applications.

   Becky Gallaher indicated that the pre-proposals and final proposals can be uploaded to the Tributary Committees ftp site. The site was recently changed by the PUD and Becky will need to acquire access to the site.

5. Tracy Hillman and Casey Baldwin shared with the Committees the proposed schedule for proposal development, submission, and review of SRFB/GSHP projects. Currently, pre-proposals would be delivered to the Tributary Committees on 4 June and the Committees would review the pre-proposals during their June meeting (10 June). Project tours are scheduled for 21-24 June. Final review of pre-proposals by the Committees would occur during the July meeting (8 July). Final proposals would be posted to the Tributary Committees ftp site on 19 July. The Committees would conduct an initial review of the final proposals during their August meeting (12 August) and determine if supplemental tours of selected projects are necessary. Supplemental tours would occur on 9 September and, if necessary, sponsors would be invited to present their projects to the Committees on 14 October. The Committees would make final funding decisions in December.

   The Committees voiced concern about the confined timeline and asked if dates could be pushed up about two weeks. Tracy and Casey will discuss this request with Derek Van Marter and Joy Juelson.

6. Casey Baldwin provided the Committees members with a Project/Program Development and Implementation flow diagram, which shows the proposed project identification and selection process for the Upper Columbia. The diagram was developed to articulate how projects would be developed, evaluated, and funded through the proposed programmatic habitat project with BPA. It also shows how Tributary Funds, SRFB Funds, and BPA Funds fit into the overall process for the region. Casey pointed out that the reference to the Tributary Fund was intended to show how those funds had been applied rather than to direct the future obligation of those funds. Julie Morgan and Derek Van Marter plan to attend the April meeting of the Tributary Committees to talk more about project and funding coordination.

7. The Committees reviewed their meeting schedule for the remainder of 2010. The Committees will meet on the following dates:

8 April	8 July	14 October
13 May	12 August	18 November
10 June	9 September	9 December

VII. Next Steps

The Committees will next meet on Thursday, 8 April 2010 at Chelan PUD in Wenatchee. Tentative agenda items include:

- Update from the Upper Columbia Salmon Recovery Board.

Meeting notes submitted by Tracy Hillman (tracy.hillman@bioanalysts.net).

Wells, Rocky Reach, and Rock Island HCP Tributary Committees Meeting Notes 8 April 2010

Members Present: Dale Bambrick (NOAA Fisheries), Dennis Beich (WDFW), Chris Fisher (Colville Tribes), Steve Hays (Chelan PUD), Tom Kahler (Douglas PUD), Lee Carlson (Yakama Nation), and Tracy Hillman (Committees Chair).

Members Absent: David Morgan[1] (USFWS).

Others Present: Jeff Osborn (Chelan PUD). Julie Morgan (UCSRB Executive Director), Derek Van Marter (UCSRB Associate Director), and James White (UCSRB Data Steward) joined the meeting from 10:00 to 11:45 am. Denny Rohr (PRCC Habitat Subcommittee facilitator) joined the meeting at 11:45 am.

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans Tributary Committees met at the Chelan PUD Auditorium in Wenatchee, Washington, on Thursday, 8 April 2010 from 9:30 am to 12:25 pm.

I. Review and Adopt Agenda

Tracy Hillman welcomed everyone to the meeting, and the Committees adopted the proposed agenda with the following two additional items added to Information Updates:

- Nason Creek update.
- SRFB/TC Proposal Schedule.

II. Review and Approval of Meeting Minutes

The Committees reviewed and approved the 11 March 2010 meeting notes with edits offered by David Morgan, Casey Baldwin, and Tom Kahler.

III. Monthly Update on Ongoing Projects

Tracy Hillman gave an update on the following projects:

- A new pump was installed for the *Below the Bridge* project. Dale Bambrick asked for a picture of the new pump. Remaining riparian plantings will occur later in April.
- Although the *Entiat PUD Canal System* project is moving forward, we have not been able to get an update from the project manager at Chelan PUD.

[1] David was unable to join the meeting. He did provide comments on the draft March meeting notes.

- The Sponsor Agreement for the *Entiat National Fish Hatchery Improvement* project is complete and signed.
- Under the *Roaring Creek Flow Enhancement and Barrier Removal* project, Cascadia Conservation District has submitted a permit for boring. The permit is being reviewed by the Chelan County Public Works.
- Under the *Riparian Restoration and Regeneration Initiative* project, the Methow Conservancy has identified two addition properties for restoration. The sponsor will visit the two sites and obtain landowner agreements. Cultural issues have already been addressed.

IV. Upper Columbia Salmon Recovery Board Presentations

Julie Morgan (UCSRB Executive Director), Derek Van Marter (UCSRB Associate Director), and James White (UCSRB Data Steward) provided the Committees with updates on activities proposed by the Upper Columbia Salmon Recovery Board in 2010. What follows is a summary of information provided by each individual (their presentations are in Attachment A).

Julie Morgan:

Julie gave a brief presentation on the Board's goal of "Improving Returns on Investments." She indicated that the Board has identified six priorities and challenges:

- Resilience of Decisions
- All-H Coordination
- Project Funding Coordination of Large-Scale Projects
- Funding the Infrastructure for Capacity, O&M, and Outreach
- Coordination of M&E and Reporting
- Stewardship of the Habitat Adaptive Management Framework and Major Tasks

James White:

James gave a brief update on adaptive management, RME, and data management. He described some of the ongoing monitoring in the Upper Columbia (e.g., PUD-funded hatchery monitoring, water quality and quantity monitoring, and BiOp monitoring). He then identified the guiding documents, including the monitoring plan and adaptive management plan for the Recovery Plan. James described data gap prioritization and the four tiers of prioritization. He then placed the Upper Columbia data gaps in context with regional efforts and evaluations. James identified additional monitoring needs, including post-implementation and annual monitoring, verification monitoring, habitat response monitoring, and water quality and quantity monitoring. James also talked about the proposed work needed to update EDT analysis in the Upper Columbia Basin. He briefly discussed how the monitoring data will be used and how they fit into adaptive management. Lastly, he gave a brief overview of the RTT Analysis Workshop, which was held in January 2010.

Dale Bambrick asked if monitoring will track habitat destruction as well as habitat improvements. James noted that the current strategy calls for monitoring of several habitat condition metrics at both coarse and fine scales. This monitoring should help identify and track habitat destruction and improvements.

Julie Morgan:

Julie then talked about project and funding coordination. She noted that most of the single-focus projects (e.g., culvert replacements) are complete. Thus, it is time to focus on big projects. Julie showed a slide that identified habitat project implementation funds and there sources. The estimated total money available for restoration and protection actions in the Upper Columbia basin is about 22.5 million dollars per year (this includes Tributary Funds, BPA non-Accord Funds, Accord Funds, SRFB Funds, etc.).

James White:

James spoke about technical review and planning of habitat restoration and protection actions in the Upper Columbia. The RTT has an important role in reviewing and planning actions. James noted that the RTT has two general tasks: (1) provide guidance on what should be done ("planning" science) and (2) evaluate projects once they are proposed ("review" science). Some of the tools used by the RTT in "planning" science include models, expert opinion, published literature, the biological strategy, and reach assessments. James then described the criteria used to review proposals (from the RTT Biological Strategy) including the six-step process for project selection.

Julie Morgan:

Julie talked about BPA programmatic, non-Accord funding and how it fits in with the current funding efforts. She noted that there are two conceptual pathways for funding projects: (1) targeted solicitation and (2) the current six-step process. The latter tends to focus on smaller, opportunistic projects spread among the basins. The former focuses on larger, complex projects that address natural watershed processes. Under the targeted solicitation pathway, the RTT will review and provide feedback on the Alternatives Evaluation Reports (reach assessments) and select the one or two top priority alternatives that best address limiting factors, restore natural processes, and have the highest biological benefit. This would then flow through a six-step process, which includes pre-application, site visit, presentations, proposal submittal, technical review and ranking, and BPA/NPCC prioritized list. Julie noted that the Process Guide will be updated to reflect this pathway.

Julie walked the Committees through the "rain-drop diagram," which Casey Baldwin shared with the Committees during the last meeting. The diagram shows the proposed project identification and selection process for the Upper Columbia. The diagram was developed to articulate how projects would be developed, evaluated, and funded through the proposed programmatic habitat project with BPA. It also shows how Tributary Funds, SRFB Funds, and BPA Funds fit into the overall process for the region. Julie pointed out that the reference to the Tributary Fund in the diagram was intended to show how those funds have been applied in the past.

Derek Van Marter:

Derek stated that there is a need to mesh proposed actions with available funds. Derek shared with the Committees a bar chart that identified the total estimated costs (for restoration and protection actions) by subbasin for the years 2010 through 2013. The total estimated costs needed annually for implementation (summed across all subbasins) is $2,579,453 in 2010, $28,220,900 in 2011, $37,903,500 in 2012, and $16,703,500 in 2013. This money reflects costs only for planning, permitting, and implementation. Derek asked the Committees to consider how Tributary Funds should fit into the proposed funding process. Currently, Tributary Funds are used to help fund submitted proposals. Derek asked if Tributary Funds could also be used to help fund targeted solicitations. The Committees indicated that they would discuss this during their next meeting and report back to Julie and Derek.

Julie Morgan:

As a final note, Julie shared with the Committees the UCSRB's 2010 work plan. The work plan is included in Attachment A.

V. Information Updates

The following information updates were provided during the meeting.

1. Approved Payment Requests in March and April:

   Rock Island Plan Species Account:

   - $203.50 to LeMaster and Daniels for first-quarter financial administration.
   - $628.40 to Chelan PUD for first-quarter administration and coordination.

   Rocky Reach Plan Species Account:

   - $203.50 to LeMaster and Daniels for first-quarter financial administration.
   - $628.49 to Chelan PUD for first-quarter administration and coordination.

   Wells Plan Species Account:

   - $590.33 to Chelan PUD for first-quarter administration and coordination.
2. Dale Bambrick reported that NOAA has made an internal decision to move forward with the Grant PUD-funded hatchery facility in the White River basin. The plan is to build a "conventional" facility on the lower White River.
3. Lee Carlson reported that the BNSF Railroad has decided that culverts cannot be used to reconnect channels in Nason Creek. Bridges are the preferred alternative for reconnecting the channel. BNSF will likely want the bridges built for two rails, which will significantly increase the cost of the project. The total cost of the project (including bridges) is unknown at this time.
4. Tracy Hillman reviewed with the Committees the proposed schedule for proposal development, submission, and review of SRFB/GSHP projects. The schedule is appended to these notes as Attachment B.

VI. Next Steps

The Committees will probably next meet on a conference call on Thursday, 13 May 2010. Tentative agenda items include:

- Discuss how Tributary Funds may fit in with the proposed funding pathways.

Meeting notes submitted by Tracy Hillman (tracy.hillman@bioanalysts.net).

Attachment A

Presentations from representatives of the Upper Columbia Salmon Recovery Board (see pdf document).

Improving Returns on Investments

Julie Morgan, Executive Director
Derek Van Marter, Associate Director
James White, Data Steward
Upper Columbia Salmon Recovery Board

proving on In

Tributary Committees

April 8, 2010

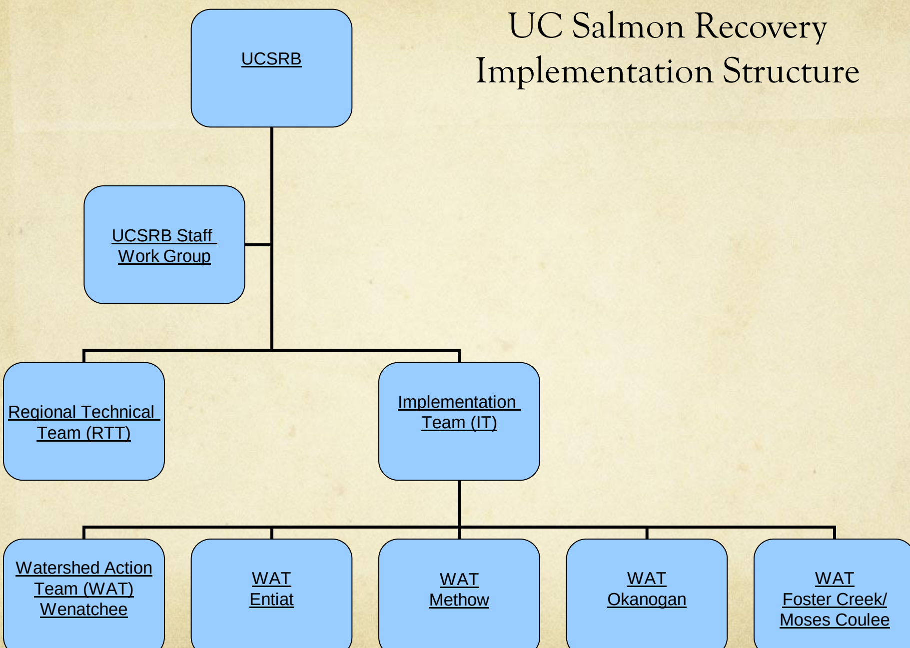
Upper Columbia Spring Chinook Salmon and Steelhead Recovery Plan*

August 2007

Upper Columbia Salmon Recovery Board

*This Plan also covers bull trout, which are under the jurisdiction of the U.S. Fish and Wildlife Service. The strategies and actions in this proposed plan are intended as additional recommendations for the draft bull trout recovery plan that was published by the U.S. Fish and Wildlife Service in April 2002.

UC Salmon Recovery Implementation Structure



Watershed Action Team for the Methow Subbasin Methow Restoration Council (MRC)

Regional Technical Team

Priorities and Challenges

- Resilience of Decisions
- All-H Coordination
- Project Funding Coordination of Large-Scale Projects
- Funding the Infrastructure for Capacity, O&M, and Outreach
- Coordination of M&E and Reporting
  - Data Management
- Stewardship of the UC Habitat Adaptive Management Framework and Major Tasks

The mission of the Upper Columbia Salmon Recovery Board is to restore viable and sustainable populations of salmon, steelhead, and other at-risk species through the collaborative, economically sensitive efforts, combined resources, and wise resource management of the Upper Columbia region.

415 King Street, Wenatchee, WA 98801 phone: (509) 662-4710 fax: (509) 665-6475 ucsrb.com

Upper Columbia Salmon Recovery Board
2009 Work Plan Summary
December 18, 2009

2009 Tasks Throughout the Year
• Facilitate and support collaborative decision-making • Development of products for the Upper Columbia Salmon Recovery Forum (UCSRF) • Continue outreach to federal and state agencies and partners • Improve outreach to local groups, focusing on success stories (e.g. irrigation districts, local governments, business interests) - WATs will lead and UCSRB staff will support when necessary • Facilitate next round of project funding (March thru December) • Funding coordination • Facilitate first round of UC adaptive management cycle
January thru March
• Development of the 3-year work plans (funding coordination) • Outreach on SRFB request to State for funding recovery • Development of UCSRB operations budget and secure funds (thru June) • UCSRB DC visits (March)
April thru June
• Presentation to federal caucus • Presentation to Northwest Power and Conservation Council • FCRPS workshops (April) • Tour of UC for members of the federal caucus and others (June?) • UCSRB policies (e.g. personnel policies, executive director transition)
July thru September
• Convene first meeting of the UC Board of Trustees (September) • UCSRB 10 year birthday celebration (September) • Approve adaptive management framework narrative and monitoring & evaluation plan
October thru December
• UC RTT Analysis workshop • Implementation report
2010 Tasks
• UC RTT Analysis workshop Phase II • Adaptive Management workshops

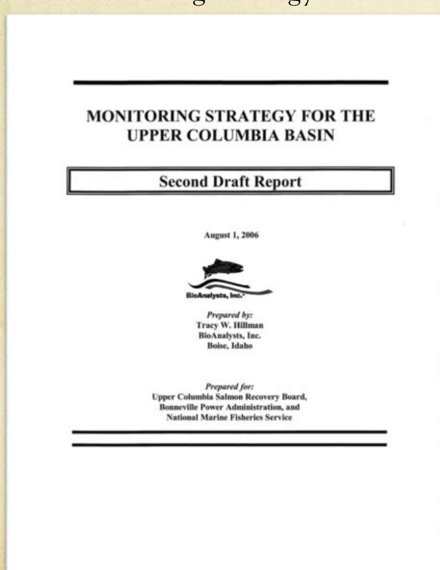
Ongoing monitoring…

- PUD hatchery mitigation requires extensive monitoring:
  - VSP parameters
  - Hatchery influence
- WDOE Watershed Planning (HB 2514)
  - Extensive WQ/WQ monitoring
- Past and current BiOp:
  - Ramping up of habitat monitoring: Effectiveness and Status and Trend
    - ISEMP (Wenatchee and Entiat)
    - OBMEP (Okanogan)
    - USGS/USBR (Methow)

Monitoring Strategy and Guidance

Upper Columbia
Monitoring Strategy

Sub-basin Specific
Monitoring Plans



MONITORING STRATEGY FOR THE
UPPER COLUMBIA BASIN

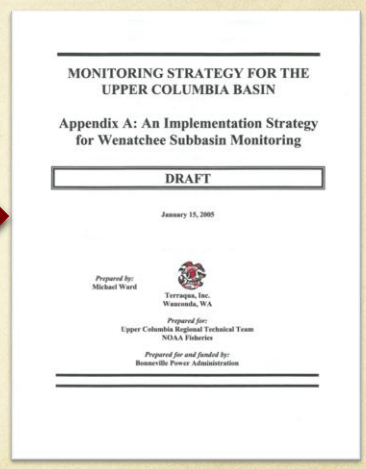
Second Draft Report

August 1, 2006

BioAnalysts, Inc.

Prepared by:
Tracy W. Hillman
BioAnalysts, Inc.
Boise, Idaho

Prepared for:
Upper Columbia Salmon Recovery Board,
Bonneville Power Administration, and
National Marine Fisheries Service



MONITORING STRATEGY FOR THE
UPPER COLUMBIA BASIN

Appendix A: An Implementation Strategy
for Wenatchee Subbasin Monitoring

DRAFT

January 15, 2005

Prepared by:
Michael Ward

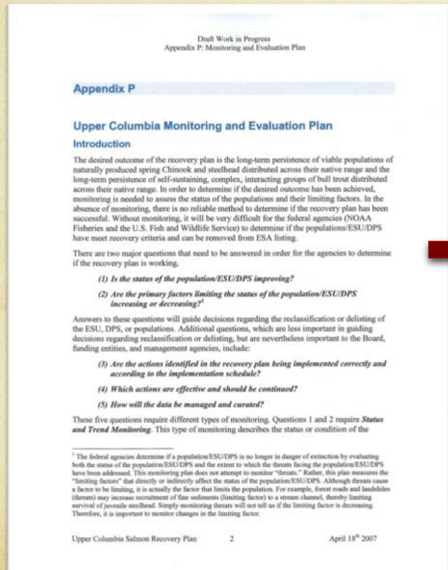
Terraqua, Inc.
Wauconda, WA

Prepared for:
Upper Columbia Regional Technical Team
NOAA Fisheries

Prepared for and funded by:
Bonneville Power Administration

First Draft, 2004

Upper Columbia M&E Plan



Draft Work in Progress
Appendix P: Monitoring and Evaluation Plan

Appendix P

Upper Columbia Monitoring and Evaluation Plan

Introduction

The desired outcome of the recovery plan is the long-term persistence of viable populations of naturally produced spring Chinook and steelhead distributed across their native range and the long-term persistence of self-sustaining, complex, interacting groups of bull trout distributed across their native range. In order to determine if the desired outcome has been achieved, monitoring is needed to assess the status of the populations and their limiting factors. In the absence of monitoring, there is no reliable method to determine if the recovery plan has been successful. Without monitoring, it will be very difficult for the federal agencies (NOAA Fisheries and the U.S. Fish and Wildlife Service) to determine if the populations/ESU/DPS have meet recovery criteria and can be removed from ESA listing.

There are two major questions that need to be answered in order for the agencies to determine if the recovery plan is working.

(1) Is the status of the population/ESU/DPS improving?

(2) Are the primary factors limiting the status of the population/ESU/DPS increasing or decreasing?[1]

Answers to these questions will guide decisions regarding the reclassification or delisting of the ESU, DPS, or populations. Additional questions, which are less important in guiding decisions regarding reclassification or delisting, but are nevertheless important to the Board, funding entities, and management agencies, include:

(3) Are the actions identified in the recovery plan being implemented correctly and according to the implementation schedule?

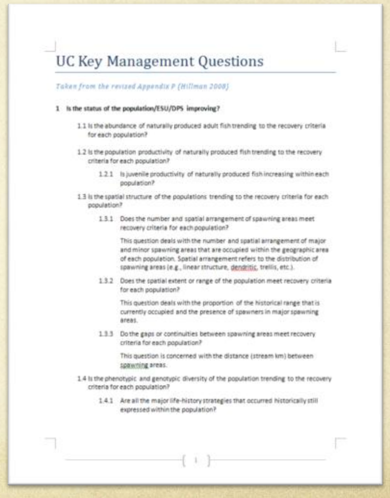
(4) Which actions are effective and should be continued?

(5) How will the data be managed and curated?

These five questions require different types of monitoring. Questions 1 and 2 require ***Status and Trend Monitoring***. This type of monitoring describes the status or condition of the

[1] The federal agencies determine if a population/ESU/DPS is no longer in danger of extinction by evaluating both the status of the population/ESU/DPS and the extent to which the threats facing the population/ESU/DPS have been addressed. This monitoring plan does not attempt to monitor "threats." Rather, this plan measures the "limiting factors" that directly or indirectly affect the status of the population/ESU/DPS. Although threats cause a factor to be limiting, it is actually the factor that limits the population. For example, forest roads and landslides (threats) may increase recruitment of fine sediments (limiting factor) to a stream channel, thereby limiting survival of juvenile steelhead. Simply monitoring threats will not tell us if the limiting factor is decreasing. Therefore, it is important to monitor changes in the limiting factor.

Upper Columbia Salmon Recovery Plan 2 April 18th 2007



UC Key Management Questions

Taken from the revised Appendix P (Hillman 2008)

1 Is the status of the population/ESU/DPS improving?

1.1 Is the abundance of naturally produced adult fish trending to the recovery criteria for each population?

1.2 Is the population productivity of naturally produced fish trending to the recovery criteria for each population?

1.2.1 Is juvenile productivity of naturally produced fish increasing within each population?

1.3 Is the spatial structure of the populations trending to the recovery criteria for each population?

1.3.1 Does the number and spatial arrangement of spawning areas meet recovery criteria for each population?

This question deals with the number and spatial arrangement of major and minor spawning areas that are occupied within the geographic area of each population. Spatial arrangement refers to the distribution of spawning areas (e.g., linear structure, dendritic, trellis, etc.).

1.3.2 Does the spatial extent or range of the population meet recovery criteria for each population?

This question deals with the proportion of the historical range that is currently occupied and the presence of spawners in major spawning areas.

1.3.3 Do the gaps or continuities between spawning areas meet recovery criteria for each population?

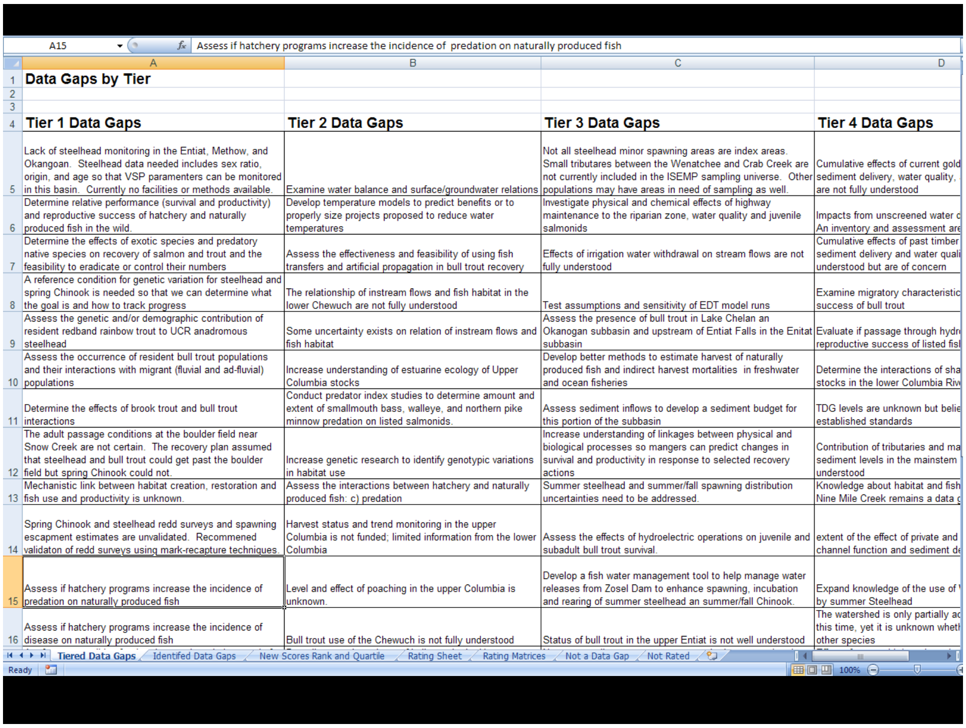
This question is concerned with the distance (stream km) between spawning areas.

1.4 Is the phenotypic and genotypic diversity of the population trending to the recovery criteria for each population?

1.4.1 Are all the major life-history strategies that occurred historically still expressed within the population?

1

UC Data Gaps Prioritization



A15 Assess if hatchery programs increase the incidence of predation on naturally produced fish

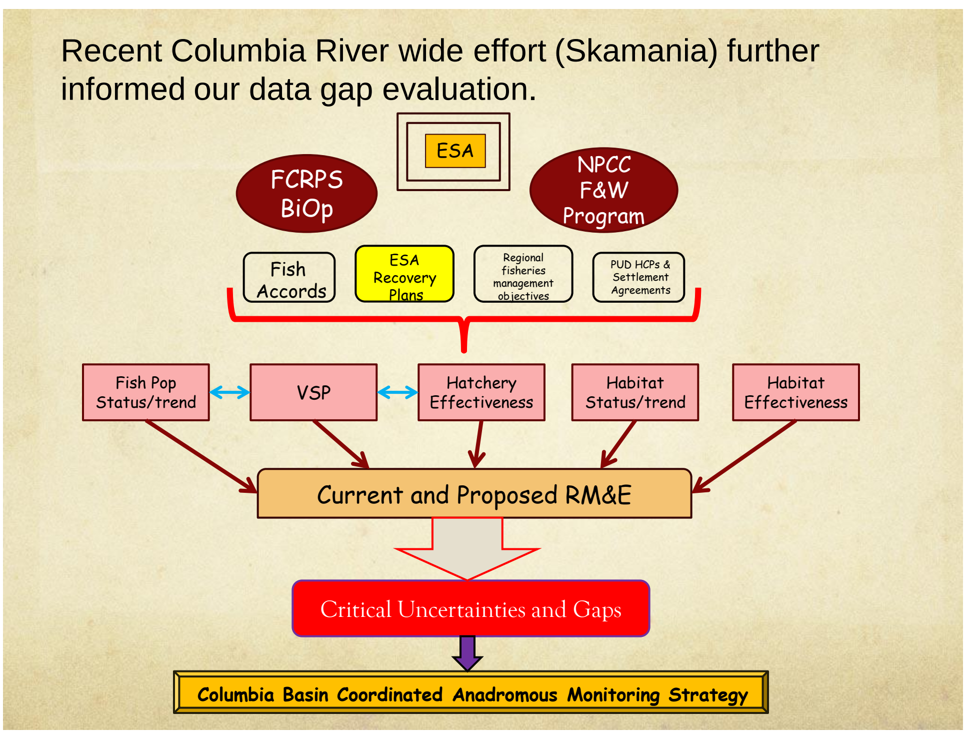
Data Gaps by Tier

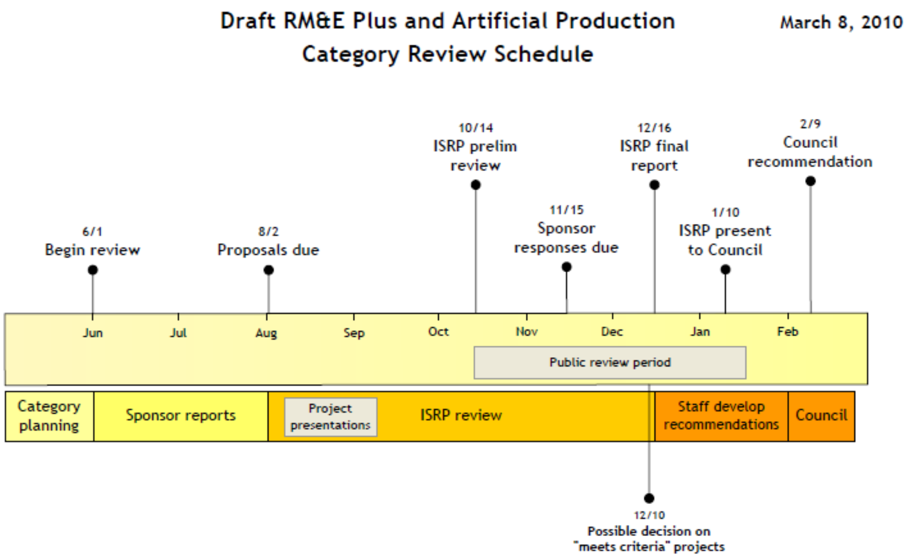
	Tier 1 Data Gaps	Tier 2 Data Gaps	Tier 3 Data Gaps	Tier 4 Data Gaps
5	Lack of steelhead monitoring in the Entiat, Methow, and Okangoan. Steelhead data needed includes sex ratio, origin, and age so that VSP paramenters can be monitored in this basin. Currently no facilities or methods available.	Examine water balance and surface/groundwater relations	Not all steelhead minor spawning areas are index areas. Small tributares between the Wenatchee and Crab Creek are not currently included in the ISEMP sampling universe. Other populations may have areas in need of sampling as well.	Cumulative effects of current gold sediment delivery, water quality, are not fully understood
6	Determine relative performance (survival and productivity) and reproductive success of hatchery and naturally produced fish in the wild.	Develop temperature models to predict benefits or to properly size projects proposed to reduce water temperatures	Investigate physical and chemical effects of highway maintenance to the riparian zone, water quality and juvenile salmonids	Impacts from unscreened water c An inventory and assessment are
7	Determine the effects of exotic species and predatory native species on recovery of salmon and trout and the feasibility to eradicate or control their numbers	Assess the effectiveness and feasibility of using fish transfers and artificial propagation in bull trout recovery	Effects of irrigation water withdrawal on stream flows are not fully understood	Cumulative effects of past timber sediment delivery and water quali understood but are of concern
8	A reference condition for genetic variation for steelhead and spring Chinook is needed so that we can determine what the goal is and how to track progress	The relationship of instream flows and fish habitat in the lower Chewuch are not fully understood	Test assumptions and sensitivity of EDT model runs	Examine migratory characteristic success of bull trout
9	Assess the genetic and/or demographic contribution of resident redband rainbow trout to UCR anadromous steelhead	Some uncertainty exists on relation of instream flows and fish habitat	Assess the presence of bull trout in Lake Chelan an Okanogan subbasin and upstream of Entiat Falls in the Enitat subbasin	Evaluate if passage through hydr reproductive success of listed fis
10	Assess the occurrence of resident bull trout populations and their interactions with migrant (fluvial and ad-fluvial) populations	Increase understanding of estuarine ecology of Upper Columbia stocks	Develop better methods to estimate harvest of naturally produced fish and indirect harvest mortalities in freshwater and ocean fisheries	Determine the interactions of sha stocks in the lower Columbia Riv
11	Determine the effects of brook trout and bull trout interactions	Conduct predator index studies to determine amount and extent of smallmouth bass, walleye, and northern pike minnow predation on listed salmonids.	Assess sediment inflows to develop a sediment budget for this portion of the subbasin	TDG levels are unknown but belie established standards
12	The adult passage conditions at the boulder field near Snow Creek are not certain. The recovery plan assumed that steelhead and bull trout could get past the boulder field but spring Chinook could not.	Increase genetic research to identify genotypic variations in habitat use	Increase understanding of linkages between physical and biological processes so mangers can predict changes in survival and productivity in response to selected recovery actions	Contribution of tributaries and ma sediment levels in the mainstem understood
13	Mechanistic link between habitat creation, restoration and fish use and productivity is unknown.	Assess the interactions between hatchery and naturally produced fish: c) predation	Summer steelhead and summer/fall spawning distribution uncertainties need to be addressed.	Knowledge about habitat and fish Nine Mile Creek remains a data g
14	Spring Chinook and steelhead redd surveys and spawning escapment estimates are unvalidated. Recommened validaton of redd surveys using mark-recapture techniques.	Harvest status and trend monitoring in the upper Columbia is not funded; limited information from the lower Columbia	Assess the effects of hydroelectric operations on juvenile and subadult bull trout survival.	extent of the effect of private and channel function and sediment de
15	Assess if hatchery programs increase the incidence of predation on naturally produced fish	Level and effect of poaching in the upper Columbia is unknown.	Develop a fish water management tool to help manage water releases from Zosel Dam to enhance spawning, incubation and rearing of summer steelhead an summer/fall Chinook.	Expand knowledge of the use of by summer Steelhead
16	Assess if hatchery programs increase the incidence of disease on naturally produced fish	Bull trout use of the Chewuch is not fully understood	Status of bull trout in the upper Entiat is not well understood	The watershed is only partially ac this time, yet it is unknown wheth other species

Tiered Data Gaps | Identifed Data Gaps | New Scores Rank and Quartile | Rating Sheet | Rating Matrices | Not a Data Gap | Not Rated

Ready 100%

Recent Columbia River wide effort (Skamania) further informed our data gap evaluation.





New monitoring...

- Post-implementation and annual monitoring
  - Post-implementation monitoring for all UC projects
  - Include verification of metrics recorded by sponsors of BPA projects
- Action effectiveness (Level 1 Effectiveness)
  - Habitat response to actions
- Supplementation of stream flow and WQ monitoring
  - AMIP
  - Fill gaps from removed WaDOE stations

EDT Updates
(Starting with Wenatchee Sub-basin)

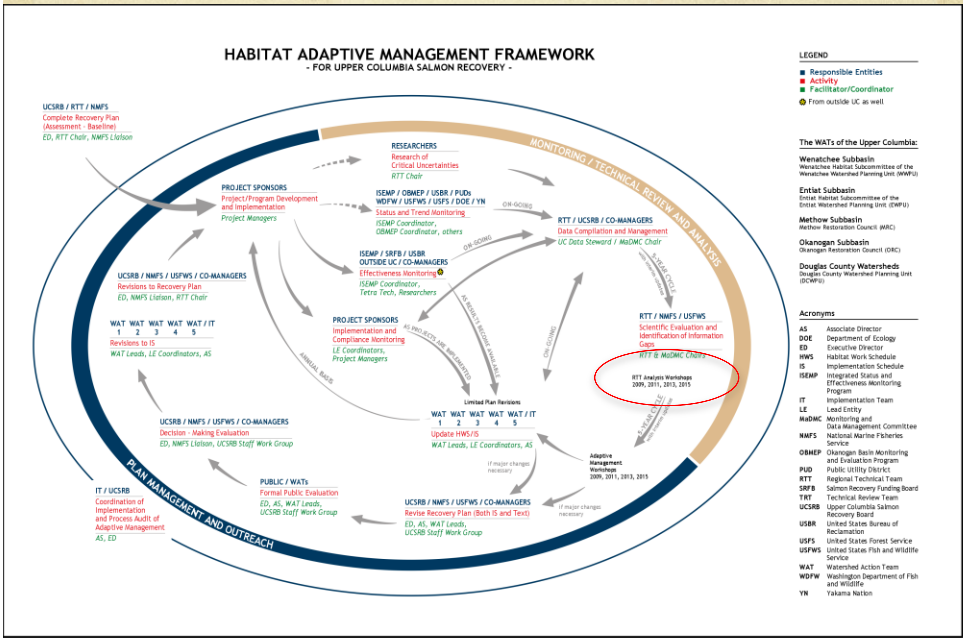
1. Create updated and documented EDT ratings based on ISEMP data and other
2. Update model analyses for spring Chinook summer Chinook and steelhead in the Wenatchee
   Population definitions, Life history patterns, and Out of basin assumptions (Baldwin, Blair and White)
3. Map recovery plan actions to new dataset and run analyses (Blair with Baldwin)
   Identify actions in action library there where implemented and that may be included in the updated current. My recollection we did not decide how to treat these cases, may simply ignore if few (Blair, Baldwin and White)
4. Analyses
   Population performance (Blair)
   Diagnosis and scenario profiles (Blair, Baldwin and White)
5. Habitat characterization summary (this item of all the items is less clear the approach)
   Current condition (Blair and Baldwin)
   Future condition (Blair and Baldwin)

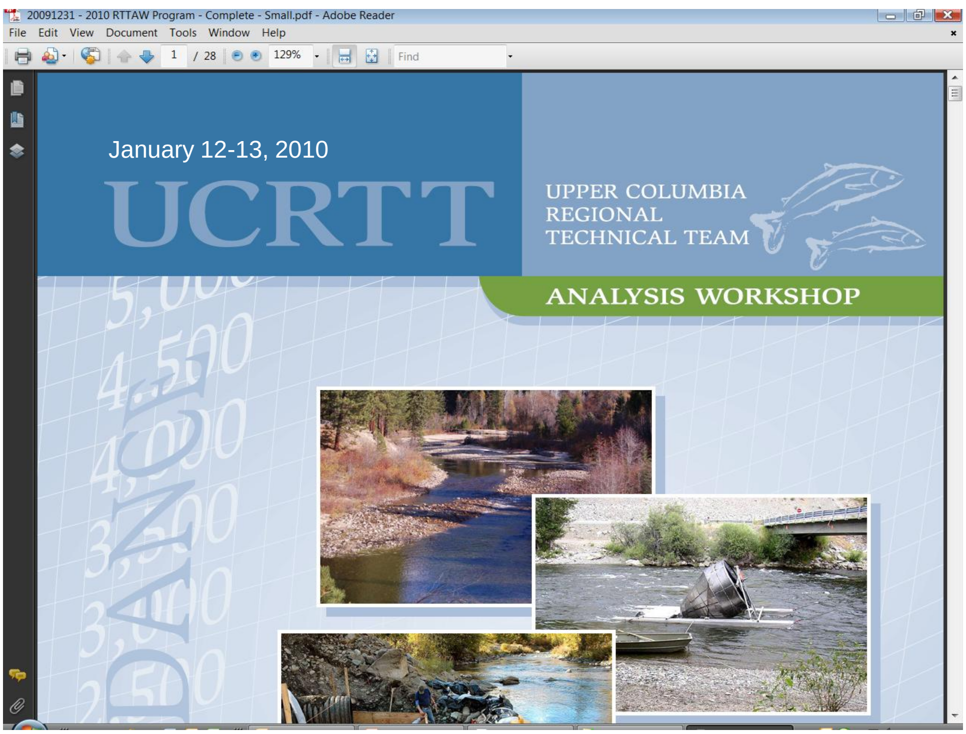
Evaluation

How are we using the data?

How does it feed the Adaptive Management Cycle?

RTT Analysis Workshop





RTT Analysis Workshop

- Objective to "provide information and data to assess the [Recovery Plan's] progress."
- And to "...interpret information gathered from monitoring and research, assess deviations from targets or anticipated results (hypothesis), and recommend changes in policies or management actions where appropriate."
- Workshop as a "a forum to present the state of the science on data available at the time"
- Hosted by RTT and UCSRB in 2 parts in January and Fall of 2010.

RTT Analysis Workshop

Short term (2-3 yrs) "check ins" with the data:
- minor course corrections
- confidence builders that we are doing the right things
- reporting responsibilities to funders

Longer term (10+ yrs):
- need time to implement enough actions to change the environment
- need time for the population to respond
- need time to overcome fluctuations in environmental conditions
- need time to increase replication and sample size to ensure scientific validity

Project and Funding Coordination

To: Watershed Action Teams (WATs)
UC Implementation Team (UC IT)
UC Regional Technical Team (UC RTT)

From: Lee Carlson, Yakama Nation
Bill Towey, Colville Tribes
Julie Morgan, UCSRB
Derek Van Marter, UCSRB
Casey Baldwin, UC RTT

Re: Funding Coordination of Salmon Recovery Projects in the Upper Columbia and the Development of the Mid-Range Implementation Plan/3-Year Work Plan

Date: January 16, 2009

For the last two decades, salmon recovery funding in the Upper Columbia has ostensibly operated on an annual or biennial basis. Access to these annual funding sources has been competitive and dominated by single, discrete, project focused recovery actions that are commensurate with the short-term nature of funding commitments. During this time period, regional partners have completed numerous habitat improvement and restoration projects that have increased habitat access and to some extent improved habitat characteristics in the Upper Columbia. These single-project-focused actions have reopened areas of tributary habitat, preserved key habitat areas in perpetuity, and protected countless fry and smolts from entrainment in irrigation diversions.

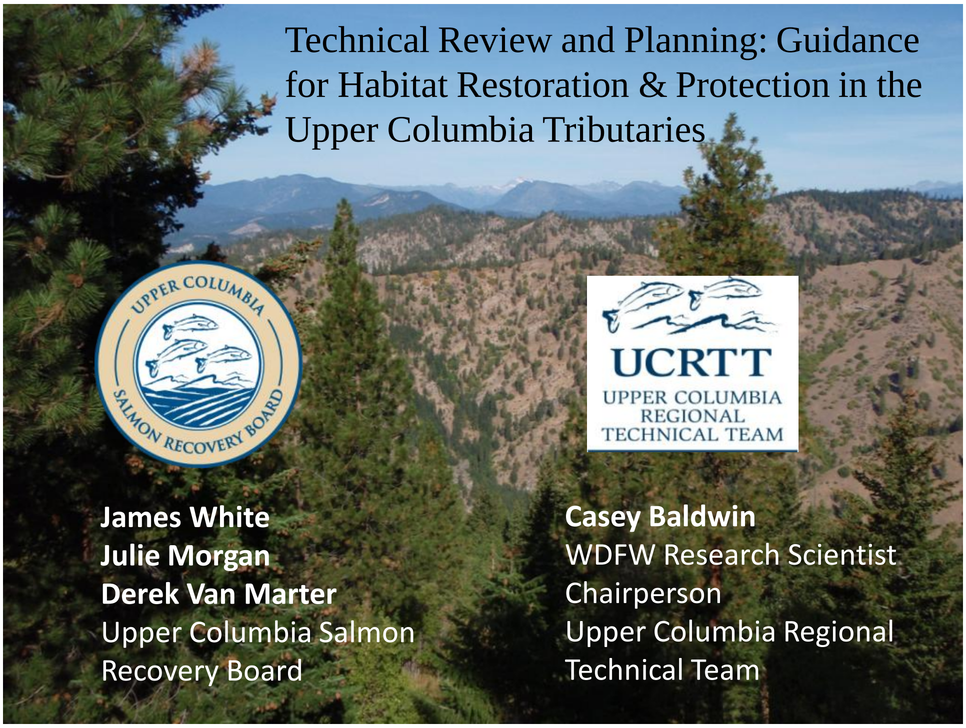
While these single-project-focused actions have provided important contributions to recovery, they also have a limit. Specifically, many of the most cost-effective and immediately beneficial single-project-focused actions have already been identified, funded, and accomplished. Under these circumstances, there is a growing consensus among biologists, project managers, and the entities providing salmon recovery funding, that the greatest current opportunities for habitat restoration projects that will yield the greatest biological benefits are found in the yet to be addressed large-scale, multi-year, multi-million dollar recovery activities. By their very nature, these long-term projects are more difficult to design, fund, coordinate and implement.

It has also become increasingly clear that the Upper Columbia cannot achieve the recovery of listed species without these larger-scale projects. The fisheries co-managers of the Upper Columbia and the Upper Columbia Salmon Recovery Board (UCSRB) are in agreement that pursuing isolated opportunities, though still important in some instances, will generally yield diminishing results and that a comprehensive, coordinated, and strategic approach to restoration is warranted to meet the objectives as specified in the Upper Columbia Recovery Plan (see Yakama Nation memo date September 8, 2008).

UC Project and Funding Coordination

Habitat Project Implementation Funds

Enabling Action	Main Funding Sources	Annual $
State Salmon Recovery Act	SRFB (PCSRF and Washington State)	$2 M
Mid-Columbia PUDs FERC	HCPs Tributary Fund Committee (Chelan and Douglas County PUDs)	$2 M
Mid-Columbia PUDs FERC	Priest Rapids Coordinating Committee (Grant County PUD)	$1 M
NW Power Act (NPCC) FCRPS BiOp	Yakama Nation Fish Accords (BPA) Colville Tribes Fish Accords (BPA)	$6 M $3 M
NW Power Act (NPCC) FCRPS BiOp	***UCSRB Non-Accord Funds (BPA)***	***$3.5 M***
FCRPS BiOp	USBR (Non-construction funds)	$4 M
Others	Community Salmon Fund, USFS, USFWS, WDOE, NOAA, RFEG	$1 M
	TOTAL	**$22.5 M**



Guidance on what should be done…
Review of what is proposed….

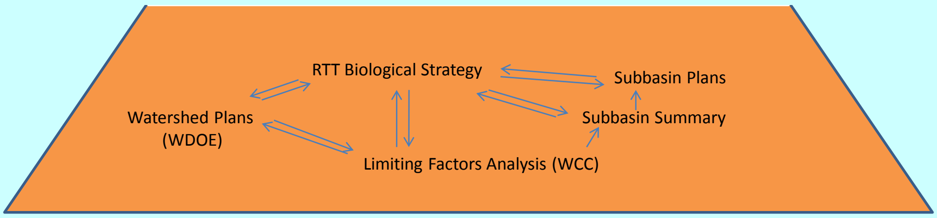
<u>Tasks of the RTT:</u>

- "Planning" Science → Provide guidance on what should be done.
- "Review" Science → Evaluate projects once they are proposed.

Planning Science

Science Tools = *local expertise
*published literature (what is working elsewhere)
*ecological models (EDT, Shiraz, PHABSIM),
*reach assessments

Identify limiting factors…….prescribe appropriate actions



USBR Reach Assessments

Figure 11. Potential habitat actions by subreach and their relative priority of implementation.

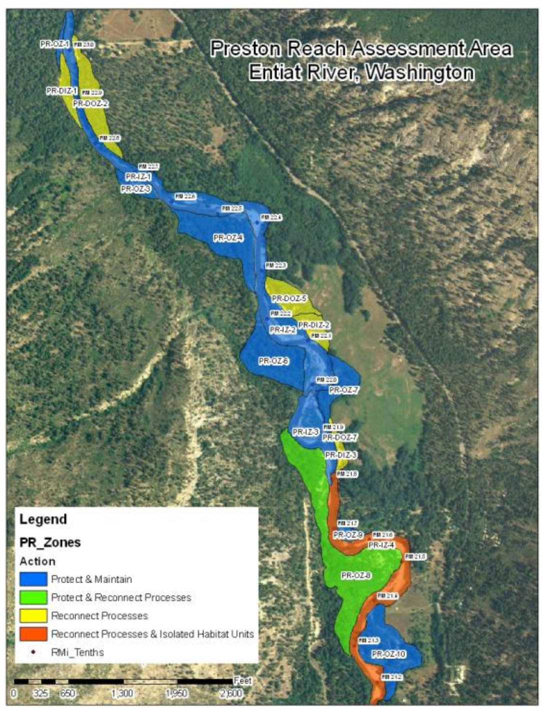


Image taken from the USBR Preston Reach Assessment Report, Entiat River, July 2009

USBR Reach Assessments

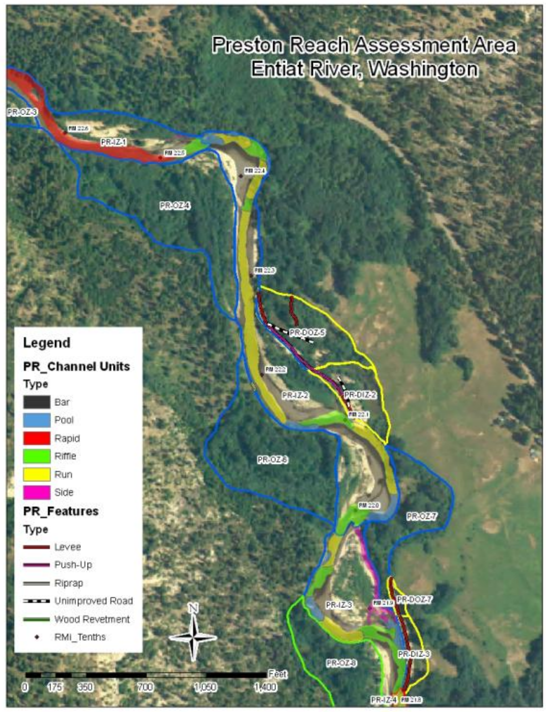
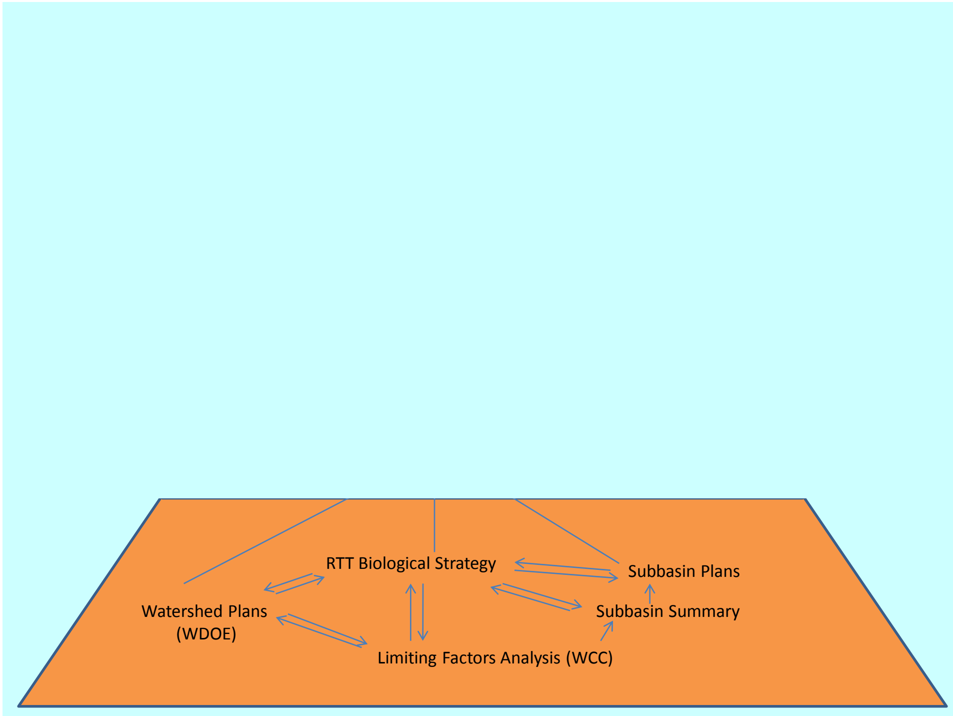
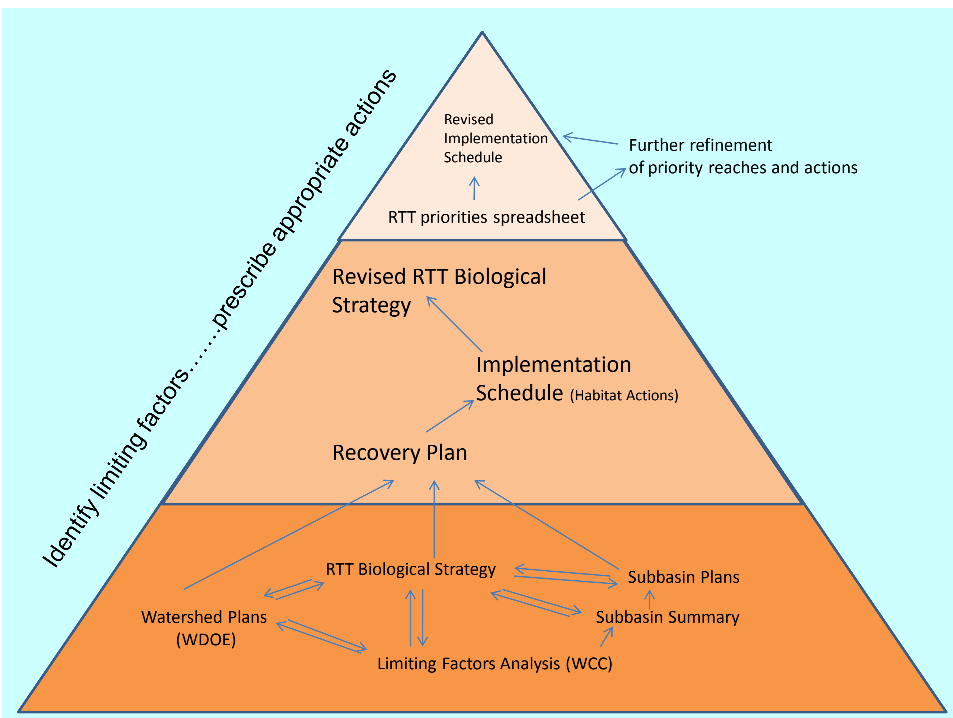


Figure 13. Location map of subreaches between RM 21.98 and 22.45 and anthropogenic features.

Image taken from the USBR Preston Reach Assessment Report, Entiat River, July 2009

Region Reach and Tributary Assessment Status & Schedule			
	LOCATION	ASSESSMENT TYPE	ENTITY
Completed	(RM 0-4)	Channel Migration Zone Study	Jones and Stokes
	Nason Creek (RM 0-4)	Channel Migration Zone Study	Jones and Stokes / Reclamation
	Nason Creek (RM 4-14)	Tributary Assessment	Reclamation
	Nason - Upper White Pine RM (12-14.5)	Reach Assessment	Reclamation
	Nason - Lower White Pine RM (9.45-11.55)	Reach Assessment	Reclamation
	Nason - Kahler (RM 4.65-8.9)	Reach Assessment	Reclamation
In Progress	Peshastin RM (0-7)	Reach Assessment	Yakama Nation
Future Priorities	( )	Reach Assessment	Yakama Nation
	Icicle (boulder field- Upper Icicle)	Reach Assessment	Reclamation (2011/2012)
Completed	Entiat RM (0-26)	Tributary Assessment	Reclamation
	RM (22.7-23.3)	Reach Assessment	Reclamation
	Stormy RM (17.9-18.1)	Reach Assessment	Reclamation
In Progress	Entiat 3D RM (24-25)	Reach Assessment	Yakama Nation
Future Priorities	Entiat 2A, 3C, 3F (RM 16.1-17.9, RM 23.3-24, RM 25.6-26)	Reach Assessment	Yakama Nation (completed by 2017)
	Entiat 1B, 1C, 1E (RM 0.8-4.3, RM 6.3-6.9)	Reach Assessment	TBD (completed by 2014)
	Entiat 1D, 1F (RM 4.3-6.3, RM 6.9-10.6)	Reach Assessment	TBD (completed by 2020)
Completed	(RM 0-80)	Tributary Assessment	Reclamation
	Big Valley (RM 54.2-60)	Reach Assessment	Reclamation
In Progress	Methow mainstem to (RM 40-51.5)	Reach Assessment	Reclamation
	Chewuch (RM 0-20)	Reach Assessment	Yakama Nation
	(RM 0-15)	Reach Assessment	Yakama Nation
Future Priorities	Methow mainstem, to (51.5-54.2	Reach Assessment	Reclamation
	Methow mainstem, to Mazama (RM 61-67)	Reach Assessment	TBD
	Methow Silver (RM 29-40, RM 52-55)	Reach Assessment	Reclamation


RTT Biological Strategy
Subbasin Plans
Watershed Plans
(WDOE)
Subbasin Summary
Limiting Factors Analysis (WCC)


Identify limiting factors…….prescribe appropriate actions
Revised
Implementation
Schedule
Further refinement
of priority reaches and actions
RTT priorities spreadsheet
Revised RTT Biological
Strategy
Implementation
Schedule (Habitat Actions)
Recovery Plan
RTT Biological Strategy
Subbasin Plans
Watershed Plans
(WDOE)
Subbasin Summary
Limiting Factors Analysis (WCC)

Planning Science: RTT Biological Strategy

Where it is

What it is

Priority level

Details

Subbasin	Watershed or Reach	Watershed Category[1]	Priority Action Type or Specific Action[2]	Tier Level[3]	Priority level[4]		Comments
Wenatchee	Nason	2	Restore natural channel processes	1	1		Sidechannel and/or offchannel connection or other actions that address causal mechanisms for limiting factors and maintain processes that promote the retention and recruitment of large woody debris. Feasibility of implementing priority actions is very low in the first 3 years. Need to focus initial effort on making progress with DOT and the Railroad and putting together a restoration plan. Instream structures should not be implemented until progress is made with restoring natural processes and addressing the causes of limiting factors.
Wenatchee	Upper Wenatchee (Lake to Tumwater Canyon)	1	Increase LWD retention and recruitment to increase complexity in a manor that is consistent with natural channel structure and function.	1	2		Need an assessment and implementation plan to determine appropriate locations and prescriptions. Preference for actions that enhance natural accumulations of LWD.
Wenatchee	Icicle Creek	2	Assess passage at boulder field, reconfigure Icicle/City of Leavenworth diversions	NR-1	3		If the boulder field is currently inhibiting passage due to anthropogenic effects, then take measures to improve upstream adult passage over the boulder field. (EDT and ICTRT intrinsic potential model predict very large increases in capacity for steelhead with access to the upper Icicle).
Wenatchee	Peshastin	2	Geomorphic assessment / Instream flow / Channel complexity	1	4		The geomorphic assessment needs to include the entire area impacted by the highway (at least to Tronson Ck confluence). After the assessment is completed, then develop a restoration plan that includes restoration of natural processes where possible, normative flow levels, migration corridors, and holding and rearing habitat in lower Peshastin Creek.
Wenatchee	Lower Mainstem (Mouth to Tumwater Canyon)	2	Restore natural channel processes	1	5		Sidechannel and/or offchannel connection or other actions that address causal mechanisms for limiting factors. Some priority areas include Cashmere Ponds, above Sleepy Hollow Bridge, Monitor Flats; need to re-evaluate potential benefits of other CMZ sites in the Lower Wenatchee.
Wenatchee	Wenatchee Subbasin Wide	NA	Nutrient Enhancement	2	6		Develop a nutrient enhancement plan in coordination with the WHSC, WQSC, and ISEMP, then implement a nutrient enhancement project in appropriate areas using hatchery carcasses and / or carcass analogs.
Wenatchee	Nason	2	Land Protection, Acquisition or Lease	1		1	May need 1-2 yr to assess and prioritize risks and opportunities. Combine USBR assessment information with lower 4.6 miles and determine priority areas for protection based on biological function and risk of development.
Wenatchee	White River	1	Land Protection, Acquisition or Lease	1		1	At risk areas are in the lower reach where there is no spawning and very limited rearing. The majority of primary spawning and rearing areas are already protected.
Wenatchee	Upper Wenatchee	1	Land Protection, Acquisition or Lease	1		1	Select opportunities that protect or allow for sidechannel reconnection would be higher priority.
Wenatchee	Chiwawa	1	Land Protection, Acquisition or Lease	1		1	Chikamin Flats, the majority of other private ownership is in the lower 4 miles that is primarily a migration corridor and not as high a priority. There could be select areas of high priority, but without an assessment we are not aware of those opportunities.
Wenatchee	Lower Mainstem	2	Land Protection, Acquisition or Lease	1		5	Select opportunities that protect or allow for sidechannel reconnection would be higher priority.
Wenatchee	Peshastin	2	Land Protection, Acquisition or Lease	1		6	Select opportunities that protect or allow for sidechannel reconnection would be higher priority.
Wenatchee	Wenatchee Subbasin wide	NA	Instream Flow	1 or 2	NR	NR	Strategic acquisition of water for instream benefits. Priority level depends on quantity and location.
Wenatchee	Subbasin wide	NA	Riparian Habitat	1 or 2	NR	NR	In general it needs to be done in association with other primary projects, need to be sure it is done in areas where other processes are functioning and restoration has a high likelihood of success. Priority level of stand alone projects depends on the quantity and location.

RTT Priorities Spreadsheet

- Priority reaches for biological benefit
  - Combines limiting factors with biological significance
- Priority actions
  - Protects the most functional habitat
  - Address the most critical limiting factors
  - Restore natural processes
- Recognizes across ESU prioritization using Tier levels
- Provides biological priorities within each Subbasin
  - More specific guidance for WATs to develop projects that address the most critical limiting factors.

Proposal Review

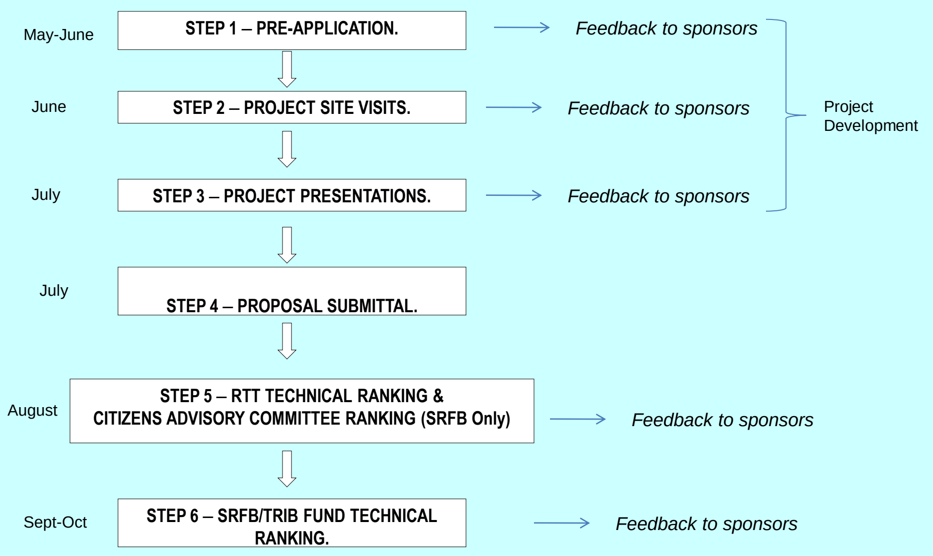
- Review criteria based on:
  - – improving status (VSP parameters)
  - – limiting factors
  - – priority areas
  - – protect functioning habitat
  - – restoring natural processes
  - – sequencing
  - – certainty of success

Appendix D. RTT Biological Strategy: Project Review Criteria (18 pg.)

RTT Scoring Criteria: Biological Benefit Rating

Biological Benefit	Score	Notes
Benefit to VSP abundance and/or productivity	35	See decision support matrix (Table D2.a) for guidance on scoring.
Benefit to VSP spatial structure and/or diversity	15	See decision support matrix (Table D2.b) for guidance on scoring.
Does the project address one or more limiting factors identified in the Recovery Plan or Biological Strategy?	10	See decision support matrix (Table D2.c) for guidance on scoring.
Is this a priority watershed (or major spawning area) for the populations?	10	See decision support matrix (Table D2.d)
Is this project dependent on other limiting factors being addressed first (sequencing)?	20	See decision support matrix (Table D2.e) for guidance on scoring.
Will the project benefit multiple listed species?	10	See decision support matrix (Table D2.f) for guidance on scoring.

Project Selection- Current 6 Step Process for SRFB and HCP Tributary Fund $



How will the BPA programmatic non-Accord funding fit in?

Conceptual Pathways to Funding Projects

1. Targeted solicitation: Large complex projects, reach based, restoring natural processes; AKA "pulse funds" for big ticket projects.
   - Majority of funds are available
   - Biological priorities, multi-yr action plans, and funding coordination through the IT provides the guidance

2. Current 6 step process: Smaller, opportunistic, spread among the Subbasins
   - Still must pass the biological priority test via RTT review
   - Often will be engineering, design, and alternative evaluation reports
     - ➢ This is necessary to "set up" the large complex projects

Conceptual Pathways to Funding Projects

BPA Habitat Programmatic $

$SRFB
$Trib

Targeted solicitation:

RTT reviews and provides feedback on the Alternatives Evaluation Reports (AER) and selects the one or two top priority alternatives that best address limiting factors, restore natural processes, and have the highest biological benefit.

Current 6 Step Process

STEP 1 – PRE-APPLICATION.

STEP 2 – PROJECT SITE VISITS.

STEP 3 – PROJECT PRESENTATIONS.

STEP 4 – PROPOSAL SUBMITTAL.

STEP 5 – RTT TECHNICAL RANKING & CITIZENS ADVISORY COMMITTEE RANKING (SRFB Only)

STEP 6 – SRFB/TRIB FUND TECHNICAL RANKING.

Conceptual Pathways to Projects

BPA Habitat Programmatic $

Targeted solicitation:

RTT reviews and provides feedback on the Alternatives Evaluation Reports (AER) and selects the one or two top priority alternatives that best address limiting factors, restore natural processes, and have the highest biological benefit.

This will generally include 2-3 feedback sessions

- presentation before the AER is developed
- a site visit/field tour
- review and ranking for the preferred alternative

Conceptual Pathways to Projects

BPA Habitat Programmatic $

$SRFB
$Trib

Targeted solicitation:

BPA/NPCC 6 Step Process

STEP 1 – PRE-APPLICATION.

STEP 2 – PROJECT SITE VISITS.

STEP 3 – PROJECT PRESENTATIONS.

STEP 4 – PROPOSAL SUBMITTAL.

STEP 5 – RTT TECHNICAL REVIEW & RANKING

STEP 6 –BPA/NPCC PRIORITIZED LIST

Current 6 Step Process

STEP 1 – PRE-APPLICATION.

STEP 2 – PROJECT SITE VISITS.

STEP 3 – PROJECT PRESENTATIONS.

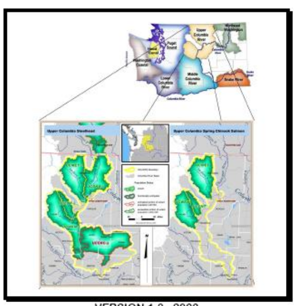
STEP 4 – PROPOSAL SUBMITTAL.

STEP 5 – RTT TECHNICAL RANKING & CITIZENS ADVISORY COMMITTEE RANKING (SRFB Only)

STEP 6 – SRFB/TRIB FUND TECHNICAL RANKING.

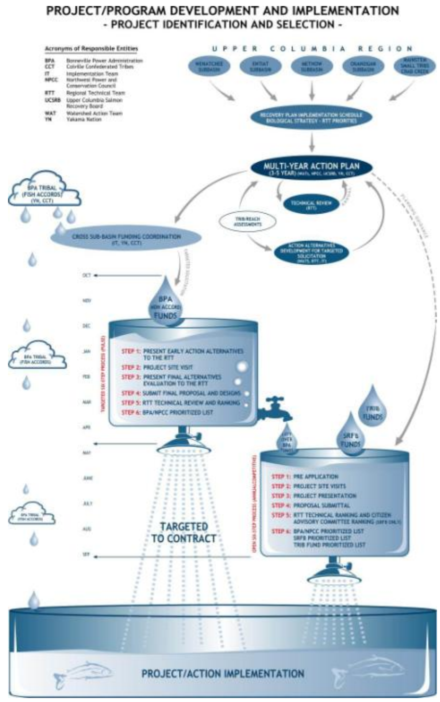
PROCESS GUIDE

FOR DEVELOPING AND SUBMITTING SALMON HABITAT RESTORATION PROJECTS IN THE UPPER COLUMBIA REGION TO THE SALMON RECOVERY FUNDING BOARD (SRFB) AND TRIBUTARY COMMITTEES*



VERSION 1.3 - 2008

* Developed by Lead Entities in cooperation with the UCSRB and the Tributary Committees for use during the 2008 9th Round of SRFB funding and Chelan, Douglas and Grant County PUDs Tributary Funds.


PROJECT/PROGRAM DEVELOPMENT AND IMPLEMENTATION
- PROJECT IDENTIFICATION AND SELECTION -
Acronyms of Responsible Entities
BPA Bonneville Power Administration
CCT Colville Confederated Tribes
IT Implementation Team
NPCC Northwest Power and Conservation Council
RTT Regional Technical Team
UCSRB Upper Columbia Salmon Recovery Board
WAT Watershed Action Team
YN Yakama Nation
UPPER COLUMBIA REGION
WENATCHEE SUBBASIN
ENTIAT SUBBASIN
METHOW SUBBASIN
OKANOGAN SUBBASIN
MAINSTEM SMALL TRIBS CRAB CREEK
RECOVERY PLAN IMPLEMENTATION SCHEDULE BIOLOGICAL STRATEGY - RTT PRIORITIES
MULTI-YEAR ACTION PLAN
BPA TRIBAL (FISH ACCORDS) (YN, CCT)
TECHNICAL REVIEW (RTT)
TRIB/REACH ASSESSMENTS
CROSS SUB-BASIN FUNDING COORDINATION (IT, YN, CCT)
ACTION ALTERNATIVES DEVELOPMENT FOR TARGETED SOLICITATION
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUNE
JULY
AUG
SEP
BPA NON ACCORD FUNDS
STEP 1: PRESENT EARLY ACTION ALTERNATIVES TO THE RTT
STEP 2: PROJECT SITE VISIT
STEP 3: PRESENT FINAL ALTERNATIVES EVALUATION TO THE RTT
STEP 4: SUBMIT FINAL PROPOSAL AND DESIGNS
STEP 5: RTT TECHNICAL REVIEW AND RANKING
STEP 6: BPA/NPCC PRIORITIZED LIST
TRIB FUNDS
SRFB FUNDS
STEP 1: PRE APPLICATION
STEP 2: PROJECT SITE VISITS
STEP 3: PROJECT PRESENTATION
STEP 4: PROPOSAL SUBMITTAL
STEP 5: RTT TECHNICAL RANKING AND CITIZEN ADVISORY COMMITTEE RANKING
STEP 6: BPA/NPCC PRIORITIZED LIST
SRFB PRIORITIZED LIST
TRIB FUND PRIORITIZED LIST
TARGETED TO CONTRACT
PROJECT/ACTION IMPLEMENTATION

UPPER COLUMBIA SALMON RECOVERY BOARD

The mission of the Upper Columbia Salmon Recovery Board is to restore viable and sustainable populations of salmon, steelhead, and other at-risk species through the collaborative, economically sensitive efforts, combined resources, and wise resource management of the Upper Columbia region.

415 King Street, Wenatchee, WA 98801 phone: (509) 662-4710 fax: (509) 665-6475 ucsrb.com

Upper Columbia Salmon Recovery Board
2010 Work Plan Summary
March 31, 2010

2010 Tasks Throughout the Year
• Facilitate and support collaborative decision-making • Development of products for the Upper Columbia Salmon Recovery Forum (UCSRF) • Continue outreach to federal and state agencies and partners • Improve outreach to local groups, focusing on success stories (e.g. irrigation districts, local governments, business interests) • Develop and produce an UC Salmon Recovery Video • Facilitate next round of project funding (March thru December) for SRFB/Trib Fund/BPA • Continue work on project and funding coordination • Continue facilitating first round of UC adaptive management cycle • Develop implementation report • Update EDT Model (start with Wenatchee) • M&E gaps (independent implementation monitoring, WQ, effectiveness monitoring, others)
January thru March
• Development of the 3-year work plans (MYAP - project and funding coordination) • Outreach on SRFB request to State for funding recovery • UCSRB DC visits (March)
April thru June
• Development of the 3-year work plans (MYAP - project and funding coordination) • Revision of UCSRB operations budget and secure funds (M&E, contract admin, other) • AM - Work with WAT to provide input to RTT synthesis report • Update UC Regional Process Guide
July thru September
• AM - Present results of the RTT synthesis report to the UCSRB
October thru December
• AM - Upper Columbia Habitat: Adaptive Management Conference • Review and update UCSRB policies (e.g. personnel policies, executive director transition)
2011 Tasks
• Convene first meeting of the UCSRF (All-H coordination) • Publish implementation report

Attachment B

2010 UPPER COLUMBIA PROCESS SCHEDULE

SRFB/TRIB/BPA

Project Proposal Development, Submission, and Review

DATE	ACTIVITY/MILESTONE (MEETING/DEADLINE)
MARCH	
30 March	SRFB/TRIB Debrief of 2009; preparations for 2010; IT Funding Coordination Meeting
APRIL	
April	SRFB/Tributary Fund cycles announced; SRFB Policy Manual available
MAY	
4 May	SRFB/TRIB/BPA Kickoff Meeting for the Region; RCO presentation; RTT Technical criteria presentation; CAC criteria presentation
May	Project Sponsors develop projects and pre-proposal (materials available from http://www.midcolumbiahcp.org/)
30 May	**Pre-proposals due on Tributary ftp site and uploaded on Prism**
JUNE	
4 June	Pre-proposals delivered to RTT, TRIB (via TRIB ftp site) and SRFB Panel Members (via PRISM)
10 June	TRIB internal review of pre-proposals
14 June	Conference Call to discuss project tour logistics (RTT, LEs, Trib and UCSRB)
21-24 June	SRFB/TRIB/BPA project tours • 21st – Okanogan • 22nd – Methow • 23rd – Wenatchee • 24th – Entiat
JULY	
July-August	SRP discusses “flagged” projects and update the comment form. Panel will meet either in person or conference call to provide full panel feedback on “Flagged” projects.
8 July	TRIB final review of pre-proposals
7 July (all day)	Pre-proposal Presentation Workshop: review pre-proposals with RTT, TRIB and CAC’s
14 July	Final comments from TRIB will be via e-mail to LE for distribution to project sponsors.
19 July	**Final project proposals due on TRIB ftp site**
23 July	Project proposals available on TRIB ftp on the 23rd.
AUGUST	
TBA	Draft project review forms due from SRP to LEs and project sponsors
4, 9 or 11 August (TBD)	RTT Meeting: formal project reviews and technical ranking
12 or 19 August	RTT ratings delivered to LE/TRIB/BPA

(TBD)	
16-20 August	Okanogan CAC project ranking
16-20 August	Chelan CAC project ranking
24 August	Regional joint CAC identifies combined ranked list
25 August	LE submits final project applications and deliverables to RCO/SRFB in PRISM
SEPTEMBER	
9 September	TRIB supplemental tours of selected projects (project sponsors will be notified in advance of visit)
15 September	Regional organizations submit their recommendations for funding and responses to the information questionnaire.
27-30 September	Regional presentations to State Technical Review Panel
OCTOBER	
14 October	Project Presentations to TRIB (*if needed*)
27 October	Comments due on State Technical Review Panel draft report (available 8 October)
NOVEMBER	
18 November	TRIB makes initial internal decisions
19 November	Final report from State Technical Review Panel delivered to SRFB
DECEMBER	
9-10 December	SRFB makes funding decisions
December	TRIB makes supplemental decisions

Acronyms

CAC Citizen's Advisory Committee
BPA Bonneville Power Administration
IT Implementation Team
LE Lead Entity
RCO Recreation and Conservation Office
SRB State Review Panel
SRFB Salmon Recovery Funding Board
TRIB HCP Tributary Committee

Wells, Rocky Reach, and Rock Island HCP Tributary Committees Conference Call Notes 13 May 2010

Members Present: Dale Bambrick (NOAA Fisheries), Dennis Beich (WDFW), Chris Fisher (Colville Tribes), Steve Hays (Chelan PUD), Tom Kahler (Douglas PUD), David Morgan (USFWS), and Tracy Hillman (Committees Chair).

Members Absent: Lee Carlson[1] (Yakama Nation).

Others Present: Becky Gallaher (Chelan PUD).

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans Tributary Committees had a conference call on Thursday, 13 May 2010 from 10:00 to 11:45 am.

I. Review and Adopt Agenda

Tracy Hillman welcomed everyone on the call and the Committees adopted the proposed agenda with the following items added to Information Updates:

- Mission Creek Small Project Proposal
- HCP Annual Reports
- Daley-Wilson Conservation Easement

II. Review and Approval of Meeting Minutes

The Committees reviewed and approved the 8 April 2010 meeting notes with one edit offered by Becky Gallaher.

III. Monthly Update on Ongoing Projects

Becky Gallaher gave an update on the following projects:

- Under the *Entiat PUD Canal System Conversion* project, contractors completed drilling of Test Well #2. The final depth of Well #2 was 170 feet. The contractor will conduct a pump test on Well #2 and drill Test Well #3. A change in the drilling method may be investigated to increase drilling progress. Depending on the results of the pump test, a combination of wells and river intake may be required to achieve the goals of the project. The Rock Island Tributary Committee would like to be informed of any changes in scope.

[1] Lee was unable to join the conference call. However, prior to the call, he provided his vote on decision items.

- Under the *Roaring Creek Flow Enhancement and Barrier Removal* project, the review of the Biological Assessment was completed in May. A permit from Chelan County Water Works to bore under Roaring Creek Road was obtained on 8 April.
- Under the *Entiat National Fish Hatchery Habitat Improvement* project, the Tributary Committee/Sponsor Agreement was signed in April. The JARPA was completed and submitted on 16 April. The sponsor submitted 80% drawings for Committee review and expects to have the final drawings completed by mid-June. Construction should begin in September.
- Chelan-Douglas Land Trust provided the Rock Island Tributary Committee with the Sleepy Hollow Reserve Protection Feasibility Assessment report. Becky mailed copies of the report to each member and noted that the report is also posted on the website.

IV. Small Projects Program Application: Prevent Fish Entrainment on Inkaneep Creek

The Committees reviewed a Small Projects Program application from the Okanagan Nation Alliance titled *Prevent Fish Entrainment on Inkaneep Creek.*

Prevent Fish Entrainment on Inkaneep Creek

The purpose of this project is to purchase 3,000 hay bales in lieu of irrigating a field for hay production during 2010, which would entail diverting water through an unscreened diversion on the lowermost 0.5 mile of Inkaneep Creek. Inkaneep Creek is an important steelhead/rainbow stream that drains into Lake Osoyoos. The sponsor is working diligently with the landowner to develop other alternative water sources and delivery systems. These include withdrawing water from Lake Osoyoos and possibly using a conveyance system that is more efficient than a series of open ditches. The transition to a more modern irrigation system will probably not be implemented until 2011. Thus, the landowner has agreed not to divert water from Inkaneep Creek if hay is provided to feed her cattle. The total cost of the project is $24,000 (assumes $8/bale). The sponsor requested $24,000 from HCP Tributary Funds. After careful consideration of the proposal, ***the Wells Committee approved funding for this project***.

V. Review of Entiat National Fish Hatchery Habitat Improvement Project Drawings

Cascadia Conservation District and the U.S. Fish and Wildlife Service asked the Rocky Reach Tributary Committee to review the 80% design drawings for the Entiat National Fish Hatchery Habitat Improvement Project. Prior to the conference call, Chris Fisher requested information on (1) where the sponsor intends to deposit the materials removed from the levee and (2) the thickness of the ford. Tracy Hillman noted that the sponsor had not yet responded to the information requests (following the conference call, the sponsor provided a written response, which was shared with the Committee). ***The Rocky Reach Tributary Committee approved the 80% design drawings.*** Final drawings should be completed by mid-June.

VI. Participation in the UCSRB Funding Strategy

Tracy Hillman reminded members that during the last meeting, the Committees agreed to determine if Tributary Funds could be used to help fund targeted solicitations. Currently, Tributary Funds are used to help fund non-targeted submitted proposals (open process). In addition to the open process, the UCSRB has developed a targeted process that will be funded largely by BPA Non-Accord Funds.

The Tributary Committees agreed to support and participate in the targeted process. They did not commit to a certain dollar amount, but are willing to contribute to the coordinated effort. In addition, they believe the UCRTT is the appropriate body to conduct the targeted six-step process. However, as with the open process, the Committees will participate in the review of any proposals received as part of the targeted solicitations. The Committees asked Tracy Hillman to communicate their decision to the UCSRB.

VII. Information Updates

The following information updates were provided during the meeting.

1. Approved Payment Requests in April and May:

   Rocky Reach Plan Species Account:

   - $978.05 to Cascadia Conservation District for project administration on the Below the Bridge project.

   Wells Plan Species Account:

   - $85.26 to the Methow Conservancy for planning and mapping WDFW properties south of Twisp (under the Riparian Regeneration and Restoration Initiative project).

2. Dale Bambrick reported that the BNSF Railroad has decided that culverts will not be used to reconnect channels in Nason Creek. The Railroad is requiring bridges. BNSF will likely want the bridges built for two rails, which will significantly increase the cost of the project. Chris Fisher stated that the current proposal is to install two bridges at each of two connection points. The two bridges at each point will allow for the future construction of a double rail. David Morgan stated that the building of these “ghost” bridges (second bridge at each location), which are not needed at this time because it is only a single track, is a concern for him because it would require a lot of extra fish restoration money but would not provide any extra benefit to fish. David indicated that we do not want the railroad to build or expand in this location. Building the ghost bridges may make it more attractive to BNSF to build in this location. Dale added that the second rail would require significant filling of the wetland. David commented that someone needs to discuss this with BNSF, and to determine whether future double tracks could be built in nearby upland areas where there would be little damage to the restored habitat. David said that he would bring this up at the next BNSF meeting hosted by Chelan County.

   Dale noted that the project should not divert most or all of the flow into the reconnected channel, but rather provide enough flow to offer ESA-listed species quiescent, off-channel habitat, especially during winter. Full connection may not be best because of landowner issues, cost/benefits, and sequencing of the project. David commented that LiDAR identified high ground separating the two oxbows. However, fieldwork has demonstrated that the two oxbows are really one larger oxbow (there is no high ground between the two). Thus, there is actually one larger side channel to be reconnected. David noted that the intent is to divert about 10% of the flow into the side channel. The presence of beaver could be an issue in the long term.

3. Becky Gallaher gave an update on the recent SRFB 11th Round Kickoff Meeting. She noted that the Committees may receive two pre-proposals from the Methow Conservancy, two from the Chelan-Douglas Land Trust, possibly one from WDFW, and four or five from Chelan County. At this point, Cascadia Conservation District, Methow Salmon Recovery Foundation, and Okanogan Conservation District are not planning to submit proposals.

   Becky also shared that she received feedback from the Methow Conservancy and Chelan-Douglas Land Trust that they would like more certainty that their final proposals will be funded if they address the comments offered by the Committees on the pre-proposals. That is, sponsors do not want to spend time and resources addressing comments on the pre-proposal if there is little chance that the final proposal will be funded. Members noted that they do inform sponsors if there is little likelihood that the final proposal will be funded. Nevertheless, the Committees cannot give certainty that a given project will be funded even if the sponsor addresses comments. Tracy Hillman indicated that he will make that clear in the letters sent to the sponsors.

4. Tracy Hillman reviewed with the Committees the final schedule for proposal development, submission, and review of SRFB/GSHP projects. David Morgan noted that if the site visits can be completed in two days, Monday and Tuesday (21 and 22 June) would work best for him. Becky Gallaher indicated that she would share this with the coordinators during the conference call on 14 June. The final schedule is appended to these notes as Attachment A.

5. Tracy Hillman reported that members should have received the web link to the Chelan PUD Rocky Reach and Rock Island HCP Annual Reports. Douglas PUD sent each member the Wells HCP Annual Report on a CD.

6. Becky Gallaher reported that she received a Small Project Program proposal from Cascadia Conservation District titled, *Mission Creek Fish Passage Project*. Because she received the proposal the day before the conference call, members did not have time to review the proposal. Therefore, the Committees will conduct a thorough review of the proposal during the June meeting. However, based on a cursory review of the proposal, the Committees identify the following issues that they would like the sponsor to address before the next meeting:

   - Similar structures funded in the past on Mission Creek were washed out during high flow. Are the proposed log weirs designed so that they will not fail under high flows? At what flows would these structures fail?
   - Do the landowners have valid water rights?
   - Is the installation of log weirs the most appropriate restoration method for this section of Mission Creek?
   - What is the life expectancy of the log weirs?

   Tracy Hillman will request responses to these questions before the next meeting.

7. Becky Gallaher reported that Mickey Fleming with Chelan-Douglas Land Trust contacted her about the possibility of the Tributary Committees funding the Dally-Wilson Conservation Easement on the White River. Becky noted that a few years ago the Committees gave the Chelan-Douglas Land Trust a lump sum of money to purchase conservation easements on the White River. One of the properties that was to be covered by the lump sum was the Dally-Wilson Property. However, the landowner was unable to finalize the agreement; therefore, the money intended for the Dally-Wilson Property was

used to purchase a conservation easement on a different property on the White River. The landowner has now agreed to the easement. Because the money intended to cover the cost of the easement on the Dally-Wilson Property is no longer available, the Land Trust is asking the Committees if they are still interested in funding the Dally-Wilson easement. The cost of the easement is $191,000 and protects 13.7 acres and 1,050 feet of river bank. ***The Rock Island Tributary Committee agreed to fund the conservation easement on the Dally-Wilson property.***

VIII. Next Steps

The Committees will next meet on Thursday, 10 June 2010 at Chelan PUD in Wenatchee. Tentative agenda items include:

- Review Small Project Program Application
- Review General Salmon Habitat Program Pre-Proposals

Meeting notes submitted by Tracy Hillman (tracy.hillman@bioanalysts.net).

Attachment A

2010 UPPER COLUMBIA PROCESS SCHEDULE

SRFB/TRIB/BPA

Project Proposal Development, Submission, and Review

DATE	ACTIVITY/MILESTONE (MEETING/DEADLINE)
MARCH	
30 March	SRFB/TRIB Debrief of 2009; preparations for 2010; IT Funding Coordination Meeting
APRIL	
April	SRFB/Tributary Fund cycles announced; SRFB Policy Manual available
MAY	
4 May	SRFB/TRIB/BPA Kickoff Meeting for the Region; RCO presentation; RTT Technical criteria presentation; CAC criteria presentation
May	Project Sponsors develop projects and pre-proposal (materials available from http://www.midcolumbiahcp.org/)
31 May	**Pre-proposals due on TRIB ftp site and uploaded on PRISM**
JUNE	
4 June	Pre-proposals delivered to RTT, TRIB (via TRIB ftp site) and SRFB Panel Members (via PRISM)
10 June	TRIB internal review of pre-proposals
14 June	Conference Call to discuss project tour logistics (RTT, LEs, Trib and UCSRB)
21-24 June	SRFB/TRIB/BPA project tours • 21st – Okanogan • 22nd – Methow • 23rd – Wenatchee • 24th – Entiat
JULY	
July-August	SRP discusses “flagged” projects and update the comment form. Panel will meet either in person or conference call to provide full panel feedback on “Flagged” projects.
7 July	Pre-proposal Presentation Workshop: review pre-proposals with RTT, TRIB and CAC’s
8 July	TRIB final review of pre-proposals
14 July	Final comments from TRIB will be via e-mail to LE for distribution to project sponsors.
19 July	**Final project proposals due to LE Coordinators and on TRIB ftp site**
23 July	Project proposals available on TRIB ftp on the 23rd.
AUGUST	
TBA	Draft project review forms due from SRP to LEs and project sponsors
4 August	RTT Meeting: formal project reviews and technical ranking

12 August	RTT ratings delivered to LE/TRIB/BPA
16-20 August	Okanogan CAC project ranking
16-20 August	Chelan CAC project ranking
24 August	Regional joint CAC identifies combined ranked list
25 August	LE submits final project applications and deliverables to RCO/SRFB in PRISM
SEPTEMBER	
9 September	TRIB supplemental tours of selected projects (project sponsors will be notified in advance of visit)
15 September	Regional organizations submit their recommendations for funding and responses to the information questionnaire.
27-30 September	Regional presentations to State Technical Review Panel
OCTOBER	
14 October	Project Presentations to TRIB (*if needed*)
27 October	Comments due on State Technical Review Panel draft report (available 8 October)
NOVEMBER	
18 November	TRIB makes initial internal decisions
19 November	Final report from State Technical Review Panel delivered to SRFB
DECEMBER	
9-10 December	SRFB makes funding decisions
December	TRIB makes supplemental decisions

<u>Acronyms</u>
CAC Citizen's Advisory Committee
BPA Bonneville Power Administration
IT Implementation Team
LE Lead Entity
RCO Recreation and Conservation Office
SRB State Review Panel
SRFB Salmon Recovery Funding Board
TRIB HCP Tributary Committee

Wells, Rocky Reach, and Rock Island HCP Tributary Committees Notes 10 June 2010

Members Present: Casey Baldwin (WDFW), Lee Carlson (Yakama Nation), Chris Fisher (Colville Tribes), Steve Hays (Chelan PUD), Tom Kahler (Douglas PUD), David Morgan (USFWS), and Tracy Hillman (Committees Chair).

Members Absent: Dale Bambrick[1] (NOAA Fisheries).

Others Present: Becky Gallaher (Tributary Project Coordinator).

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans Tributary Committees met at the Chelan PUD Auditorium in Wenatchee, Washington, on Thursday, 10 June 2010 from 9:00 am to 3:00 pm.

I. Review and Adopt Agenda

Tracy Hillman welcomed everyone to the meeting, and the Committees adopted the proposed agenda with the following addition to Information Updates:

- Nason Creek update.

II. Review and Approval of Meeting Minutes

The Committees reviewed and approved the 13 May 2010 meeting notes with edits offered by David Morgan and Tom Kahler.

III. Monthly Update on Ongoing Projects

Becky Gallaher gave an update on the following projects:

- The Methow Conservancy and the landowner of the Buckley Property (*Twisp River Riparian Protection* project) are discussing a combination of an acquisition and conservation easement. An obstacle that could prevent the easement from moving forward is that the property is not free of encumbrance; an existing mortgage remains on the property. Depending on the conservation easement issue, this could result in a change in budget, a change in contract language, or both.

[1] Dale was unable to join the meeting. However, prior to the meeting, he provided his vote on decision items.

IV. Small Projects Program Application: Mission Creek Fish Passage Project

The Committees reviewed a Small Projects Program application from Cascadia Conservation District titled *Mission Creek Fish Passage Project*.

Mission Creek Fish Passage Project

The purpose of this project is to improve juvenile steelhead and Chinook salmon rearing habitat and passage, stream flows, and riparian habitat and function at five sites (between RM 4.2 and 7.5) on Mission Creek. This will be accomplished by installing five log weirs to provide primary pool habitat that will increase habitat complexity and eliminate season fish passage barriers. In addition, the sponsor will re-vegetate the stream banks to control bank erosion and improve shade in the channelized section of Mission Creek. The total cost of the project is $50,000. The sponsor requested $45,000 from HCP Tributary Funds. After careful consideration of the proposal and the sponsor's response to questions, ***the Rock Island Committee approved funding for this project***.

There is some concern that the flow over the structures may not always allow passage for juvenile salmonids or that conditions will change through time rendering the structures ineffective. It is important to the Committees that monitoring occur at these structures. There may be opportunities for implementation and effectiveness monitoring through other funding sources. Landowner agreements to allow future access will be critical to those future efforts. Simply measuring flows, velocities, and depths may be all that is needed to demonstrate that the structures are effective. The Committees would like to visit these structures sometime in the future.

V. Preliminary Review of General Salmon Habitat Program Pre-Proposals

The Committees received 19 General Salmon Habitat Program pre-proposals. The Committees conducted a preliminary review of the pre-proposals with the intent of identifying which projects the Committees would like to visit in the field. In addition, the Committees identified pre-proposals that would have a low likelihood of receiving funding from the Tributary Committees. The following table summarizes preliminary reviews.

Project Title	Sponsor	General Comments[1]
Dillwater ELJ's and Side Channel Enhancement	Chelan County Natural Resources Department	Yes, visit site. Downstream structures need more justification. Consider consulting with Entrix on ELJ design and installation.
Lower Wenatchee River Leavenworth Reach Alternatives Analysis and Design	Chelan County Natural Resources Department	Yes, visit site. Why is it necessary to do an analysis? Why not move forward with the actions?
Nason Creek N1 Floodplain Reconnection	Chelan County Natural Resources Department	Yes, visit site. WDOT should be involved and contribute funding. Expensive project and the $275,000 does not get to a 100% design (only 30% design).
Peshastin Irrigation District – Wenatchee River Pump Station Feasibility Study	Chelan County Natural Resources Department	No site visit necessary. Anchor/EES has conducted PHABSIM modeling so why is an additional $35,000 needed to evaluate instream benefits. Why is $85,000 needed to identify and evaluate

Project Title	Sponsor	General Comments[1]
		alternatives when some of this work was completed by Anchor. Need to justify the seemingly high cost of the study.
Skinney Creek Channel Restoration	Chelan County Natural Resources Department	Yes, visit site. WDOT already completed an evaluation. Why is the feasibility study necessary? Expensive study for 0.42 miles.
Entiat River Upper Preston Reach Habitat Complexity Project	Chelan County Natural Resources Department	Yes, visit site. Planting vegetation is good, but the use of LWD and its benefits are questionable. Bank erosion may be exacerbated upstream from the placement of LWD (on the neighboring property).
Chiwawa Irrigation District Water Conservation Feasibility Study	Chelan County Natural Resources Department	No site visit necessary. Who will do the evaluation? Are there PHABSIM results for the lower Chiwawa River? What benefits to a wide, shallow river can be achieved by added a small amount of flow?
White River Van Dusen Conservation Easement	Chelan-Douglas Land Trust	Yes, visit site.
Middle Methow Island Conservation Acquisition (2010 RM 48.7 RB)	Methow Salmon Recovery Foundation	Yes, visit site. Need a map showing location of property along the Middle Methow and land ownership. Need a map showing elevations and FEMA 100-year floodplain. Need a table indicating the number of acres and the number of homesites permitted with and without easement or acquisition. Are there any restoration actions planned for this site if acquired?
Methow River Floodplain Conservation Acquisition (2010 RM 39.5 LH)	Methow Salmon Recovery Foundation	Yes, visit site. Need a map showing location of property along the Middle Methow and land ownership. Need a map showing elevations and FEMA 100-year floodplain. Need a table indicating the number of acres and the number of homesites permitted with and without easement or acquisition. Are there any restoration actions planned for this site if acquired?
Upper Methow Floodplain Conservation Acquisition (2010 RM 56.0 RR)	Methow Salmon Recovery Foundation	Yes, visit site. Need a map showing location of property along the Middle Methow and land ownership. Need a map showing elevations and FEMA 100-year floodplain.

Project Title	Sponsor	General Comments[1]
		Need a table indicating the number of acres and the number of homesites permitted with and without easement or acquisition. Are there any restoration actions planned for this site if acquired?
Middle Methow Side Channel and Associated Wetland Conservation Acquisition	Methow Salmon Recovery Foundation	Yes, visit site. Need a map showing location of property along the Middle Methow and land ownership. Need a map showing elevations and FEMA 100-year floodplain. Need a table indicating the number of acres and the number of homesites permitted with and without easement or acquisition. Are there any restoration actions planned for this site if acquired? Will funds from the resale of the uplands be returned to the Committees?
Chewuch River Instream Flow Project	Trout Unlimited	No site visit necessary. Need a better description of the project. Need to describe “Diversion Reduction Easement.” Need to flesh out the budget.
Lower Wenatchee Instream Flow Enhancement Project	Trout Unlimited	No site visit necessary.
Wenatchee Nutrient Enhancement – Salmon Toss	Upper Columbia Regional Fisheries Enhancement Group and WDFW	No site visit necessary. Although the Committees are not opposed to nutrient enhancement in some locations (this is called for in the Recovery Plan), the pre-proposal did not provide evidence that the streams identified in the pre-proposal are nutrient limited (e.g., Little Wenatchee and maybe Nason Creek). There is no apparent coordination with WDOE. There is no indication of how this project will affect the TMDL in the lower Wenatchee River. The Committees have no interest in funding the purchase of a truck and trailers or supporting the salary of the Executive Director. It is the Committees understanding that other sources fully fund this position. It is not clear what happens if there are no excess fish at Tumwater Dam in 2011. Members indicated that this project has a low likelihood of receiving funding from the Tributary Committees.
Lower Icicle Creek Reach Assessment	Wild Fish Conservancy	No site visit necessary. It is not clear how the proposed work will build upon the work by The Watershed Company (2005) or Lorang and Aggett (2005). The sponsor needs to demonstrate their ability to

Project Title	Sponsor	General Comments[1]
		conduct the assessment (e.g., qualifications, experience and examples of doing similar assessments, GIS support, etc.). The assessment should begin just upstream from the boulder field. Demonstrate how similar, or different, the proposed approach is to the geomorphic approach used by the BOR. Justify why the reach assessment should occur before the BOR conducts the Tributary Assessment.
Christianson Ranch Riparian Protection	Methow Conservancy	Yes, visit site. Need more information on cattle grazing.
Upper Methow Riparian Protection IV	Methow Conservancy	Yes, visit site. Feet of river bank per acre is low. Need a better assessment of the quality of habitat protected.
McLouglin Falls – Last Best Place	WDFW	No site visit necessary.

[1] Comments do not reflect all the discussions that occurred on each project.

Because there will be no site visits associated with the *Lower Icicle Reach Assessment* and the *Peshastin Irrigation District – Wenatchee River Pump Station Feasibility Study*, the Committees directed Tracy to send emails to the sponsors identifying the Committees' concerns with the respective projects. This will help the sponsors better prepare for their presentations.

The Committees directed Tracy to inform Upper Columbia Regional Fisheries Enhancement Group and WDFW that their proposed project, *Wenatchee Nutrient Enhancement – Salmon Toss*, has a low likelihood of receiving funding from the Tributary Committees.

Finally, the Committees directed Tracy to send an email to Trout Unlimited identifying concerns with their project, *Chewuch River Permanent Instream Flow Project*. This will help the sponsor prepare for the site visit and presentation.

Site visits are scheduled for 21 through 24 June (see Attachment A). Members will visit proposed projects in the Okanogan on Monday, projects in the Methow on Tuesday, projects in the Wenatchee on Wednesday, and projects in the Entiat on Thursday. The sponsors will give presentations to the Tributary Committees and the RTT on Wednesday, 7 July.

VI. Information Updates

The following information updates were provided during the meeting.

1. Approved Payment Requests in May and June:

   Rock Island Plan Species Account:

   - $120,000 to North Meridian Title and Escrow Company for purchase of the Dally-Wilson Conservation Easement on the White River.

2. Becky Gallaher reported that she reviewed the contract language in the Conservation Easement for the Dally-Wilson Conservation Easement on the White River. Becky noted that the landowner is requesting:

- The construction of up to three small sheds or other small structures in a designated area outside the floodplain. The structures will not require a building permit and will not have plumbing.
- Construction of a wildlife viewing platform (aka wildlife shooting platform), which will be no larger than 150 square feet. The platform will not have plumbing or be connected to external utilities.
- Drill an exempt well for water on the property outside the floodplain.

The Rock Island Tributary Committee agreed to these conditions.

3. Chris Fisher and David Morgan gave a brief update on the BNSF Railroad project in Nason Creek. The proposal is to reconnect off-channel habitat at two locations. However, in the short term, reconnection may be possible only at one location. If there can only one reconnection point in the short term, it would be at the downstream location, which would reconnect Roaring Creek, Coulter Creek, and an unnamed stream with Nason Creek. Lee Carlson indicated that currently there is no opportunity for possible funding sources to negotiate with the Railroad. Only Chelan County is communicating with the Railroad. Lee also noted that Mike Kaputa will be meeting with BPA on funding. Additional updates will be provided in the future.
4. David Morgan shared with the Committees that he recently visited some of the off-channel projects along the Wenatchee River. At the Cashmere Pond site, David noted that the sill may be creating higher velocities within the side channel at high flows. These higher velocities do not look suitable for salmonid fry. During low flows, this is not a problem. At Site 11, wood placed at the downstream end of the side channel is catching driftwood and creating a bridge. The woody debris appears to be creating suitable habitat at high flows for salmonids. At Site 12, the water velocities in the side channel appear high and not suitable for salmonid fry. David described the side channel as a flume. At Site 13, velocities are much lower in the side channel and more suitable for salmonid fry. Casey Baldwin noted that fish stranding/entrapment is a concern at Sites 12 and 13.

VII. Next Steps

The Committees will conduct site visits on 21-24 June. Sponsors will give presentations to the RTT and Tributary Committees on Wednesday, 7 July. The next meet of the Tributary Committees will be on Thursday, 8 July at Chelan PUD in Wenatchee. Tentative agenda items include:

- Review Small Project Program Application
- Review General Salmon Habitat Program Pre-Proposals

Meeting notes submitted by Tracy Hillman (tracy.hillman@bioanalysts.net).

Attachment A

FINAL
Upper Columbia 11th Round Project Tours
June 21-24, 2009

June 21 OKANOGAN

9:45	Meet at USFS Supervisor's Office (Wenatchee) – for those wanting to carpool to the sites
10:00	**Depart USFS** (Travel 2 hours)
12:00	Meet at Virginia Granger Building, 123 5th Ave N., Okanogan
1:15 – 2:15	**McGloughlin Falls** site visit (Travel 60 minutes)
3:15 – 3:45	**Loup Loup** site visit (Travel 60 minutes)
3:45 – 5:45	Return to USFS Supervisor's Office (Wenatchee)

June 22 METHOW

7:15	Meet at USFS Supervisor's Office (Wenatchee) – for those wanting to carpool to Twisp
7:30	**Depart USFS** (Travel 2 hours)
9:30	Meet at Hanks Market in Twisp
10:00 – 10:45	**Christianson Ranch Riparian Protection** site visit (Travel 15 minutes)
11:05– 11:35	**Middle Methow Island Conservation Acquisition (2010 RM 48.7RB)** (Travel 20 minutes)
11:55 – 12:45	**Lunch and Chewuch River Permanent Instream Flow Project Presentation** (Travel 20 minutes)
1:05 – 1:45	**Upper Methow Riparian IV** site visit (Travel 15 minutes)
2:05 – 2:35	**Upper Methow Floodplain Conservation Acquisition (2010 RM 56.0RR)** (Travel 15 minutes)
2:35 –4:30	Return to USFS Supervisor's Office (Wenatchee)

June 23 WENATCHEE

8:00	Meet at USFS Supervisor's Office (Wenatchee) – for those wanting to carpool to Leavenworth
8:15	**Depart USFS** (Travel 30 minutes)
8:45 – 9:00	Meet at Leavenworth City Hall parking lot (Travel 10 minutes to Tumwater Dam)
9:10 – 9:25	**Tumwater Dam** to discuss nutrient enhancement salmon toss (Travel time 15-20 minutes to Nason Creek)
9:45 – 11:00	**N1 Nason Creek Floodplain reconnection** site visit – park in pull-out upstream of project site and then drive (or 15 min walk) to downstream project area – park under power lines (Travel 15 minutes to lunch)

11:15 – 12:00	**LUNCH** at Lake Wenatchee State Park and bathroom break. Discuss 4 projects that don't have site visits. (Travel 20 min to White River sites)
12:20 – 13:30	**Dally-Wilson and VanDusen Acquisitions White River** (Travel 30 minutes to Leavenworth)
14:00 – 14:45	**Lower Wenatchee Leavenworth Reach Alternatives Analysis** site visit (plus bathroom stop) at Enchantment Park – blackbird island (Travel 10 minutes to other side of River)
14:55 – 15:40	**Lower Wenatchee Leavenworth Reach Alternatives Analysis** site visit park at East Leavenworth boat launch – off-channel pond
15:40 – 16:10	Return to USFS in Wenatchee

June 24 ENTIAT

8:00	Meet at USFS Supervisor's Office (Wenatchee) – for those wanting to carpool to Entiat
8:15	**Depart USFS -** consider ½ day vs. full day in carpooling (Travel 30 minutes)
8:45 – 9:00	**Meet at Entiat Bakery** (restroom and coffee break – grab lunch, if needed) (Travel 30 minutes)
9:30 – 10:15	**Upper Preston Habitat Complexity** site visit (Travel 10 minutes)
10:25 – 11:30	**Dillwater ELJ and side channel enhancement** site visit (Travel 15 minutes)
11 :45 - 12 :30	**Troy Acquisition** (for those who want to see it - others can depart)
12:45	Return to Entiat Bakery
13:15	Return to USFS in Wenatchee

Questions?
Char Schumacher (509) 422-7113
Jennifer Goodridge (509) 667-6682
Becky Gallaher (509) 661-4814
Derek Van Marter (509) 670-1462

Wells, Rocky Reach, and Rock Island HCP Tributary Committees Notes 8 July 2010

Members Present: Dale Bambrick (NOAA Fisheries), Casey Baldwin (WDFW), Lee Carlson (Yakama Nation), Chris Fisher (Colville Tribes), Steve Hays (Chelan PUD), Tom Kahler (Douglas PUD), and Tracy Hillman (Committees Chair).

Members Absent: David Morgan[1] (USFWS).

Others Present: Becky Gallaher (Tributary Project Coordinator).

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans Tributary Committees met at the Chelan PUD Auditorium in Wenatchee, Washington, on Thursday, 8 July 2010 from 9:00 am to 2:30 pm.

I. Review and Adopt Agenda

Tracy Hillman welcomed everyone to the meeting, and the Committees adopted the proposed agenda with the following additions to Information Updates:

- Upper Columbia Salmon Recovery Board update
- BPA request to attend Tributary Committees meetings
- Review letter from the Methow Conservancy

II. Review and Approval of Meeting Minutes

The Committees reviewed and approved the 10 June 2010 meeting notes with edits offered by Casey Baldwin and Tracy Hillman.

III. Monthly Update on Ongoing Projects

Becky Gallaher gave an update on the following projects:

- For the Entiat PUD Canal System Conversion Project, drillers completed the third test well, which ended at 310 feet deep and produced 80 gpm of water. Bach Drilling will move to the fourth test well in early July.
- Under the Entiat National Fish Hatchery Project, the sponsor is expecting bids to go out in August and construction to begin the middle of September. A planting plan is being developed and scheduled for installation this fall.

[1] David was unable to join the meeting. However, prior to the meeting, he provided his vote on decision items.

IV. Small Projects Program Application

The Committees reviewed a Small Projects Program application from Cascadia Conservation District titled *Moen Surface Diversion to Groundwater Well*.

Moen Surface Diversion to Groundwater Well Project

The purpose of this project is to improve instream flows in the Entiat River by converting Alan Moen's existing surface diversion to a groundwater well. Currently, Moen diverts water from the Gaines Ditch. The Moen water right is 0.04 cfs. This project represents a component of a larger project, whereby the Gaines Ditch irrigators will be converted from surface water to groundwater wells. The goal is to decommission the Gaines Ditch, which is a very inefficient system. Closure of the ditch will result in a savings of 1.96 cfs. The project includes installing efficient mainline conveyance pipes and converting overhead sprinklers to under-vine drip irrigation. The total cost of the project is $48,298. The sponsor requested $48,298 from HCP Tributary Funds. After careful consideration of the proposal and the sponsor's response to questions, ***the Rocky Reach Tributary Committee elected to fund this project only if the following conditions/concerns are met:***

1. Assurance that all the water from the Gaines Ditch goes into a Trust and stays in the river.
2. Surface-water withdrawals by the Gaines Ditch will permanently cease with the conversion of Moen's existing surface-water diversion to a groundwater source. The Committees found the application somewhat ambiguous regarding the final disposition of the ditch, and ultimately concluded that closure of the ditch must be contingent on converting Moen's existing surface diversion to groundwater; but the Committee remains uncertain whether the ditch would remain active to serve Julian. Therefore, the Rocky Reach Tributary Committee conditions approval of this project upon the closure of the Gaines Ditch.
3. Provide a sequence and expected timeline for actions described in the application, including the conversion of all ditch users and the closure/decommissioning of the ditch.
4. Describe plans for decommissioning the ditch, specifically, the final disposition of the intake.

Although the Rocky Reach Tributary Committee struggled with the cost of the project ($48,298 for 0.04 cfs, or about $1.2M/cfs), they viewed it as the final step in the decommissioning of the ditch, and as such, they are interested in funding the project if the sponsor can address the conditions/concerns identified above. The Committee directed Tracy to relay this message to the sponsor and to seek their response as soon as possible.

V. Review of General Salmon Habitat Program Pre-Proposals

The Committees received 19 General Salmon Habitat Program pre-proposals. Chelan County Natural Resources Department withdrew two of their pre-proposals: *Skinney Creek Channel Restoration* and *Entiat River Upper Preston Reach Habitat Complexity Project*. Thus, the Committees reviewed 17 pre-proposals.

The Committees reviewed each pre-proposal and selected those that they believe warranted a full proposal. Projects that the Committees dismissed were either inconsistent with the intent of the Tributary Fund or did not have strong technical merit. The Committees assigned pre-proposals to one of two categories: Fundable and Not Fundable. It is important to note that these are ratings of pre-proposals and do not reflect ratings of full proposals. The Committees directed Tracy to notify sponsors with appropriate projects to submit a full proposal, with a discussion of the questions/comments identified for each pre-proposal listed below.

Dillwater ELJ's and Side Channel Enhancement (Fundable)

The Committees recommend that the sponsor (Chelan County Natural Resources Department) consider the following comments/suggestions as they develop the full proposal:

- Please describe in more detail why the downstream ELJ structure is necessary. It appears that this area is a depositional zone and the placement of the ELJ structure to induce backwatering may further contribute to the deposition of fine sediments. This area could fill rapidly with sediments and negate the benefits of the structure.
- Is the construction of the mid-channel deflector ELJ the most cost-effective approach? Would it be more cost effective to add a small log structure that would catch LWD recruited to the channel?
- It would be useful to include drawings or designs of the proposed ELJs.
- Please consult with an engineer who has experience designing and implementing ELJs.
- Please explain how this project will tie into the restoration work that the Bureau of Reclamation (BOR) will be doing on the upstream adjacent property. For example, will the actions funded by the BOR increase the effectiveness of the proposed work, or will the proposed work have the same effect regardless of the actions taken by the BOR?
- Please justify why project management and outreach costs $35,000.

Peshastin Irrigation District – Wenatchee River Pump Station Feasibility Study (Not Fundable)

The Committees recommend that this project, sponsored by the Chelan County Natural Resources Department, should not be submitted as a full proposal to the Tributary Committees for the following reasons:

- Although the Committees support adding more water to the lower 2.4 miles of Peshastin Creek, they find no justification for an expensive feasibility study to determine how best to deliver water from the Wenatchee River to the PID canal, or for quantifying the potential benefit using PHAMSIM.
- The Committees believe this project could be greatly simplified (and costs substantially reduced) by following a stepwise process of identifying fatal flaws in alternatives identified from previous work before advancing to subsequent levels of project development.
- The Committees would be more inclined to fund the implementation of the project once the PID accepts a design alternative.

Nason Creek N1 Floodplain Reconnection (Not Fundable)

The Committees recommend that this project, sponsored by the Chelan County Natural Resources Department, should not be submitted as a full proposal to the Tributary Committees for the following reasons:

- The Committees believe this project is too expensive and noted that the proposed cost does not result in a 100% design.

- Based on the review of the proposal, the site visit, and the presentation, the Committees believe the project should focus on off-channel reconnection at the downstream end of the project area.
- The Committees also believe that WDOT should be involved and contribute financially to this project.

Lower Wenatchee River Leavenworth Reach Alternatives Analysis and Design (Not Fundable)

Although the Committees believe that the implementation of off-channel actions in this area would benefit habitat quality, especially for early rearing of summer Chinook fry that emerge from spawning habitat just upstream from the proposed project area, the Committees recommend that this project, sponsored by the Chelan County Natural Resources Department, should not be submitted as a feasibility analysis to the Tributary Committees for the following reason:

- The Committees are not interested in funding the alternatives analysis; however, they would be interested in reviewing a full proposal that addresses design and implementation of the project.

Wenatchee – Chiwawa Irrigation District – Water Conservation Feasibility Study (Not Fundable)

The Committees recommend that this project, sponsored by the Chelan County Natural Resources Department, should not be submitted as a full proposal to the Tributary Committees for the following reasons:

- The Committees are generally supportive of adding more water to a stream; however, there is no evidence that flows are limiting in the Chiwawa River. In addition, a small increase in stream flows to a wide, shallow channel will probably not provide much biological benefit.
- The applicant provided insufficient justification for an assessment of the scope proposed. Prior to application, the necessity of such an elaborate assessment should have been determined by running some simple calculations of the potential for water savings based on present rates of withdrawal versus acres served.

White River Van Dusen Conservation Easement (Fundable)

The Committees have no specific comments/suggestions on this project. However, they hope that the sponsor (Chelan-Douglas Land Trust) will consider the comments/suggestions offered by the RTT and Committees members during the site visit and presentation.

Lower Wenatchee Instream Flow Enhancement Project (Not Fundable)

The Committees recommend that this project, sponsored by Trout Unlimited, should not be submitted as a full proposal to the Tributary Committees for the following reason:

- The Committees believe that their contribution of $167,500 to this project last year sufficiently addresses the potential biological benefits associated with this project.

Chewuch River Permanent Instream Flow Project (Fundable)

The Committees recommend that the sponsor (Trout Unlimited) consider the following comments/suggestions as they develop the full proposal:

- Please provide a better description of the proposed project. The pre-proposal is confusing and members of the Committees have slightly different interpretations of what is actually proposed.
- Please clearly define and describe "Diversion Reduction Easement."
- How much water will actually be saved (remain in the river)?
- Because the water savings are not placed in a trust, how will the easement protect the water in perpetuity?

Middle Methow Side Channel and Associated Wetland Conservation Acquisition (Fundable)

The Committees recommend that the sponsor (Methow Salmon Recovery Foundation) consider the following comments/suggestions as they develop the full proposal:

- Please include a table indicating the number of acres and the number of homesites permitted with and without acquisition.
- Please include a vicinity map showing the location of the property along the Middle Methow and land ownership.
- Please include a map showing elevations and FEMA 100-year floodplain.
- Please include LIDAR images if available.
- Are there any restoration actions planned for this site if acquired? If so, what actions are planned?
- Please indicate if funds from the resale of the uplands will be returned to the Committees.

Methow River Floodplain Conservation Acquisition (2010 RM39.5LH) (Fundable)

The Committees recommend that the sponsor (Methow Salmon Recovery Foundation) consider the following comments/suggestions as they develop the full proposal:

- Please include a table indicating the number of acres and the number of home sites permitted with and without acquisition.
- Please include a vicinity map showing the location of the property along the Middle Methow and land ownership.
- Please include a map showing elevations and FEMA 100-year floodplain.
- Please include LIDAR images if available.
- Are there any restoration actions planned for this site if acquired? If so, what actions are planned?

Upper Methow Floodplain Conservation Acquisition (2010 RM56.0RR) (Not Fundable)

The Committees recommend that this project, sponsored by the Methow Salmon Recovery Foundation, should not be submitted as a full proposal to the Tributary Committees for the following reasons:

- The Committees generally support protecting channel migration zones; however, in this case, the cost per acre is quite high and the issues with the house are troublesome. The

Committees would like the landowner to deal with the house before they consider supporting this protection project.

Middle Methow Island Conservation Acquisition (2010 RM48.7RB) (Fundable)

The Committees recommend that the sponsor (Methow Salmon Recovery Foundation) consider the following comments/suggestions as they develop the full proposal:

- Please include a table indicating the number of acres and the number of home sites permitted with and without acquisition.
- Please include a vicinity map showing the location of the property along the Middle Methow and land ownership.
- Please include a map showing elevations and FEMA 100-year floodplain.
- Please include LIDAR images if available.
- Are there any restoration actions planned for this site if acquired? If so, what actions are planned?
- Please verify if the $25,000 for property restoration will be included in the full proposal.

Christianson Ranch Riparian Protection (Not Fundable)

The Committees recommend that this project, sponsored by the Methow Conservancy, should not be submitted as a full proposal to the Tributary Committees for the following reasons:

- The Committees are not interested in funding this project if the levee cannot be breached. Without breaching the levee, this project will have limited biological value. The Committees would like to see a full proposal if the sponsor can:
  - Add breaching as part of the proposed action.
  - Provide more information on the extent of grazing within the grazing management zone.
  - Describe whether protection of this property will affect restoration on the Buckley Property.

Upper Methow Riparian Protection IV (Not Fundable)

The Committees recommend that this project, sponsored by the Methow Conservancy, should not be submitted as a full proposal to the Tributary Committees for the following reasons:

- The Committees believe that protecting this site will have little value without also protecting the upstream property. Therefore, the Committees recommend that the sponsor focus first on protecting the upstream property and then address the Keith property.
- The linear feet of riverbank per acre protected is low.

McLoughtlin Falls – Last Best Place (Not Fundable)

The Committees recommend that this project, sponsored by the Washington Department of Fish and Wildlife, should not be submitted as a full proposal to the Tributary Committees for the following reasons:

- The Committees believe that protecting this site will have little value to salmon and steelhead.

- The Committees generally fund protection projects in channel migration zones and this particular area is in a confined or moderately confined canyon. Protecting this property would have greater value to wildlife than to fish.

Wenatchee Nutrient Enhancement – Salmon Toss (Not Fundable)

The Committees recommend that this project, sponsored by the Washington Department of Fish and Wildlife, should not be submitted as a full proposal to the Tributary Committees for the following reasons:

- Although the Committees are not opposed to nutrient enhancement in some locations (this is called for in the Recovery Plan), the pre-proposal did not provide evidence that the streams identified in the pre-proposal are nutrient limited (e.g., Little Wenatchee and perhaps Nason Creek).
- There is no apparent coordination with WDOE.
- There is no indication of how this project will affect the TMDL in the lower Wenatchee River.
- The Committees have no interest in funding the purchase of a truck and trailers or supporting the salary of the Executive Director. It is the Committees understanding that other sources fully fund this position.
- It is not clear what happens if there are no excess fish at Tumwater Dam in 2011.

Lower Icicle Creek Reach Assessment (Not Fundable)

The Committees recommend that this project, sponsored by the Wild Fish Conservancy, should not be submitted as a full proposal to the Tributary Committees for the following reason:

- The Committees understand that the BOR will be conducting a reach assessment within lower Icicle Creek next year. Although the pre-proposal is reasonably priced, the Committees cannot justify spending money on an assessment that will be done in the future at no cost to them.

Tracy will share this information with project sponsors on Friday, 9 July. The Committees hope this feedback will help sponsors develop full proposals, which are due on 19 July.

VI. Information Updates

The following information updates were provided during the meeting.

1. Approved Payment Requests in June and July:

   Rock Island Plan Species Account:

   - $11,230.37 to Chelan PUD for well drilling and management on the Entiat PUD Canal System Conversion Project.
   - $837.08 to Chelan PUD for second-quarter project coordination and administration.
   - $142.50 to LeMaster and Daniels for second-quarter financial administration.

   Rocky Reach Plan Species Account:

- $884.17 to Cascadia Conservation District for completing the Below the Bridge Project.
- $570.10 to Chelan PUD for second-quarter project coordination and administration.
- $142.50 to LeMaster and Daniels for second-quarter financial administration.

Wells Plan Species Account:

- $7,025.77 to the Okanagan Nation Alliance for completing the Okanagan River Restoration-Phase IV Project. Becky Gallaher will check to make sure this final invoice does not exceed the total budget for this project. If it does, only the amount remaining in the budget will be paid to the sponsor.
- $646.45 to Chelan PUD for second-quarter project coordination and administration.

2. Tracy Hillman reported that he received an email from Joe Connor, BPA, asking if he could attend the Tributary Committees meeting as an observer. Tracy denied Joe's request to attend the present meeting because the Committees will be reviewing pre-proposals in executive session. Tracy indicated that if it is okay with the Committees, he would invite Joe to the August meeting. The Committees had no concern with Joe observing during the August meeting.
3. Tracy Hillman shared with the Committees a letter he received from the Methow Conservancy regarding Conservation Easement Monitoring. The Conservancy wanted to reassure the Committees that they take their long-term conservation easement stewardship and monitoring responsibilities seriously. They noted that they allocate resources to their easement monitoring program and will continue to have adequate capacity to meet their monitoring responsibilities over time.
4. Tracy Hillman reported that he received an email from Mike Rickel, Cascadia Conservation District, indicating that Cascadia will develop a monitoring plan to address the concerns expressed by the Committees on the Mission Creek Fish Passage Project. Mike noted in the email that they will provide a draft monitoring plan for the Committees to review in September. He also indicated that Cascadia will set up a site visit for the Committees in a year or two.
5. Chris Fisher gave a brief update on the BNSF Railroad project in Nason Creek. He noted that implementation of the project will not occur until 2012. This will allow more time for the development and review of restoration alternatives.
6. Tracy Hillman reported that he received a request from the Upper Columbia Salmon Recovery Board (UCSRB) to provide the Committees with an update on Board activities, monitoring, and project and funding coordination. The Committees agreed to add the UCSRB to the August agenda.
7. Dale Bambrick asked about the role of the UCSRB Data Steward and stated that he has heard that it can be difficult to get information from the Data Steward. Casey Baldwin noted that the role of the Data Steward is to support the implementation and testing of data management tools in the Upper Columbia by providing technical guidance and assistance to system users, including installing, configuring, maintaining and trouble-shooting hardware and software. Primary activities include development of protocols that allow data collected in each sub-basin to be integrated into one data system. Steve Hays commented that he was unsuccessful in getting redd count data from the Data Steward.

Casey stated that this is probably because the Data Steward provides first-tier customer support to monitoring and evaluation projects that are aligned with the Upper Columbia Monitoring Strategy and the Upper Columbia Salmon Recovery Research, Monitoring and Evaluation Plan. Redd counts are part of the HCP Hatchery Monitoring Program and those data are managed by WDFW, not the UCSRB. The Committees asked if James White, UCSRB Data Steward, could briefly describe and demonstrate the database. In addition, the Committees would like to know why the BOR is hiring a data manager for the Methow Basin. This seems redundant with the role of the Data Steward. Tracy will ask James to provide a presentation during the UCSRB update in August.

VII. Next Steps

The next meet of the Tributary Committees will be on Thursday, 12 August at Chelan PUD in Wenatchee. Tentative agenda items include:

- Presentation by the Upper Columbia Salmon Recovery Board
- Review General Salmon Habitat Program Full Proposals

Meeting notes submitted by Tracy Hillman (tracy.hillman@bioanalysts.net).

Wells, Rocky Reach, and Rock Island HCP Tributary Committees Notes 12 August 2010

Members Present: Dale Bambrick (NOAA Fisheries), Dennis Beich (WDFW), Lee Carlson (Yakama Nation), Steve Hays (Chelan PUD), Tom Kahler (Douglas PUD), David Morgan (USFWS), and Tracy Hillman (Committees Chair).

Members Absent: Chris Fisher[1] (Colville Tribes).

Others Present: Becky Gallaher (Tributary Project Coordinator), Casey Baldwin (WDFW), and Joe Connor (Bonneville Power Administration) were present for the entire meeting. Denny Rohr (PRCC Habitat Subcommittee facilitator), David Duvall and Ben Lenz (Grant PUD), Julie Morgan (UCSRB Executive Director), Derek Van Marter (UCSRB Associate Director), and James White (UCSRB Data Steward) joined the meeting at 1:00 pm.

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans Tributary Committees met at the Chelan PUD Auditorium in Wenatchee, Washington, on Thursday, 12 August 2010 from 9:00 am to 3:30 pm.

I. Review and Adopt Agenda

Tracy Hillman welcomed everyone to the meeting and the Committees adopted the proposed agenda with the following changes:

- Moved the ORRI Monitoring agenda item to the 9:20 am time slot and the Monthly Updates on Ongoing Projects to the 11:40 am time slot.
- Added to the agenda a Small Project Application, which was received before the meeting.

II. Review and Approval of Meeting Minutes

The Committees reviewed and approved the 8 July 2010 meeting notes with edits offered by Tom Kahler.

III. Monthly Update on Ongoing Projects

Becky Gallaher gave an update on funded projects. Most are progressing well or had no salient activity in the past month.

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[1] Chris was unable to join the meeting. However, following the meeting, he provided his vote on decision items.

- For the Mission Creek Fish Passage Project, effectiveness monitoring was added as a special provision to the contract with Cascadia Conservation District.

IV. Okanagan River Restoration Initiative Monitoring

Karilyn Alex, ONA Project Biologist, submitted a monitoring report titled, "Aquatic Monitoring of the Okanagan River Restoration Initiative—Post Construction 2009" to the Wells Committee. The Committee reviewed the report and the monitoring proposal/budget and concluded that the monitoring efforts should continue as planned. Thus, ***the Wells Committee directed Douglas PUD to fund the following component for another year: Fish Holding and Rearing for $4,164.*** The Committee elected not to fund any other "unfunded" components of the monitoring plan. The Committee directed the sponsor to submit another report and budget at the end of the monitoring year (April 2011).

V. Small Projects Program Application

The Committees reviewed a Small Projects Program application from the Methow Salmon Recovery Foundation (MSRF) titled *Methow Subbasin LWD Acquisition and Stockpile*.

Methow Subbasin LWD Acquisition and Stockpile

The purpose of this project is to acquire, transport, and stage large woody debris (LWD) with attached rootwads at stockpile locations near habitat improvement project sites in the Methow Basin. As LWD pieces are used for individual projects, funds will be used to replenish the stockpile. This will ensure that LWD of appropriate size and species is available when needed. The performance period for this project is 2010-2012. The total cost of the project is $50,000. The sponsor requested $50,000 from HCP Tributary Funds. After careful consideration of the proposal, ***the Rocky Reach Tributary Committee elected to fund this project with the following condition:***

1. For each habitat complexity project for which the LWD will be used, the MSRF must submit in writing (email to Tracy Hillman and Becky Gallaher) the location and type of habitat action that will benefit from the wood purchased with Tributary Funds.

VI. Review of General Salmon Habitat Program Proposals

The Committees received ten General Salmon Habitat Program proposals. The Committees reviewed each proposal and determined if they need additional information and if a presentation is necessary. What follows are general thoughts/comments on each proposal. The Committees will make final funding decisions in December.

Dillwater ELJ's and Side Channel Enhancement

The Committees would like to see the results of hydraulic modeling when they are complete. David Morgan will speak with Robes Parrish and find out when the modeling results will be available. The Committees will then determine if a presentation is necessary. Bonneville Power Administration (BPA) indicated that they are interested in funding this project.

Boat Launch Off-Channel Pond Reconnection

Although the Committees recognize the importance of connecting off-channel habitat with the main channel, the cost of this project is very high. The Committees believe this project could be completed for less than $100,000. David Morgan noted that the Blackbird project was larger and much more complex than this project, but the cost of the Blackbird project was only slightly more than this project. It was also noted that most of the cost ($87,000) deals with process (e.g., designs, permitting, bids, inspection, management, and administration). Actual restoration work makes up only 37% of the total cost of the project. Therefore, the Committees indicated that they would be willing to fund the 15% cost share required by the SRFB provided the 15% match does not exceed $15,000. The Committees directed Tracy Hillman to relay this information to the sponsor. In addition, the Committees would like to know why the sponsor dropped LWD from the proposed project. No presentation is necessary.

White River Van Dusen Conservation Easement

The Committees have no specific requests on this project. No presentation is necessary.

Lower Icicle Creek Reach Assessment

The Committees have no specific requests on this project. No presentation is necessary.

Lower Wenatchee Instream Flow Enhancement Project

The Committees have no specific requests on this project. No presentation is necessary.

Chewuch River Permanent Instream Flow Project

The Committees have no specific requests on this project. No presentation is necessary.

Upper Methow Riparian Protection IV

The Committees have no specific requests on this project. No presentation is necessary.

Methow River Acquisition 2010 MR 48.7 RB (Bird)

The Committees have no specific requests on this project. No presentation is necessary.

Methow River Acquisition 2010 MR 39.5 LH (Hoffman)

The Committees have no specific requests on this project. No presentation is necessary.

Methow River Acquisition 2010 MR 41.5 LR (Risley)

The Committees would like to know the likelihood of selling the upland component of the acquisition and the potential resale value of the upland component. No presentation is necessary.

Tracy will seek additional information from the sponsors. Members of the Committees will review the proposals in more detail during the December meeting.

VII. Information Updates

The following information updates were provided during the meeting.

1. Approved Payment Requests in June, July, and August:

   Rock Island Plan Species Account:

   - $22.75 to Chelan PUD for the cost of mailing proposals to Committees members.
   - $16,599.90 to Chelan-Douglas Land Trust for analysis and development of the final report on the Sleepy Hollow Reserve Protection Project.

Rocky Reach Plan Species Account:

- $22.75 to Chelan PUD for the cost of mailing proposals to Committees members.
- $21,125.60 to Cascadia Conservation District for materials and work in June for the Below the Bridge Project.

Wells Plan Species Account:

- $22.75 to Chelan PUD for the cost of mailing proposals to Committees members.
- $910.25 to the Methow Conservancy for landowner contacts and for installing 80 cages during April through July on the Riparian Regeneration and Restoration Initiative Project.

2. Tracy Hillman reported that he received an email from Mike Kaputa, Chelan County Natural Resource Department, asking the Committees to "clarify what 'evidence' should be shown to demonstrate if flows are limiting or suggest how to quantify biological benefit." Mike sent this email in response to the Committees rejection letter of the Counties pre-proposal titled, Chiwawa Irrigation District Water Conservation Feasibility Study. Tracy Hillman responded to Mike's question, but not as an official response from the Committees.

   The Committees concurred with the response sent by Tracy. Dale Bambrick added that since the sponsor presented the Chiwawa Irrigation District Study as a voluntary project that might lead to some trust water, it is important that someone determine how much water might be available. One could simply compare diversion rates to the acres served by the diversion. This would be far cheaper than conducting PHABSIM and seepage studies. The Committees directed Tracy to share this with Mike Kaputa.

3. Tracy Hillman reported the following balances for the Plan Species Accounts:

   Rock Island Account: $1,929,582

   Rocky Reach Account: $1,417,942

   Wells Account: $725,291

VIII. Upper Columbia Salmon Recovery Board Update

Julie Morgan (UCSRB Executive Director), Derek Van Marter (UCSRB Associate Director), and James White (UCSRB Data Steward) provided the Committees with updates on Upper Columbia Salmon Recovery Board activities including planning, adaptive management, and implementation. What follows is a brief summary of information provided by each individual (their presentations are appended to these notes in Attachment A).

Derek Van Marter:

Derek talked about project and funding coordination. He reviewed current progress and provided an update on the targeted solicitation workplan. He indicated that they have a multi-year action plan (2010-2013) that identifies what projects should be implemented, where they will be implemented, who will implement them, when they will be implemented, and estimates how much the projects might cost. Derek noted that there is about $22.5M/year available for implementing habitat restoration and conservation actions. The goal is to coordinate funding. To that end, Derek would like to set up a coordination meeting with funding entities in September. The purpose of the meeting is to discuss what projects (or types of projects) each funding entity would like to fund. The Committees indicated that they would like to participate in the coordination process. Derek will coordinate with Tracy Hillman and Denny Rohr.

The Committees noted that they are not interested in funding "junk" projects. Unlike the SRFB, which provides a given amount of money each year for restoration actions, the Committees can withhold funding if the Committees determine that the projects have little biological benefit, are technically flawed, or have low benefit/cost ratios. The Committees also encourage the recruitment of "new" project sponsors.

Julie Morgan:

Julie talked about All-H Coordination. As an example, she described the coordination of hatchery and habitat actions in the White River. There were three different design concepts for the White River hatchery. Concept #2 was selected in part because it provided the greatest habitat restoration potential including enhanced riparian and off-channel habitat.

James White:

James gave a brief overview on the "database" he manages, including what it does, how it does it, and whose data are in it. He described the aquatic resources schema and showed an example of the database using ISEMP data collected in the Entiat and Wenatchee basins. To request ISEMP data, one should send a specific request to James (james.white@ucsrb.com) and cc Pamela Nelle (pamela.nelle@nwi.net). James also described the OBMEP database, which contains data collected in the Okanogan Basin. To request OBMEP data, one should send a specific request to Jennifer Panther (jennifer.panther@colvilletribes.com) or James and cc Jennifer. James then provided an overview of the ISEMP data portal and how specific information can be retrieved.

James shared with the Committees the intent of the Bureau of Reclamation to hire a Methow Data Coordinator. He began by describing the flow of information in the Upper Columbia Basin. Information goes from Data Collectors to the Subbasin/MPG Coordinator, who compiles the information and sends it to the Regional/ESU Data Steward. The Data Steward (James) then inputs the data into the STEM database. Carol Volk is the Subbasin/MPG Coordinator for the Wenatchee and Entiat basins and Jennifer Panther is the Coordinator for the Okanogan Basin. Currently, there is no coordinator for the Methow Basin. A person will be hired by the Bureau of Reclamation to fill this role.

Finally, James described UCSRB monitoring efforts. Efforts include status and trend monitoring, reach and tributary assessments, implementation monitoring, and effectiveness monitoring. James identified post-implementation, compliance, and verification metrics developed by BPA and then requested that funding entities add monitoring coordination language to project contracts. James offered the following language as an example:

> "*The project sponsor will coordinate with the Upper Columbia Salmon Recovery Board to ensure that adequate project monitoring and reporting occur. Adequate project monitoring includes implementation/compliance monitoring of project implementation. Some projects may also be selected for effectiveness monitoring, which could involve pre- and post-monitoring. The project sponsor agrees to coordinate with the Upper Columbia Salmon Recovery Board and/or its contractors to coordinate sufficient site access, communicate progress timelines to schedule implementation visits, and other activities that will provide for efficient and effective collection of data. Implementation/compliance monitoring may be conducted, in coordination with project sponsors, by the U.S. Bureau of Reclamation, or the Upper Columbia Salmon Recovery Board and its contractors. Effectiveness monitoring, where it occurs, is provided by various regional programs.*"

The Committees will discuss the inclusion of this language, or a variation thereof, during a future meeting.

IX. Next Steps

The Committees will likely not meet in September because of a lack of agenda items. The next meeting of the Tributary Committees will be on Thursday, 14 October at Chelan PUD in Wenatchee.

Meeting notes submitted by Tracy Hillman (tracy.hillman@bioanalysts.net).

Attachment A

Upper Columbia Salmon Recovery Board Update Slides

Developments in Upper Columbia planning, science, adaptive management, and implementation for salmon recovery

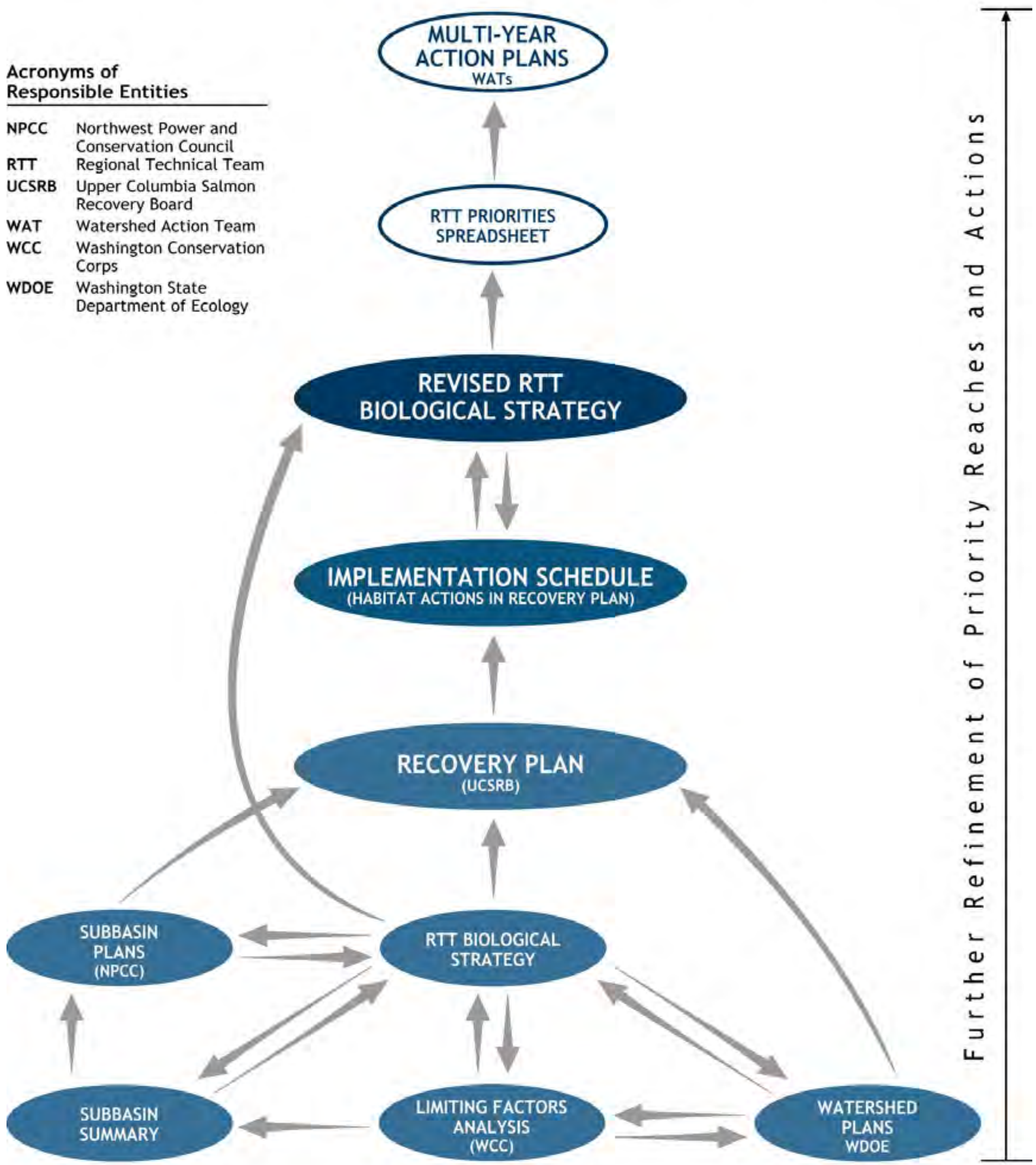
PROJECT & FUNDING COORDINATION UPDATE

- DEREK VAN MARTER -

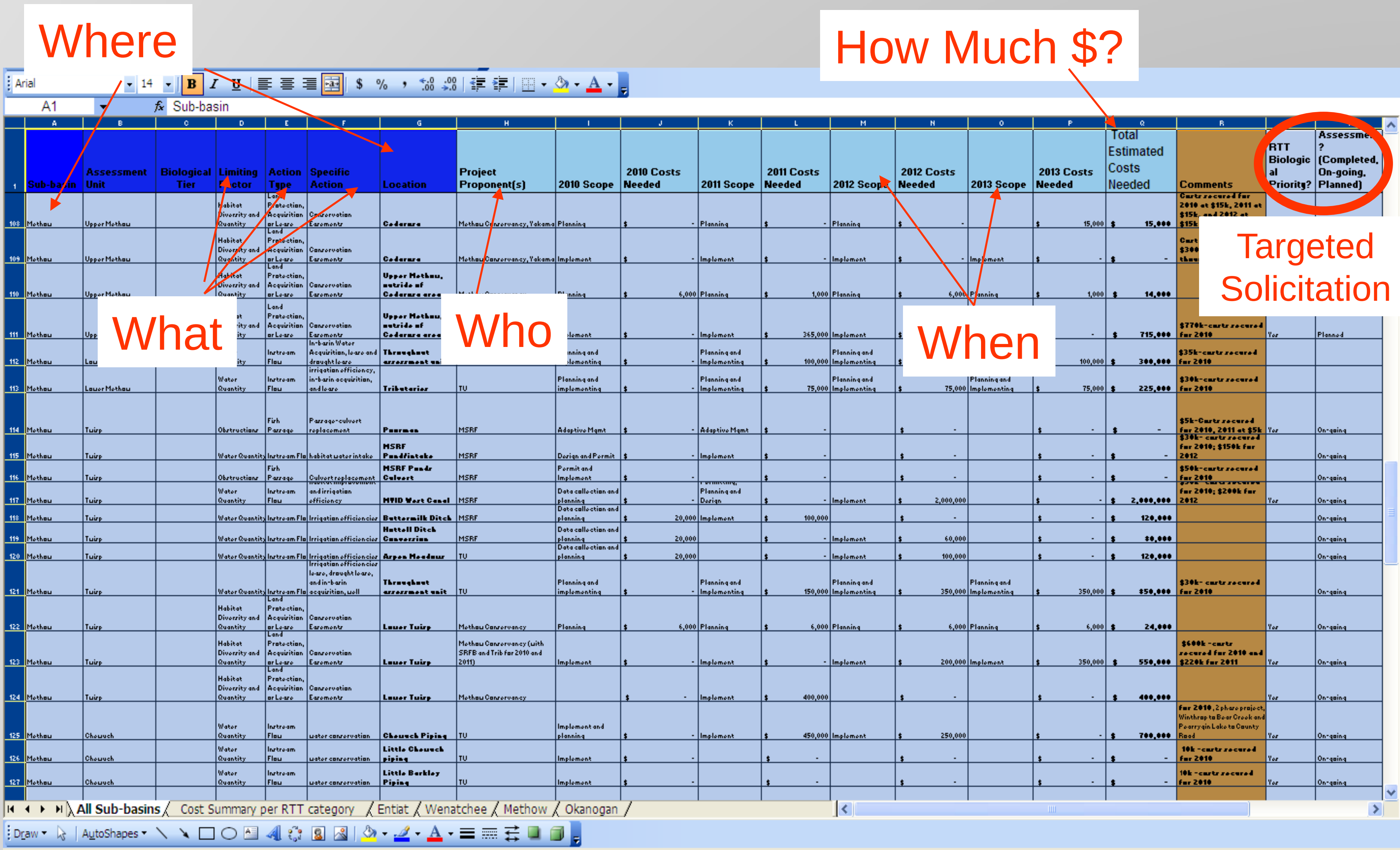
Topics

- Review and Update on Current Progress
- Targeted Solicitation Work Plan
- Existing Project List
- Funders Coordination Meeting (September)

IDENTIFICATION OF LIMITING FACTORS AND REFINEMENT OF PRIORITIES FOR HABITAT RESTORATION



MYAPs As Guidance



	Sub-basin	Assessment Unit	Biological Tier	Limiting Factor	Action Type	Specific Action	Location	Project Proponent(s)	2010 Scope	2010 Costs Needed	2011 Scope	2011 Costs Needed	2012 Scope	2012 Costs Needed	2013 Scope	2013 Costs Needed	Total Estimated Costs Needed	Comments	RTT Biological Priority?	Assessment? (Completed, On-going, Planned)
108	Methow	Upper Methow		Habitat Diversity and Quantity	Land Protection, Acquisition or Lease	Conservation Easements	[illegible]	Methow Conservancy, Yakama	Planning	$ -	Planning	$ -	Planning	$ -		$ 15,000	$ 15,000	Costs secured for 2010 at $15k, 2011 at $15k, and 2012 at $15k	[illegible]	[illegible]
109	Methow	Upper Methow		Habitat Diversity and Quantity	Land Protection, Acquisition or Lease	Conservation Easements	[illegible]	Methow Conservancy, Yakama	Implement	$ -	Implement	$ -	Implement	$ -	Implement	$ -	$ -	Cost [illegible] $300 [illegible] thou[illegible]	[illegible]	[illegible]
110	Methow	Upper Methow		Habitat Diversity and Quantity	Land Protection, Acquisition or Lease	Conservation Easements	Upper Methow, outside of [illegible] area	[illegible]	Planning	$ 6,000	Planning	$ 1,000	Planning	$ 6,000	Planning	$ 1,000	$ 14,000		[illegible]	[illegible]
111	Methow	Upp[illegible]		[illegible]	Land Protection, Acquisition or Lease	Conservation Easements	Upper Methow, outside of [illegible] area	[illegible]	[illegible]	$ -	Implement	$ 365,000	Implement	[illegible]	[illegible]	$ -	$ 715,000	$770k-costs secured for 2010	Yes	Planned
112	Methow	Low[illegible]		[illegible]	Instream Flow	In-basin Water Acquisition, lease and drought lease	Throughout assessment uni[illegible]	[illegible]	[illegible]	$ -	Planning and Implementing	$ 100,000	Planning and Implementing	[illegible]	[illegible]	100,000	$ 300,000	$35k-costs secured for 2010		
113	Methow	Lower Methow		Water Quantity	Instream Flow	irrigation efficiency, in-basin acquisition, and lease	Tributaries	TU	Planning and implementing	$ -	Planning and Implementing	$ 75,000	Planning and Implementing	$ 75,000	Planning and Implementing	$ 75,000	$ 225,000	$30k-costs secured for 2010		
114	Methow	Twisp		Obstructions	Fish Passage	Passage-culvert replacement	Poorman	MSRF	Adaptive Mgmt	$ -	Adaptive Mgmt	$ -		$ -		$ -	$ -	$5k-Costs secured for 2010, 2011 at $5k	Yes	On-going
115	Methow	Twisp		Water Quantity	Instream Flo	habitat water intake	MSRF Pond/intake	MSRF	Design and Permit	$ -	Implement	$ -		$ -		$ -	$ -	$30k- costs secured for 2010; $150k for 2012		On-going
116	Methow	Twisp		Obstructions	Fish Passage	Culvert replacement	MSRF Ponds Culvert	MSRF	Permit and Implement	$ -		$ -		$ -		$ -	$ -	$50k-costs secured for 2010		On-going
117	Methow	Twisp		Water Quantity	Instream Flow	habitat improvement and irrigation efficiency	MVID West Canal	MSRF	Data collection and planning	$ -	Permitting, Planning and Design	$ -	Implement	$ 2,000,000		$ -	$ 2,000,000	$50k- costs secured for 2010; $200k for 2012	Yes	On-going
118	Methow	Twisp		Water Quantity	Instream Flo	Irrigation efficiencies	Buttermilk Ditch	MSRF	Data collection and planning	$ 20,000	Implement	$ 100,000		$ -		$ -	$ 120,000			On-going
119	Methow	Twisp		Water Quantity	Instream Flo	Irrigation efficiencies	Hottell Ditch Conversion	MSRF	Data collection and planning	$ 20,000		$ -	Implement	$ 60,000		$ -	$ 80,000			On-going
120	Methow	Twisp		Water Quantity	Instream Flo	Irrigation efficiencies	Aspen Meadows	TU	Data collection and planning	$ 20,000		$ -	Implement	$ 100,000		$ -	$ 120,000			On-going
121	Methow	Twisp		Water Quantity	Instream Flo	Irrigation efficiencies lease, drought lease, and in-basin acquisition, well	Throughout assessment unit	TU	Planning and implementing	$ -	Planning and Implementing	$ 150,000	Planning and Implementing	$ 350,000	Planning and Implementing	$ 350,000	$ 850,000	$30k- costs secured for 2010		On-going
122	Methow	Twisp		Habitat Diversity and Quantity	Land Protection, Acquisition or Lease	Conservation Easements	Lower Twisp	Methow Conservancy	Planning	$ 6,000	Planning	$ 6,000	Planning	$ 6,000	Planning	$ 6,000	$ 24,000		Yes	On-going
123	Methow	Twisp		Habitat Diversity and Quantity	Land Protection, Acquisition or Lease	Conservation Easements	Lower Twisp	Methow Conservancy (with SRFB and Trib for 2010 and 2011)	Implement	$ -	Implement	$ -	Implement	$ 200,000	Implement	$ 350,000	$ 550,000	$600k -costs secured for 2010 and $220k for 2011	Yes	On-going
124	Methow	Twisp		Habitat Diversity and Quantity	Land Protection, Acquisition or Lease	Conservation Easements	Lower Twisp	Methow Conservancy		$ -	Implement	$ 400,000		$ -		$ -	$ 400,000		Yes	On-going
125	Methow	Chewuch		Water Quantity	Instream Flow	water conservation	Chewuch Piping	TU	Implement and planning	$ -	Implement	$ 450,000	Implement	$ 250,000		$ -	$ 700,000	for 2010, 2 phase project, Winthrop to Bear Creek and Pearrygin Lake to County Road	Yes	On-going
126	Methow	Chewuch		Water Quantity	Instream Flow	water conservation	Little Chewuch piping	TU	Implement	$ -		$ -		$ -		$ -	$ -	10k -costs secured for 2010	Yes	On-going
127	Methow	Chewuch		Water Quantity	Instream Flow	water conservation	Little Barkley Piping	TU	Implement	$ -		$ -		$ -		$ -	$ -	10k -costs secured for 2010	Yes	On-going

Region Reach and Tributary Assessment Status & Schedule			
	LOCATION	ASSESSMENT TYPE	ENTITY
Completed	(RM 0-4)	Channel Migration Zone Study	Jones and Stokes
	Nason Creek (RM 0-4)	Channel Migration Zone Study	Jones and Stokes / Reclamation
	Nason Creek (RM 4-14)	Tributary Assessment	Reclamation
	Nason - Upper White Pine RM (12-14.5)	Reach Assessment	Reclamation
	Nason - Lower White Pine RM (9.45-11.55)	Reach Assessment	Reclamation
	Nason - Kahler (RM 4.65-8.9)	Reach Assessment	Reclamation
In Progress	Peshastin RM (0-7)	Reach Assessment	Yakama Nation
Future Priorities	( )	Reach Assessment	Yakama Nation
	Icicle (boulder field- Upper Icicle)	Reach Assessment	Reclamation (2011/2012)
Completed	Entiat RM (0-26)	Tributary Assessment	Reclamation
	RM (22.7-23.3)	Reach Assessment	Reclamation
	Stormy RM (17.9-18.1)	Reach Assessment	Reclamation
In Progress	Entiat 3D RM (24-25)	Reach Assessment	Yakama Nation
Future Priorities	Entiat 2A, 3C, 3F (RM 16.1-17.9, RM 23.3-24, RM 25.6-26)	Reach Assessment	Yakama Nation (completed by 2017)
	Entiat 1B, 1C, 1E (RM 0.8-4.3, RM 6.3-6.9)	Reach Assessment	TBD (completed by 2014)
	Entiat 1D, 1F (RM 4.3-6.3, RM 6.9-10.6)	Reach Assessment	TBD (completed by 2020)
Completed	(RM 0-80)	Tributary Assessment	Reclamation
	Big Valley (RM 54.2-60)	Reach Assessment	Reclamation
In Progress	Methow mainstem to (RM 40-51.5)	Reach Assessment	Reclamation
	Chewuch (RM 0-20)	Reach Assessment	Yakama Nation
	(RM 0-15)	Reach Assessment	Yakama Nation
Future Priorities	Methow mainstem, to (51.5-54.2	Reach Assessment	Reclamation
	Methow mainstem, to Mazama (RM 61-67)	Reach Assessment	TBD
	Methow Silver (RM 29-40, RM 52-55)	Reach Assessment	Reclamation

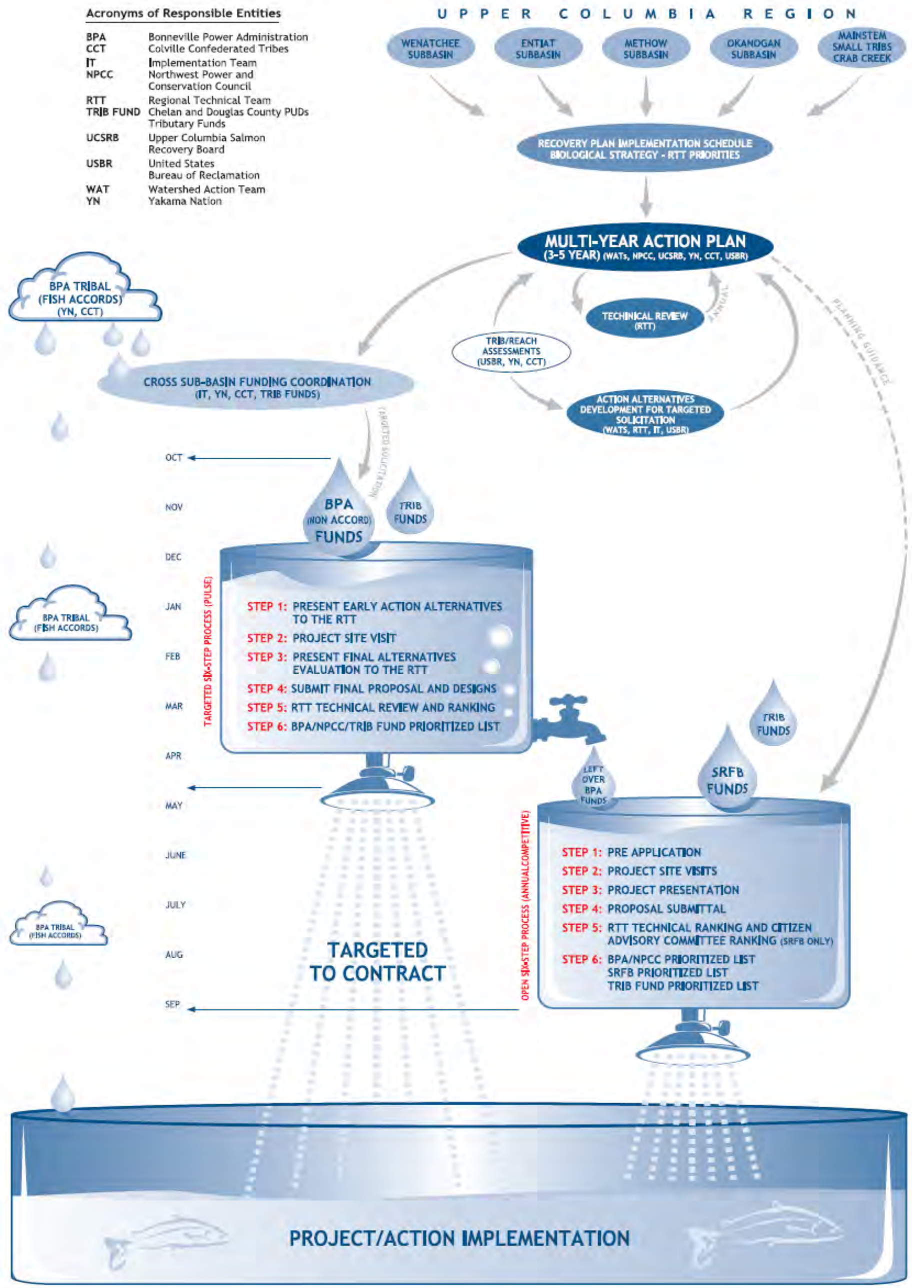
Targeted Project Solicitation Timeline

Federal Fiscal Year	FY 10 10/1/09 to 9/30/10	FY 11 10/1/10 to 9/30/11	FY 12 10/1/11 to 9/30/12	FY 13	FY 14	FY 15
BPA Amount Other Funds?	~$1 Million Left	~$3.5 Million	~$3.5 Million	~$3.5 Million	~$3.5 Million	~$3.5 Million
Targeted Projects	None	- Middle Entiat IMW - Nason Railroad Project	- Upper White Pine? -N-1? - Methow M-2?	- Methow M-2?	- Entiat IMW?	
Targeted Solicitation and Selection Process Window	N/A	Compressed. Start February 2010	Will start October 2010. Wrap up May 2011	Will start October 2011. Wrap up May 2012	Will start October 2012. Wrap up May 2013	
Contract Negotiation			Can start in June 2011	Can start in June 2012	Can start in June 2013	
Contract Window		October 2010 to September 2011 (Can go up to September 2012)	October 2011 to September 2012 (Can go up to September 2013)	October 2012 to September 2013 (Can go up to September 2014)	October 2013 to September 2014 (Can go up to September 2015)	
Construction		Summer 2011	Summer 2012	Summer 2013	Summer 2014	

PROJECT/PROGRAM DEVELOPMENT AND IMPLEMENTATION
- PROJECT IDENTIFICATION AND SELECTION -

Acronyms of Responsible Entities

BPA	Bonneville Power Administration
CCT	Colville Confederated Tribes
IT	Implementation Team
NPCC	Northwest Power and Conservation Council
RTT	Regional Technical Team
TRIB FUND	Chelan and Douglas County PUDs Tributary Funds
UCSRB	Upper Columbia Salmon Recovery Board
USBR	United States Bureau of Reclamation
WAT	Watershed Action Team
YN	Yakama Nation



2010

UC Project and Funding Coordination

Habitat Project Implementation Funds

Enabling Action	Main Funding Sources	Annual $
State Salmon Recovery Act	SRFB (PCSRF and Washington State)	$2 M
Mid-Columbia PUDs FERC	HCPs Tributary Fund Committee (Chelan and Douglas County PUDs)	$2 M
Mid-Columbia PUDs FERC	Priest Rapids Coordinating Committee (Grant County PUD)	$1 M
NW Power Act (NPCC) FCRPS BiOp	Yakama Nation Fish Accords (BPA) Colville Tribes Fish Accords (BPA)	$6 M $3 M
NW Power Act (NPCC) FCRPS BiOp	***UCSRB Non-Accord Funds (BPA)***	***$3.5 M***
FCRPS BiOp	USBR (Non-construction funds)	$4 M
Others	Community Salmon Fund, USFS, USFWS, WDOE, NOAA, RFEG	$1 M
	TOTAL	**$22.5 M**

RANK	PROJECT NAME	SPONSOR	AMOUNT REQUESTED					RTT SCORE		
			SRFB	TRIB	Other	Total	SRFB Cumulative	BB	COS	Total Score
1	White River Van Dusen Conservation Easement	Chelan Douglas Land Trust (CDLT)	$ 360,000	$ 60,000	$ 20,000	$ 440,000	$ 360,000	74	39	113
2	White River Dally-Wilson Conservation Easement	CDLT	$ 59,000	$ -	$ 135,000	$ 194,000	$ 419,000	68	42	110
3	Entiat River Troy Acquisition	CDLT	$ 205,000	$ -	$ 180,000	$ 385,000	$ 624,000	68	42	110
4	Chewuch River Instream Flow Project	Trout Unlimited (TU)	$ -	$ 325,000	$ 875,000	$ 1,200,000	$ 624,000	69	34	103
5	Dillwater ELJ and Side Channel Enhancement	Chelan Co Natural Resources Dept (CCNRD)	$ 167,000	$ 169,500	$ 50,000	$ 386,500	$ 791,000	67	36	103
6	Middle Methow Island Conservation Acquisition (2010 RM48.7RB)	Methow Salmon Recovery Foundation (MSRF)	$ 139,860	$ 94,900	$ 10,000	$ 244,760	$ 930,860	63	37	100
7	Remove fish passage impediments in Loup Loup Creek	Okanogan County/Colville Confederated Tribes	$ 265,000	$ -	$ 30,500	$ 295,500	$ 1,195,860	54	40	94
8	Middle Methow Side Channel and Associated Wetland Conservation Acquisition (2010 RM41.5 LR)	MSRF	$ 106,356	$ 122,404	$ 10,000	$ 238,760	$ 1,302,216	59	32	91
9	Boat Launch Off-channel Pond Reconnection	CCNRD	$ 74,750	$ 74,750	$ -	$ 149,500	$ 1,376,966	59	31	90
10	Methow River Floodplain Conservation Acquisition (2010 MR39.5LH)	MSRF	$ 110,633	$ 74,415	$ 10,000	$ 195,048	$ 1,487,599	56	34	90
11	Lower Wenatchee Instream Flow Enhancement	TU	$ 205,000	$ 205,000	$ 2,947,666	$ 3,357,666	$ 1,692,599	50	38	88
12	Upper Methow Riparian Protection IV	Methow Conservancy	$ 308,552	$ 54,450	$ -	$ 363,002	$ 2,001,151	52	35	87
13	Upper Methow Floodplain Conservation Acquisition (2010 RM56.0RR)	MSRF	$ 162,178	$ -	$ 30,000	$ 192,178	$ 2,163,329	55	31	86
14	Christianson Ranch Riparian Protection	Methow Conservancy	$ 390,458		$ 68,904	$ 459,362	$ 2,553,787	54	32	86
15	Upper Columbia Nutrient Enhancement – Salmon Toss	UC RFEG	$ 30,571	$ -	$ 24,400	$ 54,971	$ 2,584,358	56	24	80
16	McLoughlin Falls – Last Best Place	WDFW	$ 400,000	$ -	$ 700,000	$ 1,100,000	$ 2,984,358	49	28	77
17	Nason Creek N1 Floodplain Reconnection	CCNRD	$ 130,000	$ -	$ 92,280	$ 222,280	$ 3,114,358	46	26	72
18	Blackbird Channel Inlet Feasibility Study	CCNRD	$ 37,042	$ -	$ 12,000	$ 49,042	$ 3,151,400	32	33	65
19	Lower Icicle Creek Reach Assessment	Wild Fish Conservancy	$ 62,814	$ 13,000	$ -	$ 75,814	$ 3,214,214	22	33	55
20	Chiwawa Irrigation District water conservation feasibility study	CCNRD	$ 144,500	$ -	$ 25,500	$ 170,000	$ 3,358,714	19	29	48
		TOTALS	$ 3,358,714	$ 1,193,419	$ 5,221,250	$ 9,773,383				
						final allocation=	$ 2,180,850			

All-H Coordination (White River)

- Julie Morgan -

What is known about 'Best Management Practices'

Keely Murdoch
Yakama Nation
July 14th 2010

What do 'Best Management Practices' do?

- Promote local adaptation
- Minimize adverse ecological interactions
- Minimize effects of hatchery facilities on the ecosystem
- Maximize survival of hatchery fish

White River Work Group

July 14, 2010
Leavenworth

Russell Langshaw

Grant County
PUBLIC UTILITY DISTRICT
Excellence in Service and Leadership

Acclimation Design Options

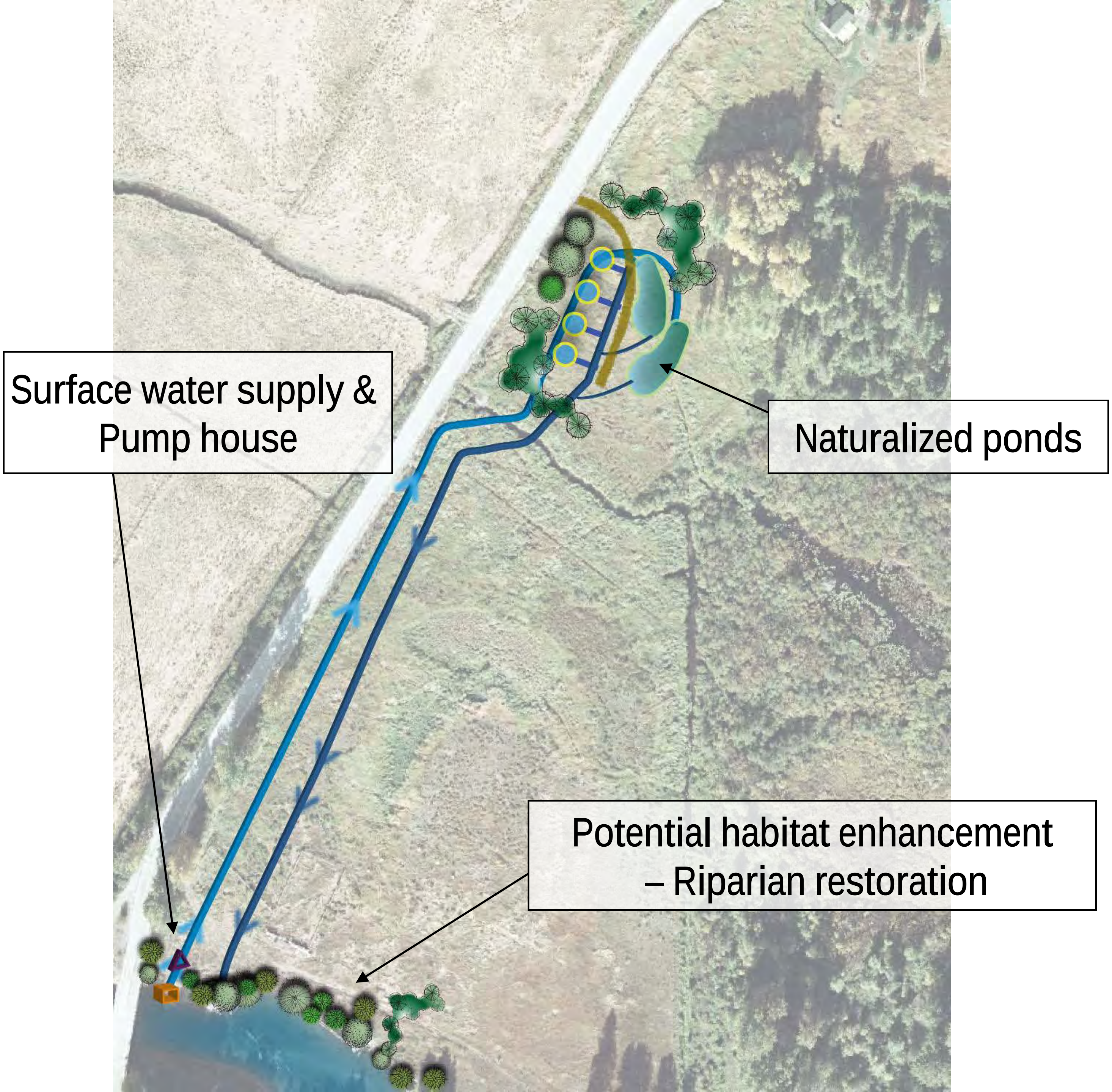
- Three alternatives
  - All have overwinter acclimation
  - All have natural feature spring acclimation
  - Adaptively managed
- Conceptual
- Need review and further design work by engineers
- Vessel and location matrix

Concept 1
- 4 Circular Tanks
- 2 Naturalized Ponds

Concept 2
- 4 Circular Tanks
- 1 Oxbow Pond

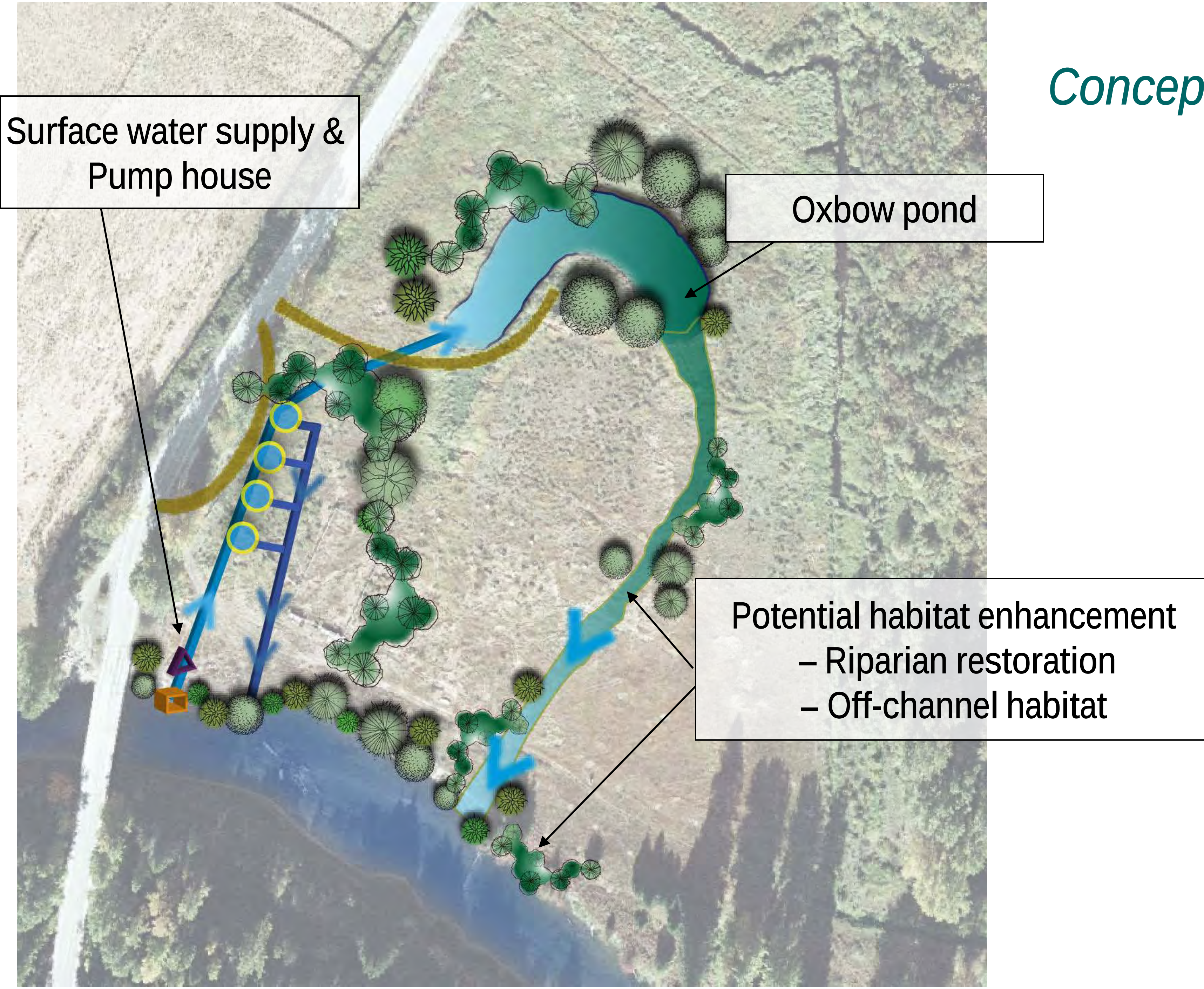
Concept 3
- 8 Circular Tanks

Concept 1

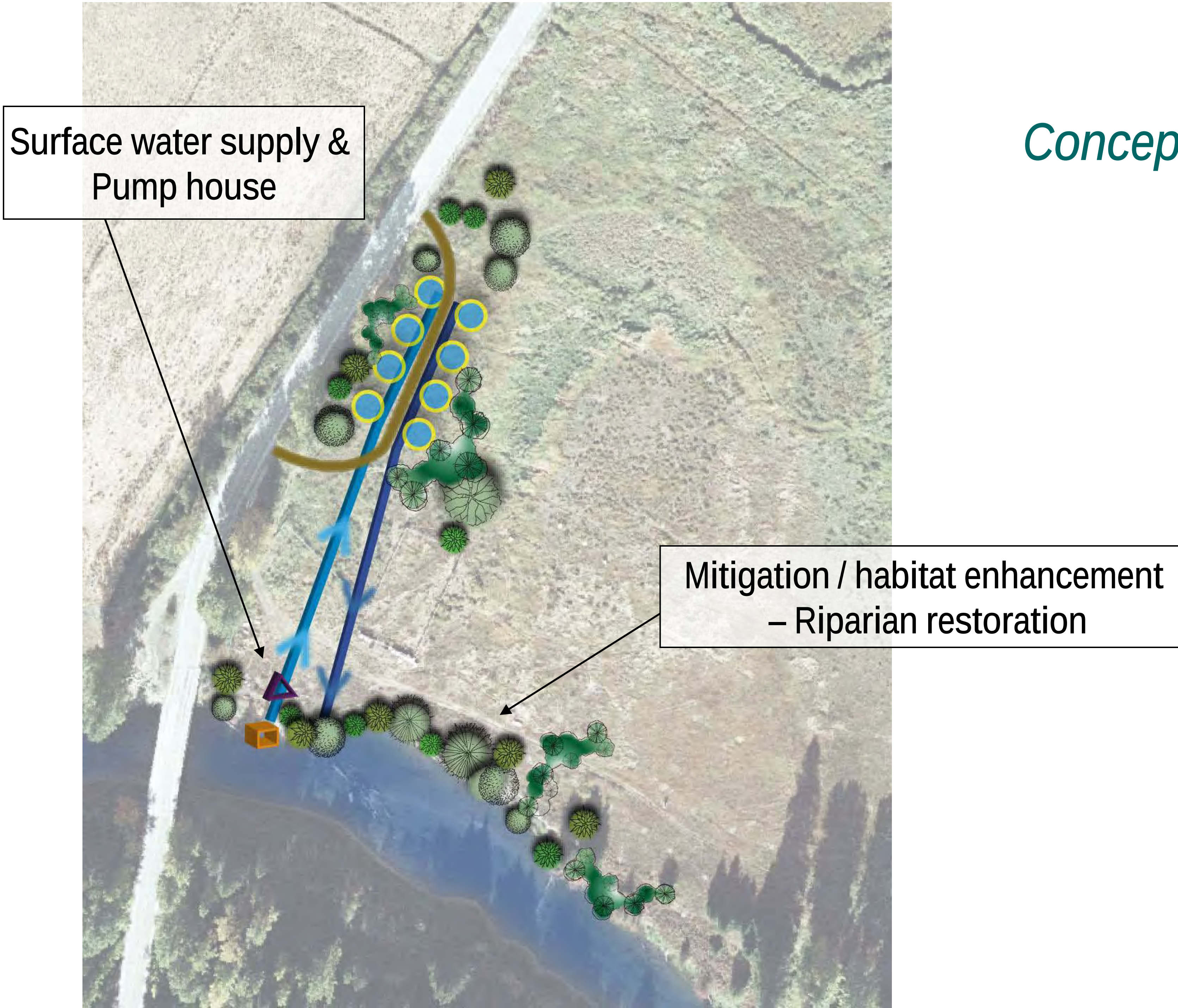


Surface water supply &
Pump house
Naturalized ponds
Potential habitat enhancement
– Riparian restoration

Concept 2


Surface water supply &
Pump house
Oxbow pond
Potential habitat enhancement
– Riparian restoration
– Off-channel habitat

Concept 3


Surface water supply & Pump house
Mitigation / habitat enhancement – Riparian restoration

Post Release Survival of White River Juvenile Spring Chinook Salmon

Bill Gale, Mid-Columbia River Fishery Resource Office, US Fish and Wildlife Service

– Possible contributing factors:

- High rates of residualism
- Poor fish quality
- Stress of transfer and or inadequate acclimation prior to release
- Predation by bull trout and northern pikeminnow in Lake Wenatchee

– Additional studies are being considered to:

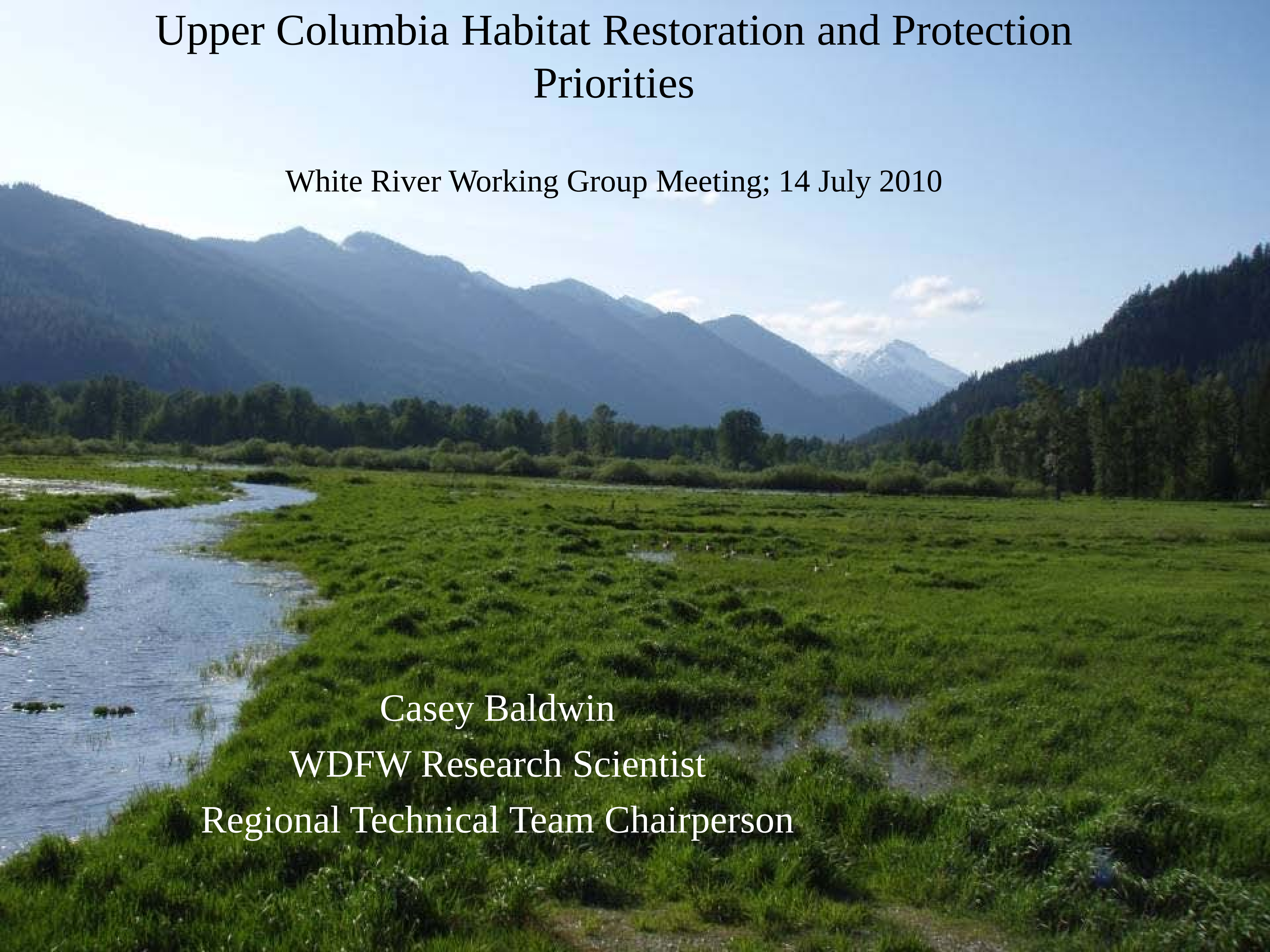
- Estimate the abundance of the predator base in Lake Wenatchee and better understand the magnitude of impact this may play.

- Identify whether hatchery origin juveniles are especially vulnerable to predation and whether this is related to fish quality/biology/behavior.

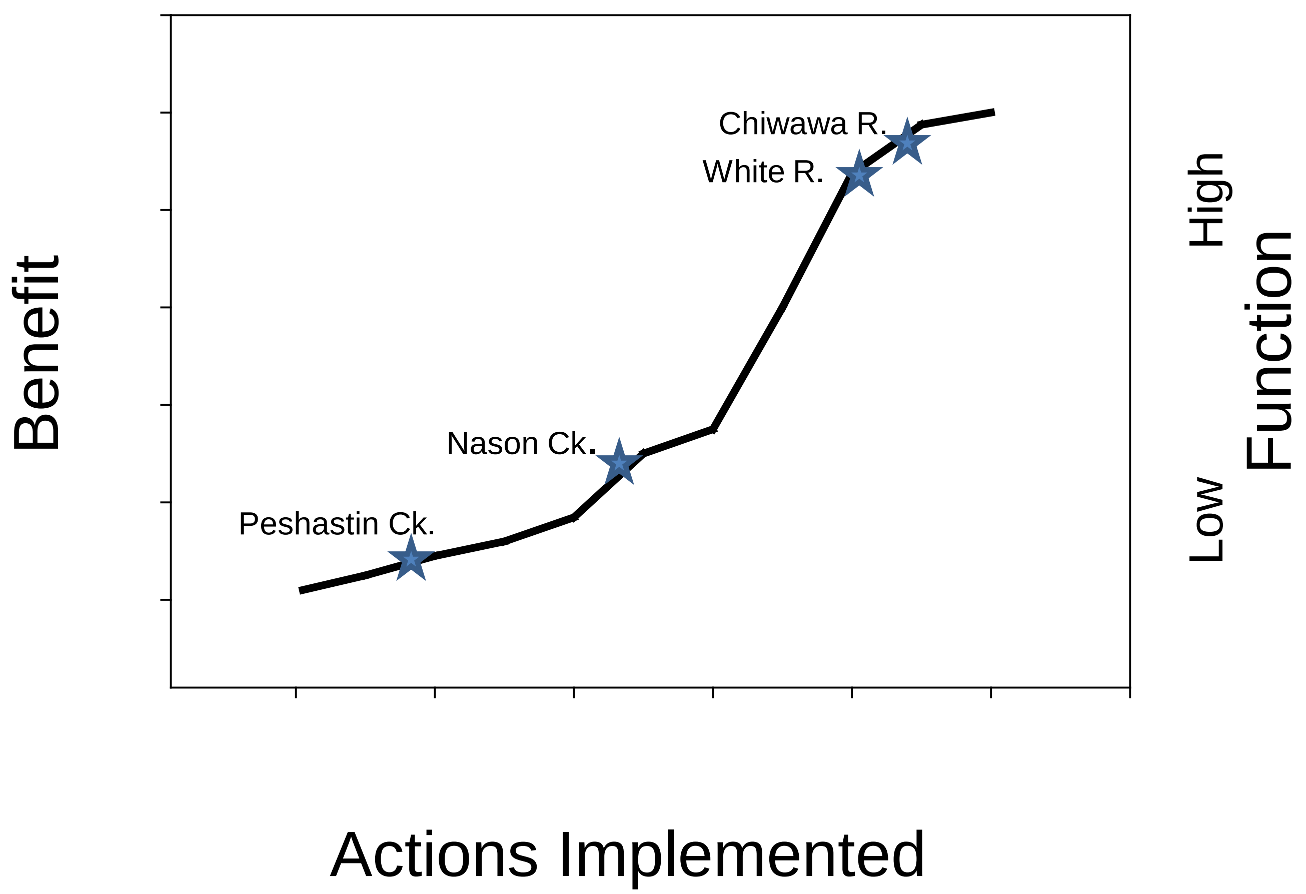
- Identify areas in Lake Wenatchee where predators may congregate and whether it is possible to avoid these pinch points.

Upper Columbia Habitat Restoration and Protection Priorities

White River Working Group Meeting; 14 July 2010



Casey Baldwin
WDFW Research Scientist
Regional Technical Team Chairperson



Benefit
Chiwawa R.
White R.
Nason Ck.
Peshastin Ck.
High
Low
Function
Actions Implemented

RTT Biological Strategy

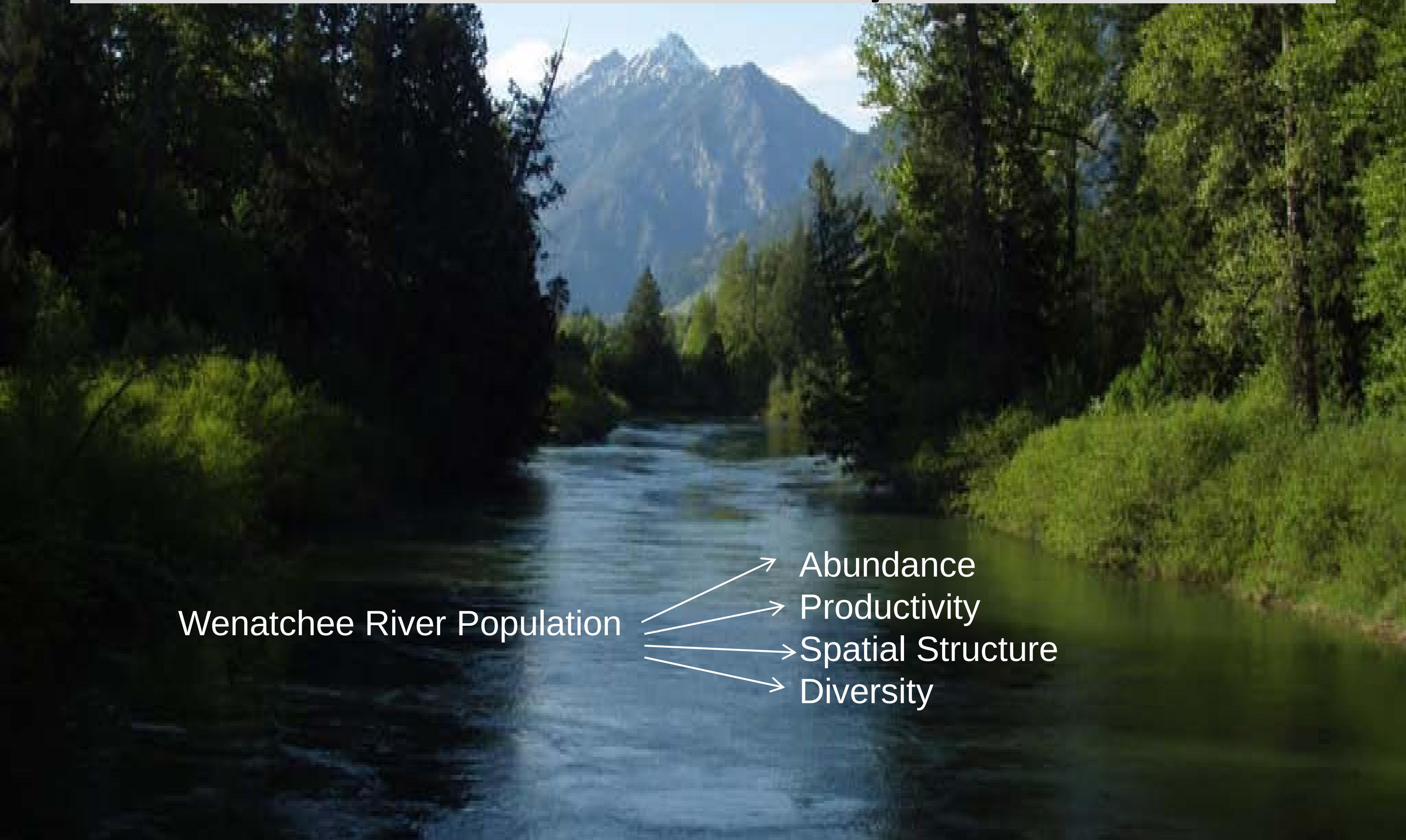
HABITAT ACTION RECOMMENDATIONS:

Tier 1

Protect existing riparian habitat and channel migration floodplain function.

- Acquire conservation acquisition/easements in the lower mainstem White River

What is the role of the White River in ESA Recovery?



What is the role of the White River in ESA Recovery?

1) Contribute to abundance (x% of 2000 fish minimum for the Wenatchee).
2) Productivity ($\geq$ average and $\geq$ 1.0 returns/spawner). i.e. population "growth" is stable or increasing.
3) Spatial structure- important spawning aggregate in unique location (above the lake)
4) Diversity—perpetuate their unique genes

   -Local adaptation leads to divergence

   -Divergent spawning aggregates leads to greater diversity in the ESU (separation between Wenatchee, Entiat, and Methow).

White River Policy Group

July 15th Meeting

Julie Morgan

Public Meetings and Work Group	Technical Team	Policy Planning Team and Policy Group
Public Meeting December 2, 2009	Technical Team July 1, 2010	Policy Planning Team February 12, 2010
Public Meeting February 20, 2010	Technical Team July 9, 2010	Grant County PUD Mtg with UCSRB Staff February 18, 2010
Work Group (Site Tour) April 20, 2010	Technical Team July 14, 2010	Policy Planning Team April 16, 2010
Work Group June 15, 2010	Technical Team August 10, 2010	Policy Planning Team May 7, 2010
Work Group July 14, 2010		Policy Group July 15, 2010
Work Group Will Meet in August 17th and September ?		Policy Group August 24, 2010
Public Meeting October or November		Policy Group September ?, 2010

Key Products

- Product 1 – Policy Related Topics – Memo to the Priest Rapids Coordinating Committee (PRCC)
- Product 2 – Technical Related Topics – Memo to the PRCC Hatchery Subcommittee

Product 1 – Policy Related Topics
Memo to the Priest Rapids Coordinating Committee

- Background
  - Summary of Process
  - Intent of Key Findings Report
- Summary of Key Findings
- Communicate and Address Comments - Policy
  - General and Process
  - Performance Indicators and Adaptive Management
    - Definition of Success/Failure
    - How are hatchery programs adaptively managed to get toward recovery?
    - Description of the nature of scientific review
- Attachment – Public Comments

Product 2 – Technical Related Topics
Memo to the PRCC Hatchery Subcommittee

- Background
  - Summary of Process
  - Intent of Key Findings Report
- Summary of Key Findings
- Communicate and Address Comments - Technical
  - General and Process
  - Hatchery Best Management Practices (BMPs)
  - Acclimation Design and Strategy
  - Predation in Lake Wenatchee
  - Habitat Improvements to Complement the White River Spring Chinook Program
  - Performance Indicators and Adaptive Management
- Attachment – Public Comments

Data Management and Monitoring

- James White -

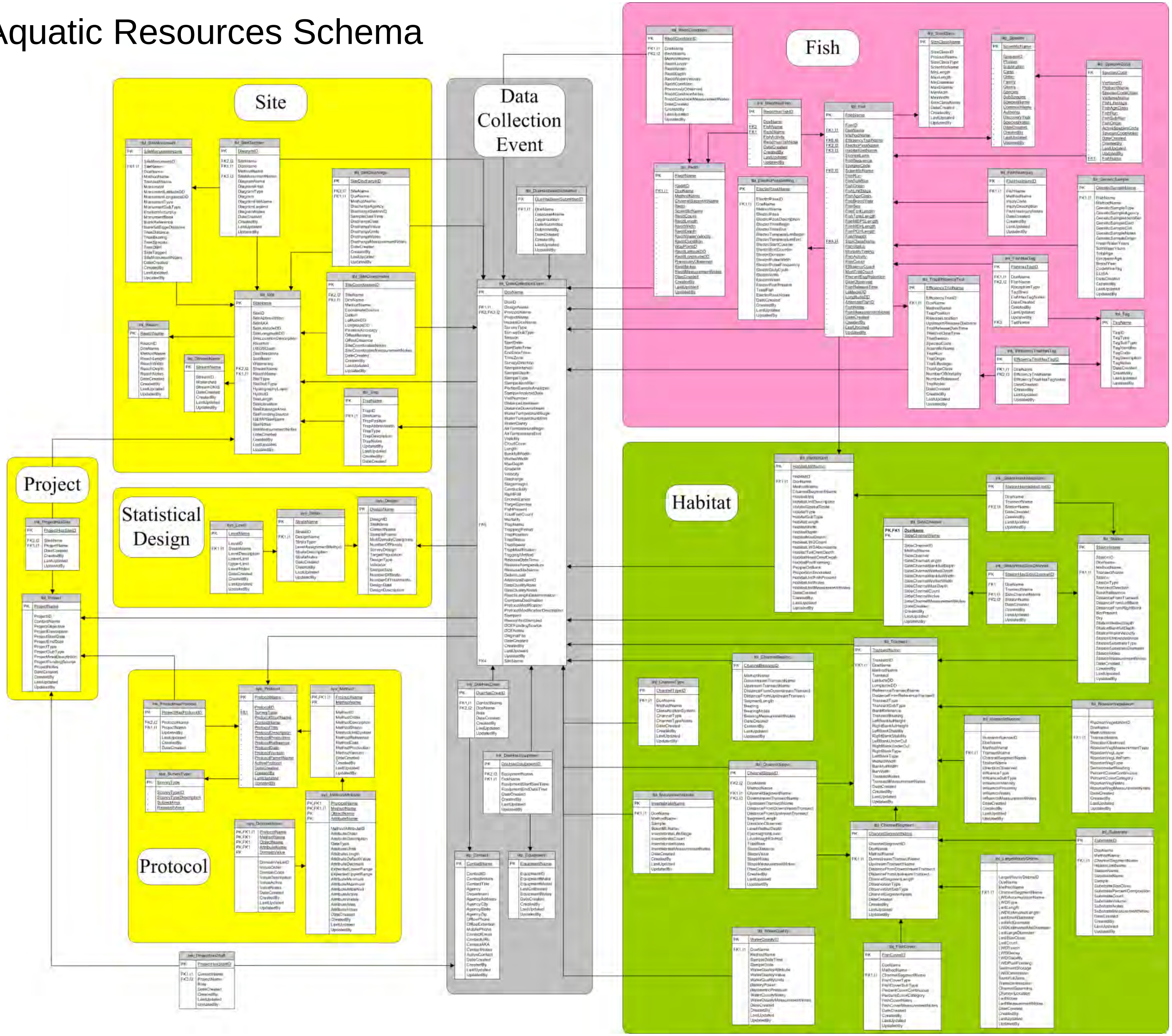
Topics

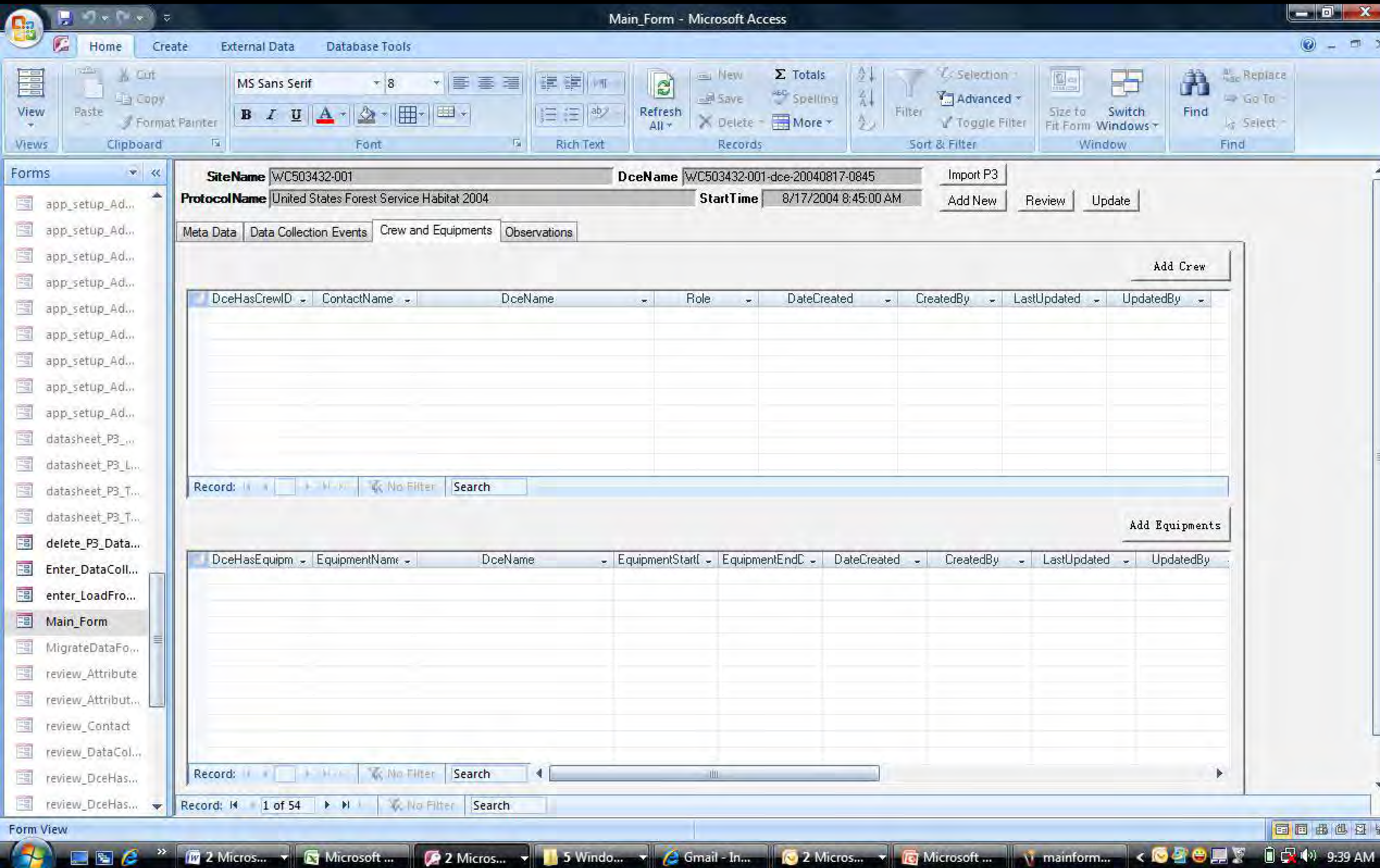
- Requested Topics
  - The “database,” what it does, how it does it, and whose data is in it.
  - Methow data manager
- UCSRB Topics
  - UCSRB monitoring efforts
  - Request

The Database

ATM/ARS

ISEMP Aquatic Resources Schema





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SurveyType	Year	Contractor	TaskDescription
habitat	2005	Terraqua	habitat at status/trend sites
habitat	2005	Terraqua	habitat at B2B sites
habitat	2006	Terraqua	habitat at B2B sites
habitat	2006	Terraqua	habitat at status/trend sites
habitat	2007	Terraqua	habitat at status/trend sites
sediment	2006	USFS-Entiat Ranger District	McNeil core sample/fine sediment
sediment	2007	USFS Entiat	McNeil core sample/fine sediment
smolt	2004	USFWS	smolt trap at RM 6
smolt	2005	USFWS	smolt trap at RM 6
smolt	2006	USFWS	smolt trap at Entiat Mouth
smolt	2006	USFWS	smolt trap at Entiat Mouth and steelhead redd surveys (existing contracts)
smolt	2007	USFWS	smolt trap at RM 6 on Entiat
smolt	2007	USFWS	smolt trap at Entiat Mouth
snorkel	2005	USFWS	snorkel survey 11 sites over 3 seasonal periods during 2005 to 2006
snorkel	2006	USFWS	snorkel survey 11 sites over 3 seasonal periods during 2005 to 2006
snorkel	2006	Yakama Nation	snorkel at Entiat monitoring sites
snorkel	2007	USFS	snorkel at Entiat effectiveness monitoring sites
snorkel	2007	USFWS	snorkel at effectiveness sites
snorkel	2007	USFWS	snorkel at B2B
snorkel	2007	Yakama Nation	snorkel at Entiat status and trend monitoring sites
snorkel	2007	Yakama Nation	snorkel at Entiat effectiveness monitoring sites
spawning survey	2004	USFWS	steelhead redd counts in Entiat
spawning survey	2005	USFWS	steelhead redd counts in Entiat
spawning survey	2006	USFS-Entiat Ranger District	steelhead redd surveys in madd river
spawning survey	2006	USFWS	steelhead redd counts in Entiat
water quality	2006	USFS PNW	water quality/pH monitoring
water quality	2006	USFS-Entiat Ranger District	water temperature
water quality	2007	USFS PNW	water quality/pH monitoring

This is not the data inventory. Only an example of data from the Entiat sub-basin.

Data in ATM/ARS

- Entiat
  - Habitat Status, Trend, Effectiveness: 2005-2009
  - Snorkel and Electrofish: 2005-2009
  - Smolt Trap: 2004-2009
  - Steelhead Redd Surveys: 2003-2009
  - Water Quality: 1997-2009
  - Fine Sediment: 2007-2008

Data in ATM/ARS

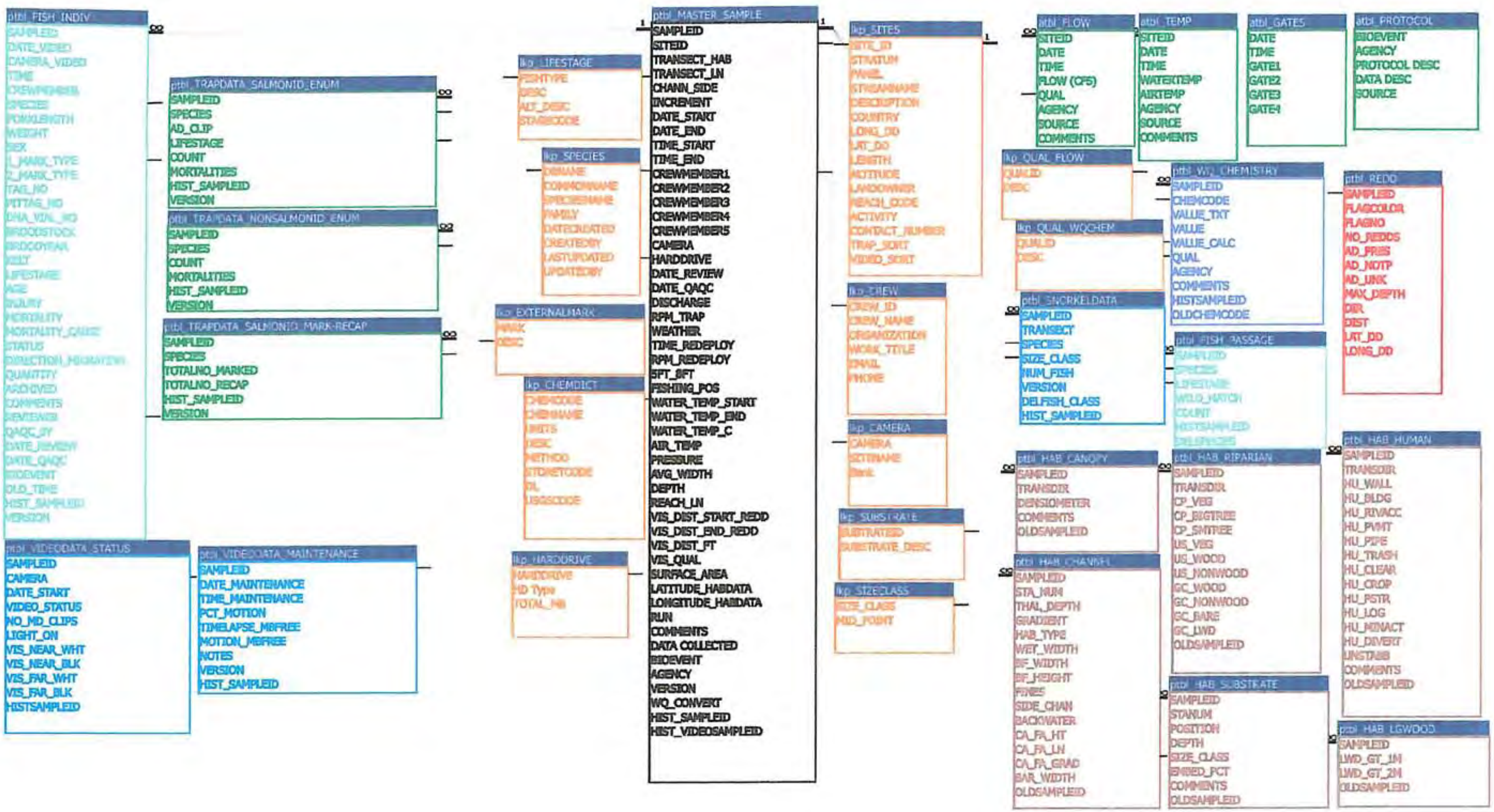
- Wenatchee
  - Habitat Status and Trend: 2004-2009
  - Snorkel and Electrofish: 2005-2009
  - Smolt Trap: 2004-2009
  - Steelhead Redd Surveys: 2001-2009
  - Water Quality: 2004-2009
  - Fine Sediment: 1991-2006
  - Macroinvertebrates: 2004-2009

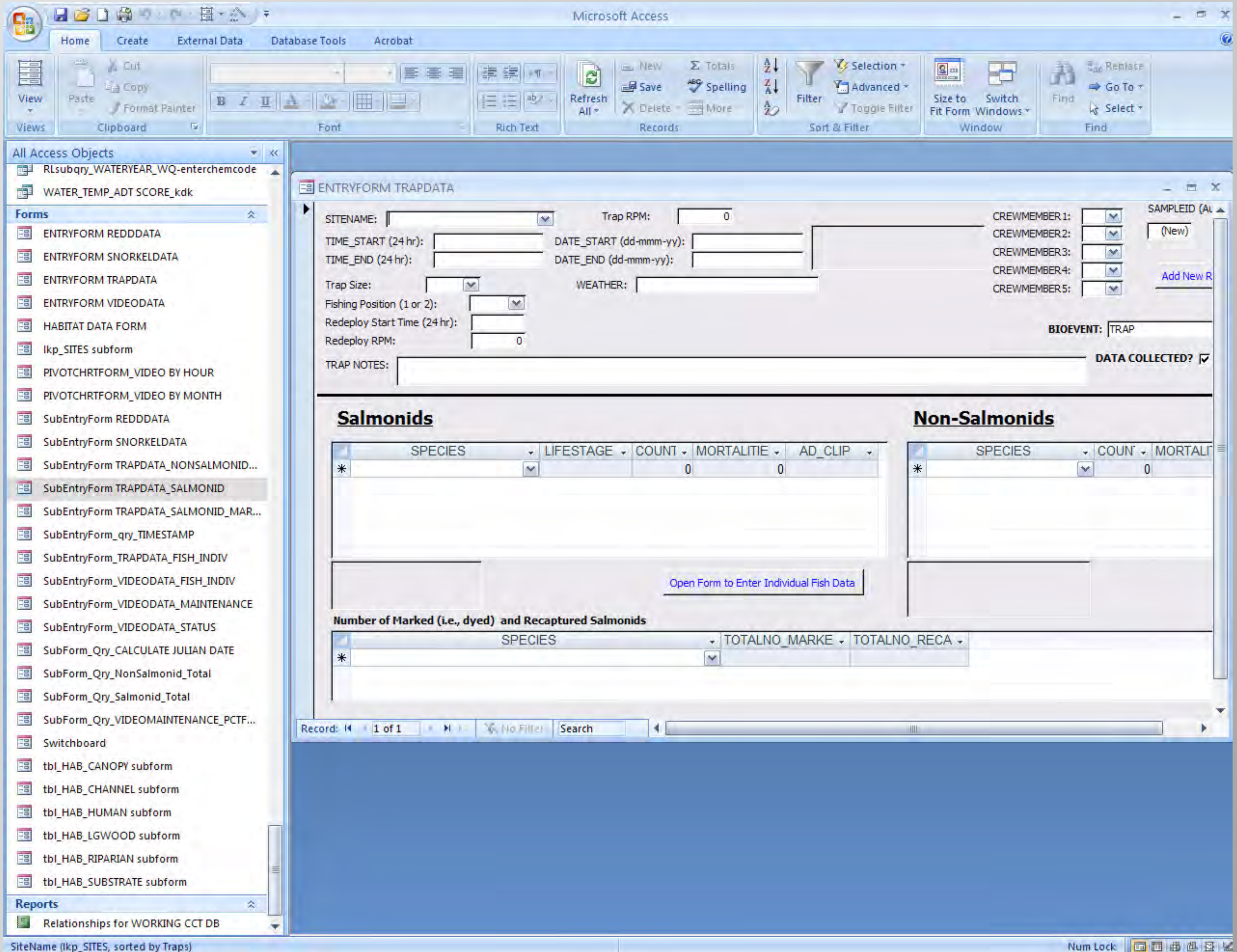
To Request ISEMP Data

1. E-mail to james.white@ucsrb.com with specific request (location, survey type, years, etc.)
2. Cc to pamela.nelle@nwi.net

OBMEP

Relationships for WORKING CCT DB 18-Jul-07
July 18, 2007

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SubEntryForm TRAPDATA_SALMONID_MAR...
SubEntryForm_qry_TIMESTAMP
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SubEntryForm_VIDEODATA_FISH_INDIV
SubEntryForm_VIDEODATA_MAINTENANCE
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tbl_HAB_HUMAN subform
tbl_HAB_LGWOOD subform
tbl_HAB_RIPARIAN subform
tbl_HAB_SUBSTRATE subform
Reports
Relationships for WORKING CCT DB
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TIME_END (24 hr):
DATE_START (dd-mmm-yy):
DATE_END (dd-mmm-yy):
Trap Size:
WEATHER:
Fishing Position (1 or 2):
Redeploy Start Time (24 hr):
Redeploy RPM: 0
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CREWMEMBER2:
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SiteName (lkp_SITES, sorted by Traps)
Num Lock

Data in OBMEP Database

- Okanogan
  - Physical Habitat:
  - Snorkel: 2004-2009
  - Smolt Trap: 2006-2009
  - Steelhead Redd Surveys: 2005-2009
  - Summer Chinook Redd Surveys: 2004-2009
  - Water Quality: 2005-2009
  - Zosal Dam Video Counts: 2006-2009
  - Macroinvertebrates:

To Request OBMEP Data

- E-mail to jennifer.panther@colvilletribes.com with specific request (location, survey type, years, etc.)

OR

1. E-mail to james.white@ucsrb.com with specific request (location, survey type, years, etc.)
2. Cc to jennifer.panther@colvilletribes.com

STEM

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ISEMP

Integrated Status & Effectiveness Monitoring Program

DATA PORTAL

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Integrated Status and Effectiveness Monitoring Program Data Portal

The Integrated Status and Effectiveness Monitoring Program (ISEMP) was created in 2004 to support PNW-wide aquatic Research, Monitoring and Evaluation programs of listed salmon species and their habitat.

The STEM Databank holds ISEMP collated datasets from these pilot subbasins:

- Wenatchee, WA
- Entiat, WA
- John Day, OR
- South Fork Salmon, ID
- Lemhi, ID

ISEMP is funded through the Bonneville Power Administration (BPA) and Northwest Fisheries Science Center (NOAA-Fisheries).

Back Next

NOAA | U.S. Department of the Interior Bureau of Reclamation | Bonneville Power Administration

Version 0.9 final beta

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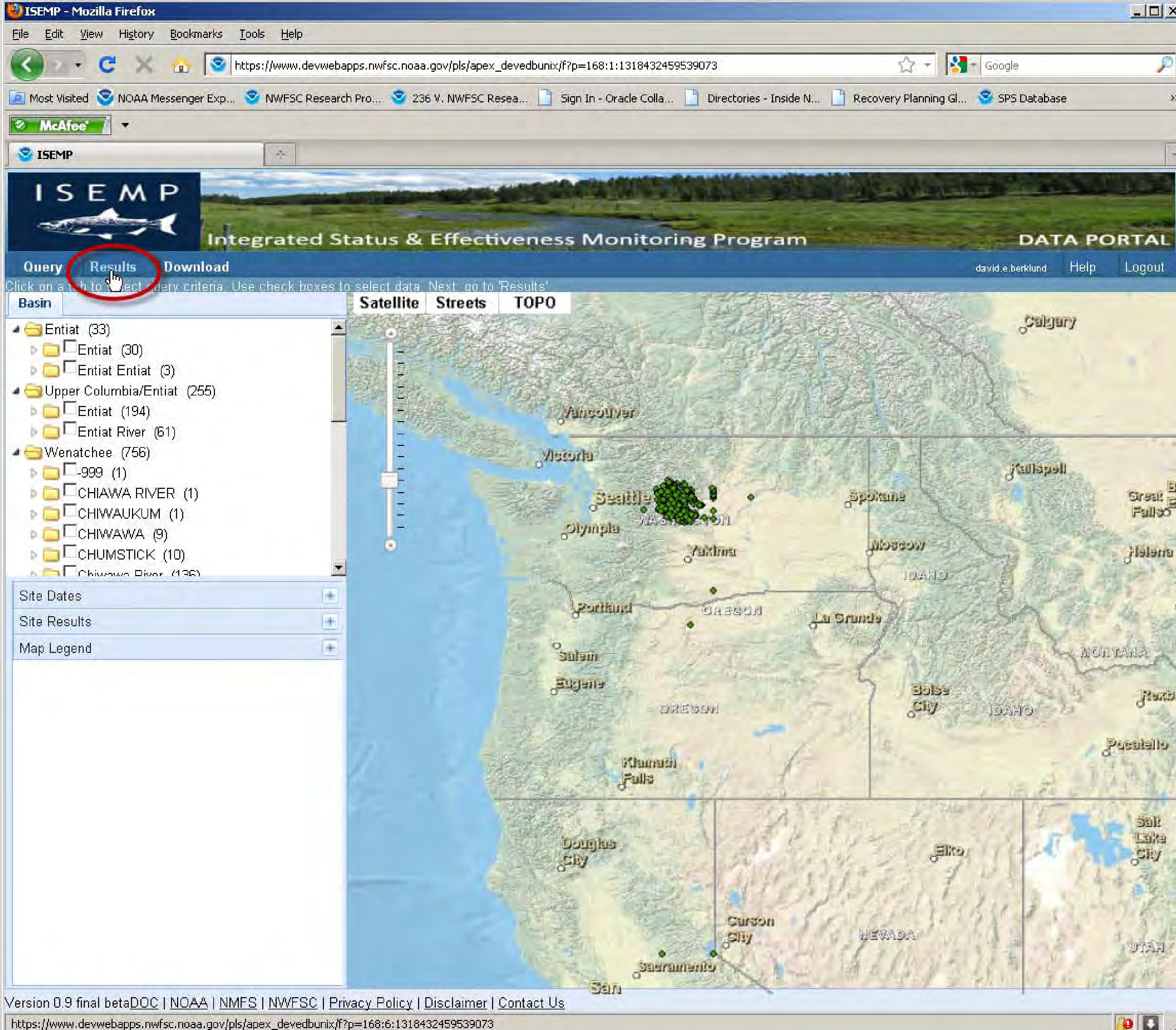
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Google
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NWFSC Research Pro...
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Directories - Inside N...
Recovery Planning Gl...
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McAfee
ISEMP
ISEMP
Integrated Status & Effectiveness Monitoring Program
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Entiat (30)
Entiat Entiat (3)
Upper Columbia/Entiat (255)
Entiat (194)
Entiat River (61)
Wenatchee (756)
-999 (1)
CHIAWA RIVER (1)
CHIWAUKUM (1)
CHIWAWA (9)
CHUMSTICK (10)
Site Dates
Site Results
Map Legend
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Streets
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Seattle
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Kalispell
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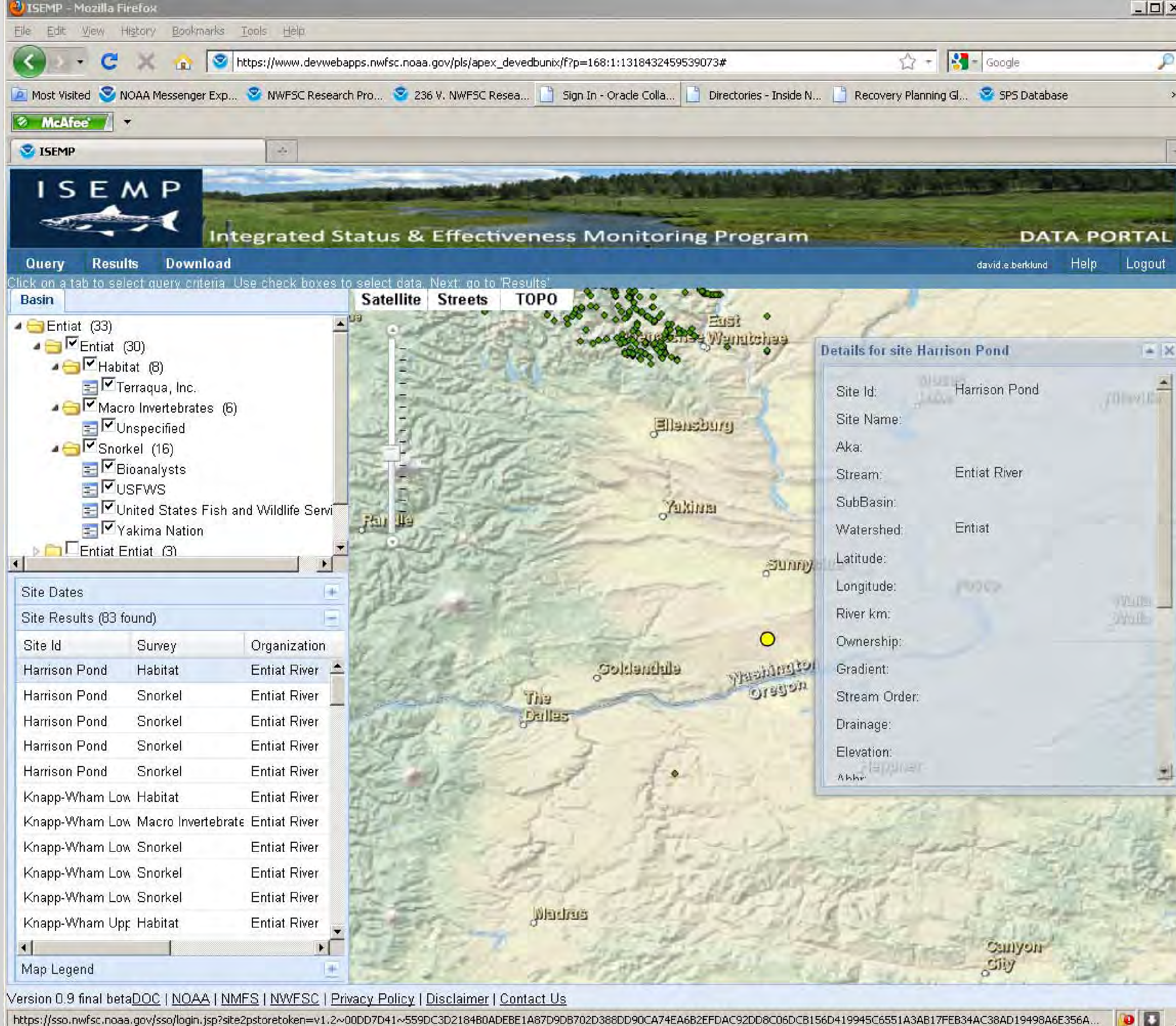
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Terraqua, Inc.
Macro Invertebrates (6)
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Snorkel (16)
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United States Fish and Wildlife Servi
Yakima Nation
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Site Results (83 found)
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Goldendale
Washington
Oregon
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Madras
Canyon City
Details for site Harrison Pond
Site Id: Harrison Pond
Site Name:
Aka:
Stream: Entiat River
SubBasin:
Watershed: Entiat
Latitude:
Longitude:
River km:
Ownership:
Gradient:
Stream Order:
Drainage:
Elevation:
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  - Habitat
    - Survey Event
    - Discharge
    - Project
    - Sites
    - Habitat
    - Channel Cross Sectior
  - Macro Invertebrates
  - Snorkel

Sampling Events data

No	SURVEY_TYPE	ProjectName	ProjectStartDate	ProjectType	ProjectAgency	ContactName
1	Habitat	Monitoring of Fish Populations using	01-JAN-05	Monitoring	USFWS	Unspecified_f_name Unspecified_l
2	Habitat	Monitoring of Fish Populations using	01-JAN-05	Monitoring	Terraqua, Inc.	Jon Raymond
3	Habitat	Monitoring of Fish Populations using	01-JAN-05	Monitoring	Terraqua, Inc.	Jon Raymond
4	Habitat	Monitoring of Fish Populations using	01-JAN-05	Monitoring	Terraqua, Inc.	Jon Raymond
5	Habitat	Monitoring of Fish Populations using	01-JAN-05	Monitoring	Terraqua, Inc.	Jeremy Moberg
6	Habitat	Monitoring of Fish Populations using	01-JAN-05	Monitoring	Terraqua, Inc.	Jeremy Moberg
7	Habitat	Monitoring of Fish Populations using	01-JAN-05	Monitoring	Terraqua, Inc.	Jeremy Moberg
8	Habitat	Monitoring of Fish Populations using	01-JAN-05	Monitoring	Terraqua, Inc.	Jeremy Moberg
9	Habitat	Monitoring of Fish Populations using	01-JAN-05	Monitoring	Terraqua, Inc.	Jeremy Moberg
10	Habitat	Monitoring of Fish Populations using	01-JAN-05	Monitoring	Terraqua, Inc.	Jeremy Moberg
11	Habitat	Monitoring of Fish Populations using	01-JAN-05	Monitoring	Terraqua, Inc.	Jeremy Moberg
12	Habitat	Monitoring of Fish Populations using	01-JAN-05	Monitoring	Terraqua, Inc.	Jeremy Moberg
13	Habitat	Monitoring of Fish Populations using	01-JAN-05	Monitoring	Terraqua, Inc.	Jeremy Moberg
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17	Habitat	Monitoring of Fish Populations using	01-JAN-05	Monitoring	Terraqua, Inc.	Jeremy Moberg
18	Habitat	Monitoring of Fish Populations using	01-JAN-05	Monitoring	Terraqua, Inc.	Jeremy Moberg
19	Habitat	Monitoring of Fish Populations using	01-JAN-05	Monitoring	Terraqua, Inc.	Jeremy Moberg
20	Habitat	Monitoring of Fish Populations using	01-JAN-05	Monitoring	Terraqua, Inc.	Jeremy Moberg

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  - Macro Invertebrates
  - Snorkel
    - Project
    - Fish Observation
    - Sites
    - Water Quality
    - Habitat
    - Survey Event

Sampling Events data

No	SURVEY_TYPE	SiteName	StartDateTime	EndDateTime	Season	VisitNu	Wettec	Lengt	Gradie	Bankfu	Condu	WaterTe
1	Snorkel	Powerline	19-AUG-08	19-AUG-08	Summer	1	0	0	0	0	0	16
2	Snorkel	Powerline	17-OCT-08	17-OCT-08	Fall	1	0	0	0	0	0	8
3	Snorkel	Powerline	12-MAR-09	12-MAR-09		1	0	0	0	0	0	3
4	Snorkel	Powerline	13-AUG-09	13-AUG-09	Summer	1	0	0	0	0	0	16
5	Snorkel	Harrison Pond	12-MAR-08	12-MAR-08	Winter	1	0	0	0	0	0	8
6	Snorkel	Harrison Pond	20-AUG-08	20-AUG-08	Summer	1	0	0	0	0	0	0
7	Snorkel	Harrison Pond	21-OCT-08	21-OCT-08	Fall	1	0	0	0	0	0	9
8	Snorkel	Harrison Pond	18-MAR-09	18-MAR-09	Winter	1	0	0	0	0	0	6
9	Snorkel	Harrison Pond	18-AUG-09	18-AUG-09	Summer	1	0	0	0	0	0	18
10	Snorkel	Harrison Upper	19-AUG-08	19-AUG-08	Summer	1	0	0	0	0	0	19
11	Snorkel	Harrison Upper	08-OCT-08	08-OCT-08	Fall	1	0	0	0	0	0	8
12	Snorkel	Harrison Upper	10-MAR-09	10-MAR-09	Winter	1	0	0	0	0	0	3
13	Snorkel	Harrison Upper	17-AUG-09	17-AUG-09	Summer	1	0	0	0	0	0	15
14	Snorkel	Knapp-Wham Lower	18-AUG-08	18-AUG-08	Summer	1	0	0	0	0	0	19
15	Snorkel	Knapp-Wham Lower	09-OCT-08	09-OCT-08	Fall	1	0	0	0	0	0	7
16	Snorkel	Knapp-Wham Lower	09-MAR-09	09-MAR-09	Winter	1	0	0	0	0	0	4
17	Snorkel	Knapp-Wham Lower	13-AUG-09	13-AUG-09	Summer	1	0	0	0	0	0	15
18	Snorkel	Knapp-Wham Upper	18-AUG-08	18-AUG-08	Summer	1	0	0	0	0	0	19
19	Snorkel	Knapp-Wham Upper	09-OCT-08	09-OCT-08	Fall	1	0	0	0	0	0	7
20	Snorkel	Knapp-Wham Upper	09-MAR-09	09-MAR-09	Winter	1	0	0	0	0	0	3

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Methow Data Manager

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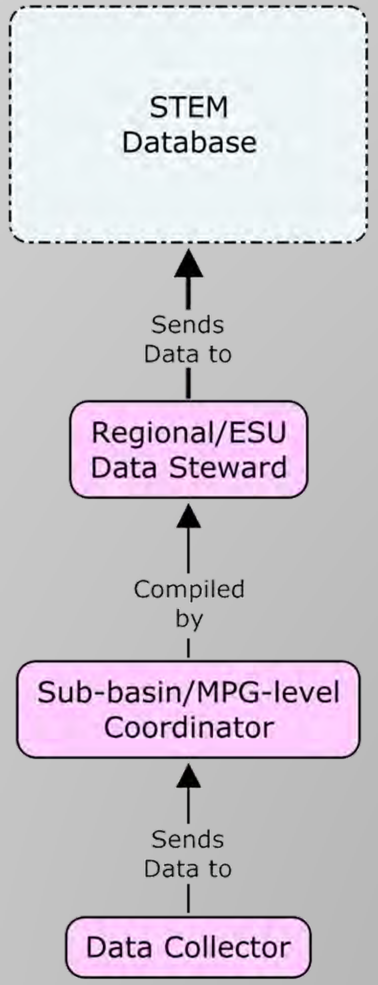
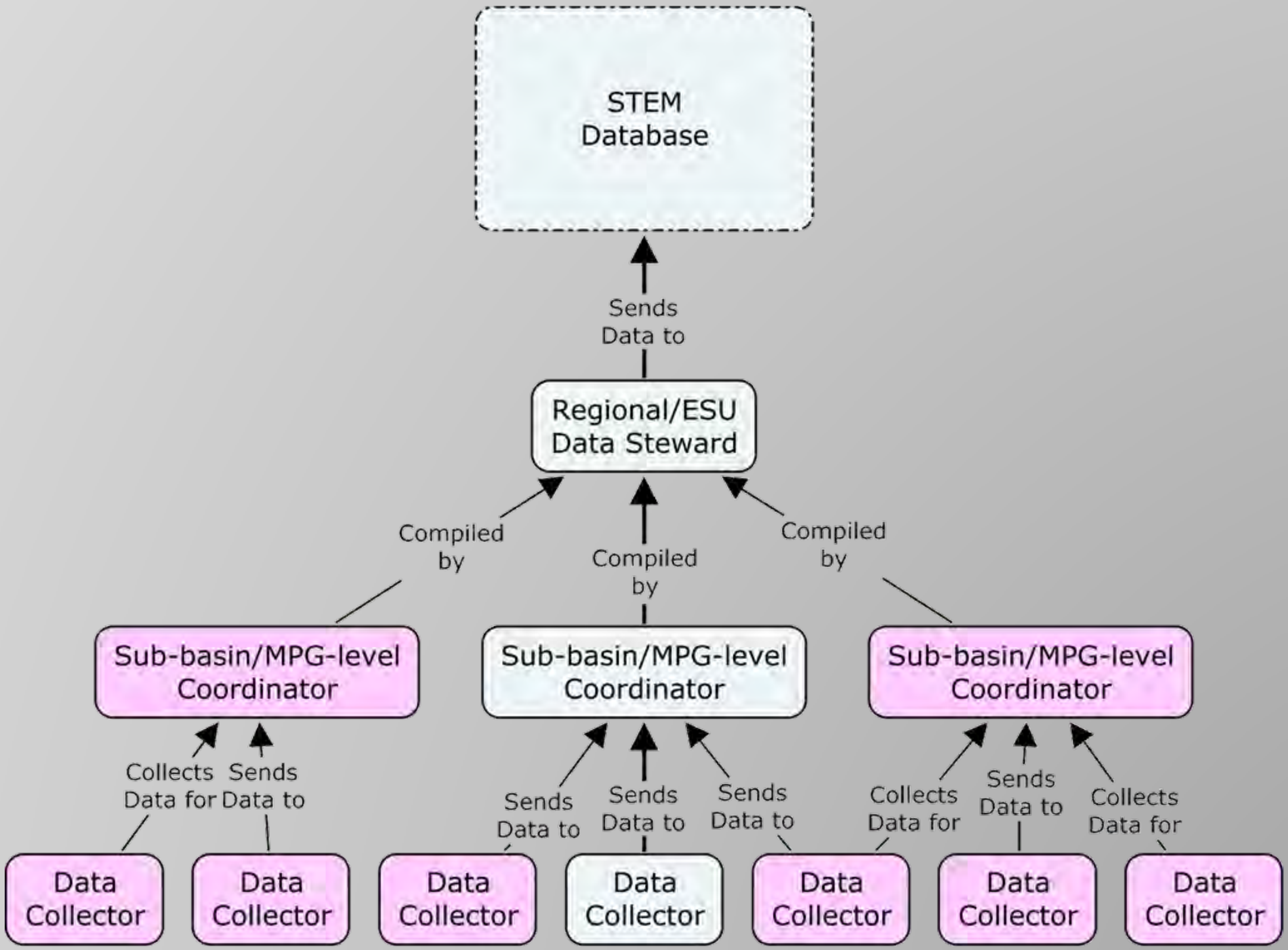
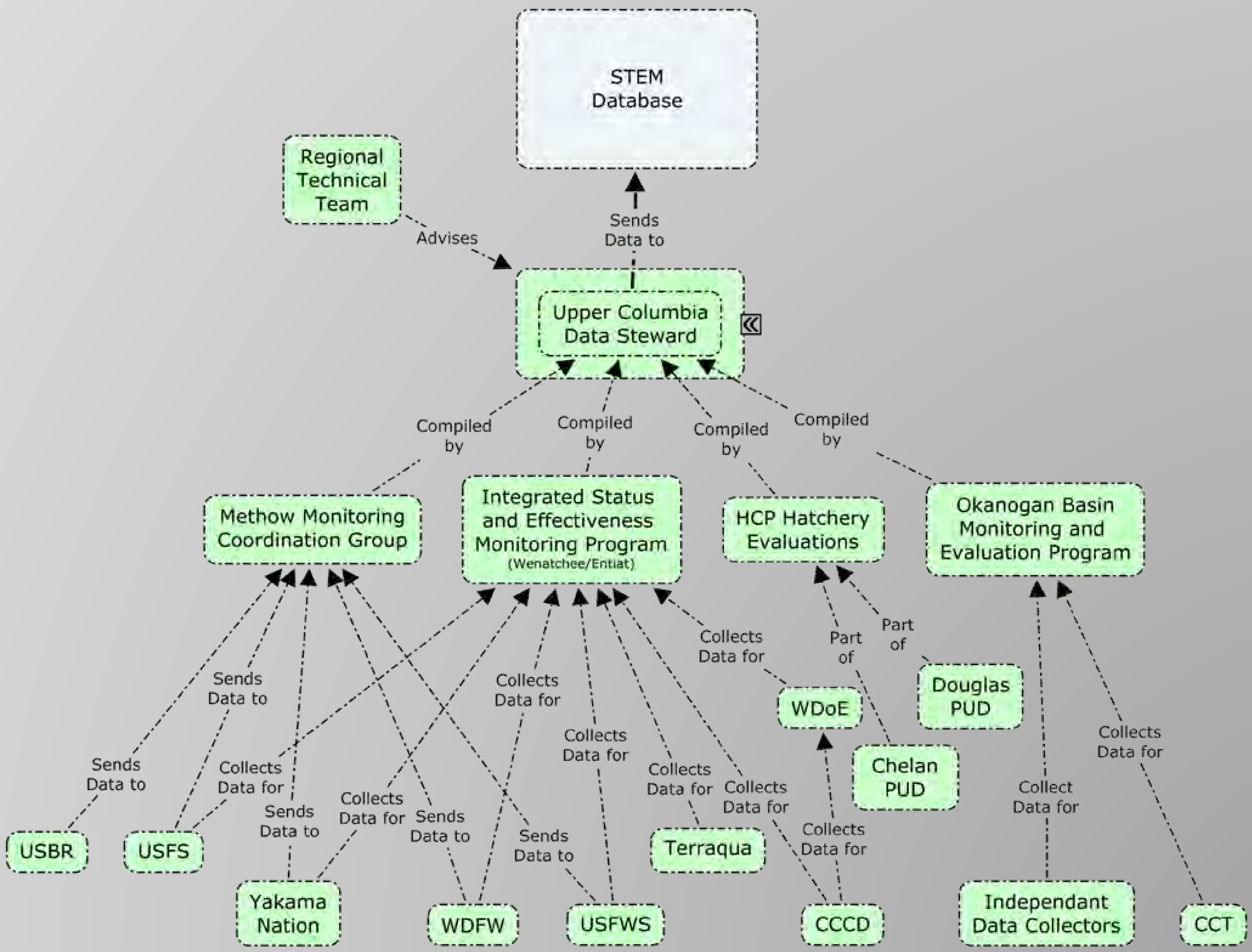
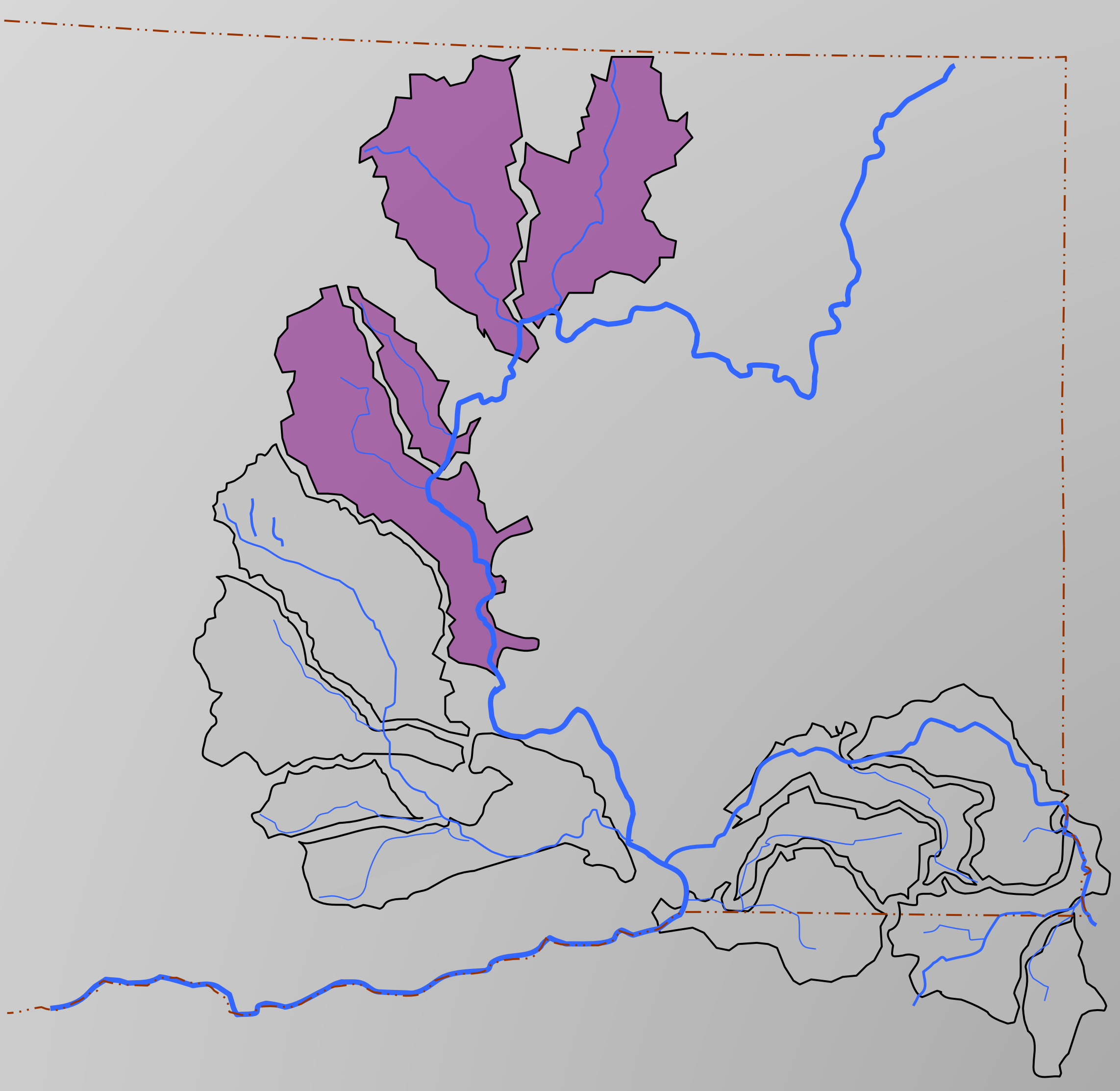


Horizontal Monitoring Data Flow

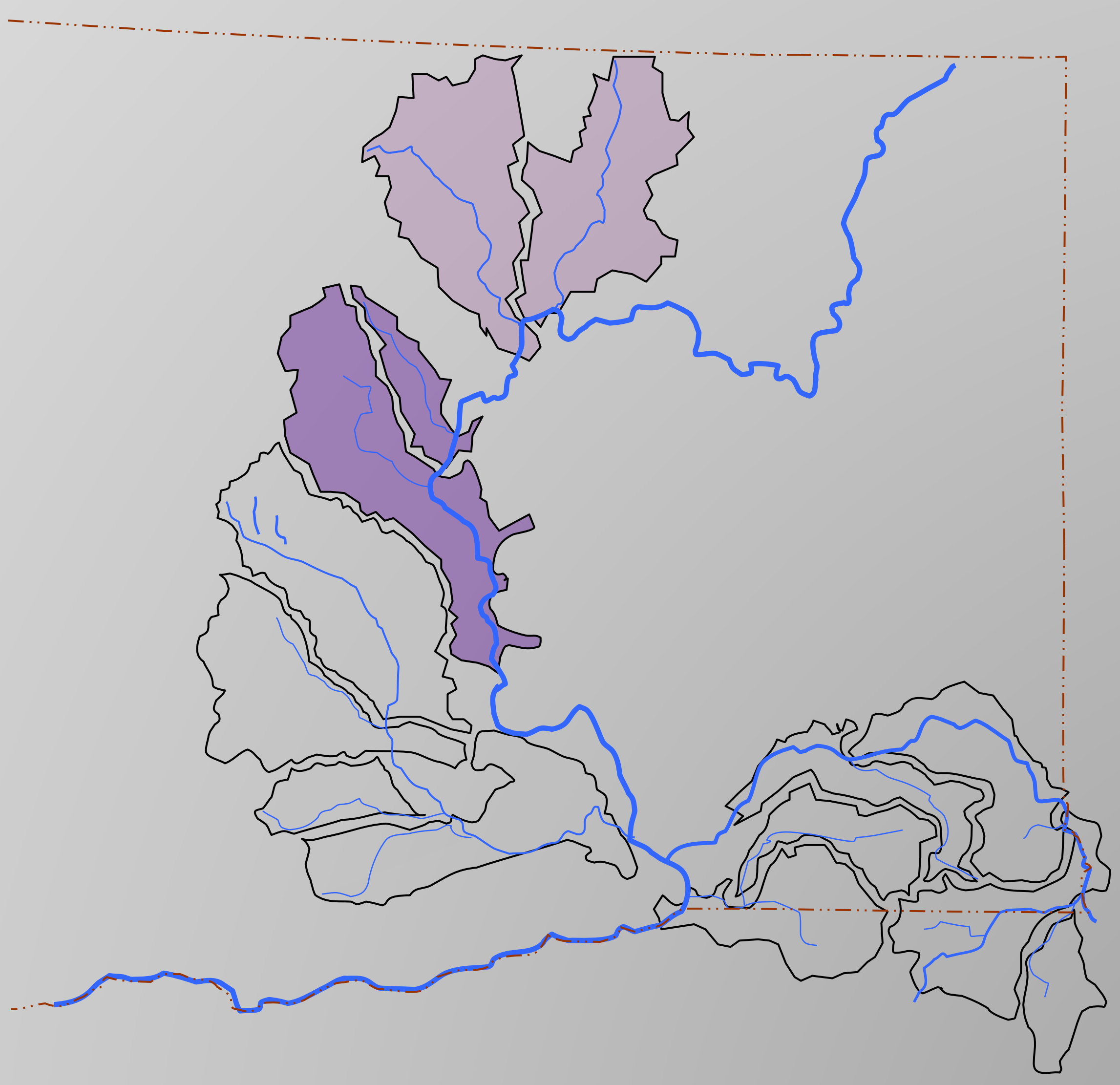


Upper Columbia Monitoring Data Flow

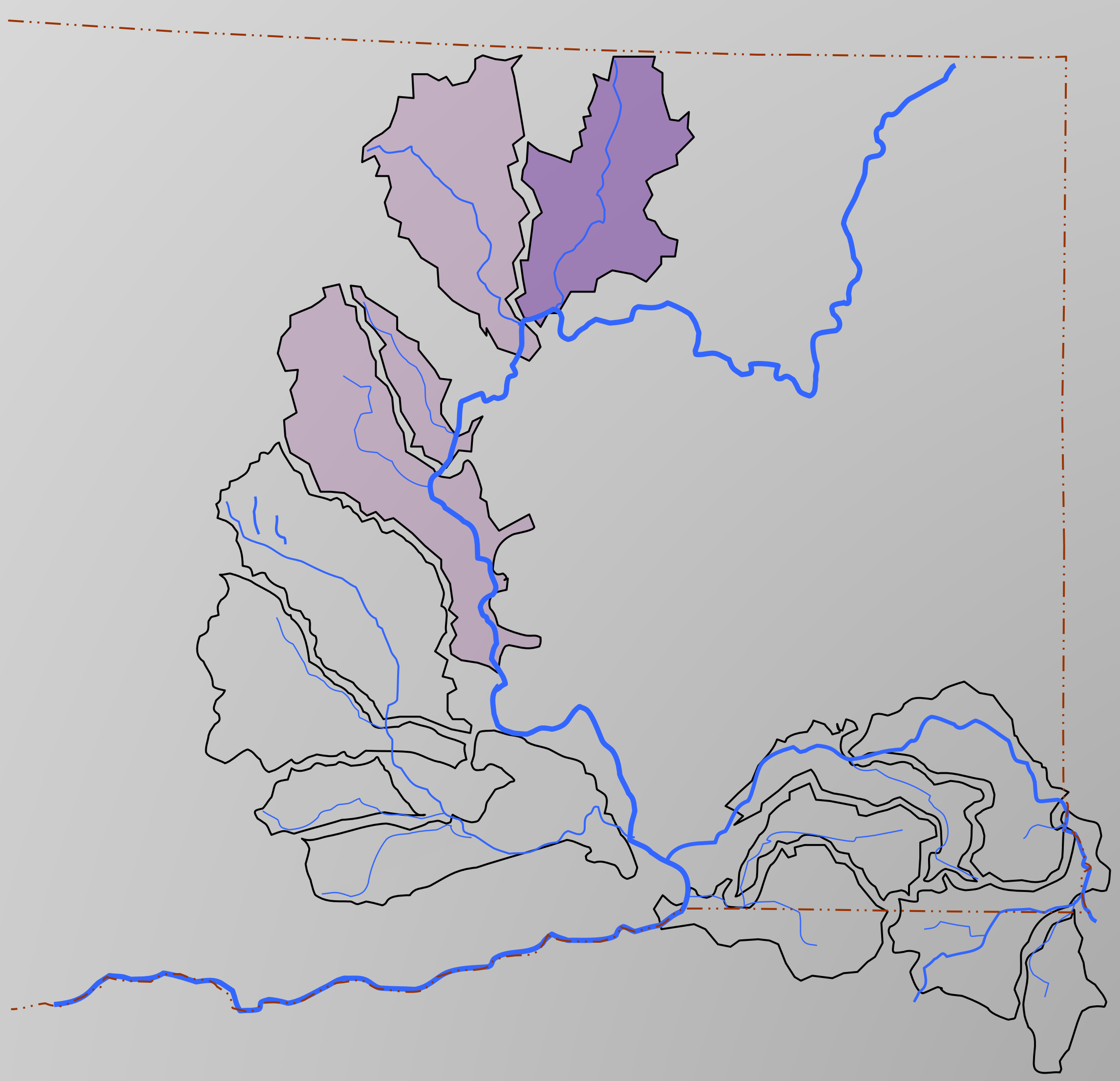




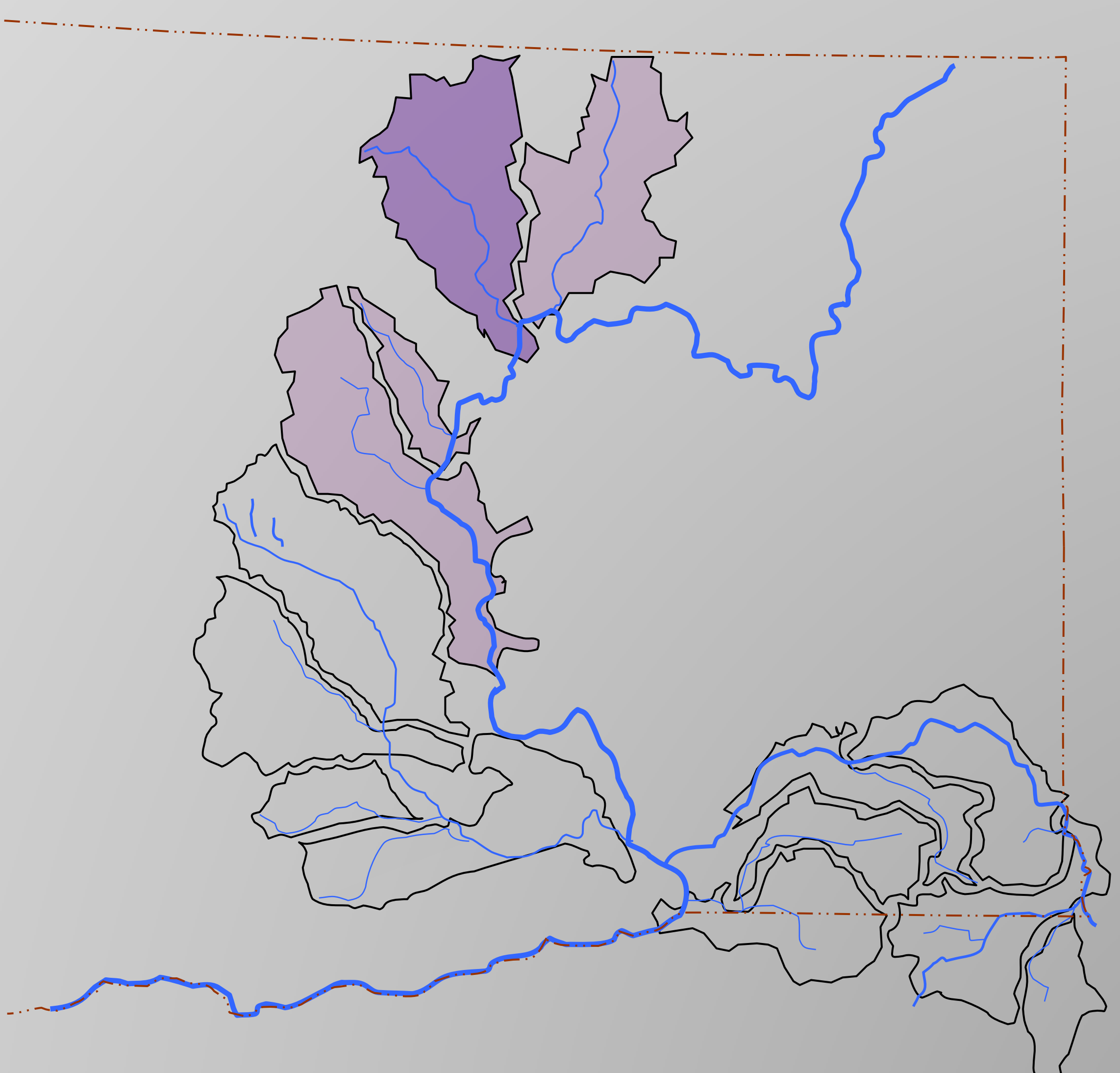
Integrated Status and Effectiveness Monitoring Project



Okanogan Basin Monitoring and Effectiveness Project



Methow Restoration Council

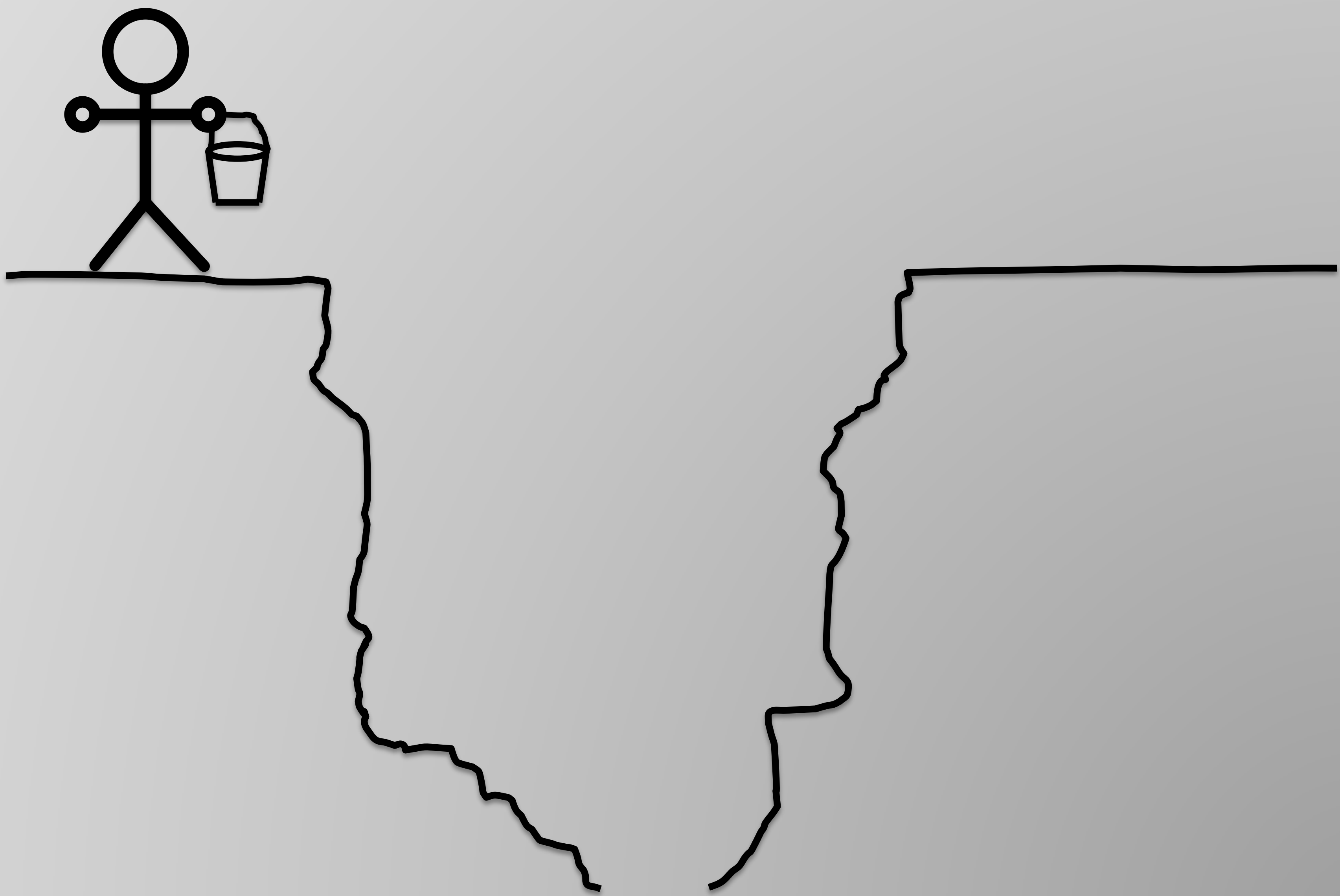


UCSRB Monitoring Efforts

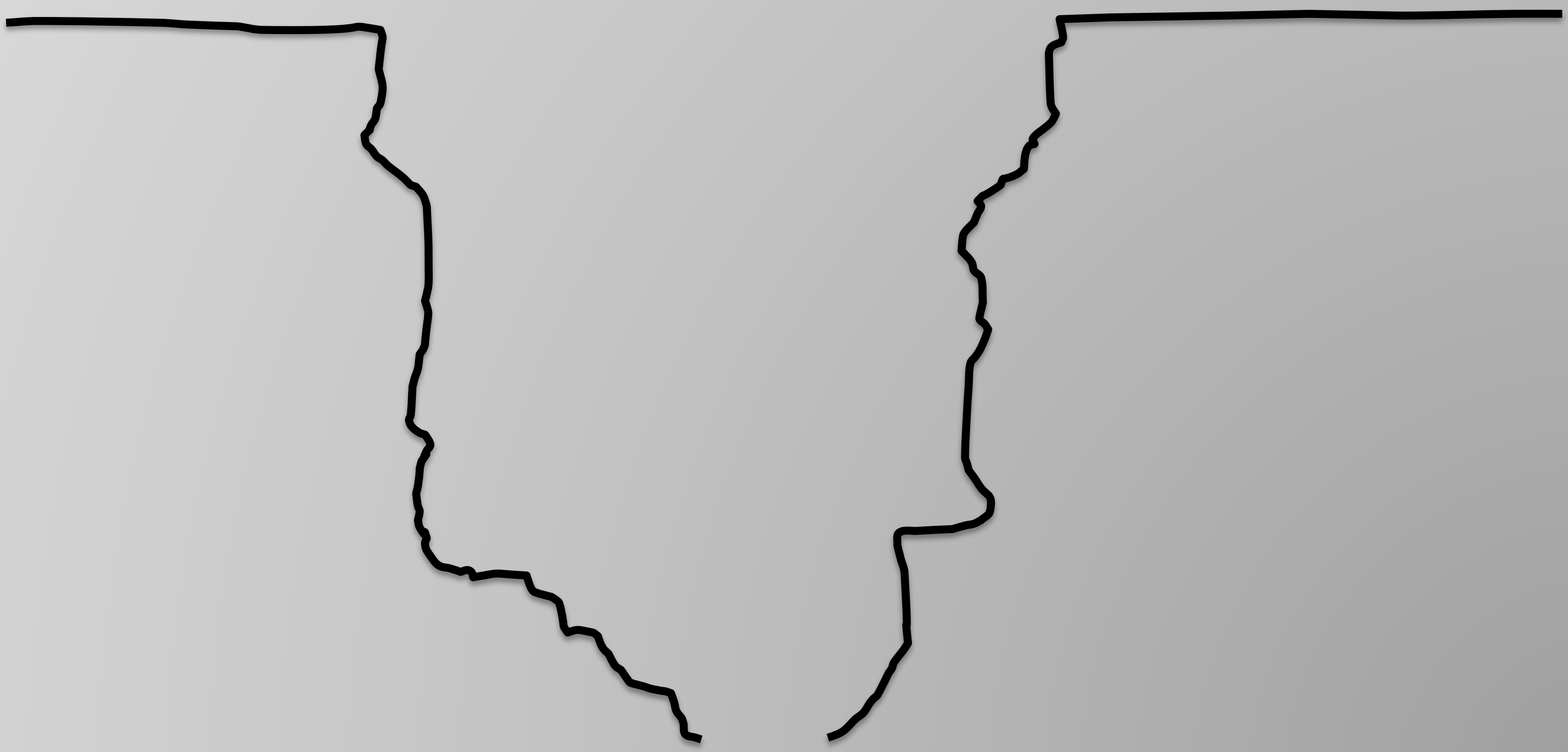
How Do We Know When We’re Done?

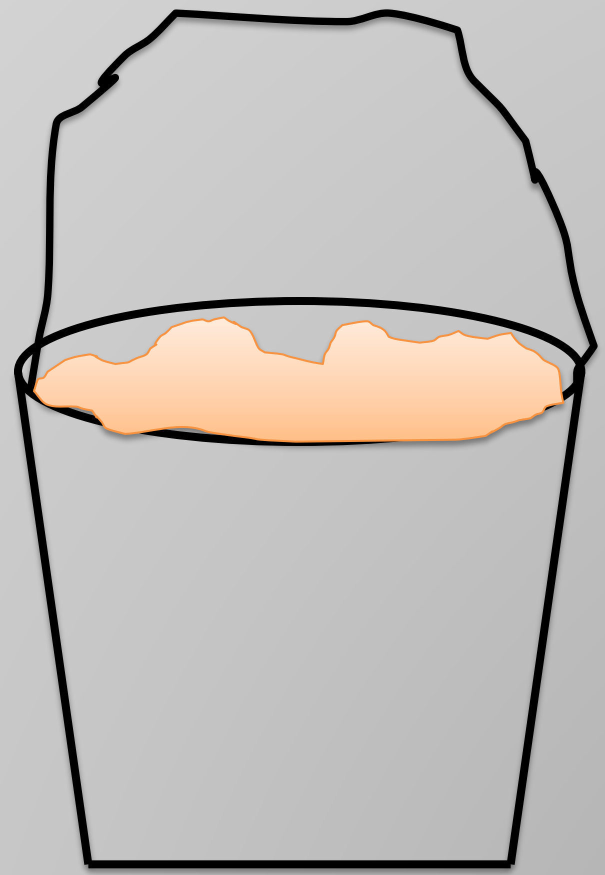
How Do We Know When We’ve Done Enough?

When is a Limiting Factor No Longer Limiting?



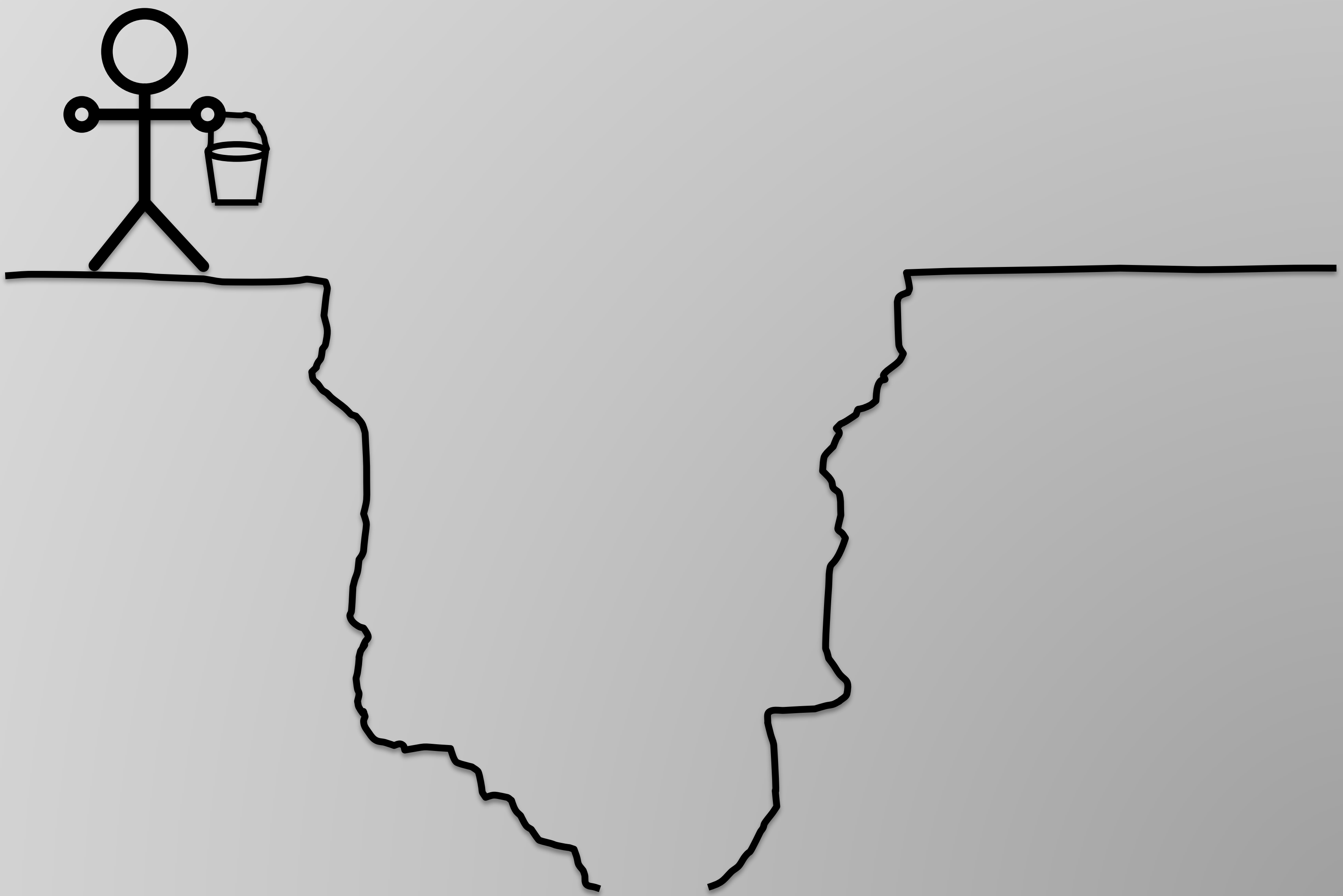
How Deep is the Hole?





How Big is the Bucket?

How Many Buckets will it Take?



How deep is the hole?

Status and Trends Monitoring

Reach Assessments

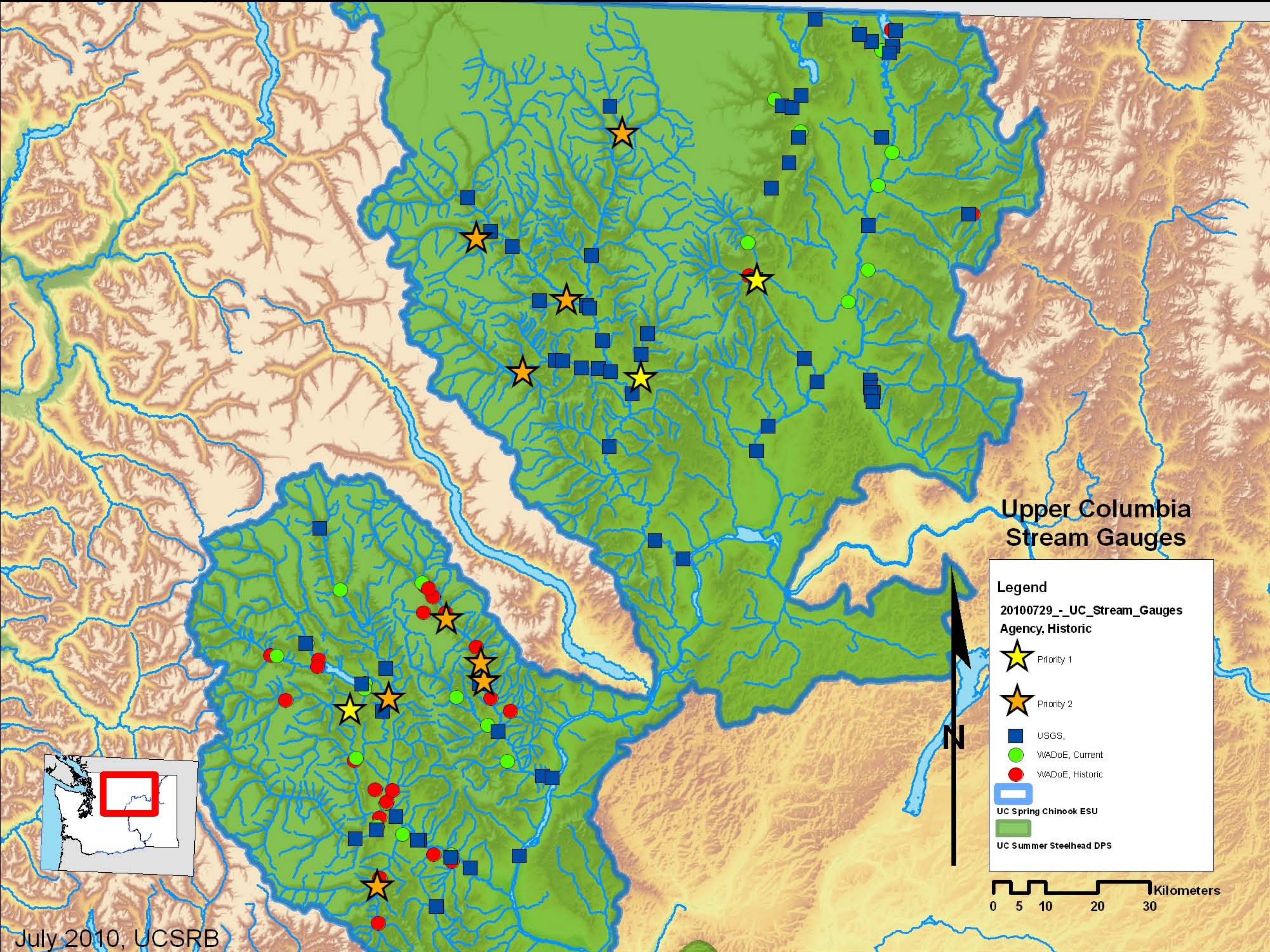
How many buckets?

Implementation Monitoring

How big is the bucket?

Effectiveness Monitoring

Status and Trends Monitoring



Upper Columbia
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Agency, Historic
Priority 1
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USGS,
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WADoE, Historic
UC Spring Chinook ESU
UC Summer Steelhead DPS
N
Kilometers
0 5 10 20 30
July 2010, UCSRB

Effectiveness Monitoring

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Washington State Salmon Recovery Funding Board

Reach-Scale Effectiveness Monitoring Program

2009 Annual Progress Report

April 2010




Implementation Monitoring

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Upper Columbia
Salmon Habitat Implementation Schedule and Projects

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Upper Columbia River Basin Salmon Habitat Restoration

The Upper Columbia Basins consists of six major "subbasins" (Crab Creek, Entiat, Lake Chelan, Methow, Okanogan, and Wenatchee), several smaller watersheds, and the mainstem of the Columbia River. The Plan emphasizes actions that may lead to delisting of three independent populations of spring Chinook within the region's Evolutionarily Significant Unit (Entiat, Methow and Wenatchee); four steelhead populations (Entiat, Methow, Okanogan and Wenatchee); and recovery of bull trout within the Entiat, Methow and Wenatchee subbasins.

Plan Implementation

Implementation of the Upper Columbia Salmon Recovery Plan cannot be successful without the help and support of a number of organizations and individuals. The Upper Columbia Salmon Recovery Plan implementation structure relies on the existing local groups for project implementation in each of the watersheds - they are referred to as "Watershed Action Teams." Representatives from each of these WATs will work with the regional Implementation Team to coordinate funding sources and implementation schedules across the region as well as coordinating monitoring and adaptive management activities of the plan.

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Fender Mill Floodplain Restoration (OK-91)

Status and Schedule

Started on: Mar 01, 2007
Ends on: Oct 10, 2010

Description

The Methow Salmon Recovery Foundation initiated restoration of salmon habitat in the Methow River using natural stream processes. The first project construction was completed in April 2009. Potential work includes removing barriers such as dikes and roads that have resulted in isolation of historically active channels. Side channels for rearing habitat and refugia from high flows will be created directly downstream from the Weeman Bridge. There are four major features at the site which may eventually be addressed.

1. Push-up dikes and mill remnants: The location is the site of an early 20th century sawmill which included one or two canals which not only filled the millpond but also provided a means to float logs into the millpond for processing. Prior to the development and operation of Fender Mill these canals were natural side channels of the mainstem which traversed the floodplain and re-entered the Methow River about 1/2 mile downstream. Constructed improvements at Fender Mill included pushup dikes comprised of native river cobbles which controlled the flow into the side channel canals and millpond and generally protected the site from flooding; a levee which formed the millpond; and a concrete control structure at the lower end of the millpond which regulated its depth. From this control structure return flows traversed the floodplain through the natural channels and returned to the mainstem as previously described. The levee and control structure were essentially an earthen dam which collected side channel flow forming the millpond. Today remnants of the protective cobble dikes prevent live flows from entering the historic side channel. The pond levee and remnants of the control structure obstruct the historic side channel.
2. Rockview Ditch remnants: At approximately the same time as the Fender mill site operated local homesteaders constructed the Rockview irrigation ditch which had its intake on the Methow River just above the Fender mill site at the Weeman Bridge. It appears that this ditch crossed the Fender mill pond and then crossed under the road (later SR 20) via either a small bridge or culvert. Return flow from the fish screen for the ditch used the Fender mill return flow channel as fish return to the Methow River after mill operations ceased. Though the Rockview ditch ceased operations in 2000 and the fish screen was removed the concrete headworks and chain link fencing remain intact. These remnants would impede flows in the historic side channel once the channel is reconnected.
3. Fish return channel blockage: Also around 2000 power line clearing operations occurred along the edge of the project site. Over 100 cottonwood trees were felled. The logs and debris from this operation were piled in the fish return channel effectively blocking it.
4. Hardened crossing: A user-defined crossing which allows recreational access to the river has developed from a road entry access off SR 20. This road fords the old return channel below the wood debris plug and vehicle passage has widened and hardened the crossing point considerably causing a braided channel.

The photos show the work to reopen channel access, cover the Rockview ditch screen debris and prevention of access to stranding areas.

Photos

Initial restoration of floodplain channel to avoid stranding

Location

Okanogan County (US WA Counties)
T35-0N R20-0E S10 (US WA Township)
Methow (US WA WRIA)
Middle Methow River (USGS Level 5 Hydro Regions)
Upper Middle Methow River (USGS Level 6 Hydro Regions)

Map

RECLAMATION
Managing Water in the West

2009 Tributary Projects Evaluation and Hydraulic Function Monitoring Report for the Entiat and Wenatchee Subbasins

U.S. Department of the Interior
Bureau of Reclamation
Pacific Northwest Region
Pacific Northwest Regional Office, Boise, Idaho

March 2010

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Washington State Salmon Recovery Funding Board

Reach-Scale Effectiveness Monitoring Program

2009 Annual Progress Report

April 2010

UC Post-Implementation, Compliance, and Verification Monitoring Metrics

Table 10: The following draft list of Upper Columbia implementation monitoring metrics is based on a list of metrics provided by BPA. This list is subject to change as the result of coordination with BPA, Reclamation and Tetra Tech EC.

Fish Screening

Habitat Action	Compliance Metric	Frequency	Duration
Fish Screen Installation, Fish Screen Removal, Fish Screen Replacement	Does the screen meet NOAA specs?	Years 1, 2, 5	5 years
	Flow rate at the screen diversion allowed by the water right in cubic-feet per second (cfs)	Years 1, 2, 5	5 years
	Is the screen New or a Replacement?	Each event	once
	Quantity of water protected by screening in acre-feet/year as determined by water rights or calculated base flow rate.	Years 1, 2, 5	5 years
	Measure of whether the screened diversion meets engineering design criteria.	Years 1, 2, 5	5 years
	Measure of whether the screen is constructed at the point of diversion with the screen face generally parallel to river flow (where feasible).	Years 1, 2, 5	5 years
	Measure of whether approach velocity exceeds 0.40 ft/s for active screens, or 0.20 ft/s for passive screens.	Years 1, 2, 5	5 years
	Determine if the screen design provides for nearly uniform flow distribution over the screen surface, thereby minimizing approach velocity over the entire screen face	Years 1, 2, 5	5 years
	Determine if screens longer than 6 feet are angled and have sweeping velocity greater than the approach velocity.	Years 1, 2, 5	5 years
	For screens longer than 6 feet, determine if sweeping velocity decreases along the length of the screen.	Years 1, 2, 5	5 years
	Circular Screens-screen face openings must not exceed 3/32 inch in diameter. Perforated plate must be smooth to the touch with openings punched through in the direction of approaching flow.	Years 1, 2, 5	5 years
	Slotted Screens-screen face openings must not exceed 1/16 inch in the narrow direction.	Years 1, 2, 5	5 years

Request

- Add monitoring coordination language to project contracts:

The project sponsor will coordinate with the Upper Columbia Salmon Recovery Board to ensure that adequate project monitoring and reporting occur. Adequate project monitoring includes implementation/compliance monitoring of project implementation. Some projects may also be selected for effectiveness monitoring , which could involve pre- and post-monitoring . The project sponsor agrees to coordinate with the Upper Columbia Salmon Recovery Board and/or its contractors to coordinate sufficient site access, communicate progress timelines to schedule implementation visits, and other activities that will provide for efficient and effective collection of data. Implementation/compliance monitoring may be conducted, in coordination with project sponsors, by the U.S. Bureau of Reclamation, or the Upper Columbia Salmon Recovery Board and its contractors. Effectiveness monitoring, where it occurs, is provided by various regional programs.

Wells, Rocky Reach, and Rock Island HCP Tributary Committees Notes 14 October 2010

Members Present: Dale Bambrick (NOAA Fisheries), Dennis Beich (WDFW), Lee Carlson (Yakama Nation), Chris Fisher (Colville Tribes), Steve Hays (Chelan PUD), Tom Kahler (Douglas PUD), David Morgan (USFWS), and Tracy Hillman (Committees Chair).

Others Present: Becky Gallaher (Tributary Project Coordinator). Denny Rohr (PRCC Habitat Subcommittee facilitator) joined the meeting at 11:30 am.

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans Tributary Committees met at the Chelan PUD Auditorium in Wenatchee, Washington, on Thursday, 14 October 2010 from 9:00 am to 12:10 pm.

I. Review and Adopt Agenda

Tracy Hillman welcomed everyone to the meeting and the Committees adopted the proposed agenda with the following changes:

- Review the Upper Columbia Salmon Recovery Board (UCSRB) Small Project Proposal.
- Discuss David Morgan's future status.

II. Review and Approval of Meeting Minutes

The Committees reviewed and approved the 12 August 2010 meeting notes with edits offered by Tom Kahler.

III. Monthly Update on Ongoing Projects

Becky Gallaher gave an update on funded projects. Most are progressing well or had no salient activity in the past month.

- The Committees have received no report from the project manager on the Entiat PUD Canal System Conversion Project.
- The sponsor completed the "area of potential effect" for the Roaring Creek Flow Enhancement and Barrier Removal Project.
- Construction on the Entiat National Fish Hatchery Project was scheduled to begin on 6 October 2010.

IV. Small Projects Program Applications

The Committees received three Small Projects Program applications that they reviewed during the meeting.

<u>Assessing Nutrient Enhancement Logistics – Upper Columbia</u>

The Upper Columbia Regional Fisheries Enhancement Group submitted this proposal. The purpose of the project is to investigate logistical and technical aspects of collecting, storing, screening, transporting, and distributing excess hatchery-origin salmon carcasses throughout the Upper Columbia, including the Wenatchee, Entiat, Methow, and Okanogan basins. The outcome of this assessment will be the first step in establishing a coordinated region-wide nutrient enhancement program. The total cost of the project is $9,875. The sponsor requested $9,875 from HCP Tributary Funds. After careful consideration of the proposal, ***the Rock Island Tributary Committee elected to fund this project with the following conditions:***

1. The sponsor needs to identify and communicate with stakeholders including cities and counties. The addition of nutrients in a system that has a TMDL may be a concern with some entities.
2. The sponsor should try to complete the assessment within a shorter time frame. Also, about mid-way through the assessment, the sponsor should provide the Committee with an update on progress. This can be in the form of a memo or presentation.

<u>Loan Request to Support the Implementation of the Upper Columbia Habitat Programmatic</u>

The UCSRB submitted a request for a loan from Tributary Funds to help the UCSRB implement the Upper Columbia Habitat Programmatic. The UCSRB will implement a $3.5M annual programmatic fund from BPA. In an effort to manage the fund to implement high priority habitat actions in the Upper Columbia, the UCSRB must secure a no-interest loan of $100,000 to cover reimbursable costs submitted to the UCSRB by subcontractors. The UCSRB would pay back the loan at the end of the programmatic in 2017. After careful review of the request, the Tributary Committees elected not to provide the UCSRB with a loan for the following reasons:

1. The Tributary Committees cannot accept Small Project Applications for which the total budget exceeds $50,000, including matches (see Section 3.6 in the Tributary Committees Policies and Procedures for Funding Projects).
2. The Tributary Committees are unclear on how they would report to the FERC that they provided a no-interest loan using HCP funds.
3. HCP Tributary Funds are held in interest-bearing accounts. The loss of potential interest on the loan is not appealing to the Committees.
4. The Tributary Committees have no means to oversee or control how the money would be used.
5. The Tributary Committees believe that it is the responsibility of BPA to provide the monies needed to implement the Upper Columbia Habitat Programmatic.

<u>Pucket Creek/Methow River Sediment Reduction</u>

The Washington Water Project of Trout Unlimited submitted this proposal. The purpose of the project is to prevent chronic sediment delivery to the Methow River from a poorly designed private and county road. Puckett Creek is a small, non-fish bearing stream with a gradient of 10% that is crossed at three locations by the subject road. During intensive storms, runoff overwhelms the undersized culverts at the road crossings and flows down about 1,000 feet of the unmaintained road. The intent of the project is to rebuild the private portion of the road, to improve drainage features, and, at the crossings of Puckett Creek, to replace the undersized culverts with rock fords. This will keep future runoff in the channel and reduce capture by the road. The total cost of the project is $17,542.80. The sponsor requested $14,542.80 from HCP Tributary Funds. After careful review of the proposal, the Tributary Committees elected not to fund the project for the following reasons:

1. The proposed approach may not be effective in reducing sediment recruitment to the Methow River in the long term.
2. Fine sediment in this portion of the Methow River does not appear to be the primary limiting factor to ESA-listed species.

The Committees would be interested in reviewing an application that proposes to relocate the road at least 200 feet from the stream. In addition, removal of the cattle from the stream would be beneficial.

V. General Salmon Habitat Program Proposals

In August, the Committees received ten General Salmon Habitat Program proposals. Since then, BPA has agreed to fund the Committees’ portion of the following proposals: Dillwater ELJ’s and Side Channel Enhancement Project and the Lower Wenatchee Instream Flow Enhancement Project. Thus, the Committees will review eight proposals in November.

In August, the Committees requested additional information on the budget for the Boat Launch Off-Channel Pond Reconnection Project. The sponsor, Chelan County Natural Resource Department, provided a revised budget. The total cost of the project did not change; however, the sponsor provided more detail in the budget. The sponsor indicated that they would provide more justification for the total cost of the budget.

Tracy Hillman indicated that he received unsolicited comments from the Okanogan Wilderness League (Mr. Lee Bernheisel) on proposed projects in the Methow Basin. Tracy shared those comments with the Committees. The Committees will consider those comments when they conduct their final review of proposed projects in November.

VI. Monitoring Language in Contracts with Project Sponsors

In August, James White, UCSRB Data Steward, asked the Committees to consider adding monitoring coordination language to project contracts. James proposed the following language as an example:

> “*The project sponsor will coordinate with the Upper Columbia Salmon Recovery Board to ensure that adequate project monitoring and reporting occur. Adequate project monitoring includes implementation/compliance monitoring of project implementation. Some projects may also be selected for effectiveness monitoring, which could involve pre- and post-monitoring. The project sponsor agrees to coordinate with the Upper Columbia Salmon Recovery Board and/or its contractors to coordinate sufficient site access, communicate progress timelines to schedule implementation visits, and other activities that will provide for efficient and effective collection of data. Implementation/compliance monitoring may be conducted, in coordination with project sponsors, by the U.S. Bureau of Reclamation, or*

the Upper Columbia Salmon Recovery Board and its contractors. Effectiveness monitoring, where it occurs, is provided by various regional programs."

Members believe the proposed language places a requirement on the Committees to ensure that the project sponsor establishes and maintains coordination between the UCSRB (and their contractors) and the landowner. The Committees do not want to be in a position where they have to police this level of coordination among the sponsor, UCSRB, and landowner. The Committees are fine with including "none-required" language in their contracts with sponsors that encourages the sponsors to coordinate with the UCSRB and landowner, but the UCSRB should be responsible for maintaining coordination with the project sponsor and landowner. The Committees directed Tracy Hillman to draft revised language for review during the November meeting.

VII. Review of the Tributary Committees Chairperson

Tom Kahler reported that the Committees agreed unanimously to retain Tracy Hillman as the Chairperson for the next three-year period (2011 through 2013). Tracy accepted the appointment and asked the members for feedback on how he could better serve them as their Chairperson. Members requested that Tracy (1) more freely offer technical information on projects and (2) coordinate better with Denny Rohr, PRCC Habitat Subcommittee Chair.

VIII. Information Updates

The following information updates were provided during the meeting.

1. Approved Payment Requests in September and October:

   Rock Island Plan Species Account:

   - $1,267.72 to Chelan PUD for Rock Island project administration and coordination during the third quarter, 2010.
   - $125.00 to LeMaster and Daniels for third quarter financial management.
   - $5,054.00 to Chelan-Douglas Land Trust for landowner coordination and contract negotiations on the Nason View Acquisition Project.

   Rocky Reach Plan Species Account:

   - $1,000.58 to Chelan PUD for Rocky Reach project administration and coordination during the third quarter, 2010.
   - $125.00 to LeMaster and Daniels for third quarter financial management.

   Wells Plan Species Account:

   - $805.96 to Chelan PUD for Wells project administration and coordination during the third quarter, 2010.

2. Tracy Hillman, with much help from Chris Fisher, David Morgan, and Dennis Beich, provided a briefing on their trip to the Okanagan River in Canada (notes from the trip are appended as Attachment A). During the first day of the visit (6 October), members of the Committees visited Okanagan Falls Dam. The dam provides no fish passage and therefore is the most upstream barrier to sockeye migration. Hundreds of sockeye were

staging near the base of the dam. Members then visited the Penticton Channel (Okanagan River upstream from Okanagan Falls Dam), which was channelized in the 1950s. About 100 meters of spawning gravels were added to the channel in the mid-1970s. Kokanee spawn extensively in these gravels. The Okanagan Nation Alliance (ONA) intends to add about four spawning gravel ramps to the Penticton Channel that will be used by sockeye after passage is provided at Okanagan Falls Dam. Because of controlled flows, the gravels remain stable in the channel.

Members then visited the lower portion of Shuttleworth Creek. The lower portion of Shuttleworth Creek was reconfigured to act as a sediment trap. As such, the lower portion of the stream is wide, shallow, and heavily embedded with fine sediments. The banks are laid-back and there is limited channel structure and riparian vegetation. In addition, there is a barrier just upstream from the mouth of the stream. Sockeye were staging just downstream from the barrier. Restoration actions under consideration include removing the barrier, reconfiguring the channel, and restoring riparian vegetation. This would open about 31 km of tributary habitat. This stream is an important spawning and rearing area for steelhead/rainbow. In the future, the Committees may see a proposal from ONA to conduct assessment/feasibility studies and ultimately a proposal to help fund restoration in this stream.

On the second day (7 October), members visited McIntyre Dam. During the visit in 2009, members noted that fish were temporarily trapped in a cavity along the outer edge of the horizontal lift gates. Engineers have since placed metal plates over the outer edge of the lift gates. Members observed several attempts by sockeye to pass the lift gates. Few attempts were successful. The ONA will continue to test different combinations of passage scenarios (e.g., opening various gates, testing different flows over gates, adding flow bevels/baffles, etc.). Members suggested that it may be useful to test portable, steep-pass fishways near the left bank. Most fish were attempting to pass along the end wall on the left bank.

Members then visited the Okanagan River Restoration Initiative (ORRI) Project, which is located just upstream from the Town of Oliver. The first phase of implementation, which is mostly complete, was to rebuild the setback dike in the lower portion of the project area. Members observed the completed side channel and instream rock structures. They also visited the location of the second phase of the project, which will reconnect the channel with the floodplain. At least two options are being evaluated under Phase II. One approach is to rebuild setback dikes; the other is to breach the dike in at least two places. The former is the most expensive approach. The ONA, fisheries agencies, and engineers will be conducting cost-benefit analyses on the different options.

3. David Morgan reported that he will be going on an extended leave and therefore will probably not be able to attend the Tributary Committees meetings during that time. Although someone from the USFWS will likely participate on the Committees in David’s stead, members want David to resume his participation on the Committees when he returns. Thus, the Committees directed Tracy Hillman to send a letter to Jessica Gonzales (one of David’s supervisors) that describes the importance of David’s participation on the Committees. The letter should describe David’s contribution to the Committees and identify some of the projects funded by the Tributary Committees that have benefited Plan species.

   Because David will be on leave in December, the Committees decided to conduct their final review of 2010 General Salmon Habitat Program proposals during the November meeting when David would be available to participate in the review.

IX. Next Steps

The next meeting of the Tributary Committees will be on Thursday, 18 November at Chelan PUD in Wenatchee. At that time, the Committees will make final funding decisions on 2010 General Salmon Habitat Program Proposals.

Meeting notes submitted by Tracy Hillman (tracy.hillman@bioanalysts.net).

Attachment A

Okanagan Project Tour Handouts

HCP & PRCC OKANAGAN PROJECT TOUR

Wednesday, October 6, 2010 &
Thursday, October 7, 2010

TOUR DRAFTAGENDA

October 6, 2010

7:00 am	Depart from Wenatchee
9:15 am	Depart from Omak
Noon	Lunch (in Penticton) + hotel check-in
1:30 pm	Spawning in Penticton channel- enhanced section
2:00 pm	Shingle Creek
2:30 pm	Skaha Dam to VDS 16 (Shuttleworth Creek mouth)
4:30 pm	Wine tour

October 7, 2010

8:30 am	Depart from hotel
9:00 am	McIntyre Dam
10:15 am	ORRI- phase I, II, III
Noon	lunch (in Osoyoos)
2:00 pm	Arrive in Omak – Break and CCT departs
4:00 pm	Arrive in Wenatchee

Directions for Drivers – October 6, 2010:

Stop 1: Penticton Channel- Enhance section – 13:30

Directions from Ramada Hotel:

- Take Hwy 97 North toward Kelowna (also called Eckhardt Ave. W).
- Turn left immediately after the bridge.
- Open the blue gate (require a key).
- Drive south along the dyke (on the West side of the channel).

Stop 2: Shingle Creek – 14:00

Directions from Ramada Hotel:

- Follow the Hwy 97 in direction of Skaha Lake (also called Eckhardt Ave and then Channel Phwy).
- Turn right on Green Mountain Road.
- Turn right on the driveway with the sign "Parkway Stables" (one of first driveway after gas station). Park just after bridge.

Directions for Drivers – October 6, 2010 (continued):

Stop 3: Skaha Lake Outlet Dam – 14:30

Directions from Penticton

- Take Hwy 97 South toward Okanagan Falls.
- Turn right on Green Lake Road (road before the bridge that crosses the River below Skaha Lake).
- Park on the right hand side along Green Lake Road (in front of the dam).

Stop 4: VDS 17 to Shuttleworth Creek mouth – 15:00

Directions from Skaha Oultlet Dam

- Drive south on Green Lake Road toward the campground.
- Take the first left driveway after the campground. Park near of the drop structure.
- Walk south (on west side of channel) until VDS 16, then cross VDS 16 and walk until sediment catching basin (Shuttleworth Creek mouth).

Stop 5: Shuttleworth Creek upstream habitat – 16:00

Directions from Skaha Oultlet Dam

- Take Hwy 97 South in direction of Oliver.
- Turn left on Commercial Road (also called Weyerhauser Road) after Tickelberry.
- Follow Commercial Road until junction with Shuttleworth Creek.

Stop 6: Blue Mountain Winery – 16:30

2385 Allendale Road, Okanagan Falls, BC

Directions from Commercial Road (at Shuttleworth Creek)

- Drive toward Okanagan Falls' downtown.
- Turn left on Oliver Ranch Road.
- Turn left on Allendale Road.

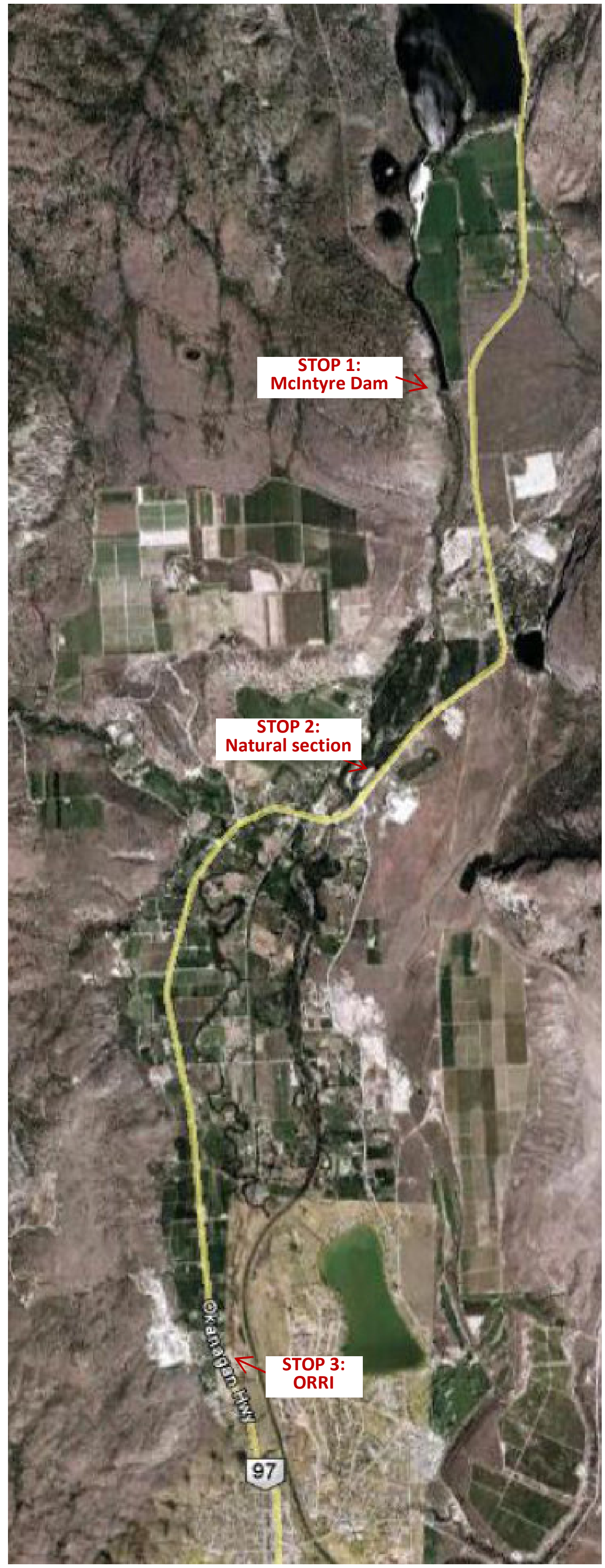
Directions for Drivers – October 7, 2010:

Stop 1: McIntyre Dam – 9:00

39232 97 St, Oliver, BC

Directions from Penticton:

- Take Hwy 97 South toward Oliver.
- Turn right on the driveway (yellow mail box) located just after the road curves below Vaseux Lake.
- Please close the gate (not locked) after each entrance and exit. Follow the left dirt road.
- Please use ONA parking area.



STOP 2: View of the Natural Section - 10:00

Directions from Penticton:

- Take Hwy 97 South toward Oliver.
- Turn right on the pull over located before the Oasis Gas Station (there are several ad billboards).

Stop 3: ORRI- V-line Access – 10:15

Directions from Penticton:

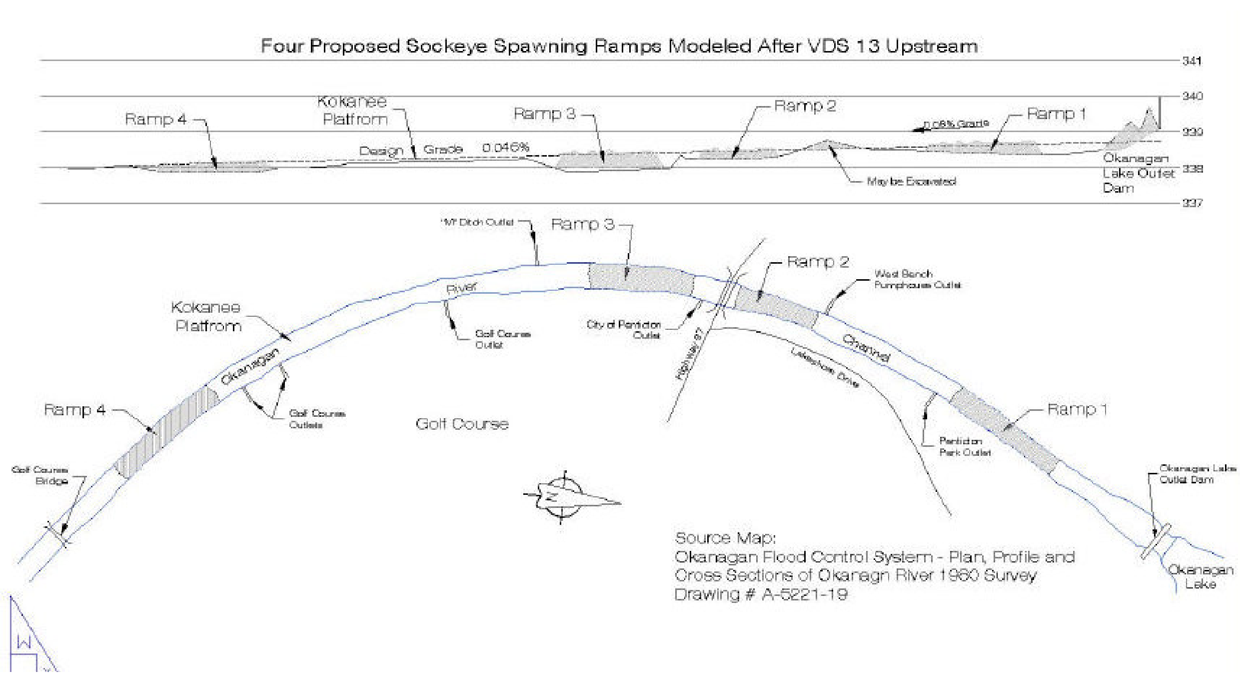
- Take Hwy 97 South toward Oliver.
- Turn left at the V-Line construction driveway.
- Follow the left dirt road until the dyke.

Penticton Channel – Enhanced Section

Historic photo:

- The photo was taken in the 1930's prior to channelization (Vedan, 2003), when the Okanagan River that flowed through Penticton contained oxbows bordered by thick riparian cover.

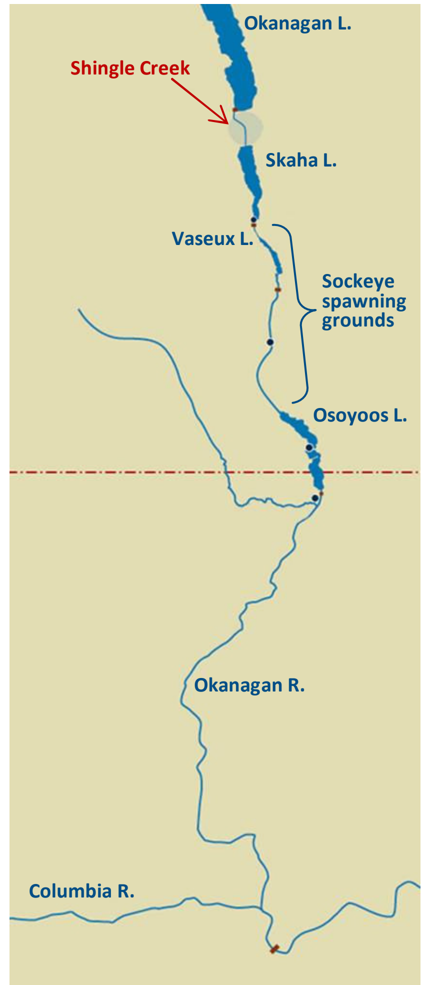
Design:



Shingle Creek

<u>Background information</u>:

- Creek length: 31 km
- Fish species: Kokanee, Rainbow/Steelhead, Brook trout, Whitefish.
- Was historically a major fishing area, main tributary for kokanee in Skaha Lake (with exception of Okanagan River).
- Known fish migration barrier:
  - PIB dam with no longer in use domestic water intake (2.2 km from creek mouth).
- Other known issues:
  - Cattle access, hanging culvert, man-made weir with pump house in Riddle creek (tributary of Shingle).
- Land use in watershed: agriculture, range and forestry



Improving the Habitat of the Okanagan River mainstem (above McIntyre Dam)

Skaha Lake Outlet Dam

Between Skaha Lake Outlet Dam and VDS 17

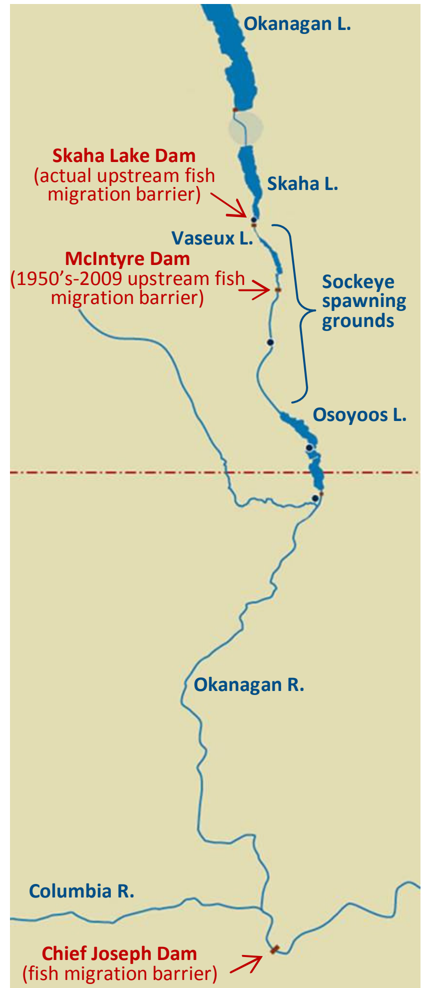
VDS 17

VDS 16

VDS 15

VDS 14

Improving the Habitat of the Okanagan River mainstem (above McIntyre Dam)



Project History:

- Fish passage provided at McIntyre Dam in 2009 allows salmon to access 8 km of Okanagan River (until Okanagan Falls) and Vaseux Lake.
- Most of the Okanagan River upstream McIntyre Dam was channelized and dyked. In consequence, spawning areas are now limited.

Project Goal:

- Creating pools and riffles sequences for sockeye, stealheal/rainbow and potentially Chinook.
- Creating spawning platform for sockeye.

Project Location:

- Okanagan River mainstem (between VDS 17 and 14).

Project Progress:

- Scoping suitable options.

Shuttleworth Creek – Sediment catching Basin

Ortho photo
(Google map, 2010)

Sediment catching basin
(view from downstream)

Shuttleworth Creek – Habitat upstream Sediment catching Basin

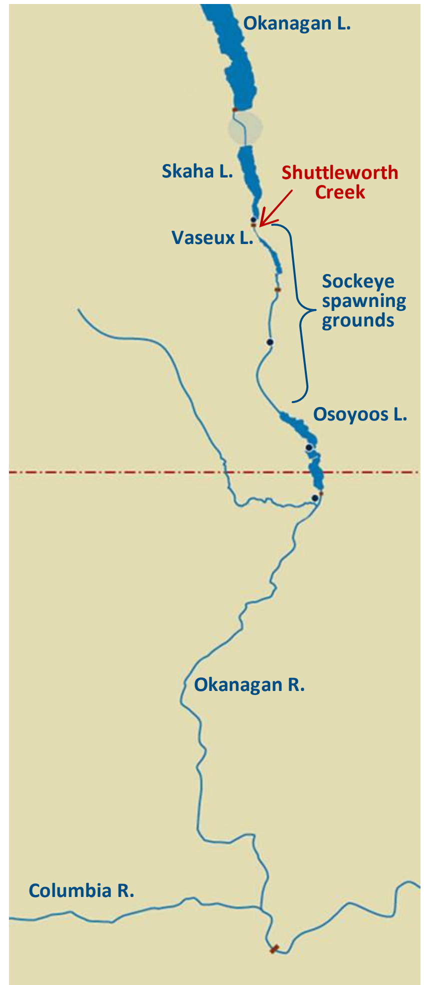
Lower Reach

Middle Braided Reach

Upper Reach

Raibow/Steelhead parr

Shuttleworth Creek – Sediment catching Basin



Project History:

- The sediment catching basin was constructed by the B.C. Ministry of Environment (MOE) in the 1950's at the mouth of Shuttloworth Creek, along with the Okanagan River canalization.
- MOE has been removing the sediments accumulated in this basin approximately every 5-10 years since that time.
- This sediment catching basin is a partial fish barrier.
- The upstream section of Shuttleworth Creek is a good quality habitat for steelhead (listed as endangered in US).

Project Goal:

- Provide fish passage at the sediment catching basin while maintaining the B.C MOE criteria for the maintenance of the Okanagan River channel capacity.

Project Location:

- Shuttleworth Creek (mouth)
- Okanagan Falls, BC

Project Progress:

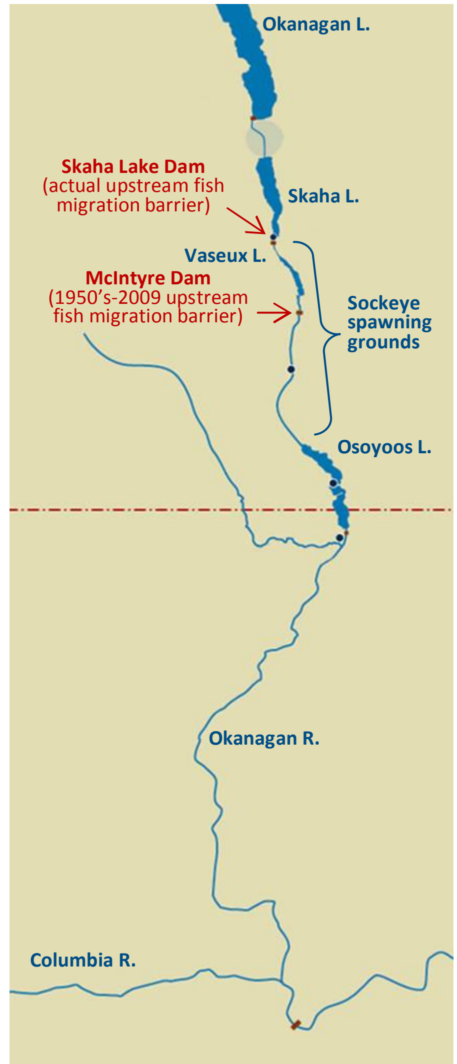
- Under discussion through a Steering Committee to scope optimal options for all partners.
- Funding request proposal planned for March 2011.

Providing Fish Passage at McIntyre Dam

BEFORE (2008)

AFTER (2009)

Providing Fish Passage at McIntyre Dam



Project History:

- Historically, salmon were present in Okanagan, Skaha, Vaseux, and Osoyoos lakes. However, dams constructed in the Okanagan River in the 1900's impeded or eliminated access by Okanagan salmon to Okanagan, Skaha and Vaseux lakes.
- McIntyre Dam has been the upstream fish migration barrier since its construction (1954) and its weir (1914).

Project Goal:

Provide upstream adult salmon passage and improve downstream juvenile salmon migration at McIntyre Dam, by:

- Replacing the undershot gates with overshot gate.
- Building a backwater riffle downstream of the dam.
- Monitoring the effectiveness of the project on sockeye salmon migration.
- Installing a permanent screen in the Oliver irrigation canal (by the Town of Oliver).

Project Location:

- McIntyre Dam, Okanagan River
- Oliver, BC

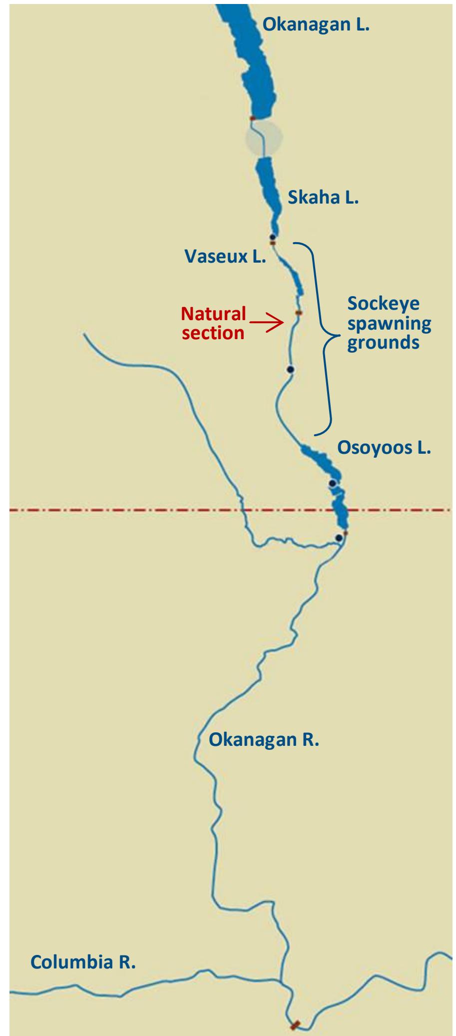
Project Timeline:

- February 2008 to March 2011.

Project Progress:

- Steering committee meetings/Engineering design: complete.
- Modifications to the dam (construction works): complete in 2009.
- Monitoring impact on salmon: to be complete by October 2010.
- Improvement of fish jumping efficiency: expected by March 2011.
- Installation of a water survey station: expected by November 2010.
- Reporting: expected by March 2011.

Preservation the natural portion of the Okanagan River



Project History:

- The only natural portion of the Okanagan River is located on the Osoyoos Indian Band (OIB) reserve. Development opportunities in this area may arise in the future.

Project Goal:

- Search for sustainable alternatives to development in collaboration with OIB.

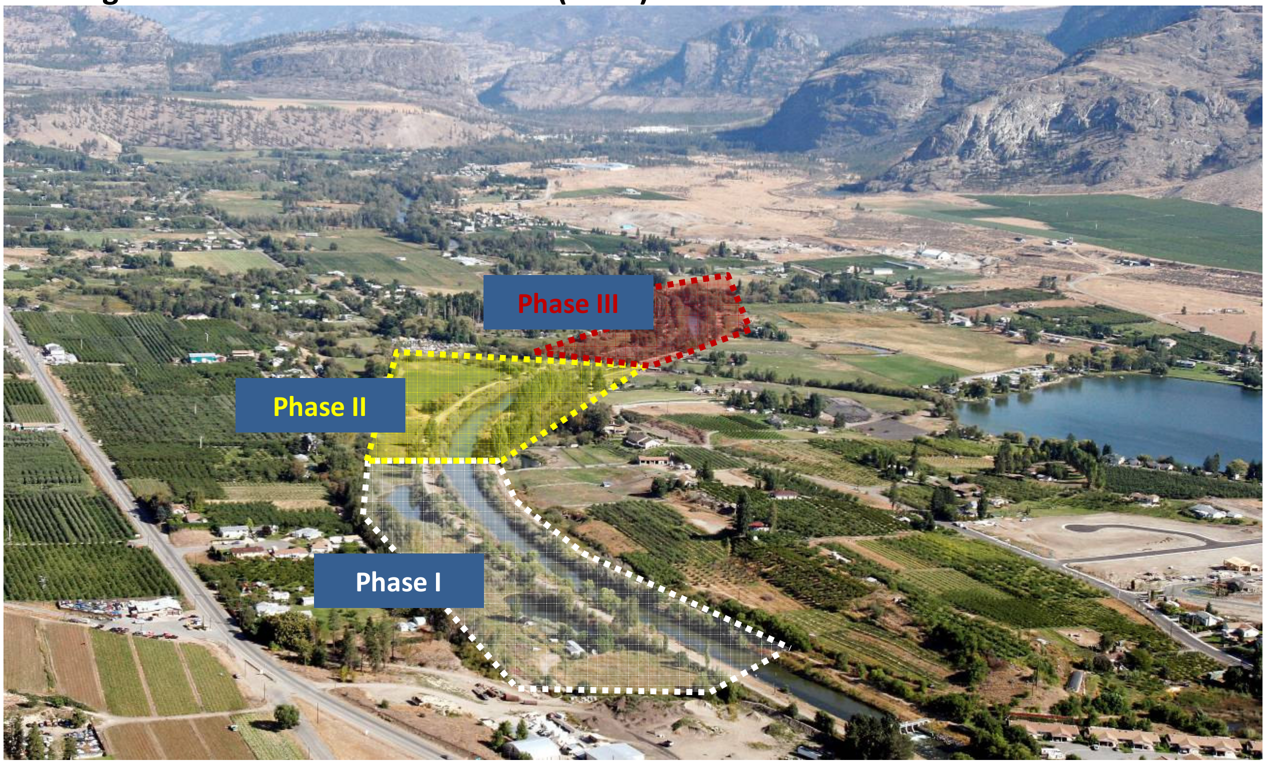
Project Location:

- Okanagan River
- Oliver, BC

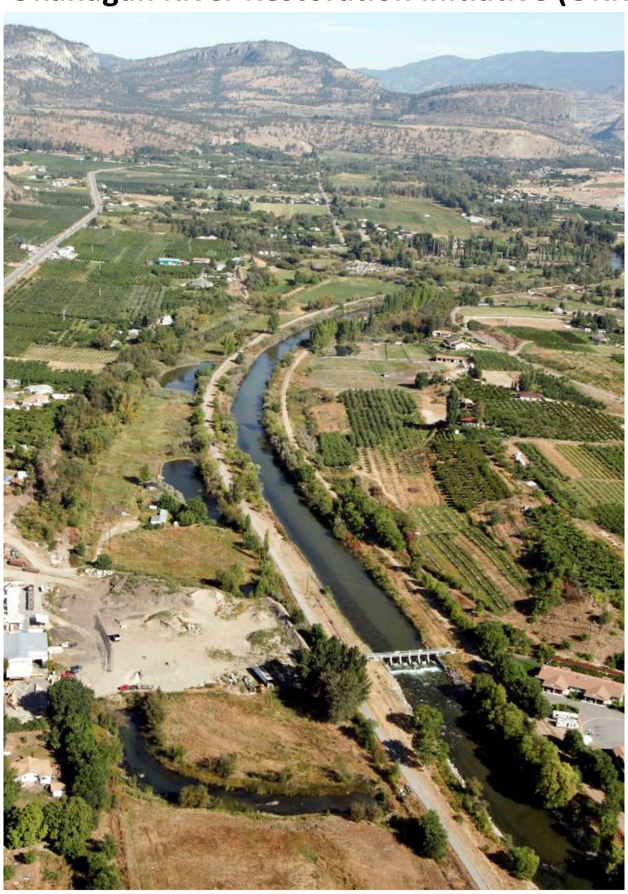
Project Timeline & Progress:

- Under preliminary discussions with Osoyoos Indian Band.

Okanagan River Restoration Initiative (ORRI)



Okanagan River Restoration Initiative (ORRI) – Phase I



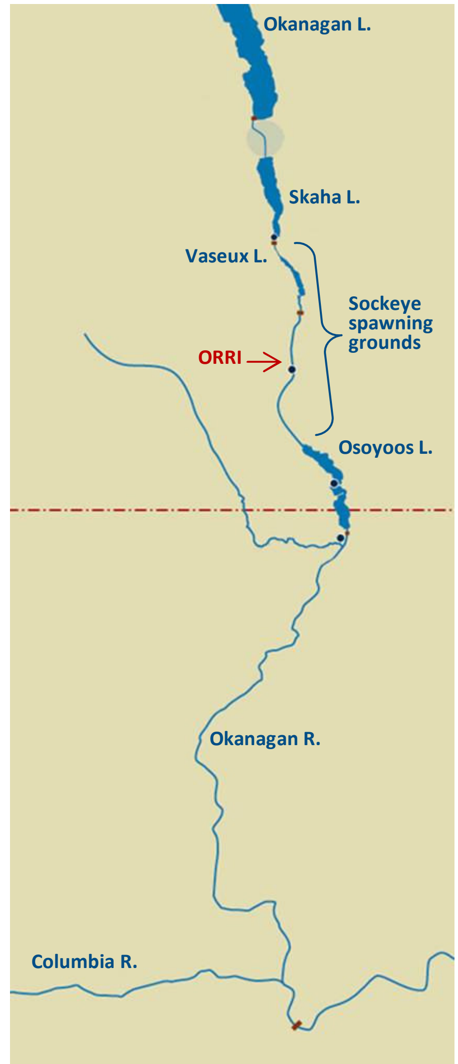
BEFORE (Michael Bezener, 2005)

AFTER (Kevin Dunn, 2009)

Okanagan River Restoration Initiative (ORRI) – Phase II

Okanagan River Restoration Initiative (ORRI) – Phase III

Okanagan River Restoration Initiative (ORRI)



Project History:

- In the mid-1950s much of the Okanagan River was straightened and diked for flood control purposes.

Project Goal:

- Return portions of the channelized Okanagan River back to a more natural condition and regain the habitat quality and quantity that has been lost.

Project Location:

- Okanagan River
- Oliver, BC

Project Timeline & Progress:

- Phase I:
  - Dyke set back: complete in 2008.
  - Re-meandering the river (creation of a dual channel, building of riffles/spawning platform, placement of gravel bars): complete in 2009.
  - Site Re-vegetation: on-going.
- Phase II:
  - Dyke set back: complete in 2008.
  - Under review of potential options and engineer designs.
- Phase III:
  - Under discussion for land acquisition with landowners.

Wells, Rocky Reach, and Rock Island HCP Tributary Committees Notes 18 November 2010

Members Present: Dale Bambrick (NOAA Fisheries), Casey Baldwin (WDFW), Lee Carlson (Yakama Nation), Chris Fisher (Colville Tribes), Steve Hays (Chelan PUD), Tom Kahler (Douglas PUD), David Morgan (USFWS), and Tracy Hillman (Committees Chair).

Others Present: Becky Gallaher (Tributary Project Coordinator). Keith Truscott (Chelan PUD) joined from 10:00-10:20 am. Denny Rohr (PRCC Habitat Subcommittee facilitator) joined the meeting at 11:15 am.

The Wells, Rocky Reach, and Rock Island Hydroelectric Projects Habitat Conservation Plans Tributary Committees met at the Chelan PUD First Floor Conference Room in Wenatchee, Washington, on Thursday, 18 November 2010 from 9:00 am to 1:00 pm.

I. Review and Adopt Agenda

Tracy Hillman welcomed everyone to the meeting and the Committees adopted the proposed agenda with the following changes:

- Review Delegation of Authority.
- Updates from David Morgan.

II. Review and Approval of Meeting Minutes

The Committees reviewed and approved the 14 October 2010 meeting notes with edits offered by Tom Kahler.

III. Monthly Update on Ongoing Projects

Becky Gallaher gave an update on funded projects. Most are progressing well or had no salient activity in the past month.

- For the Entiat PUD Canal System Conversion Project, drilling was completed on test well (TW) 5, 6, 7, and 8. The wells still need to be pump tested; however, based on estimates during drilling, TW 5 produces about 50 gpm, TW 6 and 7 each produce about 75 gpm, and TW 8 about 25 gpm. TW 7 and 8 show promise of greater production. The project geotechnical engineer will analyze data before additional drilling or development commences. The geotechnical engineer will soon prepare a report that summarizes results from the eight test wells. The next steps include identification and evaluation of alternatives, including cost estimates, for possible scenarios that would meet individual landowner needs. River intakes will likely be a component of the project.

- The Riparian Restoration and Regeneration Initiative Project is complete. The sponsor submitted the final report to the Wells Committee.
- Construction is underway on the Entiat National Fish Hatchery Project.
- For the Twisp River Riparian Protection Project, the Buckley property is ready to close and the Zinn property should close in December or January.

IV. Monitoring Language in Contracts with Project Sponsors

In August, James White, UCSRB Data Steward, asked the Committees to consider adding monitoring coordination language to project contracts. In October, the Committees reviewed the proposed language and concluded that the language places a requirement on the Committees to ensure that the project sponsor establishes and maintains coordination between the UCSRB (and their contractors) and the landowner. The Committees did not want to be in a position where they have to police this level of coordination among the sponsor, UCSRB, and landowner. Therefore, the Committees developed the following "none-required" language for their contracts with sponsors:

> *Various monitoring efforts may occur over the term of this Agreement. In the event that the project is desired as a monitoring site, upon receipt of a written Committee request, the Sponsor shall facilitate such monitoring efforts. For the term of this Agreement, Sponsor responsibilities may include but not be limited to: coordinating monitoring visits with the Landowner and familiarizing those performing the monitoring with the project and project site. If other specific monitoring activities are required for the project, those requirements will be included in Attachment 1.*
>
> *Habitat restoration projects implemented within the Upper Columbia Basin will be monitored for implementation and compliance by the U.S. Bureau of Reclamation or the Upper Columbia Salmon Recovery Board (or its contractors). The sponsor is encouraged to coordinate with the Upper Columbia Salmon Recovery Board in this effort. The sponsor should coordinate access to the project site, communicate progress timelines to schedule implementation visits, and share other activities that will provide for efficient and effective collection of implementation/compliance data. In addition, a random selection of projects will be monitored for their effectiveness at the reach or project scale. This could involve the collection of data before and after the implementation of the project. Sponsor coordination with the Upper Columbia Salmon Recovery Board is important in this effort.*

This language encourages the sponsors to coordinate with the UCSRB and landowner, but the UCSRB will be responsible for maintaining coordination with the project sponsor and landowner.

V. General Salmon Habitat Program Proposals

In August, the Committees received ten General Salmon Habitat Program proposals. Since then, BPA has agreed to fund the Committees' portion of the following proposals: *Dillwater ELJ's and Side Channel Enhancement Project* and the *Lower Wenatchee Instream Flow Enhancement Project*. Thus, the Committees reviewed eight proposals.

Before reviewing the proposals, Becky Gallaher reported that currently there is $414,390 in the Rock Island Plan Species Account (~$650,000 will be added in January), $1,092,017 in the

Rocky Reach Plan Species Account (~$300,000 will be added in January), and about $600,000 in the Wells Plan Species Account (~$230,000 will be added in January).

Boat Launch Off-Channel Pond Reconnection Project

Chelan County Natural Resource Department is the sponsor of the Boat Launch Off-Channel Pond Reconnection Project. The purpose of this project is to design and construct a flow-through channel between a 0.25-acre pond and the Wenatchee River by removing sections of a 30 ft berm. This should provide refuge and rearing habitat and increase floodplain connectivity. The total cost of the project is $136,500. The sponsor requested $62,000 from HCP Tributary Funds. ***The Rock Island Committee approved funding for this project.***

White River Van Dusen Conservation Easement

The Chelan-Douglas Land Trust is the sponsor of the White River Van Dusen Conservation Easement. The purpose of this project is to obtain a conservation easement along the White River between RM 8.5 and 9.1. The easement would protect 40 acres (with 75% in the floodplain), including 5,000 feet of riverbank. The total cost of the project is $440,000. The sponsor requested $60,000 from HCP Tributary Funds. ***The Rock Island Committee approved funding for this project.***

Lower Icicle Creek Reach Assessment

The Washington Fish Conservancy is the sponsor of the Lower Icicle Creek Reach Assessment. The intent of this project is to assess the geomorphic function and establish baseline conditions of channel morphology, habitat diversity, and shoreline conditions within the lower 2.8 miles of Icicle Creek. This work would be used to develop a prioritized list of site-specific habitat preservation and restoration opportunities. In addition, the work would include a landowner willingness survey and a public outreach effort. The total cost of the project is $75,814. The sponsor requested $13,000 from HCP Tributary Funds.

The Committees acknowledge the importance of an assessment within lower Icicle; however, they understand that the BOR will be conducting a reach assessment within lower Icicle Creek. Therefore, the Committees cannot justify spending money on an assessment that will be done in the future at no cost to them. In addition, the Committees believe the assessment should include the area from the mouth of Icicle Creek to the confluence with Bridge Creek. Thus, ***the Tributary Committees elected not to fund this project***.

Chewuch River Permanent Instream Flow Project

Trout Unlimited – Washington Water Project is the sponsor of the Chewuch River Permanent Instream Flow Project. The purpose of this project is to reduce the Chewuch Canal Company's (CCC) maximum diversion from 34 cfs to 24 cfs when the Chewuch flow levels reach 100 cfs. This will result in a 10% increase in instream flow for the Chewuch River. The basis of the project is a contract between Trout Unlimited and CCC under which CCC agrees to reduce its diversions in exchange for compensation. The total cost of the project is $1,200,000. The sponsor requested $325,000 from HCP Tributary Funds. ***The Rocky Reach Committee approved funding for this project*** provided Pearrygin Lake can be filled during high spring flow.

Upper Methow Riparian Protection IV (Keith)

The Methow Conservancy is the sponsor of the Upper Methow Riparian Protection IV Project. The purpose of this project is to obtain a conservation easement on a 28.4-acre property located along the upper Methow River. The easement would protect about 16 acres, including 1,210 feet of riverbank. The total cost of the project is $363,003. The sponsor requested $54,450 from HCP Tributary Funds.

Although the Committees understand the importance of protecting riparian and off-channel habitat, some of the members of the Committees believe that protecting this site will have little value without also protecting the upstream property. The Committees recommend that the sponsor focus first on protecting the upstream property and then address the Keith property. Therefore, ***the Tributary Committees elected not to fund this project***.

Methow River Acquisition 2010 MR 39.5 LH (Hoffman)

The Methow Salmon Recovery Foundation is the sponsor of the Methow River Acquisition 2010 MR 39.5 LH (Hoffman) Project. The purpose of this project is to acquire about 22.8 acres along the middle Methow River. The acquisition would include about 15 acres of floodplain and riparian habitat, and about 2,100 ft of riverbank. The total cost of the project is $195,048. The sponsor requested $74,415 from HCP Tributary Funds. ***The Wells Committee approved funding for this project.***

Methow River Acquisition 2010 MR 41.5 LR (Risley)

The Methow Salmon Recovery Foundation is the sponsor of the Methow River Acquisition 2010 MR 41.5 LR (Risley) Project. The purpose of this project is to acquire about 20 acres along the middle Methow River near RM 41.5. The acquisition would include about 13.5 acres of floodplain and riparian habitat, and about 1,500 ft of riverbank. The total cost of the project is $238,760. The sponsor requested $122,404 from HCP Tributary Funds.

Although the Committees understand the importance of protecting riparian and off-channel habitat, they do not want to provide funds for the upland component of the acquisition. It is the understanding of the Committees that the owner is unwilling at this time to separate the two parcels. However, if at some point the owner is willing to separate the parcels, the Committees would consider providing funds for the floodplain parcel. Therefore, ***the Tributary Committees elected not to fund this project***.

Methow River Acquisition 2010 MR 48.7 RB (Bird)

The Methow Salmon Recovery Foundation is the sponsor of the Methow River Acquisition 2010 MR 48.7 RB (Bird) Project. The purpose of this project is to acquire about 18 acres along the middle Methow River between RM 48.6-49. The acquisition would include about 17 acres of floodplain and riparian habitat, and about 2,100 ft of riverbank. The total cost of the project is $244,760. The sponsor requested $94,900 from HCP Tributary Funds. ***The Wells Committee approved funding for this project.***

Summary of Review of 2010 General Salmon Habitat Program Projects.

Project Name	Sponsor[1]	Total Cost	Request from T.C.	Plan Species Account[2]
Boat Launch Off-Channel Pond Reconnection	CCNRD	136,500	62,000	RI
White River Van Dusen Conservation Easement	CDLT	440,000	60,000	RI
Lower Icicle Creek Reach Assessment	WFC	75,814	13,000	--
Chewuch River Permanent Instream Flow Project	TU-WWP	1,200,000	325,000	RR
Upper Methow Riparian Protection IV	MC	363,003	54,450	--
Methow River Acquisition 2010 MR 39.5 LH (Hoffman)	MSRF	195,048	74,415	W
Methow River Acquisition 2010 MR 41.5 LR (Risley)	MSRF	238,760	122,404	--
Methow River Acquisition 2010 MR 48.7 RB (Bird)	MSRF	244,760	94,900	W

[1] CDLT = Chelan-Douglas Land Trust; MC = Methow Conservancy; MSRF = Methow Salmon Recovery Foundation, CCNRD = Chelan County Natural Resource Department; TU-WWP = Trout Unlimited - Washington Water Project; WFC = Wild Fish Conservancy.

[2] RI = Rock Island Plan Species Account; RR = Rocky Reach Plan Species Account; W = Wells Plan Species Account.

VI. Information Updates

The following information updates were provided during the meeting.

1. Approved Payment Requests in October and November:

   Rocky Reach Plan Species Account:

   - $89,825.00 to Inland Professional Title for the Buckley Property under the Twisp River Riparian Protection Project.
   - $180.97 to Cascadia Conservation District for work on the Below the Bridge Project.

   Wells Plan Species Account:

   - $1,084.75 to the Methow Conservancy for work on the Riparian Regeneration and Restoration Initiative.
   - $2,272.00 to Douglas PUD for Wells project administration during the third quarter, 2010.

2. Dale Bambrick and Casey Baldwin shared with the Committees the outcome of the Wenatchee and Entiat project tour, which was organized by Chelan County Natural Resource Department and the Cascadia Conservation District. The tour was held on Thursday, 4 November. Projects visited in the Wenatchee included Cashmere Pond, Peshastin Irrigation District Piping, CMZ 6, and Goodfellow. In the Entiat, projects included Keystone ELJ, Entiat National Fish Hatchery Project, Entiat Riparian Restoration Site, and Preston (Yurt) Project. Dale and Casey shared some of the good and not-so-good aspects of the projects. Dale pointed out the importance of more frequently visiting the projects. This is needed to adaptively learn (i.e., to identify what works and what does not). Casey took several photographs, which can be found on the Tributary Committees website.

3. Casey Baldwin asked if the Policies and Procedures of the Tributary Committees allow for targeted solicitation. The Policies and Procedures do not preclude targeted solicitations; however, the Committees agreed that any proposals received under a targeted solicitation would have to fit within the General Salmon Habitat Program timeline and schedule.
4. Becky Gallaher indicated that Chelan PUD has prepared a contract to continue the work of the Chair (Tracy Hillman) for the Rock Island and Rocky Reach Committees through 2011. Tom Kahler indicated that Douglas PUD has also prepared a contract to extend the work of the Chair for the Wells Committee. As part of the process, Becky asked members of the Committees if they would like to continue to delegate some of the Committees' authorities to the Chair for the transaction of Committees' business (consistent with past years). Members of the Committees and the Chair signed the Delegation of Authority, which provides limited authority to transmit correspondence on behalf of the Committees, sign HCP TC/Sponsor Agreements, sign contracts, and under certain conditions directly disperse or authorize a third party to disburse funds for the Committees.
5. David Morgan shared with the Committees updates from the Wenatchee Watershed Subcommittee meeting. David noted that the subcommittee discussed alternatives for the Lower Nason Creek N1 Project. One of the top alternatives is road relocation, which is an action that many have advocated for several years. David stated that this alternative should not be funded entirely with fish dollars. The WDOT will also need to contribute funding.

   David noted that the Bureau of Reclamation has hired Enterprise Team to identify and evaluate different alternatives for the Upper White Pine Project. One of the alternatives is to relocate the power lines.

   Lastly, David stated that he has been talking with Jason Lundgren about the salmon toss project. Jason is in communication with the WDOE, but is not yet clear on what WDOE will require. Jason has agreed to provide the Committees with periodic updates.
6. Chris Fisher gave a presentation on the Driscoll Island flow management structure that was funded by the Colville Tribes. The purpose of the project is to maintain flows within a segment of the Okanogan River that dewaters during low-flow periods. During low flows, the Okanogan River flows through the cross channel into the Similkameen River. During higher flows, the Similkameen flows through the cross channel into the Okanogan River. Chris described the process of improving the ford in the Okanogan River and developing a flow management structure in the cross channel. The total cost of the project was about $360,000. This included $100,000 for design, $249,000 for construction, and $10,500 for engineering and oversight.
7. This was David Morgan's last meeting with the Committees. Keith Truscott and members of the Tributary Committees told David how much they appreciated his involvement with the Committees. His expertise and knowledge of the basins will be missed. Kate Terrell, U.S. Fish and Wildlife Service, will replace David on the Committees.

VII. Next Steps

The next meeting of the Tributary Committees will be on Thursday, 13 January at Chelan PUD in Wenatchee.

Meeting notes submitted by Tracy Hillman (tracy.hillman@bioanalysts.net).

APPENDIX D
LIST OF WELLS HCP COMMITTEE MEMBERS

Wells Dam Mid-Columbia HCP Committees

Coordinating Committee

Name	Organization
Michael Schiewe (Chair)	Anchor QEA, LLC
Jerry Marco	Colville Tribes
Tom Kahler	Douglas PUD
Bryan Nordlund	NOAA Fisheries
Jim Craig	USFWS
Bill Tweit	WDFW
Steve Parker	Yakama Nation

Hatchery Committee

Name	Organization
Michael Schiewe (Chair)	Anchor QEA, LLC
Kirk Truscott	Colville Tribes
Greg Mackey	Douglas PUD
Rob Jones	NOAA Fisheries
Bill Gale	USFWS
Mike Tonseth	WDFW
Tom Scribner	Yakama Nation

Tributary Committee

Name	Organization
Tracy Hillman (Chair)	BioAnalysts
Chris Fisher	Colville Tribes
Tom Kahler	Douglas PUD
Dale Bambrick	NOAA Fisheries
David Morgan	USFWS
Dennis Beich	WDFW
Bob Rose	Yakama Nation

Policy Committee

Name	Organization
Michael Schiewe (Facilitator)	Anchor QEA, LLC
Joe Peone	Colville Tribes
Shane Bickford	Douglas PUD
Keith Kirkendall	NOAA Fisheries
Mark Miller	USFWS
Bill Tweit	WDFW
Virgil Lewis	Yakama Nation

APPENDIX E
STATEMENTS OF AGREEMENT FOR COORDINATING COMMITTEES

Wells HCP Coordinating Committee
Draft Statement of Agreement
Approval of the Results of the 2010 Wells Project
Survival Verification Study, Phase III (Standard Achieved)
November 4, 2010
Approved November 16, 2010

Statement

The Wells HCP Coordinating Committee accepts the results of Douglas PUD's 2010 Wells Project Survival Verification Study, which verifies the continued achievement of Phase III (Standard Achieved) for yearling Chinook and steelhead migrating through the Wells Project as per Section 4.2.5.1 of the Wells HCP. The Juvenile Project Survival measured in 2010 (96.4%, SE = 0.0128) will now be included with the results of previous survival studies (99.7%, 94.3%, 94.6%) in a new 4-year average Juvenile Project Survival of 96.3% for yearling Chinook and steelhead. Thus, Douglas PUD's NNI hatchery-production commitments for yearling Chinook and steelhead will be adjusted per Section 8.4.4 of the Wells HCP, with the final adjusted production as follows: yearling summer Chinook = 105,714 smolts @ ~10 fpp; yearling spring Chinook = 59,464 smolts @ ~15 fpp; summer steelhead = 47,571 smolts @ ~6 fpp. Douglas PUD will be required to re-evaluate Juvenile Project Survival for yearling Chinook and steelhead in 2020.

Background

During Phase I of the Wells HCP Passage Survival Plan (Section 4), Douglas PUD conducted three years of valid Juvenile Project Survival studies with steelhead and yearling Chinook salmon. Results from those studies consistently exceeded the 93% Juvenile Project Survival standard and the precision and accuracy requirements of the HCP. The average juvenile project survival for yearling Chinook and steelhead over the three years of study was 96.2%. The results from the Phase I Juvenile Project Survival studies, coupled with the results from the adult passage studies, provided the necessary information for the HCP Coordinating Committee to determine that the Wells Project could proceed to Phase III (Standard Achieved) for yearling Chinook and steelhead (adopted at the February 2005 Coordinating Committee meeting).

Phase III of the Passage Survival Plan (Wells HCP Section 4.2.5) indicates that when the appropriate survival standard has been achieved, periodic monitoring is required to ensure that the survival of Plan Species is maintained and remains in compliance with the survival standards set forth in the plan for the term of the Agreement. To verify the continued achievement of Phase III (Standard Achieved) for yearling Chinook and steelhead, Douglas PUD implemented the *Wells Project Survival Verification Study; Phase III (Standard Achieved), 2010 Study Plan*, as approved by the Wells Coordinating Committee on June 23, 2009.

APPENDIX F
STATEMENTS OF AGREEMENT FOR HATCHERY COMMITTEES

Wells HCP Hatchery Committee
Statement of Agreement
Twisp River Steelhead Spawning Success Study
January 21, 2010

Statement

The Wells HCP Hatchery Committee approves the Twisp River Steelhead Spawning Success Study dated 23 December 2009. The study proposed is a requirement of the Wells HCP (Section 8.5.3) and is part of the Hatchery Genetic Management Plan (HGMP) for the Wells Hatchery Summer Steelhead Program. The information gained from this study will provide important information that can contribute to the management and eventual recovery of steelhead in the Methow Basin.

Background

The study will compare the relative spawning success (RSS) of wild and hatchery steelhead from parents to progeny returning as f2 and f3 adults in the Twisp River, Methow Basin beginning in 2009 and running through 2021. The study will encompass three broods through the f3 generation and will use the Twisp Weir to sample adult steelhead, molecular genetic analyses to determine parentage, and field data collection to assess factors that affect reproductive success. The study integrates objectives and activities of the *Conceptual Approach to Monitoring and Evaluation for Hatchery Programs* funded by Douglas PUD. Critical gaps in knowledge addressed by this study include: 1) the RSS of hatchery fish compared to wild fish in the Twisp River, 2) the environmental and genetic contribution to potential differences in RSS between hatchery and wild fish, and 3) traits associated with differences in RSS. The findings of this study will be related to the management of steelhead in the Methow Basin.

The study has been developed based on the best available information in the scientific literature, hypotheses that when tested will fill important data gaps, an assessment of logistics and infrastructure that make such a study possible, and an analysis of the statistical power needed to detect reproductive differences between hatchery and wild fish. The Twisp River and associated weir is the best location in the Methow Basin to conduct such a study. The District's monitoring and evaluation plan includes activities under Objectives 1, 2, and 4 that will integrate with this study, such as sampling upstream migrants at the Twisp Weir and performing intensive spawning ground surveys.

Douglas PUD's Steelhead RSS Study was developed to meet the requirements of the HCP (Section 8.5.3) and is a standalone study. WDFW's BPA-funded reproductive success study in the Twisp River complements the Douglas PUD RSS study. In addition, these studies will include information on repeat spawners or re-conditioned kelts that are passed upstream of the Twisp Weir.

Wells HCP Hatchery Committee
Statement of Agreement
2010 Methow Spring Chinook Hatchery Genetics Management Plan
Approved 2-17-10

Statement

The Wells HCP Hatchery Committee approves the Hatchery Genetic Management Plan (HGMP) for the Methow Hatchery Spring Chinook Program, dated February 12, 2010.

Background

The Wells HCP requires Douglas PUD to produce hatchery spring Chinook toward achieving the No Net Impact (NNI) goal of the HCP. Chinook survival at the Wells Project has been measured to average 96.2% during three years of study. The current release of 61,000 spring Chinook smolts mitigates for the unavoidable loss of 3.8% of the juvenile spring Chinook migrating through the Wells Project.

Chelan PUD is required to produce up to 288,000[1] Methow Basin spring Chinook smolts toward achievement of the current NNI goals of the Rocky Reach and Rock Island HCPs, and Grant PUD is required to produce up to 201,000 Methow Basin spring Chinook smolts toward achievement of current NNI goals for the Priest Rapids Hydroelectric Project. Douglas PUD is currently producing these fish on behalf of Chelan and Grant PUDs at the Methow Fish Hatchery under a hatchery sharing agreement.

The HSRG acknowledged there are insufficient NORs to properly integrate all existing spring Chinook production in the Methow Basin, and they were unable to craft a management strategy for the Methow Hatchery that increased NORs under current habitat conditions. The HSRG acknowledged that managing for the recommended PNI values for a primary population may not be possible or appropriate when abundance levels are low. Further, the HSRG recommended managing with a "sliding scale" of NOR extraction for broodstock while modulating pHOS and pNOB to meet objectives for minimum spawner escapement and hatchery production toward a goal of achieving an average PNI over time.

[1] Initial production levels subject to recalculation every 10 years beginning in 2013.

Wells HCP Hatchery Committee
Statement of Agreement
Regarding Collection of Adult Broodstock for Entiat National Fish Hatchery (USFWS)

Statement

The Wells HCP Hatchery Committee approves the collection of additional summer Chinook (60 pair) during broodstock collection efforts at the Wells Hatchery volunteer ladder trap for the 2010 brood year. This agreement is in effect for only one year. These additional brood (egg collection target = 200,000) will be transferred to the US Fish and Wildlife Service's Entiat NFH for the initiation of a new summer Chinook program. This collection is already described in the Draft Upper Columbia River Salmon and Steelhead Broodstock Objectives and Site-Based Broodstock Collection Protocols. US Fish and Wildlife Service agrees to provide staff required for these collection efforts. Currently, this includes one person to sort fish and two people to transfer fish to the truck. Should staffing needs increase in the future, USFWS will supply the required additional staff. Transportation of adults to Entiat NFH is the responsibility of US Fish and Wildlife Service. Spawning and adult holding activities will occur at Entiat NFH and are the responsibility of US Fish and Wildlife Service.

Background

The US Fish and Wildlife Service (FWS), in conjunction with other parties (Yakama Nation [YN], Confederated Colville Tribes, NOAA, WDFW, BOR) is currently in the process of developing plans to implement a new summer Chinook production program at Entiat NFH. The long-term goal of this program is to provide fish for tribal, commercial, and sport harvest, and to meet tribal trust responsibilities as mitigation for Grand Coulee Dam. A Hatchery and Genetics Management Plan (HGMP) for this program was submitted to NOAA in July of 2009. This HGMP has also been distributed to all of the relevant co-managers.

This is the final planned transition year (second of two years at partial hatchery production) of rearing 200,000 juveniles. In 2011 the FWS anticipates moving to a full program with a yearly release goal of 350-400K yearling summer Chinook smolts released into the Entiat River. The first release from this partial production will occur in spring of 2011 (brood year 2009). To initiate this production program the Service plans to use adult summer Chinook collected at Wells Hatchery as volunteer returns to the facility for broodstock. This broodstock collection effort will entail transfer of eggs in the first year of partial production (BY 2009), and transfer of adults in all subsequent years (BY 2010 and until sufficient returns to Entiat NFH). Full production will require the collection of up to 300 hatchery origin summer Chinook adults (enough to provide up to 400K eggs). As the progeny of the initial Wells Hatchery collections return as adults (to Entiat NFH), they will be used as broodstock and the number of adults needed from Wells Hatchery will be reduced. It is anticipated that by brood year 2016 the Entiat NFH program will utilize volunteers to that facility for 100% of broodstock needs. Funding for this new program will be the responsibility of the FWS and BOR.

Broodstock collection will occur concurrent with the currently planned WDFW efforts as detailed in the Draft 2010 Upper Columbia River Salmon and Steelhead Broodstock Objectives and Site-Based Broodstock Collection Protocols developed in conjunction with the HCP-Hatchery subcommittee.

Future summer Chinook broodstock management and adult holding at Entiat NFH will likely overlap with YN adult coho holding and spawning. The earliest that adult summer Chinook would be brought on station would be in brood year 2010. The FWS and YN are currently developing plans for how this will occur without impacting either program. Current options include splitting the Entiat NFH adult pond into two separate ponds, one designated for coho and the other for summer Chinook, or transferring the YN coho adult holding and spawning activities to the Leavenworth NFH. The FWS and YN plan to test the latter option in brood year 2010 and are working together to ensure that there is adequate hatchery infrastructure in place prior to coho spawning.

In addition to working with appropriate co-managers to develop agreement concerning implementation of summer Chinook production at Entiat NFH (i.e. completion of an HGMP), the Service has provided a proposal for consideration by parties to the *US vs OR* agreement. This proposal was approved by the production advisory and policy committees to the *US vs OR* agreement resulting in a revision to the Production Tables on Sept 29, 2009. Furthermore, before summer Chinook are released from Entiat NFH the Service will ensure that ESA Section 7 consultation has been completed with both NOAA and USFWS. Coordination between the interested parties has been ongoing since the fall of 2008. All coordination and consultation activities will occur during the transition from partial to full production and will be completed prior to the first smolt release in spring 2011.

Wells, Rocky Reach and Rock Island HCP Hatchery Committees
Statement of Agreement
Conflict of Interest Policy
For approval October 20, 2010

Statement of Agreement

The Wells, Rocky Reach, and Rock Island Habitat Conservation Plans Hatchery Committees approve for an initial two-year period the attached Conflict of Interest Policy. After a two-year trial period the policy will be subject to review and modification before being adopted as final.

Attachment

Wells HCP Hatchery Committee
Statement of Agreement

Douglas County PUD Okanogan Basin Chinook Salmon Mitigation Strategy at Chief Joseph Hatchery

Revised 11-15-2010

Statement

The Wells HCP Hatchery Committee approves the Douglas PUD Okanogan Basin Chinook mitigation strategy that will provide compensation for unavoidable passage losses at Wells Dam for Okanogan Basin spring Chinook and for Okanogan Basin summer/fall Chinook consistent with the requirements of the Wells HCP.

To satisfy the No Net Impact commitment in the Okanogan Basin, Douglas PUD agrees to provide funding at the current HCP passage loss rate (3.7%) of the operation, maintenance, monitoring, and evaluation costs for the yearling spring Chinook and yearling summer/fall Chinook programs and 7% of those costs for the proposed subyearling summer/fall Chinook program at the new Chief Joseph Fish Hatchery. The HCP passage loss rate compensation level will also apply to the future conversion of the subyearling program to yearling production.

Background

On December 12, 2007 the Wells HCP Hatchery Committee approved a Statement of Agreement (SOA) that addressed Douglas PUD's Okanogan Basin spring Chinook obligation. The 3.7% level of production approved in this SOA reflects the current average survival rate for yearling fish migrating through the Wells Project (96.3%). The 3.7% level of passage-loss compensation is based upon the results of four years of survival studies. The results of future survival studies will be used to periodically adjust Douglas PUD's hatchery compensation programs.

At passage losses of 3.7% for yearling Chinook and an assumed 7% rate of loss for subyearling summer/fall Chinook, Douglas PUD would provide funding sufficient to rear up to 33,300 yearling spring Chinook smolts, up to 48,100 yearling summer/fall Chinook smolts, and up to 49,000 subyearling summer/fall Chinook for release upstream of Wells Dam in areas deemed appropriate by the Colville Confederated Tribes.

The number of fish funded by Douglas PUD is directly proportional to the number of fish produced at the Chief Joseph Hatchery on an annual basis. At full production the Chief Joseph Hatchery is expected to produce 900,000 spring Chinook smolts (33,300 yearlings for 3.7% NNI), 1,300,000 new yearling summer/fall Chinook smolts (48,100 yearlings for 3.7% NNI), and 700,000 subyearling summer/fall Chinook (49,000 subyearlings for 7% NNI). Should the 700,000 subyearlings (40 fish per pound) be converted to 175,000 yearling smolts (10 fish per pound), then compensation levels for these new yearlings will be adjusted to the 3.7% level resulting in the production of 6,475 additional yearling smolts (3.7% x 175,000 smolts = 6,475 yearling smolts).

Douglas PUD's summer/fall Chinook NNI mitigation will be divided between the Okanogan and Methow basins by subtracting the Chief Joseph NNI fish from the total Douglas PUD NNI obligation for summer/fall Chinook.

Douglas PUD's funding obligation will begin once gametes or fish are being held within the newly constructed facility.

APPENDIX G
2010 JUVENILE BYPASS OPERATING PLAN

Commissioners:
T. JAMES DAVIS
LYNN M. HEMINGER
RONALD E. SKAGEN

General Manager:
WILLIAM C. DOBBINS

Public Utility District No. 1 of Douglas County

1151 Valley Mall Parkway • East Wenatchee, Washington 98802-4497 • 509/884-7191 • FAX 509/884-0553 • www.douglaspud.org

Memorandum

TO: Wells HCP Coordinating Committee

FROM: Shane Bickford, Douglas PUD

DATE: February 16, 2010

SUBJECT: Final - 2010 Juvenile Bypass Operating Plan

The 2010 spring and summer outmigration at Wells Dam will consist of naturally produced fish whose parents spawned during brood years (BY) 2008 and 2009. The spring migration will be made up of progeny from 3,134 BY 2008 adult and jack spring Chinook, 165,334 BY 2008 adult sockeye, and 1,191 BY 2008 adult coho. The spring migration will also include juvenile steelhead that are age two migrants (from 7,500 adults, return year 2007/BY-2008) and yearling migrants (from 9,808 adults return year 2008/BY-2009). The naturally produced summer migrating fish will be summer/fall Chinook sub-yearlings from 35,820 BY 2009 adult and jacks.

Scheduled hatchery releases, above Wells Dam, include yearling spring Chinook from the Methow Fish Hatchery (543,063) and the Winthrop National Fish Hatchery (WNFH; 520,000). The WNFH also will release 309,000 coho this spring. Summer Chinook yearlings will be released from the Carlton (398,318), Similkameen (347,983) and Bonaparte Ponds (177,244). Hatchery summer steelhead will be released throughout the Methow and Okanogan rivers. Hatchery steelhead released above Wells Dam are from Wells Hatchery (432,806) and WNFH (100,000). An additional 20,000 steelhead smolts are expected to be released from the Cassimer Bar Fish Hatchery into the Okanogan Basin. In general, the hatchery yearling Chinook, coho and steelhead are scheduled to be released after April 15th with Winthrop coho and Wells steelhead scheduled to be released after April 20th. By the first week of May, all of the Chinook and coho will have been released. The steelhead releases historically continue into late May.

The summer outmigration expected to pass Wells Dam in 2010 are 100% naturally produced ocean-type summer/fall Chinook spawned during brood year 2009. Natural escapement of summer/fall Chinook in 2009 was 35,820 counted at Wells Dam.

Operation of the bypass system throughout the 2010 season will be guided by the criteria contained within the Wells Dam Juvenile Dam Passage Survival Plan (Wells Juvenile Bypass Plan) found in Section 4.3 of the Wells HCP. One of the main goals of the Wells Juvenile Bypass Plan is to provide bypass operation for at least 95% of the spring and at least 95% of the summer migration of juvenile plan species.

Bypass operations are implemented based upon an analysis of 21 years of hydroacoustic and 14 years of species composition information collected on juvenile run patterns at Wells Dam. Based upon this analysis, Douglas PUD has proposed bypass operating dates that have been broader than those contained within the Wells HCP Agreement. The HCP Agreement originally directed Douglas PUD to operate the bypass continuously from April 10th to August 15th. However, based upon the District's 21-year run-timing analysis, presented and agreed to by both the Wells HCP Committee and the Wells Coordinating Committee in February 2004, initiation of the Wells bypass system on April 12th and termination on August 26th will conservatively provide bypass operations for more than 95% of both the spring and summer outmigrations.

Historically, initiation of the bypass system on April 12th would provide a non-turbine passage alternative for 95.5% of the spring migration. Similarly, shutting down the bypass system on August 26th, on average would provide bypass operation for greater than 95.0% of the summer migration. Similar to the past 7 years and for accounting purposes, the end of the 2010 spring bypass season will be June 13th at 2400 hours and the beginning of the summer bypass season will be June 14th at 0000 hours.

APPENDIX H
BROODSTOCK COLLECTION PROTOCOLS

STATE OF WASHINGTON
DEPARTMENT OF FISH AND WILDLIFE
Wenatchee Research Office
3515 Chelan Hwy 97-A Wenatchee, WA 98801 (509) 664-1227 FAX (509) 662-6606

April 26, 2010

To: Kristine Petersen, Salmon Recovery Division, NMFS

From: Mike Tonseth, WDFW

Subject: **DRAFT 2010 UPPER COLUMBIA RIVER SALMON AND STEELHEAD BROODSTOCK OBJECTIVES AND SITE-BASED BROODSTOCK COLLECTION PROTOCOLS**

The attached protocol was developed for hatchery programs rearing spring Chinook salmon, sockeye salmon, summer Chinook salmon and summer steelhead associated with the mid-Columbia HCPs, spring Chinook salmon and steelhead programs associated with the 2008 Biological Opinion for the Priest Rapids Hydroelectric Project (FERC No. 2114) and fall Chinook consistent with Grant County Public Utility District and Federal mitigation obligations associated with Priest Rapids and John Day dams, respectively. These programs are funded by Chelan, Douglas, and Grant County Public Utility Districts (PUDs) and are operated by the Washington Department of Fish and Wildlife (WDFW). Additionally, the Yakama Nation's (YN) Coho Reintroduction Program broodstock collection protocol, when provided by the YN, will be included in this protocol due to the overlap in trapping dates and locations.

This protocol is intended to be a guide for 2010 collection of salmon and steelhead broodstocks in the Methow, Wenatchee, and Columbia River basins. It is consistent with previously defined program objectives such as program operational intent (i.e., conservation and/or harvest augmentation), mitigation production levels (HCPs, Priest Rapids Dam 2008 Biological Opinion) and to comply with ESA permit provisions.

Notable in this years protocols are:

- Methow spring Chinook broodstock protocol targeting natural-origin spring Chinook at Wells Dam and at the Twisp River weir.

- Utilization of genetic sampling/assessment to differentiate Twisp River and non-Twisp River natural-origin adults collected at Wells Dam and CWT interrogation during spawning of hatchery spring Chinook collected at the Twisp Weir, Methow FH and Winthrop NFH to differentiate Twisp and Methow Composite hatchery fish for discrete management of Twisp and Methow Composite production components.

- The collection of hatchery-origin spring Chinook for the Methow River Basin program in excess of production requirements, for BKD management.

- Wenatchee spring Chinook broodstock collection strategies targeting Chiwawa hatchery-origin Chinook at Tumwater Dam, intended to provide improved hatchery-origin broodstock collection and to reduce the number of Leavenworth NFH strays into other Wenatchee basin UCR spring Chinook spawning aggregates.

- The use of ultrasonography to determine sex of Wenatchee summer Chinook, Wenatchee sockeye, Wenatchee summer steelhead, Chiwawa spring Chinook and Methow/Okanogan summer Chinook at collection to achieve a 1:1 male to female ratio in the broodstock.

- Collection of summer Chinook adults sufficient to meet a 600K yearling juvenile Turtle Rock Program.

- Collection of 26 natural origin steelhead at the Twisp Weir in spring 2011

- The potential collection of natural-origin summer Chinook adults for the Okanogan summer Chinook program via purse seine (CCT proposal yet to be developed and agreed upon by the HCP-HC).

- The collection of Wells summer Chinook to support the USFWS, Entiat NFH summer Chinook program (SOA approved by the HCP-HC at the 3/17 meeting with edits).

- The potential collection of Wells summer Chinook to support the Yakama Nation (YN) summer Chinook re-introduction program in the Yakima River Basin (requires agreement of the HCP Hatchery Committee).

These protocols may be adjusted in-season, based on actual run monitoring at mainstem dams and/or other sampling locations.

Above Wells Dam

Spring Chinook

Inclusion of natural-origin fish in the broodstock will be a priority, with natural-origin fish specifically being targeted. Collections of natural-origin fish will not exceed 33% of the MetComp and Twisp natural-origin run escapement at Wells Dam.

To facilitate BKD management, comply with ESA Section 10 permit take provisions, and to meet programmed production, hatchery-origin spring Chinook will be collected in numbers excess to program production requirements. Based on historical Methow FH spring Chinook ELISA levels above 0.12, the hatchery origin spring Chinook broodstock collection will include hatchery origin spring Chinook in excess to broodstock requirements by approximately 8.4%. For purposes of BKD management and to comply with maximum production levels and other take provisions specified in ESA Section 10 permit 1196, culling will include the destruction of eggs from hatchery-origin females with ELISA levels greater than 0.12 and/or that number of hatchery origin eggs required to maintain production at 550,000 yearling smolts. Culling of eggs from natural-origin females will not occur unless their ELISA levels are determined by WDFW Fish Health to be a substantial risk to the program. Progeny of natural-origin females, with ELISA levels greater than 0.12, will be differentially tagged for evaluation purposes. Annual monitoring and evaluation of the prevalence and level of BKD and the efficacy of culling in returning hatchery- and natural-origin spring Chinook will continue and will be reported in the annual monitoring and evaluation report for this program.

Recent WDFW genetic assessment of natural-origin Methow spring Chinook (Small et al. 2007) indicated that Twisp natural-origin spring Chinook can be distinguished, via genetic analysis, from non-Twisp spring Chinook with a high degree of certainty. The Wells HCP Hatchery Committee accepted that Twisp-origin fish could be genetically assigned with sufficient confidence that natural origin collections can occur at Wells Dam. Scale samples and non-lethal tissue samples (fin clips) for genetic analysis will be obtained from adipose-present, non-CWT, non-ventral-clipped spring Chinook (suspected natural-origin spring Chinook) collected at Wells Dam, and origins assigned based on that analysis. Natural-origin fish retained for broodstock will be PIT tagged (dorsal sinus) for cross-referencing tissue samples/genetic analyses. Tissue samples will be preserved and sent to WDFW genetics lab in Olympia Washington for genetic/stock analysis. The spring Chinook sampled will be retained at Methow FH and will be sorted as Twisp or non-Twisp natural-origin fish prior to spawning. The number of natural-origin Twisp and Methow Composite (non-Twisp) spring Chinook retained will be dependent upon the number of natural-origin adults returning and the collection objective limiting extraction to no greater than 33% of the natural-origin spring Chinook return above Wells Dam. Based on the broodstock-collection schedule (3-day/week, 16 hours/day), extraction of natural-origin spring Chinook is expected to be approximately 33% or less.

Weekly estimates of the passage of Wells Dam by natural-origin spring Chinook will be provided through stock-assessment and broodstock-collection activities. This information will facilitate in-season adjustments to collection composition so that extraction of natural-origin spring Chinook remains less than 33%. Twisp and Methow Composite hatchery-origin spring Chinook will be captured at the Twisp Weir, and Methow FH outfall. Trapping at the Winthrop NFH will be included if needed because of broodstock shortfalls.

Pre-season run-escapement of Methow-origin spring Chinook above Wells Dam during 2009 are estimated at 3,620 spring Chinook, including 2,702 hatchery and 918 natural origin Chinook (Table 1 and Table 2). In-season estimates of natural-origin spring Chinook will be adjusted proportional to the estimated returns to Wells Dam at weekly intervals and may result in adjustments to the broodstock collection targets presented in this document.

The following broodstock collection protocol was developed based on current juvenile rearing capacity at Methow FH, programmed production levels (550,000 smolts), BKD management strategies, projected return for BY 2010 Methow Basin spring Chinook at Wells Dam (Table 1 and Table 2), and assumptions listed in Table 3.

The 2010 Methow spring Chinook broodstock collection will target 358 adult spring Chinook. Based on the pre-season run forecast, Twisp fish are expected to represent 4% of the adipose present, CWT tagged hatchery adults and 8% of the natural origin spring Chinook passing above

Wells Dam (Tables 1 and 2). Based on this proportional contribution and a collection objective to limit extraction to no greater than 33%, the 2009 Twisp origin broodstock collection will be predominantly hatchery origin and total 58 fish (25 wild and 33 Hatchery), representing 90% of the broodstock necessary to meet Twisp program production of 100,000 smolts. Methow Composite fish are expected to represent 40% of the adipose present CWT tagged hatchery adults and 92% of the natural origin spring Chinook passing above Wells Dam (Tables 1 and 2). Based on this proportional contribution and a collection objective to limit extraction to no greater than 33%, the 2010 Methow Composite (combined Methow and Chewuch river spawning aggregates) broodstock collection will be predominantly natural origin and total 300 spring Chinook (277 wild and 23 Hatchery). The broodstock collected for the Methow Composite production represents 100% of the broodstock necessary to meet Methow Composite program production of 450,000 smolts (combined Methow and Chewuch production), and sufficient to backfill the expected shortfall of 10,000 Twisp River spring Chinook. The Twisp River releases will be limited to releasing progeny of broodstock identified as wild Twisp and or known Twisp hatchery origin fish, per ESA Permit 1196. The Chewuch Pond and Methow FH releases will include progeny of broodstock identified as wild non-Twisp origin and known Methow Composite hatchery origin fish.

Table 1. Brood year 2005-2007 age class-at-return projection for wild spring Chinook above Wells Dam, 2010.

Brood year	**Smolt Estimate**		**Age-at-return**								
			Twisp Basin				**Methow Basin**				
	Twisp[1/]	Methow Basin[2/]	Age-3	Age-4	Age-5	Total	Age-3	Age-4	Age-5	Total	SAR[3/]
2005	5,372	55,381	1	19	**9**	30	15	201	**93**	309	0.005581
2006	18,580	198,400	5	**67**	31	104	55	**720**	332	1,107	0.005581
2007	9,715	99,417	**2**	35	17	54	**27**	361	167	555	0.005581
Estimated 2010 Return			**2**	**67**	**9**	**78**	**27**	**720**	**93**	**840**	

1/-*Smolt estimate is based on sub-yearling and yearling emigration (Charlie Snow, personal communication).*
2/-*Estimated Methow Basin smolt emigration based on Twisp Basin smolt emigration, proportional redd deposition in the Twisp River and Twisp Basin smolt production estimate.*
3/- Mean Chiwawa spring Chinook SAR to the Wenatchee Basin (BY 1998-2003; WDFW unpublished data).

Table 2. Brood year 2005-2007 age class and origin run escapement projection for UCR spring Chinook at Wells Dam, 2010.

	Projected Escapement											
	Origin								Total			
	Hatchery				Wild				Methow Basin			
Stock	**Age-3**	**Age-4**	**Age-5**	**Total**	**Age-3**	**Age-4**	**Age-5**	**Total**	**Age-3**	**Age-4**	**Age-5**	**Total**
MetComp	288	699	81	**1,068**	27	720	93	**840**	315	1,419	174	**1,908**
%Total				40%				92%				53%
Twisp	27	74	2	**103**	2	67	9	**78**	29	141	11	**181**
%Total				4%				8%				5%
Winthrop (MetComp)	437	972	122	**1,531**					437	972	122	**1,531**
%Total				56%								42%
Total	752	1,745	205	**2,702**	29	787	102	**918**	781	2,532	307	**3,620**

Table 3. Assumptions and calculations to determine the number of broodstock needed for BY 2010 production of 550,000 smolts.

Program Assumptions	**Standard**	**Methow FH program**
Smolt Release		**550,000**
Fertilization-to-release survival	*84%*	
Total egg take target		**662,444**
Egg take (production)		**611,111**
Cull allowance[1/]	8.4%	**51,000**
Fecundity	*3,900*[2/]	
Female Target		**170**
Female to male ratio	*1:1*	
Broodstock target		**340**
Pre-spawn survival	*95%*	
Total broodstock collection		**358**

[1/]-Hatchery origin MetComp. component only, and is based on the projected natural origin collection and assumption that all Twisp (hatchery and wild) and wild MetComp. fish will be retained for production.
[2/]-Based on historical age-4 fecundities and expected 2010 return age structure (Table 1).

Trapping at Wells Dam will occur at the East and West ladder traps beginning on 03 May, or at such time as the first spring Chinook are observed passing Wells Dam and continue through 24 June 2009. The trapping schedule will consists of 3-day/week (Monday-Wednesday), up to 16-hours/day. Two of the three trapping days will be concurrent with the stock assessment sampling activities authorized through the 2010 Douglas PUD Hatchery M&E Implementation Plan. Natural origin spring Chinook will be retained from the run, consistent with spring Chinook run timing at Wells Dam (weekly collection quota). Once the weekly quota target is reached, broodstock collection will cease until the beginning of the next week. If a shortfall occurs in the weekly trapping quota, the shortfall will carry forward to the following week. All natural origin spring Chinook collected at Wells Dam for broodstock will be held at the Methow FH.

To meet Methow FH broodstock collection for hatchery origin Methow Composite and Twisp River stocks, adipose-present coded-wire tagged hatchery fish will be collected at Methow FH, Winthrop NFH and the Twisp Weir beginning 01May or at such time as spring Chinook are observed passing Wells Dam and continuing through 21 August 2010. Natural origin spring Chinook will be retained at the Twisp weir as necessary to bolster the Twisp program production so long as the aggregate collection at Wells Dam and Twisp River weir does not exceed 33% of the estimated Twisp River natural origin return past Wells Dam. All hatchery and natural origin fish collected at Methow FH, Twisp Weir and Winthrop NFH for broodstock will be held at the Methow FH.

Steelhead

Steelhead mitigation programs above Wells Dam (including the USFWS steelhead program at Winthrop NFH) utilize adult broodstock collections at Wells Dam and incubation/rearing at Wells Fish Hatchery (FH). The Wells Steelhead Program also provides eggs for UCR steelhead reared at Ringold FH, not as a mitigation requirement, but rather an opportunity to reduce the prevalence of early spawn hatchery steelhead in the mitigation component above Wells Dam. In an effort to minimize impacts from early maturation, the Wells Hatchery program has transferred eggs from the earliest spawn hatchery steelhead to Ringold FH. Preliminary evaluations indicate that the mean spawn timing of HxH steelhead at Wells FH has shifted to later in the season and may be a function of these actions. Based on these preliminary evaluations, WDFW proposes to continue the transfer eggs from early spawn hatchery origin steelhead to Ringold FH.

The following broodstock collection protocol was developed based on mitigation program production objectives (Table 4), program assumptions (Table 5), and the probability that sufficient adult steelhead will return in 2010 to meet production objectives absent a preseason forecast at the present time.

Trapping at Wells Dam will selectively retain 327 steelhead (east and west ladder collection) and will be comprised of no greater than 33% natural origin broodstock for the mitigation programs and 100% hatchery origin within the Ringold FH production component. Additionally, in the spring of 2011, 26 wild steelhead will be targeted at the Twisp Weir. Overall collection for the program will be 353 fish and limited to no more than 33% of the entire run or 33% of the natural origin return. Hatchery and natural origin collections will be consistent with run-timing of hatchery and natural origin steelhead at Wells Dam. The east and west ladder trapping at Wells Dam will begin on 01 August and terminate by 31 October and will be operated concurrently, three days per week, up to 16 hours per day, if required to meet broodstock objectives. Trapping will be concurrent with summer Chinook broodstocking efforts through 15 September on the west ladder. If insufficient steelhead adults are encountered on the west ladder, the east ladder trap may be considered. Adult return composition including number, origin, age structure, and sex ratio will be assessed in-season at Priest Rapids and Wells dams. Broodstock collection adjustments may be made based on in-season monitoring and evaluation. If collection of adults from the east ladder trap is necessary, access will be coordinated with staff at Wells Dam due to the rotor rewind project.

Table 4. Adult steelhead collection objectives for programs supported through adult steelhead broodstock collected at Wells Dam and the Twisp Weir.

Program	# Smolts	# Green eggs	% Wild	# Wild	# Hatchery	Total Adults
DCPUD[1/]	349,000	465,333	33%	59	119	178
GCPUD[1/]	80,000	106,667	33%	14	27	41
USFWS[1/]	50,000	66,667	33%	8	17	25
Sub-total	**479,000**	**638,667**	33%	**81**	**163**	**244**
Ringold	180,000	285,714	0%	0	109	109
Sub-total	**180,000**	**285,714**	**0%**	**0**	**109**	**109**
Grand Total[2/]	**659,000**	**924,381**	**23%**	**81**	**272**	**353**

[1/]*-Above Wells Dam releases. Target HxW parental adults as the hatchery component.*

[2/]- *Based on steelhead production consistent with Mid-Columbia HCP's, GCPUD BiOp and Section 10 permit 1395.*

Table 5. Program assumptions used to determine the number of adults required to meet steelhead production objectives for programs above Wells Dam and at Ringold Springs Fish Hatchery.

Program assumptions	Standard
Pre-spawn survival	97%
Female : Male ratio	1.0:1.0
Fecundity	5,400
Propagation survival	
Fertilization-to-eyed egg	87%
Eyed egg-to-yearling release	86%[1/]
Fertilization-to-yearling release	75%[1/]

[1/]*-Not applicable to Ringold Springs Fish hatchery.*

Summer/fall Chinook

Summer/fall Chinook mitigation programs above Wells Dam utilize adult broodstock collections at Wells Dam and incubation/rearing at Eastbank Fish Hatchery. The total production level target is 976,000 summer/fall Chinook smolts for two acclimation/release sites on the Methow and Similkameen rivers (Carlton Pond and Similkameen Pond, respectively).

The TAC 2010 Columbia River UCR summer Chinook return projection to the Columbia River (Appendix A) and BY 2006, 2007 and 2008 spawn escapement to tributaries above Wells Dam indicate sufficient summer Chinook will return past Wells Dam to achieve full broodstock collection for supplementation programs above Wells Dam. The following broodstock collection protocol was developed based on initial run expectations of summer Chinook to the Columbia River, program objectives and program assumptions (Table 6).

For 2010, WDFW will retain up to 556 natural-origin summer/fall Chinook at Wells Dam west ladder, including 278 females. Collection will be proportional to return timing between 01 July and 15 September. Trapping will occur 3-days/week, 16 hours/day.

In collaboration with the Colville Tribes, in 2010 an attempt will be made to collect up to 50% (N=167) of the natural origin adults needed to meet the Similkameen summer Chinook program will be attained through the CCT purse seine efforts as a means to evaluate the efficacy of collecting and survival to spawn of natural origin adults for broodstock for their future programs. There is still uncertainty as to how the logistics will work to transport these fish from the loading dock near Brewster to Eastbank FH for adult holding through spawning. If logistics become prohibitive to engaging in this collection activity this season, broodstock collection for the balance will revert back to Wells Dam. In addition, if broodstock collection through the CCT's purse seining efforts falls behind by any more than 25%, the difference between the fish collected to date and what should have been collected, will be made up at Wells Dam west ladder trap. Fish collected through the CCT trapping effort will be uniquely tagged from fish collected at Wells Dam to evaluate relative differences in disease, mortality, spawn timing, among other metrics.

To better assure achieving the appropriate female equivalents for program production, the collection will utilize ultrasonography to determine the sex of each fish retained for broodstock. If the probability of achieving the broodstock goal is reduced based on passage at the west ladder or actual natural-origin escapement levels, broodstock collections may be directed to the east ladder trap and/or origin composition will be adjusted to meet the broodstock collection objective. If collection of adults from the east ladder trap is necessary, access will be coordinated with staff at Wells Dam due to the rotor rewind project.

Table 6. Assumptions and calculations to determine the number of broodstock needed for summer/fall Chinook production goals in the Methow and Okanogan river basins.

Program Assumptions	**Standard**	**Carlton Pond**	**Similkameen Pond**	**Total**
Smolt release		**400,000**	**576,000**	**976,000**
Fertilization-to-release survival	81%			
Eggtake target		**493,827**	**711,111**	**1,204,938**
Fecundity	5,000			
Female target		**103**	**148**	**250**
Female:male ratio	1:1			
Broodstock target		**206**	**296**	**502**
Pre-spawn survival	95%			
Total collection target		**222**	**334**	**556**

Columbia River Mainstem below Wells Dam

Summer/fall Chinook

Summer/fall Chinook mitigation programs that release juveniles directly into the Columbia River between Wells and Rocky Reach dams are supported through adult broodstock collections at Wells Dam and the Wells Hatchery volunteer channel. The total production level supported by this collection is 920,000 yearling and 484,000 sub-yearling Chinook. Upon agreement in the HCP-HC, the 2010, summer Chinook broodstock collections at Wells FH may also include 250,000 green eggs to support the Yakama Nation (YN) reintroduction of summer Chinook to the Yakima River Basin and up to 60 adult summer Chinook pairs for the USFWS Entiat program. If approved by the HCP Hatchery Committee, the YN eggs will be the last eggs taken and will be the responsibility of staff associated with the YN program. Collection of adults for the USFWS will occur over a two-week period at the volunteer channel. Adults for that program will be transferred to Entiat NFH by USFWS staff.

Adults returning from the Wells and Turtle Rock programs are to support harvest opportunities and are not intended to increase natural production and have been termed segregated harvest programs. These programs have contributed to harvest opportunities; however, adults from these programs have been documented contributing to the adult spawning escapement in tributaries upstream and downstream from their release locations. Because of CCT concerns about sufficient natural origin fish reaching spawning grounds, incorporation of natural origin fish for the Wells program will be limited to fish collected in the Wells volunteer channel. The following broodstock collection protocol was developed based on mitigation objectives and program assumptions (Table 7).

WDFW will collect 1,211 run-at-large summer Chinook from the volunteer ladder trap at Wells Fish Hatchery outfall. Overall extraction of natural-origin fish to Wells Dam (Wells program and above Wells Dam summer/fall Chinook programs) will not exceed 33 percent. West ladder collections will begin 01 July and completed by 15 September and will be consistent with run timing past Wells Dam. If collection of adults from the east ladder trap is necessary, access will be coordinated with staff at Wells Dam due to the rotor rewind project. Due to fish health concerns associated with the volunteer collection site (warming Columbia River water during late August), the volunteer collection will begin 11 July and terminate by 31 August. The 3-year old “jack” component will be limited to 10 percent of the broodstock collection.

Table 7. Assumptions and calculations to determine the number of broodstock needed for summer/fall Chinook production goals for Wells and Turtle Rock Island/Chelan Falls programs.

Program Assumptions	Standard		Wells FH		Turtle Rock FH	YN[1/]	USFWS[2/]	
	Sub-yearling	Yearling	Sub-yearling	Yearling	Yearling	Green eggs	Adults	Total
Smolt release			**484,000**	**320,000**	**600,000**			**NA**
Green egg-to-release survival	73%[4/]	78%						NA
Eggtake target			**663,014**	**410,256**	**769,230**	**250,000**		**2,092,500**
Fecundity	4,600	4,600						
Female target			**144**	**89**	**168**	**55**	**60**	**516**
Female:Male ratio	1:1	1:1						
Broodstock target			**288**	**248**[3/]	**336**	**110**	**120**	**1,102**
Pre-spawn survival	90%	90%						
Total collection target			**320**	**276**	**373**	**122**	**120**	**1,211**

[1/]-Green eggs for YN reintroduction program in the Yakima River Basin.
[2/]-Adult collection only. For USFWS summer Chinook program in the Entiat River Basin.
[3/]- Includes 70 adults collected for the Lake Chelan triploid Chinook program.

Methow Basin Coho

Prior to 2005, coho broodstock collections for the Methow program were solely conducted at WNFH and met with very little success. In 2005, the primary collection site for the Methow program shifted towards Wells Dam in an effort to intercept more of the returning coho destined for the upper Methow River Basin but not successfully entering WNFH. For past four years (2006-2009), the average contribution of swim-ins into the Methow broodstock has exceeded 50% (n=52.0%). This apparent shift tends to demonstrate that further local adaptation may be occurring within the Methow program. Adults entering volitionally at WNFH were now becoming a predominant component of the broodstock that had not been seen in past years. Although maximizing the successful spawning of these individuals has been a high priority all along for propelling broodstock development, we also recognize that Wells Dam and/or Wells FH will still be an integral component for establishing a localized brood within the Methow River Basin. If production goals are met again in 2009, this would represent the third consecutive year that the Methow program has met BDPI requirements and completion of this phase would initiate the transition into BDPII. We will continue to maximize the swim-in component during this broodstock localization process and attempt to collect 50% of the brood from WNFH, although not a requirement under BDPI criteria. At Wells Dam, we propose to trap limited numbers of coho three days per week, coinciding and coordinating with WDFW steelhead collections, between September 15 and October 9, at both east and west ladder traps. Between October 10 and December 7, trapping will increase to 7 days per week and up to 16 hours/day, or as needed. If during this timeframe, WDFW is not operating one or both of the traps, whether meeting steelhead collection goals or agency decision, YN personnel will operate the facilities solely for coho broodstock collection. All trapping operations will be coordinated with WDFW and DCPUD. When YN personnel are required to manage the traps, active operation will occur. All non-target fish will be passed upstream and properly documented with minimal handling. YN personnel will be responsible for transportation of coho broodstock to WNFH. After November 1, if fish numbers warrant further collection, the west ladder facility may be operated passively. YN personnel will monitor trap operations on a regular basis. If collection goals are not being met, supplemental collection may occur at Wells FH adult trap.

When operating the west ladder trap, coho salmon will be shunted directly from the ladder into the holding facility at Wells FH. Removal of coho from the temporary holding area will be coordinated with Wells FH personnel. No more than 50 coho will be held at a time (1 fish / 10 cu. ft.). When operating the east ladder facility, trapped coho will be placed directly into a transport tank. All coho transported from Wells Dam will have a unique mark to differentiate them from volunteer swim-ins at WNFH.

Bi-weekly collection goals can be found in Table 8. If during any two-week period, the broodstock collection goals are not met, the deficit will be carried over to the following week. The bi-weekly collection goals are intended to serve as a guide to ensure collection from throughout the run but may be adjusted mid-season if necessary to ensure that the total collection goal is met.

The bi-weekly collection goals are expressed in numbers of adult coho needed from all sites while focusing on incorporating a high proportion of WNFH swim-ins. Ultimately, the combined number of females collected from all facilities will drive the total number of broodstock collected. A minimum of one male will be collected for each female to adhere to spawning protocols.

Table 8. Bi-weekly collection objectives for Methow coho broodstock, 2010.

Week beginning	**9/12**	**9/19**	**9/26**	**10/3**	**10/10**	**10/17**	**10/24**	**10/31**	**11/7**	**11/14**	
Winthrop NFH	0	0	2	19	46	72	131	41	0	0	***311***
Wells Dam	8	17	40	73	71	62	32	7	0	0	***310***
Totals	**8**	**17**	**42**	**92**	**117**	**134**	**163**	**48**	**0**	**0**	**621**

Wenatchee River Basin

Spring Chinook

The Eastbank Fish Hatchery (FH) rears spring Chinook salmon for the Chiwawa River acclimation pond located on the Chiwawa River. The HCP HC approved program production level target for 2010 is 298,000 smolts, requiring a total broodstock collection of 178 spring Chinook (85 natural and 93 hatchery origin; Table 9).

Table 9. Assumptions and calculations to determine the number of broodstock needed in an anticipated 2010 Chiwawa program release of 298,000 smolts.

Program Assumptions	**Standard**	**Conservation**	**Safety Net**	**Full program**
Smolt Release		**150,000**	**148,000**	**298,000**
Fertilization-to-release survival	*83%*			
Total egg take target				**380,449**
Egg take (production)		180,595	178,441	**359,036**
Cull allowance	*12%*		199,854	**21,413**
Fecundity	*4,400*			
Female Target		41	45	**86**
Female to male ratio	*1:1*			
Broodstock target		82W	90H	**172**
Pre-spawn survival	*97%*			
Total broodstock collection		**85W**	**93H**	**178**

Inclusion of natural origin fish into the broodstock will continue to be a priority, with natural origin fish specifically being targeted. Consistent with ESA Section 10 Permit 1196, natural origin fish collections will not exceed 33 percent of the return to the Chiwawa River and will provide, at a minimum, 33 percent of the total broodstock retained.

In addition to production levels and ESA permit provisions, the 2010 broodstock collection, will again, as in 2009, target hatchery origin Chiwawa spring Chinook at Tumwater Dam. Also in 2010, an interim measure will include extraction of adipose clipped non-coded wire tagged adult spring Chinook, as a strategy to reduce straying of Leavenworth NFH spring Chinook to the upper Basin habitat.

Pre-season estimates project 4,985 spring Chinook are destined for the Chiwawa River, of which 534 (10.7%) and 4,451 fish (89.3%) are expected to be natural and hatchery origin spring Chinook, respectively (Table 10 and 11). Based on the projected 2010 Chiwawa River run-size and origin composition, and provisions in ESA Section 10 Permit 1196, WDFW will retain up to 178 spring Chinook for broodstock purposes, representing 100% of the program broodstock objective. Up to 85 natural origin spring Chinook will be retained at the Chiwawa Weir and up to 93 adipose-clipped, CWT hatchery origin spring Chinook will be collected at Tumwater Dam. In-season assessment of the magnitude and origin composition of the spring Chinook return above Tumwater Dam will be used to provide in-season adjustments to hatchery/wild composition and total broodstock collection, consistent with ESA Section 10 Permit 1196.

Table 10. BY 2005-2007 age class return projection for wild spring Chinook above Tumwater Dam during 2010.

Brood year	Smolt Estimate[1/]		Chiwawa Basin[2/]				Wenatchee Basin above Tumwater Dam[2/]				
	Chiwawa	Wen. Basin	Age-3	Age-4	Age-5	Total	Age-3	Age-4	Age-5	Total	SAR[3/]
2005	140,737	338,079	51	581	**153**	785	124	1,396	**367**	1,887	0.005581
2006	86,579	153,918	32	**357**	94	483	56	**636**	167	859	0.005581
2007	65,539	103,460	**24**	271	71	366	**38**	427	112	577	0.005581
Estimated 2010 Return			**24**	**357**	**153**	**534**	**38**	**636**	**367**	**1,041**	

[1/]-Smolt production estimate for Chiwawa River derived from juvenile smolt data (Hillman et al. 2009); smolt production estimate for Wenatchee Basin is based upon proportional redd disposition between Chiwawa River and Wenatchee River basin and the Chiwawa smolt production estimate.
[2/]-Based upon average age-at-return (return year 2005-2009) for natural origin spring Chinook above Tumwater Dam (WDFW unpublished data).
[3/]-Mean Chiwawa spring Chinook SAR to the Wenatchee Basin (BY 1998-2003; WDFW unpublished data).

Table 11. BY 2005-2007 age class return projection for Chiwawa hatchery spring Chinook above Tumwater Dam during 2010.

Brood	Smolt Estimate	Adult Returns				
Year	Chiwawa[1/]	Age-3[2/]	Age-4[2/]	Age-5[2/]	Total	SAR[3/]
2005	494,012	1,260	2,845	**143**	4,248	0.0086
2006	612,482	1,563	**3,528**	176	5,267	0.0086
2007	305,542	**780**	1,760	88	2,628	0.0086
Estimated 2010 Return		**780**	**3,528**	**143**	**4,451**	

[1/]-Chiwawa smolt release (Hillman et. al. 2009).
[2/]-Based on average age-at-return for hatchery origin spring Chinook above Tumwater Dam, 2005-2009 (WDFW, unpublished data) and total estimated BY return.
[3/]-Mean Chiwawa hatchery spring Chinook SAR to the Wenatchee Basin (BY 1997-2002).

Trapping at Tumwater Dam will begin 01 May and will be concurrent with trapping for the Spring Chinook Reproductive Success Study. Collection at both Tumwater Dam and Chiwawa Weir will be based on weekly quotas, consistent with average run timing at Tumwater Dam. If the weekly quota is attained prior to the end of the week, retention of spring Chinook for broodstock will cease. If the weekly quota is not attained, the shortfall will carry forward to the next week. The number of hatchery origin fish retained at Tumwater Dam will be adjusted in-season, based on estimated Chiwawa River natural-origin returns provided through extrapolation of returns past Tumwater Dam. If hatchery origin Chinook are retained in excess to that required to maintain a minimum 33% natural origin composition in the broodstock, excess fish will be sampled, killed and either used for nutrient enhancement or disposed of in a landfill depending upon fish health staff recommendations.

Throughout broodstock collection at Tumwater Dam, adipose absent, non-CWT spring Chinook will be extracted, putatively classified as LNFH strays and provided to USFWS as a measure to reduce the prevalence of non-endemic spring Chinook above Tumwater Dam. It is likely that some proportion of the adipose clipped non-CWT fish are ESA-listed hatchery adults that have shed their tags. Based on the BY 2005, 2006, and 2007 tag rate for Chiwawa spring Chinook and the projected 2010 Chiwawa hatchery return to Tumwater Dam, the extraction of adipose clipped non-CWT spring Chinook may include up to 61 Chiwawa spring Chinook, representing just 1.9% of the projected 4,451 returning Chiwawa hatchery origin spring Chinook. The 2009 extraction of LNFH fish at Tumwater dam was 66 fish or 1.5% of the hatchery fish intercepted. Logistics for 2010 extraction activities will be coordinated between USFWS, WDFW and CPUD.

Broodstock collection at the Chiwawa Weir will begin 01 June and terminate no later than 11 September. Spring Chinook trapping at the Chiwawa Weir will follow a 4-days up and 3-days down schedule, consistent with weekly broodstock collection quotas that approximate the historical run timing and a maximum 33 percent retention of the projected natural-origin escapement to the Chiwawa River. If the weekly quota is attained prior to the end of the 4-day trapping period, trapping will cease. If the weekly quota cannot be accomplished with a 4-days up and 3-days down schedule, a 7-day per week schedule may be implemented to facilitate reaching the collection objectives. Under the 7-day per week schedule, no more than 33% (1 in 3) of the fish collected will be retained for broodstock. If the weekly quota is not attained within the trapping period, the shortfall will carry forward to the next week.

All spring Chinook in excess of broodstock needs and all bull trout trapped at the Chiwawa weir will be transported by tank truck and released into a resting/recovery pool at least 1.0 km upstream from the Chiwawa River Weir.

Steelhead

The steelhead mitigation program in the Wenatchee Basin use broodstock collected at Dryden and Tumwater dams located on the Wenatchee River. Per ESA section 10 Permit 1395 provisions, broodstock collection will target 50% natural origin fish and 50% hatchery origin fish, not to exceed 33% of the natural origin steelhead return to the Wenatchee Basin. Based on these limitations and the assumptions listed below (Table 12), the following broodstock collection protocol was developed.

WDFW will retain 208 mixed origin steelhead at Dryden and Tumwater dams, including 104 natural origin and 104 hatchery origin steelhead. Collection will be proportional to return timing between 01 July and 12 November. Collection may also occur between 13 November and 3 December at both traps, concurrent with the Yakama Nation coho broodstock collection activities. Early spawn hatchery x wild parental cross and unknown hatchery parental cross adults will be excluded from the broodstock collection. Hatchery steelhead parental origins will be determined through evaluation of VIE tags and PIT tag interrogation during collection. Adult return composition including number, origin, age structure, and sex ratio will be assessed in-season at Priest Rapids and at Dryden Dam. In-season Broodstock collection adjustments may be made based on this monitoring and evaluation. To better assure achieving the appropriate females equivalents for program production, the collection will utilize ultrasonography to determine the sex of each fish retained for broodstock.

In the event steelhead collections fall substantially behind schedule, WDFW may initiate/coordinated adult steelhead collection in the mainstem Wenatchee River by hook and line. In addition to trapping and hook and line collection efforts, Tumwater and Dryden dams may be operated between February and early April the subsequent spring to supplement broodstock numbers if the fall trapping effort provides fewer than 208 adults.

Table 12. Assumptions and calculations to determine the number and origin of Wenatchee summer steelhead broodstock needed for Wenatchee Basin program release of 400,000 smolts.

Program Assumptions	Standard	Wenatchee program
Smolt Release		**400,000**
Fertilization-to-release survival	*75%*	
Egg take target		**533,333**
Fecundity	*5,400*	
Female Target		**99**
Female to male ratio	*1:1*	
Broodstock target		**198**
Pre-spawn survival	*95%*	
Total broodstock collection		**208**
Natural:Hatchery ratio	1:1	
Natural origin collection total		**104**
Hatchery origin collection total		**104**

<u>*Summer/fall Chinook*</u>

Summer/fall Chinook mitigation programs in the Wenatchee River Basin utilize adult broodstock collections at Dryden and Tumwater dams, incubation/rearing at Eastbank Fish Hatchery (FH) and acclimation/release from the Dryden Acclimation Pond. The total production level target for BY 2010 is 864,000 smolts.

The TAC 2010 Columbia River UCR summer Chinook return projection to the Columbia River (Appendix A) and BY 2006, 2007 and 2008 spawn escapement to the Wenatchee River indicate sufficient summer Chinook will return to the Wenatchee River to achieve full broodstock collection for the Wenatchee River summer Chinook supplementation program. Review of recent summer/fall Chinook run-timing past Dryden and Tumwater dam indicates that previous broodstock collection activities have omitted the early returning summer/fall Chinook, primarily due to limitations imposed by ESA Section 10 Permit 1347 to minimize impacts to listed spring Chinook. In an effort to incorporate broodstock that better represent the summer/fall Chinook run timing in the Wenatchee Basin, the broodstock collection will front-load the collection to account for the disproportionate collection timing. Approximately 43% of the summer/fall Chinook passage to the upper Basin occurs prior to the end of the first week of July; therefore, the collection will provide 43% of the objective by the end of the first week of July. Weekly collection after the first week of July will be consistent with run timing of summer/fall Chinook during the remainder of the trapping period. Collections will be limited to a 33% extraction of the estimated natural-origin escapement to the Wenatchee Basin. Based on these limitations and the assumptions listed below (Table 13), the following broodstock collection protocol was developed.

WDFW will retain 492 natural-origin, summer Chinook at Dryden and Tumwater dams, including 246 females. To better assure achieving the appropriate females equivalents for program production, the collection will utilize ultrasonography to determine the sex of each fish retained for broodstock. Trapping at Dryden Dam will begin 01 July and terminate no later than 15 September and operate up to 7-days/week, 24-hours/day. Trapping at Tumwater Dam may begin 15 July and terminate no later than 15 September and operate 3-days/week, 8-hours/day.

If the probability of achieving the broodstock goal is reduced, based on the estimated escapement levels, broodstock composition (e.g. incorporation of hatchery origin fish) will be adjusted to meet the broodstock collection objective of 492 summer Chinook.

Table 13. Assumptions and calculations to determine the number of Wenatchee summer Chinook salmon broodstock needed for Wenatchee Basin program release of 864,000 smolts.

Program Assumptions	**Standard**	**Wenatchee program**
Smolt Release		**864,000**
Fertilization-to-release survival	*78%*	
Egg take target		**1,107,692**
Fecundity	*5,000*	
Female Target		**222**
Female to male ratio	*1:1*	
Broodstock target		**443**
Pre-spawn survival	*90%*	
Total broodstock collection		**492**

<u>*Sockeye*</u>

Sockeye Salmon mitigation in the Wenatchee River Basin utilizes adult broodstock collections at Tumwater Dam, incubation/rearing at Eastbank Fish Hatchery (FH) and rearing/pre-smolt releases from the net pens in Lake Wenatchee. The total production level for the 2010 BY is 200,000 pre-smolts.

The TAC 2010 UCR sockeye return projection to Columbia River (Appendix A) indicates sufficient Lake Wenatchee sockeye will be available to meet broodstock collection objectives. Based on TAC projected returns, 100% natural-origin broodstock composition and assumptions listed below (Table 14), the following broodstock collection protocol was developed.

WDFW will retain 260 natural origin sockeye, proportional to run timing at Tumwater Dam. Due to highly variable sex ratios in previous years, ultrasonography will be used to collect an equal number of males and females. Trapping may begin on 15 July and terminate by 15 August. Trapping will occur no more than 3-days/week, 8- hours/day.

Table 14. Assumptions and calculations to determine the number of Wenatchee sockeye salmon broodstock needed for Wenatchee Basin program release of 200,000 pre-smolts.

Program Assumptions	Standard	Wenatchee program
Smolt Release		**200,000**[1/]
Fertilization-to-release survival	*78%*	
Egg take target		**256,410**
Fecundity	*2,615*	
Female Target		**99**
Female to male ratio	*1:1*	
Broodstock target		**198**
Pre-spawn survival	*76%*	
Total broodstock collection		**260**

1/- Chelan HCP Hatchery Committee has agreed to future production level of 280,000 fish, pending appropriate infrastructure improvements.

Wenatchee Basin Coho

To maximize genetic diversity, we will collect a representative sample of returning coho from throughout the run. Based on information collected from 2000-2009, we expect the first coho to arrive at Dryden Dam during the first week of September. The run typically continues through the last week of November with peak migration normally occurring between mid to late October. Tumwater run timing, based on past run information, is typically two weeks behind Dryden. We expect the migration period to begin mid-September and continue through November with peak migration occurring late October. In an attempt to drive broodstock fitness so that adults may become better suited for upper basin success, bi-weekly broodstock collection goals have been established accounting for both Tumwater Dam and Dryden Dam. Tumwater collections will focus on incorporating at least 511 coho (50%) from upper basin returns into the broodstock. Dryden will then become the secondary focus but continue to collect throughout the historical, spatial distribution of returning coho but at a smaller sample rate (Table 15). As a precautionary measure, LNFH will backfill any deficit that may result from this collection strategy. To maximize collection opportunities at Tumwater Dam, upper basin released smolts were marked with a blank wire tag in the adipose fin. This mark was introduced to differentiate upper basin releases from Icicle Creek releases at Dryden Dam. As these uniquely marked, upper basin origin adults enter Dryden Dam, they will be identified as such, PIT tagged, and passed upstream for possible re-collection at Tumwater Dam. This recapture methodology is necessary to determine at what proportion fish passing Dryden Dam are successfully continuing upstream and being collected at the desired trapping location, Tumwater Dam. In past years' observations, coho have had difficulties migrating through the Tumwater corridor for a myriad of assumed reasons. One of these hypothetical rationales is that during most return years, coho may experience both high and low flow velocity barriers within certain portions of Tumwater Canyon, which could restrict successful upstream migration. Dryden Dam and Leavenworth NFH broodstock collections; intercepting fish that originated from Leavenworth NFH juvenile releases, will be equally important to ensure continual local broodstock is obtained. If during any two-week period the broodstock collection goals are not met, the deficit will carry over into the following week. Bi-weekly goals are intended to serve as a guide for collection from throughout the run but may be adjusted mid-season if necessary to ensure that the broodstock goals are being met. A minimum of one male will be collected for each female to adhere to spawning protocols.

Table 15. Bi-weekly collection goals for Wenatchee coho broodstock, 2010

Week beginning	**8/29**	**9/5**	**9/12**	**9/19**	**9/26**	**10/3**	**10/10**	**10/17**	**10/24**	**10/31**	**11/7**	**Total**
Dryden Dam	0	5	7	34	35	83	177	105	34	20	11	***511***
Tumwater Dam	0	5	7	19	41	55	196	56	97	26	9	***511***
Total	**0**	**10**	**14**	**53**	**76**	**138**	**373**	**161**	**131**	**46**	**20**	**1022**

Between September 1 and November 13, broodstock collection at Dryden Dam will take place daily in coordination with Eastbank Fish Hatchery Complex personnel (WDFW). Yakama Nation will provide a minimum of two people each day during this time period to assist in operation and collection at Dryden Dam fish trapping facilities. Between November 14 and December 6, the Yakama Nation is permitted to operate the trapping facility independently but will coordinate with Eastbank FH, WDFW, and CCPUD personnel regarding collections, trap maintenance, and operations.

In 2010, as mentioned previously, Tumwater Dam collection efforts will be maximized so that we may incorporate upper basin coho. If we foresee that our bi-weekly broodstock collection goals, through trapping efforts at Tumwater and Dryden dams will not be met, adult coho will be collected concurrently at Leavenworth NFH adult ladder to make up the difference. Tumwater Dam operation will be coordinated with Eastbank Fish Hatchery personnel and/or WDFW hatchery evaluation crews. Increased collection effort at Tumwater Dam in 2010, as conducted in 2008 and 2009, will be possible due to WDFW's steelhead reproductive success study which began in 2007. This study will allow for maximum collection up to 7 days/week and 16 hours/day between September 1 and December 6. Differential marking (colored floy-tags) will be utilized on all coho collected at sites other than Dryden Dam so not to affect future smolt-to-adult survival analyses. Yakama Nation will provide broodstock collection objectives and program assumptions for the coho reintroduction program in the Wenatchee River basin. WDFW will work collaboratively with the Yakama Nation to facilitate coho broodstock collections at Dryden and Tumwater Dam.

White River Spring Chinook Captive Brood

Smolt production associated with the White River Captive Broodstock Program (150,000 smolts) will be separate from the smolt production objective associated with the Chiwawa River adult supplementation program. Spawning, incubation, rearing acclimation and release will be consistent with provisions of ESA Permit 1592.

Broodstock collection efforts for brood year 2010 will be addressed in a future document separate from this 2010 broodstock collection/protocol document and developed through the Priest Rapids Coordinating Committee Hatchery Committee (PRCC HC).

Priest Rapids Fall Chinook

Collection of fall Chinook broodstock at Priest Rapids Hatchery will generally begin in early September and continue through mid November. Smolt release objectives specific to Grant PUD

(5,000,000 sub-yearlings) and Federal (1,700,000 sub-yearlings) mitigation commitments and biological assumptions are detailed in Table 16. Smolt release objectives for Ringold Springs occur as green eggs collected at Priest Rapids FH and incubated at Bonneville prior to eyed egg transfers to Ringold Springs. The Yakama program is eyed egg transfers from Priest Rapids FH Table 16 (see footnotes for reference). After the new Priest Rapids FH rebuild there will no longer be incubation capacity for programs above GCPUD mitigation obligations. The default trapping location for fall Chinook adults for all programs is the Priest Rapids volunteer trap.

Table 16. Assumptions and calculations to determine the number of fall Chinook salmon broodstock needed for the Priest Rapids program release of 6,700,000 sub-yearling fall Chinook.

Program Assumptions	Standard	Program objective
Juvenile Production Level		
Grant PUD Mitigation-PUD Funded		**5,000,000**
John Day Mitigation-Federally Funded		**1,700,000**
John Day Mitigation [1]-Ringold Springs-ACOE funding.		**3,500,000**
John Day Mitigation [2]-Yakama N Request		**2,000,000**
Total Program Objectives		**12,200,000**
Fertilization-to-release survival	*87%*	
Egg take target		**14,022,989**
Fecundity	*4,300*	
Female Target		**3,261**
Female to male ratio	*2:1*	
Pre-spawn survival	*88%*	
Broodstock target		
Females		**3,706**
Males		**1,853**
Total broodstock collection		**5,559**

[1] As of brood year 2009, Priest Rapids Hatchery is taking 3,500,000 eggs for release at Ringold-Meseberg Hatchery funded by the ACOE – incubation of this program occurs at Bonneville.
[2] The Yakama Nation has requested 2,000,000 fall Chinook eggs for Priest rapids Hatchery for 2010. This request has been submitted to GCPUD. Funding is being pursued from John Day Mitigation or other possible funding sources.

Appendix A

Columbia River Mouth Fish Returns – Actual and Forecasts**					
			2009 Forecast	2009 Return	2010 Forecast
Spring Chinook	**Total Spring Chinook**		353,700	221,350	559,900
	Willamette		37600	39,400	62,700
	Sandy		5,200	2,700	3,700
	Cowlitz*		4,100	4,900	12,500
	Kalama*		900	350	900
	Lewis*		2,200	1,900	6,000
	Select areas		4,800	2,800	4,100
	Lower River Total		**54,800**	**52,050**	**89,900**
	Wind*		6,900	4,600	14,000
	Drano Lake*		9,600	10,700	28,900
	Klickitat*		2,000	1,500	4,500
	Yakima*		15,900	7,500	16,600
	Upper Columbia	Total	23,100	17,400	57,300
	Upper Columbia	*Wild*	*2,700*	*1,800*	*5,700*
	Snake River Spring/Summer	Total	179,200	92,000	272,000
	Snake River	*Wild*	*29,700*	*20,900*	*73,400*
	Upriver Total		**298,900**	**169,300**	**470,000**
Summer Chinook	**Upper Columbia**	**Total**	**70,700**	**53,900**	**88,800**
Sockeye					
	Wenatchee		18,300	32,100	14,300
	Okanogan		164,900	145,400	110,300
	Snake River		600	1,400	600
	Total Sockeye	**Total**	**183,800**	**179,000**	**125,200**
Steelhead					
Winter			15,200	11,400	20,100
Upriver Summer (to Bonneville Dam)	Upper Skamania Index	**Total**	**16,000**	**13,900**	**NYA**
		Wild	*4,200*	*3,500*	
	Group A-run Index	**Total**	**278,900**	**543,100**	**NYA**
		Wild	*75,400*	*154,000*	
	Group B-run Index	**Total**	**56,900**	**44,500**	**NYA**
		Wild	*10,300*	*13,700*	
	Total Upriver Steelhead	**Total**	**351,800**	**601,600**	
		Wild	*89,900*	*171,300*	

*Return to tributary mouth.
**Totals may not sum due to rounding.

APPENDIX I
2010 ACTION PLAN: WELLS HCP

2010 ACTION PLAN
WELLS HCP

HCP COORDINATING COMMITTEE

1. BYPASS OPERATING PLAN
   a. Draft to Committee: February 2010.
   b. Approval Deadline: March 2010.
   c. Period Covered: April to August 2010.
   d. Report Deadline: October 2010.

2. BULL TROUT MONITORING AND MANAGEMENT PLAN
   a. Period Covered: July 2008 – December 2009.
   b. Report Deadline: March 2010.

3. PREDATOR CONTROL PROGRAMS
   a. Pikeminnow Removal – Wells Project: March – July 2010.
   b. Avian Predator Hazing at Wells: October 2009 – May 2010.

4. SURVIVAL STUDY IMPLEMENTATION
   a. Tag Study Fish: Feb. 2010.
   b. Releases of Study Fish: April-May 2010.
   c. Draft Report to Committee: November 2010.
   d. Committee Approval Deadline: December 2010.
   e. Final Report: January 2011.

5. VELOCITY REDUCTIONS TO ENHANCE LAMPREY PASSAGE (if requested by Aquatic SWG)
   a. Draft to Committee: May 2010.
   b. Approval Deadline: June 2010.
   c. Period Covered: August – October 2010.
   d. Report Deadline: March 2011 (if study requested in 2010).

HCP HATCHERY COMMITTEE

1. 5-YEAR HATCHERY MONITORING AND EVALUATION PLAN
   a. Implementation: 2006 to 2010.
   b. Draft Annual Report for 2009: March 2010.
   c. Final Annual Report June 2010.

2. HCP ANNUAL HATCHERY PRODUCTION COMPLIANCE REPORT
   a. Period Covered: January 2010 to December 2010.
   b. Draft to Committee: November 2010.
   c. Approval Deadline: December 2010.
   d. Submission Deadline: December 2010.

3. 2010 BROOD STOCK PROTOCOL
    a. Draft to Committee: March 9, 2010.
    b. Approval Deadline: April 2010.
    c. Implementation: May 2010 to April 2011.

4. ANNUAL IMPLEMENTION REPORT - SOCKEYE FLOW MANAGEMENT
    a. Period Covered: Linked to Brood Years (incubation through emergence).
    b. Draft to Committee: One report per year.
    c. Final Reports Due: 60-days after comments received from Hatchery Committee.

5. HGMPS – METHOW SPRING CHINOOK AND WELLS STEELHEAD
    a. Final HGMPs to NMFS March 2010.
    b. NMFS Approval of HGMP *to be determined*.

6. METHOW STEELHEAD RELATIVE REPRODUCTIVE SUCCESS STUDY
    a. Committee Approves Final Plan February 2010.
    b. Implementation March 2010 - December 2021.
    c. Interim reports Annually.
    d. Final Report 2021/2022.

HCP TRIBUTARY COMMITTEE

1. PLAN SPECIES ACCOUNT ANNUAL CONTRIBUTION
    a. $176,178 in 1998 dollars January 31, 2010.

2. ANNUAL REPORT - PLAN SPECIES ACCOUNT STATUS
    a. Draft to Committee: February 2010.
    b. Approval Deadline: March 2010.
    c. Period Covered: January to December 2010.

3. 2010 FUNDING-ROUND REVIEW AND FUNDING DECISIONS
    a. RFP: *To be determined* (typically in March).
    b. Approval Deadline: *To be determined* (typically in December).

APPENDIX J
ANNUAL REPORT OF WELLS PLAN SPECIES ACCOUNT FINANCIAL ACTIVITY FOR THE YEAR ENDED DECEMBER 31, 2010

Annual Report of Wells Plan Species Account Financial Activity
For the Year Ended December 31, 2010

As required by Section 7.3.7.2 of the Wells Hydroelectric Project HCP

Beginning cash and investment balance 01/01/2010			$ 549,206.40
Sources:			
Annual payment from Douglas PUD per Section 7.4 of HCP		$ 237,455.00	
Interest earnings		3,206.90	
	Total Sources		240,661.90
Uses:			
Project #	Description		
0702	Heath Floodplain Restoration	4,780.78	
0801	Okanagon River Restoration Phase IV	35,345.08	
0802	Riparian Regeneration and Restoration	3,875.90	
	Total for Projects	44,001.76	
0699	Chelan PUD	2,685.55	
0699	Douglas PUD	2,272.00	
0699	Cordell, Neher & Co. - financial review	1,416.66	
	Total for Administration	$ 6,374.21	
	Total Uses		50,375.97
Ending cash and investment balance 12/31/2010			$ 739,492.33

Wyatt W. Scheibner 1/12/11

Wyatt W. Scheibner, Treasurer
PUD No. 1 of Douglas County

APPENDIX K
MONITORING AND EVALUATION OF WELLS AND METHOW HATCHERY PROGRAMS IN 2009

(Appendix K is provided only in the CD-ROM versions of this report and in the submittal to FERC. This appendix is available from Douglas PUD upon request.)

MONITORING AND EVALUATION OF WELLS AND METHOW HATCHERY PROGRAMS IN 2009

Prepared for

Douglas County Public Utility District

and

Wells Habitat Conservation Plan
Hatchery Committee

by

Charlie Snow, Charles Frady, and Alex Repp

Washington Department of Fish and Wildlife
Supplementation Research Team
Methow Field Office
Twisp, WA

Andrew Murdoch

Washington Department of Fish and Wildlife
Supplementation Research Team
Wenatchee Field Office
Wenatchee, WA

and

Maureen P. Small and Cheryl Dean
Washington Department of Fish and Wildlife
Conservation Biology Unit, Molecular Genetics Laboratory
Olympia, WA

July 2010

Executive Summary

Chapter 1: 2007 Brood Spring and Summer Chinook Salmon and 2008 Brood Summer Steelhead Reared at Methow and Wells Hatchery Facilities:

The Public Utility District No. 1 of Douglas County funds hatchery programs intended by the Joint Fishery Parties (JFP) to supplement natural populations of spring Chinook salmon and summer steelhead, and to produce summer Chinook salmon for harvest augmentation. These hatchery programs collect, rear, and release salmonids in accordance with protocols governing the number, origin, and timing of adult salmon and steelhead collected for broodstock, thereby affecting the subsequent number and genetic composition of the juveniles released. For the 2007 brood summer Chinook salmon, adult collection achieved 100% of the overall collection goal of 1,274 fish, and 72% of the collection goal of 128 wild fish. The 2007 spring Chinook salmon broodstock collection achieved only 63% of the overall collection goal, and too few wild fish were collected to meet genetic composition targets. The 2008 brood steelhead broodstock collection achieved both the overall numerical target and the genetic composition target. Pre-spawn survival of broodstock was above the set standards for each program. Adult hatchery and wild Chinook salmon of the same age were generally similar in length, but sample sizes of wild fish were typically too low to make valid statistical comparisons for all ages and stocks. No significant difference in fork length between wild and hatchery steelhead was detected between fish of the same sex and salt-age. Most summer Chinook salmon were age-5 hatchery fish with a mean fecundity of 4,708, while a majority of the spring Chinook salmon were age-4 hatchery fish with a mean fecundity of 3,468. No significant difference in fecundity was detected between hatchery and wild age-5 Methow Composite fish, or between age-4 hatchery Methow Composite and Twisp fish. Statistical tests were not conducted with summer Chinook fecundities because too few of the wild fish collected were sampled for fecundity. The 2008 brood steelhead were comprised primarily of 1-salt hatchery fish with a mean fecundity of 5,526, and no significant difference in fecundity was detected between hatchery and wild fish of the same salt-age. Evidence of the BKD bacterium in spring and summer Chinook broodstocks as assessed by ELISA sampling was lower than in most recent broods. Juvenile release numbers were within 5% of release goals for the Wells summer Chinook salmon and steelhead, but were below target levels (<90%) for spring Chinook salmon due primarily to an inadequate number of fish being collected for broodstock. The current brood years of salmon and steelhead exhibited hatchery replacement rates great enough to replace parent broods (i.e., ≥ 1), with the exception of the subyearling summer Chinook salmon.

Chapter 2: Harvest and Straying of Naturally Produced and Hatchery Origin Fish Released From Wells Complex Hatchery Facilities:

All stocks of salmon and steelhead covered in this chapter were subject to commercial, sport, or tribal fisheries in ocean and freshwater environments. Based on analysis of coded-wire tag data, most Wells summer Chinook salmon adults were recovered in fisheries, while most Methow spring Chinook salmon stocks were recovered in hatchery broodstocks or on spawning grounds. For the current brood examined, harvest of hatchery and wild Methow Basin spring Chinook totaled 9.6% and 5.3% of the total return, respectively. Unlike earlier hatchery releases, recent releases of Methow spring Chinook salmon have not been adipose fin-clipped, which may result in a decrease in harvest rates and an increase in recoveries of coded-wire tagged fish on the spawning grounds. For the most recent broods examined, less than 5% of the total return of spring Chinook salmon released into the Methow River strayed to non-target spawning grounds. However, greater than 5% of the total return of spring Chinook salmon releases in the Twisp and Chewuch rivers strayed into non-target spawning grounds. Less than 5% of the total brood return of Wells yearling and subyearling summer Chinook were recovered in non-target spawning grounds. For the 2008 return year, Wells summer Chinook salmon comprised less than 10% of the spawning populations of other independent populations. Local creel census was used to monitored harvest in selective (steelhead), and non-selective (summer Chinook salmon) fisheries occurring in the upper Columbia River ESU. An estimated 2,654 summer Chinook salmon, 2,002 hatchery steelhead, and 26 wild steelhead were directly or indirectly removed through sport fisheries in 2009. Overall, Wells Complex hatchery fish provided commercial, recreational, and limited tribal harvest, while meeting escapement requirements in that most spring Chinook salmon were recovered in broodstocks or on spawning grounds, and most summer Chinook salmon were recovered in fisheries.

Chapter 3: Methow River Basin Spring Chinook Salmon and Steelhead Smolt Monitoring in 2009:

The mean number of smolts produced per redd is a metric used to compare the relative productivity of target species during freshwater rearing. We used salmonid capture data from rotary screw traps to estimate the number of spring Chinook salmon and summer steelhead smolts emigrating from the Twisp River and Methow River basins. We captured 113 wild spring Chinook salmon smolts at the Methow River trap and 644 smolts at the Twisp River trap. A total of 403 and 658 wild steelhead emigrants were captured at the Methow and Twisp River traps, respectively. The number of these species captured each day was expanded by trap efficiency estimates derived from mark/recapture efficiency trials. Using this methodology, we estimate that a total of 5,163 (± 4,317, 95% CI) wild spring Chinook salmon smolts emigrated from the Methow River, including 5,547 (± 491, 95% CI) smolts emigrating from the Twisp River. An estimated 31,301 (± 34,328 95% CI) wild steelhead emigrated from the Methow River, including 12,629 (± 812, 95% CI) fish from the Twisp River. During the fall emigration period, we estimated that 7,139 (± 1,482, 95% CI) spring Chinook salmon parr emigrated past the Twisp River trap and 2,948 (± 535, 95% CI) spring Chinook salmon parr emigrated past the Methow River trap. Utilizing data gathered during spring Chinook salmon spawning ground surveys in 2008, we estimated that the number of emigrants produced from each 2007 brood spring Chinook salmon redd in the Twisp River (324) was 10 times greater than the number of emigrants produced in the remainder of the Methow River basin (32). Steelhead in the Methow Basin and in the Twisp River produced an estimated 10 and 11 emigrants from 2005 brood redds, respectively. While data for spring Chinook salmon for each trapping location were similar, we were unable to assess the relative contribution of naturally spawning hatchery fish to smolt production without similar data from non-supplemented reference populations.

Chapter 4: 2009 Brood Summer Steelhead Spawning Ground Surveys Conducted in the Methow River Basin:

Steelhead spawning ground surveys were performed to estimate the relative abundance, distribution, and timing of spawning within the Methow River basin. Based on surveys conducted between 5 March and 12 June, we estimated a minimum of 1,030 steelhead redds were constructed in the Methow in 2009. The greatest number of redds were found in the Twisp and upper Methow River subbasins (N = 352 and 287, respectively). The lower Methow (N = 219) and Chewuch River (N = 172) subbasins had similar numbers of redds. The run-at-large above Wells Dam was composed primarily of hatchery-origin steelhead (88.4%). Based on biological sampling of steelhead during broodstock collection at Wells Hatchery, 24.1% of total escapement was composed of out-of-basin stray hatchery fish, primarily from the Wenatchee River. Passive integrated transponder (PIT) tag recaptures from the 2002-2004 broods indicate that steelhead released from Wells Hatchery rarely stray into other independent populations downstream of Wells Dam. Within the Methow and Okanogan basins, Wells Hatchery steelhead comprised greater than 10% of the spawning population of some tributaries in which no hatchery steelhead were released. Wild 1-salt steelhead migrated to Wells Dam significantly earlier than hatchery 1-salt steelhead, based on sampling conducted each Monday during the broodstock collection period. No significant differences in spawn timing of hatchery and wild female steelhead were observed in the hatchery environment or during natural spawning in the Twisp River. Based on run-escapement estimates, the mean natural replacement rate for the eight most recent broods of steelhead spawning above Wells Dam (1996-2003) was 0.24 recruits per adult. For all brood years examined (1996-2003), the hatchery replacement rate was significantly greater than the natural replacement rate.

Chapter 5: 2009 Brood Spring Chinook Salmon Spawning Ground Surveys Conducted in the Methow River Basin:

Spawning ground surveys were conducted to evaluate the spawn timing, spatial distribution, genetic composition, and to estimate the tributary-specific spawning escapement of spring Chinook salmon within the Methow River basin. Spawning ground surveys were performed on foot between 5 August and 25 September. A total of 490 spring Chinook salmon redds were constructed in the Methow River basin in 2009. The Methow River subbasin had the greatest number of redds (N = 323). The Chewuch River subbasin had fewer redds (N = 143) than the mainstem Methow River excluding hatchery outfalls (N = 255), and the fewest redds were located in the Twisp River (N = 24). An estimated 4,804 spring Chinook salmon migrated upstream of Wells Dam in 2009. After subtracting fish that were double counted at Wells Dam fish ladders (N = 59), moved downstream of Wells Dam without reascending (N = 176), collected for hatchery broodstock (N = 738), and those originating from Okanogan River releases (N = 376), the estimated run escapement to the Methow River basin was 3,690 fish. There were no significant differences in migration timing between hatchery and wild fish. Redd counts expanded by the male-to-female ratio from sampling at Wells Dam (4.39:1.00) suggest that the Methow River spawning population comprised 2,641 fish, or 71.6% of the estimated escapement. No estimates of poaching, predation, or pre-spawn mortality were made. Peak spawning occurred between 25 August and 9 September in index areas of all three subbasins. There were no significant differences in the spatial distribution of female carcasses or spawn timing between hatchery and wild fish within any subbasin. Wild fish comprised 35.1%, 24.8%, and 15.0% of the estimated spawning escapement in the Chewuch, Twisp, and Methow subbasins, respectively. The natural replacement rate (NRR) for the most recent brood year of spring Chinook salmon with complete recovery data (2003 brood) was highest in the Methow River subbasin (0.15 recruits per spawner). The geometric mean NRR for brood years 1992 to 2003 was less than 1.0 in each subbasin regardless of whether broodyears 1996 through 1998 were omitted (no spawning ground surveys in 1996 and 1998). Broodyear 2003 hatchery replacement rates (HRR) did not meet the target BAMP value. Target BAMP HRR values have not been met for any of the broodyears and stocks. Of the estimated total of coded-wire-tagged hatchery fish recovered on spawning grounds (N = 1,912), 16.3% were classified as within-basin strays from Methow Hatchery and 3.9% were stray fish from other basins.

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General Introduction

The Public Utility District No. 1 of Douglas County (DCPUD) funds hatchery programs to compensate for inundation of spawning habitat and lost harvest opportunities related to the construction of the Wells Hydroelectric Project and for mortality associated with operation and passage at the Project as part of the Anadromous Fish Agreement and Habitat Conservation Plan (HCP) for the Wells Hydroelectric Project (Wells HCP 2002). The Joint Fishery Parties (JFP) developed specific goals for these hatchery programs, which are described in the Monitoring and Evaluation Plan (Wells HCP HC 2005).

1. Support the recovery of ESA-listed species by increasing the abundance of the natural adult population, while ensuring appropriate spatial distribution, genetic stock integrity, and adult spawner productivity (Methow spring Chinook salmon, Methow summer steelhead, Okanogan summer steelhead).

2. Increase the abundance of the natural adult population of unlisted plan (i.e., HCP) species, while ensuring appropriate spatial distribution, genetic stock integrity, and adult spawner productivity. In addition, provide harvest opportunities in years when spawning escapement is sufficient to support harvest (Methow summer/fall Chinook salmon, Okanogan sockeye).

3. Provide salmon for harvest and increase harvest opportunities, while segregating returning adults from natural spawning populations (Wells summer/fall Chinook salmon).

These programs occur at either Wells Hatchery, located on the west bank of the Columbia River adjacent to Wells Dam (rkm 830), or Methow Hatchery, located on the Methow River (rkm 83) upstream of the town of Winthrop. At Wells Hatchery, summer steelhead adults are collected from fish ladders at Wells Dam adjacent to the hatchery, spawned, and reared as part of what the JFP has considered a supplementation program. Subsequently, juvenile steelhead are released into the Methow and Okanogan River basins in an effort to increase the abundance of naturally produced populations (Snow 2004). Summer Chinook salmon are collected, spawned, reared, and released directly from Wells Hatchery into the Columbia River as part of a harvest augmentation program (Snow 2005). Methow Hatchery operates as a spring Chinook salmon supplementation facility. Broodstock are collected from the Methow and Twisp rivers, or the fish ladders at Wells Dam. Juvenile spring Chinook salmon are reared on groundwater and Methow River surface water to the pre-smolt stage, and acclimated on surface water in their release basin in acclimation ponds on the Methow, Twisp, and Chewuch rivers prior to release (Humling 2005; Figure 1).

The Wells HCP Hatchery Committee (HC) developed and adopted a conceptual monitoring and evaluation plan (M&E Plan) for the hatchery programs that consists of 10 objectives (Wells HCP HC 2007). This report summarizes activities and presents data collected during 2008 required to address the program-specific objectives of the M&E Plan and is consistent with the implementation plan proposed by the Supplementation Research Team (SRT) of the Washington Department of Fish and Wildlife (WDFW) and approved by the HCP HC (SRT 2007). Hence, annual reports are based on activities conducted during the calendar year or, as necessary, directly related activities from previous years. These activities are reported by subject within each chapter of the report. Analysis of the data and results for each objective in the M&E Plan will be presented in a separate five-year report.

Specific Monitoring and Evaluation Objectives

Objective 1: Determine if: a) supplementation programs have increased the number of naturally spawning and naturally produced adults of the target population relative to a non-supplemented population (i.e., reference stream), and b) the changes in the natural replacement rate (NRR) of the supplemented population are similar to that of the non-supplemented population.

Objective 2: Determine if the run timing, spawn timing, and spawning distribution of both the natural and hatchery components of the target population are similar.

Objective 3: Determine if genetic diversity, population structure, and effective population size have changed in natural spawning populations as a result of the hatchery program. Additionally, determine if hatchery programs have caused changes in the phenotypic characteristics of natural populations.

Objective 4: Determine if the hatchery adult-to-adult survival (i.e., hatchery replacement rate, HHR) is greater than the natural adult-to-adult survival (i.e., natural replacement rate, NRR) and equal to or greater than the program specific HRR expected value (BAMP 1998).

Objective 5: Determine if the stray rate of hatchery fish is below acceptable levels to maintain genetic variation between stocks.

Objective 6: Determine if hatchery fish were released at the programmed size and number.

Objective 7: Determine if the proportion of hatchery fish on the spawning grounds affects the freshwater productivity (i.e., number of smolts per redd) of supplemented streams when compared to non-supplemented streams.

Objective 8: Determine if harvest opportunities have been provided using hatchery returning adults where appropriate (e.g., Wells Chinook salmon).

Regional Objectives

Objective 9: Determine whether BKD management actions lower the prevalence of disease in hatchery fish and subsequently in the naturally spawning population. In addition, when feasible, assess the transfer of Rs infection at various life stages from hatchery fish to naturally produced fish.

Objective 10: Determine if the release of hatchery fish impact non-target taxa of concern (NTTOC) within acceptable limits.

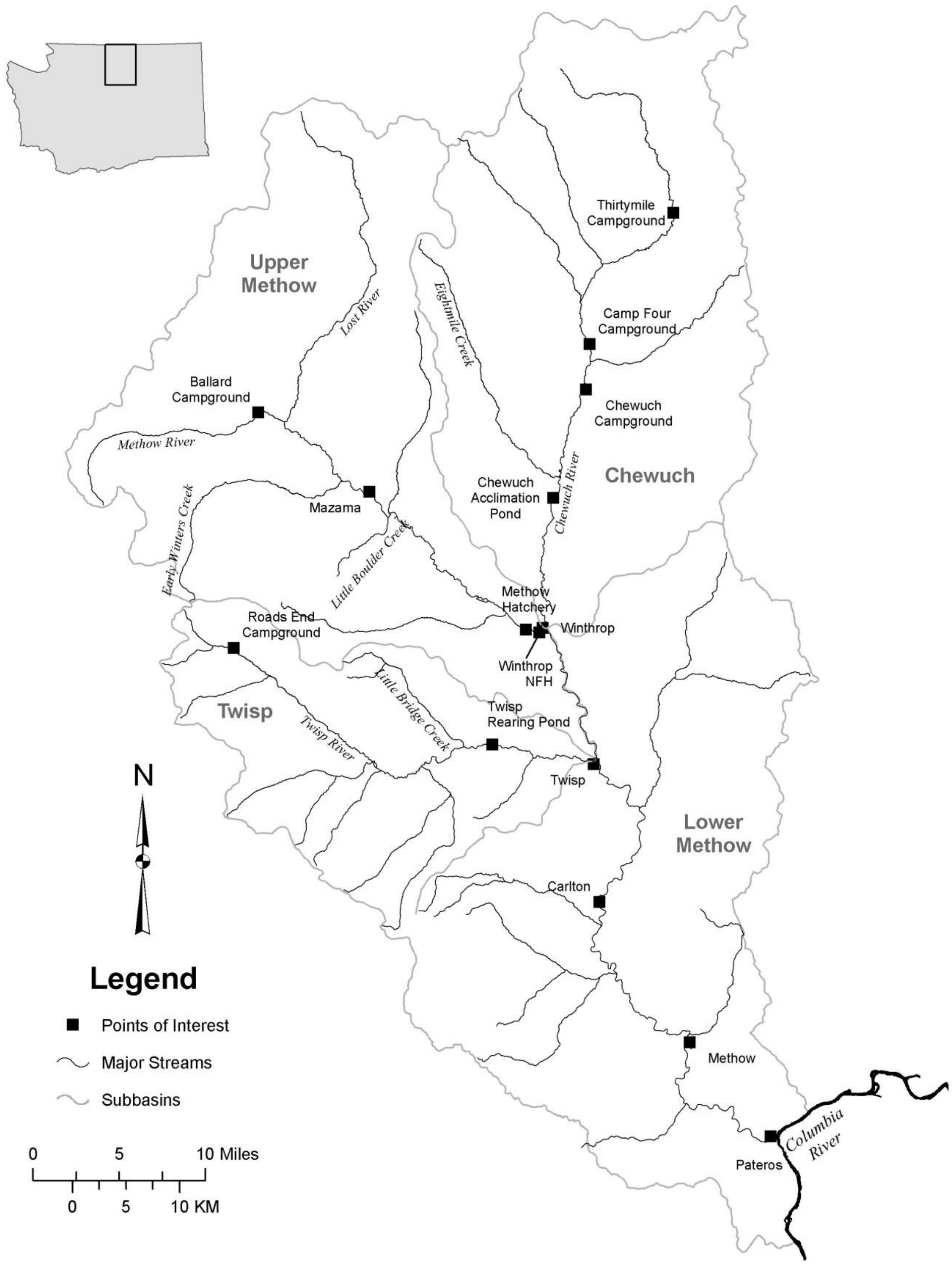

Figure 1. Map of Methow River basin hatchery facilities and rearing ponds.

Chapter 1

2007 Brood Spring and Summer Chinook salmon and 2008 Brood Summer Steelhead Reared at Methow and Wells Hatchery Facilities

Abstract

The Public Utility District No. 1 of Douglas County funds hatchery programs intended by the Joint Fishery Parties (JFP) to supplement natural populations of spring Chinook salmon and summer steelhead, and to produce summer Chinook salmon for harvest augmentation. These hatchery programs collect, rear, and release salmonids in accordance with protocols governing the number, origin, and timing of adult salmon and steelhead collected for broodstock, thereby affecting the subsequent number and genetic composition of the juveniles released. For the 2007 brood summer Chinook salmon, adult collection achieved 100% of the overall collection goal of 1,274 fish, and 72% of the collection goal of 128 wild fish. The 2007 spring Chinook salmon broodstock collection achieved only 63% of the overall collection goal, and too few wild fish were collected to meet genetic composition targets. The 2008 brood steelhead broodstock collection achieved both the overall numerical target and the genetic composition target. Pre-spawn survival of broodstock was above the set standards for each program. Adult hatchery and wild Chinook salmon of the same age were generally similar in length, but sample sizes of wild fish were typically too low to make valid statistical comparisons for all ages and stocks. No significant difference in fork length between wild and hatchery steelhead was detected between fish of the same sex and salt-age. Most summer Chinook salmon were age-5 hatchery fish with a mean fecundity of 4,708, while a majority of the spring Chinook salmon were age-4 hatchery fish with a mean fecundity of 3,468. No significant difference in fecundity was detected between hatchery and wild age-5 Methow Composite fish, or between age-4 hatchery Methow Composite and Twisp fish. Statistical tests were not conducted with summer Chinook fecundities because too few of the wild fish collected were sampled for fecundity. The 2008 brood steelhead were comprised primarily of 1-salt hatchery fish with a mean fecundity of 5,526, and no significant difference in fecundity was detected between hatchery and wild fish of the same salt-age. Evidence of the BKD bacterium in spring and summer Chinook broodstocks as assessed by ELISA sampling was lower than in most recent broods. Juvenile release numbers were within 5% of release goals for the Wells summer Chinook salmon and steelhead, but were below target levels (<90%) for spring Chinook salmon due primarily to an inadequate number of fish being collected for broodstock. The current brood years of salmon and steelhead exhibited hatchery replacement rates great enough to replace parent broods (i.e., ≥ 1), with the exception of the subyearling summer Chinook salmon.

Introduction

To be successful, supplementation programs must achieve a minimum survival rate of fish in the hatchery and after release such that a greater number of fish return as adults than were collected for broodstock. Release goals for Douglas County Public Utility District (DCPUD) funded hatchery programs are based on mitigation for mortality associated with inundation of spawning habitat resulting from the construction of the Wells Hydroelectric Project and mortality resulting from the operation of the Wells Hydroelectric Project (Wells HCP 2002). Hatchery mitigation is a critical component of achieving no net impact (NNI) on anadromous fish populations from the Wells Hydroelectric Project. The number of broodstock required for each hatchery program was derived from biological assumptions related to the sex ratio, broodstock survival, fecundity, and juvenile survival within the hatchery. The ratio of the number of returning hatchery fish from a particular brood year to the number of broodstock collected for that brood is referred to as the hatchery replacement rate (HRR). A minimum expected HRR for each hatchery program was calculated using this ratio and reported in the Monitoring and Evaluation Plan (Wells HCP HC 2005). The HRR of hatchery programs must also be greater than the number of naturally produced fish that would have been produced if the broodstock were allowed to spawn naturally. The ratio of the number of naturally produced adults to the number of natural spawners of the parent brood is referred to as the natural replacement rate (NRR) or recruits per spawner. Should the survival of hatchery fish decline such that the actual HRR falls below the expected HRR or the NRR of the target population, an assessment of the hatchery program to determine causation may be necessary.

Harvest augmentation programs were developed to replace lost natural production due to the loss of habitat from inundation and lost harvest opportunities resulting from the construction of the hydroelectric project. While the Wells summer Chinook salmon program remains a harvest augmentation program, the ESA listing of steelhead required a shift from a traditional harvest augmentation to supplementation in order to assist in the recovery of the populations upstream of Wells Dam (Wells HCP HC 2005). The survival standards of hatchery fish in harvest augmentation programs are identical to those in supplementation programs. However, since the returning hatchery adults are not intended to spawn naturally, comparisons between HRR and NRR are not applicable.

The Wells HCP outlines the number and size (fish per pound) of fish that are to be released from each hatchery program. The M&E Plan lists target length and weight goals for each program based on the fish per pound size goals in the HCP (Wells HCP HC 2005, Appendix C, Table 5). Modifications to the number of fish released in NNI hatchery compensation or supplementation programs may occur based on the survival studies conducted at each hydroelectric project, or as a result of monitoring and evaluation activities. Monitoring the number and size of fish released is critical in evaluating the hatchery programs and ensuring the conditions of the HCP are being met.

This chapter addresses hatchery activities related to the 2007 brood Wells summer Chinook salmon, 2007 brood Methow spring Chinook salmon, and the 2008 brood Wells summer steelhead. The information presented is applicable to many of the M&E Plan objectives, but will specifically report primary indicators (hatchery replacement rate, number of fish released and size of fish released) for the following objectives and associated hypothesis statements:

Objective 3: Determine if genetic diversity, population structure, and effective population size have changed in natural spawning populations as a result of the hatchery program. Additionally, determine if hatchery programs have caused changes in phenotypic characteristics of natural populations.

- Ho: Age at Maturity $_{\text{Hatchery}}$ = Age at Maturity $_{\text{Naturally produced}}$
- Ho: Size (length) at Maturity $_{\text{Hatchery Age X and Gender Y}}$ = Size (length) at Maturity $_{\text{Naturally produced Age X and Gender Y}}$

Objective 4: Determine if the hatchery adult-to-adult survival (i.e., hatchery replacement rate) is greater than the natural adult-to-adult survival (i.e., natural replacement rate) and equal to or greater than the program specific expected value (BAMP 1998).

- Ho: HRR $_{\text{Year X}} \geq$ NRR $_{\text{Year X}}$
- Ho: HRR $\geq$ BAMP value (expected)

Objective 6. Determine if hatchery fish were released at the programmed size and number.

- Ho: Hatchery fish $_{\text{Size at release}}$ = Programmed $_{\text{Size at release}}$
- Ho: Hatchery fish $_{\text{Number released}}$ = Programmed $_{\text{Number released}}$

Methods

Broodstock Collection and Spawning

Salmon and steelhead broodstock were collected in accordance with protocols designed to ensure enough fish of a desired genetic composition (i.e., hatchery and wild) were collected to satisfy specific program release goals (Appendix A). Although broodstock were collected for Wells HCP hatchery programs and other unrelated programs (i.e., Turtle Rock Summer Chinook Salmon Program [Chelan PUD], Winthrop Summer Steelhead Program [USFWS], and Ringold Hatchery Steelhead Program [WDFW]), this chapter only describes and reports on activities related to hatchery programs funded by Douglas County PUD.

Broodstock were collected as specified in collection protocols (Truscott 2007). Hatchery summer Chinook salmon were collected as volunteers to Wells Hatchery. Wild summer Chinook salmon were collected from the west ladder at Wells Dam, or as volunteers to Wells Hatchery. Summer steelhead were collected from the east and west ladders of Wells Dam. Spring Chinook salmon were collected at Wells Dam, the Twisp River weir, or on the Methow River at the Methow Hatchery and Winthrop National Fish Hatchery outfalls. In addition to specifying the collection location and target numbers, the collection protocols designated a maximum extraction rate for most hatchery broodstocks. Extraction rates are expressed as a proportion of the escapement that may be retained for hatchery broodstocks.

Run escapement estimates for Wells Hatchery summer Chinook salmon were calculated as the difference between the number of summer Chinook salmon counted at Wells and Rocky Reach Dams. Although some mainstem spawning occurs and tributaries enter the Columbia River between the two dams (e.g., Entiat and Chelan rivers), natural production of summer Chinook salmon in these tributaries is thought to be limited (Hamstreet 2008, 2009; Miller 2006, Miller 2008). Methow spring Chinook salmon run escapement was estimated from spring Chinook counts at Wells Dam by subtracting summer Chinook salmon passing Wells Dam during the spring Chinook salmon migration period (see Chapter 5). Spawning escapement estimates for spring Chinook salmon in individual tributaries were calculated from a total census of redds multiplied by the number of fish per redd (i.e., sex ratio).

Broodstock were scanned for marks or tags during trapping to assess the number of hatchery and naturally produced fish collected. Spring Chinook salmon were held in separate ponds depending on collection location, or were internally (i.e., Passive Integrated Transponder [PIT] tag) or externally marked (e.g., opercle punch) prior to mixing in order to facilitate mating by collection location at spawning. During spawning, broodstock were crowded to one end of a holding pond and sexually mature fish were sorted to separate holding pens. Spring Chinook salmon, steelhead, and summer Chinook salmon utilized for yearling programs were assigned a unique number at spawning to allow tracking of biological samples (e.g., age, fecundity, ELISA) and to facilitate the implementation of proper mating protocols. Spawning occurred weekly until all broodstock were used or egg collection goals had been satisfied. Spring Chinook salmon adults and gametes were transferred between Methow Hatchery (MH) and Winthrop National Fish Hatchery (WNFH) as necessary to meet program or rearing requirements.

Biological sampling of broodstock occurred after the gametes were collected. Personnel collected length, sex, mark, scale, and origin data in addition to recovering coded wire tags (CWT). Tissue samples were also collected from all stocks for DNA analysis. The unique sample number assigned to each fish at spawning allowed for the correlation of health sample (i.e., ELISA), fecundity, and egg mortality data provided by hatchery or WDFW fish health personnel. Differences in size and fecundity by age class of hatchery and wild fish were tested with a non-parametric Kruskal-Wallis analysis of variance (KW ANOVA) test because assumptions of normality could not be met with transformed data.

Juvenile Rearing and Release

A description of the rearing facilities at Methow and Wells hatcheries can be found in the Integrated Hatchery Operations Team (1995) manual and described in detail by Snow (2003) and Jateff (2001). The marking scheme for each program varied depending on ESA status or study purpose. All fish released received a CWT and/or an external mark (i.e., adipose fin-clip or elastomer tag). Spring Chinook salmon were initially reared on well water, but were transferred to acclimation ponds (Methow, Chewuch, and Twisp rivers) in the spring and reared on river water prior to release. Rearing anadromous salmonids on ambient-temperature surface water versus relatively warm well water was intended to promote the smoltification process and provide a survival advantage (Bjornn and Ringe 1984). Acclimation ponds located on natal rivers in the vicinity of good spawning habitat were used to decrease stray rates and ensure adequate spatial distribution. Yearling summer Chinook salmon and steelhead released from Wells Hatchery were reared on Columbia River water prior to release. Wells subyearling summer Chinook salmon were the only anadromous fish reared entirely on well water prior to release.

Juvenile Hatchery Survival

The survival of juveniles in the hatchery is not a primary indicator in the M&E Plan, but may help explain why program release goals (i.e., number of fish released) were not met despite adequate broodstock. Survival rates were calculated based on the complete inventory of the population at tagging and any mortality that occurred prior to or after tagging was complete, depending on the specific stage of development.

Number of Juvenile Fish Released

A 100% inventory of fish on station is possible during marking because all juvenile fish receive either an internal and/or external tag or mark during rearing. The number of juvenile fish released was calculated based on the number of fish tagged or marked minus mortality that occurred between marking and release.

Size of Juvenile Fish Released

The size of juvenile fish released was estimated from no less than 100 fish randomly sampled immediately prior to release. Fork length was measured to the nearest millimeter and weight was measured to the nearest 0.1 gram. Juvenile weight at release was compared to the target release weight using a one-sample t-test.

Hatchery Replacement Rate

Program-specific target hatchery replacement rates (HRR) were derived from the Biological Assessment and Management Plan (BAMP 1998). These rates were calculated by dividing the number of returning adults estimated from CWT recoveries (spring and summer Chinook salmon) or run escapement estimates at Wells Dam (steelhead) by the number of broodstock (including pre-spawn mortality). The HRR of each stock was tested against target HRR rates using a one-sample t-test. For stocks where the HRR data did not meet assumptions of normality, HRR and target values were log transformed prior to analysis.

Results

Adult Collection and Spawning

Broodstock collection is dependent on the run size and migration timing of the target stock. Pre-season estimates of upper Columbia River salmon runs were calculated to assist managers in determining trapping location, duration, and in developing weekly quotas to extract broodstock in proportion to the run-at-large. Pre-season run estimates for spring Chinook salmon were large enough to recommend tributary collection instead of mainstem Columbia River trapping at Wells Dam. However, due to delays in the design and implementation of a replacement Twisp River weir, the decommissioning of Fulton Dam, and limited on-station releases of smolts from Methow Hatchery, Wells Dam was designated as the primary collection site for the 2007 brood (Appendix A). Summer Chinook salmon were collected from the Wells Hatchery volunteer trap (hatchery and wild fish) and from the west fish ladder at Wells Dam (wild fish only). Summer steelhead were collected from the east and west fish ladders at Wells Dam.

Chinook salmon trapping at Wells Dam did not closely reflect run-at-large passage of target stocks (Table 1). Spring Chinook salmon collection was skewed towards the earlier part of the run cycle because protocols specified trapping every third day and the majority of fish were collected during a relatively narrow time period when passage was high. Summer Chinook salmon were typically collected from the Wells Hatchery volunteer trap later than the run-at-large because fish did not enter the volunteer trap at the same rate as fish that migrated through the fish ladders at Wells Dam. However, broodstock collection from the hatchery volunteer trap was completed by 16 August, and subsequently trapped fish were donated to local Native American tribes. For spring Chinook programs, too few hatchery and wild fish were collected to meet protocol requirements (Table 2). This was due primarily to low overall abundance of wild fish and a lack of tributary collection sites.

Table 1. Cumulative trapping of selected upper Columbia salmon and steelhead runs at Wells Dam. Wells summer Chinook salmon trapping reflects fish collected from the volunteer channel and the west fish ladder of Wells Dam (MEOK = Methow and Okanogan rivers).

Stock (brood) / trapping dates	Cumulative passage date during trapping period and broodstock retained (%)			
	25%	50%	75%	100%
MEOK summer Chinook salmon (2007)	17-Jul	26-Jul	07-Aug	31-Aug
10 Jul - 31 Aug	6.8	38.7	85.1	100.0
MEOK spring Chinook salmon (2007)	24-May	30-May	08-Jun	27-Jun
1-May - 27-Jun	45.2	75.9	86.1	100.0
MEOK summer steelhead (2008)	02-Sep	17-Sep	04-Oct	31-Oct
1-Aug - 31-Oct	24.5	46.1	76.2	100.0

Table 2. Broodstock collection results from Wells Complex hatcheries for steelhead (2008 brood) and Chinook salmon (2007 brood). Estimated escapement and required extraction rates for Wells summer Chinook salmon are based on the difference in Chinook salmon counts between Rocky Reach and Wells Dams, and combine hatchery (H) and wild (W) fish. Broodstock goals for spring Chinook salmon were based on the estimated run escapement and a maximum extraction rate for wild fish of 33% of the total escapement.

	Wells summer Chinook		Wells steelhead		Spring Chinook			
					Methow		Twisp	
	H	W	H	W	H	W	H	W
Broodstock goal	1,146	128	289	91	249	57	47	10
Est. run escapement	9,950		6,698	1182	1,610	172	141	30
Extraction rate required	0.128		0.043	0.077	0.155	0.330	0.330	0.330
Actual extraction rate	0.129		0.043	0.078	0.106	0.110	0.241	0.133
Broodstock collected	1,189	92	288	92	171	19	34	4

Age Composition and Size at Maturity

Biological sampling of adult broodstock occurred at spawning. Mean length, age, origin, and fecundity data were used to estimate egg deposition from naturally spawning fish (Chapters 4 and 5) and were used in part to calculate replacement rates for hatchery and wild stocks. Broodstock were intended to serve as a representative sample of the spawning population from which comparisons could be made of demographic and phenotypic traits by origin. However, because of the low number of wild fish represented in the 2007 spring Chinook salmon broodstock, comparisons were made from hatchery and wild carcasses recovered on spawning grounds (Snow et al. 2008).

Hatchery and wild Chinook salmon were generally similar in length, but sample sizes of wild fish were small or non-existent for some ages and stocks, affecting our ability to make comparisons for all ages of each stock (Table 3; Appendix C). No significant difference in fork length between wild and hatchery steelhead was detected between fish of the same sex and salt-age (KW ANOVA: $P = 1.0$; Table 4).

Table 3. Mean fork length (cm; *N*; SD) by age, sex, and origin of 2007 Chinook salmon broodstocks sampled at Wells Hatchery Complex facilities.

Sex	Age-2	Age-3		Age-4		Age-5		Age-6	Age-7
	W	H	W	H	W	H	W	H	H
				Methow Composite spring Chinook					
M	- -	51.6	48.0	70.2	71.6	92.9	96.0	- -	- -
		(16; 4.4)	(1; - -)	(40; 6.5)	(6; 6.9)	(14; 5.2)	(3; 3.6)		
F	- -	- -	- -	74.1	- -	88.0	90.3	- -	- -
				(43; 4.7)		(21; 3.5)	(9; 2.2)		
				Twisp spring Chinook					
M	- -	48.1	48.0	70.4	- -	- -	- -	- -	- -
		(7; 4.3)	(1; - -)	(10; 5.4)					
F	- -	- -	- -	74.0	73.0	- -	93.0	- -	- -
				(16; 5.3)	(1; - -)		(2; 2.8)		
				Wells summer Chinook subyearling					
M	51.5	73.2	68.2	84.2	86.4	- -	94.3	94.0	- -
	(2; 4.9)	(40; 4.6)	(18; 5.4)	(18; 6.8)	(8; 9.4)		(6; 6.7)	(1; - -)	
F	- -	74.6	70.3	85.4	78.7	92.1	95.6	91.5	- -
		(10; 2.9)	(3; 2.8)	(18; 5.3)	(3; 4.1)	(7; 4.6)	(14; 3.9)	(2; 2.1)	
				Wells summer Chinook yearling					
M	- -	63.9	- -	76.8	- -	93.1	- -	95.4	79.0
		(21; 3.5)		(132; 5.9)		(255; 7.5)		(14; 10.3)	(1; - -)
F	- -	74.0	- -	80.0	- -	91.4	89.0	93.3	88.9
		(1; - -)		(70; 5.8)		(408; 4.9)	(1; - -)	(37; 5.4)	(7; 7.7)

Table 4. Mean fork length (cm; *N*; SD) by saltwater age, sex, and origin of 2008 steelhead broodstock sampled at Wells Hatchery Complex facilities.

Sex	1-salt		2-salt	
	H	W	H	W
M	63.2 (131; 2.9)	64.6 (31; 4.3)	77.6 (11; 4.3)	74.0 (3; 3.4)
F	61.1 (67; 2.7)	62.4 (42; 2.8)	71.8 (58; 3.9)	74.4 (13; 3.3)

Fecundity of salmon and steelhead is directly related to fish size (Quinn et al. 2004; Campbell et al. 2006). Most summer Chinook salmon were age-5 hatchery fish with a mean fecundity of 4,708. The majority of spring Chinook sampled were age-4 Methow Composite hatchery fish with a mean fecundity of 3,468 (Table 5). No significant difference in fecundity was detected between hatchery and wild age-5 Methow Composite fish, or between age-4 hatchery Methow Composite and Twisp fish (KW ANOVA: $P = 1.0$). No statistical tests were conducted with summer Chinook fecundities because too few of the wild fish collected were sampled for fecundity ($N = 1$). The 2008 brood steelhead were comprised of primarily 1-salt hatchery fish with a mean fecundity of 5,526 (Table 6). No significant difference in fecundity between wild and hatchery steelhead was detected between fish of the same salt-age (KW ANOVA: $P = 1.0$). Mean fecundity values for previous broods of Chinook salmon and steelhead are reported in Appendix D.

Table 5. Mean fecundity (*N*; SD) by total age and origin of 2007 brood Chinook salmon sampled at Wells Complex hatchery facilities.

Chinook stock	Origin	Age-3	Age-4	Age-5	Age-6
Wells summer	H	3,137 (1; - -)	4,016 (10; 900)	4,708 (66; 949)	4,595 (6; 602)
Wells summer	W	2,906 (1; - -)	- -	- -	- -
Met Comp spring	H	- -	3,468 (43; 817)	4,633 (21; 959)	- -
Met Comp spring	W	- -	- -	5,047 (9; 629)	- -
Twisp spring	H	- -	3,422 (16; 721)	- -	- -
Twisp spring	W	- -	2,977 (1; - -)	5,304 (2; 1,580)	- -

Table 6. Mean fecundity (*N*; SD) by salt-age and origin of 2008 brood summer steelhead sampled at Wells Complex hatchery facilities.

Origin	1-salt	2-salt
H	5,526 (66; 980)	6,682 (57; 1,319)
W	5,434 (41; 1,099)	6,171 (13; 1,135)

Results from ELISA sampling of kidney and spleen tissue collected from female spring and summer Chinook salmon at spawning indicated that the prevalence of the antigen for Bacterial Kidney Disease (BKD) was generally low for the 2007 brood (Table 7). The 2007 brood ELISA results were lower by category than most recent broods (Appendix E).

Table 7. Results (%) of ELISA sampling of 2007 brood female Chinook salmon by category and value.

Program	Below-low	Low	Med	High	*N*
	<0.099	0.099 - 0.199	0.20 - 0.449	> 0.450	
Wells summer Chinook	98.2	1.8	0.0	0.0	166
Methow spring Chinook	93.2	4.1	1.3	1.3	73
Twisp spring Chinook	94.1	0.0	5.9	0.0	17

Juvenile Hatchery Survival

Pre-spawn survival of all broodstocks was above the standards outlined in Appendix C of the M&E Plan (Table 8). Survival of most stocks exceeded set standards after the fish were ponded. However, Wells stocks were below set standards in the unfertilized egg-to-eyed egg stage, and most stocks were below set standards in the eyed egg-to-ponding life stage. Mortality in these life stages was primarily responsible for most stocks being below set standards in the unfertilized egg-to-release life stage. Historically, these Chinook programs have usually exceeded survival standards in most categories, while the Wells steelhead program has not (Appendix F).

Table 8. Life-stage survival rate standards (%) for Wells and Methow Hatcheries, the 5-year mean (SD) and survival achieved for current brood year.

Life stage	Survival standard	Wells steelhead		Wells-1 summer Chinook		Methow spring Chinook		Twisp spring Chinook	
		5-year mean (SD)	Survival achieved	5-year mean (SD)	Survival achieved	5-year mean (SD)	Survival achieved	5-year mean (SD)	Survival achieved
Collection-to-spawning	90 female	96.4 (2.5)	98.9	96.5 (1.5)	97.2	97.5 (1.0)	98.6	96.6 (6.2)	100.0
Collection-to-spawning	85 male	97.3 (2.7)	96.6	98.0 (0.8)	98.2	97.1 (2.0)	98.8	88.6 (13.6)	100.0
Unfertilized egg-to-eyed	92	84.9 (2.7)	85.2	88.4 (4.8)	87.9	93.9 (2.3)	92.9	95.4 (2.2)	92.4
Eyed egg-to-ponding	98	97.6 (2.6)	85.2	99.8 (0.3)	98.3	99.2 (1.7)	96.0	99.2 (1.1)	96.0
30 d after ponding	97	96.1 (2.8)	99.3	99.3 (0.2)	99.9	98.7 (0.9)	98.8	99.3 (0.3)	99.4
100 d after ponding	93	90.2 (7.5)	99.5	99.2 (0.3)	99.7	98.5 (1.0)	98.2	99.0 (0.4)	98.4
Ponding-to-release	90	83.8 (7.6)	92.9	95.3 (2.9)	93.0	91.8 (5.5)	94.5	93.3 (8.4)	88.6
Transport-to-release	95	- -	- -	- -	- -	98.8 (1.5)[a]	99.1[a]	99.8 (0.2)	99.7
Unfertilized egg-to-release	81	69.4 (5.4)	67.5	84.1 (4.0)	80.4	84.0 (6.5)	84.2	87.9 (9.0)	78.6

[a] All data from Chewuch acclimation pond releases.

Number of Juvenile Fish Released

Yearling summer Chinook were within 10% of the release target, while subyearling releases were 17% below target. Overall, spring Chinook releases were 54% of their target, with the releases in the Methow, Chewuch and Twisp all below target release levels (Table 9). Spring Chinook salmon releases were below target values because too few adult fish were collected for broodstock. Summer Chinook salmon releases were below target values due to losses within the subyearling population attributed to coagulated yolk disease. The 2008 brood summer steelhead releases were within target values overall and within the Methow Basin, but Okanogan Basin releases exceeded target values (Table 9). Annual release numbers for each program are listed in Appendix G.

Table 9. Target and actual release numbers for anadromous fish releases from Wells Complex hatchery facilities in 2009.

Stock/Program	Target	Number released (% of target)	16-year (1992 – 2007 broods)[a]		
			Min.	Max.	Mean
Wells summer Chinook	804,000	713,342 (89)	561,227	923,790	749,193
Yearling	320,000	310,063 (97)	185,200	457,770	331,281
Subyearling	484,000	403,279 (83)	187,382	541,923	417,916
Methow spring Chinook	550,000	299,558 (54)	28,878	611,763	340,488
Methow River	183,334	119,407 (65)	4,477	332,484	146,460
Chewuch River	183,333	126,055 (69)	11,854	284,165	176,834
Twisp River	183,333	54,096 (30)	15,470	116,749	46,800
Wells summer steelhead	450,000	455,145 (101)	328,100	775,272	467,414
Methow River	106,667	103,236 (97)	80,580	359,170	168,503
Chewuch River	106,667	100,373 (94)	78,205	138,300	105,265
Twisp River	106,666	104,903 (98)	84,475	136,680	109,527
Okanogan River	130,000	146,633 (113)	67,500	228,770	124,538

[a] Excludes years of no release: 1995 brood Twisp and 1995 and 1999 broods Chewuch spring Chinook salmon;1994 – 1996 brood steelhead releases in the Twisp and Chewuch rivers.

All juvenile anadromous salmonids released from Wells Complex hatchery facilities were marked or tagged prior to release. Marking allows the identification of stray hatchery fish, and provides the means to calculate survival rates and fishery contribution rates of specific hatchery stocks (Chapter 2). Marks or tags used included elastomer (Wells steelhead), adipose fin-clips (Wells steelhead and summer Chinook salmon), CWT (spring and summer Chinook salmon), and passive integrated transponder (PIT) tags. These marks are applied singly or in combination with other marks or tags depending on the requirements of individual stocks or studies. Coded-wire tags are inserted into all Chinook salmon prior to release, but subsequent tag loss during rearing typically results in a mark rate less than 100% (Appendix H).

Size of Juvenile Fish Released

Target release sizes specified in the M&E Plan were derived from weight-at-release (fish per pound) goals outlined in the Wells HCP. Corresponding length-at-release targets were derived from standardized length/weight relationship tables (Piper et al. 1992). However, Piper et al (1992), cautions that length/weight relationships vary within stocks of the same species, and recommends that this relationship be developed independently for individual hatchery stocks. Thus, we did not statistically compare differences between observed and target fork lengths. Mean weight at release was significantly different than target weights for all stocks (one-sample t-tests: $P < 0.001$) except steelhead releases in Methow Basin tributaries. Wells yearling summer Chinook and Chewuch spring Chinook salmon were heavier at release than target values, and the remaining stocks were below target weights (Table 10). Size-at-release values for historic broods are listed in Appendix I.

Table 10. Target size-at-release goals and the actual mean fork length (mm), coefficient of variation (CV), mean weight (g), and fish per pound (FPP) for anadromous fish released from Wells and Methow hatcheries in 2009 (BY = brood year). Na = not applicable.

Stock/Program (BY)	Target			Actual		
	Fork length (CV)	Weight		Fork length (CV)	Weight	
		Mean (g)	FPP		Mean (g)	FPP
Wells summer Chinook (2007)						
Yearling	176 (9.0)	45.4	10	173 (5.7)	52.3	8.6
Early subyearling	na	na	na	93 (7.6)	8.6	52.4
Normal subyearling	140 (9.0)	22.7	20	108 (6.7)	13.5	33.5
Methow spring Chinook (2007)						
Methow River	154 (9.0)	30.2	15	131 (10.7)	27.0	16.8
Chewuch River	154 (9.0)	30.2	15	146 (20.0)	43.3	10.4
Twisp River	154 (9.0)	30.2	15	128 (10.6)	24.9	18.2
Wells summer steelhead (2008)						
Methow River	198 (9.0)	75.6	6	190 (11.8)	77.0	5.8
Chewuch River	198 (9.0)	75.6	6	190 (11.8)	77.0	5.8
Twisp River	198 (9.0)	75.6	6	190 (11.8)	77.0	5.8
Okanogan River	198 (9.0)	75.6	6	186 (13.1)	69.0	6.5

Hatchery Replacement Rate

For the current broods examined, all Wells FH Complex programs returned enough adults to replace the parent brood (i.e., HRR $\geq$1) except for the subyearling summer Chinook. The mean HRR for the Wells subyearling summer Chinook salmon was significantly less than the target value ($P < 0.05$), and HRR values for the current broods of subyearling summer Chinook and all spring Chinook stocks did not meet program-specific target values (Table 11). The mean HRR values for Wells steelhead and summer Chinook yearlings were not significantly different from target values ($P = 0.06 – 0.68$). However, the HRR for Wells steelhead includes steelhead released from Winthrop NFH because fish from both programs were marked similarly (i.e., adipose fin-clip) during the years examined and could not be differentiated as returning adults. The HRR data by stock and brood year is listed in Appendix B.

Numerous factors may affect survival rate calculations for hatchery fish released from Wells FH Complex facilities (e.g., poor juvenile survival, smolt survival, ocean survival, low sample rates, or incomplete adult return data). Additional analysis and research will be required to identify the life stage(s) during which excessive mortality occurs, contributing to the low adult return rates. Such analyses are not the focus of this report.

Table 11. The expected and actual smolt-to-adult (SAR) and HRR or adult-to-adult survival rates for Wells FH Complex programs. Steelhead also include Winthrop NFH releases and returns.

Program	Brood year	Number of broodstock	Smolts released	SAR (%)	Adult equivalents	# smolts/ adult	HRR
Wells summer Chinook							
Yearling program	Expected	182	320,000	0.30	960	333	5.3
Actual	2002	182	306,810	1.20	3,677	83	20.2
Mean	1992-2001	195	341,167	1.12	3,982	404	20.6
Median	1992-2001	191	350,065	0.51	1,832	198	8.9
Subyearling program	Expected	266	484,000	0.12	581	833	2.2
Actual	2002	265	473,100	0.03	126	3,755	0.5
Mean	1993-2001	235	407,776	0.08	332	5,081	1.4
Median	1993-2001	221	408,000	0.04	240	2,258	0.9
Twisp spring Chinook	Expected	121	183,024	0.30	549	333	4.5
Actual	2003	33	50,627	0.10	49	1,033	1.5
Mean	1992-2002	27	51,243	0.19	82	1,437	3.6
Median	1992-2002	24	46,662	0.12	53	889	2.1
Methow spring Chinook	Expected	121	183,024	0.30	549	333	4.5
Actual	2003	30	48,831	0.12	57	857	1.9
Mean[a]	1993-2002	79.3	159,054	0.23	377	1,047	4.9
Median[a]	1993-2002	85.5	181,005	0.27	346	379	5.0
Chewuch spring Chinook	Expected	121	183,024	0.30	549	333	4.5
Actual	2003	60	127,614	0.05	61	2,092	1.0
Mean[b]	1992-2002	67	153,836	0.14	271	1,863	3.3
Median[b]	1992-2002	64	132,759	0.10	116	1,048	1.9
Wells steelhead	Expected	260	509,000	1.00	5,090	100	19.6
Actual	2005	273	576,027	1.22	7,001	82	25.6
Mean	1996-2004	284	598,606	1.17	7,200	126	24.5
Median	1996-2004	277	543,028	1.04	4,878	96	17.9

[a] Does not include 1998 or 2000 broods (mixed MetComp groups).
[b] Does not include 1995, 1998, or 2000 broods (mixed MetComp groups).

Discussion

Spring Chinook releases were at least 10% below program production goals, primarily because of inadequate broodstock collection due to low overall abundance of returning adult fish. Recent broodstock protocols have included mainstem collection sites (i.e., Wells Dam) in addition to tributary locations to maximize broodstock collection opportunities. However, limitations to trapping duration (i.e., only 3 d per week) and the necessity of using DNA analysis to determine stock origin limits the ability of Wells Dam trapping to complete numeric objectives. Analysis of tissue samples currently allows managers to separate collected natural origin fish into Twisp or non-Twisp groups. Wild spring Chinook salmon identified as non-Twisp origin are incorporated into the Methow Composite stock, but this broad genetic grouping likely includes stray fish from other river basins, further decreasing the utility of trapping at Wells Dam. Managers should continue to investigate tributary collection methods and locations for the Methow Composite stock to maintain genetic integrity, represent run timing of local stocks, and assist with meeting numeric collection targets.

Yearling summer Chinook and Methow steelhead met production targets, while subyearling summer Chinook were at least 10% below program production goals. Okanogan steelhead releases were greater than 10% above target release goals. Releases of Wells summer Chinook salmon subyearlings were below release targets primarily because of disease issues during early life stages (i.e., bacterial cold water disease during incubation). Bacterial cold water disease routinely affects the subyearling fish and is seldom found in yearling program fish. This is likely due to the fact that yearling fish are incubated on chilled water. Strategies to minimize mortality from cold water disease should be investigated and implemented, and would increase the likelihood of this program meeting annual rearing and release goals. Predation in the dirt ponds at Wells Hatchery may further decrease production levels for summer Chinook and steelhead.

Historical data related to SAR and HRR of all Chinook stocks must be reviewed carefully to ensure the effort to recover and report CWTs was similar across years. Given the high proportion of CWTs recovered from spawning grounds (i.e., spring Chinook salmon), disproportionate levels of effort to recover CWTs would bias HRR values. A detailed review of data from historical spawning ground surveys (i.e., survey dates and locations and corresponding sample rates) would provide the information required to assess which data should be included in the analysis.

Coded-wire tags are increasingly being used in summer steelhead released above Wells Dam. For the steelhead releases covered in this chapter, calculation of SAR and HRR rates include release and survival information for hatchery programs outside the scope of the DCPUD M&E Plan (i.e., Winthrop National Fish Hatchery releases). This has been necessary because the respective hatchery stocks have historically received the same mark prior to release (i.e., ad-clip). Calculating survival estimates from CWT data may allow, at least for some broods, the development of HRR rates that exclude stocks not covered under the M&E Plan, and should better describe the survival of target stocks because differences in survival that may exist between hatchery programs would be removed.

Mean ELISA values of spring Chinook salmon broodstocks have decreased over time and the net decrease is even greater after culled gametes are removed from the equation. This trend should decrease incidence of BKD at the hatchery and increase survival of juvenile fish. However, determining whether this trend results from management actions (i.e., culling) and whether lower ELISA values contribute to increased juvenile survival are important questions that may require changes to hatchery rearing practices to answer. Developing meaningful relationships between mean ELISA of contributing adults and survival indices such as egg-to-release survival or HRR is confounded when rearing and marking of juvenile fish is independent of ELISA values, or when rearing parameters (i.e., density index) are intentionally manipulated, based on ELISA values, to increase survival. Experiments within the hatchery environment could address some of these management questions if adequate rearing space were available. However, effort should also be made to monitor disease incidence in the natural environment to determine whether trends observed in the hatchery mimic those in the wild.

Target release lengths specified in the M&E Plan were derived by applying standardized length/weight relationships by species to weight-at-release (fish per pound) goals outlined in the Wells HCP. However, the standardized length/weight relationships used may not adequately describe the length/weight relationship of M&E Plan species. Target release lengths should be developed independently for M&E Plan stocks so that appropriate length targets are used when analyzing M&E Plan objectives. Length-based statistical comparisons are better than weight-based comparisons because of inherent variability in fish weight data due to water weight and feeding regime.

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Appendix A

Upper Columbia River salmon and steelhead broodstock collection protocols for hatchery programs funded by Douglas County PUD.

STATE OF WASHINGTON

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To: Mid-Columbia HCP Hatchery Committee

From: Kirk Truscott

Subject: **DRAFT 2007 UPPER COLUMBIA RIVER SALMON AND STEELHEAD BROODSTOCK OBJECTIVES AND SITE-BASED BROODSTOCK COLLECTION PROTOCOLS**

This protocol was developed for hatchery programs rearing spring Chinook salmon, sockeye salmon, summer Chinook salmon and summer steelhead associated with the mid-Columbia Habitat Conservation Plans (HCPs), spring Chinook salmon and steelhead programs associated with the Biological Opinion for Section 7 Consultation of the Interim Operation for the Priest Rapids Hydroelectric Project (FERC No. 2114) and fall Chinook consistent with Grant County Public Utility District and Federal mitigation obligations associated with Priest Rapids and John Day dams, respectively. These programs are funded by Chelan, Douglas, and Grant County Public Utility Districts (PUDs) and are operated by the Washington Department of Fish and Wildlife (WDFW). Additionally, the Yakama Nation's Coho Reintroduction Program broodstock collection protocol, when provided by the Yakama Nation, will be included in this protocol because of the overlap in trapping dates and locations.

This protocol is intended to be a guide for 2007 collection of salmon and steelhead broodstocks in the Methow, Wenatchee, and Columbia River basins. It is consistent with previously defined program objectives such as program operational intent (i.e., conservation and/or harvest augmentation), mitigation production levels, and to comply with ESA permit provisions and the Priest Rapids Dam 2004 Biological Opinion.

Notable in this year's protocols are: (1) Wenatchee spring Chinook broodstock collection strategies targeting Chiwawa hatchery origin Chinook at Tumwater Dam, intended to provide improved hatchery origin broodstock collection and reduce the number of Chiwawa hatchery-origin strays in other Wenatchee basin UCR spring Chinook spawning aggregates; (2) Natural origin Chiwawa spring Chinook collection at the Chiwawa Weir, consistent with ESA Section 10 Permit 1196; (3) Methow spring Chinook broodstock protocol targeting hatchery and natural origin spring Chinook at Wells Dam; (4) utilization of genetic sampling/assessment to differentiate Twisp River and non Twisp River natural origin adults and CWT interrogation of hatchery spring Chinook collected at Wells Dam during spawning to differentiate Twisp and Methow Composite hatchery fish to aid in maintaining discrete Twisp and Methow Composite production components and (5) use of ultra-sound technology to determine sex of summer Chinook during collection to aid in achieving the appropriate female equivalents to meet programmed production. These protocols may be adjusted in-season, based on actual run monitoring at mainstem dams and other sampling locations.

Above Wells Dam

Spring Chinook

Natural-origin fish inclusion into the broodstock will be a priority, with natural-origin fish specifically being targeted; however, natural-origin fish collections will not exceed 33 percent of natural origin run escapement at Wells Dam. All hatchery origin fish retained for broodstock will be adipose-present and coded-wire tagged.

The 2007, Methow spring Chinook broodstock collection will occur predominantly at Wells Dam. Damage to the Twisp weir as a result of 2006 floods, delays in design and implementation of both a Twisp replacement weir and a Chewuch weir coupled with the decommission of Fulton Dam, and limited on-station release of smolts from the Methow FH preclude reasonable certainty of meeting adult collection requirements via tributary and hatchery outfall collections and are the principle reasons for broodstock collection at Wells Dam during 2007. Additionally, recent WDFW genetic assessment of natural origin Methow spring Chinook (report pending) suggests that Twisp natural origin spring Chinook can be identified with sufficient confidence that natural origin collections can occur at Wells Dam, thereby facilitating natural origin inclusion in the broodstock, while maintaining the ability to manage separately the Twisp origin spring Chinook spawning aggregate.

Broodstock will be collected at Wells Dam East and West ladders. Trapping will occur every third day, 16 hours/day throughout the spring Chinook run passage past Wells Dam, as necessary to achieve weekly broodstock collection objectives. Non-lethal tissue samples (fin clips) for genetic analysis and scale samples will be obtained from adipose present, non CWT, non-adipose clipped, non-ventral clipped spring Chinook (suspected natural origin spring Chinook) passing Wells Dam for origin analysis. Natural origin fish will be tagged with a PIT tag (dorsal sinus) for tissue sample/genetic analysis cross-reference. Tissue samples will be preserved and sent to WDFW genetics lab in Olympia Washington for genetic/stock analysis. The spring Chinook sampled will be retained at Methow FH and will be sorted as Twisp or non-Twisp natural origin fish prior to spawning. The number of natural origin Twisp and Methow Composite (non-Twisp) spring Chinook retained will be dependent upon the number of natural origin adult return and the collection objective to limit extraction no greater than 33% of the natural origin spring Chinook return past Wells Dam. Based on broodstock collection schedule (every third day and 16 hours/day), natural origin spring Chinook extraction is expected to be 33% or less. Adipose present, CWT hatchery origin spring Chinook will be collected from the East and West ladder traps, consistent with natural origin collection and transferred to the Methow FH.

The Methow FH rears spring Chinook salmon for three acclimation/release sites in the Methow River Basin, including: (1) Methow River (Methow FH); (2) Twisp River (Twisp Acclimation Pond) and (3) Chewuch River (Chewuch Acclimation Pond). The total production level target is 550,000 smolts divided equally among the three release sites (approximately 183,000 smolts per site).

Although in recent years, broodstock collection objectives have been achieved, Bacterial Kidney Disease (BKD) management strategies, including but not limited to lower density rearing of progeny from higher ELISA parents have effectively limited the Methow FH smolt production to levels less than the 550,000 smolt objective. Although no specific BKD management strategy has been developed and agreed upon through the HCP HC, the parties to the HCP have acknowledged that limited culling, targeting broodstock collection objectives at levels that provide variance for BKD management to meet production levels and prioritizing natural origin fish for rearing to yearling smolt stage may be a viable approach to balance the promotion of fish health while preventing inadvertent reductions in genetic diversity and reduced program production, particularly ESA listed supplementation programs. While HCP HC has agreed to consider the above elements as potential strategies to address BKD and programmed production, the take authorizations in the current ESA Permit 1196, do not specifically address purposeful over-collection of adult spring Chinook to meet production levels, whereby "culling"$_{1/}$ is required to comply with authorized production levels. Elements of potential BKD strategies and broodstocking that include meeting full programmed production should be pursued as a modification to the existing permit to provide take authorization should these elements/strategies be implemented in the future.

Pre-season run-escapement of Methow origin spring Chinook past Wells Dam totals 1,399 spring Chinook, including 1,346 hatchery and 53 wild Chinook (96% and 4%, respectively, (Table 1). In-season estimates of natural-origin spring Chinook will be adjusted proportional to the estimated returns to Wells Dam at the 50% and 75% passage dates and may result in adjustments to the broodstock collection targets presented in this document.

Based on current juvenile rearing capacity at Methow FH, current permit take authorizations and projected return for BY 2007 Methow Basin spring Chinook at Wells Dam discussed in preceding sections, and assumptions listed in Table 2, below, adult collections at Wells Dam, during 2007, will target 307 adult spring Chinook.

Based on the pre-season run forecast, Twisp fish are expected to represent 15% of the adipose present, CWT tagged hatchery adults and 7.5% of the natural origin spring Chinook passing above Wells Dam (Table 1). Based on this proportional contribution, the 2007 Twisp origin broodstock collection will be predominantly hatchery origin and total 68 fish (1 wild and 67 Hatchery), representing 67% of the broodstock necessary to meet Twisp program production of 183,000 smolts.

Based on the pre-season run forecast, Methow Composite fish are expected to represent 85% of the adipose present CWT tagged hatchery adults and 92% of the natural origin spring Chinook passing above Wells Dam (Table 1). Based on this proportional contribution, the 2007 Methow

Composite origin (combined Methow and Chewuch river spawning aggregates) broodstock collection will be predominantly hatchery origin and total 239 fish (16 wild and 223 Hatchery), representing 100% of the broodstock necessary to meet Methow Composite program production of 367,000 smolts (combined Methow and Chewuch production) and sufficient to backfill the 61,000 fish shortfall in the Twisp program. The Twisp Pond release group is limited to releasing progeny of broodstock identified as wild Twisp and or known Twisp hatchery origin fish. The Chewuch Pond and Methow FH releases will include progeny of broodstock identified as wild non-Twisp origin and known Methow Composite hatchery origin fish.

If required to meet Methow FH broodstock collection for Methow Composite stock, adipose-present code-wire tagged hatchery fish may be collected at WNFH, consistent with availability of Chinook that are excess to WNFH requirements.

Table 1. BY 2002-2004 age-class and origin 2007 run-escapement projection for spring Chinook at Wells Dam

	Projected Escapement											
	Origin								**Total**			
	Hatchery				**Wild**				**Methow Basin**			
Stock	**Age-3**	**Age-4**	**Age-5**	**Total**	**Age-3**	**Age-4**	**Age-5**	**Total**	**Age-3**	**Age-4**	**Age-5**	**Total**
MetComp	118	786	239	1,143	2	24	23	49	120	810	262	1,192
% Total				85%				92%				85%
Twisp	22	171	10	203	1	1	2	4	23	172	12	207
% Total				15%				8%				15%
Total	140	957	249	1,346	3	25	25	53	143	982	274	1,399
				96%				4%				100%

1/- "culling" implies removal from the hatchery population in a manner consistent with achieving program goals (including but not limited to destruction of eggs and early release strategies).

Table 2. Assumptions and calculations to determine number of broodstock needed for BY 2007 production of 543,558 smolts

Smolt release		**550,000**	**Smolts**
Fertilization-to-release survival	90%		
Egg-take Target		611,000	**Eggs**
Fecundity	4,200	146	Females spawned
Female to male ratio	1 to 1	292	Total spawned
Pre-spawn survival	**95%**	**307**	**Broodstock collection target**

Trapping at Wells Dam will begin on 01 May and is expected to be completed by 27 June. Salmon will be retained from the run consistent with estimated spring Chinook run timing at Wells Dam and weekly collection quotas. Once the weekly quota target is reached, trapping will cease until the beginning of the next week. If a shortfall occurs in the weekly trapping quota, the shortfall will carry forward to the following weeks collection quota.

To better assure adequate males in the broodstock for outcrossing with Twisp females, collection of male hatchery fish from the Twisp River will occur at the Twisp Weir between 01 May and 31 August, pending successful weir installation. In addition to the aforementioned Twisp collections, hatchery origin Twisp fish will also be transferred from the Winthrop NFH to Methow FH during spawning.

Steelhead
The U.S. v Oregon Technical Advisory Committee (TAC) 2007 estimate for A-run summer steelhead to the Columbia River (Appendix A), indicates sufficient UCR steelhead should be available to provide the 380 adult steelhead broodstock required to meet mitigation program objectives. Steelhead mitigation programs above Wells Dam utilize adult broodstock collections at Wells Dam and incubation/rearing at Wells Fish Hatchery (FH). Based on mitigation program production objectives (Table 3) and program assumptions (Table 4), the following broodstock collection protocol was developed.

Trapping at Wells Dam will selectively retain 380 steelhead (east and west ladder collection). The collection will retain no greater than 33% natural origin broodstock for the mitigation programs and 100% hatchery origin within the Ringold FH production component. Overall collection will be limited to no more than 33% of the entire run or 33% of the natural origin return. The east and west ladder trapping at Wells Dam will begin on 01 August and terminate by 31 October and will be operated concurrently three days per week, up to 16 hours per day, if required to meet broodstock objectives. Trapping on the east ladder will be concurrent with summer Chinook broodstocking efforts through 14 September and will continue through 31 October, concurrent with west ladder steelhead collections. Adult return composition including number, origin, age structure, and sex ratio will be assessed in-season at Priest Rapids and Wells dams. Broodstock collection adjustments may be made based on in-season monitoring and evaluation.

Table 3. Adult steelhead collection objectives for programs supported through adult steelhead broodstock collection at Wells Dam.

Program	# Smolts	# eyed eggs	% Wild	# Wild	# Hatchery	Total Adults	
DCPUD [1/]	349,000	405,814	33%	59	119	178	
GCPUD [1/]	80,000	93,023	33%	14	27	41	
USFWS [1/]	100,000	125,000	33%	18	37	55	3/
Sub-Total	**529,000**	**623,837**	**33%**	**91**	**183**	**274**	
Ringold	180,000	240,000	0%	0	106	106	3/
Sub-Total	**180,000**	**240,000**	**0%**	**0**	**106**	**106**	
Grand Total [2/]	**709,000**	**863,837**	**24%**	**91**	**289**	**380**	

1/- Above Wells Dam releases. Target HxW parental adults as the hatchery component

2/- Based on steelhead production consistent with Mid Columbia HCP's, GCPUD BiOp and Section 10 Permit 1395.

3/- Based on adults required for eyed egg allotment

Table 4. Program assumptions used to determine adult collection required to meet steelhead production objectives for programs above Wells Dam and at Ringold Springs Fish Hatchery.

Program assumption	Standard
Pre-spawn survival	97%
Female to male ratio	1.0 : 1.0
Fecundity	5,400
Propagation survival	
87% fertilization to eyed egg	87%
86% eyed egg to yearling release	86% [1/]
75% fertilization to yearling release	75% [1/]

1/- Not applicable to Ringold Springs Fish Hatchery

Summer/fall Chinook

Summer/fall Chinook mitigation programs above Wells Dam utilize adult broodstock collections at Wells Dam and incubation/rearing at Eastbank Fish Hatchery. The total production level target is 976,000 summer/fall Chinook smolts for two acclimation/release sites on the Methow and Similkameen rivers (Carlton Pond and Similkameen Pond, respectively).

The TAC 2007 Columbia River UCR summer Chinook return projection to the Columbia River (Appendix A) and BY 2002, 2003 and 2004 spawn escapement to tributaries above Wells Dam indicate sufficient summer Chinook will return past Wells Dam to achieve full broodstock collection for supplementation programs above Wells Dam. Based on initial run expectations of summer Chinook to the Columbia River, program objectives and program assumptions (Table 5); the following broodstock collection protocol was developed.

WDFW will retain 556 natural-origin summer/fall Chinook at Wells Dam east ladder, including 278 females. To better assure achieving the appropriate females equivalents for programmed production, the collection will utilize ultra-sound equipment to determine the sex of each fish retained for broodstock. Collection will be proportional to return timing between 01 July and 13 September. Trapping will occur 3-days/week, 16 hours/day. The 3-year old component will be limited to 10 percent of the broodstock collection. If the probability of achieving the broodstock goal is reduced based on actual natural-origin escapement levels, broodstock origin composition will be adjusted to meet the broodstock collection objective.

Table 5. Assumptions and calculations to determine number of broodstock needed for summer/fall Chinook production at Carlton and Similkameen ponds.

Program Assumption		Carlton Pond	Similkameen Pond	Total
Smolt release		**400,000**	**576,000**	**976,000**
Fertilization-to-release survival	90%			
Eggtake Target		**512,821**	**738,462**	**1,251,282**
Fecundity	5,000			
Female target		**103**	**148**	**250**
Female to male ratio	1 to 1			
Broodstock target		**205**	**295**	**501**
Pre-spawn survival	95%			
Total collection target		**228**	**328**	**556**

Columbia River Mainstem below Wells Dam

Summer/fall Chinook

Summer/fall Chinook mitigation programs that release juveniles directly into the Columbia River between Wells and Rocky Reach dams are supported through adult broodstock collections at Wells Dam. The total production level supported by this collection is 520,000 yearling and 1,562,000 sub-yearling Chinook.

Adults returning from this program are to support harvest opportunities and are not intended to increase natural production and have been termed segregated harvest programs. These programs have contributed to harvest opportunities; however, adults from these programs have been documented contributing to the adult spawning escapement in tributaries upstream and downstream from their release locations. Because adults from these programs contribute to the natural spawn escapement, the broodstock collection will incorporate 10 percent natural-origin fish into the broodstock to reduce the potential genetic risk to the naturalized summer/fall Chinook stocks in the upper Columbia River region. Based on mitigation objectives and program assumptions (Table 6), the following broodstock collection protocol was developed.

WDFW will collect 1,274 run-at-large summer Chinook including 1,146 hatchery fish from the volunteer ladder trap at Wells Fish Hatchery outfall and 128 natural-origin fish from the Wells Hatchery outfall, and/or Wells Dam east and west ladders. Overall extraction of natural-origin fish passing Wells Dam (Wells program and above Wells Dam summer/fall Chinook programs) will not exceed 33 percent. West ladder collections will begin 01 July and completed by 14 September and will be consistent with run timing past Wells Dam. Due to fish health concerns associated with the volunteer collection site, the volunteer collection will begin 10 July and terminate by 31 August, or when the summer Chinook broodstock collection objective is met, whichever is earliest. The 3-year old component will be limited to 10 percent of the broodstock collection.

Table 6. Assumptions and calculations to determine number of broodstock needed for summer/fall Chinook production at Wells and Turtle Rock Island hatcheries.

	Standard		Wells FH		Turtle Rock FH		Lake Chelan [1/]	Total		
Program Assumption	**Sub-yearling**	**Yearling**	**Sub-yearling**	**Yearling**	**Sub-yearling**	**Yearling**	**eye- egg**	**Sub-yearling**	**Yearling**	**Total**
Smolt release			484,000	320,000	1,078,000	200,000	NA	1,562,000	520,000	2,082,000
Fertilization-to-release survival	81%	78%					NA			
Eggtake Target			597,531	410,256	1,330,864	256,410	100,000	1,928,395	666,667	2,695,062
Fecundity	4,700	4,700								
Female target			127	87	283	55	21	432	142	573
Female to male ratio	1 to 1	1 to 1								
Broodstock target			254	175	566	110	42	820	285	1,105
Pre-spawn survival	90%	90%								
Total collection target			**282**	**194**	**629**	**122**	**47**	**958**	**316**	**1,274**

[1/]- Lake Chelan eggs will be incorporated into the last egg take and incubated at Wells Hatchery until eyed stage and then shipped to the Lake Chelan RSI program.

Coho

Yakama Nation will provide broodstock collection objectives for the coho reintroduction program in the Methow River basin. WDFW will work collaboratively with the Yakama Nation to facilitate coho collections at Wells Dam.

Appendix A-Columbia River Salmon and Steelhead – 2007 Forecasts: Spring Chinook, Summer Chinook and Sockeye

2007 Forecasts For Columbia River Spring Chinook, Summer Chinook, Sockeye and Steelhead			
	2006 Forecast	**2006 Return**	**2007 Forecast**
Upriver Spring Chinook [1/]	88,400	132,100	78,500
Snake River Spring/Summer Chinook [2/]	*46,200*	*53,000*	*38,500*
Snake River Wild Spring/Summer Chinook [3/]	*14,600*	*16,700*	*13,100*
Upper Columbia Spring Chinook [2/]	*12,600*	*21,100*	*9,200*
Upper Columbia Wild Spring Chinook [4/]	*1,600*	*2,800*	*1,200*
Upper Columbia Summer Chinook	49,000	76,200	45,600
Willamette Spring Chinook	46,500	59,700	52,000
Cowlitz, Kalama, Lewis River Spring Chinook [6/]	15,200	20,100	15,900
Yakima Spring Chinook [6/]	6,700	6,000	4,100
Klickitat Spring Chinook [6/]	1,300	1,700	1,200
Wind [6/]	7,500	4,700	2,100
Little White Salmon [6/]	12,500	10,500	6,000
Sockeye [5/]	31,100	37,100	27,300
Wenatchee Stock	*7,800*	*10,300*	*6,600*
Okanogan Stock	*23,300*	*26,700*	*20,700*
Snake River Sockeye	*21*	*79*	*300*
Steelhead			
Wild Winter Steelhead	16,000	16,600	16,200
Summer Steelhead			
Skamania Hatchery	*11,800*	*7,700*	*12,300*
Skamania Wild	*3,800*	*2,200*	*4,400*
A-Index Hatchery	*187,300*	*181,400*	*199,900*
A-Index Wild	*66,100*	*63,700*	*41,600*
APPENDIX A Cont.	*45,600*	*65,700*	*45,600*

Appendix A, continued.

B Index Wild	*9,800*	*8,500*	*10,800*
Total Summer Steelhead	324,400	329,200	314,600

[1/] Includes Snake River Summer Chinook.
[2/] Included in Upriver Spring Chinook number.
[3/] Included in Snake River Spring/Summer Chinook number.
[4/] Included in Upper Columbia Spring Chinook number.
[5/] Includes Wenatchee, Okanogan, and Snake River stocks.
[6/] To mouth of tributary

Prepared by *U.S. v Oregon* Technical Advisor Committee
December 11, 2006
Revised January 10, 2007

Appendix B. Number of broodstock spawned (including pre-spawn mortalities) and smolts released by brood year from Wells Complex hatchery facilities. Wells summer steelhead includes releases from WNFH and Cassimer Bar Hatchery.

Brood year	Number of broodstock	Smolts released	Adult returns	SAR (%)	# Smolts/ adult	HRR
			Wells yearling summer Chinook salmon			
1992	205	331,353	836	0.252	396	4.1
1993	225	388,248	2,011	0.518	193	8.9
1994	185	365,000	141	0.039	2,589	0.8
1995	144	290,000	1,144	0.394	253	7.9
1996	193	356,707	1,652	0.463	216	8.6
1997	189	381,867	10,941	2.865	35	57.9
1998	207	457,770	10,550	2.305	43	51.0
1999	176	312,098	1,544	0.495	202	8.8
2000	175	343,423	8,300	2.417	41	47.4
2001	248	185,200	2,700	1.458	69	10.9
2002	182	306,810	3,677	1.198	83	20.2
			Wells subyearling summer Chinook salmon			
1993	173	187,382	40	0.021	4,685	173
1994	255	450,935	15	0.003	30,062	255
1995	221	408,000	128	0.031	3,188	221
1996	336	473,000	704	0.149	672	336
1997	274	541,923	240	0.044	2,258	274
1998	179	370,617	376	0.101	986	179
1999	212	363,600	524	0.144	694	212
2000	257	498,500	185	0.037	2,695	257
2001	210	376,027	776	0.206	485	210
2002	265	473,100	126	0.027	3,755	265
			Twisp spring Chinook salmon			
1992	18	35,853	21	0.059	1,707	1.2
1993	42	116,749	27	0.023	4,324	0.6
1994	5	19,835	5	0.025	3,967	1.0
1995	-	-	-	-	-	-
1996	43	76,687	278	0.363	276	6.5
1997	15	26,714	67	0.251	399	4.5
1998	10	15,470	23	0.149	673	2.3
1999	32	67,408	61	0.091	1,105	1.9
2000	64	74,717	173	0.232	432	2.7
2001	30	51,652	44	0.085	1,174	1.5
2002	9	20,541	120	0.589	170	13.3
2003	33	50,627	49	0.097	1,033	1.5

Appendix B, continued.

Brood year	Number of broodstock	Smolts released	Adult returns	SAR (%)	# Smolts/ adult	HRR
			Methow spring Chinook salmon			
1993	91	210,849	192	0.091	1,098	2.1
1994	2	4,477	1	0.022	4,477	0.5
1995	12	28,878	122	0.422	237	10.2
1996	103	202,947	500	0.246	406	4.9
1997	187	332,484	946	0.284	352	5.1
1998[a]	161	435,670	2,300	0.528	189	14.3
1999	90	180,775	145	0.080	1,247	1.6
2000[a]	147	266,392	852	0.320	313	5.8
2001	69	130,787	508	0.388	257	7.4
2002	81	181,235	599	0.331	303	7.4
2003	30	48,831	57	0.117	857	1.9
			Chewuch spring Chinook salmon			
1992	21	40,881	39	0.095	1,048	1.9
1993	103	284,165	116	0.041	2,450	1.1
1994	12	11,854	2	0.017	5,927	0.2
1995	-	-	-	-	-	-
1996	64	91,672	37	0.040	2,478	0.6
1997	64	132,759	360	0.271	369	5.6
2001	85	261,284	738	0.282	354	8.7
2002	123	254,238	699	0.275	364	5.7
2003	60	127,614	61	0.048	2,092	1.0
			Wells summer steelhead			
1996	207	531,798	2,779	0.523	191	13.4
1997	316	543,028	4,702	0.866	115	14.9
1998	377	888,180	14,076	1.585	63	37.3
1999	310	712,822	14,691	2.061	49	47.4
2000	277	653,874	1,752	0.268	373	6.3
2001	277	541,453	11,218	2.072	48	40.5
2002	288	580,498	4,577	0.788	127	15.9
2003	228	468,538	6,129	1.308	76	26.9
2004	272	467,266	4,878	1.044	96	17.9
2005	273	576,027	7,001	1.215	82	25.6

[a] Mixed MetComp group.

Appendix C. Mean fork length (cm; *N*; SD) by age, sex, and brood of Wells Hatchery complex broodstocks.

Brood	Sex	Age-3		Age-4		Age-5		Age-6		Age-7
		H	W	H	W	H	W	H	W	H
					Wells summer Chinook-yearling migrants					
2007	M	63.9 (21; 3.5)	- -	76.8 (132; 5.9)	- -	93.1 (255; 7.5)	- -	95.4 (14; 10.3)	- -	79.0 (1; - -)
2007	F	74.0 (1; - -)	- -	80.0 (70; 5.8)	- -	91.4 (408; 4.9)	89.0 (1; - -)	93.3 (37; 5.4)	- -	88.9 (7; 7.7)
2006	M	- -	- -	79.4 (171; 6.1)	- -	91.4 (105; 6.8)	83.5 (4; 8.2)	91.3 (50; 8.4)	- -	92.0 (1; - -)
2006	F	- -	- -	82.7 (62; 5.0)	81.0 (1; - -)	92.0 (178; 5.2)	- -	93.9 (99; 7.0)	- -	- -
2005	M	- -	- -	80.5 (137; 5.9)	80.5 (7; 4.2)	88.9 (295; 6.7)	96.7 (3; 7.1)	91.6 (5; 4.9)	- -	97.0 (1; - -)
2005	F	- -	- -	81.1 (55; 4.5)	88.0 (1; - -)	89.8 (385; 4.9)	95.2 (6; 2.8)	95.5 (23; 5.0)	- -	- -
2004	M	55.0 (1; - -)	- -	79.3 (247; 5.0)	77.2 (5; 5.8)	88.1 (104; 7.1)	94.8 (6; 8.7)	100.0 (36; 10.0)	- -	- -
2004	F	- -	- -	79.7 (90; 4.8)	85.7 (3; 2.1)	89.0 (124; 4.6)	91.9 (14; 3.9)	97.1 (101; 5.5)	- -	76.0 (1; - -)
2003	M	59.1 (9; 5.7)	- -	76.6 (32; 5.8)	74.5 (2; 16.3)	92.4 (343; 7.8)	94.0 (2; 24.0)	97.7 (6; 14.7)	- -	- -
2003	F	- -	- -	80.2 (18; 4.3)	- -	92.4 (488; 4.7)	- -	97.4 (23; 4.2)	- -	- -
2002	M	51.5 (6; 3.3)	- -	80.1 (266; 6.1)	- -	95.4 (278; 7.2)	- -	99.5 (6; 5.9)	- -	- -
2002	F	- -	- -	84.3 (66; 4.5)	- -	94.3 (519; 4.8)	- -	100.0 (10; 2.8)	- -	- -
2001	M	54.9 (12; 3.8)	- -	81.0 (437; 6.4)	84.0 (1; - -)	94.6 (84; 8.0)	97.7 (16; 8.3)	99.5 (2; 7.8)	- -	- -
2001	F	- -	- -	82.7 (302; 4.6)	- -	93.9 (179; 5.3)	98.7 (3; 1.5)	98.5 (12; 6.1)	92.0 (1; - -)	- -
2000	M	53.2 (63; 5.1)	68.0 (1, - -)	75.9 (303; 6.6)	81.9 (13; 8.7)	91.6 (130; 8.0)	97.8 (12; 6.4)	109.0 (1; - -)	- -	- -
2000	F	- -	- -	81.7 (68; 5.3)	85.5 (4; 4.2)	92.1 (208; 5.0)	95.1 (30; 4.5)	98.1 (8; 11.5)	- -	- -
1999	M	51.8 (42; 6.9)	- -	76.8 (172; 7.9)	81.6 (26; 8.7)	93.8 (80; 8.5)	99.6 (8; 6.9)	99.1 (16; 8.7)	- -	- -
1999	F	- -	- -	81.5 (79; 6.1)	84.0 (12; 4.6)	91.4 (169; 5.5)	94.5 (29; 4.6)	98.0 (58; 6.4)	- -	89.5 (2; 2.1)
1998	M	55.7 (30; 5.9)	61.0 (2; 2.8)	74.7 (125; 8.9)	83.0 (19; 6.2)	94.9 (213; 10.1)	100 5 (2; 2.1)	101.0 (19; 9.9)	- -	- -
1998	F	- -	- -	79.4 (30; 5.2)	86.0 (5; 4.2)	95.2 (418; 5.4)	97.6 (8; 5)	97.9 (32; 8.7)	- -	101.0 (1; - -)
1997	M	47.0 (2; 0.0)	68.0 (1; - -)	78.7 (46; 6.4)	79.5 (2; 4.9)	91.3 (43; 9.6)	98.0 (18; 5.6)	108.0 (3; 6.8)	109.0 (1; - -)	- -
1997	F	- -	- -	81.2 (26; 5.5)	87.5 (4; 3.7)	92.1 (96; 4.9)	96.2 (9; 5.7)	98.0 (10; 8.5)	- -	- -

Appendix C, continued.

Brood	Sex	Age-3 H	Age-3 W	Age-4 H	Age-4 W	Age-5 H	Age-5 W	Age-6 H	Age-6 W	Age-7 H
1996	M	49.3 (9; 5.4)	57.3 (4; 6.6)	76.4 (87; 7.0)	81.0 (19; 7.5)	90.4 (49; 7.5)	94.9 (24; 6.6)	98.4 (10; 8.1)	102.3 (3; 11.6)	- -
1996	F	- -	- -	80.6 (40; 4.0)	86.9 (10; 3.2)	89.4 (68; 4.5)	94.7 (26; 3.6)	96.3 (39; 7.4)	- -	92.7 (3; 5.9)
1995	M	53.4 (19; 4.4)	62.0 (3; 5.6)	73.1 (71; 8.2)	84.4 (12; 7.3)	90.2 (115; 7.7)	107.0 (1; - -)	98.3 (130; 8.2)	96.0 (1; - -)	- -
1995	F	71.0 (1; - -)	- -	81.9 (22; 6.4)	84.5 (2; 7.8)	90.7 (126; 5.2)	94.7 (65; 4.4)	96.6 (333; 5.8)	- -	- -
1994	M	- -	- -	77.1 (16; 7.9)	- -	89.6 (104; 6.6)	- -	- -	- -	- -
1994	F	- -	- -	71.3 (3; 2.3)	- -	89.7 (137; 5.3)	91.3 (4; 10.2)	- -	- -	- -
Wells summer Chinook-subyearling migrants										
2007	M	73.2 (40; 4.6)	68.2 (18; 5.4)	84.2 (18: 6.8)	86.4 (8; 9.4)	- -	94.3 (6; 6.7)	94.0 (1; - -)	- -	- -
2007	F	74.6 (10; 2.9)	70.3 (3; 2.8)	85.4 (18: 5.3)	78.7 (3; 4.1)	92.1 (7; 4.6)	95.6 (14; 3.9)	91.5 (2; 2.1)	- -	- -
2006	M	81.0 (1; - -)	76.0 (2, 4.2)	83.4 (5; 4.3)	90.4 (15; 5.8)	93.1 (14; 5.3)	95.4 (13; 6.5)	- -	- -	- -
2006	F	- -	- -	85.3 (7; 3.0)	90.0 (8; 6.7)	92.2 (35; 3.9)	96.0 (22; 5.9)	- -	- -	- -
2005	M	78.0 (1; - -)	71.8 (6; 7.2)	85.1 (32; 6.0)	82.6 (23; 6.0)	94.0 (3; 6.9)	98.6 (5; 4.0)	105.0 (1; - -)	- -	- -
2005	F	- -	74.0 (1; - -)	84.2 (55; 4.1)	84.4 (26; 4.4)	88.8 (13; 5.6)	91.8 (4; 2.1)	92.0 (2; 7.1)	100.0 (1; - -)	- -
2004	M	73.4 (9; 4.5)	72.3 (3; 9.9)	84.5 (12; 4.5)	84.0 (11; 1.9)	92.2 (18; 7.0)	98.7 (24; 7.4)	- -	- -	- -
2004	F	68.0 (1; - -)	65.0 (1; - -)	84.0 (11; 6.4)	84.2 (5; 1.1)	90.7 (67; 4.0)	93.9 (61; 5.1)	- -	- -	- -
2003	M	63.0 (5; 4.7)	65.0 (1; - -)	83.0 (29; 6.5)	83.6 (18; 4.2)	- -	98.7 (3; 11.0)	- -	- -	- -
2003	F	- -	- -	84.7 (53; 4.7)	86.4 (11; 4.2)	90.0 (6; 5.5)	95.0 (2; 7.1)	- -	- -	- -
2002	M	67.6 (7; 5.9)	70.5 (2; 4.9)	86.3 (15; 9.3)	73.0 (2; 19.8)	- -	- -	- -	119.0 (1; - -)	- -
2002	F	78.0 (2; 7.1)	- -	88.3 (15; 3.5)	81.0 (1; - -)	90.8 (5; 5.2)	- -	- -	- -	- -
2001	M	74.1 (8; 6.3)	- -	85.4 (19; 7.8)	91.7 (10; 8.8)	99.0 (1; - -)	99.6 (10; 8.7)	- -	- -	- -
2001	F	- -	- -	87.6 (14; 5.1)	88.0 (6; 6.5)	97.7 (19; 4.4)	98.0 (1; - -)	- -	- -	- -
2000	M	65.5 (4; 9.6)	72.4 (14; 3.5)	82.8 (60; 6.8)	86.1 (27; 5.9)	109.0 (2; 2.1)	101 0 (11; 8.5)	- -	- -	- -
2000	F	72.0 (1; - -)	- -	87.5 (146; 4.7)	87.8 (32; 5.9)	92.1 (19; 6.1)	94.3 (29; 4.4)	- -	- -	- -

Appendix C, continued.

Brood	Sex	Age-3		Age-4		Age-5		Age-6		Age-7
		H	W	H	W	H	W	H	W	H
1999	M	68.0 (73; 7.0)	69.6 (18; 6.3)	81.6 (30; 9.6)	85.2 (37; 5.9)	102.0 (6; 5.1)	97.7 (3; 2.1)	84.0 (1; - -)	- -	- -
1999	F	74.1 (20; 6.1)	66.5 (2; 0.7)	85.5 (41; 4.7)	84.7 (52; 5.8)	89.3 (3; 9.5)	96.0 (13; 4.0)	- -	- -	- -
1998	M	67.3 (9; 4.5)	66.1 (9; 3.9)	81.4 (5; 11.9)	89.3 (10; 6.2)	96.0 (3; 7.5)	102 5 (4; 6.0)	- -	- -	- -
1998	F	- -	- -	83.3 (4; 5.6)	85.2 (13; 7.4)	93.8 (6; 5.8)	98.0 (1; - -)	- -	- -	- -
1997	M	- -	- -	90.0 (1; - -)	96.8 (4; 8.4)	- -	101 5 (2; 3.5)	- -	- -	- -
1997	F	- -	- -	85.0 (1; - -)	87.7 (6; 6.0)	- -	100 4 (5; 4.7)	- -	- -	- -
1996	M	59.0 (1; - -)	68.3 (6; 2.7)	80.0 (1; - -)	82.8 (12; 8.5)	- -	103 4 (46; 5.9)	- -	- -	- -
1996	F	- -	- -	- -	87.3 (16; 5.2)	92.0 (1; - -)	94.5 (6; 4.7)	- -	- -	- -
1995	M	- -	69.5 (11; 5.8)	- -	90.1 (8; 8.0)	104.0 (2; 2.1)	99.7 (12; 7.8)	- -	101.5 (2; 2.1)	- -
1995	F	72.0 (1; - -)	63.0 (1; - -)	- -	92.9 (8; 6.3)	97.8 (4; 4.1)	96.2 (102; 4.6)	- -	99.0 (1; - -)	- -
1994	M	- -	- -	75.0 (2; 8.5)	87.3 (7; 8.4)	89.5 (4; 11.3)	- -	- -	- -	- -

Appendix C, continued.

Brood	Male				Female			
	1-salt		2-salt		1-salt		2-salt	
	H	W	H	W	H	W	H	W
				Wells Hatchery summer steelhead				
2008	63.2 (131; 2.9)	64.6 (31; 4.3)	77.6 (11; 4.3)	74.0 (3;3.4)	61.1 (67; 2.7)	62.4 (42; 2.8)	71.8 (58; 3.9)	74.4 (13; 3.3)
2007	62.0 (130; 2.9)	63.3 (13; 4.8)	74.6 (10; 4.9)	76.8 (5; 4.6)	60.1 (137; 2.5)	63.3 (10; 3.5)	71.7 (54; 5.4)	73.0 (16; 5.1)
2006	60.3 (98; 3.3)	65.2 (21; 4.5)	75.6 (58; 4)	77.4 (16; 3.5)	59.7 (22; 4.3)	61.4 (8; 4.9)	70.9 (123; 4.2)	72.7 (42; 3.3)
2005	60.4 (93; 3.2)	62.1 (15; 3.2)	74.0 (53; 3.2)	75.6 (9; 2.5)	59.4 (31; 2.4)	62.5 (15; 2.5)	71.8 (138; 3.5)	73.4 (27; 4.1)
2004	60.9 (183; 2.8)	64.2 (53; 3.4)	73.0 (3; 6.6)	- -	60.1 (118; 2.6)	62.2 (55; 3.5)	67.5 (6; 3.4)	73.4 (9; 6.2)
2003	61.9 (30; 3.8)	- -	78.6 (89; 4.9)	81.6 (9; 3.7)	60.4 (17; 3.7)	- -	74.7 (133; 3.9)	75.8 (18; 3.7)
2002	64.3 (106; 3.1)	63.7 (3; 2.9)	78.3 (68; 3.3)	76.0 (1; - -)	62.9 (50; 2.3)	63.8 (5; 5.1)	73.6 (150; 3.5)	74.7 (9; 4.8)
2001	61.2 (120; 3.4)	60.9 (14; 3.7)	76.1 (27; 5.1)	82.5 (2; 4.9)	60.2 (66; 2.5)	59.4 (7; 3.0)	72.9 (106; 3.4)	73.3 (3; 2.5)
2000	63.4 (113; 2.9)	62.9 (13; 3.4)	77.8 (28; 5.0)	76.0 (4; 10.7)	61.4 (87; 2.4)	62.5 (13; 2.4)	73.8 (98; 3.6)	76.8 (11; 7.8)
1999	63.3 (123; 2.9)	64.0 (5; 2.9)	80.0 (41; 2.8)	80.8 (4; 7.4)	62.3 (66; 2.4)	61.8 (5; 2.4)	74.3 (141; 3.6)	73.8 (13; 2.9)
1998	64.8 (122; 3.7)	65.6 (5; 3.0)	79.3 (64; 4.8)	- -	62.1 (78; 3.1)	64.0 (4; 1.4)	75.3 (169; 3.6)	74.3 (3; 0.6)
1997	64.2 (145; 3.1)	63.8 (18; 3.5)	76.6 (20; 3.6)	74.5 (10; 8.0)	62.3 (94; 3.3)	61.6 (14; 2.3)	71.9 (53; 4.5)	74.3 (15; 5.7)
1996	- -	- -	- -	- -	- -	- -	- -	- -
1995	66.0 (1; - -)	64.3 (8; 4.2)	80.0 (1; - -)	77.6 (5; 3.8)	60.3 (9; 2.6)	63.8 (12; 4.4)	74.8 (16; 4.1)	74.2 (11; 5.8)

Appendix C, continued.

Brood	Sex	Age-3		Age-4		Age-5	
		H	W	H	W	H	W
				Methow / Methow Composite spring Chinook salmon			
2007	M	51.6 (16; 4.4)	48.0 (1; - -)	70.2 (40; 6.5)	71.6 (6; 6.9)	92.9 (14; 5.2)	96.0 (3; 3.6)
2007	F	- -	- -	74.1 (43; 4.7)	- -	88.0 (21; 3.5)	90.3 (9; 2.2)
2006	M	45.0 (3; 3.6)	50.0 (1; - -)	76.3 (110; 5.0)	75.6 (3; 1.1)	90.5 (2; 7.7)	95.0 (1; - -)
2006	F	- -	- -	74.3 (121; 3.7)	77.2 (4; 2.2)	82.8 (7; 4.9)	92.0 (1; - -)
2005	M	52.1 (28; 3.9)	- -	72.3 (74; 7.0)	- -	- -	- -
2005	F	- -	- -	74.3 (98; 4.4)	71.0 (2; 2.8)	81.0 (1; - -)	- -
2004	M	48.3 (85; 3.3)	- -	72.0 (52; 6.9)	- -	- -	- -
2004	F	- -	- -	73.4 (144; 3.6)	75.0 (1; - -)	76.0 (1; - -)	- -
2003	M	49.0 (36; 3.7)	51.0 (1; - -)	- -	- -	96.7 (9; 2.6)	- -
2003	F	- -	- -	75.3 (17; 3.4)	- -	- -	- -
2002	M	48.3 (7; 6.4)	- -	79.0 (88; 6)	- -	100.0 (1; - -)	- -
2002	F	- -	- -	76.3 (145; 3.5)	- -	87.3 (6; 7.5)	- -
2001	M	60.0 (1; - -)	- -	80.6 (10; 4.7)	- -	- -	- -
2001	F	- -	- -	76.9 (67; 3.7)	- -	- -	- -
2000	M	51.2 (40; 4.2)	- -	73.0 (59; 6.7)	- -	- -	- -
2000	F	- -	- -	74.5 (74; 3.4)	- -	- -	- -
1999	M	- -	- -	- -	- -	- -	- -
1999	F	- -	- -	78.0 (27; 3.1)	77.6 (13; 5.1)	- -	86.5 (4; 6.6)
1998	M	- -	- -	- -	- -	- -	- -
1998	F	- -	- -	76.3 (8; 3.7)	76.1 (27; 3.5)	84.9 (23; 8.7)	88.9 (42; 6.2)
				Twisp spring Chinook salmon			
2007	M	48.1 (7; 4.3)	48.0 (1; - -)	70.4 (10; 5.4)	- -	- -	- -
2007	F	- -	- -	74.0 (16; 5.3)	73.0 (1; - -)	- -	93.0 (2; 2.8)
2006	M	49.5 (2; 2.1)	- -	66.2 (10; 10.1)	- -	- -	- -
2006	F	- -	- -	72.1 (15; 3.7)	- -	85.0 (1; - -)	- -
2005	M	49.6 (10; 1.8)	- -	- -	82.0 (1; - -)	- -	- -
2005	F	- -	- -	- -	81.0 (4; 8.0)	- -	88.5 (2; 3.5)
2004	M	49.0 (1; - -)	45.7 (3; 2.3)	72.2 (6; 9.0)	71.6 (21; 7.0)	- -	- -
2004	F	- -	- -	73.0 (16; 3.5)	75.8 (20; 5.6)	- -	- -
2003	M	50.7 (3; 3.1)	50.0 (4; 3.2)	- -	67.0 (1; - -)	- -	- -
2003	F	- -	- -	70.7 (3; 7.5)	- -	- -	93.4 (5; 0.9)
2002	M	46.3 (4; 5.3)	- -	- -	- -	- -	- -
2002	F	- -	- -	75.0 (5; 2.7)	- -	- -	- -
2001	M	63.0 (2; 2.8)	52.5 (2; 2.1)	79.3 (4; 5.6)	75.3 (22; 4.5)	- -	- -
2001	F	- -	- -	76.9 (7; 2.1)	79.6 (7; 1.5)	92.5 (2; 9.2)	88.0 (1; - -)
2000	M	- -	45.0 (1; - -)	- -	- -	- -	98.0 (2; 1.4)
2000	F	- -	- -	75.1 (38; 3.6)	- -	- -	91.0 (3; 1)
1999	M	- -	- -	- -	- -	- -	- -
1999	F	- -	- -	- -	78.5 (13; 3.1)	- -	89.3 (3; 2.1)
1998	M	- -	- -	- -	- -	- -	- -

Appendix C, continued.

Brood	Sex	Age-3		Age-4		Age-5	
		H	W	H	W	H	W
1998	F	- -	- -	77.0 (2; 1.4)	- -	76.5 (4; 16.3)	- -
				Chewuch spring Chinook salmon			
1996	F	- -	- -	76.4 (5; 2.9)	- -	- -	- -
1994	M	- -	- -	- -	80.0 (1; - -)	- -	- -
1994	F	- -	- -	- -	74.0 (1; - -)	- -	80.5 (4; 2.6)

Appendix D. Mean fecundity (*N*; SD) of Wells Complex hatchery broodstocks by total age and origin.

Brood	Age-3		Age-4		Age-5		Age-6	Brood total
	Hatchery	Wild	Hatchery	Wild	Hatchery	Wild	Hatchery	
				Wells summer Chinook salmon				
2007	3,137 (1; - -)	2,906 (1; - -)	4,016 (10; 900)	- -	4,708 (66; 949)	- -	4,595 (6; 602)	4,616 (87; 963)
2006	- -	- -	3,877 (11; 672)	- -	4,412 (55; 898)	4,154 (4; 641)	4,959 (10; 1,071)	4,420 (87; 967)
2005	- -	- -	3,729 (14; 677)	3,592 (4; 756)	4,264 (63; 694)	4,502 (2; 49)	5,459 (3; 1,029)	4,193 (86; 763)
2003	- -	- -	3,907 (12; 851)	4,427 (3; 1,662)	4,711 (104; 832)	4,190 (1; - -)	4,872 (8; 495)	4,635 (128; 862)
2002	- -	- -	4,742 (13; 648)	- -	5,287 (105; 869)	- -	5,186 (3; 404)	5,226 (121; 853)
2001	- -	- -	4,320 (96; 732)	5,356 (3; 749)	5,011 (91; 896)	5,474 (3; 437)	4,951 (7; 658)	4,689 (200; 878)
2000	2,371 (1; - -)	- -	4,126 (72; 829)	4,582 (10; 998)	4,695 (76; 921)	4,754 (11; 720)	6,598 (1; - -)	4,450 (171; 937)
1999	2,818 (2; 531)	- -	3,848 (30; 925)	3,243 (7; 824)	3,802 (24; 1,197)	4,345 (5; 1,364)	4,736 (15; 946)	3,949 (83; 1,099)
				Twisp spring Chinook salmon				
2007	- -	- -	3,422 (16; 721)	2,977 (1; - -)	- -	5,304 (2; 1,580)	- -	3,597 (19; 972)
2006	- -	- -	3,433 (15; 648)	- -	- -	- -	- -	3,433 (15; 648)
2005	- -	- -	- -	4,216 (4; 641)	- -	4,745 (2; 123)	- -	4,393 (6; 569)
2004	- -	- -	3,496 (16; 633)	3,811 (20; 1,060)	- -	- -	- -	3,671 (36; 898)
2003	- -	- -	3,195 (11; 519)	- -	- -	5,867 (5; 512)	- -	4,012 (17; 1,332)
2002	- -	- -	4,652 (2; 664)	- -	- -	- -	- -	4,652 (2; 664)
2001	- -	- -	3,922 (7; 579)	4,617 (6; 534)	4,941 (1; - -)	4,902 (2; 612)	- -	4,369 (16; 657)
2000	- -	- -	3,820 (38; 698)	- -	- -	5,292 (3; 997)	- -	3,927 (41; 807)
				Methow Composite spring Chinook salmon				
2007	- -	- -	3,468 (43; 817)	- -	4,633 (21; 959)	5,047 (9; 629)	- -	3,998 (73; 1,055)
2006	- -	- -	3,541 (132; 818)	4,047 (3; 687)	4,265 (7; 816)	- -	- -	3,587 (142; 829)
2005	- -	- -	3,475 (98; 809)	3,823 (2; 482)	3,261 (1; - -)	- -	- -	3,480 (101; 800)
2004	- -	- -	3,510 (144; 745)	3,565 (1; - -)	3,510 (1; - -)	- -	- -	3,506 (148; 735)
2003	- -	- -	3,795 (17; 759)	- -	4,839 (31; 1,403)	- -	- -	4,469 (48; 1,306)
2002	- -	- -	3,905 (125; 682)	- -	3,318 (4; 342)	- -	- -	3,887 (129; 681)
2001	- -	- -	3,938 (90; 764)	3,753 (10; 706)	- -	- -	- -	3,920 (100; 758)
2000	- -	- -	3,759 (74; 678)	- -	- -	- -	- -	3,759 (74; 678)

Appendix D, continued.

Brood	1-salt		2-salt		Brood total
	Hatchery	Wild	Hatchery	Wild	
			Wells Hatchery summer steelhead		
2008	5,526 (66; 980)	5,434 (41; 1,099)	6,682 (57; 1,319)	6,171 (13; 1,135)	5,946 (180; 1,264)
2007	4,715 (125; 849)	4,881 (10; 888)	5,868 (46; 1,598)	6,116 (4; 1,748)	5,107 (198; 1,274)
2006	4,652 (13; 815)	4,203 (7; 189)	6,858 (80; 1,538)	6,397 (35; 1,205)	6,387 (135; 1,580)
2005	4,547 (28; 795)	5,370 (13; 1,084)	6,575 (129; 1,317)	6,627 (24; 1,455)	6,208 (194; 1,457)
2004	4,543 (111; 814)	4,517 (54; 1,072)	5,865 (6; 885)	4,832 (9; 1,222)	4,594 (180; 947)
2003	4,241 (17; 600)	- -	6,545 (130; 1,210)	6,954 (18; 1,357)	6,352 (165; 1,382)
2002	4,786 (48; 1,048)	4,721 (5; 1,051)	6,744 (144; 1,221)	6,586 (9; 1,859)	6,232 (206; 1,477)
2001	4,356 (65; 1,093)	3,865 (6; 1,436)	6,624 (94; 1,411)	6,714 (3; 1,155)	5,650 (168; 1,721)
2000	4,837 (26; 1,485)	5,760 (3; 405)	6,049 (31; 1,360)	- -	5,509 (60; 1,495)

Appendix E. Results of ELISA sampling conducted on Wells Complex hatchery Chinook salmon broodstocks by category. The value listed within each category is the percent of the total number of female Chinook salmon sampled within each brood, excluding captive brood and non-viable females.

Brood	Below-low	Low	Med	High	Total number
	<0.099	0.099 - 0.199	0.20 - 0.449	> 0.450	
		Wells summer Chinook salmon			
2007	98.2	1.8	0.0	0.0	166
2006	100.0	0.0	0.0	0.0	167
2005	98.9	0.5	0.0	0.5	190
2004	95.0	5.0	0.0	0.0	20
2003	94.9	2.0	2.0	1.0	99
2002	93.9	2.4	0.0	3.7	82
2001	99.3	0.0	0.0	0.7	139
2000	87.9	8.8	3.3	0.0	91
1999	99.1	0.9	0.0	0.0	106
1998	91.7	5.5	1.8	0.9	109
1997	88.6	7.6	1.1	2.7	185
1996	99.0	0.5	0.0	0.5	196
1995	78.8	12.9	1.8	6.5	170
1994	97.2	1.7	0.0	1.1	181
1993	100.0	0.0	0.0	0.0	132
		Methow Composite spring Chinook salmon			
2007	93.2	4.1	1.3	1.3	73
2006	80.3	19.6	0.0	0.0	102
2005	87.1	7.9	0.0	4.9	101
2004	45.9	13.5	10.8	29.7	148
2003	34.0	34.0	6.4	25.5	47
2002	59.2	30.3	1.3	9.2	152
2001	76.8	10.5	2.1	10.5	95
2000	78.4	18.9	1.4	1.4	74
1999	70.5	20.5	2.2	6.8	44
1998	72.8	7.8	3.9	15.5	103
		Methow spring Chinook salmon			
1997	30.5	46.8	12.1	10.6	141
1996	83.6	10.9	0.0	5.5	55
1995	14.3	42.9	14.3	28.6	7
1994	100.0	0.0	0.0	0.0	1
1993	38.8	46.9	4.1	10.2	49
		Twisp spring Chinook salmon			
2007	94.1	0.0	5.9	0.0	17
2006	80.0	13.3	0.0	6.7	15
2005	83.3	16.6	0.0	0.0	6
2004	63.9	22.2	11.1	2.8	36
2003	52.9	29.4	5.9	11.8	17

Appendix E, continued.

Brood	Below-low	Low	Med	High	Total
	<0.099	0.099 - 0.199	0.20 - 0.449	> 0.450	number
		Twisp spring Chinook salmon			
2002	50.0	50.0	0.0	0.0	2
2001	93.3	0.0	0.0	6.7	15
2000	82.9	17.1	0.0	0.0	41
1999	81.3	6.3	0.0	12.5	16
1998	50.0	33.3	0.0	16.7	6
1997	36.4	36.4	18.2	9.1	11
1996	68.2	18.2	4.5	9.1	22
1995	- -	- -	- -	- -	- -
1994	25.0	50.0	0.0	25.0	4
1993	4.3	52.2	26.1	17.4	23
1992	0.0	77.8	11.1	11.1	9
		Chewuch spring Chinook salmon			
1997	35.0	35.0	22.5	7.5	40
1996	71.9	15.6	3.1	9.4	32
1995	- -	- -	- -	- -	- -
1994	33.3	50.0	0.0	16.7	6
1993	30.5	33.9	6.8	28.8	59
1992	8.3	83.3	0.0	8.3	12

Appendix F. Hatchery life stage survival-rate standards and level achieved (%) by stock and broodyear. Pre-spawn survival of adult summer Chinook is listed under the yearling life history stage category.

Brood	Collection to spawning		Unfertilized egg to eyed	Eyed egg to ponding	30 d after ponding	100 d after ponding	Ponding to release	Transport to release	Unfertilized egg to release
	90.0 female	85.0 male	92.0	98.0	97.0	93.0	90.0	95.0	81.0
				Wells summer Chinook salmon yearling					
2007	97.2	98.2	87.9	98.3	99.9	99.7	93.0	- -	80.4
2006	96.4	97.3	82.0	99.3	99.4	99.2	97.8	- -	79.7
2005	96.8	98.9	87.5	100.0	99.2	99.0	92.0	- -	80.5
2004	98.3	98.2	92.0	100.0	99.0	98.9	96.7	- -	89.0
2003	96.8	98.4	86.4	99.8	99.2	99.2	97.7	- -	84.4
2002	94.2	97.0	94.1	100.0	99.6	99.6	92.4	- -	87.0
2001	97.1	93.9	95.3	98.8	99.4	99.4	35.9	- -	33.8
2000	98.3	95.2	93.8	99.9	99.5	99.4	99.0	- -	92.9
1999	97.3	96.3	92.3	97.1	98.0	98.0	97.5	- -	87.4
				Wells summer Chinook salmon subyearling					
2007	- -	- -	91.7	86.5	99.5	99.1	98.3	- -	78.0
2006	- -	- -	90.0	100.0	94.3	80.5	78.6	- -	70.8
2005	- -	- -	87.1	100.0	82.7	82.4	82.2	- -	71.6
2004	- -	- -	93.6	98.4	94.3	94.4	94.3	- -	87.0
2003	- -	- -	85.7	100.0	87.9	87.9	87.8	- -	75.3
2002	- -	- -	93.8	99.9	88.1	87.3	87.1	- -	81.7
2001	- -	- -	94.6	100.0	95.6	94.2	94.1	- -	89.1
2000	- -	- -	94.1	100.0	97.6	97.4	97.1	- -	91.4
1999	- -	- -	90.9	100.0	96.7	96.3	96.2	- -	87.5
				Wells summer steelhead					
2008	98.9	96.6	85.2	85.2	99.3	99.5	92.9	- -	67.5
2007	92.8	95.8	80.8	99.0	97.8	96.2	85.6	- -	68.4
2006	95.2	93.3	86.6	99.5	92.7	89.8	80.4	- -	69.3
2005	96.4	99.5	87.4	95.9	96.9	92.2	85.7	- -	71.8
2004	98.6	98.4	86.2	94.0	99.4	95.5	94.0	- -	76.1
2003	99.0	99.3	83.5	99.9	93.6	77.6	73.5	- -	61.3
2002	98.0	99.5	82.2	96.2	99.0	98.7	97.8	- -	77.3
2001	98.0	99.0	83.9	98.6	97.0	96.9	95.0	- -	78.6
2000	98.0	99.2	85.2	97.4	98.1	98.7	95.3	- -	79.1
1999	99.3	99.8	77.0	98.0	97.1	96.6	92.8	- -	70.0

Appendix F, continued.

Brood	Collection to spawning[a]		Unfertilized egg to eyed	Eyed egg to ponding	30 d after ponding	100 d after ponding	Ponding to release	Transport to release	Unfertilized egg to release
	90.0 female	85.0 male	92.0	98.0	97.0	93.0	90.0	95.0	81.0
				Methow Composite spring Chinook salmon					
2007	98.6	98.8	92.9	96.0	98.8	98.2	94.5	99.1	84.2
2006	96.8	95.1	94.8	100.0	97.2	97.0	83.0	96.2	77.6
2005	99.0	99.1	96.1	100.0	99.6	99.5	90.4	99.6	87.7
2004	97.7	99.2	94.8	96.2	99.2	99.1	96.1	99.8	84.2
2003	96.3	97.2	90.0	100.0	98.8	98.3	93.0	99.8	77.9
2002	97.7	95.1	93.6	100.0	98.6	98.6	96.5	98.5	92.7
2001	98.9	97.3	96.1	100.0	99.3	99.1	97.0	99.8	90.8
2000	96.2	97.2	96.5	100.0	99.6	99.4	99.0	99.9	92.7
1999	96.0	96.3	97.4	100.0	99.5	99.5	99.2	N/A	92.5
				Twisp spring Chinook salmon					
2007	100.0	100.0	92.4	96.0	99.4	98.4	88.6	99.7	78.6
2006	85.7	100.0	95.9	100.0	99.6	99.3	94.2	99.7	90.4
2005	100.0	100.0	95.7	98.2	99.6	99.5	99.2	99.9	93.2
2004	97.4	87.9	95.5	97.8	99.1	98.8	78.7	99.5	73.3
2003	100.0	88.2	91.8	99.8	98.8	98.5	95.9	100.0	86.4
2002	100.0	66.7	97.9	100.0	99.3	99.1	98.5	99.9	96.4
2001	93.8	88.2	91.1	100.0	99.0	95.7	90.1	100.0	81.2
2000	96.4	92.9	97.1	100.0	99.6	99.5	47.3	23.9	46.0
1999	100.0	95.7	94.3	100.0	99.2	99.0	98.0	99.7	92.3

[a] Collection to spawning survival includes all fish trapped for Methow Composite and Twisp programs at WDFW trapping locations (including Wells Dam); does not include captive brood programs.

Appendix G. Annual releases by program from Wells Complex Hatchery facilities. All Wells summer Chinook salmon were released into the Columbia River directly adjacent to Wells Hatchery. Twisp River spring Chinook only include yearling progeny of anadromous adults.

Brood	Release location						Wells summer Chinook salmon		
	Methow	Twisp	Chewuch	Okanogan	Columbia R.	Total	Subyearling	Yearling	Total
			Wells Hatchery steelhead						
2008	103,236	104,903	100,373	146,633	- -	455,145	427,131	- -	427,131
2007	99,464	100,446	92,670	147,782	- -	440,362	402,527	- -	402,527
2006	96,219	111,770	107,545	135,547	- -	451,081	396,538	311,880	708,418
2005	99,820	107,245	119,500	146,826	- -	473,391	430,203	333,587	763,790
2004	86,041	96,405	82,280	78,940	- -	343,666	471,123	312,980	784,103
2003	80,580	117,545	78,205	79,605	- -	355,935	425,271	313,509	738,780
2002	96,420	105,323	117,495	141,890	- -	461,128	473,100	306,810	779,910
2001	94,020	84,475	85,615	126,855	- -	390,965	376,027	185,200	561,227
2000	116,830	109,950	99,490	228,770	- -	555,040	498,500	343,423	841,923
1999	139,900	136,680	138,300	144,650	47,782	607,312	363,600	312,098	675,698
1998	320,250	113,583	116,403	160,756	64,280	775,272	370,617	457,770	828,387
1997	127,020	126,000	125,300	100,005	64,703	543,028	541,923	381,867	923,790
1996	310,480	- -	- -	99,720	17,500	427,700	473,000	356,707	829,707
1995	242,400	- -	- -	67,500	18,200	328,100	408,000	290,000	698,000
1994	359,170	- -	- -	91,225	- -	450,395	450,935	365,000	815,935
1993	324,200	- -	- -	95,910	- -	420,110	187,382	388,248	575,630
1992	392,815	- -	- -	118,408	- -	511,223	- -	331,353	331,353
			Methow Hatchery spring Chinook salmon						
2007	119,407	54,096	126,055	- -	- -	299,558			
2006	249,504	45,892	154,381	- -	- -	449,777			
2005	156,633	27,658	232,811	- -	- -	417,102			
2004	65,146	25,000	204,906	- -	- -	366,513			
2003	48,831	43,734	127,614	- -	- -	313,443			
2002	181,235	20,541	254,238	- -	- -	456,014			
2001	130,787	51,652	261,284	- -	- -	449,542			
2000	66,454	74,717	199,938	- -	- -	342,096			
1999	180,775	67,408	--	- -	- -	248,183			
1998	218,499	15,470	217,171	- -	- -	451,140			
1997	332,484	26,714	132,759	- -	- -	491,957			
1996	202,947	76,687	91,672	- -	- -	371,306			
1995	28,878	--	--	- -	- -	28,878			
1994	4,477	19,835	11,854	- -	- -	36,166			
1993	210,849	116,749	284,165	- -	- -	611,763			
1992	--	35,853	40,881	- -	- -	76,734			

Appendix H. Coded-wire tagged releases from Wells Complex Hatchery facilities. Spring Chinook salmon releases include high ELISA (HE) progeny. Mixed indicates that a single tag code was used for more than one release site and are listed as Chewuch River fish by default.

Brood	Program	Release date	Days acclimated	Mark code		Mark release (N)			Total
				Hatchery	CWT	Marked	No mark	Rate	
				Wells summer Chinook salmon					
2007	Subyearling	13-May-08	0	Ad-clip	633872	155,376	3,420	0.9784	158,796
2007	Subyearling	16-Jun-08	0	Ad-clip	633871	242,123	2,360	0.9903	244,483
2006	Subyearling	16-May-07	0	Ad-clip	633385	202,950	1,575	0.9922	204,525
2006	Subyearling	13-Jun-07	0	Ad-clip	633386	190,669	1,344	0.993	192,013
2005	Subyearling	12-May-06	0	Ad-clip	633298	200,461	4,509	0.9780	204,970
2005	Subyearling	14-Jun-06	0	Ad-clip	633299	223,048	2,185	0.9903	225,233
2004	Subyearling	13-Jun-05	0	Ad-clip	632285	235,256	5,218	0.9783	240,474
2004	Subyearling	18-May-05	0	Ad-clip	632286	222,069	8,580	0.9628	230,649
2003	Subyearling	14-Jun-04	0	Ad-clip	632370	201,200	9,570	0.9546	210,770
2003	Subyearling	11-May-04	0	Ad-clip	632371	192,558	21,943	0.8977	214,501
2002	Subyearling	16-Jun-03	0	Ad-clip	631368	233,322	1,882	0.9920	235,204
2002	Subyearling	16-Jun-03	0	Ad-clip	631370	233,431	4,466	0.9812	237,897
2001	Subyearling	17-Jun-02	0	Ad-clip	631423	368,533	7,494	0.9801	376,027
2000	Subyearling	20-Jun-01	0	Ad-clip	630775	498,500	0	1	498,500
1999	Subyearling	19-Jun-00	0	Ad-clip	630267	350,361	13,239	0.9636	363,600
1998	Subyearling	18-Jun-99	0	Ad-clip	631018	362,362	8,255	0.9777	370,617
1997	Subyearling	04-Jun-98	0	Ad-clip	630602	528,438	13,485	0.9751	541,923
1996	Subyearling	18-Jun-97	0	Ad-clip	636054	232,232	5,214	0.9780	237,446
1996	Subyearling	18-Jun-97	0	Ad-clip	636323	230,381	5,173	0.9780	235,554
1995	Subyearling	13-Jun-96	0	Ad-clip	635841	229,757	11,110	0.9539	240,867
1995	Subyearling	13-Jun-96	0	Ad-clip	636044	159,424	7,709	0.9539	167,133
1994	Subyearling	15-Jun-95	0	Ad-clip	635546	211,875	6,047	0.9723	217,922
1994	Subyearling	15-Jun-95	0	Ad-clip	635703	226,547	6,466	0.9723	233,013
1993	Subyearling	28-Jun-94	0	Ad-clip	635145	183,199	4,813	0.9777	188,012
2007	Yearling	15-Apr-09	125	Ad-clip	634390	173,218	2,181	0.9875	175,399
2007	Yearling	15-Apr-09	125	Ad-clip	634287	132,990	1,674	0.9875	134,664
2006	Yearling	06-Apr-08	97	Ad-clip	633799	310,106	1,774	0.9943	311,880
2005	Yearling	23-Apr-07	137	Ad-clip	633596	322,445	11,142	0.9666	333,587
2004	Yearling	21-Apr-06	137	Ad-clip	632799	147,802	8,288	0.9469	156,090
2004	Yearling	22-Apr-06	137	Ad-clip	632864	148,559	8,331	0.9468	156,890
2003	Yearling	11-Apr-05	166	Ad-clip	632580	306,894	6,615	0.9789	313,509
2002	Yearling	19-Apr-04	166	Ad-clip	631890	302,905	3,905	0.9873	306,810
2001	Yearling	21-Apr-03	166	Ad-clip	631549	183,591	1,609	0.9913	185,200
2000	Yearling	15-Apr-02	166	Ad-clip	630995	337,913	7,591	0.9780	345,504
1999	Yearling	16-Apr-01	166	Ad-clip	630468	305,947	6,151	0.9803	312,098
1998	Yearling	18-Apr-00	166	Ad-clip	631061	437,235	20,535	0.9551	457,770
1997	Yearling	15-Apr-99	166	Ad-clip	630611	374,268	7,419	0.9806	381,687
1996	Yearling	15-Apr-98	166	Ad-clip	630134	199,585	3,306	0.9837	202,891
1996	Yearling	15-Apr-98	166	Ad-clip	630217	143,295	2,373	0.9837	145,668
1995	Yearling	01-Apr-97	166	Ad-clip	634129	187,847	3,153	0.9835	191,000
1995	Yearling	01-Apr-97	166	Ad-clip	634130	96,720	2,280	0.9770	99,000

Appendix H, continued.

Brood	Program	Release date	Days acclimated	Mark code		Mark release (*N*)			Total
				Hatchery	CWT	Marked	No mark	Rate	
1994	Yearling	01-Apr-96	166	Ad-clip	635324	109,034	7,966	0.9319	117,000
1994	Yearling	01-Apr-96	166	Ad-clip	635838	242,786	5,214	0.9790	248,000
1993	Yearling	15-Apr-95	166	Ad-clip	634610	131,625	3,594	0.9734	135,219
1993	Yearling	15-Apr-95	166	Ad-clip	635702	241,202	11,827	0.9533	253,029
1992	Yearling	27-Apr-94	166	Ad-clip	635005	209,245	122,108	0.6315	331,353
Chewuch River spring Chinook salmon									
2007	MC Chewuch	21-Apr-09	29	None	634294	99,242	760	0.992	100,002
2007	MC Chewuch	21-Apr-09	29	None	634471	25,852	201	0.992	26,053
2006	MC Chewuch	17-Apr-08	31	None	633884	151,046	3,335	0.979	154,381
2005	MC Chewuch	16-Apr-07	27	None	633294	230,716	2,095	0.991	232,811
2004	MC Chewuch	18-Apr-06	27	None	632899	202,468	2,438	0.988	204,906
2003	MC Chewuch	18-Apr-05	39	None	632566	54,598	341	0.994	54,939
2003	MC Chewuch	18-Apr-05	39	None	632569	71,432	1,243	0.983	72,675
2002	MC Chewuch	14-Apr-04	22	None	631976	249,763	4,475	0.982	254,238
2001	MC Chew. HE	23-Apr-03	0	None	631494	15,808	1,433	0.917	17,241
2001	MC Chewuch	21-Apr-03	26	None	631384	145,698	2,039	0.986	147,737
2001	MC Chewuch	21-Apr-03	26	None	631440	94,977	1,329	0.986	96,306
2000	MC Mixed	16-Apr-02	18	None	630776	255,124	11,268	0.958	266,392
1998	MC Mixed	17-Apr-00	36	Ad-clip	631024	412,613	23,057	0.947	435,670
1997	Chewuch	19-Apr-99	27	Ad-clip	630614	128,404	4,355	0.967	132,759
1996	Chewuch	15-Apr-98	21	Ad-clip	630233	79,493	12,179	0.867	91,672
1994	Chewuch	21-Apr-96	31	Ad-clip	635132	2,361	21	0.991	2,382
1994	Chewuch	21-Apr-96	31	Ad-clip	635416	3,805	33	0.991	3,838
1994	Chewuch	21-Apr-96	31	Ad-clip	635863	967	9	0.991	976
1994	Chewuch	21-Apr-96	31	Ad-clip	635903	310	3	0.990	313
1994	Chewuch	21-Apr-96	31	Ad-clip	635905	656	5	0.992	661
1994	Chewuch HE	21-Apr-96	31	Ad-clip	635415	3,652	32	0.991	3,684
1993	Chewuch	17-Apr-95	18	Ad-clip	634127	174,761	4,114	0.977	178,875
1993	Chewuch	17-Apr-95	18	Ad-clip	635350	23,236	461	0.981	23,697
1993	Chewuch HE	17-Apr-95	18	Ad-clip	635161	79,804	1,789	0.978	81,593
1992	Chewuch	18-Apr-94	3	Ad-clip	634331	2,577	10	0.996	2,587
1992	Chewuch	18-Apr-94	3	Ad-clip	634332	2,511	25	0.990	2,536
1992	Chewuch	18-Apr-94	3	Ad-clip	634848	4,148	- -	1	4,148
1992	Chewuch	18-Apr-94	3	Ad-clip	634850	4,432	43	0.990	4,475
1992	Chewuch	18-Apr-94	3	Ad-clip	635121	5,165	31	0.994	5,196
1992	Chewuch	18-Apr-94	3	Ad-clip	635123	4,051	25	0.994	4,076
1992	Chewuch	18-Apr-94	3	Ad-clip	635124	4,417	-	1	4,417
1992	Chewuch	18-Apr-94	3	Ad-clip	635133	3,414	27	0.992	3,441
1992	Chewuch	18-Apr-94	3	Ad-clip	635138	3,580	-	1	3,580
1992	Chewuch	18-Apr-94	3	Ad-clip	635139	3,120	6	0.998	3,126
1992	Chewuch	18-Apr-94	3	Ad-clip	635140	3,228	71	0.978	3,299

Appendix H, continued.

Brood	Program	Release date	Days acclimated	Mark code		Mark release (*N*)			Total
				Hatchery	CWT	Marked	No mark	Rate	
Methow River spring Chinook salmon									
2007	MC Methow	21-Apr-09	152	None	634293	104,510	960	0.991	105,470
2007	MC Methow HE	21-Apr-09	152	None	634674	13,773	438	0.968	13,937
2006	MC Methow	16-Apr-08	168	None	633866	208,689	3,028	0.986	211,717
2006	MC Methow	23-Dec-06	13	Otolith	None	37,787	0	1	37,787
2005	MC Methow	16-Apr-07	153	None	633395	143,571	1,362	0.991	144,933
2005	MC Methow HE	16-Apr-07	153	None	633281	11,367	333	0.972	11,700
2004	MC Methow	18-Apr-06	169	None	631187	63,270	1,876	0.971	65,146
2004	MC Methow	18-Apr-06	169	None	632694	42,252	- -	1	42,252
2003	MC Methow	18-Apr-05	169	None	632568	46,521	2,310	0.953	48,831
2002	MC Methow	02-Apr-04	7	None	631524	35,075	694	0.981	35,769
2002	MC Methow	14-Apr-04	42	None	631891	142,804	2,662	0.982	145,466
2001	MC Methow	21-Apr-03	82	None	630976	49,960	312	0.994	50,272
2001	MC Methow	21-Apr-03	82	None	631179	32,152	4,080	0.887	36,232
2001	MC Methow	21-Apr-03	82	None	631477	43,273	1,110	0.975	44,383
1999	MC Methow	17-Apr-01	171	Ad-clip	630377	161,827	5,454	0.967	167,281
1999	MC HE	17-Apr-01	171	Ad-clip	630380	13,198	296	0.978	13,494
1997	Methow	15-Apr-99	300	Ad-clip	630613	315,441	17,043	0.949	332,484
1996	Methow	15-Apr-98	300	Ad-clip	630130	182,343	3,962	0.979	186,305
1996	Methow	15-Apr-98	300	Ad-clip	630246	2,987	57	0.981	3,044
1996	Met. (Snake R)	15-Apr-98	300	Ad-clip	636315	8,763	167	0.981	8,930
1996	Methow HE	15-Apr-98	300	Ad-clip	630248	4,581	87	0.981	4,668
1995	Methow	15-Apr-97	350	Ad-clip	636037	5,218	4	0.999	5,222
1995	Methow	15-Apr-97	350	Ad-clip	636038	4,747	4	0.999	4,751
1995	Methow	15-Apr-97	350	Ad-clip	636039	4,035	5	0.999	4,040
1995	Methow	15-Apr-97	350	Ad-clip	636041	4,001	5	0.999	4,006
1995	Methow	15-Apr-97	350	Ad-clip	636042	3,536	5	0.999	3,541
1995	Methow HE	15-Apr-97	350	Ad-clip	636040	3,617	29	0.992	3,646
1995	Methow HE	15-Apr-97	350	Ad-clip	636043	3,647	25	0.993	3,672
1994	Methow	22-Apr-96	29	Ad-clip	635417	4,460	17	0.996	4,477
1993	Methow	15-Apr-95	227	Ad-clip	635551	187,496	2,235	0.988	189,731
1993	Methow HE	15-Apr-95	227	Ad-clip	635410	20,758	360	0.983	21,118
Twisp River spring Chinook salmon									
2007	Twisp	25-Apr-09	10	None	634673	52,276	300	0.9943	52,576
2007	Twisp HE	25-Apr-09	10	None	634675	1,498	22	0.9857	1,520
2006	Twisp	21-Apr-08	41	None	633687	39,206	1,183	0.971	40,389
2006	Twisp HE	21-Apr-08	41	None	634068	5,292	211	0.962	5,503
2005	Twisp	16-Apr-07	34	None	633483	26,552	1,106	0.960	27,658
2004	Twisp	02-Apr-05	3	None	631508	3,643	0	1	3,643
2004	Captive HE	22-Apr-06	30	None	632878	69,717	1,900	0.976	71,617
2004	Twisp HE	22-Apr-06	30	None	632988	24,380	620	0.975	25,000
2003	Twisp	18-Apr-05	35	None	632567	42,750	984	0.978	43,734
2003	Captive and HE	25-Apr-05	2	None	632499	44,660	2,114	0.955	46,774

Appendix H, continued.

Brood	Program	Release date	Days acclimated	Mark code		Mark release (*N*)			Total
				Hatchery	CWT	Marked	No mark	Rate	
2003	Captive and HE	25-Apr-05	2	None	632564	35,390	1,675	0.955	37,065
2003	Captive and HE	25-Apr-05	2	None	632565	8,999	426	0.955	9,425
2002	Twisp	13-Apr-04	27	None	631582	20,377	164	0.992	20,541
2002	Twisp Captive	13-Apr-04	28	None	631076	11,876	517	0.958	12,393
2002	Twisp Captive	13-Apr-04	28	None	631077	10,088	439	0.958	10,527
2002	Twisp Captive	13-Apr-04	28	None	631694	8,504	308	0.965	8,812
2002	Twisp Captive	13-Apr-04	0	None	631695	5,599	202	0.965	5,801
2001	Twisp	21-Apr-03	27	None	631478	50,454	1,198	0.977	51,652
2001	Twisp Captive	21-Apr-03	27	None	631068	5,656	163	0.972	5,819
2000	Twisp Captive	23-Apr-02	0	None	630994	978	9	0.991	987
2000	Twisp	15-Apr-02	20	None	630182	74,045	672	0.991	74,717
1999	Twisp	17-Apr-01	36	Ad-clip	630378	28,808	589	0.98	29,397
1999	Twisp	17-Apr-01	36	Ad-clip	630379	27,743	828	0.971	28,571
1999	Twisp HE	17-Apr-01	36	Ad-clip	630381	9,357	83	0.991	9,440
1998	Twisp	17-Apr-00	36	Ad-clip	631041	14,752	718	0.954	15,470
1997	Twisp	15-Apr-99	30	Ad-clip	630434	25,557	1,157	0.957	26,714
1996	Twisp	15-Apr-98	26	Ad-clip	636114	62,239	2,479	0.962	64,718
1996	Twisp	15-Apr-98	26	Ad-clip	636317	4,394	205	0.955	4,599
1996	Twisp HE	15-Apr-98	26	Ad-clip	636316	7,041	329	0.955	7,370
1994	Twisp	21-Apr-96	36	Ad-clip	634515	6,197	71	0.989	6,268
1994	Twisp	21-Apr-96	36	Ad-clip	635419	4,457	51	0.989	4,508
1994	Twisp	21-Apr-96	36	Ad-clip	635420	4,457	51	0.989	4,508
1994	Twisp HE	21-Apr-96	36	Ad-clip	635418	4,499	52	0.989	4,551
1993	Twisp	17-Apr-95	20	Ad-clip	635329	96,319	3,709	0.963	100,028
1993	Twisp HE	17-Apr-95	20	Ad-clip	635609	16,638	83	0.995	16,721
1992	Twisp	15-Apr-94	3	Ad-clip	634849	4,194	94	0.978	4,288
1992	Twisp	15-Apr-94	3	Ad-clip	634851	4,032	24	0.994	4,056
1992	Twisp	15-Apr-94	3	Ad-clip	635122	5,150	52	0.99	5,202
1992	Twisp	15-Apr-94	3	Ad-clip	635125	4,197	260	0.942	4,457
1992	Twisp	15-Apr-94	3	Ad-clip	635134	3,835	69	0.982	3,904
1992	Twisp	15-Apr-94	3	Ad-clip	635135	3,169	25	0.992	3,194
1992	Twisp	15-Apr-94	3	Ad-clip	635136	3,316	80	0.976	3,396
1992	Twisp	15-Apr-94	3	Ad-clip	635137	3,821	167	0.958	3,988
1992	Twisp	15-Apr-94	3	Ad-clip	635141	3,355	13	0.996	3,368

Appendix I. Mean fork length (mm), coefficient of variation (CV), weight (g), and fish per pound (FPP) for anadromous fish released from Wells and Methow hatcheries.

Brood	Fork length			Weight			
	Mean	SD	CV	Mean	SD	CV	FPP
			Wells yearling Chinook salmon				
2007	173.0	9.9	5.7	52.3	9.4	18.0	8.6
2006	153.8	11.1	7.2	41.1	8.6	20.9	11.0
2005	154.9	13.4	8.6	42.1	10.6	25.1	10.7
2004	170.8	11.0	6.4	52.0	10.4	20.0	8.7
2003	157.0	19.8	12.6	45.0	16.4	36.4	10.1
2002	156.0	13.4	8.6	46.7	11.8	25.3	9.7
2001	155.7	12.3	7.9	43.8	10.0	22.8	10.3
2000	161.2	11.6	7.2	47.9	11.1	23.2	9.5
1999	159.5	9.8	6.1	44.5	8.3	18.7	10.2
1998	183.6	13.6	7.4	74.1	16.6	22.4	6.1
1997	202.1	19.5	9.6	75.6	- -	- -	6.0
			Wells subyearling Chinook salmon				
2007	108.1	7.3	6.7	13.5	- -	- -	33.5
2006	111.0	10.3	9.3	14.9	- -	- -	30.4
2005	108.5	7.4	6.8	14.3	3.6	25.3	31.7
2004	109.5	6.1	5.6	15.0	2.8	18.7	30.2
2003	115.4	7.2	6.2	18.9	4.4	23.5	24.0
2002	108.1	8.0	7.4	14.7	3.6	25.0	30.9
2001	116.9	7.6	6.5	20.6	4.8	23.5	21.9
2000	111.3	8.5	7.6	16.9	4.9	28.9	26.7
1999	122.1	9.2	7.5	24.5	6.6	27.1	18.5
1998	116.5	8.0	6.9	18.3	5.1	27.9	24.7
			Wells H x H steelhead				
2008	185.7	24.5	13.1	69.0	26.8	38.9	6.5
2007	181.4	15.3	8.4	67.3	16.6	24.7	6.7
2006	180.6	21.9	12.1	65.7	22.3	33.8	6.9
2005	171.4	18.7	10.9	56.8	17.1	30.1	7.9
2004	192.4	21.7	11.3	82.4	28.8	34.9	5.4
2003	189.9	19.4	10.2	79.9	23.4	29.3	5.6
2002	188.5	19.6	10.4	75.9	22.6	29.8	5.9
2001	194.7	15.4	7.9	87.3	20.7	23.7	5.1
2000	172.9	22.4	13.0	60.0	21.3	35.5	7.5
1999	189.4	18.1	9.6	76.8	20.8	27.1	5.9
			Wells H x W steelhead				
2008	189.7	22.4	11.8	77.0	27.2	35.3	5.8
2007	178.3	16.1	9.0	63.5	17.4	27.4	7.1
2006	181.5	20.4	11.2	68.8	23.1	33.1	6.5
2005	168.4	16.4	9.7	53.3	15.0	28.3	8.5
2004	184.5	24.3	13.1	72.2	29.1	40.2	6.2
2003	163.2	29.7	18.2	62.1	--	--	7.3

Appendix I, continued.

Brood	Fork length			Weight			
	Mean	SD	CV	Mean	SD	CV	FPP
2002	187.9	24.1	12.8	73.1	26.7	36.5	6.2
2001	181.8	26.9	14.8	72.9	30.5	41.9	6.2
2000	178.6	20.9	11.7	66.7	21.7	32.5	6.7
1999	195.4	18.2	9.3	83.0	21.3	25.7	5.4
1998	191.8	18.9	9.9	79.4	23.6	29.7	5.7
Twisp River spring Chinook salmon							
2007	127.5	13.6	10.6	24.9	9.3	37.4	18.2
2006	134.0	11.1	8.3	29.6	8.3	28.1	15.3
2005	139.0	10.0	7.2	33.9	7.8	22.9	13.0
2004	130.2	14.6	11.2	27.9	12.0	43.0	16.2
2003	132.8	11.1	8.4	28.2	7.9	28.0	16.1
2002	135.9	9.6	7.1	30.3	7.2	23.8	15.0
2001	122.5	10.0	8.2	21.6	- -	- -	21.0
2000	133.4	6.8	5.1	27.2	- -	- -	16.7
1999	155.9	15.5	9.9	47.7	15.7	32.9	9.5
1998	138.0	10.6	7.7	30.3	7.6	25.1	15.0
1997	133.4	- -	- -	28.2	- -	- -	16.1
1996	137.2	- -	- -	30.7	- -	- -	14.8
1995	na	na	na	na	na	na	na
1994	138.5	- -	- -	31.4	- -	- -	14.4
1993	132.9	- -	- -	29.8	- -	- -	15.2
1992	135.0	- -	- -	30.0	- -	- -	15.1
Methow River spring Chinook salmon							
2007	130.8	14.0	10.7	27.0	9.3	34.4	16.8
2006	127.6	15.8	12.4	25.3	12.0	47.6	17.9
2005	130.8	13.9	10.6	27.4	9.3	34.1	17.0
2004	137.3	7.3	5.3	32.1	5.7	17.7	14.1
2003	135.0	10.9	8.1	28.4	6.5	23.0	16.0
2002	132.5	12.5	9.4	28.7	8.1	28.2	15.8
2001	132.8	- -	- -	28.4	- -	- -	16.0
2000	131.3	6.8	5.2	26.8	4.8	18.0	16.9
1999	151.0	14.3	9.5	40.9	13.1	100.0	11.0
1998	133.9	6.7	5.0	28.3	5.6	19.8	16.0
1997	126.5	- -	- -	24.7	- -	- -	18.3
1996	128.2	- -	- -	25.0	- -	- -	18.1
1995	134.9	- -	- -	32.2	- -	- -	14.1
1994	132.0	- -	- -	31.2	- -	- -	14.5
1993	134.8	- -	- -	28.5	- -	- -	15.9
1992	na	na	na	na	na	na	na

Appendix I, continued.

Brood	Fork length			Weight			
	Mean	SD	CV	Mean	SD	CV	FPP
			Chewuch River spring Chinook salmon				
2007	145.5	29.0	20.0	43.3	28.8	66.5	10.4
2006	115.7	10.9	9.4	19.2	6.2	32.3	23.7
2005	126.0	15.3	12.2	24.7	10.2	41.1	18.0
2004	144.1	20.8	14.4	42.4	21.0	49.6	10.7
2003	131.0	11.7	8.9	27.6	7.9	28.6	16.4
2002	142.5	16.1	11.3	35.0	13.2	37.7	12.9
2001	133.8	6.7	5.0	30.2	- -	- -	15.0
2000	131.3	6.8	5.2	26.8	4.8	18.0	16.9
1999	na	na	na	na	na	na	na
1998	127.9	8.7	6.8	24.6	5.0	20.1	18.4
1997	132.7	- -	- -	27.9	- -	- -	16.2
1996	129.8	- -	- -	22.7	- -	- -	20.0
1995	na	na	na	na	na	na	na
1994	145.7	- -	- -	35.7	- -	- -	12.7
1993	134.5	- -	- -	27.7	- -	- -	16.4
1992	141.8	- -	- -	30.0	- -	- -	15.1

Chapter 2

Harvest and Straying of Naturally Produced and Hatchery Origin Fish Released From Wells Complex Hatchery Facilities.

Abstract

All stocks of salmon and steelhead covered in this chapter were subject to commercial, sport, or tribal fisheries in ocean and freshwater environments. Based on analysis of coded-wire tag data, most Wells summer Chinook salmon adults were recovered in fisheries, while most Methow spring Chinook salmon stocks were recovered in hatchery broodstocks or on spawning grounds. For the current brood examined, harvest of hatchery and wild Methow Basin spring Chinook totaled 9.6% and 5.3% of the total return, respectively. Unlike earlier hatchery releases, recent releases of Methow spring Chinook salmon have not been adipose fin-clipped, which may result in a decrease in harvest rates and an increase in recoveries of coded-wire tagged fish on the spawning grounds. For the most recent broods examined, less than 5% of the total return of spring Chinook salmon released into the Methow River strayed to non-target spawning grounds. However, greater than 5% of the total return of spring Chinook salmon releases in the Twisp and Chewuch rivers strayed into non-target spawning grounds. Less than 5% of the total brood return of Wells yearling and subyearling summer Chinook were recovered in non-target spawning grounds. For the 2008 return year, Wells summer Chinook salmon comprised less than 10% of the spawning populations of other independent populations. Local creel census was used to monitored harvest in selective (steelhead), and non-selective (summer Chinook salmon) fisheries occurring in the upper Columbia River ESU. An estimated 2,654 summer Chinook salmon, 2,002 hatchery steelhead, and 26 wild steelhead were directly or indirectly removed through sport fisheries in 2009. Overall, Wells Complex hatchery fish provided commercial, recreational, and limited tribal harvest, while meeting escapement requirements in that most spring Chinook salmon were recovered in broodstocks or on spawning grounds, and most summer Chinook salmon were recovered in fisheries.

Introduction

Wells Complex hatchery facilities funded by Douglas County Public Utility District release juvenile salmonids as compensation for the inundation of mainstem spawning habitat resulting from the construction of the Wells Hydroelectric Project (original inundation compensation) and for mortality associated with passage at the Wells Hydroelectric Project (NNI compensation). Hatchery releases are intended to supplement natural populations (Methow spring Chinook salmon; Methow and Okanogan summer steelhead) or to produce fish for commercial and recreational harvest (Wells summer Chinook salmon). Some hatchery fish released from Wells Complex facilities are heavily exploited in marine areas along the Pacific coast from Washington to Alaska by sport, commercial, and tribal harvest. In years of high post-release survival, returning hatchery fish can exceed the level necessary for broodstock and natural spawning purposes, thereby providing excess fish for local harvest. The information presented in this chapter will specifically address the following M&E Plan objectives:

Objective 5: Determine if the stray rate of hatchery fish is below the acceptable levels to maintain genetic variation.

- Ho: Stray rate Hatchery fish < 5% of total brood return
- Ho: Stray hatchery fish < 5% of spawning escapement (based on run year) within other independent populations
- Ho: Stray hatchery fish < 10% of spawning escapement (based on run year) of any non-target streams within independent population

Objective 8: Determine if harvest opportunities have been provided using hatchery returning adults where appropriate (e.g., Wells Chinook salmon).

- Ho: Harvest rate ≤ Maximum level to meet program goals
- Ho: Escapement ≤ Maximum level to meet supplementation goals

Hatchery fish released from Wells Complex facilities were marked prior to release to identify stock, genetic origin, or release location. Hatchery marking differs by stock depending on management requirements of each species, or as mandated by federal permits (ESA section 10). The primary mark used by most agencies to denote hatchery origin is the adipose fin clip. In Chinook salmon stocks, an adipose fin clip typically identifies the presence of a coded-wire tag (CWT). Because fish released for supplementation purposes are intended to contribute to natural spawning populations and therefore aid in ESA recovery efforts, many of the steelhead and spring Chinook salmon from Wells Complex hatcheries are marked with only a CWT or visual-implant elastomer. Leaving the adipose fin intact on these fish is designed to minimize fishery extraction. When the return of hatchery fish is greater than that needed to meet broodstock and spawning escapement objectives, fisheries may target the adipose fin-clipped portions of an ESA listed population (i.e., selective) to decrease the number of hatchery origin fish on the spawning grounds (e.g., Wells summer steelhead) or target both hatchery and wild origin fish (i.e., non-selective) of non-ESA listed populations (e.g., summer Chinook salmon).

Local Chinook salmon fisheries target non-listed summer Chinook salmon and are temporally and spatially designed to avoid impacting ESA-listed spring Chinook salmon. Through the use of CWT recovery data, the effectiveness of this segregation can be assessed. Coded-wire tag data from fisheries, spawning grounds, or from hatcheries in the Pacific Region are stored in the Regional Mark Processing Center (RMPC) database. The RMPC is the central repository for all coded-wire tagged and otherwise associated release, catch, sample, and recovery data regarding anadromous salmonids in the greater Pacific Coast Region of the United States of America (RMPC Strategic Plan 2006-2009). The Regional Mark Information System database (RMIS) within the RMPC provides specific recovery data for individual tag codes, along with the sample rate used to derive the total number of recoveries by fishery type. The RMIS database is the primary tool for estimating the survival and extraction rate of adipose fin-clipped and CWT hatchery releases.

In addition to providing harvest estimates, CWT recoveries from spawning ground surveys provide the data necessary to estimate hatchery stray rates (see Chapter 5 for a more in depth assessment of straying). Hatchery fish may stray within their basin of release, or to other river basins, and may contribute to the loss of genetic variation within or between populations. In the upper Columbia River Basin, comprehensive spawning ground surveys are conducted in most river basins for all Chinook salmon stocks. Coded-wire tags extracted from carcasses and the overall carcass sample rates are stored in the RMIS database.

Estimating the impact of fisheries, both direct and indirect (i.e., hooking mortality), on wild fish is challenging. Although wild steelhead and spring Chinook salmon are ESA-listed species, some fish are undoubtedly captured in sport and commercial fisheries either as target species or as unintended by-catch. Estimating the total mortality of fisheries on wild stocks is necessary to make survival comparisons between hatchery and wild fish, and to better understand the risk associated with specific fisheries.

Methods

Hatchery Chinook Salmon

Fishery extraction and escapement rates of hatchery Chinook salmon, whether adipose fin-clipped or not, were calculated from CWT data available within the RMIS database. The RMIS database reports the number of fish observed and estimated for each type of recovery category. The data for each CWT code was sorted by fishery type, year of capture, and reporting agency. In the case of spawning ground and hatchery data, the specific stream or hatchery was also recorded.

Coded-wire tag data reported to RMIS is expanded by a sample rate generated by the agency reporting the data. In some cases, the expanded number of tags reported is less than the number actually observed. This typically occurs when the sample rate is unknown or not reported. In these instances, the observed number was used instead of the estimated number when calculating contribution rates. The sum of the estimated CWT recoveries was then expanded by the marking rate for the population to yield the total number of fish recovered. Mark rates for tagged populations were determined from quality control sampling of juvenile fish prior to release. These data were obtained from the RMIS website or from local quality control sampling documentation. Expanded recovery data was sorted by fishery code and site name, and grouped into four categories:

1. Broodstock
2. Spawning ground
3. Ocean fishery
4. Freshwater fishery

Within the broodstock and spawning ground categories, subcategories were employed to designate target areas (i.e., stream or hatchery of release), and non-target areas (i.e., stray locations). Within the ocean and freshwater categories, subcategories were developed to designate commercial, sport, or tribal harvests. The spawning ground subcategories of target and non-target streams were based on the release location of populations of fish where the entire tagged group was released in the same stream. Releases of 1998 and 2000 brood spring Chinook salmon in the Chewuch River were accomplished with a composite of Methow and Chewuch stocks or Methow Composite stock fish that were not uniquely tagged by release site. Thus, returning adults from these broods could not be identified by release site.

Wells summer Chinook salmon are propagated for harvest augmentation and released into the mainstem Columbia River. Because the purpose of the program is harvest, all spawning ground recoveries of hatchery summer Chinook were considered to be in non-target areas. For hatchery Chinook salmon stocks, observed stray rates were compared to target values using a one-sample t-test at a significance level of 0.05. Proportional Wells summer Chinook spawning ground recoveries were arcsin (square root) transformed prior to plotting.

Wild Chinook Salmon

All of the spring Chinook salmon broods covered in this chapter were subject to sport, commercial, or tribal fisheries. Prior to 2001, these fisheries were able to retain spring Chinook salmon regardless of the presence or absence of an adipose fin (i.e., non-selective). Beginning in 2001, Columbia River sport fisheries have required that sport anglers be allowed to retain only adipose fin-clipped Chinook salmon (i.e., selective). Since 2002, both non-tribal sport and commercial fisheries in the Columbia River were conducted as selective fisheries. Because non-selective fisheries (i.e., tribal and ocean) retain spring Chinook salmon regardless of origin, the exploitation rate of specific hatchery stocks (e.g., Methow River) should be the same as for naturally produced fish from the same population. The number of wild fish harvested in non-selective fisheries can therefore be estimated from the exploitation rate of hatchery fish, assuming both components of the population are similarly exposed to the open fishery (i.e., same migration timing and spatial distribution).

The exploitation rate of a hatchery stock was used to estimate the number of wild fish of a similar stock harvested in selective fisheries. Even though the retention of wild fish is not allowed, selective fisheries impact wild fish through indirect post-release mortality. Estimates of post-release mortality were calculated by multiplying the proportion of hatchery fish harvested in a specific fishery by the indirect mortality rate calculated for each fishery type. Indirect mortality rates have been determined for Columbia River selective fisheries (Cindy Lafleur, WDFW, personal communication; Table 1).

Table 1. Indirect mortality rates for selective fisheries in the Columbia River.

Fishery	Indirect mortality
Sport	10.0 %
Commercial	40.0 %

Summer Chinook Salmon Sport Fishery

A non-selective sport fishery on summer Chinook salmon upstream of Priest Rapids Dam began in 2001, but creel surveys were not conducted until 2004. The objectives of the creel surveys were to:

1) Estimate sport harvest of summer Chinook and sockeye salmon.

2) Estimate rates of incidental catch and release of steelhead and Coho salmon.

3) Help evaluate the success of summer Chinook salmon mitigation efforts.

We used a two-stage non-uniform probability sampling as described in Creel Information from Sport Fisheries, WDFW Methods Manual (Hahn et al.1993). This method minimizes some of the problems associated with sampling large rivers containing disproportional angler effort per river section (Table 2).

Table 2. River section descriptions used for summer Chinook salmon creel surveys.

River section code	River section description
537	Priest Rapids Dam to Wanapum Dam
539	Wanapum Dam to Rock Island Dam
541	Rock Island Dam to Rocky Reach Dam
543	Rocky Reach Dam to Wells Dam
545	Wells Dam to Chief Joseph Dam
627/629	Okanogan and Similkameen rivers

Summer Steelhead Sport Fishery

Since ESA listing in 1997, steelhead returns have had to meet specific requirements for abundance and genetic composition before a local fishery could be considered. Because hatchery steelhead were not coded-wire tagged, no stock-specific fishery harvest estimate could be generated from the RMIS database. Instead, creel census was used to estimate harvest and indirect mortality (i.e., hooking mortality) associated with local fisheries. Creel census was conducted consistent with roving creel census methodologies described by Malvestuto et al. (1978). An estimated hooking mortality rate of 5% was used to estimate mortality of wild and hatchery fish released by sport anglers. Angler interviews produced a catch-per-unit-effort (CPUE) statistic where one unit of effort was equal to one angler fishing for one hour. The total number of steelhead captured was determined by multiplying the total angler effort by the overall CPUE for each fishery location.

Results

Hatchery Chinook Salmon

Fishery contribution rates for individual broodyears were combined for hatchery spring (1992 – 2003) and summer Chinook salmon (1992 – 2002). Most hatchery Chinook salmon from these broods, regardless of race, were adipose fin-clipped and received a CWT prior to release (Chapter 1). Starting with the 2000 brood, spring Chinook salmon releases have been marked with a CWT, but have not been adipose fin-clipped. Thus, prior to the 2000 brood, most fish intended for supplementation did not receive any protection from fishery extraction afforded by selective fisheries. Mark rates for the years examined ranged from 88% to 100% for spring Chinook salmon and from 63% to 100% for summer Chinook salmon. Hatchery Chinook salmon stocks were recovered in fishery categories at different rates depending on race. For the most recent completed brood year examined, summer Chinook salmon were primarily recovered in fisheries, while spring Chinook salmon were primarily recovered as broodstock or on spawning grounds (Table 3). Because spring Chinook of the 2003 brood were not adipose fin-clipped, few of these fish were recovered in fisheries. However, indirect mortality derived using a surrogate stock (2003 brood Chiwawa spring Chinook), indicates Methow spring Chinook salmon were impacted primarily in freshwater selective sport fisheries.

For the current brood examined (2003), less than 5% of the total return of spring Chinook salmon released into the Methow River strayed into non-target spawning grounds. Spring Chinook salmon releases in the Twisp and Chewuch rivers strayed into non-target spawning areas at a rate greater than 5% of the total brood return (Table 3). Mean stray rates to non-target spawning grounds for historic broods were significantly lower than the 5% target for Methow releases ($P < 0.01$), and were not significantly different for Twisp ($P = 0.054$) or Chewuch releases ($P = 0.102$; Table 4; Appendix B).

Table 3. Percent of total hatchery Chinook recoveries by race and recovery location for 2003 brood year spring Chinook salmon and 2002 brood year summer Chinook salmon. Recoveries are expanded by mark rate and sample rate for each category and adjusted for indirect mortality associated with selective fisheries.

Recovery category	Release group: Methow spring	Twisp spring	Chewuch spring	Wells summer-year	Wells summer-sub
Total recoveries (*N*)	57	49	61	3,725	126
Broodstock target stream	64.9	4.1	24.5	32.3	29.3
Broodstock non-target stream	10.5	4.1	4.9	0.0	0.0
Broodstock from Wells Dam	8.8	12.2	13.1	- -	- -
Spawning ground target stream	7.0	42.9	11.5	NA	NA
Spawning ground non-target stream	0.0	26.5	36.1	1.7	0.0
Ocean fishery-commercial	1.8	2.0	3.3	29.6	27.8
Ocean fishery-sport	0.0	0.0	0.0	8.3	12.7
Ocean fishery-tribal	0.0	0.0	0.0	1.1	0.0
Freshwater fishery-commercial	3.5	4.1	3.3	13.7	18.3
Freshwater fishery-sport	3.5	4.1	3.3	12.9	11.9
Freshwater fishery-tribal	0.0	0.0	0.0	0.4	0.0

NA = Not applicable.

Adult returns of hatchery summer Chinook salmon were great enough to provide fish for broodstock and harvest. Harvest of summer Chinook salmon occurred primarily in ocean fisheries and yearling releases have provided 96.7% of all recoveries of summer Chinook salmon from the 1992-2002 broods (Table 4). Because Wells summer Chinook salmon are intended for harvest, no target stream was designated. Consequently, all spawning ground recoveries were considered to be in non-target areas, but stray rates for the current brood examined did not exceed the 5% target. Mean stray rates to non-target spawning grounds for the 1992-2002 broods were not significantly different than target values for the Wells yearling (P = 0.309) and subyearling (P = 0.941) summer Chinook salmon releases (Figure 1; Appendix C1).

Summer Chinook salmon are known to spawn in the Columbia River downstream of Wells Dam (Miller, T. 2006; Miller, M. 2008), but redds in this area are difficult to quantify and few carcasses have been recovered from this spawning area. Because of this, spawning ground recovery data and smolt-to-adult survival should be considered minimum values. When CWT recoveries were examined by return year, stray rates of Wells summer Chinook salmon were inversely correlated with distance from Wells Hatchery (Figure 2; Appendix C2), and were seldom greater than 10% of other independent spawning populations in the Upper Columbia ESU (Wenatchee, Methow, and Okanogan). The highest proportion of Wells summer Chinook salmon are consistently recovered in the Chelan River, which is currently not identified as a summer Chinook salmon population.

Table 4. Percent of total hatchery Chinook recoveries by race and recovery category. Methow spring Chinook include the 1993 – 1997, 1999, and 2001 – 2003 broods. Twisp spring Chinook include the 1992 – 2003 broods and Chewuch spring Chinook include the 1992 –1997, and 2001 – 2003 broods. Summer Chinook include the 1992 –2002 broods. Recoveries were expanded by mark rate and sample rate for each category and adjusted for indirect mortality associated with selective fisheries.

Recovery category	Release group				
	Methow spring	Twisp spring	Chewuch spring	Wells summer Chinook	
				Yearling	Subyearling
Total recoveries (*N*)	3,152	976	2,016	43,970	3,180
Broodstock target stream	42.3	6.4	4.3	21.7	29.4
Broodstock non-target stream	0.3	17.7	10.9	1.4	1.0
Broodstock from Wells Dam	11.3	9.8	10.8	- -	- -
Spawning ground target stream	23.9	37.4	25.6	NA	NA
Spawning ground non-target stream	2.1	17.0	33.5	7.7	6.7
Ocean fishery-commercial	0.5	0.5	0.9	47.7	44.0
Ocean fishery-sport	0.0	0.0	0.0	7.8	6.0
Ocean fishery-tribal	0.0	0.0	0.0	1.7	1.0
Freshwater fishery-commercial	10.0	5.3	3.1	4.6	5.7
Freshwater fishery-sport	8.4	4.7	9.8	6.7	5.5
Freshwater fishery-tribal	1.2	1.1	1.1	0.6	0.7

NA = Not applicable.

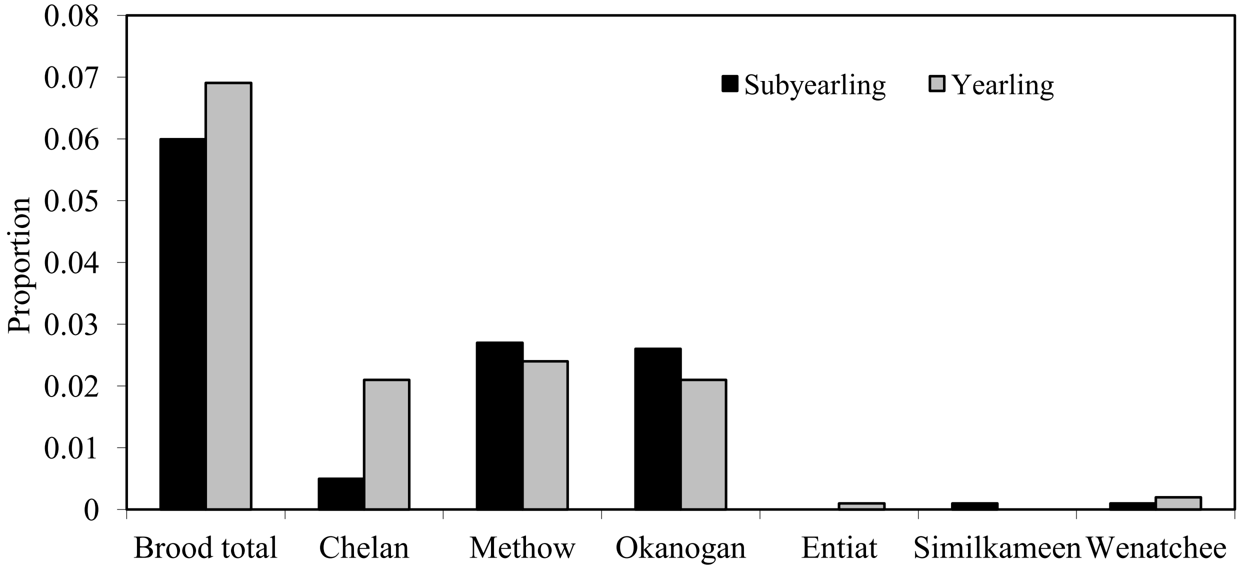

Figure 1. Mean proportion of Wells summer Chinook salmon hatchery adults from yearling (1992-2002 broods) and subyearling (1995-2002 broods) programs that strayed and the proportion of the spawning escapement composed of Wells summer Chinook salmon recovered in spawning areas within the Upper Columbia River ESU (1997-2007).

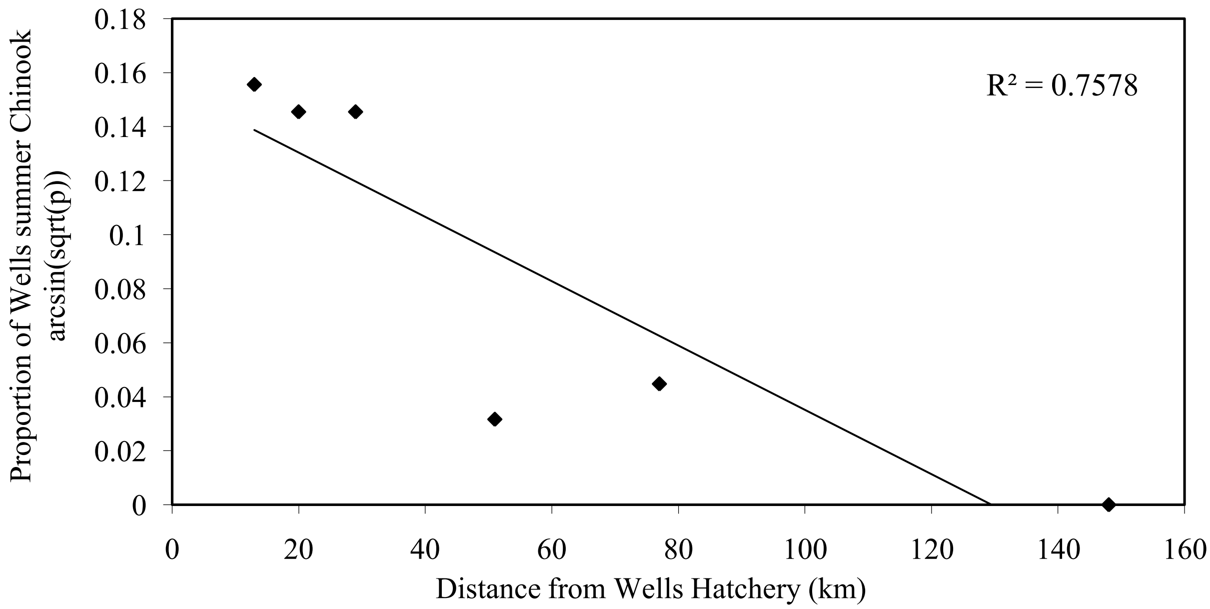

Figure 2. Relationship between the proportion of Wells summer Chinook salmon (yearling program) found on the spawning grounds and the distance from Wells Hatchery.

Most spring Chinook salmon hatchery releases covered in this chapter occurred prior to ESA-listing of the species in the upper Columbia ESU and were marked with an adipose-fin clip and a CWT. This marking combination did not allow upper Columbia ESU spring Chinook salmon to be exempted from selective fisheries that target hatchery fish based on the absence of an adipose fin. The 2000 brood was the first spring Chinook salmon release covered in this report in which the adipose fin was not clipped. This change in marking strategy resulted in a decrease in the overall proportion of spring Chinook salmon recovered in fisheries from 26.7% (1992 – 1999 broods) to 8.4% (2000 – 2003 broods). For the current brood of hatchery spring Chinook examined (2003), 9.6% were harvested in fisheries.

Wild Chinook Salmon

Wells Hatchery summer Chinook are a production program with no corresponding wild stock, thus no estimate of wild summer Chinook harvest was appropriate. Harvest of wild spring Chinook salmon was estimated for the Methow River basin using Leavenworth National Fish Hatchery (LNFH) as a surrogate for brood years prior to 1996, and for 2000 – 2002 because hatchery releases from Methow Hatchery (MH) included too few fish, or did not include adipose fin-clipped fish. For the 2003 brood, spring Chinook released from the Chiwawa Ponds were used as a surrogate. The percent of wild fish harvested from the 1992 – 2003 broods ranged from 2.63% to 22.07% (Table 5).

Based on the harvest rates of local hatchery stocks, an estimated 1,056 wild spring Chinook were harvested from the 1992 – 2003 broods (Table 6), with harvest of the current brood (2003) totaling 5.3%. Because the 2003 brood hatchery fish were not adipose fin-clipped, harvest rates of hatchery and wild fish were assumed to be equal. When adipose fin-clipped hatchery fish were used as surrogates (i.e., 2000-2003 broods), recoveries of hatchery fish were expanded by fishery-specific mortality rates, to estimate mortality of wild fish. The 1997 brood provided the majority of wild fish harvested (78.1%). Although escapement of wild spring Chinook in most recent run years has been low, the addition of harvested fish to the run escapement would have been unlikely to result in escapements meeting tributary-specific escapement goals (Chapter 5).

Table 5. Summary of spring Chinook salmon selective (S) and non-selective (NS) fisheries by broodyear. Harvest rate is based on harvest of local hatchery stocks determined through CWT analysis (LNFH = Leavenworth NFH; MH = Methow Hatchery; CH = Chiwawa Hatchery).

Brood	Fishery exposure by total age									Harvest rate	
	Sport			Commercial			Tribal				
	3	4	5	3	4	5	3	4	5	%	Source
1992	NS	NS	NS	NS	NS	NS	NS	NS	NS	5.55	LNFH
1993	NS	NS	NS	NS	NS	NS	NS	NS	NS	3.25	LNFH
1994	NS	NS	NS	NS	NS	NS	NS	NS	NS	2.68	LNFH
1995	NS	NS	NS	NS	NS	NS	NS	NS	NS	5.31	LNFH
1996	NS	NS	S	NS	NS	NS	NS	NS	NS	2.85	MH
1997	NS	S	S	NS	NS	S	NS	NS	NS	22.07	MH
1998	S	S	S	NS	S	S	NS	NS	NS	15.53	MH
1999	S	S	S	S	S	S	NS	NS	NS	2.63	MH
2000	S	S	S	S	S	S	NS	NS	NS	6.13	LNFH
2001	S	S	S	S	S	S	NS	NS	NS	4.19	LNFH
2002	S	S	S	S	S	S	NS	NS	NS	7.13	LNFH
2003	S	S	S	S	S	S	NS	NS	NS	4.79	CH

Table 6. Total adult return and number of wild spring Chinook salmon harvested by population and brood year.

Brood	Methow R.		Twisp R.		Chewuch R.		Lost R.		Total	
	Total	Harvest	Total	Harvest	Total	Harvest	Total	Harvest	Return	Harvest
1992	69	4	96	5	45	3	26	1	236	13
1993	120	4	53	2	95	3	5	0	274	9
1994	26	1	25	1	19	0	8	0	78	2
1995	71	4	39	2	34	2	6	0	150	8
1996	125	4	69	2	102	3	143	4	439	13
1997	879	194	1,237	273	1,563	345	33	7	3,712	819
1998	86	13	195	30	89	14	-	-	370	57
1999	5	0	8	0	2	0	-	-	15	0
2000	317	19	441	27	91	6	17	1	865	53
2001	254	11	156	7	321	13	26	1	757	32
2002	148	11	115	8	214	15	119	9	595	42
2003	95	5	1	0	54	3	1	0	151	8
Total	2,195	270	2,435	357	2,629	407	384	23	7,642	1,056

Summer Chinook Salmon Sport Fishery

Creel surveys have been conducted during the summer Chinook salmon sport fishery since 2004 and have generally increased in scope over time to ensure all river sections are surveyed. The greatest number of Chinook salmon harvested has been in the upper river sections, with a total of 2,654 fish harvested during 2009 fisheries (Table 7). Coded-wire tag analysis from the 2009 fishery are currently not available (Appendix A).

Table 7. Summary of summer Chinook salmon harvest based on creel surveys conducted during sport fisheries in the upper Columbia River. Harvest data for 2008 and 2009 was expanded to account for indirect mortality of Chinook salmon released during the fishery.

Year	Area											
	545		543		541		539		537		627/629	
	Harvest	CPUE	Harvest	CPUE	Harvest	CPUE	Harvest	CPUE	Harvest	CPUE	Harvest	CPUE
2004	2,803	0.073	2,139	0.075	907	0.038	NA	NA	NA	NA	NA	NA
2005	1,419	0.068	411	0.054	362	0.024	NA	NA	NA	NA	NA	NA
2006	1,973	0.048	1,444	0.071	446	0.027	1	0.001	NA	NA	145	0.128
2007	1,774	0.055	1,255	0.066	132	0.016	- -	0.000	739	0.060	29	0.042
2008	1,486	0.063	345	0.038	40	0.006	31	0.039	714	0.105	184	0.220
2009	869	0.041	593	0.076	157	0.017	6	0.007	834	0.092	195	0.102

Summer Steelhead

Upper Columbia River summer steelhead return during the summer and fall prior to spawning the following spring (i.e., brood year). Thus, the typical steelhead fishery period occurring between October and March encompasses two calendar years, but targets fish from a single brood year. Steelhead returns met abundance and composition requirements necessary to conduct local sport fisheries on the 2002 – 2009 broods of returning adults. The number of hatchery fish harvested and the indirect mortality rate for both hatchery and wild fish was estimated by creel census. Most steelhead were harvested in the Methow and Columbia River fisheries (Table 8), but CPUE for these areas have generally decreased over time, likely due to an increase in angling effort during a period of decreasing adult returns (Chapter 4). Steelhead harvest in local fisheries has not impacted broodstock collection because harvest typically occurs after steelhead have escaped the collection location, or after collection has ceased. Because local steelhead fisheries were based on local escapement objectives (i.e., above Priest Rapids Dam), all hatchery fish removed were considered excess fish appropriate for harvest. In many years, retention of hatchery steelhead in the fishery would have been greater if more hatchery fish been adipose fin-clipped, and fewer fish were released by anglers resulting in closure of the fishery due to wild fish indirect mortality thresholds being reached.

Table 8. Total number of steelhead removed in upper Columbia River sport fisheries by fishery location and brood. The total CPUE was calculated from the total number of fish captured divided by the total number of hours fished in each fishery.

Brood	Methow R.			Okanogan R.			Similkameen R.			Columbia R.			Total		
	H	W	CPUE	H	W	CPUE	H	W	CPUE	H	W	CPUE	H	W	CPUE
2009	635	11	0.077	409	4	0.232	37	1	0.124	921	10	0.060	2,002	26	0.113
2008	470	9	0.095	225	4	0.244	63	3	0.120	872	8	0.177	1,630	24	0.129
2007[a]	- -	- -	- -	- -	- -	- -	- -	- -	- -	523	2	0.093	523	2	0.093
2006	683	8	0.108	229	3	0.332	263	2	0.309	437	4	0.055	1,612	17	0.050
2005	680	9	0.114	243	2	0.087	290	2	0.245	493	4	0.067	1,706	17	0.104
2004	336	10	0.151	328	1	0.149	57	0	0.071	298	4	0.081	1,019	15	0.140
2003	254	13	0.362	57	1	0.074	63	1	0.147	455	9	0.146	829	24	0.189
2002[b]	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	694	73	0.167

[a] Fishery occurred in Columbia River only.

[b] Fishery occurred in Okanogan and Similkameen Rivers only. Data reflects the total number of fish captured, including those released.

Discussion

Wells summer Chinook salmon are an appropriate stock for commercial and recreational fisheries to target during years of high abundance. For the years examined, the majority of adult recoveries came from fishery harvest. While most of these fish were harvested outside of the Columbia River Basin, freshwater fisheries in the lower Columbia River and upstream of Rock Island Dam have been initiated in recent years. As these fisheries mature, the exploitation rate of hatchery summer Chinook in freshwater areas should increase.

Hatchery releases intended to supplement natural populations should result in an increased number of adult fish on the spawning grounds of the target (supplemented) stream. Most spring Chinook salmon broods examined in this chapter were adipose fin-clipped prior to release, thus many of the returning adults from those broods were harvested in fisheries (i.e., primarily Columbia River). To protect these fish from exploitation, recent releases of Methow spring Chinook salmon have not been adipose fin-clipped, which resulted in a dramatic decrease in harvest rates from 26% (1992 – 1999 broods) to 8% (2000 – 2003 broods) and an increase in spawning ground recoveries of these broods from 19% to 59%.

Stray rates of Twisp and Chewuch hatchery spring Chinook salmon for the current brood examined in this chapter exceeded the 5% of total brood return threshold. The mean stray rate for all broods released in the Twisp and Chewuch rivers was not significantly different from the target value, but the analysis includes many years of very low abundance where few fish were recorded in any recovery category. Stray rates for the last five years of Twisp river releases were significantly greater than the target, and results for Chewuch releases were similar. In contrast, releases directly from Methow Hatchery were significantly below the 5% target value, likely due to the extended acclimation time that these fish receive and the strong attraction of the Methow Hatchery outfall. Although releases in the Twisp and Chewuch basins were accomplished through the use of acclimation ponds, acclimation time is short primarily because environmental conditions (freezing) prevent transfer to the ponds before about 1 March. Longer acclimation may not be possible without acquisition of ground water to prevent freezing. Because of their low overall abundance, adequate broodstock for the Twisp River program has seldom been achieved, and decreasing the stray rates for Twisp River releases would assist the hatchery program in meeting production goals by increasing the number of fish available for collection at the Twisp River weir.

Wells summer Chinook salmon stray rates are generally less than the 5% of the total brood return target, primarily because a high proportion of recoveries of these fish occurs in sport and commercial fisheries. However, yearling releases exceeded 10% of the spawning population in the Methow River in two of the ten years examined. Recent broodstock protocols have targeted a minimum wild component of 10% for the Wells summer Chinook broodstock to increase genetic diversity and thereby minimize risks associated with straying of this program. Most evaluations of Wells summer Chinook programs deal with subyearling and yearling releases separately. However, because fish within each release group are not different genetically, stray rate calculations should pool these groups together for analyses. It is unlikely that this would significantly change contribution rates to other populations for the current broods examined given the low survival of subyearling releases. However, changes in rearing and release strategies that result in increased survival of subyearling fish may require that this analysis be reexamined.

For the brood years examined, an estimated 4.1 million subyearling and 3.7 million yearling summer Chinook salmon were released. Despite similar release numbers, yearling fish returned approximately 16 adults for each adult returned from subyearling releases. Yearling Chinook salmon were larger at release, and were released in mid-April instead of mid-June as were subyearling fish. These factors may influence survival of hatchery fish in the Columbia River system. Studies have been initiated with recent broods of subyearling summer Chinook salmon to determine if an earlier release (i.e., mid-May) improves survival.

Steelhead fisheries targeting Wells stock steelhead have occurred locally since 2003. These fisheries are monitored via creel census to determine harvest and mortality of hatchery and wild fish. The accuracy of these estimates has not historically been quantified, and an estimate of accuracy would be a valuable tool for fishery managers in monitoring and evaluating the creel census program. Stray rates for hatchery steelhead have not been calculated primarily because carcasses are seldom recovered during spawning ground surveys. With the increased use of coded-wire and PIT tags in steelhead, local creel census and the increasing prevalence of PIT tag monitoring arrays may begin to address harvest and straying of specific stocks.

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Appendix A
Final 2009 summer Chinook creel survey summary

February 5, 2010

During the 2009 summer Chinook sport fishery in the mainstem Columbia River from Priest Rapids Dam up-river to Chief Joseph Dam we estimate that **8,912** anglers fished a total of **48,018** hours and caught **2,561** Chinook; of these, **114** were released, the remaining **2,447** were retained. Of those fish retained **979** fish **(40%)** were adipose fin-clipped. **1,345** sockeye were also harvested (see Table 1).

River Section	545	543	541	539	537	Grand Total
Angler Sample Rate:	62.4%	56.5%	27.1%	21.7%	22.3%	42.9%
Total completed Anglers Interviewed:	1,745	998	610	42	425	3,820
Sample # Chinook Kept	448	264	128	2	168	1,010
Adipose Fin Clipped Chin. Kept	156	174	9	1	60	400
Mark rate %	35	65.9	7.0	50.0	35.7	40%
Estimated Total Effort (hrs):	21,169	7,779	9,152	880	9,038	48,018
Estimated Total Angler Trips:	2,798	1,765	2,249	193	1,906	8,912
Estimated Total Chinook Harvest:	867	590	157	6	827	2,447
Estimated Total Chinook Released:	24	25	0	0	65	114
Estimated Total Chinook Catch:	891	615	157	6	892	2,561
Estimated Total Sockeye Harvest:	1,314	19	0	0	12	1,345
Estimated Total Sockeye Released:	41	1	14	0	6	62
Estimated Total Sockeye Catch:	1,354	20	14	0	18	1,407
Estimated Total Steelhead Harvest:	0	0	0	0	0	0
Estimated Total Steelhead Released:	0	0	0	0	0	0
Estimated Total Steelhead Catch:	0	0	0	0	0	0
Total Anglers Sampled:	1,745	998	610	42	425	3,820
Total Fishing Hours Sampled:	10,779	5,432	2,419	155	2,201	20,986
Mean Hours per Trip:	6	5	4	4	5	5

During the 2009 summer Chinook sport fishery in the Okanogan and Similkameen rivers we estimate that 545 anglers fished a total of 1,909 hours and caught 195 Chinook; of these, none were released. Of those fish retained, 111 fish (56.9%) were adipose fin-clipped. A total of 111 sockeye were also harvested (see Table 2).

Table 2. Summary of the 2009 Summer Chinook Fishery for the Okanogan and Similkameen Rivers	
Estimated Effort Hours	1909
Estimated Number Anglers	545
CPUE	0.1021
Estimated Ad-absent Chinook Retained	111
Estimated Ad-present Chinook Retained	84
Estimated Chinook Released (Ad-absent and Ad-present)	0
Total Chinook Retained	195
Summary of 2009 Sockeye Fishery for the Okanogan and Similkameen Rivers, including Lake Osoyoos	
Estimated Effort Hours	1909
Estimated Number Anglers	545
CPUE	0.0581
Estimated Sockeye Retained	111
Estimated Sockeye Released	0
Total Sockeye Retained	111

Note: All of the anglers fishing for Chinook were also fishing for sockeye, so effort hours were the same for both species.

Appendix B. Coded wire tag recoveries from the RMIS database by broodyear and stock expanded by sample rate and tag rate.

Brood	Broodstock			Spawning ground		Ocean fishery			Freshwater fishery		
	Target	Non-target	Wells	Target	Non-target	Comm.	Sport	Tribal	Comm.	Sport	Tribal
Wells summer Chinook salmon yearling											
1992	359	9	- -	NA	40	81	37	6	0	4	16
1993	1,141	346	- -	NA	56	645	54	2	14	16	50
1994	89	5	- -	NA	2	30	6	0	0	0	9
1995	392	23	- -	NA	183	332	122	19	22	44	5
1996	501	28	- -	NA	308	593	182	6	2	32	0
1997	1,412	125	- -	NA	1,731	6,088	1,039	308	89	317	63
1998	1,195	43	- -	NA	564	6,863	948	141	219	481	74
1999	164	13	- -	NA	68	826	135	50	100	261	11
2000	2,198	2	- -	NA	345	3,379	490	133	785	988	36
2001	900	0	- -	NA	40	1,033	120	44	269	338	6
2002	1,203	0	- -	NA	62	1,103	311	40	512	480	14
Wells summer Chinook salmon subyearling											
1993	19	2	- -	NA	0	15	0	0	3	0	0
1994	9	0	- -	NA	0	3	0	0	0	0	3
1995	62	4	- -	NA	2	42	6	6	3	1	0
1996	267	21	- -	NA	78	266	54	5	2	8	3
1997	44	3	- -	NA	30	117	11	3	7	29	0
1998	44	0	- -	NA	40	236	14	1	7	25	4
1999	94	2	- -	NA	33	297	38	8	32	30	8
2000	63	1	- -	NA	8	78	10	2	23	5	0
2001	295	0	- -	NA	23	310	41	8	81	61	4
2002	37	0	- -	NA	0	35	16	0	23	15	0
Methow spring Chinook salmon											
1993	43	0	134	6	1	0	0	0	0	4	3
1994	0	0	1	0	0	0	0	0	0	0	0
1995	3	0	114	3	0	2	0	0	0	0	0
1996	200	0	58	221	8	0	0	0	2	0	11
1997	422	0	3	16	1	3	0	0	280	209	12
1998	- -	- -	- -	- -	- -	3	0	0	462	428	30
1999	93	0	- -	35	7	1	0	0	3	6	0

NA = Not applicable.

Appendix B, continued.

Brood	Broodstock			Spawning ground		Ocean fishery			Freshwater fishery		
	Target	Non-target	Wells	Target	Non-target	Comm.	Sport	Tribal	Comm.	Sport	Tribal
2000	- -	- -	- -	- -	- -	5	0	0	21	6	0
2001	289	0	5	182	23	3	0	0	0	0	0
2002	245	2	37	287	26	9	0	0	22	28	13
2003	37	6	5	4	0	1	0	0	2	2	0
				Twisp spring Chinook salmon							
1992	0	0	21	0	0	0	0	0	0	0	0
1993	0	3	18	1	1	0	0	0	0	4	0
1994	0	0	4	0	0	0	0	0	0	0	0
1995	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1996	4	58	40	151	17	0	0	0	1	0	6
1997	21	6	- -	14	0	0	0	0	14	9	1
1998	1	8	- -	0	2	0	0	0	11	0	0
1999	3	25	- -	8	20	1	0	0	4	0	0
2000	22	12	- -	67	40	0	0	0	7	0	0
2001	2	0	1	33	7	0	0	0	0	0	0
2002	7	59	6	70	66	3	0	0	8	10	4
2003	2	2	6	21	13	1	0	0	2	2	0
				Chewuch spring Chinook salmon							
1992	0	1	38	0	0	0	0	0	0	0	0
1993	0	19	79	8	3	5	0	0	0	0	1
1994	0	0	3	0	0	0	0	0	0	0	0
1995	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
1996	- -	15	15	0	4	0	0	0	6	0	1
1997	54	44	14	4	27	2	0	0	24	144	7
2001	15	46	2	323	321	0	0	0	2	0	0
2002	2	92	58	174	299	9	0	0	23	29	13
2003	15	3	8	7	22	2	0	0	2	2	0

Appendix C1. Proportion by brood year of Wells Hatchery summer Chinook salmon that strayed onto spawning grounds of other Chinook salmon populations. All recoveries are considered to be non-target areas.

Brood year	Summer Chinook salmon spawning population					
	Methow	Okanogan	Similkameen	Chelan	Entiat	Wenatchee
			Wells summer Chinook salmon yearlings			
1992	0.000	0.072	0.000	0.000	0.000	0.000
1993	0.021	0.006	0.000	0.000	0.000	0.002
1994	0.014	0.000	0.000	0.000	0.000	0.000
1995	0.014	0.036	0.000	0.104	0.000	0.004
1996	0.083	0.056	0.000	0.043	0.000	0.000
1997	0.071	0.042	0.001	0.035	0.003	0.000
1998	0.022	0.009	0.000	0.013	0.007	0.001
1999	0.012	0.000	0.001	0.008	0.000	0.009
2000	0.013	0.013	0.001	0.013	0.001	0.001
2001	0.007	0.000	0.000	0.008	0.000	0.000
2002	0.011	0.000	0.000	0.004	0.001	0.000
2003	0.004	0.005	0.000	0.008	0.004	0.000
2004	0.006	0.011	0.000	0.007	0.002	0.003
2005	0.000	0.013	0.000	0.000	0.000	0.000
			Wells summer Chinook salmon subyearlings			
1995	0.016	0.000	0.000	0.000	0.000	0.000
1996	0.026	0.058	0.007	0.015	0.000	0.004
1997	0.068	0.056	0.000	0.000	0.000	0.000
1998	0.040	0.054	0.000	0.011	0.000	0.000
1999	0.015	0.028	0.000	0.018	0.000	0.000
2000	0.042	0.000	0.000	0.000	0.000	0.000
2001	0.016	0.012	0.000	0.000	0.000	0.000
2002	0.000	0.000	0.000	0.000	0.000	0.000
2003	0.000	0.020	0.000	0.000	0.000	0.000
2004	0.057	0.030	0.005	0.009	0.000	0.000
2005	0.018	0.009	0.003	0.011	0.000	0.000

Appendix C2. Proportion by return year of Wells Hatchery summer Chinook salmon that strayed onto spawning grounds of other Chinook salmon populations. All recoveries are considered to be non-target areas.

Return year	Summer Chinook salmon spawning population					
	Methow	Okanogan	Similkameen	Chelan	Entiat	Wenatchee
			Wells summer Chinook salmon yearlings			
1997	0.000	0.065	0.000	0.000	0.000	0.000
1998	0.039	0.011	0.000	0.000	0.000	0.003
1999	0.005	0.000	0.000	0.019	0.000	0.000
2000	0.013	0.032	0.000	0.054	0.000	0.002
2001	0.072	0.048	0.005	0.050	0.000	0.000
2002	0.054	0.029	0.000	0.017	0.004	0.001
2003	0.027	0.005	0.000	0.015	0.012	0.002
2004	0.009	0.009	0.001	0.006	0.000	0.001
2005	0.012	0.009	0.001	0.013	0.002	0.002
2006	0.009	0.003	0.000	0.008	0.000	0.000
2007	0.013	0.000	0.000	0.007	0.001	0.000
2008	0.006	0.014	0.000	0.010	0.004	0.002
			Wells summer Chinook salmon subyearlings			
1997	0.000	0.000	0.000	0.000	0.000	0.000
1998	0.000	0.000	0.000	0.000	0.000	0.000
1999	0.007	0.000	0.000	0.000	0.000	0.000
2000	0.025	0.084	0.000	0.021	0.000	0.006
2001	0.104	0.045	0.017	0.000	0.000	0.000
2002	0.029	0.075	0.000	0.021	0.000	0.000
2003	0.003	0.000	0.000	0.016	0.000	0.000
2004	0.021	0.019	0.000	0.000	0.000	0.000
2005	0.014	0.017	0.000	0.000	0.000	0.000
2006	0.040	0.000	0.000	0.000	0.000	0.000
2007	0.000	0.007	0.000	0.000	0.000	0.000
2008	0.044	0.025	0.006	0.015	0.000	0.000

Chapter 3

Methow River Basin Spring Chinook Salmon and Steelhead Smolt Monitoring in 2009

Abstract

The mean number of smolts produced per redd is a metric used to compare the relative productivity of target species during freshwater rearing. We used salmonid capture data from rotary screw traps to estimate the number of spring Chinook salmon and summer steelhead smolts emigrating from the Twisp River and Methow River basins. We captured 113 wild spring Chinook salmon smolts at the Methow River trap and 644 smolts at the Twisp River trap. A total of 403 and 658 wild steelhead emigrants were captured at the Methow and Twisp River traps, respectively. The number of these species captured each day was expanded by trap efficiency estimates derived from mark/recapture efficiency trials. Using this methodology, we estimate that a total of 5,163 (± 4,317, 95% CI) wild spring Chinook salmon smolts emigrated from the Methow River, including 5,547 (± 491, 95% CI) smolts emigrating from the Twisp River. An estimated 31,301 (± 34,328 95% CI) wild steelhead emigrated from the Methow River, including 12,629 (± 812, 95% CI) fish from the Twisp River. During the fall emigration period, we estimated that 7,139 (± 1,482, 95% CI) spring Chinook salmon parr emigrated past the Twisp River trap and 2,948 (± 535, 95% CI) spring Chinook salmon parr emigrated past the Methow River trap. Utilizing data gathered during spring Chinook salmon spawning ground surveys in 2008, we estimated that the number of emigrants produced from each 2007 brood spring Chinook salmon redd in the Twisp River (324) was 10 times greater than the number of emigrants produced in the remainder of the Methow River basin (32). Steelhead in the Methow Basin and in the Twisp River produced an estimated 10 and 11 emigrants from 2005 brood redds, respectively. While data for spring Chinook salmon for each trapping location were similar, we were unable to assess the relative contribution of naturally spawning hatchery fish to smolt production without similar data from non-supplemented reference populations.

Introduction

An important component of both past and present hatchery monitoring and evaluation programs has been estimating the freshwater productivity of spring Chinook salmon *Oncorhynchus tshawytscha* and steelhead *O. mykiss* in the Methow River basin (MBSCSP 1995; Wells HCP HC 2005). Estimates of natural production by spring Chinook salmon and steelhead coupled with characteristics of the spawning population (i.e., abundance and composition) should provide some of the data necessary to assess the efficacy of hatchery supplementation programs for these species. Although rotary screw traps have proved to be a reliable, cost-effective, and minimally invasive method of producing species-specific production estimates in other river systems (Thedinga et al.1994; Murdoch et al. 2001), limited information exists on smolt production in the Methow Basin because smolt-monitoring efforts were not implemented annually or with consistency of methods or sampling locations. Screw traps were operated sporadically on the upper Methow and Chewuch rivers prior to 2004 (Hubble and Sexauer 1994; Hubble and Harper

1999; Hubble et al. 2003). However, estimates of smolt production for the entire Methow Basin were not calculated because monitoring was intermittent or occurred primarily in tributaries (i.e., Chewuch River). Beginning in 2004, the WDFW Supplementation Research Team implemented a smolt-monitoring program on the Methow River and expanded the program to the Twisp River in 2005. The primary objective was to estimate juvenile production of spring Chinook salmon and steelhead and to estimate stage-specific survival rates. These objectives were incorporated into the development and implementation of the Conceptual Approach to Monitoring and Evaluation for Hatchery Programs funded by Douglas County PUD (M&E Plan; Wells HCP HC 2007), for which this chapter focuses on the following objective:

Objective 7: Determine if the proportion of hatchery fish on the spawning grounds affects the freshwater productivity (i.e., number of smolts per redd) of supplemented streams when compared to non-supplemented streams.

- Ho: Slope of Ln(juveniles/redd) vs. redds $_{\text{Supplemented population}}$ = Slope of Ln(juveniles/redd) vs. redds $_{\text{Non-supplemented population}}$
- Ho: The relationship between proportion of hatchery spawners and juveniles/redd is $\geq$ 1

The M&E Plan requires that smolt production data from supplemented populations be compared to similar data from non-supplemented reference populations (Wells HCP HC 2007). Comparisons using a non-supplemented population or populations (i.e., reference stream) will reduce annual variation associated with these data so only the treatment effect (i.e., supplementation fish) can be tested. Reference populations for Methow spring Chinook salmon and steelhead have not yet been identified and this lack of suitable controls represents a significant data gap with respect to evaluating the impact of hatchery fish on these populations.

Methods

Methods used in trap operation and in calculating population estimates are provided in more detail in Appendix E of the Monitoring and Evaluation Plan (Wells HCP HC 2007).

Smolt Trap Operation

Rotary smolt traps of different sizes were operated in several configurations depending on the specific requirements of each site. The Twisp River site used a single trap with a 1.5-m cone diameter because of low stream flow and a relatively narrow stream channel. The Methow River site used traps with cone diameters of 2.4 m and 1.5 m to increase trap efficiency at greater ranges of river discharge. Large variation in discharge in the Methow River also required the use of two trapping positions due to the channel configuration and safety for personnel and fish. A 1.5 m trap was deployed in the lower position at the Methow site at discharges below 56.6 m^3/s. At discharges greater than 56.6 m^3/s, an additional 2.4 m trap was installed and operated in tandem with the 1.5 m trap. The tandem traps were operated approximately 30 m upstream of the low position (i.e., upper position).

Trapping occurred mostly after dark. Trap cones were lowered 1-2 hours before sunset and raised 1-2 hours after sunrise. Traps were pulled to the bank during the day to avoid debris as well as to allow easier access for boaters and recreational users as stated in our Okanogan County Conditional Use Permit. During periods of low smolt abundance, fish were removed from the traps each morning. During periods of greater discharge and/or smolt abundance, traps were monitored throughout the night to minimize mortality of captured fish and avoid equipment damage from debris. Discharge and velocity influenced trap position and frequency of sampling, and were the most important factors affecting trap efficiency. Cheng and Gallinat (2004) reported similar conclusions for a rotary screw trap operated on the Tucannon River located in southeastern Washington.

Debris was removed from the catch box by a small rotating drum-screen powered directly by the rotation of the cone (2.4-m trap) or by the cone contacting a rubber tire that caused the drum-screen to rotate (1.5-m traps). Traps were either connected to a main cable spanning the river (Methow River site), or to a single point on the right bank (Twisp River site). A more detailed description of the configuration at each site can be found in Snow and Perry (2005) and Snow and Fowler (2006).

Biological Sampling

Captured fish were retained in a 0.37 m^3 live box and were sorted, counted by species, and classified as hatchery or wild origin at each trap. Fish utilized for mark and recapture trials or tagged with passive integrated transponder (PIT) tags were held in 0.11 m^3 or 1.0 m^3 auxiliary live boxes affixed to the rear section of each trap. Salmonids were anesthetized in a solution of MS-222 prior to sampling and allowed to recover prior to release. Salmonids were visually classified as fry, parr, transitional, or smolt. Fry were defined as newly emerged fish without a visible yolk sac and largely underdeveloped pigmentation, with a fork length less than 50 mm. Parr had a fork length equal to or greater than 50 mm and distinct parr marks on their sides. Transitional migrants had faded parr marks, bright silver coloration, and some scale loss. Salmonids lacking or having highly faded parr marks, bright silver color, and deciduous scales were classified as smolts.

Most hatchery spring Chinook salmon and some hatchery steelhead were not adipose fin-clipped; therefore, the origin of adipose-present migrating salmonids was determined from the presence of coded-wire tags (e.g., spring Chinook salmon and coho [*O. kisutch*]), or elastomer tags and dorsal fin erosion (e.g., steelhead). Most hatchery summer Chinook salmon released in the Methow River were adipose fin-clipped. Juvenile salmonids lacking any tags, visible marks, or fin erosion were considered wild.

Sampling protocols differed by origin and species, although all fish were scanned for PIT tags prior to release. Hatchery-origin fish were counted by mark type, while most wild-origin fish were counted, measured to the nearest millimeter, and weighed to the nearest 0.1 g. Scale samples were collected from the majority of wild summer steelhead captured throughout the migration period. Scale samples were analyzed by the WDFW Scale Lab to estimate the contribution of different age classes to the migrating population. Most wild spring Chinook

salmon, steelhead, and bull trout were PIT tagged prior to release. Non-salmonids were counted by species or by family if they were too small to identify to species (e.g., *Catostomidae*).
We used age, trap location, and DNA analysis to determine race (spring or summer) of captured juvenile Chinook salmon. All Chinook salmon captured in the Twisp River trap were considered spring Chinook salmon, regardless of size (i.e., summer Chinook salmon have not been documented spawning upstream of the trap). All yearling Chinook salmon captured at the Methow River trap during the spring migration period were considered spring Chinook salmon because spring Chinook salmon are yearling migrants and summer Chinook salmon are typically subyearling migrants. All Chinook fry and parr captured at the Methow River trap during spring were considered summer Chinook salmon. Some spring Chinook salmon juveniles migrate as fry or parr from natal areas and some summer Chinook salmon may migrate as yearlings. Hence, a small yet unknown proportion of spring Chinook salmon may be misclassified as summer Chinook salmon and vice versa. Although the number of misclassified spring Chinook salmon should be relatively small compared with the numerically dominant summer Chinook salmon, production estimates for the less abundant spring Chinook salmon could be profoundly influenced by such misclassifications. In order to determine the proportion of spring and summer Chinook salmon in the total catch, we collected tissue samples (i.e., fin clips) of outmigrating yearling Chinook salmon captured during the spring and subyearling Chinook salmon captured during the fall trapping period at the Methow River site for DNA analysis. Tissue samples were transported to the WDFW genetics lab for processing. However, bleach contamination occurred during preparation of some of the samples collected in 2009, and all yearling Chinook samples and a portion of the subyearling samples were destroyed (C. Dean, WDFW, personal communication).

During periods when the trap was not operating (e.g., mechanical problems, high debris, or high discharge) the number of spring Chinook salmon, summer Chinook salmon, and summer steelhead captured was estimated. The estimated number of fish captured was calculated using the average number of fish captured two days prior and two days after the break in operation.

Population Estimates

Groups of at least fifty juvenile salmonids were used for trap efficiency trials. These fish were marked using a top or bottom caudal fin-clip, PIT tag, or were stained with Bismarck brown dye. Fish used in trap efficiency trials were anesthetized prior to marking and held in an auxiliary live box until the day of the trial. Marked fish were transported upstream of the trap in a 1,211 L two-chamber transport tank, or 18.9 L snap-lid buckets. Fish were divided into two equal groups and released on both streambanks to increase the likelihood that marked fish were mixed with unmarked fish and therefore representative of the population when recaptured. Releases of marked fish occurred the evening of the next trapping period after the trap was set. Marked groups of fish were released over the greatest range of discharge possible in order to increase the utility of the capture efficiency-flow regression model used to estimate the daily trap efficiency. The mean daily discharge for each trapping period was calculated based on the start and end time of trap operation. Discharge was measured and recorded every 15 min at USGS gauging station No. 12449950 (Methow River near Pateros, Washington) and station No. 12448998 (Twisp River near Twisp, Washington). Marked fish from the Methow River trap were transported and released approximately 5.6 km upstream of the trap (rkm 36). Fish for Twisp River trap mark groups were transported and released approximately 0.81 km upstream of the trap (rkm 3). Recaptured fish were recorded by mark type, measured, and released.

Emigration estimates were calculated using estimated daily trap efficiency, which was derived from a regression formula using trap efficiency (dependent variable) and discharge (independent variable). Trap efficiency was calculated using the following formula:

Trap efficiency = $E_i = R_i / M_i$

Where E_i is the trap efficiency during time period i; M_i is the number of marked fish released during time period i; and R_i is the number of marked fish recaptured during time period i. The number of fish captured was expanded by the estimated daily trap efficiency (e) to estimate the daily number of fish migrating past the trap (N_i) using the following formula:

Estimated daily migration = $\hat{N}_i = C_i / \hat{e}_i$

Where N_i is the estimated number of fish passing the trap during time period i; C_i is the number of unmarked fish captured during time period i; and e_i is the estimated trap efficiency for time period i based on the regression equation.

The variance for the total daily number of fish migrating past the trap was calculated using the following formula:

Variance of daily migration estimate = $\operatorname{var}(\hat{N}_i) = \hat{N}_i^2 \dfrac{\text{MSE}\left(1 + \frac{1}{n} + \frac{(X_i - \bar{X})^2}{(n-1)s_X^2}\right)}{\hat{e}_i^2}$

Where X_i is the discharge for time period i, and n is the sample size (number of mark recapture trials used in model). If a relationship between discharge and trap efficiency was not present (i.e., $P < 0.05$; $r^2 \approx 0.5$), pooled trap efficiency was used to estimate daily emigration:

Pooled trap efficiency = $E_p = \sum R / \sum M$

The daily emigration estimate was calculated using the formula:

Daily emigration estimate = $\hat{N}_i = C_i / E_p$

The variance for daily emigration estimates using the pooled trap efficiency was calculated using the formula:

Variance for daily emigration estimate = $\operatorname{var}(\hat{N}_i) = \hat{N}_i^2 \dfrac{E_p(1 - E_p) / \sum M}{E_p^2}$

The total emigration estimate and confidence interval were calculated using the following formulas:

Total emigration estimate = $\sum \hat{N}_i$

95% confidence interval = $1.96 \times \sqrt{\sum \text{var}[\hat{N}_i]}$

A valid estimate would require the following assumptions to be true concerning the trap efficiency trials:

1. All marked fish passed the trap or were recaptured during time period *i*.
2. The probability of capturing a marked or unmarked fish is equal.
3. Marked individuals were randomly dispersed in the population before recapture.
4. All marked fish recaptured were identified.
5. Marks were not lost between the time of release and recapture.

Ideally, a species-specific discharge/capture efficiency model (i.e., flow model) was developed at each trap site within each year for each trap position used. When this was not possible, we used the following protocols in order of priority to determine the methodology used to develop production estimates for each trap site and species:

1. Flow model using target species within current year.
2. Flow model using target and surrogate species within current year.
3. Flow model using surrogate species within current year.
4. Flow model using target species over multiple years.
5. Flow model using target and surrogate species over multiple years.
6. Flow model using surrogate species over multiple years.
7. Pooled efficiency estimate using target species within current year.
8. Pooled efficiency estimate from previous year.

Juveniles Per Redd

Production estimates for each age class by trapping location were summed to produce a total brood year emigration estimate. For spring Chinook salmon, the estimate of fall-migrant spring Chinook salmon parr was added to the emigrant estimate from the following spring to produce a total emigrant estimate for each brood year. Because a single brood of steelhead may require four or more years to completely migrate, the annual emigration estimate at each trap location was multiplied by the proportion of migrants from each brood determined through scale pattern analysis. The total number of migrants produced from one brood of spawning adults requires at least four years of emigration estimates. The number of emigrants per redd for each brood year was calculated by dividing the total brood year emigrant production estimate by the total number of redds in that brood year estimated through spawning ground surveys.

For spring Chinook salmon, egg deposition values used to calculate egg-to-emigrant survival were derived from carcass surveys and hatchery broodstock sampling. For each brood examined, the number of redds deposited was estimated by age and origin of the female spawning population within each basin as determined through spawning ground surveys. Each redd was then multiplied by the mean fecundity values by age and origin determined through sampling of Methow Hatchery broodstock, and adjusted by the percent of eggs retained in the body cavity determined through spawning ground surveys. For summer steelhead, egg deposition values were derived by multiplying the total number of redds in each basin by mean fecundity values according to age and origin of the female steelhead population as determined through run composition and hatchery broodstock sampling at Wells Hatchery.

Spawning ground surveys identified summer steelhead and spring Chinook salmon redds downstream of the Methow and Twisp River trap sites in some years. We assumed that redds located downstream from each trap site did not contribute to production estimates calculated at upstream smolt traps. To calculate total production and emigration estimates for the populations, we applied the egg-to-smolt survival rates calculated for those redds upstream of trap to the estimated number of eggs deposited downstream of the trap. Confidence intervals (95%) were adjusted in a similar manner. Total brood year emigration estimates were calculated by adding the estimated number of emigrants produced downstream of the trap to the estimate of emigrants produced upstream of the trap location.

Results

Smolt Trap Operation

Trapping in the Methow River basin in 2009 began at the Methow River site on 24 February and at the Twisp River site on 11 March. Trapping at both locations was interrupted on several occasions over the course of the trapping season because of unfavorable environmental conditions (e.g., flooding, low flow, ice). Discharge was below annual mean values for much of the year (Figures 1-2), but briefly exceeded safe trap operation ranges at both sites during spring runoff. River discharge in the fall was near mean values at both sites.

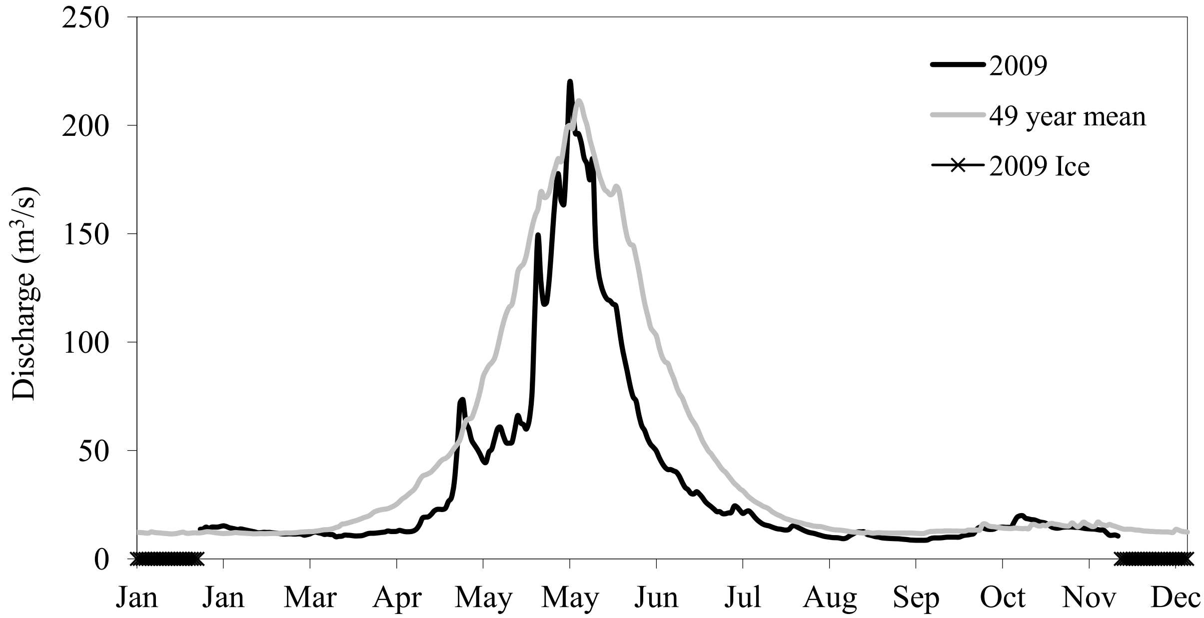

Figure 1. Methow River 2009 daily discharge and 49-year mean as measured at the USGS gauging station No. 12449950 (Methow River near Pateros, Washington).

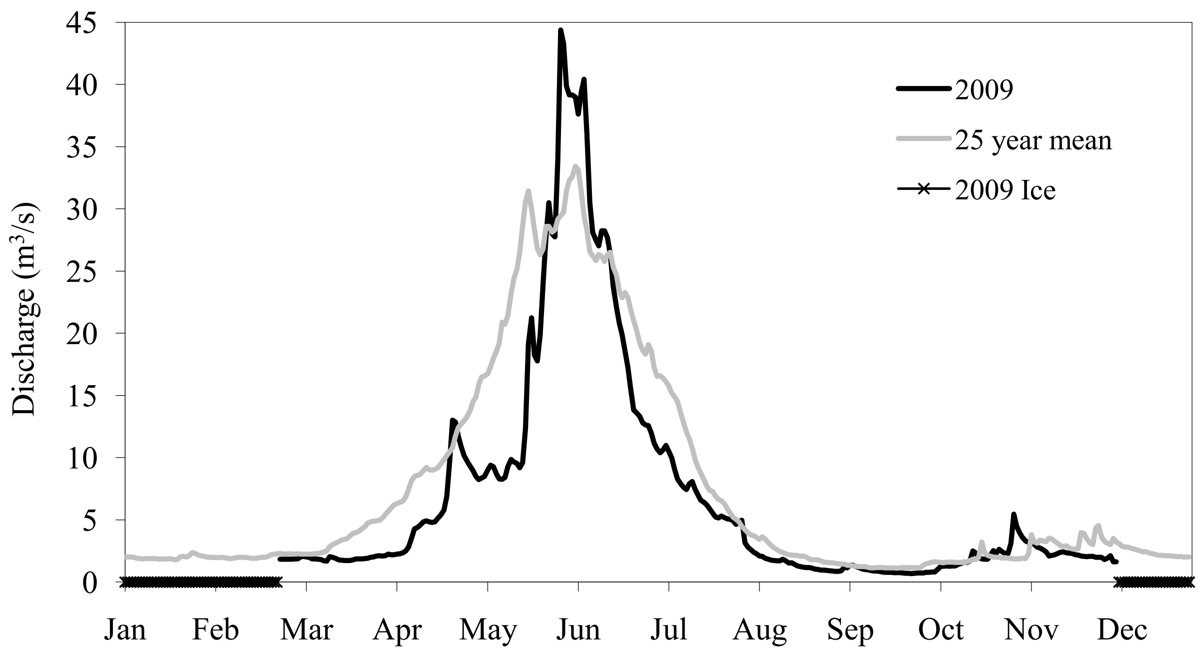

Figure 2. Twisp River 2009 daily discharge and 25-year mean as measured at the USGS gauging station No.12448998 (Twisp River near Twisp, Washington).

Daily Captures and Biological Sampling

Methow River Trap

2007 Brood Chinook salmon

A total of 113 wild yearling Chinook salmon emigrants were captured between 24 February and 30 June. Peak captures (N = 7) occurred on 14, 18, 19, 24 April (Figure 3). We implanted PIT tags into 109 wild smolts, all of which were released without mortality or tag shedding (Appendix B1). We also implanted PIT tags into 664 of the 3,316 hatchery Chinook salmon captured for survival comparison. Nineteen mortalities occurred, resulting in 645 fish released with PIT tags. Three additional hatchery Chinook mortalities occurred prior to tagging. Mortalities of hatchery Chinook salmon smolts totaled 0.66% (N = 22) of the hatchery smolts captured. Wild spring Chinook salmon smolts had a mean fork length (N; SD) of 99.5 mm (112; 9.0) and a mean weight (N; SD) of 11.2 g (112; 3.0). Hatchery smolts had a mean fork length (N; SD) of 130.0 mm (649; 12.9; Table 1), which was significantly greater than the mean fork length of wild Chinook smolts (Mann-Whitney U-test: P < 0.001).

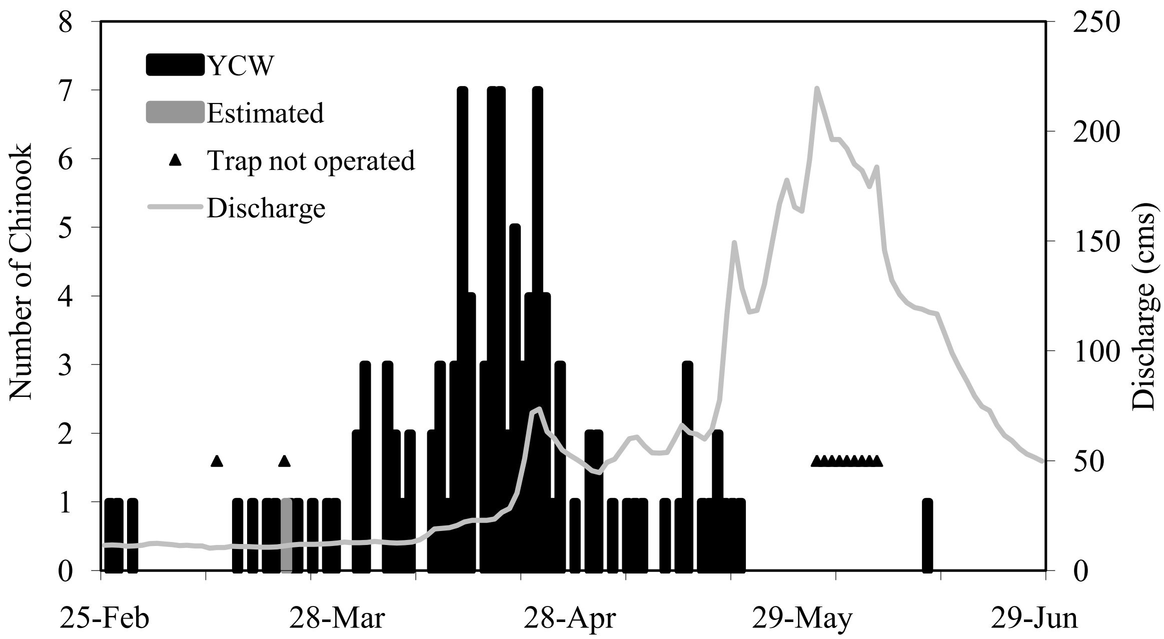

Figure 3. Daily capture of wild Chinook salmon smolts (YCW) at the Methow River smolt trap during 2009.

2008 Brood Chinook salmon

Subyearling Chinook salmon fry (N = 7,632) and parr (N = 1,225) captured at the Methow trap between 24 February and 14 September had mean fork lengths of 39.2 mm and 63.3 mm, respectively (Table 1). Mortality during this period totaled 22 fry (0.2%). An additional 68 emigrant Chinook salmon parr were captured during the fall trapping period between 15 October and 4 December. The mean fork length of Chinook salmon parr captured during this period was 84.4 mm (Table 1). Peak capture of Chinook salmon during the fall period occurred on 2 November (*N* = 8; Figure 4). We inserted PIT tags into 66 (Appendix B2) of the 68 Chinook salmon parr captured during the fall period, and no mortality occurred. Genetic analysis of tissue samples collected from Chinook salmon parr captured during fall trapping indicated that all were spring Chinook salmon (Appendix C). None of the fall samples were lost to bleach contamination.

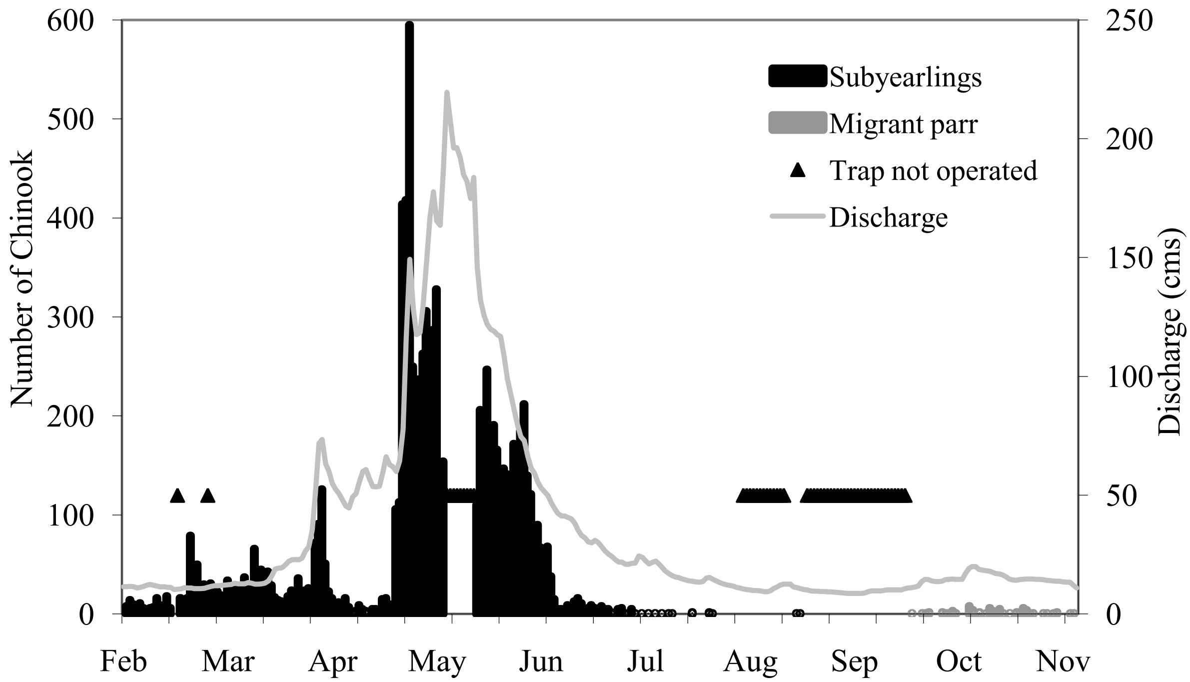

Figure 4. Daily capture of wild subyearling Chinook salmon parr at the Methow River smolt trap in 2009.

Table 1. Summary of length and weight sampling of Chinook salmon captured at the Methow River smolt trap in 2009.

Brood	Origin/stage	Fork length (mm)			Weight (g)			K-factor
		Mean	*N*	SD	Mean	*N*	SD	
2008	Wild fry	39.2	874	4.3	1.6	8	0.8	2.7
2008	Wild parr (Feb-Sep)	63.3	365	11.5	4.5	158	2.3	1.8
2008	Wild parr (Oct-Dec)	84.4	67	9.0	7.3	47	2.1	1.2
2007	Wild smolt	99.5	112	9.0	11.2	112	3.0	1.1
2007	Hatchery smolt	130.0	649	12.9	--	--	--	--

Summer Steelhead

We captured 403 wild summer steelhead emigrants (smolt and transitional) between 24 February and 29 June in the Methow River trap, with peak capture on 23 April ($N = 72$; Figure 5). We estimated an additional 20 steelhead would have been captured if the traps had operated during the entire period (Appendix A3). We PIT tagged 387 wild steelhead emigrants, and released 386 with PIT tags after shed tags ($N = 1$) were subtracted. We inadvertently inserted PIT tags into three of the 1,940 hatchery-origin steelhead captured at the trap because they were not identified as hatchery-origin fish until after the tags were implanted. Total PIT tagged fish released was 389. Most wild summer steelhead migrants were age-2 fish (80.3%) with a mean fork length (N; SD) of 160.5 mm (257; 15.7; Table 2). Hatchery summer steelhead had a mean fork length (N; SD) of 194.8 mm (47; 15.9) which was significantly greater than that of the overall population of wild fish captured (Mann-Whitney U-test: $P < 0.001$). However, sample sizes of hatchery fish were small because most hatchery fish were not bio-sampled. No mortality of wild steelhead emigrants occurred during 2009 at the Methow trap (Appendix B3).

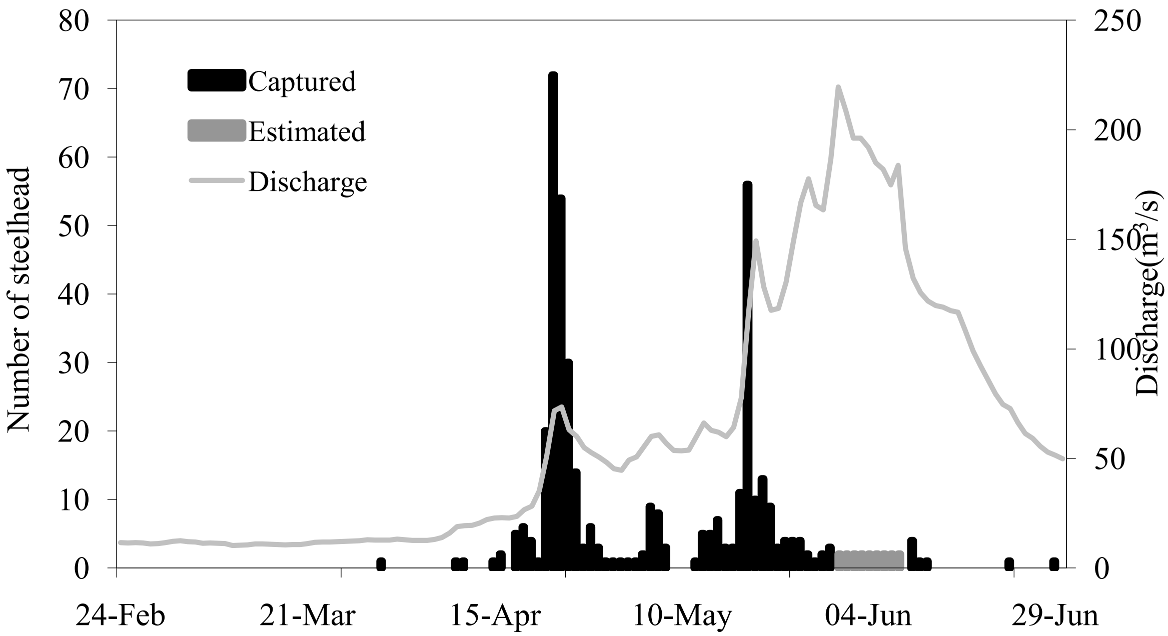

Figure 5. Daily capture of wild steelhead smolt and transitional migrants at the Methow River smolt trap in 2009. Trap not operated where numbers are estimated.

We captured 213 wild fry and 49 wild summer steelhead parr between 24 February and 4 December. These fish were not included in emigrant production estimates. Steelhead parr greater than 55 mm and in good physical condition were PIT tagged ($N = 39$) prior to release (Appendix B4). Wild steelhead parr had a mean fork length (N; SD) of 91.9 mm (49; 25.7) and mean weight of 12.4 g (43; 12.3). There was no mortality of steelhead fry or parr in 2009, and no steelhead parr shed tags prior to release.

Table 2. Mean length, weight and condition factor by age class of wild transitional and smolt summer steelhead emigrants captured at the Methow River trap in 2009.

Age	*N* (%)	Fork (mm)			Weight (g)			K-factor
		Mean	*N*	SD	Mean	*N*	SD	
1	13 (4.1)	144.1	13	12.8	31.9	13	8.2	1.1
2	257 (80.3)	160.5	257	15.7	42.6	257	13	1.0
3	39 (12.2)	178.9	39	16.7	57.8	39	16.6	1.0
4	11 (3.4)	175.1	11	15.6	54.3	11	12.3	1.0

Twisp River Trap

2007 Brood Spring Chinook salmon

The Twisp River trap captured 644 wild yearling spring Chinook salmon smolts between 11 March and 30 June. Peak captures occurred on 21 April ($N = 61$; Figure 6). We estimated 34 additional smolts would have been captured had the trap operated without interruption during the entire period (Appendix A4). We inserted PIT tags into 631 of the captured fish, and released 627 tagged smolts after subtracting one shed tag and three mortalities (Appendix B5). Wild spring Chinook salmon had a mean fork length (*N*; SD) of 94.3 mm (642; 8.7), and a mean condition factor of 1.1 (Table 3). We inserted PIT tags into 201 of the 6,162 hatchery spring Chinook salmon captured for use in mark/recapture trials. We released all 201 hatchery spring Chinook without mortality or shed tags. Hatchery spring Chinook salmon had a mean fork length (*N*; SD) of 134.1 mm (201; 10.6; Table 3), which was significantly greater than that of wild Chinook smolts (Mann-Whitney U-test: $P < 0.001$). Mortalities unrelated to tagging totaled 0.02% ($N = 1$) of all hatchery Chinook salmon captured at the Twisp River trap.

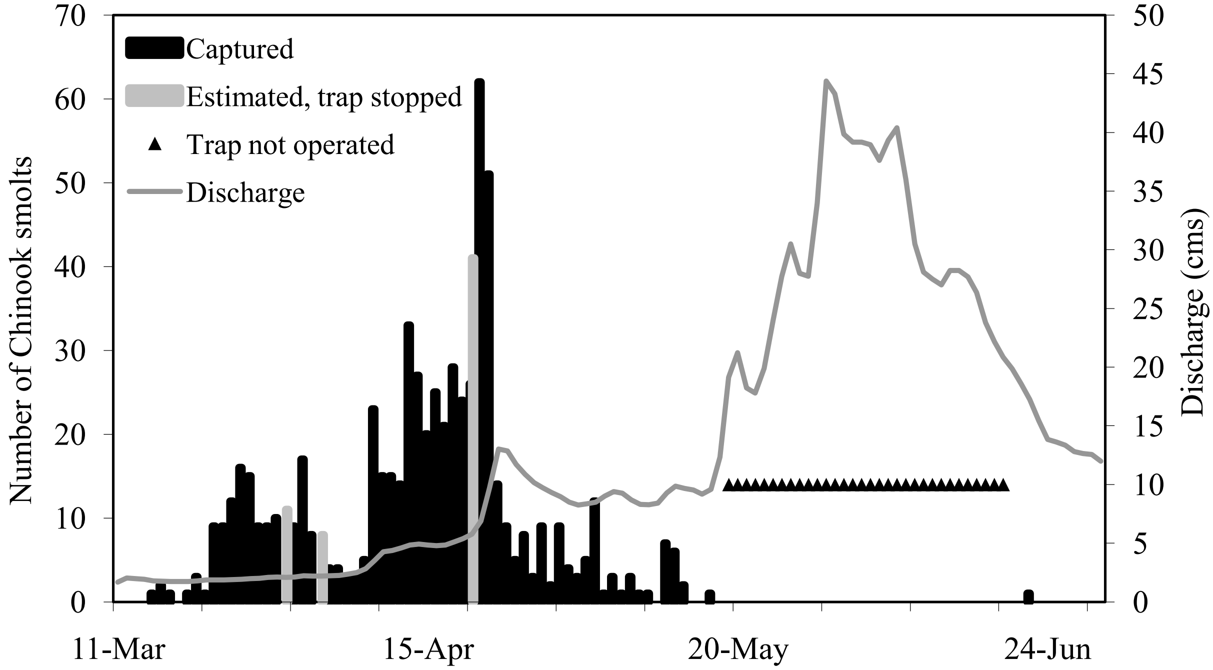

Figure 6. Daily capture of wild spring Chinook salmon smolts at the Twisp River smolt trap in 2009.

Table 3. Summary of length and weight sampling conducted on Chinook salmon captured at the Twisp River smolt trap in 2009.

Brood	Origin/stage	Fork length (mm)			Weight (g)			K-factor
		Mean	*N*	SD	Mean	*N*	SD	
2007	Wild smolt	94.3	642	8.7	9.4	640	2.3	1.1
2007	Hatchery smolt	134.1	201	10.6	--	--	--	--
2008	Wild fall parr	82.9	647	7.9	6.4	647	1.7	1.1

2008 Brood Spring Chinook salmon

We captured 1,014 subyearling spring Chinook salmon between 11 March and 21 August, of which seven (0.7 %) fish were recorded as mortalities. An additional 650 migrant parr were captured between 14 October and 2 December, four of which were recorded as a mortalities (0.6%). The smolt trap was not operated between 22 August and 13 October, because river discharge was too low to adequately rotate the trap cone. Peak capture of migrant spring Chinook salmon parr occurred 1 November (*N* = 169; Figure 7). We estimated 12 additional spring Chinook salmon parr would have been captured had the trap operated during the entire fall emigration period (Appendix A5). We implanted 111 PIT tags into subyearling parr between 29 June and 21 August, and implanted 635 tags into migrant parr between 14 October and 1 December, but only 741 were released with tags after 4 mortalities and one shed tag were subtracted (Appendix B6). Fall migrant parr had a mean fork length of 82.9 mm (see Table 3).

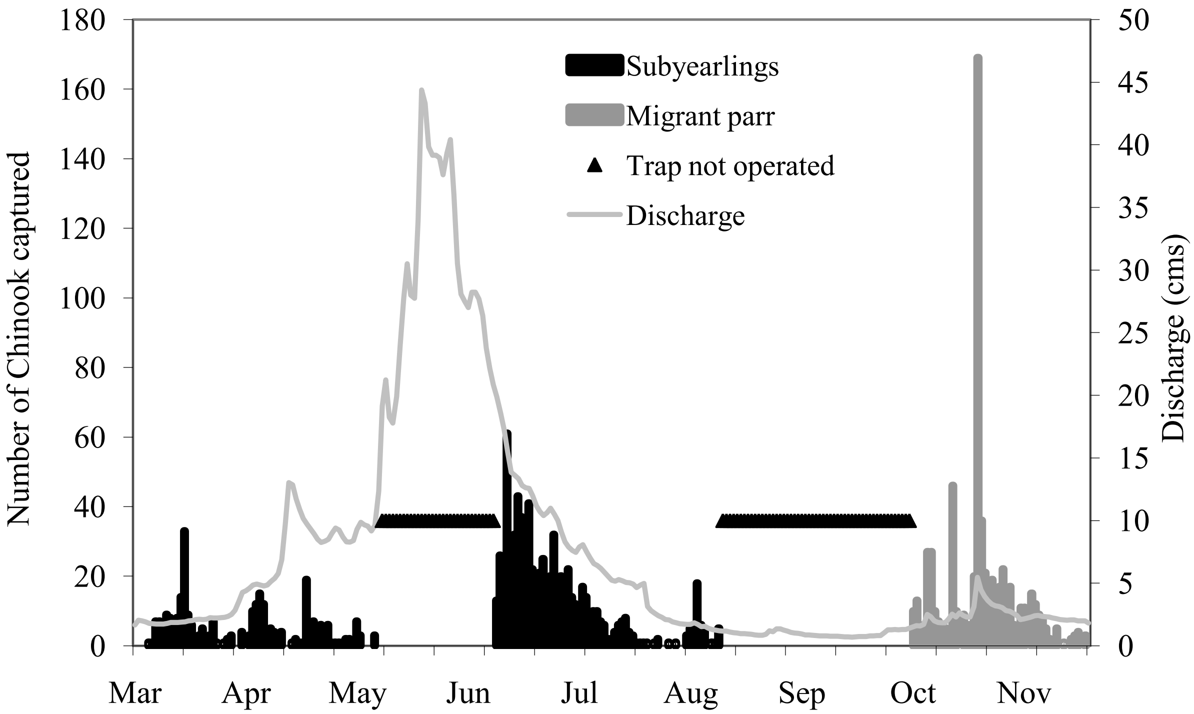

Figure 7. Daily capture of subyearling wild spring Chinook salmon (Mar – Aug) and migrant parr (Oct – Dec) at the Twisp River smolt trap in 2009.

Summer Steelhead

We captured 658 wild summer steelhead emigrants (smolt and transitional) between 11 March and 30 June. Peak capture occurred on 22 April (N = 143; Figure 8). We estimated an additional 162 steelhead would have been captured if the trap had operated without interruption (Appendix A6). Wild emigrants had a mean fork length (N; SD) of 162.4mm (658; 20.5). Most wild summer steelhead migrants were age-2 fish (80.9%; Table 4). Hatchery steelhead captured at the Twisp River trap had a mean fork length (N; SD) of 197.8 mm (417; 20.4) and were significantly larger than wild summer steelhead captured at the trap (Mann-Whitney U-test: $P < 0.05$). No mortality of wild summer steelhead migrants occurred in 2009 at the Twisp River trap. We inserted PIT tags into 644 wild steelhead emigrants, but released only 637 tagged fish after shed tags (N = 7) were subtracted (Appendix B7). We implanted PIT tags into 418 of 8,390 hatchery origin steelhead captured at the trap to conduct mark recapture trials. We released 414 hatchery steelhead after subtracting mortalities (N = 4). Hatchery summer steelhead mortalities were 0.1% (N = 11) of all hatchery summer steelhead captured in 2009.

Non-migrant summer steelhead captured at the trap included 65 wild fry and 260 wild parr captured between 11 March and 2 December (Figure 9). Steelhead parr greater than 55 mm and in good condition were PIT tagged prior to release (N = 231), and no shed tags or tagging-related mortalities occurred (Appendix B8). Wild summer steelhead parr had a mean fork length (N;

SD) of 86.2 mm (254; 26.0), and mean weight of 10.3 g (248; 14.6). Mortalities of wild summer steelhead fry and parr were 0.6 % (N = 2) of the fry and parr captured.

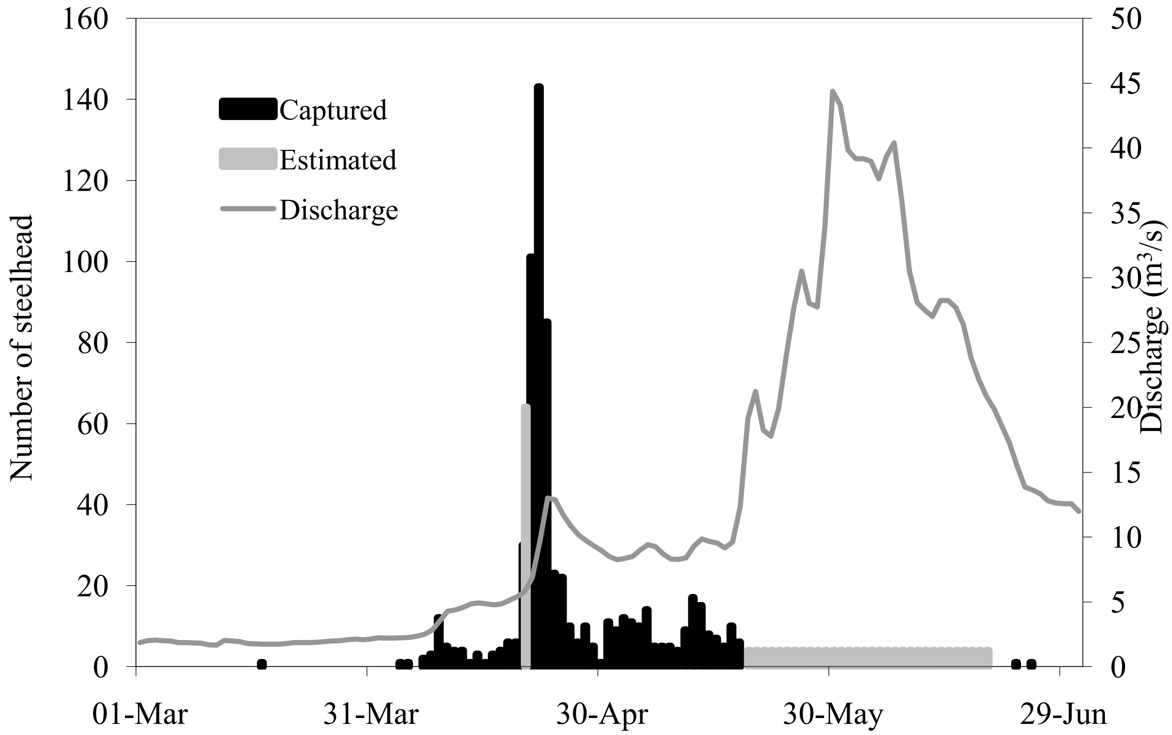

Figure 8. Daily capture of wild steelhead smolt and transitional migrants at the Twisp River smolt trap in 2009. Trap not operated where numbers are estimated.

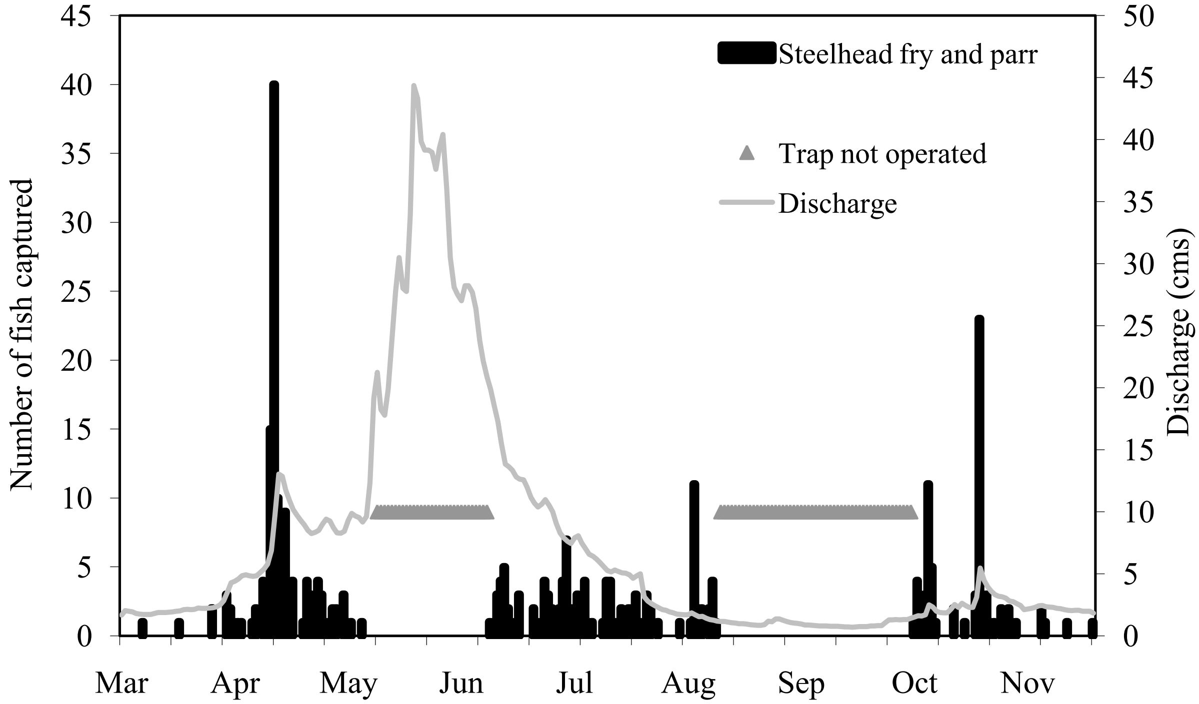

Figure 9. Daily capture of wild steelhead fry and parr at the Twisp River smolt trap in 2009.

Table 4. Mean length at migration age of wild transitional and smolt summer steelhead captured at the Twisp River trap in 2009.

Age	*N* (%)	Fork (mm)			Weight (g)			K-factor
		Mean	*N*	SD	Mean	*N*	SD	
1	3 (0.6)	166.3	3	36.5	44.1	3	21.7	1.0
2	431 (80.9)	157.2	431	17.5	38.5	431	13.9	1.0
3	94 (17.6)	175.6	94	17.3	52.4	94	14.9	1.0
4	5 (0.9)	162.6	5	10.4	42.7	5	9.7	1.0

Population Estimates

Methow River Basin

<u>*2007 Brood Chinook salmon*</u>

Mark/recapture efficiency trials for estimating wild spring Chinook salmon smolt production should be conducted with wild Chinook salmon. However, no mark/recapture efficiency trials were conducted with wild spring Chinook smolts because we captured too few wild fish within a given time period to provide the necessary sample size for an appropriate trial. We therefore used hatchery spring Chinook salmon and hatchery coho as surrogates for wild spring Chinook. Nevertheless, no significant regression model was developed for the low position using mark/recapture efficiency trials conducted with hatchery coho and spring Chinook (P = 0.25, r^2 =

0.14) in the spring of 2009, therefore the model from 2008 was used ($P = 0.018$, $r^2 = 0.56$). Including the 2009 hatchery coho and spring Chinook mark/recapture trials for the low position with the 2008 flow-capture efficiency model decreased the model significance, thus they were excluded. Because too few recaptures were obtained from mark/recapture trials in the upper position in 2009, we used the flow model from the 2007 trials. The linear-regression model for the upper position in the spring of 2007 was significant and explained an adequate portion of the variation in trap efficiency ($P = 0.047$, $r^2 = 0.58$; Table 5) to justify its use with the 2009 data. Using these flow-capture efficiency models, the estimated number of yearling spring Chinook salmon emigrants was 5,163 (± 4,317, 95% CI). When combined with the estimate of parr that emigrated in 2008 (4,083 ± 1,139, 95% CI), we estimated that 9,246 (± 5,456, 95% CI) 2007 brood wild spring Chinook salmon migrated from the Methow River basin between 8 October 2008 and 30 June 2009 (Snow et al. 2008).

Table 5. Mark and recapture efficiency trials used to estimate emigration of 2007 brood spring Chinook salmon (YCH = yearling Chinook salmon hatchery origin, YCW = yearling Chinook salmon wild origin, SBC = sub yearling Chinook salmon wild origin, and COH= yearling Coho salmon hatchery origin).

Species	Date	Position	Released	Recaptured	Efficiency (%)	Discharge (m^3/s)
SBC	18-Nov-08	Low	55	2	7.14	26.7
SBC	25-Nov-08	Low	19	0	0	21.2
SBC	03-Dec-08	Low	13	0	0	18.8
	Pooled		87	2	2.3	
YCW	20-Mar-08	Low	8	1	12.5	13.9
YCW	13-Apr-08	Low	47	2	4.26	18.7
YCW	17-Apr-08	Low	189	3	1.59	30.4
YCW	20-Apr-08	Low	90	3	3.33	32.3
YCW	25-Apr-08	Low	46	1	2.17	27.4
YCW	29-Apr-08	Low	70	1	1.43	40.2
	Flow model		450	11	2.44	
YCW, COH	06-Apr-07	Upper	109	3	2.75	71.9
YCH	12-Apr-07	Upper	448	9	2.01	119
YCH, YCW	14-Apr-07	Upper	224	3	1.34	105.8
YCH	18-Apr-07	Upper	361	10	2.77	95.1
YCH	20-Apr-07	Upper	305	8	2.62	89.9
COH	25-Apr-07	Upper	373	4	1.07	108.2
COH	30-Apr-07	Upper	600	3	0.5	123.0
	Flow model		2,420	40	1.65	

2008 Brood Chinook salmon

We could not obtain sufficient numbers of fish to conduct mark/recapture trials in the fall of 2009. Hence, pooled trap efficiency from 2008 was used to estimate the number of emigrant parr during the fall trapping period. Tissue samples were collected from 67 Chinook salmon parr to determine race composition (i.e., spring or summer) through DNA analysis (Appendix C). Based on the results of the DNA analysis, an estimated 41 parr captured in the fall were spring Chinook salmon. Twenty-six samples were not included because equipment failure at the lab destroyed the samples. Based on the DNA assignment results, we estimated 2,948 (± 535, 95% CI) spring Chinook salmon parr (Appendix A2) emigrated past the Methow River trap during fall 2009 trapping.

Table 6. Mark and recapture efficiency trials used to estimate emigration of 2007 brood Chinook salmon parr at the Methow River smolt trap in 2009 (SBC Parr = wild subyearling Chinook salmon).

Species	Date	Position	Released	Recaptured	Efficiency (%)	Discharge (m^3/s)
SBC Parr	18-Nov-08	Low	55	2	3.63	26.7
SBC Parr	25-Nov-08	Low	19	0	0	21.2
SBC Parr	03-Dec-08	Low	13	0	0	18.8
	Pooled		87	2	2.3	

Summer Steelhead

No mark/recapture trials were conducted in 2009 in the upper position. Hatchery summer steelhead (SHH) and wild yearling Chinook salmon were used as surrogate mark groups to estimate capture efficiency for wild steelhead in prior years. The lack of a significant regression model in the upper position from prior years ($P = 0.96$, $r^2 = 0.15$), and only one recapture from 2009 trials in the lower position required the use of yearling Chinook flow models from previous years for each position in 2009 estimates (Table 7). Combining estimates from all positions, we calculated that an estimated 31,301 (± 34,328, 95% CI) summer steelhead emigrated from the Methow River basin in 2009. Most migrants were age-2 fish from the 2007 brood (Table 8). Steelhead spawning ground surveys in 2005 identified 78 redds downstream of the Methow trap. Using the egg-to-emigrant ratio calculated for redds deposited upstream of the trap, we estimate an additional 745 migrant steelhead were produced from those redds downstream of the trap. Thus, the total 2005 brood migration was estimated to be 17,688 (± 2,725, 95% CI) fish.

Table 7. Mark and recapture efficiency trials used to estimate emigration of wild summer steelhead at the Methow River smolt trap in 2009.

Species	Date	Position	Released	Recaptured	Efficiency (%)	Discharge (m^3/s)
YCW	20-Mar-08	Low	8	1	12.5	13.9
YCW	13-Apr-08	Low	47	2	4.26	18.7
YCW	17-Apr-08	Low	189	3	1.59	30.4
YCW	20-Apr-08	Low	90	3	3.33	32.3
YCW	25-Apr-08	Low	46	1	2.17	27.4
YCW	29-Apr-08	Low	70	1	1.43	40.2
	Flow model		450	11	2.44	
YCW, COH	06-Apr-07	Upper	109	3	2.75	71.9
YCH	12-Apr-07	Upper	448	9	2.01	119
YCH, YCW	14-Apr-07	Upper	224	3	1.34	105.8
YCH	18-Apr-07	Upper	361	10	2.77	95.1
YCH	20-Apr-07	Upper	305	8	2.62	89.9
COH	25-Apr-07	Upper	373	4	1.07	108.2
COH	30-Apr-07	Upper	600	3	0.5	123
	Flow model		2,420	40	1.65	

Table 8. Estimated number of steelhead emigrants from the Methow River basin in 2009 by age and brood.

Age	Brood	Percent of emigrants	Number
1	2008	4.1	1,283
2	2007	80.3	25,135
3	2006	12.2	3,819
4	2005	3.4	1,064
Total		100.0	31,301

Twisp River

2007 Brood Spring Chinook salmon

Capture efficiency in the low position of wild spring Chinook salmon smolts was significantly related to discharge (P = 0.0002, r^2 = 0.93) at the Twisp River trapping site in 2009 (Table 9). Using a flow model regression derived from 2009 efficiency trials, we estimated that 5,547 (± 491, 95% CI) smolts emigrated from the Twisp River between 11 March and 30 June 2009. No redds were identified downstream of the Twisp trap in 2007, so estimating production downstream of the trap site was unnecessary. Snow et al. (2009) estimated that 4,168 (± 666, 95% CI) 2007 brood spring Chinook salmon parr emigrated from the Twisp River between 1 July and 11 December 2008. Thus the total emigration estimate for this brood is 9,715 (± 1,157, 95% CI).

Table 9. Mark/recapture efficiency trials used to estimate the 2009 emigration of wild spring Chinook salmon smolts from the Twisp River (YCW = yearling Chinook salmon wild origin).

Species	Date	Position	Released	Recaptured	Efficiency (%)	Discharge (m^3/s)
YCW	26-Mar-09	Low	61	11	18.0	2.0
YCW	13-Apr-09	Low	75	9	12.0	4.9
YCW	16-Apr-09	Low	72	9	12.5	4.9
YCW	22-Apr-09	Low	134	10	7.5	13.0
YCW	22-Apr-09	Low	200	13	6.5	13.0
	Flow model		542	52		

2008 Brood Spring Chinook salmon

Trap efficiency in the low position for 2008 brood spring Chinook salmon parr was significantly related to discharge (P = 0.001, r^2 = 0.64). Because of this, we used a flow model regression (Table 10) to estimate that 7,139 (± 1,482, 95% CI) 2008 brood spring Chinook salmon parr emigrated from the Twisp River between 1 July and 2 December 2009. Stream surveyors located no spring Chinook salmon redds downstream of the Twisp smolt trap in 2008, so estimating production downstream of the trap was unnecessary.

Table 10. Mark and recapture efficiency trials used to estimate emigration of 2008 brood wild spring Chinook salmon parr at the Twisp River trap (SBC = subyearling Chinook salmon wild origin).

Species	Date	Position	Released	Recaptured	Efficiency (%)	Discharge (m^3/s)
SBC	14-Nov-06	Low	164	40	24.4	7.6
SBC	18-Nov-06	Low	56	8	14.3	6.3
SBC	21-Nov-06	Low	53	13	24.5	5.8
SBC	22-Oct-07	Low	45	2	4.4	1.5
SBC	31-Oct-07	Low	60	4	6.6	1.8
SBC	10-Nov-08	Low	52	4	7.7	2.3
SBC	17-Nov-08	Low	222	44	19.8	5.5
SBC	25-Nov-08	Low	69	13	18.8	3.7
SBC	02-Nov-09	Low	221	31	14.0	4.0
SBC	05-Nov-09	Low	53	6	11.3	3.2
SBC	08-Nov-09	Low	53	10	18.9	2.8
	Flow model		1,048	175		

<u>*Summer Steelhead*</u>

A significant relationship did not exist between discharge and trap efficiency for summer steelhead at the Twisp River trap site in 2009 (P = 0.032, r^2 = 0.28). We therefore used a pooled efficiency from five mark groups to estimate the 2009 migration of summer steelhead (Table 11). We estimated that 12,629 (± 812, 95% CI) wild summer steelhead migrated from the Twisp River basin between 11 March and 30 June 2009. Most migrants were age-2 fish from the 2007 brood (Table 12). Steelhead spawning ground surveys in 2005 identified 20 redds downstream of the Twisp trap. Using the egg-to-emigrant ratio calculated for redds deposited upstream of the trap, we estimate an additional 220 migrant steelhead were produced from those redds downstream of the trap, thus, the total 2005 brood migration is estimated to be 5,413 (± 214, 95% CI) fish.

Table 11. Mark/recapture efficiency trials used to estimate emigration of wild summer steelhead migrants from the Twisp River (SHR = natural origin steelhead).

Species	Date	Position	Released	Recaptured	Efficiency (%)	Discharge (m^3/s)
SHR	13-Apr-09	Low	13	1	7.7	4.9
SHR	16-Apr-09	Low	6	0	0	4.9
SHR	19-Apr-09	Low	15	1	6.7	5.8
SHR	22-Apr-09	Low	267	15	5.6	13.0
SHR	25-Apr-09	Low	129	11	8.5	10.9
	Pooled		430	28	6.5	

Table 12. Estimated number of steelhead emigrants from the Twisp River in 2009 by age and brood.

Age	Brood	% of total emigrants	Number
1	2008	0.6	76
2	2007	80.9	10,217
3	2006	17.6	2,223
4	2005	0.9	113
Total		100.0	12,629

Smolts Per Redd

2007 Brood Spring Chinook salmon

The number of emigrants per redd for the 2007 brood spring Chinook salmon in the Twisp River was greater than the value for the entire Methow Basin (Table 13). When Twisp River production was excluded from the estimate of Methow Basin production, we estimated that 10 times more emigrants were produced per redd in the Twisp River than were produced in the rest of the Methow River basin for the 2007 brood. However, Twisp production estimates began with parr migrating in July, while Methow productions estimates did not begin until October. This likely imparts a small survival advantage to Twisp fish because mortality experienced by parr between July and October is reflected in the Methow estimate, but not the Twisp estimate. Age-1 smolts accounted for 57.1% of all 2007 brood emigrants from the Twisp River, and 54.8% of all emigrants from the rest of the Methow River basin (Table 13).

Table 13. Estimated emigrant-per-redd and egg-to-emigrant survival for Methow Basin spring Chinook salmon. Methow Basin and Twisp River estimates are for redds deposited upstream of the respective trap sites, and do not include redds that dewatered. Age-0 emigrants from the Methow Basin were calculated by incorporating results from DNA analysis of individual broods (2005-2007), or were estimated based on samples collected from the 2005 brood (2003). DNOT = Did not operate trap.

Basin	Brood	Redds	Estimated eggs	Number of emigrants			Egg to emigrant (%)	Emigrant per redd
				Age-0	Age-1	Total		
Twisp	2008	79	268,711	7,139	--	--	--	--
Twisp	2007	30	128,182	4,168	5,547	9,715	7.6	324
Twisp	2006	84	288,372	5,645	15,660	21,305	7.4	254
Twisp	2005	54	233,874	6,974	3,532	10,506	4.5	195
Twisp	2004	135	496,530	1,323	5,092	6,415	1.3	48
Twisp	2003	18	81,558	DNOT	723	723	0.9	40
Methow	2008	373	1,365,130	2,948	--	--	--	--
Methow	2007	293	1,182,195	4,083	5,163	9,246	0.8	32
Methow	2006	922	3,362,156	2,913	28,857	31,770	0.9	34
Methow	2005	566	2,069,906	17,490	33,710	51,200	2.5	91
Methow	2004	543	1,933,506	DNOT	15,869	15,869	0.8	29
Methow	2003	462	2,167,026	8,170	15,306	23,476	1.1	51
Methow	2002	1,105	4,235,465	DNOT	26,044	26,044	0.6	24

Summer Steelhead

Juvenile steelhead may emigrate as age-4 fish; therefore, the 2003 brood was the first brood for which a complete emigration estimate was calculated. We estimated that 89 age-4 steelhead emigrated in 2009, resulting in a complete 2005 brood emigration of 16,737 (± 1,690, 95% CI; Table 14) fish. The 2005 brood produced 10 emigrants from each redd in the Methow River basin (including Twisp River) and 11 emigrants from each redd in the Twisp River basin. Excluding Twisp River production, Methow Basin steelhead produced an estimated 9 emigrants per redd for 2005 brood steelhead.

Table 14. Estimated emigrant-per-redd and egg-to-emigrant survival of Methow Basin steelhead. Emigrant-per-redd values were not calculated for incomplete brood years. Number of emigrants at age did not incorporate production downstream of each trap site except for the Methow 2003 brood. DNOT = Did not operate trap.

Basin	Brood	Number of redds	Estimated number of eggs	Number of emigrants					Egg to emigrant (%)	Emigrant per redd
				Age-1	Age-2	Age-3	Age-4	Total		
Twisp	2008	182	1,078,350	76	--	--	--	76	0.007	--
Twisp	2007	82	418,774	42	10,217	--	--	10,259	2.44	--
Twisp	2006	384	2,452,992	81	4,712	2,223	--	7,016	0.29	--
Twisp	2005	452	2,806,016	292	2,686	2,102	113	5,193	0.19	11
Twisp	2004	254	1,166,876	79	3,192	500	198	3,969	0.34	16
Twisp	2003	606	3,849,312	DNOT	1,787	1,357	58	3,202	0.08	5
Methow	2008	867	5,136,975	1,238	--	--	--	1,238	0.24	--
Methow	2007	740	3,779,180	3,194	25,135	--	--	28,329	0.75	--
Methow	2006	785	5,013,795	639	6,313	3,819	--	10,771	0.21	--
Methow	2005	1,685	10,460,480	2,030	12,775	868	1,064	16,737	0.16	10
Methow	2004	947	4,350,518	1,883	9,082	1,277	343	12,585	0.29	13
Methow	2003	2,019	12,824,688	1,596	4,872	2,459	106	9,033	0.07	4

Incidental Species

Pacific lamprey were the most abundant incidental species captured at the Methow River trap, while longnose dace were the most abundant incidental species captured at the Twisp River trap (Table 15). We captured 16 wild coho smolts from the 2007 brood in 2009. Utilizing the same mark/recapture efficiency trial data used at the Methow River site for spring Chinook salmon, we estimate that 1,144 (± 2,476, 95% CI) wild coho from the 2007 brood emigrated from the Methow River in 2009. Some species (e.g., Pacific lamprey) were abundant at the Methow River trap, but were not encountered in the Twisp River.

Table 15. Biological sampling conducted on selected incidental species captured at Methow River basin smolt traps in 2009.

Species	Captured	Fork length (mm)			Weight (g)		
		Mean	*N*	SD	Mean	*N*	SD
Methow River trap							
Pacific lamprey (*Lampetra tridentata*)	4,463	130.2	122	12.3	3.7	107	1.3
Hatchery coho (*O. kisutch*)	3,161	134.3	94	12.3	28.6	22	7.7
Longnose dace (*Rhinichthys cataractae*)	584	48.8	213	33	11.3	67	6.9
Sculpin (*Cottus spp.*)	111	43.6	48	21	8.2	9.6	9
Redside shiner (*Richardsonius balteatus*)	105	30.9	37	18	- -	- -	- -
Sucker (*Catostomus spp.*)	69	47	11	55.2	- -	- -	- -
Wild coho fry (*O. kisutch*)	53	37.1	24	4.7	- -	- -	- -
Bridge lip sucker (*Catostomus columbianus*)	43	64.3	20	26.7	7.6	12	5.6
Whitefish (*Prosopium williamsoni*)	40	48.7	24	30.7	8.1	6	5.2
Wild coho parr (*O. kisutch*)	26	58.2	18	5.5	4.2	8	1.7
Wild coho smolt (*O. kisutch*)	16	94.4	14	18.2	12.1	11	5.3
Sockeye fry (*O. nerka*)	14	24.6	11	1.4	- -	- -	- -
Brown bullhead (*Ictalurus nebulosus*)	8	171	1	- -	68.1	1	- -
Bull trout (*Salvelinus confluentus*)	6	158.8	6	20.2	39.3	6	13.7
Cutthroat trout (*O. clarki*)	3	96	3	38.6	17.6	2	17.1
Twisp River trap							
Longnose dace (*Rhinichthys cataractae*)	1,746	96.1	488	13.6	12.3	485	6.9
Sculpin (*Cottus spp.*)	109	50.8	88	28.8	10.7	35	11.7
Whitefish (*Prosopium williamsoni*)	33	42	28	13	2	8	0.6
Bull trout (*Salvelinus confluentus*)	21	161	21	25.2	44.4	21	25.3
Bridge lip sucker (*Catostomus columbianus*)	20	118.4	17	90.9	67.6	17	163
Cutthroat trout (*O. clarki*)	10	191.8	9	29.3	80.9	9	37.8
Sucker (*Catostomus spp.*)	3	71	1	- -	4.6	1	- -
Brown bullhead (*Ictalurus nebulosus*)	2	156	2	1.4	55.6	2	2.7
Hatchery coho (*O. kisutch*)	2	116.5	2	2.1	18.6	2	0.9
Wild coho smolt (*O. kisutch*)	1	114	1	- -	17.3	1	- -

Discussion

High river discharge and low juvenile abundance limited smolt trap operation and the ability to conduct trap efficiency trials over a broad range of river conditions in 2009. As a result, inadequate trap efficiency-to-discharge regression models forced the use of pooled trap efficiencies in some cases. Despite moderate observed trap efficiencies for salmon and steelhead (range 2-9%), the relatively low abundance of wild yearling Chinook salmon and steelhead severely limited the number and sample size of trials that could be conducted using wild fish. Although a common alternative, the use of hatchery fish as surrogates should also be carefully examined because of potential behavioral and size differences between wild and hatchery fish. At emigration, hatchery fish are typically greater in size than their wild conspecifics and size-related biases related to trap efficiency might preclude the use of some hatchery fish. Because we have been unable to conduct multiple paired mark/recapture trials with hatchery and wild fish, we cannot test whether capture efficiency at specific discharges for hatchery fish is similar to that of wild fish. Availability of hatchery fish has also been an issue at higher discharges. We were unable to operate the 2.4 m and the 1.5 m traps in the upper position in the Methow River until mid-May in 2009 because of low river discharge. This affected our ability to conduct mark/recapture trials with hatchery or wild fish in this position because emigration was mostly completed by that time.

Developing life-stage survival estimates and models for threatened or endangered salmonids is challenging due to their relatively low abundance, complex life history, and the desire to avoid negative impacts to the species on which research is focused. Establishing the relationship between trap efficiency and discharge may be accomplished in a single year provided abundance of the target species is adequate with an appropriate range of flow conditions. However, multiple years of data are required to calculate an estimate of egg-to-emigrant survival for a single brood year (e.g., steelhead). Trap locations in the Methow and Twisp rivers appear appropriate for the target species and expected environmental conditions. Observed trap efficiencies are within the acceptable level of the ESA permit conditions (i.e., < 20%). A retrospective analysis of data from previous years should provide more robust smolt-production estimates once trap efficiency models have been established.

In subbasins with spring and summer Chinook salmon populations, smolt traps are intentionally located far downstream of spawning areas for spring Chinook salmon to minimize encounters with subyearling spring Chinook salmon emigrating from spawning tributaries. Hence, all yearling Chinook salmon captured were assumed to be spring Chinook salmon and subyearling Chinook salmon were assumed to be summer Chinook salmon. Based on this assumption, subyearling spring Chinook salmon migrating past the Methow smolt trap may be misclassified as summer Chinook salmon. Conversely, summer Chinook salmon may be misclassified if the yearling life history is more prevalent than adult scale samples suggest or subyearling summer Chinook salmon are misclassified as yearling spring Chinook salmon. Ongoing studies (e.g., DNA analysis) should determine to what extent spring Chinook salmon migrate as subyearling fish and summer Chinook salmon as yearlings. Tissue samples collected during the spring of 2008 from yearling Chinook salmon at the Methow trap indicated that few yearling fish were summer Chinook salmon. Tissue samples were also taken from yearlings in the spring of 2009 but they were destroyed when equipment at the genetics lab malfunctioned during the analysis process. We therefore assumed that the majority of yearling migrants in 2009 were spring Chinook. We remove any fish identified as summer Chinook from our data set to represent only spring Chinook in the production estimates. Tissue samples collected from subyearling Chinook salmon at the Methow trap during the fall of 2009 indicated all of the fish sampled were spring Chinook salmon.

We used brood-specific fecundity values, excluded dewatered redds, and included the estimated production from redds downstream from each trap site to calculate egg-to-emigrant and emigrant-per-redd estimates in 2009. The low freshwater production of yearling Chinook salmon and steelhead may suggest severe density dependent mortality, low reproductive success, or another limiting factor contributing to the observed survival rates. Egg deposition estimates for spring Chinook salmon were based on total ground counts of redds throughout the basin. Error associated with spring Chinook salmon redd counts are likely small (i.e., low water levels, high water clarity, large redds). Conversely, steelhead egg deposition estimates may underestimate actual deposition because of environmental factors affecting surveys (i.e., high water discharge, poor water clarity), potentially reducing already low productivity estimates.

Preliminary comparisons between the Twisp and Methow/Chewuch rivers suggest the Twisp River spring Chinook salmon are more productive than the Methow/Chewuch population, but some of the apparent productivity difference is attributable to the disparity in precision between production estimates from the two trapping sites. The production estimate for yearling spring Chinook in the Twisp River; 5,547 (± 491, 95% CI) was greater than the estimate for the entire Methow Basin 5,163 (± 4,137, 95% CI). This disparity can be explained in part by differences in the strength of the correlation relationships of the flow models (Twisp r^2 = 0.93, Methow upper position r^2 =0.58 and low position r^2 =0.56). Differences in trap efficiencies also help explain differences in precision of the estimates. Because Methow trap efficiencies are much lower than at the Twisp trap, fewer fish are available to conduct mark/recapture trials to develop more robust trap efficiency models. Trap efficiency models at the Methow River trapping site should improve over time as mark/recapture trials with target species and life stages are conducted.

Summer steelhead productivity may be similar in both the Twisp and Methow/Chewuch, based solely on estimates of smolt production. Causation of differences in productivity between populations and the overall low level of juvenile production is unknown. Estimating the proportion of hatchery fish that contribute to the spawning population in each subbasin may also provide important insight in determining why productivity is relatively low. Additional research is necessary to better understand the reproductive success and carrying capacity of spring Chinook salmon and steelhead in the Methow Basin. In 2010 a multi-year study of steelhead reproductive success was initiated on the Twisp River. This study should provide insight into the role of reproductive success as it pertains to hatchery and wild fish. The study may also provide insight into carrying capacity in the Twisp River.

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Appendix A1. Daily capture of wild spring Chinook smolts emigrating from the Methow River, 24 February through 30 June 2009. Estimated number of Chinook captured when the trap was not operating (bold) was calculated from the average captures two days preceding and after the break in operation. Estimated trap efficiency is a rounded value.

Date	Captured	Estimated trap efficiency	Daily emigration estimate	Date	Captured	Estimated trap efficiency	Daily emigration estimate
02/24/09	0	0.0384	0	03/30/09	0	0.0384	0
02/25/09	0	0.0384	0	03/31/09	2	0.0384	52
02/26/09	1	0.0384	26	04/01/09	3	0.0384	78
02/27/09	1	0.0384	26	04/02/09	0	0.0384	0
02/28/09	0	0.0384	0	04/03/09	0	0.0384	0
03/01/09	1	0.0384	26	04/04/09	3	0.0384	78
03/02/09	0	0.0384	0	04/05/09	2	0.0384	52
03/03/09	0	0.0384	0	04/06/09	1	0.0384	26
03/04/09	0	0.0384	0	04/07/09	2	0.0384	52
03/05/09	0	0.0384	0	04/08/09	0	0.0384	0
03/06/09	0	0.0384	0	04/09/09	0	0.0384	0
03/07/09	0	0.0384	0	04/10/09	2	0.0382	52
03/08/09	0	0.0384	0	04/11/09	3	0.0376	80
03/09/09	0	0.0384	0	04/12/09	1	0.0374	27
03/10/09	0	0.0384	0	04/13/09	3	0.0359	83
03/11/09	**0**	**0.0384**	**0**	04/14/09	7	0.0339	207
03/12/09	**0**	**0.0384**	**0**	04/15/09	4	0.0329	122
03/13/09	0	0.0384	0	04/16/09	0	0.0328	0
03/14/09	0	0.0384	0	04/17/09	3	0.0329	91
03/15/09	1	0.0384	26	04/18/09	7	0.0321	218
03/16/09	0	0.0384	0	04/19/09	7	0.0283	247
03/17/09	1	0.0384	26	04/20/09	2	0.0264	76
03/18/09	0	0.0384	0	04/21/09	5	0.0188	266
03/19/09	1	0.0384	26	04/22/09	3	0.0143	209
03/20/09	1	0.0384	26	04/23/09	4	0.0143	279
03/21/09	**1**	**0.0384**	**26**	04/24/09	7	0.0143	488
03/22/09	1	0.0384	26	04/25/09	4	0.0143	279
03/23/09	1	0.0384	26	04/26/09	1	0.0143	70
03/24/09	0	0.0384	0	04/27/09	3	0.0143	209
03/25/09	1	0.0384	26	04/28/09	0	0.0143	0
03/26/09	0	0.0384	0	04/29/09	1	0.0143	70
03/27/09	1	0.0384	26	04/30/09	0	0.0143	0
03/28/09	1	0.0384	26	05/01/09	2	0.0143	139
03/29/09	0	0.0384	0	05/02/09	2	0.0143	139

Appendix A1, continued.

Date	Captured	Estimated trap efficiency	Daily emigration estimate	Date	Captured	Estimated trap efficiency	Daily emigration estimate
05/03/09	0	0.0143	0	**06/02/09**	**0**	**0.0098**	**0**
05/04/09	1	0.0143	70	**06/03/09**	**0**	**0.0098**	**0**
05/05/09	0	0.0143	0	**06/04/09**	**0**	**0.0098**	**0**
05/06/09	1	0.0143	70	**06/05/09**	**0**	**0.0098**	**0**
05/07/09	1	0.0143	70	**06/06/09**	**0**	**0.0098**	**0**
05/08/09	1	0.0143	70	**06/07/09**	**0**	**0.0098**	**0**
05/09/09	0	0.0143	0	**06/08/09**	**0**	**0.0098**	**0**
05/10/09	0	0.0143	0	06/09/09	0	0.0098	0
05/11/09	1	0.0143	70	06/10/09	0	0.0098	0
05/12/09	0	0.0143	0	06/11/09	0	0.0098	0
05/13/09	1	0.0143	70	06/12/09	0	0.0101	0
05/14/09	3	0.0143	209	06/13/09	0	0.0108	0
05/15/09	0	0.0143	0	06/14/09	0	0.0110	0
05/16/09	1	0.0322	31	06/15/09	1	0.0116	87
05/17/09	1	0.0322	31	06/16/09	0	0.0118	0
05/18/09	2	0.0291	69	06/17/09	0	0.0149	0
05/19/09	1	0.0118	85	06/18/09	0	0.0187	0
05/20/09	1	0.0098	102	06/19/09	0	0.0217	0
05/21/09	1	0.0098	102	06/20/09	0	0.0247	0
05/22/09	0	0.0115	0	06/21/09	0	0.0281	0
05/23/09	0	0.0113	0	06/22/09	0	0.0307	0
05/24/09	0	0.0098	0	06/23/09	0	0.0317	0
05/25/09	0	0.0098	0	06/24/09	0	0.0322	0
05/26/09	0	0.0098	0	06/25/09	0	0.0322	0
05/27/09	0	0.0098	0	06/26/09	0	0.0322	0
05/28/09	0	0.0098	0	06/27/09	0	0.0322	0
05/29/09	0	0.0098	0	06/28/09	0	0.0322	0
05/30/09	0	0.0098	0	06/29/09	0	0.0322	0
05/31/09	**0**	**0.0098**	**0**	06/30/09	0	0.0322	0
06/01/09	**0**	**0.0098**	**0**				

Appendix A2. Daily capture of wild spring Chinook parr emigrating from the Methow River, 16 October through 4 December 2009. Estimated number of Chinook captured when the trap was not operating (bold) were calculated from the average captures two days preceding and after the break in operation. Race of captured Chinook was determined through DNA analysis.

Date	Captured	Estimated trap efficiency	Daily emigration estimate	Date	Captured	Estimated trap efficiency	Daily emigration estimate
10/16/2009	1	0.023	43	11/17/2009	2	0.023	87
10/17/2009	0	0.023	0	11/18/2009	6	0.023	261
10/18/2009	0	0.023	0	11/19/2009	4	0.023	174
10/19/2009	1	0.023	43	11/20/2009	1	0.023	43
10/20/2009	1	0.023	43	11/21/2009	1	0.023	43
10/21/2009	2	0.023	87	11/22/2009	0	0.023	0
10/22/2009	0	0.023	0	11/23/2009	0	0.023	0
10/23/2009	0	0.023	0	11/24/2009	1	0.023	43
10/24/2009	0	0.023	0	11/25/2009	1	0.023	43
10/25/2009	2	0.023	87	11/26/2009	0	0.023	0
10/26/2009	1	0.023	43	11/27/2009	1	0.023	43
10/27/2009	1	0.023	43	11/28/2009	2	0.023	87
10/28/2009	3	0.023	130	11/29/2009	0	0.023	0
10/29/2009	1	0.023	43	11/30/2009	0	0.023	0
10/30/2009	0	0.023	0	12/01/2009	0	0.023	0
10/31/2009	0	0.023	0	12/02/2009	1	0.023	43
11/01/2009	0	0.023	0	12/03/2009	1	0.023	43
11/02/2009	8	0.023	348	12/04/2009	0	0.023	0
11/03/2009	4	0.023	174				
11/04/2009	0	0.023	0				
11/05/2009	2	0.023	87				
11/06/2009	0	0.023	0				
11/07/2009	1	0.023	43				
11/08/2009	6	0.023	261				
11/09/2009	3	0.023	130				
11/10/2009	1	0.023	43				
11/11/2009	5	0.023	217				
11/12/2009	1	0.023	43				
11/13/2009	0	0.023	0				
11/14/2009	1	0.023	43				
11/15/2009	0	0.023	0				
11/16/2009	2	0.023	87				

Appendix A3. Daily capture of wild steelhead smolt and transitional fish emigrating from the Methow River, 24 February to 30 June 2009. Estimated number of steelhead captured when the trap was not operating (bold) was calculated from the average captures two days preceding and after the break in operation. Estimated trap efficiency is a rounded value.

Date	Captured	Estimated trap efficiency	Daily emigration estimate	Date	Captured	Estimated trap efficiency	Daily emigration estimate
02/24/2009	0	0.03841	0	03/29/2009	0	0.03841	0
02/25/2009	0	0.03841	0	03/30/2009	0	0.03841	0
02/26/2009	0	0.03841	0	03/31/2009	1	0.03841	26
02/27/2009	0	0.03841	0	04/01/2009	0	0.03841	0
02/28/2009	0	0.03841	0	04/02/2009	0	0.03841	0
03/01/2009	0	0.03841	0	04/03/2009	0	0.03841	0
03/02/2009	0	0.03841	0	04/04/2009	0	0.03841	0
03/03/2009	0	0.03841	0	04/05/2009	0	0.03841	0
03/04/2009	0	0.03841	0	04/06/2009	0	0.03841	0
03/05/2009	0	0.03841	0	04/07/2009	0	0.03841	0
03/06/2009	0	0.03841	0	04/08/2009	0	0.03841	0
03/07/2009	0	0.03841	0	04/09/2009	0	0.03841	0
03/08/2009	0	0.03841	0	04/10/2009	1	0.03818	26
03/09/2009	0	0.03841	0	04/11/2009	1	0.03763	27
03/10/2009	0	0.03841	0	04/12/2009	0	0.03740	0
03/11/2009	**0**	**0.03841**	**0**	04/13/2009	0	0.03594	0
03/12/2009	**0**	**0.03841**	**0**	04/14/2009	0	0.03388	0
03/13/2009	0	0.03841	0	04/15/2009	1	0.03289	30
03/14/2009	0	0.03841	0	04/16/2009	2	0.03282	61
03/15/2009	0	0.03841	0	04/17/2009	0	0.03289	0
03/16/2009	0	0.03841	0	04/18/2009	5	0.03206	156
03/17/2009	0	0.03841	0	04/19/2009	6	0.02829	212
03/18/2009	0	0.03841	0	04/20/2009	4	0.02636	152
03/19/2009	0	0.03841	0	04/21/2009	1	0.01881	53
03/20/2009	0	0.03841	0	04/22/2009	20	0.01434	1394
03/21/2009	**0**	**0.03841**	**0**	04/23/2009	72	0.01434	5019
03/22/2009	0	0.03841	0	04/24/2009	54	0.01434	3764
03/23/2009	0	0.03841	0	04/25/2009	29	0.01434	2021
03/24/2009	0	0.03841	0	04/26/2009	14	0.01434	976
03/25/2009	0	0.03841	0	04/27/2009	3	0.01434	209
03/26/2009	0	0.03841	0	04/28/2009	6	0.01434	418
03/27/2009	0	0.03841	0	04/29/2009	3	0.01434	209
03/28/2009	0	0.03841	0	04/30/2009	1	0.01434	70

Appendix A3, continued.

Date	Captured	Estimated trap efficiency	Daily emigration estimate	Date	Captured	Estimated trap efficiency	Daily emigration estimate
05/01/2009	1	0.01434	70	**06/03/2009**	**2**	**0.00977**	**205**
05/02/2009	1	0.01434	70	**06/04/2009**	**2**	**0.00977**	**205**
05/03/2009	1	0.01434	70	**06/05/2009**	**2**	**0.00977**	**205**
05/04/2009	1	0.01434	70	**06/06/2009**	**2**	**0.00977**	**205**
05/05/2009	2	0.01434	139	**06/07/2009**	**2**	**0.00977**	**205**
05/06/2009	9	0.01434	627	**06/08/2009**	**2**	**0.00977**	**205**
05/07/2009	8	0.01434	558	**06/09/2009**	**2**	**0.00977**	**205**
05/08/2009	3	0.01434	209	06/10/2009	4	0.00977	409
05/09/2009	0	0.01434	0	06/11/2009	1	0.00977	102
05/10/2009	0	0.01434	0	06/12/2009	1	0.01011	99
05/11/2009	0	0.01434	0	06/13/2009	0	0.01079	0
05/12/2009	1	0.01434	70	06/14/2009	0	0.01104	0
05/13/2009	5	0.01434	349	06/15/2009	0	0.01156	0
05/14/2009	5	0.01434	349	06/16/2009	0	0.01182	0
05/15/2009	7	0.01434	488	06/17/2009	0	0.01493	0
05/16/2009	3	0.03222	93	06/18/2009	0	0.01873	0
05/17/2009	3	0.03222	93	06/19/2009	0	0.02174	0
05/18/2009	11	0.02912	378	06/20/2009	0	0.02471	0
05/19/2009	55	0.01177	4,672	06/21/2009	0	0.02808	0
05/20/2009	10	0.00977	1,024	06/22/2009	0	0.03069	0
05/21/2009	13	0.00977	1,331	06/23/2009	1	0.03172	32
05/22/2009	9	0.01151	782	06/24/2009	0	0.03223	0
05/23/2009	3	0.01125	267	06/25/2009	0	0.03223	0
05/24/2009	4	0.00977	409	06/26/2009	0	0.03223	0
05/25/2009	4	0.00977	409	06/27/2009	0	0.03223	0
05/26/2009	4	0.00977	409	06/28/2009	0	0.03223	0
05/27/2009	2	0.00977	205	06/29/2009	1	0.03223	31
05/28/2009	1	0.00977	102	06/30/2009	0	0.03223	0
05/29/2009	2	0.00977	205				
05/30/2009	3	0.00977	307				
05/31/2009	**2**	**0.00977**	**205**				
06/01/2009	**2**	**0.00977**	**205**				
06/02/2009	**2**	**0.00977**	**205**				

Appendix A4. Daily capture of wild spring Chinook smolts emigrating from the Twisp River, 11 March to 30 June 2009. Estimated number of Chinook captured when the trap was not operating (bold) was calculated from the average captures two days preceding and after the break in operation. Twenty-six smolt were captured on 4/20 but trap was stopped when checked so 41 were estimated.

Date	Captured	Estimated trap efficiency	Daily emigration estimate	Date	Captured	Estimated trap efficiency	Daily emigration estimate
03/11/09	0	0.1618	0	04/14/09	27	0.1334	202
03/12/09	0	0.1615	0	04/15/09	20	0.1342	149
03/13/09	0	0.1618	0	04/16/09	25	0.1347	186
03/14/09	0	0.1618	0	04/17/09	21	0.1342	156
03/15/09	1	0.1618	6	04/18/09	28	0.1316	213
03/16/09	2	0.1618	12	04/19/09	24	0.1292	186
03/17/09	1	0.1618	6	**04/20/09**	**41**	**0.1256**	**326**
03/18/09	0	0.1618	0	04/21/09	61	0.1157	527
03/19/09	1	0.1618	6	04/22/09	51	0.0920	554
03/20/09	3	0.1618	19	04/23/09	14	0.0674	208
03/21/09	1	0.1618	6	04/24/09	9	0.0686	131
03/22/09	9	0.1618	56	04/25/09	5	0.0767	65
03/23/09	9	0.1618	56	04/26/09	8	0.0830	96
03/24/09	12	0.1618	74	04/27/09	3	0.0884	34
03/25/09	16	0.1618	99	04/28/09	9	0.0920	98
03/26/09	15	0.1618	93	04/29/09	2	0.0952	21
03/27/09	9	0.1618	56	04/30/09	9	0.0982	92
03/28/09	9	0.1610	56	05/01/09	4	0.1019	39
03/29/09	10	0.1607	62	05/02/09	3	0.1040	29
03/30/09	**11**	**0.1610**	**68**	05/03/09	5	0.1031	49
03/31/09	9	0.1607	56	05/04/09	12	0.1019	118
04/01/09	17	0.1595	107	05/05/09	1	0.0977	10
04/02/09	8	0.1598	50	05/06/09	3	0.0945	32
04/03/09	**8**	**0.1598**	**50**	05/07/09	1	0.0956	10
04/04/09	4	0.1595	25	05/08/09	3	0.1003	30
04/05/09	4	0.1592	25	05/09/09	1	0.1036	10
04/06/09	3	0.1584	19	05/10/09	1	0.1038	10
04/07/09	3	0.1570	19	05/11/09	0	0.1026	0
04/08/09	5	0.1536	33	05/12/09	7	0.0954	73
04/09/09	23	0.1466	157	05/13/09	6	0.0909	66
04/10/09	15	0.1396	107	05/14/09	2	0.0925	22
04/11/09	15	0.1385	108	05/15/09	0	0.0934	0
04/12/09	14	0.1366	102	05/16/09	0	0.0963	0
04/13/09	33	0.1342	246	05/17/09	1	0.0929	11

Appendix A4, continued.

Date	Captured	Estimated trap efficiency	Daily emigration estimate	Date	Captured	Estimated trap efficiency	Daily emigration estimate
05/18/09	0	0.0722	0	06/21/09	0	0.0674	0
05/19/09	**0**	**0.0674**	**0**	06/22/09	1	0.0674	15
05/20/09	**0**	**0.0674**	**0**	06/23/09	0	0.0674	0
05/21/09	**0**	**0.0674**	**0**	06/24/09	0	0.0674	0
05/22/09	**0**	**0.0674**	**0**	06/25/09	0	0.0674	0
05/23/09	**0**	**0.0674**	**0**	06/26/09	0	0.0674	0
05/24/09	**0**	**0.0674**	**0**	06/27/09	0	0.0690	0
05/25/09	**0**	**0.0674**	**0**	06/28/09	0	0.0702	0
05/26/09	**0**	**0.0674**	**0**	06/29/09	0	0.0706	0
05/27/09	**0**	**0.0674**	**0**	06/29/09	0	0.0706	0
05/28/09	**0**	**0.0674**	**0**	06/30/09	0	0.0748	0
05/29/09	**0**	**0.0674**	**0**				
05/30/09	**0**	**0.0674**	**0**				
05/31/09	**0**	**0.0674**	**0**				
06/01/09	**0**	**0.0674**	**0**				
06/02/09	**0**	**0.0674**	**0**				
06/03/09	**0**	**0.0674**	**0**				
06/04/09	**0**	**0.0674**	**0**				
06/05/09	**0**	**0.0674**	**0**				
06/06/09	**0**	**0.0674**	**0**				
06/07/09	**0**	**0.0674**	**0**				
06/08/09	**0**	**0.0674**	**0**				
06/09/09	**0**	**0.0674**	**0**				
06/10/09	**0**	**0.0674**	**0**				
06/11/09	**0**	**0.0674**	**0**				
06/12/09	**0**	**0.0674**	**0**				
06/13/09	**0**	**0.0674**	**0**				
06/14/09	**0**	**0.0674**	**0**				
06/15/09	**0**	**0.0674**	**0**				
06/16/09	**0**	**0.0674**	**0**				
06/17/09	**0**	**0.0674**	**0**				
06/18/09	**0**	**0.0674**	**0**				
06/19/09	**0**	**0.0674**	**0**				
06/20/09	0	0.0674	0				

Appendix A5. Daily capture of wild spring Chinook parr emigrating from the Twisp River, 1 July to 2 December 2009. Estimated numbers of Chinook captured when the trap was not operating (bold) were calculated from the average captures two days preceding and after the break in operation.

Date	Captured	Estimated trap efficiency	Daily emigration estimate	Date	Captured	Estimated trap efficiency	Daily emigration estimate
07/01/09	4	0.2599	15	08/03/09	1	0.1041	10
07/02/09	7	0.2599	27	08/04/09	2	0.0992	20
07/03/09	6	0.2599	23	08/05/09	0	0.0958	0
07/04/09	4	0.2599	15	08/06/09	0	0.0917	0
07/05/09	6	0.2599	23	08/07/09	1	0.0910	11
07/06/09	7	0.2599	27	08/08/09	0	0.0877	0
07/07/09	7	0.2599	27	08/09/09	1	0.0858	12
07/08/09	9	0.2599	35	08/10/09	0	0.0838	0
07/09/09	11	0.2599	42	08/11/09	0	0.0832	0
07/10/09	8	0.2599	31	08/12/09	3	0.0825	36
07/11/09	8	0.2589	31	08/13/09	4	0.0825	48
07/12/09	7	0.2528	28	08/14/09	4	0.0858	47
07/13/09	2	0.2599	8	08/15/09	18	0.0825	218
07/14/09	8	0.2599	31	08/16/09	6	0.0787	76
07/15/09	9	0.2539	35	08/17/09	4	0.0794	50
07/16/09	5	0.2369	21	08/18/09	0	0.0781	0
07/17/09	7	0.2223	31	08/19/09	1	0.0781	13
07/18/09	9	0.2165	42	08/20/09	1	0.0781	13
07/19/09	5	0.2089	24	08/21/09	5	0.0781	64
07/20/09	5	0.1986	25	**08/22/09**	**0**	**0.0781**	**0**
07/21/09	1	0.1885	5	**08/23/09**	**0**	**0.0781**	**0**
07/22/09	2	0.1787	11	**08/24/09**	**0**	**0.0781**	**0**
07/23/09	4	0.1760	23	**08/25/09**	**0**	**0.0781**	**0**
07/24/09	4	0.1804	22	**08/26/09**	**0**	**0.0781**	**0**
07/25/09	5	0.1769	28	**08/27/09**	**0**	**0.0781**	**0**
07/26/09	5	0.1734	29	**08/28/09**	**0**	**0.0781**	**0**
07/27/09	4	0.1725	23	**08/29/09**	**0**	**0.0781**	**0**
07/28/09	3	0.1690	18	**08/30/09**	**0**	**0.0781**	**0**
07/29/09	1	0.1604	6	**08/31/09**	**0**	**0.0781**	**0**
07/30/09	1	0.1664	6	**09/01/09**	**0**	**0.0781**	**0**
07/31/09	1	0.1707	6	**09/02/09**	**0**	**0.0781**	**0**
08/01/09	1	0.1179	8	**09/03/09**	**0**	**0.0781**	**0**
08/02/09	0	0.1091	0	**09/04/09**	**0**	**0.0781**	**0**

Appendix A5, continued.

Date	Captured	Estimated trap efficiency	Daily emigration estimate	Date	Captured	Estimated trap efficiency	Daily emigration estimate
09/05/09	**0**	**0.0781**	**0**	**10/11/09**	**0**	**0.0781**	**0**
09/06/09	**0**	**0.0781**	**0**	**10/12/09**	**0**	**0.0781**	**0**
09/07/09	**0**	**0.0781**	**0**	**10/13/09**	**0**	**0.0781**	**0**
09/08/09	**0**	**0.0781**	**0**	10/14/09	10	0.0781	128
09/09/09	**0**	**0.0781**	**0**	10/15/09	13	0.0806	161
09/10/09	**0**	**0.0781**	**0**	10/16/09	3	0.0800	37
09/11/09	**0**	**0.0781**	**0**	10/17/09	6	0.0825	73
09/12/09	**0**	**0.0781**	**0**	10/18/09	27	0.1013	267
09/13/09	**0**	**0.0781**	**0**	10/19/09	27	0.0971	278
09/14/09	**0**	**0.0781**	**0**	10/20/09	10	0.0890	112
09/15/09	**0**	**0.0781**	**0**	10/21/09	7	0.0864	81
09/16/09	**0**	**0.0781**	**0**	10/22/09	1	0.0858	12
09/17/09	**0**	**0.0781**	**0**	10/23/09	5	0.0858	58
09/18/09	**0**	**0.0781**	**0**	10/24/09	3	0.0930	32
09/19/09	**0**	**0.0781**	**0**	10/25/09	46	0.1020	451
09/20/09	**0**	**0.0781**	**0**	10/26/09	10	0.0964	104
09/21/09	**0**	**0.0781**	**0**	**10/27/09**	**18**	**0.1048**	**172**
09/22/09	**0**	**0.0781**	**0**	10/28/09	9	0.0999	90
09/23/09	**0**	**0.0781**	**0**	10/29/09	6	0.0964	62
09/24/09	**0**	**0.0781**	**0**	10/30/09	6	0.0964	62
09/25/09	**0**	**0.0781**	**0**	10/31/09	22	0.1172	188
09/26/09	**0**	**0.0781**	**0**	11/01/09	169	0.1858	909
09/27/09	**0**	**0.0781**	**0**	11/02/09	36	0.1553	232
09/28/09	**0**	**0.0781**	**0**	11/03/09	21	0.1405	149
09/29/09	**0**	**0.0781**	**0**	11/04/09	16	0.1302	123
09/30/09	**0**	**0.0781**	**0**	11/05/09	19	0.1225	155
10/01/09	**0**	**0.0781**	**0**	11/06/09	15	0.1194	126
10/02/09	**0**	**0.0781**	**0**	11/07/09	17	0.1179	144
10/03/09	**0**	**0.0781**	**0**	11/08/09	22	0.1150	191
10/04/09	**0**	**0.0781**	**0**	11/09/09	4	0.1091	37
10/05/09	**0**	**0.0781**	**0**	11/10/09	17	0.1077	158
10/06/09	**0**	**0.0781**	**0**	11/11/09	6	0.1041	58
10/07/09	**0**	**0.0781**	**0**	11/12/09	5	0.0999	50
10/08/09	**0**	**0.0781**	**0**	11/13/09	11	0.0917	120
10/09/09	**0**	**0.0781**	**0**	11/14/09	11	0.0930	118
10/10/09	**0**	**0.0781**	**0**	**11/15/09**	**12**	**0.0944**	**127**

Appendix A5, continued.

Date	Captured	Estimated trap efficiency	Daily emigration estimate
11/16/09	15	0.0964	156
11/17/09	12	0.0992	121
11/18/09	9	0.0999	90
11/19/09	8	0.0978	82
11/20/09	5	0.0971	51
11/21/09	2	0.0964	21
11/22/09	1	0.0944	11
11/23/09	5	0.0937	53
11/24/09	0	0.0917	0
11/25/09	1	0.0910	11
11/26/09	0	0.0904	0
11/27/09	2	0.0910	22
11/28/09	3	0.0910	33
11/29/09	4	0.0890	45
11/30/09	0	0.0890	0
12/01/09	3	0.0890	34
12/02/09	0	0.0851	0

Appendix A6. Daily capture of wild steelhead smolt and transitional fish emigrating from the Twisp River, 11 March to 30 June 2009. Estimated number of steelhead captured when the trap was not operating (bold) was calculated from the average captures two days preceding and after the break in operation. Thirty fish were captured on 4/20 but trap was stopped when checked so 64 were estimated.

Date	Captured	Estimated trap efficiency	Daily emigration estimate	Date	Captured	Estimated trap efficiency	Daily emigration estimate
03/11/09	0	0.065	0	04/13/09	1	0.065	15
03/12/09	0	0.065	0	04/14/09	3	0.065	46
03/13/09	0	0.065	0	04/15/09	1	0.065	15
03/14/09	0	0.065	0	04/16/09	3	0.065	46
03/15/09	0	0.065	0	04/17/09	4	0.065	62
03/16/09	0	0.065	0	04/18/09	6	0.065	92
03/17/09	1	0.065	15	04/19/09	6	0.065	92
03/18/09	0	0.065	0	**04/20/09**	**64**	0.065	985
03/19/09	0	0.065	0	04/21/09	101	0.065	1,554
03/20/09	0	0.065	0	04/22/09	143	0.065	2,200
03/21/09	0	0.065	0	04/23/09	85	0.065	1,308
03/22/09	0	0.065	0	04/24/09	23	0.065	354
03/23/09	0	0.065	0	04/25/09	22	0.065	338
03/24/09	0	0.065	0	04/26/09	10	0.065	154
03/25/09	0	0.065	0	04/27/09	6	0.065	92
03/26/09	0	0.065	0	04/28/09	10	0.065	154
03/27/09	0	0.065	0	04/29/09	5	0.065	77
03/28/09	0	0.065	0	04/30/09	1	0.065	15
03/29/09	0	0.065	0	05/01/09	11	0.065	169
03/30/09	**0**	**0.065**	**0**	05/02/09	9	0.065	138
03/31/09	0	0.065	0	05/03/09	12	0.065	185
04/01/09	0	0.065	0	05/04/09	11	0.065	169
04/02/09	0	0.065	0	05/05/09	10	0.065	154
04/03/09	**0**	**0.065**	**0**	05/06/09	14	0.065	215
04/04/09	1	0.065	15	05/07/09	5	0.065	77
04/05/09	1	0.065	15	05/08/09	5	0.065	77
04/06/09	0	0.065	0	05/09/09	5	0.065	77
04/07/09	2	0.065	31	05/10/09	4	0.065	62
04/08/09	3	0.065	46	05/11/09	9	0.065	138
04/09/09	12	0.065	185	05/12/09	17	0.065	262
04/10/09	5	0.065	77	05/13/09	15	0.065	231
04/11/09	4	0.065	62	05/14/09	8	0.065	123
04/12/09	4	0.065	62	05/15/09	7	0.065	108

Appendix A6, continued.

Date	Captured	Estimated trap efficiency	Daily emigration estimate	Date	Captured	Estimated trap efficiency	Daily emigration estimate
05/16/09	5	0.065	77	**06/19/09**	**4**	**0.065**	62
05/17/09	10	0.065	154	06/20/09	0	0.065	0
05/18/09	6	0.065	92	06/21/09	0	0.065	0
05/19/09	**4**	**0.065**	62	06/22/09	0	0.065	0
05/20/09	**4**	**0.065**	62	06/23/09	1	0.065	15
05/21/09	**4**	**0.065**	62	06/24/09	0	0.065	0
05/22/09	**4**	**0.065**	62	06/25/09	1	0.065	15
05/23/09	**4**	**0.065**	62	06/26/09	0	0.065	0
05/24/09	**4**	**0.065**	62	06/27/09	0	0.065	0
05/25/09	**4**	**0.065**	62	06/28/09	0	0.065	0
05/26/09	**4**	**0.065**	62	06/29/09	0	0.065	0
05/27/09	**4**	**0.065**	62	06/29/09	0	0.065	0
05/28/09	**4**	**0.065**	62	06/30/09	0	0.065	0
05/29/09	**4**	**0.065**	62				
05/30/09	**4**	**0.065**	62				
05/31/09	**4**	**0.065**	62				
06/01/09	**4**	**0.065**	62				
06/02/09	**4**	**0.065**	62				
06/03/09	**4**	**0.065**	62				
06/04/09	**4**	**0.065**	62				
06/05/09	**4**	**0.065**	62				
06/06/09	**4**	**0.065**	62				
06/07/09	**4**	**0.065**	62				
06/08/09	**4**	**0.065**	62				
06/09/09	**4**	**0.065**	62				
06/10/09	**4**	**0.065**	62				
06/11/09	**4**	**0.065**	62				
06/12/09	**4**	**0.065**	62				
06/13/09	**4**	**0.065**	62				
06/14/09	**4**	**0.065**	62				
06/15/09	**4**	**0.065**	62				
06/16/09	**4**	**0.065**	62				
06/17/09	**4**	**0.065**	62				
06/18/09	**4**	**0.065**	62				

Appendix B1. Loss of PIT tags inserted into wild (YCW) and hatchery (YCH) spring Chinook smolts (S) at the Methow River smolt trap by tag file.

Tag file	Species	Stage	Tagged	Mortalities	Shed	Released
CGS09058.KAG	YCW	S	1	0	0	1
CGS09060.KAG	YCW	S	1	0	0	1
CGS09075.KAG	YCW	S	1	0	0	1
CGS09076.KAG	YCW	S	1	0	0	1
CGS09078.KAG	YCW	S	1	0	0	1
CGS09079.KAG	YCW	S	1	0	0	1
CGS09082.KAG	YCW	S	2	0	0	2
CGS09084.KAG	YCW	S	1	0	0	1
CGS09086.KAG	YCW	S	1	0	0	1
CGS09088.KAG	YCW	S	1	0	0	1
CGS09090.KAD	YCW	S	2	0	0	2
CGS09091.KAG	YCW	S	3	0	0	3
CGS09096.KAA	YCW	S	6	0	0	6
CGS09097.KAG	YCW	S	2	0	0	2
CGS09100.KAD	YCW	S	2	0	0	2
CGS09101.KAD	YCW	S	2	0	0	2
CGS09102.KAD	YCW	S	1	0	0	1
CGS09103.KAD	YCW	S	3	0	0	3
CGS09104.KAD	YCW	S	7	0	0	7
CGS09106.KAD	YCW	S	4	0	0	4
CGS09107.KAD	YCW	S	3	0	0	3
CGS09108.KAD	YCW	S	6	0	0	6
CGS09109.KAD	YCW	S	7	0	0	7
CGS09110.KAD	YCW	S	2	0	0	2
CGS09111.KAD	YCW	S	5	0	0	5
CGS09112.KAD	YCW	S	3	0	0	3
CGS09113.KAC	YCW	S	4	0	0	4
CGS09114.KAC	YCW	S	7	0	0	7
CGS09115.KAD	YCW	S	4	0	0	4
CGS09116.KAD	YCW	S	1	0	0	1
CGS09117.KAD	YCW	S	3	0	0	3

Appendix B1, continued.

Tag file	Species	Stage	Tagged	Mortalities	Shed	Released
CGS09119.KAD	YCW	S	1	0	0	1
CGS09121.KAD	YCW	S	2	0	0	2
CGS09122.KAD	YCW	S	2	0	0	2
CGS09124.KAD	YCW	S	1	0	0	1
CGS09126.KAD	YCW	S	1	0	0	1
CGS09127.KAD	YCW	S	1	0	0	1
CGS09128.KAD	YCW	S	1	0	0	1
CGS09131.KAG	YCW	S	1	0	0	1
CGS09133.KAD	YCW	S	1	0	0	1
CGS09135.KAD	YCW	S	2	0	0	2
CGS09136.KAD	YCW	S	1	0	0	1
CGS09137.KAD	YCW	S	1	0	0	1
CGS09138.KAD	YCW	S	2	0	0	2
CGS09139.KAD	YCW	S	1	0	0	1
CGS09140.KAD	YCW	S	1	0	0	1
CGS09141.KAD	YCW	S	1	0	0	1
CGS09166.KAD	YCW	S	1	0	0	1
Total			109	0	0	109
CGS09107.KAC	YCH	S	220	0	0	220
CGS09113.KAA	YCH	S	444	19	0	425
Total			664	19	0	645
Grand total			773	19	0	754

Appendix B2. Loss of PIT tags inserted into wild Chinook (SBC) parr (P) at the Methow River smolt trap by tag file.

Tag file	Species	Stage	Tagged	Mortalities	Shed	Released
CGS09289.KAD	SBC	P	1	0	0	1
CGS09292.KAD	SBC	P	1	0	0	1
CGS09293.KAD	SBC	P	1	0	0	1
CGS09295.KAG	SBC	P	2	0	0	2
CGS09299.KAD	SBC	P	3	0	0	3
CGS09300.KAG	SBC	P	1	0	0	1
CGS09301.KAG	SBC	P	3	0	0	3
CGS09303.KAG	SBC	P	1	0	0	1
CGS09306.KAD	SBC	P	8	0	0	8
CGS09307.KAG	SBC	P	3	0	0	3
CGS09309.KAG	SBC	P	2	0	0	2
CGS09313.KAD	SBC	P	10	0	0	10
CGS09314.KAD	SBC	P	1	0	0	1
CGS09316.KAD	SBC	P	5	0	0	5
CGS09320.KAG	SBC	P	3	0	0	3
CGS09323.KAD	SBC	P	12	0	0	12
CGS09324.KAG	SBC	P	1	0	0	1
CGS09327.KAG	SBC	P	1	0	0	1
CGS09328.KAD	SBC	P	1	0	0	1
CGS09329.KAD	SBC	P	1	0	0	1
CGS09333.KAG	SBC	P	3	0	0	3
CGS09336.KAG	SBC	P	1	0	0	1
CGS09337.KAG	SBC	P	1	0	0	1
Grand Total			66	0	0	66

Appendix B3. Loss of PIT tags inserted into wild (SHR) and hatchery (SHH) steelhead migrants at the Methow River smolt trap by tag file.

Tag file	Species	Stage	Tagged	Mortalities	Shed	Released
CGS09090.KAD	SHR	Migratory	1	0	0	1
CGS09100.KAD	SHR	Migratory	1	0	0	1
CGS09101.KAD	SHR	Migratory	1	0	0	1
CGS09106.KAD	SHR	Migratory	3	0	0	3
CGS09108.KAD	SHR	Migratory	4	0	0	4
CGS09109.KAD	SHR	Migratory	6	0	0	6
CGS09110.KAD	SHR	Migratory	3	0	0	3
CGS09111.KAD	SHR	Migratory	1	0	0	1
CGS09112.KAD	SHR	Migratory	20	0	0	20
CGS09113.KAA	SHR	Migratory	1	0	0	1
CGS09113.KAC	SHR	Migratory	71	0	0	71
CGS09114.KAC	SHR	Migratory	53	0	0	53
CGS09115.KAD	SHR	Migratory	28	0	0	28
CGS09116.KAD	SHR	Migratory	13	0	0	13
CGS09117.KAD	SHR	Migratory	2	0	0	2
CGS09118.KAD	SHR	Migratory	5	0	0	5
CGS09119.KAD	SHR	Migratory	3	0	0	3
CGS09120.KAH	SHR	Migratory	1	0	0	1
CGS09121.KAD	SHR	Migratory	1	0	0	1
CGS09122.KAD	SHR	Migratory	1	0	0	1
CGS09123.KAD	SHR	Migratory	1	0	0	1
CGS09124.KAD	SHR	Migratory	1	0	0	1
CGS09125.KAD	SHR	Migratory	2	0	0	2
CGS09126.KAD	SHR	Migratory	9	0	0	9
CGS09127.KAD	SHR	Migratory	6	0	0	6
CGS09128.KAD	SHR	Migratory	3	0	0	3
CGS09132.KAD	SHR	Migratory	1	0	0	1
CGS09133.KAD	SHR	Migratory	5	0	0	5
CGS09135.KAD	SHR	Migratory	10	0	0	10
CGS09136.KAD	SHR	Migratory	3	0	0	3
CGS09137.KAD	SHR	Migratory	3	0	0	3
CGS09138.KAD	SHR	Migratory	11	0	0	11
CGS09139.KAD	SHR	Migratory	54	0	0	54
CGS09140.KAD	SHR	Migratory	10	0	0	10
CGS09141.KAD	SHR	Migratory	12	0	0	12
CGS09142.KAD	SHR	Migratory	9	0	0	9
CGS09143.KAH	SHR	Migratory	3	0	0	3

Appendix B3, continued.

Tag file	Species	Stage	Tagged	Mortalities	Shed	Released
CGS09144.KAH	SHR	Migratory	4	0	0	4
CGS09145.KAH	SHR	Migratory	4	0	0	4
CGS09146.KAD	SHR	Migratory	4	0	0	4
CGS09147.KAD	SHR	Migratory	2	0	0	2
CGS09148.KAH	SHR	Migratory	1	0	0	1
CGS09149.KAH	SHR	Migratory	1	0	0	1
CGS09150.KAH	SHR	Migratory	3	0	0	3
CGS09161.KAD	SHR	Migratory	2	0	1	1
CGS09162.KAD	SHR	Migratory	1	0	0	1
CGS09163.KAH	SHR	Migratory	1	0	0	1
CGS09174.KAD	SHR	Migratory	1	0	0	1
CGS09200.KAD	SHR	Migratory	1	0	0	1
Total			387	0	1	386
CGS09115.KAD	SHH	Migratory	1	0	0	1
CGS09135.KAD	SHH	Migratory	1	0	0	1
CGS09139.KAD	SHH	Migratory	1	0	0	1
Total			3	0	0	3
Grand total			390	0	1	389

Appendix B4. Loss of PIT tags inserted into wild steelhead (SHR) parr (P) at the Methow River smolt trap by tag file.

Tag file	Species	Stage	Tagged	Mortalities	Shed	Released
CGS09107.KAD	SHR	P	1	0	0	1
CGS09108.KAD	SHR	P	1	0	0	1
CGS09113.KAC	SHR	P	3	0	0	3
CGS09114.KAC	SHR	P	3	0	0	3
CGS09115.KAD	SHR	P	1	0	0	1
CGS09116.KAD	SHR	P	2	0	0	2
CGS09117.KAD	SHR	P	2	0	0	2
CGS09120.KAH	SHR	P	1	0	0	1
CGS09122.KAD	SHR	P	1	0	0	1
CGS09124.KAD	SHR	P	2	0	0	2
CGS09141.KAD	SHR	P	2	0	0	2
CGS09142.KAD	SHR	P	4	0	0	4
CGS09143.KAH	SHR	P	2	0	0	2
CGS09145.KAH	SHR	P	2	0	0	2
CGS09162.KAD	SHR	P	3	0	0	3
CGS09166.KAD	SHR	P	1	0	0	1
CGS09180.KAD	SHR	P	2	0	0	2
CGS09228.KAH	SHR	P	1	0	0	1
CGS09289.KAD	SHR	P	1	0	0	1
CGS09292.KAD	SHR	P	1	0	0	1
CGS09306.KAD	SHR	P	2	0	0	2
CGS09323.KAD	SHR	P	1	0	0	1
Grand total			39	0	0	39

Appendix B5. Loss of PIT tags inserted into wild (YCW) and hatchery (YCH) spring Chinook Salmon smolts (S) at the Twisp River smolt trap by tag file.

Tag File	Species	Stage	Tagged	Mortalities	Shed	Released
CGS09075.LAG	YCW	S	2	0	0	2
CGS09076.LAD	YCW	S	1	0	0	1
CGS09078.LAG	YCW	S	1	0	0	1
CGS09079.LAG	YCW	S	3	0	0	3
CGS09082.LAD	YCW	S	19	0	0	19
CGS09083.LAG	YCW	S	12	0	1	11
CGS09084.LAA	YCW	S	16	0	0	16
CGS09085.LAA	YCW	S	15	0	0	15
CGS09086.LAA	YCW	S	9	0	0	9
CGS09087.LAA	YCW	S	9	0	0	9
CGS09088.LAA	YCW	S	10	0	0	10
CGS09090.LAA	YCW	S	9	0	0	9
CGS09091.LAA	YCW	S	16	0	0	16
CGS09092.LAA	YCW	S	7	0	0	7
CGS09094.LAA	YCW	S	4	0	0	4
CGS09095.LAA	YCW	S	4	0	0	4
CGS09096.LAG	YCW	S	3	0	0	3
CGS09098.LAC	YCW	S	5	0	0	5
CGS09099.LAC	YCW	S	23	0	0	23
CGS09100.LAC	YCW	S	14	0	0	14
CGS09101.LAC	YCW	S	15	0	0	15
CGS09102.LAC	YCW	S	14	0	0	14
CGS09103.LAC	YCW	S	32	0	0	32
CGS09104.LAC	YCW	S	27	0	0	27
CGS09105.LAC	YCW	S	20	0	0	20
CGS09106.LAC	YCW	S	25	0	0	25
CGS09107.LAC	YCW	S	21	0	0	21
CGS09108.LAC	YCW	S	28	0	0	28
CGS09109.LAC	YCW	S	24	0	0	24
CGS09110.LAC	YCW	S	25	0	0	25
CGS09111.LAC	YCW	S	59	1	0	58
CGS09112.LAC	YCW	S	51	0	0	51
CGS09113.LAC	YCW	S	12	0	0	12
CGS09114.LAC	YCW	S	9	1	0	8
CGS09115.LAC	YCW	S	5	1	0	4

Appendix B5, continued.

Tag File	Species	Stage	Tagged	Mortalities	Shed	Released
CGS09116.LAC	YCW	S	8	0	0	8
CGS09117.LAC	YCW	S	3	0	0	3
CGS09118.LAC	YCW	S	9	0	0	9
CGS09119.LAC	YCW	S	2	0	0	2
CGS09120.LAC	YCW	S	9	0	0	9
CGS09121.LAC	YCW	S	4	0	0	4
CGS09122.LAC	YCW	S	3	0	0	3
CGS09123.LAC	YCW	S	5	0	0	5
CGS09124.LAC	YCW	S	12	0	0	12
CGS09125.LAC	YCW	S	1	0	0	1
CGS09126.LAD	YCW	S	3	0	0	3
CGS09127.LAD	YCW	S	1	0	0	1
CGS09128.LAD	YCW	S	3	0	0	3
CGS09129.LAC	YCW	S	1	0	0	1
CGS09130.LAC	YCW	S	1	0	0	1
CGS09132.LAD	YCW	S	7	0	0	7
CGS09133.LAC	YCW	S	6	0	0	6
CGS09134.LAD	YCW	S	2	0	0	2
CGS09137.LAD	YCW	S	1	0	0	1
CGS09173.LAD	YCW	S	1	0	0	1
	Total		631	3	1	627
CGS09112.LAA	YCH	S	200	0	0	200
CGS09112.LAC	YCH	S	1	0	0	1
	Total		201	0	0	201

Appendix B6. Loss of PIT tags inserted into wild spring Chinook (SBC) parr (P) at the Twisp River smolt trap by tag file.

Tagfile	Species	Stage	Tagged	Mortalities	Shed	Released
CGS09180.LAD	SBC	P	3	0	0	3
CGS09181.LAD	SBC	P	1	0	0	1
CGS09182.LAD	SBC	P	1	0	0	1
CGS09183.LAD	SBC	P	1	0	0	1
CGS09186.LAD	SBC	P	3	0	0	3
CGS09187.LAD	SBC	P	1	0	0	1
CGS09188.LAD	SBC	P	2	0	0	2
CGS09189.LAD	SBC	P	3	0	0	3
CGS09190.LAD	SBC	P	6	0	0	6
CGS09191.LAD	SBC	P	5	1	0	4
CGS09193.LAD	SBC	P	2	0	0	2
CGS09195.LAG	SBC	P	2	0	0	2
CGS09196.LAG	SBC	P	3	0	0	3
CGS09197.LAD	SBC	P	2	0	0	2
CGS09200.LAD	SBC	P	7	0	0	7
CGS09201.LAD	SBC	P	2	0	0	2
CGS09202.LAD	SBC	P	1	1	0	0
CGS09204.LAD	SBC	P	1	0	0	1
CGS09205.LAD	SBC	P	4	0	0	4
CGS09207.LAD	SBC	P	5	0	0	5
CGS09208.LAD	SBC	P	3	0	0	3
CGS09209.LAD	SBC	P	3	0	0	3
CGS09210.LAD	SBC	P	1	0	0	1
CGS09212.LAD	SBC	P	1	0	0	1
CGS09213.LAD	SBC	P	1	0	0	1
CGS09215.LAD	SBC	P	1	0	0	1
CGS09216.LAD	SBC	P	2	0	0	2
CGS09219.LAD	SBC	P	1	0	0	1
CGS09222.LAD	SBC	P	1	0	0	1
CGS09224.LAD	SBC	P	3	0	0	3
CGS09225.LAD	SBC	P	4	0	0	4
CGS09226.LAD	SBC	P	4	0	0	4
CGS09227.LAD	SBC	P	16	0	0	16
CGS09228.LAD	SBC	P	5	0	0	5
CGS09228.LAD	SBC	P	1	0	0	1
CGS09229.LAD	SBC	P	3	0	0	3
CGS09231.LAD	SBC	P	1	0	0	1

Appendix B6, continued.

Tagfile	Species	Stage	Tagged	Mortalities	Shed	Released
CGS09232.LAD	SBC	P	1	0	0	1
CGS09233.LAD	SBC	P	4	0	0	4
CGS09287.LAC	SBC	P	10	0	1	9
CGS09288.LAC	SBC	P	13	0	0	13
CGS09289.LAD	SBC	P	2	0	0	2
CGS09291.LAD	SBC	P	29	0	0	29
CGS09292.LAD	SBC	P	27	1	0	26
CGS09293.LAD	SBC	P	10	0	0	10
CGS09295.LAC	SBC	P	8	0	0	8
CGS09296.LAA	SBC	P	5	0	0	5
CGS09299.LAC	SBC	P	58	0	0	58
CGS09301.LAA	SBC	P	9	0	0	9
CGS09302.LAA	SBC	P	6	0	0	6
CGS09303.LAG	SBC	P	6	0	0	6
CGS09304.LAC	SBC	P	20	0	0	20
CGS09305.LAC	SBC	P	167	1	0	166
CGS09306.LAC	SBC	P	36	0	0	36
CGS09307.LAC	SBC	P	19	0	0	19
CGS09308.LAC	SBC	P	15	0	0	15
CGS09309.LAC	SBC	P	19	0	0	19
CGS09310.LAC	SBC	P	15	0	0	15
CGS09312.LAC	SBC	P	38	0	0	38
CGS09313.LAD	SBC	P	4	0	0	4
CGS09314.LAG	SBC	P	16	0	0	16
CGS09316.LAD	SBC	P	11	0	0	11
CGS09317.LAD	SBC	P	11	0	0	11
CGS09320.LAD	SBC	P	26	0	0	26
CGS09322.LAD	SBC	P	21	0	0	21
CGS09323.LAD	SBC	P	8	0	0	8
CGS09324.LAG	SBC	P	5	0	0	5
CGS09327.LAG	SBC	P	8	0	0	8
CGS09329.LAD	SBC	P	1	0	0	1
CGS09333.LAG	SBC	P	9	0	0	9
CGS09335.LAG	SBC	P	3	0	0	3
	Total		746	4	1	741

Appendix B7. Loss of PIT tags inserted into hatchery (SHH) and wild (SHR) steelhead migrants at the Twisp River smolt trap by tag file.

Tag file	Species	Stage	Tagged	Mortalities	Shed	Released
CGS09094.LAA	SHR	Migratory	1	0	0	1
CGS09095.LAB	SHR	Migratory	1	0	0	1
CGS09098.LAC	SHR	Migratory	3	0	0	3
CGS09099.LAC	SHR	Migratory	11	0	0	11
CGS09100.LAC	SHR	Migratory	5	0	1	4
CGS09101.LAC	SHR	Migratory	4	0	0	4
CGS09102.LAC	SHR	Migratory	4	0	0	4
CGS09103.LAC	SHR	Migratory	1	0	0	1
CGS09104.LAC	SHR	Migratory	3	0	0	3
CGS09105.LAC	SHR	Migratory	1	0	0	1
CGS09106.LAC	SHR	Migratory	2	0	0	2
CGS09107.LAC	SHR	Migratory	4	0	1	3
CGS09108.LAC	SHR	Migratory	6	0	0	6
CGS09109.LAC	SHR	Migratory	6	0	0	6
CGS09110.LAC	SHR	Migratory	29	0	1	28
CGS09111.LAC	SHR	Migratory	100	0	0	100
CGS09112.LAC	SHR	Migratory	141	0	0	141
CGS09113.LAC	SHR	Migratory	84	0	1	83
CGS09114.LAC	SHR	Migratory	23	0	0	23
CGS09115.LAC	SHR	Migratory	22	0	0	22
CGS09116.LAC	SHR	Migratory	10	0	0	10
CGS09117.LAC	SHR	Migratory	6	0	0	6
CGS09118.LAC	SHR	Migratory	10	0	0	10
CGS09119.LAC	SHR	Migratory	5	0	0	5
CGS09120.LAC	SHR	Migratory	1	0	0	1
CGS09121.LAC	SHR	Migratory	11	0	0	11
CGS09122.LAC	SHR	Migratory	9	0	0	9
CGS09123.LAC	SHR	Migratory	12	0	0	12
CGS09124.LAC	SHR	Migratory	11	0	0	11
CGS09125.LAC	SHR	Migratory	10	0	0	10
CGS09126.LAD	SHR	Migratory	13	0	0	13
CGS09127.LAD	SHR	Migratory	4	0	0	4
CGS09128.LAD	SHR	Migratory	4	0	0	4
CGS09129.LAC	SHR	Migratory	5	0	0	5
CGS09130.LAC	SHR	Migratory	4	0	0	4
CGS09131.LAC	SHR	Migratory	9	0	0	9
CGS09132.LAD	SHR	Migratory	17	0	0	17

Appendix B7, continued.

Tag file	Species	Stage	Tagged	Mortalities	Shed	Released
CGS09133.LAC	SHR	Migratory	14	0	0	14
CGS09134.LAD	SHR	Migratory	8	0	1	7
CGS09135.LAD	SHR	Migratory	7	0	0	7
CGS09136.LAD	SHR	Migratory	5	0	0	5
CGS09137.LAD	SHR	Migratory	10	0	2	8
CGS09138.LAD	SHR	Migratory	6	0	0	6
CGS09174.LAH	SHR	Migratory	1	0	0	1
CGS09176.LAD	SHR	Migratory	1	0	0	1
		Total	644	0	7	637
CGS09112.LAB	SHH	Migratory	202	0	0	202
CGS09112.LAC	SHH	Migratory	1	0	0	1
CGS09113.LAC	SHH	Migratory	1	0	0	1
CGS09114.LAC	SHH	Migratory	4	0	0	4
CGS09124.LAC	SHH	Migratory	1	0	0	1
CGS09128.LAB	SHH	Migratory	209	4	0	205
		Total	418	4	0	414

Appendix B8. Loss of PIT tags inserted into wild steelhead (SHR) parr (P) at the Twisp River smolt trap by tag file.

Tag file	Species	Stage	Tagged	Mortalities	Shed	Released
CGS09076.LAD	SHR	P	1	0	0	1
CGS09086.LAH	SHR	P	1	0	0	1
CGS09095.LAB	SHR	P	2	0	0	2
CGS09099.LAC	SHR	P	3	0	0	3
CGS09100.LAC	SHR	P	2	0	0	2
CGS09101.LAC	SHR	P	1	0	0	1
CGS09102.LAC	SHR	P	1	0	0	1
CGS09103.LAC	SHR	P	1	0	0	1
CGS09107.LAC	SHR	P	1	0	0	1
CGS09109.LAC	SHR	P	4	0	0	4
CGS09110.LAC	SHR	P	1	0	0	1
CGS09111.LAC	SHR	P	1	0	0	1
CGS09111.LAC	SHR	P	13	0	0	13
CGS09112.LAC	SHR	P	1	0	0	1
CGS09112.LAC	SHR	P	40	0	0	40
CGS09113.LAC	SHR	P	10	0	0	10

Appendix B8, continued.

Tag file	Species	Stage	Tagged	Mortalities	Shed	Released
CGS09114.LAC	SHR	P	5	0	0	5
CGS09115.LAC	SHR	P	9	0	0	9
CGS09116.LAC	SHR	P	1	0	0	1
CGS09117.LAC	SHR	P	3	0	0	3
CGS09120.LAC	SHR	P	1	0	0	1
CGS09121.LAC	SHR	P	4	0	0	4
CGS09122.LAC	SHR	P	3	0	0	3
CGS09123.LAC	SHR	P	1	0	0	1
CGS09124.LAC	SHR	P	3	0	0	3
CGS09125.LAC	SHR	P	2	0	0	2
CGS09126.LAD	SHR	P	1	0	0	1
CGS09127.LAD	SHR	P	1	0	0	1
CGS09128.LAD	SHR	P	2	0	0	2
CGS09129.LAC	SHR	P	2	0	0	2
CGS09131.LAC	SHR	P	3	0	0	3
CGS09133.LAC	SHR	P	1	0	0	1
CGS09136.LAD	SHR	P	1	0	0	1
CGS09173.LAD	SHR	P	4	0	0	4
CGS09174.LAH	SHR	P	4	0	0	4
CGS09175.LAH	SHR	P	4	0	0	4
CGS09176.LAD	SHR	P	2	0	0	2
CGS09177.LAD	SHR	P	1	0	0	1
CGS09178.LAH	SHR	P	1	0	0	1
CGS09179.LAD	SHR	P	2	0	0	2
CGS09183.LAD	SHR	P	2	0	0	2
CGS09186.LAD	SHR	P	1	0	0	1
CGS09187.LAD	SHR	P	1	0	0	1
CGS09188.LAD	SHR	P	1	0	0	1
CGS09189.LAD	SHR	P	1	0	0	1
CGS09190.LAD	SHR	P	1	0	0	1
CGS09200.LAD	SHR	P	1	0	0	1
CGS09203.LAH	SHR	P	1	0	0	1
CGS09204.LAD	SHR	P	1	0	0	1
CGS09207.LAD	SHR	P	2	0	0	2
CGS09208.LAD	SHR	P	1	0	0	1
CGS09210.LAD	SHR	P	1	0	0	1
CGS09211.LAD	SHR	P	1	0	0	1
CGS09213.LAD	SHR	P	1	0	0	1

Appendix B8, continued.

Tag file	Species	Stage	Tagged	Mortalities	Shed	Released
CGS09232.LAD	SHR	P	1	0	0	1
CGS09287.LAC	SHR	P	1	0	0	1
CGS09288.LAC	SHR	P	4	0	0	4
CGS09289.LAD	SHR	P	1	0	0	1
CGS09291.LAD	SHR	P	14	0	0	14
CGS09292.LAD	SHR	P	5	0	0	5
CGS09299.LAC	SHR	P	2	0	0	2
CGS09301.LAA	SHR	P	1	0	0	1
CGS09304.LAC	SHR	P	2	0	0	2
CGS09305.LAC	SHR	P	19	0	0	19
CGS09305.LAC	SHR	P	1	0	0	1
CGS09305.LAC	SHR	P	2	0	0	2
CGS09306.LAC	SHR	P	3	0	0	3
CGS09307.LAC	SHR	P	3	0	0	3
CGS09308.LAC	SHR	P	1	0	0	1
CGS09309.LAC	SHR	P	1	0	0	1
CGS09312.LAC	SHR	P	2	0	0	2
CGS09313.LAD	SHR	P	2	0	0	2
CGS09316.LAD	SHR	P	1	0	0	1
CGS09322.LAD	SHR	P	2	0	0	2
CGS09323.LAD	SHR	P	1	0	0	1
CGS09329.LAD	SHR	P	1	0	0	1
CGS09336.LAH	SHR	P	1	0	0	1
	Total		231	0	0	231

Appendix C

2010 Methow Chinook salmon juvenile assignments

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Final report, April 6, 2010

Summary
In fall 2009, emigrating natural-origin sub-yearling Chinook salmon were collected in the Methow River smolt trap. Since two genetically distinct types of Chinook salmon, a spring-run and summer-run, spawn in the Methow River, the juveniles could be from either or both run types. Further, the spring Chinook salmon population in the Twisp River, a tributary upstream of the smolt trap in the Methow River, is genetically distinct from Methow/Chewuch spring Chinook salmon population (Small et al. 2007) and juveniles may have originated in the Twisp population. We investigated the genetic identity of the juvenile Chinook salmon through comparisons to adult spring and summer Chinook salmon collections from the Methow River and adult spring Chinook salmon from the Twisp River. We found that the majority of juveniles were summer type and roughly one-half of the spring type originated in the Twisp population.

Methods
We genotyped 375 juvenile Chinook salmon (WDFW collection code 09CW, Table 1) at the 13 standardized GAPS loci as described in Small et al. (2007) and compared them to Twisp River spring Chinook, and Methow River spring and summer Chinook salmon genotyped at the same loci. All genetic lab procedures were the same for the 09CW juveniles with the exception that the polymerase chain reaction protocol was changed to a "touch-down" where in the first three PCR cycles the annealing temperature drops one degree each cycle from an initial temperature of 60ºC, then follow 36 cycles with an annealing temperature of 50ºC. The summer-run Methow River collection genotypes were from the GAPS v2.1 database archive (Scott Blankenship, WDFW, personal communication).

Juvenile identities were examined from three perspectives. In the first examination, individuals were plotted in a factorial correspondence analysis (FCA) plot using the program GENETIX (Belkhir et al. 2004). This analysis constructs composite axes based upon allele frequencies that best describe the variation in the data set and plots individuals within the allelic space based upon their individual genotype. Individuals that are similar genetically plot near each other and individuals that are different genetically plot far from each other. The next analysis examined individual ancestry using a Bayesian analysis implemented in STRUCTURE (Pritchard et al. 2000). In this analysis, we hypothesized that there were two groups in the data set, spring and summer Chinook salmon, and estimated individual ancestry in two groups. Without knowledge of the identity of individuals the program sorts the data set in order to achieve Hardy-Weinberg equilibrium and minimize linkage disequilibrium in each hypothesized group. To further identify juvenile origins, we used assignment tests implemented in GENECLASS (Piry et al. 2004) with the Rannala and Mountain algorithm (Rannala and Mountain 1997) to calculate the likelihood that the juvenile came from the Methow spring or summer collection or the Twisp summer collection based on the genotype of the individual and the allele frequencies of the baseline collections.

Results and discussion

Seven juveniles were eliminated from the analysis because the DNA failed to amplify or amplified at fewer than eight loci, preventing definitive assignment, leaving 368 juveniles for the analysis. In the FCA, most juveniles plotted on the left side of axis 1 in the space occupied by the Methow adult summer Chinook salmon (Figure 1) suggesting that the majority of the juveniles were produced by summer Chinook salmon. Sixty-three juveniles plotted in the space occupied by the adult spring Chinook salmon, some clustered with the Methow springs and some clustered with the Twisp springs, and two juveniles plotted in the space between the spring and summer clusters, suggesting possible hybrid status. The cluster pattern of the putative spring Chinook salmon juveniles suggested that the juveniles arose from two spring Chinook salmon populations.

The STRUCTURE analysis divided the adult spring and summer Chinook salmon into two distinct clusters (Figure 2). Sixty-three juveniles had 90% or greater ancestry in the summer Chinook salmon cluster (Table 2) and these individuals also plotted in the summer Chinook salmon space in the FCA (data not shown for individuals). One individual had roughly 60% ancestry in the summer Chinook salmon cluster suggesting that it was backcrossed or a hybrid. Three individuals had roughly 10 to 20% ancestry in the summer Chinook salmon cluster suggesting some summer Chinook salmon ancestry (Table 2). Note: we included only Methow River spring and summer collections in the STRUCTURE analysis to decrease the complexity of the analysis since genetic variance between Twisp and Methow spring Chinook salmon populations is below the resolving power of STRUCTURE.

Results from GENECLASS paralleled the FCA and STRUCTURE analyses and provided further resolution (Figure 3 and Table 3). We plotted the negative log likelihood assignment values for the juveniles and for the adult spring and summer Chinook salmon collections (Figure 3). The plot shows that the adult spring and summer Chinook salmon assigned well to their respective groups, with the spring plots overlapping. The distinction and overlap indicated high power for distinguishing genetically between run groups and lower power for distinguishing between spring populations because of less differentiation between the spring Chinook salmon collections. The plot also shows that the majority of juveniles assigned to the summer collection and a minority to the spring collections.

We used a 99% posterior probability of assignment for a positive assignment in GENECLASS. The posterior probability, or relative likelihood, is calculated by dividing the highest likelihood value by the sum of the likelihood values and multiplying by 100. Ambiguity arises when highest and next highest assignment likelihoods are similar such that the posterior probability is < 99% and the fish was thus unassigned. With the 99% criterion, GENECLASS assigned 11 juveniles to the Twisp spring Chinook salmon collection, 14 juveniles to the Methow spring

Chinook salmon collection and 304 juveniles to the Methow summer Chinook salmon collection (Table 3). The 25 spring juveniles had over 90% ancestry in the spring cluster in the STRUCTURE analysis. The last 45 samples in the dataset were all springs (Table 2 and Table 3). If samples were collected in a time series this would indicate that the spring Chinook salmon juveniles out-migrated later than the summer Chinook salmon juveniles. Most spring juveniles (38/64) identified by STRUCTURE were ambiguously assigned by GENECLASS. Yet these fish had over 90% ancestry in the spring cluster. They were clearly spring Chinook salmon but the individuals had alleles in their genotypes that were common in both spring Chinook salmon populations in the baseline and GENECLASS calculated similar assignment likelihoods to both collections. The Methow and Twisp spring Chinook salmon populations are distinct from each other but they are more similar to each other than to the Methow summer Chinook salmon population.

The four fish that STRUCTURE identified with mixed ancestry assigned with >99% relative likelihood to the summer Chinook salmon collection (see Table 2 and Table 3). Their ancestry was primarily summer Chinook salmon, which is very distinct from spring Chinook salmon. Although they had some alleles that STRUCTURE detected as spring Chinook salmon alleles, the majority of their alleles were from summer Chinook salmon such that GENECLASS assigned them with high likelihood to the summer Chinook salmon baseline population. One fish, 09CW0469, had over 90% ancestry in the summer cluster in the STRUCTURE analysis but had nearly equal likelihoods of assignment to Twisp and to Methow spring Chinook salmon populations (likelihood data not shown). This fish had genotypic data at 11 loci which was enough for inclusion in the analysis, but missing data may have contributed to ambiguous assignment. Further, the allele pool for the STRUCTURE analysis was different from GENECLASS since Twisp spring Chinook salmon were absent from the STRUCTURE analysis. This may have also contributed to the ambiguous assignment for 09CW0469.

Three hundred and four juveniles assigned with > 99% relative likelihood to the Methow summer Chinook salmon collection. These juveniles also had over 90% ancestry in the cluster occupied by summer Chinook salmon in the STRUCTURE analysis and plotted with the summer Chinook salmon in the FCA. Juveniles collected in 2006 and 2007 in the Methow River smolt trap were mainly spring Chinook salmon (Small and Von Bargen 2009). If the timing of trapping differed between collection years, this would support different out-migration times for juveniles from the different run groups.

Conclusions

The different genetic perspectives offered congruent results: 17% of the emigrating juvenile Chinook salmon were offspring of spring Chinook salmon and 83% were offspring of summer Chinook salmon.

Acknowledgments

Juvenile samples were gathered by Charlie Snow (WDFW). Funding was provided by Douglas Co. PUD and Washington State General Funds. Scott Blankenship supplied genotypes for the summer Chinook salmon from the GAPS v2.1 database. Todd Kassler and Scott Blankenship provided helpful comments.

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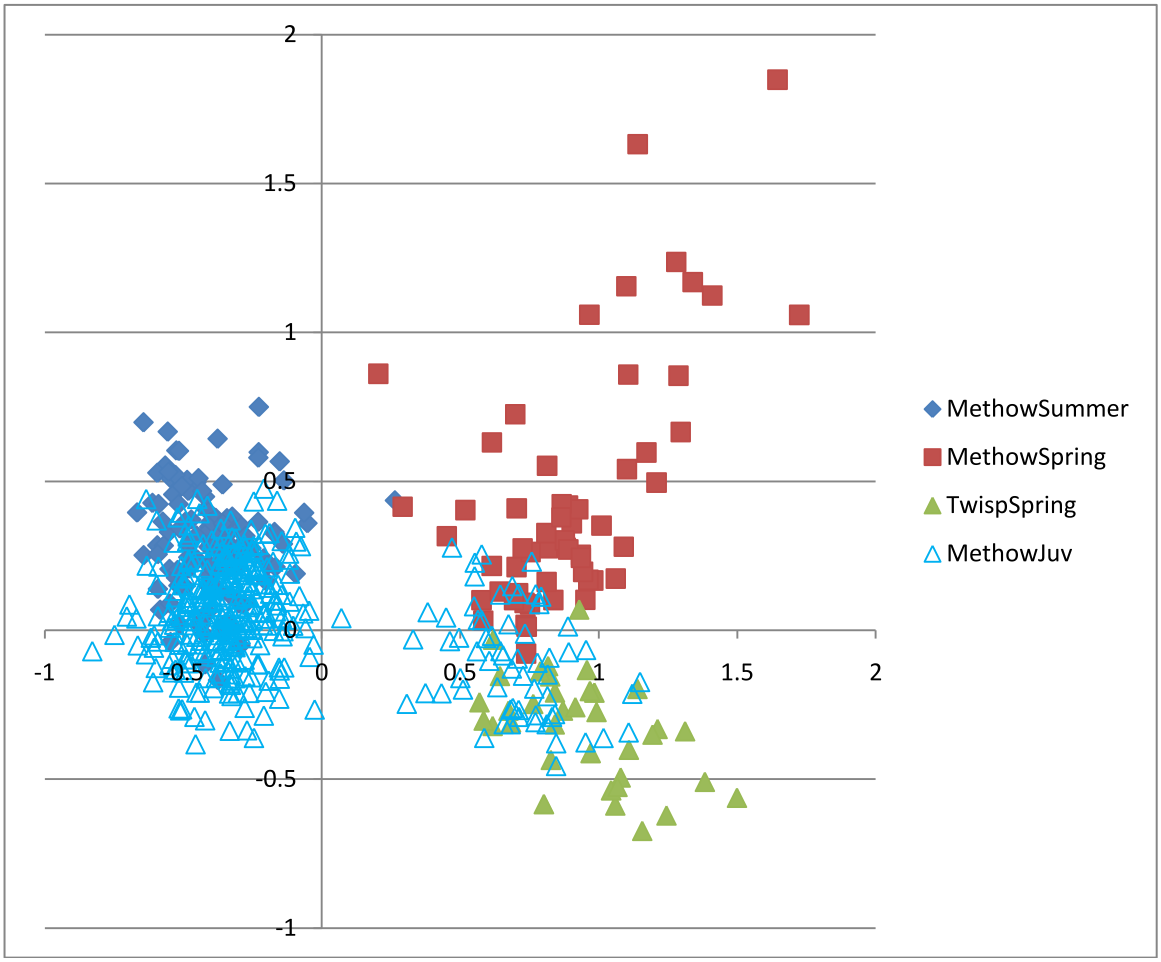

Figure 1. Factorial correspondence analysis plot from GENETIX. Each individual in plotted along the first two axes in the analysis, these axes describe a maximum amount of genetic variance in the dataset. Individuals plotting near each other are more similar genetically.

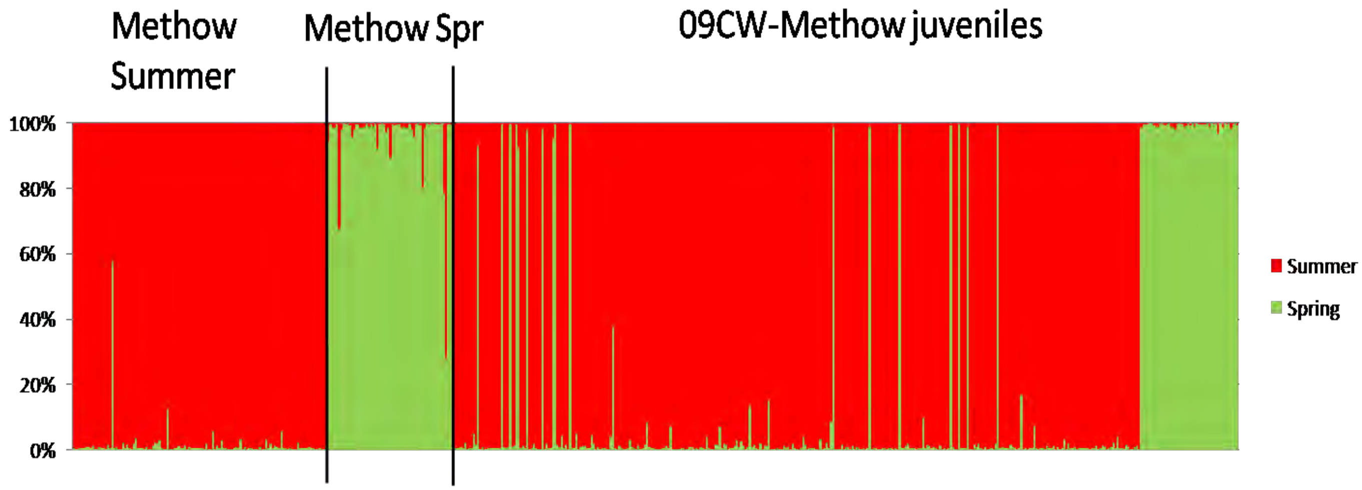

Figure 2. Ancestry values for individual fish calculated in STRUCTURE. Each fish is represented by a bar of color with red corresponding to summer Chinook salmon ancestry and green corresponding to spring Chinook salmon ancestry. Individuals with "pure" ancestry have a single color in their bar and individuals with "mixed" ancestry have two colors in their bar. Individuals are in order of the collection code number so juveniles with spring ancestry can be compared with STRUCTURE ancestry values in Table 2 and GENECLASS assignments in Table 3**.** Most of the spring Chinook salmon smolts were the last in the number series (see Table 3 for individual sample numbers).

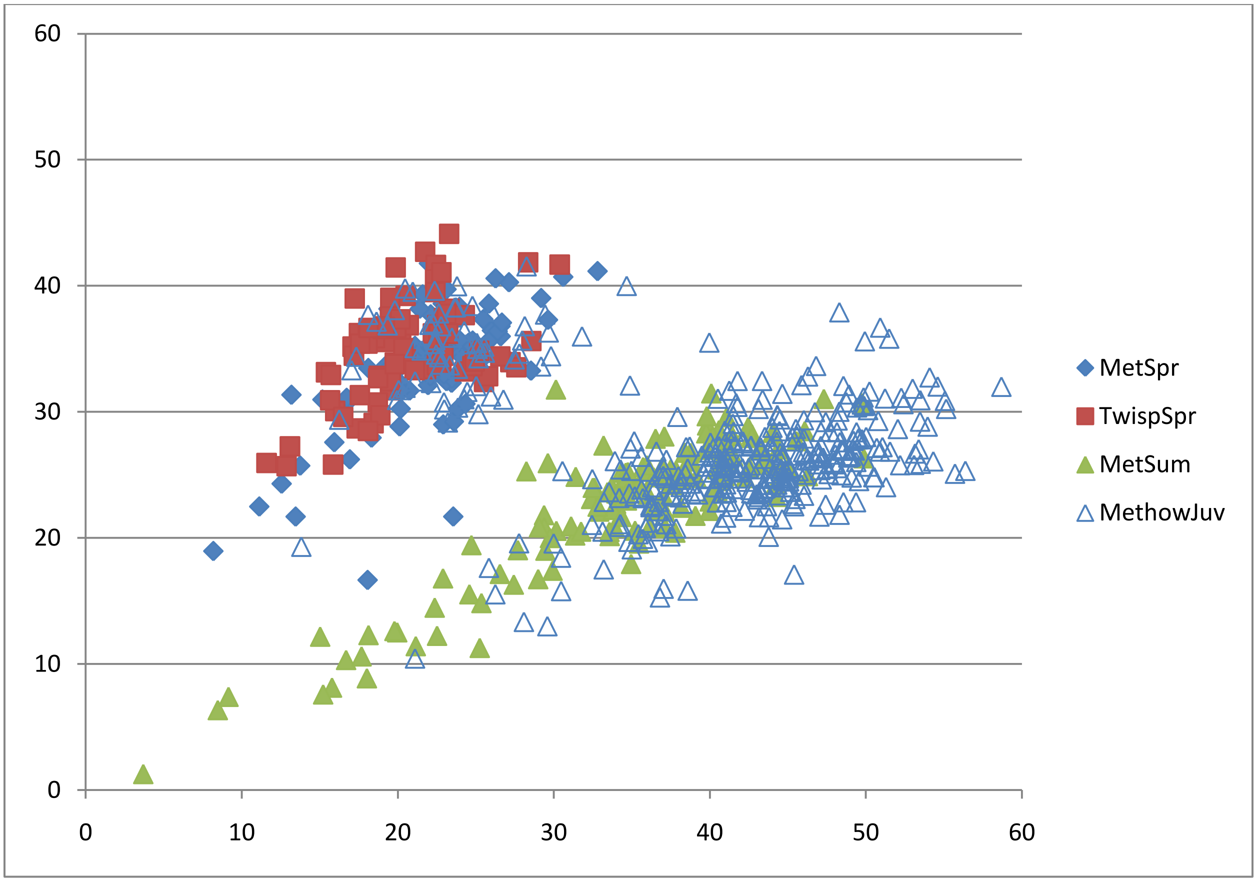

Figure 3. Graph of negative log likelihood assignment scores from GENECLASS. Methow summers (green triangles) are abbreviated MetSum, Methow springs (blue diamonds) are abbreviated MetSpr, Twisp springs (red boxes) are abbreviated TwispSpr and Methow juveniles (blue triangles) are abbreviated Juv.

Table 1. List of samples used in the 09Methow Chinook salmon juvenile assignment tests. For the Methow juveniles 375 were processed but only 368 had enough genotypic data (at least seven loci) to include in the study.

Code	Name	N
09CW	Methow juveniles - 2009	368/375
05HW	Methow spring	42
06DA	Methow spring	33
05HX	Twisp spring	42
06DA	Twisp spring	45
93EC	GAPS Methow summer	143

Table 2. Juvenile ancestry values from STRUCTURE. Only the spring Chinook ancestry and mixed ancestry individual data are shown, the others are summer Chinook salmon. See Figure 2 for graphic STRUCTURE data – percentage of ancestry in the two clusters (here spring and summer) is shown as percentage of colors in color bar in Figure 2.

	Clusters				Clusters		
	Spring	Summer	Status		Spring	Summer	Status
09CW0194	0.930	0.070	spring	09CW0523	0.997	0.003	spring
09CW0206	0.996	0.004	spring	09CW0524	0.989	0.011	spring
09CW0210	0.994	0.006	spring	09CW0525	0.985	0.015	spring
09CW0213	0.996	0.004	spring	09CW0526	0.977	0.023	spring
09CW0214	0.923	0.077	spring	09CW0527	0.996	0.004	spring
09CW0219	0.977	0.023	spring	09CW0528	0.997	0.003	spring
09CW0226	0.983	0.017	spring	09CW0529	0.995	0.005	spring
09CW0231	0.951	0.049	spring	09CW0530	0.989	0.011	spring
09CW0232	0.994	0.006	spring	09CW0531	0.991	0.009	spring
09CW0239	0.994	0.006	spring	09CW0532	0.997	0.003	spring
09CW0259	0.376	0.624	F1 ?	09CW0533	0.993	0.007	spring
09CW0325	0.136	0.864	backcross	09CW0534	0.997	0.003	spring
09CW0334	0.151	0.849	backcross	09CW0535	0.989	0.011	spring
09CW0364	0.987	0.013	spring	09CW0536	0.997	0.003	spring
09CW0381	0.989	0.011	spring	09CW0537	0.996	0.004	spring
09CW0395	0.994	0.006	spring	09CW0538	0.996	0.004	spring
09CW0421	0.993	0.007	spring	09CW0539	0.995	0.005	spring
09CW0425	0.995	0.005	spring	09CW0540	0.995	0.005	spring
09CW0429	0.988	0.012	spring	09CW0541	0.998	0.002	spring
09CW0443	0.992	0.008	spring	09CW0542	0.989	0.011	spring
09CW0454	0.170	0.830	backcross	09CW0543	0.997	0.003	spring
09CW0510	0.986	0.014	spring	09CW0544	0.995	0.005	spring
09CW0511	0.995	0.005	spring	09CW0545	0.997	0.003	spring
09CW0512	0.994	0.006	spring	09CW0546	0.965	0.035	spring
09CW0513	0.996	0.004	spring	09CW0547	0.997	0.003	spring
09CW0514	0.997	0.003	spring	09CW0548	0.985	0.015	spring
09CW0515	0.997	0.003	spring	09CW0549	0.997	0.003	spring
09CW0516	0.992	0.008	spring	09CW0550	0.994	0.006	spring
09CW0517	0.988	0.012	spring	09CW0551	0.997	0.003	spring
09CW0518	0.989	0.011	spring	09CW0552	0.983	0.017	spring
09CW0519	0.997	0.003	spring	09CW0553	0.996	0.004	spring
09CW0520	0.994	0.006	spring	09CW0554	0.998	0.002	spring
09CW0521	0.991	0.009	spring	09CW0555	0.991	0.009	spring
09CW0522	0.996	0.004	spring				

Table 3. Juvenile assignment data from GENECLASS. Baseline categories are labeled MetSum (yellow) for Methow summer, MetSpr (blue) for Methow spring and TwispSpr (green) for Twisp spring. Assign 1 are assignments with the highest likelihood (all fish had a highest assignment likelihood to a single collection) and “Assign >99” are assignments with greater than 99% relative likelihood (highest likelihood/sum of likelihoods); values over 99% are in red. “Unassigned” fish had <99% relative likelihood and thus similar assignment likelihoods to two collections. Table at top is a summary of assignments to baseline collections: “highest” is a sum of all Assign 1 assignments, Assign > 99 is a sum of assignments with over 99% relative likelihood.

	Spring		Summer		
	Methow	Twisp	Methow	unassigned	Total
highest	35	28	304	0	367
Assign >99	14	11	304	38	367

Sample	Assign 1	Rel. Like.	Assign >99	Sample	Assign 1	Rel. Like.	Assign >99	Sample	Assign 1	Rel. Like.	Assign >99
09CW0182	MetSum	100.00	MetSum	09CW0237	MetSum	100.00	MetSum	09CW0292	MetSum	100.00	MetSum
09CW0183	MetSum	100.00	MetSum	09CW0238	MetSum	100.00	MetSum	09CW0293	MetSum	100.00	MetSum
09CW0184	MetSum	100.00	MetSum	09CW0239	MetSpr	98.30	unassigned	09CW0294	MetSum	100.00	MetSum
09CW0185	MetSum	100.00	MetSum	09CW0240	MetSum	100.00	MetSum	09CW0295	MetSum	100.00	MetSum
09CW0186	MetSum	100.00	MetSum	09CW0241	MetSum	100.00	MetSum	09CW0296	MetSum	100.00	MetSum
09CW0187	MetSum	100.00	MetSum	09CW0242	MetSum	100.00	MetSum	09CW0297	MetSum	100.00	MetSum
09CW0188	MetSum	100.00	MetSum	09CW0243	MetSum	100.00	MetSum	09CW0298	MetSum	100.00	MetSum
09CW0189	MetSum	100.00	MetSum	09CW0244	MetSum	100.00	MetSum	09CW0299	MetSum	100.00	MetSum
09CW0190	MetSum	100.00	MetSum	09CW0245	MetSum	100.00	MetSum	09CW0300	MetSum	100.00	MetSum
09CW0191	MetSum	100.00	MetSum	09CW0246	MetSum	100.00	MetSum	09CW0301	MetSum	100.00	MetSum
09CW0192	MetSum	100.00	MetSum	09CW0247	MetSum	100.00	MetSum	09CW0302	MetSum	100.00	MetSum
09CW0193	MetSum	100.00	MetSum	09CW0248	MetSum	100.00	MetSum	09CW0303	MetSum	100.00	MetSum
09CW0194	MetSpr	95.89	unassigned	09CW0249	MetSum	99.84	MetSum	09CW0304	MetSum	100.00	MetSum
09CW0195	MetSum	100.00	MetSum	09CW0250	MetSum	100.00	MetSum	09CW0305	MetSum	100.00	MetSum
09CW0196	MetSum	100.00	MetSum	09CW0251	MetSum	100.00	MetSum	09CW0306	MetSum	100.00	MetSum
09CW0197	MetSum	100.00	MetSum	09CW0252	MetSum	100.00	MetSum	09CW0307	MetSum	100.00	MetSum
09CW0198	MetSum	100.00	MetSum	09CW0253	MetSum	100.00	MetSum	09CW0308	MetSum	100.00	MetSum
09CW0199	MetSum	100.00	MetSum	09CW0254	MetSum	100.00	MetSum	09CW0309	MetSum	100.00	MetSum
09CW0201	MetSum	100.00	MetSum	09CW0255	MetSum	100.00	MetSum	09CW0310	MetSum	100.00	MetSum
09CW0202	MetSum	100.00	MetSum	09CW0256	MetSum	100.00	MetSum	09CW0311	MetSum	100.00	MetSum
09CW0203	MetSum	100.00	MetSum	09CW0257	MetSum	100.00	MetSum	09CW0312	MetSum	100.00	MetSum
09CW0204	MetSum	100.00	MetSum	09CW0258	MetSum	100.00	MetSum	09CW0313	MetSum	100.00	MetSum
09CW0205	MetSum	100.00	MetSum	09CW0259	MetSum	99.72	MetSum	09CW0314	MetSum	100.00	MetSum
09CW0206	MetSpr	93.33	unassigned	09CW0260	MetSum	100.00	MetSum	09CW0315	MetSum	100.00	MetSum
09CW0207	MetSum	100.00	MetSum	09CW0261	MetSum	100.00	MetSum	09CW0316	MetSum	100.00	MetSum
09CW0208	MetSum	100.00	MetSum	09CW0262	MetSum	100.00	MetSum	09CW0317	MetSum	100.00	MetSum
09CW0209	MetSum	100.00	MetSum	09CW0264	MetSum	100.00	MetSum	09CW0318	MetSum	100.00	MetSum
09CW0210	TwispSpr	86.80	unassigned	09CW0265	MetSum	100.00	MetSum	09CW0319	MetSum	100.00	MetSum
09CW0211	MetSum	100.00	MetSum	09CW0266	MetSum	100.00	MetSum	09CW0320	MetSum	100.00	MetSum
09CW0212	MetSum	100.00	MetSum	09CW0267	MetSum	100.00	MetSum	09CW0321	MetSum	100.00	MetSum
09CW0213	MetSpr	95.74	unassigned	09CW0268	MetSum	100.00	MetSum	09CW0322	MetSum	100.00	MetSum
09CW0214	MetSpr	88.52	unassigned	09CW0269	MetSum	100.00	MetSum	09CW0323	MetSum	100.00	MetSum
09CW0216	MetSum	100.00	MetSum	09CW0270	MetSum	100.00	MetSum	09CW0324	MetSum	100.00	MetSum
09CW0217	MetSum	100.00	MetSum	09CW0272	MetSum	100.00	MetSum	09CW0325	MetSum	100.00	MetSum
09CW0218	MetSum	100.00	MetSum	09CW0273	MetSum	100.00	MetSum	09CW0326	MetSum	100.00	MetSum
09CW0219	MetSpr	95.67	unassigned	09CW0274	MetSum	100.00	MetSum	09CW0327	MetSum	100.00	MetSum
09CW0220	MetSum	100.00	MetSum	09CW0275	MetSum	100.00	MetSum	09CW0328	MetSum	100.00	MetSum
09CW0221	MetSum	100.00	MetSum	09CW0276	MetSum	100.00	MetSum	09CW0329	MetSum	100.00	MetSum
09CW0222	MetSum	100.00	MetSum	09CW0277	MetSum	99.99	MetSum	09CW0330	MetSum	100.00	MetSum
09CW0223	MetSum	100.00	MetSum	09CW0278	MetSum	100.00	MetSum	09CW0331	MetSum	100.00	MetSum
09CW0224	MetSum	100.00	MetSum	09CW0279	MetSum	100.00	MetSum	09CW0332	MetSum	100.00	MetSum
09CW0225	MetSum	100.00	MetSum	09CW0280	MetSum	100.00	MetSum	09CW0333	MetSum	100.00	MetSum
09CW0226	TwispSpr	90.88	unassigned	09CW0281	MetSum	100.00	MetSum	09CW0334	MetSum	100.00	MetSum
09CW0227	MetSum	100.00	MetSum	09CW0282	MetSum	100.00	MetSum	09CW0335	MetSum	100.00	MetSum
09CW0228	MetSum	100.00	MetSum	09CW0283	MetSum	100.00	MetSum	09CW0336	MetSum	100.00	MetSum
09CW0229	MetSum	100.00	MetSum	09CW0284	MetSum	100.00	MetSum	09CW0337	MetSum	100.00	MetSum
09CW0230	MetSum	100.00	MetSum	09CW0285	MetSum	100.00	MetSum	09CW0338	MetSum	100.00	MetSum
09CW0231	TwispSpr	50.04	unassigned	09CW0286	MetSum	100.00	MetSum	09CW0339	MetSum	100.00	MetSum
09CW0232	TwispSpr	93.30	unassigned	09CW0287	MetSum	100.00	MetSum	09CW0340	MetSum	100.00	MetSum

Table 3, continued.

Sample	Assign 1	Rel. Like.	Assign >99	Sample	Assign 1	Rel. Like.	Assign >99	Sample	Assign 1	Rel. Like.	Assign >99
09CW0233	MetSum	100.00	MetSum	09CW0288	MetSum	100.00	MetSum	09CW0341	MetSum	100.00	MetSum
09CW0234	MetSum	100.00	MetSum	09CW0289	MetSum	100.00	MetSum	09CW0342	MetSum	100.00	MetSum
09CW0235	MetSum	100.00	MetSum	09CW0290	MetSum	100.00	MetSum	09CW0343	MetSum	100.00	MetSum
09CW0236	MetSum	100.00	MetSum	09CW0291	MetSum	100.00	MetSum	09CW0344	MetSum	100.00	MetSum
09CW0345	MetSum	100.00	MetSum	09CW0417	MetSum	100.00	MetSum	09CW0487	MetSum	100.00	MetSum
09CW0346	MetSum	100.00	MetSum	09CW0418	MetSum	100.00	MetSum	09CW0488	MetSum	100.00	MetSum
09CW0347	MetSum	100.00	MetSum	09CW0419	MetSum	100.00	MetSum	09CW0489	MetSum	100.00	MetSum
09CW0348	MetSum	100.00	MetSum	09CW0420	MetSum	100.00	MetSum	09CW0490	MetSum	100.00	MetSum
09CW0349	MetSum	100.00	MetSum	09CW0421	MetSpr	100.00	MetSpr	09CW0491	MetSum	100.00	MetSum
09CW0350	MetSum	99.99	MetSum	09CW0422	MetSum	100.00	MetSum	09CW0492	MetSum	100.00	MetSum
09CW0351	MetSum	100.00	MetSum	09CW0423	MetSum	100.00	MetSum	09CW0493	MetSum	100.00	MetSum
09CW0352	MetSum	100.00	MetSum	09CW0424	MetSum	100.00	MetSum	09CW0494	MetSum	100.00	MetSum
09CW0353	MetSum	100.00	MetSum	09CW0425	TwispSpr	99.76	TwispSpr	09CW0495	MetSum	100.00	MetSum
09CW0354	MetSum	100.00	MetSum	09CW0426	MetSum	100.00	MetSum	09CW0496	MetSum	100.00	MetSum
09CW0355	MetSum	100.00	MetSum	09CW0427	MetSum	100.00	MetSum	09CW0497	MetSum	100.00	MetSum
09CW0356	MetSum	100.00	MetSum	09CW0428	MetSum	100.00	MetSum	09CW0498	MetSum	100.00	MetSum
09CW0357	MetSum	100.00	MetSum	09CW0429	MetSpr	100.00	MetSpr	09CW0499	MetSum	100.00	MetSum
09CW0358	MetSum	100.00	MetSum	09CW0430	MetSum	100.00	MetSum	09CW0500	MetSum	100.00	MetSum
09CW0359	MetSum	100.00	MetSum	09CW0431	MetSum	100.00	MetSum	09CW0501	MetSum	100.00	MetSum
09CW0360	MetSum	100.00	MetSum	09CW0432	MetSum	100.00	MetSum	09CW0502	MetSum	100.00	MetSum
09CW0361	MetSum	100.00	MetSum	09CW0433	MetSum	100.00	MetSum	09CW0503	MetSum	100.00	MetSum
09CW0362	MetSum	100.00	MetSum	09CW0434	MetSum	100.00	MetSum	09CW0504	MetSum	100.00	MetSum
09CW0363	MetSum	100.00	MetSum	09CW0435	MetSum	100.00	MetSum	09CW0505	MetSum	100.00	MetSum
09CW0364	MetSpr	99.64	MetSpr	09CW0436	MetSum	100.00	MetSum	09CW0506	MetSum	100.00	MetSum
09CW0365	MetSum	100.00	MetSum	09CW0437	MetSum	100.00	MetSum	09CW0507	MetSum	100.00	MetSum
09CW0366	MetSum	100.00	MetSum	09CW0438	MetSum	100.00	MetSum	09CW0508	MetSum	100.00	MetSum
09CW0367	MetSum	100.00	MetSum	09CW0439	MetSum	100.00	MetSum	09CW0509	MetSum	100.00	MetSum
09CW0368	MetSum	100.00	MetSum	09CW0440	MetSum	100.00	MetSum	09CW0510	TwispSpr	77.68	unassigned
09CW0369	MetSum	100.00	MetSum	09CW0441	MetSum	100.00	MetSum	09CW0511	TwispSpr	100.00	TwispSpr
09CW0370	MetSum	100.00	MetSum	09CW0442	MetSum	100.00	MetSum	09CW0512	MetSpr	76.98	unassigned
09CW0371	MetSum	100.00	MetSum	09CW0443	MetSpr	99.97	MetSpr	09CW0513	TwispSpr	93.66	unassigned
09CW0372	MetSum	100.00	MetSum	09CW0444	MetSum	100.00	MetSum	09CW0514	TwispSpr	75.90	unassigned
09CW0373	MetSum	100.00	MetSum	09CW0445	MetSum	100.00	MetSum	09CW0515	TwispSpr	99.95	TwispSpr
09CW0374	MetSum	100.00	MetSum	09CW0446	MetSum	100.00	MetSum	09CW0516	MetSpr	100.00	MetSpr
09CW0375	MetSum	100.00	MetSum	09CW0447	MetSum	100.00	MetSum	09CW0517	MetSpr	85.41	unassigned
09CW0376	MetSum	100.00	MetSum	09CW0448	MetSum	100.00	MetSum	09CW0518	MetSpr	86.24	unassigned
09CW0377	MetSum	100.00	MetSum	09CW0449	MetSum	100.00	MetSum	09CW0519	TwispSpr	66.48	unassigned
09CW0378	MetSum	100.00	MetSum	09CW0450	MetSum	100.00	MetSum	09CW0520	TwispSpr	99.78	TwispSpr
09CW0379	MetSum	100.00	MetSum	09CW0451	MetSum	100.00	MetSum	09CW0521	MetSpr	99.79	MetSpr
09CW0380	MetSum	100.00	MetSum	09CW0452	MetSum	100.00	MetSum	09CW0522	MetSpr	99.98	MetSpr
09CW0381	MetSpr	93.51	unassigned	09CW0453	MetSum	100.00	MetSum	09CW0523	TwispSpr	92.54	unassigned
09CW0382	MetSum	100.00	MetSum	09CW0454	MetSum	100.00	MetSum	09CW0524	MetSpr	93.14	unassigned
09CW0383	MetSum	100.00	MetSum	09CW0455	MetSum	100.00	MetSum	09CW0525	TwispSpr	94.33	unassigned
09CW0384	MetSum	100.00	MetSum	09CW0456	MetSum	100.00	MetSum	09CW0526	MetSpr	100.00	MetSpr
09CW0385	MetSum	100.00	MetSum	09CW0457	MetSum	100.00	MetSum	09CW0527	TwispSpr	100.00	TwispSpr
09CW0386	MetSum	100.00	MetSum	09CW0458	MetSum	100.00	MetSum	09CW0528	MetSpr	71.77	unassigned
09CW0387	MetSum	100.00	MetSum	09CW0459	MetSum	100.00	MetSum	09CW0529	MetSpr	99.99	MetSpr
09CW0388	MetSum	100.00	MetSum	09CW0460	MetSum	99.83	MetSum	09CW0530	TwispSpr	100.00	TwispSpr
09CW0389	MetSum	100.00	MetSum	09CW0461	MetSum	100.00	MetSum	09CW0531	TwispSpr	91.59	unassigned
09CW0390	MetSum	100.00	MetSum	09CW0462	MetSum	100.00	MetSum	09CW0532	MetSpr	65.92	unassigned
09CW0391	MetSum	100.00	MetSum	09CW0463	MetSum	100.00	MetSum	09CW0533	TwispSpr	99.01	TwispSpr
09CW0392	MetSum	100.00	MetSum	09CW0464	MetSum	100.00	MetSum	09CW0534	MetSpr	76.88	unassigned
09CW0393	MetSum	100.00	MetSum	09CW0465	MetSum	100.00	MetSum	09CW0535	MetSpr	75.32	unassigned
09CW0394	MetSum	100.00	MetSum	09CW0466	MetSum	100.00	MetSum	09CW0536	TwispSpr	89.64	unassigned
09CW0395	MetSpr	95.08	unassigned	09CW0467	MetSum	100.00	MetSum	09CW0537	TwispSpr	98.03	unassigned
09CW0396	MetSum	100.00	MetSum	09CW0468	MetSum	100.00	MetSum	09CW0538	MetSpr	99.93	MetSpr
09CW0397	MetSum	100.00	MetSum	09CW0469	MetSpr	51.62	unassigned	09CW0539	TwispSpr	92.87	unassigned
09CW0398	MetSum	100.00	MetSum	09CW0470	MetSum	100.00	MetSum	09CW0540	TwispSpr	99.82	TwispSpr
09CW0399	MetSum	100.00	MetSum	09CW0471	MetSum	100.00	MetSum	09CW0541	TwispSpr	97.64	unassigned
09CW0401	MetSum	100.00	MetSum	09CW0472	MetSum	100.00	MetSum	09CW0542	MetSpr	95.66	unassigned
09CW0402	MetSum	100.00	MetSum	09CW0473	MetSum	100.00	MetSum	09CW0543	MetSpr	99.83	MetSpr
09CW0403	MetSum	100.00	MetSum	09CW0474	MetSum	100.00	MetSum	09CW0544	TwispSpr	96.14	unassigned
09CW0404	MetSum	100.00	MetSum	09CW0475	MetSum	100.00	MetSum	09CW0545	MetSpr	100.00	MetSpr
09CW0405	MetSum	100.00	MetSum	09CW0476	MetSum	100.00	MetSum	09CW0546	MetSpr	100.00	MetSpr
09CW0406	MetSum	100.00	MetSum	09CW0477	MetSum	100.00	MetSum	09CW0547	MetSpr	72.03	unassigned
09CW0408	MetSum	100.00	MetSum	09CW0478	MetSum	100.00	MetSum	09CW0548	MetSpr	56.42	unassigned
09CW0409	MetSum	100.00	MetSum	09CW0479	MetSum	100.00	MetSum	09CW0549	MetSpr	75.24	unassigned

Table 3, continued.

09CW0410	MetSum	99.99	MetSum	09CW0480	MetSum	100.00	MetSum	09CW0550	TwispSpr	100.00	TwispSpr
09CW0411	MetSum	100.00	MetSum	09CW0481	MetSum	100.00	MetSum	09CW0551	TwispSpr	99.70	TwispSpr
09CW0412	MetSum	100.00	MetSum	09CW0482	MetSum	100.00	MetSum	09CW0552	MetSpr	99.86	MetSpr
09CW0413	MetSum	100.00	MetSum	09CW0483	MetSum	100.00	MetSum	09CW0553	TwispSpr	99.80	TwispSpr
09CW0414	MetSum	100.00	MetSum	09CW0484	MetSum	100.00	MetSum	09CW0554	TwispSpr	98.88	unassigned
09CW0415	MetSum	100.00	MetSum	09CW0485	MetSum	100.00	MetSum	09CW0555	MetSpr	98.75	unassigned
09CW0416	MetSum	100.00	MetSum	09CW0486	MetSum	100.00	MetSum				

Chapter 4

2009 Brood Summer Steelhead Spawning Ground Surveys Conducted in the Methow River Basin

Abstract

Steelhead spawning ground surveys were performed to estimate the relative abundance, distribution, and timing of spawning within the Methow River basin. Based on surveys conducted between 5 March and 12 June, we estimated a minimum of 1,030 steelhead redds were constructed in the Methow in 2009. The greatest number of redds were found in the Twisp and upper Methow River subbasins (N = 352 and 287, respectively). The lower Methow (N = 219) and Chewuch River (N = 172) subbasins had similar numbers of redds. The run-at-large above Wells Dam was composed primarily of hatchery-origin steelhead (88.4%). Based on biological sampling of steelhead during broodstock collection at Wells Hatchery, 24.1% of total escapement was composed of out-of-basin stray hatchery fish, primarily from the Wenatchee River. Passive integrated transponder (PIT) tag recaptures from the 2002-2004 broods indicate that steelhead released from Wells Hatchery rarely stray into other independent populations downstream of Wells Dam. Within the Methow and Okanogan basins, Wells Hatchery steelhead comprised greater than 10% of the spawning population of some tributaries in which no hatchery steelhead were released. Wild 1-salt steelhead migrated to Wells Dam significantly earlier than hatchery 1-salt steelhead, based on sampling conducted each Monday during the broodstock collection period. No significant differences in spawn timing of hatchery and wild female steelhead were observed in the hatchery environment or during natural spawning in the Twisp River. Based on run-escapement estimates, the mean natural replacement rate for the eight most recent broods of steelhead spawning above Wells Dam (1996-2003) was 0.24 recruits per adult. For all brood years examined (1996-2003), the hatchery replacement rate was significantly greater than the natural replacement rate.

Introduction

Summer steelhead are propagated at Wells Hatchery and used to supplement the natural spawning populations in the Methow and Okanogan rivers. As such, hatchery adults returning to supplemented streams should have migration timing, spawn timing, and redd distribution similar to those of naturally produced fish. Deviations from these life-history traits may have deleterious effects on the overall reproductive success of the integrated population. The number of spawners, derived from estimates of redd abundance, provides critical information not only for survival and spawner-recruit analyses, but also for assessing freshwater smolt production. Knowledge of both the productivity of the population (i.e., recruits per spawner), as related to the total abundance of spawners, and the proportion of hatchery fish on the spawning grounds should provide valuable insight on the factors limiting the number of naturally produced adults. In addition to spawner abundance, determining the proportion of stray fish on the spawning grounds would also be helpful in explaining observed levels of productivity.

The implementation of the Analytical Framework for Monitoring and Evaluating PUD Hatchery Programs (Hays et al. 2007) as proposed by Murdoch and Snow (2008) included objectives designed to address key questions regarding supplementation. Steelhead spawning ground surveys and associated activities (i.e., broodstock collection and creel surveys) were used to evaluate spawn timing, distribution, and tributary-specific escapement levels within the Methow River basin. While hatchery steelhead were released in both the Methow and Okanogan populations, this report focuses on the Methow population. Monitoring and Evaluation activities are conducted in the Okanogan Basin by the Colville Confederated Tribes and those activities are reported separately (see Arterburn and Miller 2009) unless specifically relevant to Methow Basin activities. This chapter addresses activities related to steelhead spawning ground surveys in 2009 and specific elements of the M&E Plan for the following objectives:

Objective 1: Determine if a) supplementation programs have increased the number of naturally spawning and naturally produced adults of the target population relative to a non-supplemented population (i.e., reference stream), and b) changes in the natural replacement rate (NRR) of the supplemented population are similar to that of the non-supplemented population.

- Ho: Number of hatchery fish that spawn naturally ≥ number of naturally and hatchery produced fish taken for broodstock
- Ho: Δ NOR/Max recruitment $_{\text{Supplemented population}}$ > Δ NOR/Max recruitment $_{\text{Non-supplemented population}}$
- Ho: Δ NRR $_{\text{Supplemented population}} \geq \Delta$ NRR $_{\text{Non-supplemented population}}$

Objective 2: Determine if the run timing, spawn timing, and spawning distribution of both the natural and hatchery components of the target population are similar.

- Ho: Migration timing $_{\text{Hatchery age X}}$ = Migration timing $_{\text{Naturally produced age X}}$
- Ho: Spawn timing $_{\text{Hatchery}}$ = Spawn timing $_{\text{Naturally produced}}$
- Ho: Redd distribution $_{\text{Hatchery}}$ = Redd distribution $_{\text{Naturally produced}}$

Objective 4: Determine if the hatchery adult-to-adult survival (i.e., hatchery replacement rate) is greater than the natural adult-to-adult survival (i.e., natural replacement rate) and equal to or greater than the program specific expected value (BAMP 1998).

- Ho: HRR $_{\text{Year x}} \geq$ NRR $_{\text{Year x}}$
- Ho: HRR ≥ BAMP value (preferred)

Objective 5: Determine if the stray rate of hatchery fish is below acceptable levels to maintain genetic variation.

- Ho: Stray rate $_{\text{Hatchery fish}} \leq$ 5% of total brood return
- Ho: Stray hatchery fish ≤ 5% of spawning escapement (based on run year) within other independent populations
- Ho: Stray hatchery fish ≤ 10% of spawning escapement (based on run year)

of any non-target streams within independent populations

Methods

Migration Timing and Spawner Composition

Broodstock were collected at Wells Dam from a composite of both the Methow and Okanogan populations. Adult fish were trapped a maximum of three days per week and were retained for broodstock as necessary to achieve collection goals for hatchery and wild fish (Truscott 2008). All trapped steelhead were sampled for hatchery marks, and scale samples were collected from all unmarked fish to determine origin (i.e., hatchery or wild). Additionally, scale samples were collected from fish trapped each Monday to determine origin and age composition of the entire run. Migration timing of local hatchery (i.e., Wells stock) and wild fish was calculated using all trapped fish for which age and origin could be determined. Dam passage date (day of the year) was categorized by fish salt-age and mean passage date by salt-age was analyzed using Kruskal-Wallis (KW) ANOVA because assumptions regarding equal variance could not be met. All statistical analyses were performed at a significance level of 0.05.

Steelhead passing Wells Dam were subjected to local selective fisheries, and creel surveys were used to estimate the number of steelhead removed from the Methow, Columbia, Okanogan, and Similkameen River basins (see Chapter 2). Run escapement estimates were calculated for the Methow and Okanogan rivers by applying the proportion of fish that migrated to each basin based on results of local radio-telemetry studies (English et al. 2001, 2003) to the estimated number of hatchery and wild steelhead passing Wells Dam. Basin-specific fishery removal and indirect mortality (5%) estimates were then subtracted from the estimated escapement to each basin to determine the number of steelhead available for natural spawning. Dam fallback and double counting of fish at Wells Dam were estimated using data from Passive-Integrated-Transponder (PIT) tag detections at Columbia River hydroelectric facilities or within tributaries. Fish that were detected at dams or within tributaries downstream of Wells Dam after their last detection at Wells Dam were considered fallbacks. Total fallback was estimated by expanding the estimated fallback proportion to the run-at-large passing Wells Dam. Further, PIT tag records were reviewed to determine if fish migrated through fish ladders more than once; these events overestimated the total count at Wells Dam. No estimates were made of pre-spawn mortality or illegal removal (i.e., poaching).

Migration timing at the Twisp River instream PIT tag array was evaluated using steelhead tagged during sampling at Priest Rapids and Wells Dams. Upstream migration timing at the Twisp array and kelt emigration timing (number of days from last observation at Twisp weir to first observation at the array) were analyzed using KW ANOVA because equal variance among groups could not be met; upstream migration timing analyses compared salt age and origin while kelt emigration timing also included comparisons of gender. Migration timing from the Twisp array to the Twisp weir was analyzed using factorial ANOVA; the assumption of equal variances among groups was met, and ANOVA is robust to non-normality (Zar 1999). However, the Twisp array was damaged during spring runoff in mid-May, and kelt emigration timing data may not include the entire period of out-migration.

Spawn Timing and Redd Distribution

Spawn timing within the hatchery environment was assessed during normal spawning operations at Wells Hatchery. Although spawning typically occurs much earlier in the hatchery than in the natural environment, any relative differences observed in the broodstock may also be present in the natural environment. A comparison of spawning dates based on fish parentage (genetic cross) was analyzed using one-way ANOVA; multiple comparison tests (Tukey HSD) were used to evaluate differences among groups.

The Methow River basin was divided into four geographic subbasins; the upper Methow, lower Methow, Chewuch, and Twisp. Index areas of annual spawning activity were established within each subbasin based on information from historic surveys (Tables 1 – 4). Index areas were surveyed weekly on foot or by raft throughout the spawning season. Steelhead redds were individually flagged with date, redd number, and location recorded on each flag. Each redd was also recorded with hand-held global positioning system (GPS) devices for subsequent mapping. When spawning was perceived to be near peak, non-index areas were surveyed to obtain a total redd count, and index areas were surveyed by a naïve surveyor to determine the proportion of total redds still visible. Redds observed outside of index areas were expanded by the visible:total proportion of redds from index area counts. Index area surveys continued after peak spawning, and additional expansions were made in non-index areas based on the proportion of additional redds found within index areas after peak spawning. Expanded redd counts from outside the index areas were combined with total redd counts within the index areas to estimate the total number of redds for each stream as described in Appendix F, task 7-3 of the M&E Plan (Wells HCP HC 2007).

The logistical challenges of systematically sampling numerous low-order tributaries in the Methow Basin precluded the use of annual index areas for each tributary. Therefore, a rotating panel methodology was used to estimate redd abundance in smaller streams without annual index areas. Streams accessible to spawning steelhead were identified from the Washington State Conservation Commission's Salmon, Steelhead, and Bull Trout Habitat Limiting Factors Report (LFA 2000). Tributaries were randomly assigned a survey year to serve as an index stream for each respective subbasin (Table 5). Selected tributaries were surveyed weekly during the spawning season and redd densities (redds/km) of index tributaries were expanded to other subbasin tributaries based on length (km) of available spawning habitat. The length of suitable steelhead spawning was field verified and adjusted based on data from the previous studies (LFA 2000).

In 2009, redd counts derived from existing survey methodologies were compared with total redd counts derived from weekly surveys in the Twisp River subbasin and rotating panel streams throughout the Methow Basin. All rotating panel stream reaches were surveyed multiple times during the spawning season. Redd estimates derived from total counts were compared to those derived from index-area expansions to examine potential differences between the two methodologies.

An evaluation of spawn timing and redd distribution in the natural environment was conducted by utilizing a recently upgraded weir on the Twisp River. Adult steelhead on their upstream spawning migration were trapped at the Twisp Weir and sampled for hatchery marks, sex, and origin. Wild fish and hatchery fish known or assumed to be from local releases (left yellow elastomer [LYE], right yellow elastomer [RYE], adipose fin-clip + coded wire tag [Ad + CWT], and Ad-only marks) were sampled, tagged, and released upstream of the weir. Hatchery steelhead known or assumed to be stray fish (left green elastomer [LGE], right green elastomer [RGE], snubbed dorsal fin [HFN], etc.) were released downstream of the weir. All steelhead released upstream received uniquely colored Floy tags representing sex and origin (i.e., green = wild female, blue = wild male, yellow = hatchery female, red = hatchery male). These tags were used to assess the spawn timing and location of hatchery and wild fish. Steelhead that were not already PIT-tagged were PIT-tagged in different body locations, depending on gender, prior to release upstream of the weir. All male steelhead released upstream, and all fish released downstream were PIT-tagged in the pelvic girdle. Female steelhead released upstream were tagged in the body cavity to increase the likelihood of the PIT tag being expelled into the redd during spawning. Near the end of spawning, redds were scanned with PIT-tag readers to document tag deposition. While observations of Floy-tagged fish on redds were used for spawn timing analyses, both Floy tag observations and PIT-tag detections from redds were used to determine redd distribution. When duplicate records (i.e., Floy observation and PIT-tag detection from the same redd) occurred, one was used for analyses and the other omitted from analyses. Comparisons of spawning dates and redd distributions based on origin were analyzed using the Mann-Whitney U-test because equal variance among groups was not met.

Table 1. Upper Methow River subbasin survey reaches (index reaches in bold).

Stream	Section	Code	Section length (rkm)		
			Begin	End	Total
Upper Methow	Ballard CG. - Lost River Conf.	M15	120.8	116.8	4.0
	Lost River Conf. - Gate Creek	M14	116.8	112.0	4.8
	Gate Creek - Early Winters Cr.	M13	112.0	107.8	4.2
	Early Winters Cr. - Mazama Br.	M12	107.8	104.6	3.2
	Mazama Br. - Susp. Bridge	**M11**	**104.6**	**100.6**	**4.0**
	Susp. Br. - Weeman Bridge	**M10**	**100.6**	**95.4**	**5.2**
	Weeman Br. - Along Hwy 20	M9	95.4	86.4	9.0
	Along Highway 20 - Wolf Cr.	M8	86.4	84.2	2.2
	Wolf Cr. - Foghorn Dam	M7	84.2	82.4	1.8
	Foghorn Dam - Winthrop Br.	M6	82.4	79.7	2.7
Lost River	Sunset Cr. - Eureka Cr.	L3	11.2	6.6	4.6
	Eureka Cr. - Lost River Br.	L2	6.6	0.8	5.8
	Lost River Br. - Conf.	**L1**	**0.8**	**0.0**	**0.8**
Early Winters Cr.	Klipchuck CG. - Early Winters Br.	EW5	7.2	5.8	1.4
	Early Winters Br. - Hwy 20 Br.	EW4	5.8	3.7	2.1
	Highway 20 Br. – Div. Dam	EW3	3.7	0.8	2.9
	Div. Dam - Hwy 20 Br.	**EW2**	**0.8**	**0.5**	**0.3**
	Hwy 20 Br. - Conf.	**EW1**	**0.5**	**0.0**	**0.5**
Suspension Cr.	100m above fork - Confluence	SP1	0.3	0.0	0.3
Little Susp. Cr.	50m above fork - Confluence	LSP1	0.1	0.0	0.1
Hancock Cr.	Springs - Wolf Creek Road	HA2	1.1	0.2	0.9
	Wolf Creek Road - Confluence	HA1	0.2	0.0	0.2
MH Outfall[1]	Hatchery to Methow River	MH1	0.4	0.0	0.4
WNFH Outfall[2]	Hatchery to Methow River	WN1	0.4	0.0	0.4

[1]Methow State Fish Hatchery outfall.
[2]Winthrop National Fish Hatchery outfall.

Table 2. Lower Methow River subbasin survey reaches (index reaches in bold).

Stream	Section	Code	Section length (rkm)		
			Begin	End	Total
Lower Methow	Winthrop Br. - MVID Dam	M5	80.1	72.1	8.0
	MVID - Twisp Confluence	M4	72.1	64.9	7.2
	Twisp Confluence - Carlton Br.	M3	64.9	43.8	21.1
	Carlton Br. - Upper Burma Br.	**M2**	**43.8**	**20.1**	**23.7**
	Upper Burma Bridge - Pateros	M1	20.1	0	20.1
Beaver Creek	Lester Br. - Balky Hill Rd	BV3	14.2	9.3	4.9
	Balky Hill Rd - Hwy 20	BV2	9.3	3.4	5.9
	Hwy 20 - Confluence	**BV1**	**3.4**	**0.0**	**3.4**

Table 3. Twisp River subbasin survey reaches (index reaches in bold).

Stream	Section	Code	Section length (rkm)		
			Begin	End	Total
Twisp River	Road's End CG. - South Cr. Br.	T10	46.4	41.8	4.6
	South Cr. Br. - Poplar Flats CG.	T9	41.8	38.6	3.2
	Poplar Flats CG. - Mystery Br.	T8	38.6	35.4	3.2
	Mystery Br. - War Cr. Br.	T7	35.4	28.5	6.9
	War Cr. Br. - Buttermilk Br.	T6	28.5	21.1	7.4
	Buttermilk Br. - Little Br. Cr.	**T5**	**21.1**	**15.2**	**5.9**
	Little Br. Cr. - Twisp Weir	**T4**	**15.2**	**11.4**	**3.8**
	Twisp Weir - Upper Poorman Br.	T3	11.4	7.8	3.6
	Up. P'man Br. - Low. P'man Br.	T2	7.8	2.9	4.9
	Lower Poorman Br. - Confluence	T1	2.9	0.0	2.9
Little Bridge Cr.	Vetch Cr. - Upper Bridge	LBC3	7.8	4.8	3.0
	Upper Bridge - Lower Bridge	LBC2	4.8	2.4	2.4
	Lower Bridge - Confluence	LBC1	2.4	0.0	2.4
MSRF pond outfall[1]	Acclimation pond to confluence	MSRF1	0.2	0.0	0.2

[1]Methow Salmon Recovery Foundation pond outfall.

Table 4. Chewuch River subbasin survey reaches (index reaches in bold).

Stream	Section	Code	Section length (rkm)		
			Begin	End	Total
Chewuch River	Chewuch Falls - 30 Mi. Br.	C13	54.4	50.2	4.2
	30 Mi. Br. - Road Side Camp	C12	50.2	45.6	4.6
	Road Side Camp - Andrews Cr.	C11	45.6	41.3	4.3
	Andrews Cr. - Lake Cr.	C10	41.3	37.3	4.0
	Lake Cr. - Buck Cr.	C9	37.3	35.0	2.3
	Buck Cr. - Camp 4	C8	35.0	32.6	2.4
	Camp 4 - Chewuch CG.	C7	32.6	27.5	5.1
	Chewuch CG. - Falls Cr. CG.	C6	27.5	21.8	5.7
	Falls Cr. CG. - 8 Mile Cr.	C5	21.8	18.1	3.7
	8 Mile Cr. - Boulder Cr.	**C4**	**18.1**	**14.4**	**3.7**
	Boulder Cr. - Chewuch Br.	C3	14.4	12.6	1.8
	Chewuch Br. - WDFW Land	C2	12.6	5.1	7.5
	WDFW Land - Confluence	C1	5.1	0.0	5.1
Eightmile Cr.	**500m above diversion – Conf.**	**EM1**	**0.8**	**0.0**	**0.8**

Table 5. Low-order tributaries included in the rotating panel sampling design by subbasin and survey year.

Stream (section)	Survey year	Code	Dist. (km)
Upper Methow subbasin			
Little Boulder Creek (Hwy 20 - Conf.)	2004, 2008	LBO1	0.2
Wolf Creek (Rd 5505 access – footbridge)	2005, 2009	W2	1.9
Wolf Creek (footbridge – Conf.)	2005, 2009	W1	0.5
Goat Creek (FR 52 Br. - Conf.)	2006	GT1	2.2
Lower Methow subbasin			
Gold Cr. Upper NF (11.4 rkm - Ranch)	2005, 2008	GD-N4	6.4
Gold Cr. Mid. NF (Ranch - N.F. Br.)	2005, 2008	GD-N3	0.9
Gold Cr. Mid. NF (N.F. Br. - Whispering Pines)	2005, 2008	GD-N2	1.5
Gold Cr. Lower NF (Whispering Pines - 2nd Br.)	2005, 2008	GD-N1	2.2
Gold Cr. SF (1st Br. - 1.7 rkm)	2005, 2008	GD-S3	4.4
Gold Cr. SF (1.7 rkm - 0.6 rkm)	2005, 2008	GD-S2	1.1
Gold Cr. SF (0.6 rkm - Conf.)	2005, 2008	GD-S1	0.6
Gold Cr. Mainstem (2nd Br. - Private Land)	2005, 2008	GD-M2	1.2
Gold Cr. Mainstem (Private Land - Conf.)	2005, 2008	GD-M1	1.3
Foggy Dew Creek (FR 200 - Conf.)	2005, 2008	FD1	4.2
Libby Creek (Lower Public Land)	2006, 2009	LB4	1.0
Libby Creek (Low Pub Land - Realty Land)	2006, 2009	LB3	1.1
Libby Creek (Realty Land)	2006, 2009	LB2	0.3
Libby Creek (Realty Land - Conf.)	2006, 2009	LB1	1.0
Black Canyon Cr. (2nd Br. - 0.8 rkm)	2007	BC2	1.0
Black Canyon Cr. (0.8 rkm - Conf.)	2007	BC1	0.8
Twisp subbasin			
Eagle Creek (FR 4430 culvert - Conf.)	2004, 2008	EA1	0.5
War Creek (FR 4430 - Conf.)	2005, 2009	WR1	1.0
Buttermilk Cr. (Fork - Cattle Grd.)	2006	BM2	2.1
Buttermilk Cr. (Cattle Grd. - Conf.)	2006	BM1	2.0
South Creek (Falls - Conf.)	2007	SO1	0.6
Chewuch subbasin			
Andrews Creek (Little Andrews Cr. – 1st Br.)	2004, 2008	AN2	0.3
Andrews Creek (1st Bridge - Conf.)	2004, 2008	AN1	0.2
Boulder Creek (Falls - 1st Bridge)	2005, 2006	BD2	0.8
Boulder Creek (1st Bridge - Conf.)	2005, 2006	BD1	0.8
Lake Creek (Black Lake - 1st Bridge)	2009	LK2	11.3
Lake Creek (1st Bridge - Conf.)	2009	LK1	0.8
Twentymile Creek (Falls – FR 5010)	2007	TW2	0.9
Twentymile Creek (FR 5010 - Conf.)	2007	TW1	0.1

Natural Replacement Rate (NRR) and Stray Rates

To estimate run escapement (parent broods) to the Methow Basin, steelhead returning to Wells Dam were apportioned to the Methow Basin based on radio-telemetry data (English et al. 2001, 2003). The NRR for each brood was calculated by adding the number of recruits (*r*), based on total age determined from scales, from successive return years (*i*) that originated from the same parent brood. The total number of recruits was divided by the number of spawners (*S*) for that brood year:

$$\text{NRR} = (r_{i+1} + r_{i+2} + r_{i+3} + \ldots)/S$$

Comparisons of NRR and HRR (Hatchery Replacement Rate) were conducted using Mann-Whitney U-tests because equal variance between groups was not met. Testing HRR against the set standard (19.3 adults/spawner) derived from BAMP (1998) was conducted with a one-sample t-test.

Population-specific stray rates are currently unavailable for the Methow and Okanogan populations because too few carcasses are recovered during spawning ground surveys, and most summer steelhead released are not marked to identify tributary of release. However, PIT tags can be used to identify migration patterns if instream antenna arrays are present. Currently, antenna arrays are located in numerous tributaries in the Methow Basin as well as Omak Creek in the Okanogan Basin. Array observations during 2005-2009 spawning periods were used to assess non-target straying from the 2002-2005 Wells Hatchery steelhead brood releases (see Marsh et al. 2007).

All returning Wenatchee Basin hatchery steelhead were elastomer-tagged prior to release and the contribution of stray hatchery steelhead to the Methow and Okanogan populations was assessed at Wells Dam. Unmarked hatchery fish (identified through scale analysis) were apportioned to local or stray elastomer-only marked populations based on proportions of elastomer-tagged fish in the weekly collections.

Results

Migration Timing and Spawner Composition

Stock assessment and collection of the 2009 brood Wells Hatchery steelhead broodstock occurred at Wells Dam between 6 July and 1 November 2008. During that time, a total of 9,326 steelhead migrated to Wells Dam (Table 6). Of those fish, 1,124 (12.1%) were sampled for hatchery marks or were scale sampled to determine origin. Of the sampled fish, 300 hatchery and 75 wild steelhead were retained for broodstock purposes. The remaining 706 hatchery and 43 wild steelhead were released upstream of Wells Dam. Based on weekly sampling results (i.e., Mondays), wild 1-salt steelhead migrated to Wells Dam an average of 13 days earlier than hatchery 1-salt steelhead (Figure 1; KW ANOVA: $P < 0.01$).

Table 6. Migration of hatchery and wild steelhead to Wells Dam between 6 July and 1 November 2008.

Origin	*N*	Cumulative migration date			
		25%	50%	75%	100%
Hatchery	8,354	21-Aug	12-Sept	25-Sept	1-Nov
Wild	972	18-Aug	30-Aug	23-Sept	1-Nov

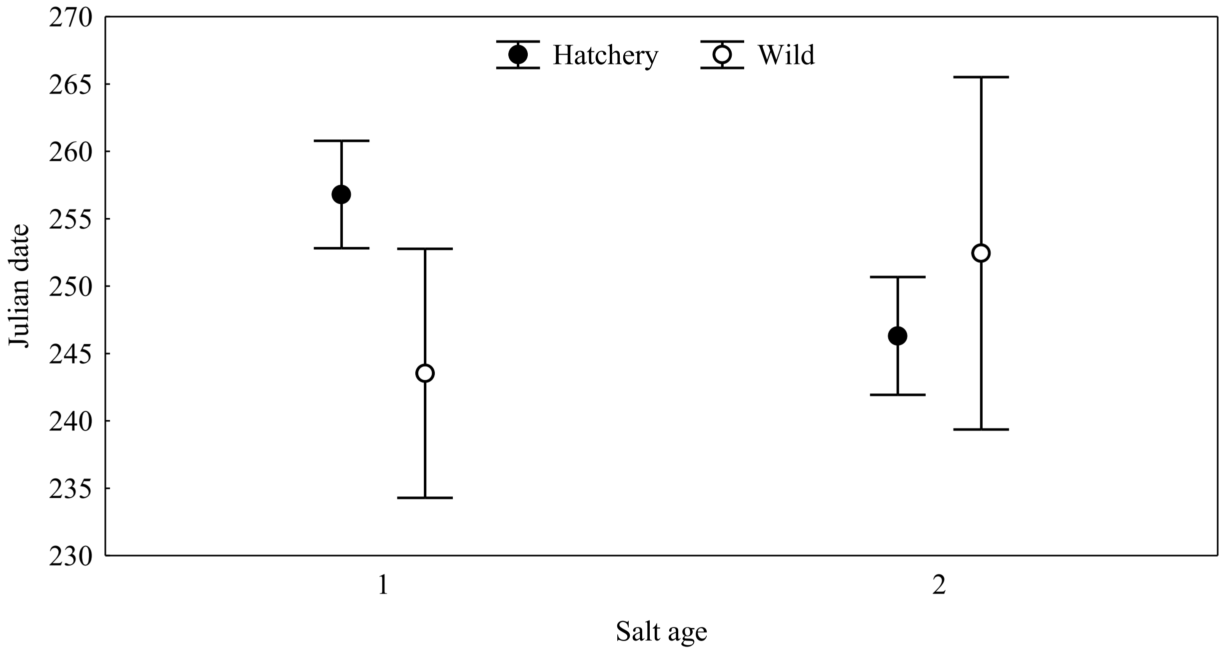

Figure 1. Mean passage date of summer steelhead passing Wells Dam between 6 July and 1 November. Error bars are 95% confidence intervals.

After removing the Wells Hatchery broodstock, the number of fish estimated to have been double-counted at Wells Dam, and the number of fish estimated to have fallen back below Wells Dam and failed to re-ascend, the net run escapement upstream of Wells Dam for the 2009 brood was 9,091 (Table 7). Analysis of scale samples and observations of hatchery marks indicated that wild fish were 11.6% of the steelhead run to Wells Dam. The abundance and relative proportion of wild steelhead in the 2009 brood return was great enough to allow a selective sport fishery in the Methow, Okanogan, and Similkameen rivers, as well as the mainstem Columbia River (see Chapter 2). Creel censuses conducted during these fisheries estimated 1,475 adipose fin-clipped steelhead were retained (total hatchery fish mortality = 1,526; Table 8; Jateff et al. 2009). Indirect mortality of steelhead captured and released during the fisheries was assumed to be 5% (K. Truscott, WDFW, personal communication) and resulted in an estimated mortality of 21 wild steelhead (Table 8). After removal of hatchery and wild fish for hatchery broodstock, and adjusting for estimated fishery retention and mortality, remaining steelhead were assigned to the Okanogan and Methow Basins based on results of radio-telemetry studies (see Table 7; English et al. 2001, 2003). An estimated 203 and 724 wild fish were available for natural spawning in the Okanogan and Methow River basins, respectively (see Table 7). Historic steelhead passage, mortality, and escapement data is presented in Appendix A.

Table 7. Escapement and disposition of the 2009 brood summer steelhead passing Wells Dam. Hatchery (*N* = 300) and wild (*N* = 75) fish removed for broodstock at Wells Dam are not included in the escapement estimate above Wells Dam. Methow and Okanogan River escapements are based on radio-telemetry data (English et al. 2001, 2003), which account for 90.4% and 91.6% of the hatchery and wild escapement, respectively. Dam count includes passage from 15 June 2008 through 14 June 2009.

Area	Description	(Variable)	Number
Wells Dam	Wells Dam fish count (FPC)	(A)	9,702
	Estimated double counted fish	(B)	163
	Estimated fallback fish	(C)	448
	Adjusted Wells Dam fish count	(D = A-B-C)	9,091
Above Wells Dam	Local Hatchery fish	(E)	5,849
	Stray hatchery fish	(F)	2,188
	Hatchery fish removed in fishery	(G)	444
	Above Wells Hatchery run estimate	(H = (E + F) - G)	7,593
	Wild fish	(I)	1,054
	Wild fish removed in fishery	(J)	5
	Above Wells Wild run estimate	(K = I - J)	1,049
Okanogan Basin	Hatchery run escapement estimate	(L = H * 0.324)	2,460
	Hatchery fish removed in fishery	(M)	446
	Hatchery fish collected for broodstock	(N)	5
	Wild run escapement estimate	(O = K * 0.208)	218
	Wild fish removed in fishery	(P)	5
	Wild fish collected for broodstock	(Q)	11
	Maximum spawning escapement estimate	(R = L-M-N+O-P-Q)	2,211
Methow Basin	Hatchery run escapement estimate	(S = H * 0.580)	4,404
	Hatchery fish removed in fishery	(T)	636
	Hatchery fish collected for broodstock	(U)	8
	Wild run escapement estimate	(V = K * 0.708)	743
	Wild fish removed in fishery	(W)	11
	Wild fish collected for broodstock	(X)	8
	Maximum spawning escapement estimate	(Y = S-T-U+V-W-Y)	4,484

Table 8. Estimated number of steelhead caught, retained, released, and mortalities from expanded creel census above Wells Dam during the 2008-2009 fishery.

Origin/disposition	Methow	Columbia	Okanogan	Similkameen	Total
Est. total steelhead caught	1,310	694	761	116	2,881
Est. hatchery steelhead retained (ad -)	611	436	394	34	1,475
Est. hatchery steelhead released (ad -)	171	12	153	20	356
Est. hatchery steelhead released (ad +)	322	145	131	37	635
Est. wild steelhead released	206	101	83	25	415
Est. hatchery steelhead hook mortality	25	8	15	3	51
Est. wild steelhead hook mortality	11	5	4	1	21

Based on radio-telemetry data (English et al. 2001, 2003), an estimated 58.0% of the hatchery fish passing Wells Dam were destined for the Methow Basin. After broodstock and fishery removal, an estimated 3,760 hatchery and 724 wild steelhead were available for natural spawning in the Methow River basin (see Table 7). The maximum estimated spawning escapement to the Okanogan River basin (N = 2,214) was nearly identical to the maximum spawning escapement of 2,198 fish calculated from expanded redd counts in 2009 (Arterburn et al. 2010).

Twisp River Migration Timing

Steelhead migration timing in the Twisp River was evaluated using an in-stream PIT-tag antenna array. Tagged steelhead were detected between 28 March and 18 May as they ascended the Twisp River to spawn. No significant differences in migration timing based on fish origin or salt age (Figure 2; KW ANOVA: $P = 0.12$) were detected. Migration timing from the Twisp River instream PIT-tag array to the Twisp River weir ranged from 2 to 26 days, and no significant differences in migration time between these two points based on fish origin or salt age (Figure 3; factorial ANOVA: $P = 0.14$ and 0.06, respectively) were detected. Post-spawning emigration, calculated as the number of days from last observation at the Twisp Weir to first subsequent detection at the instream array, ranged from 5 to 42 days, although we excluded two fish from the analysis that had an emigration timing of less than two days to account for potential handling effects. We found no significant differences in kelt timing between hatchery and wild fish of the same sex, but did detect a significant difference in the emigration timing between male and female fish (Figure 4; KW ANOVA: $P < 0.01$), with females tending to emigrate earlier than males.

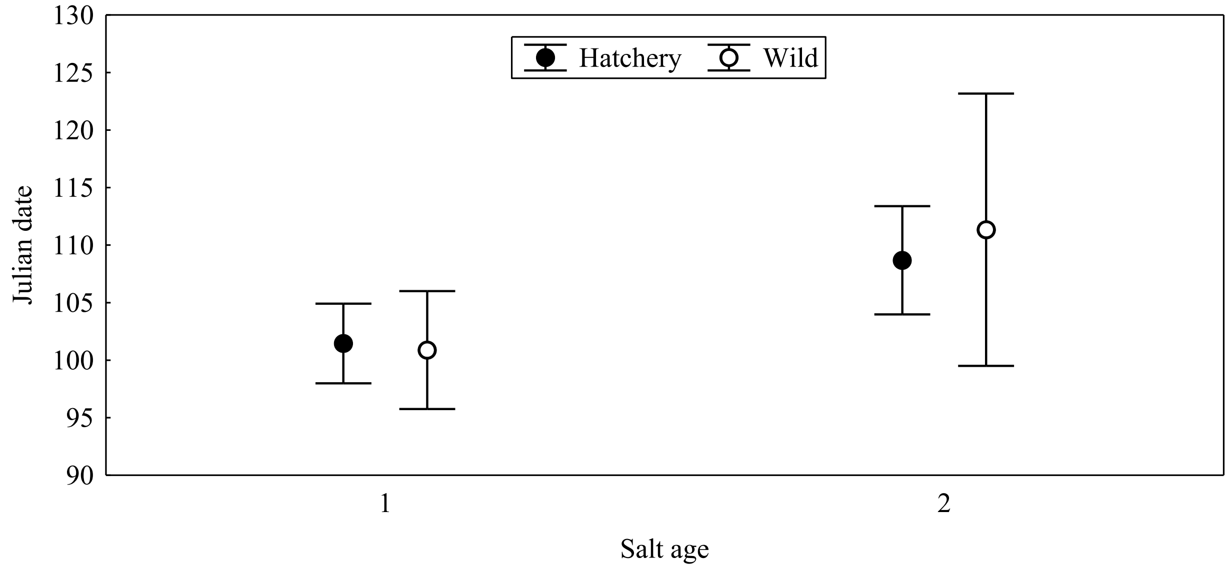

Figure 2. Mean arrival date of summer steelhead at the Twisp River instream PIT tag array between 28 March and 18 May. Error bars are 95% confidence intervals.

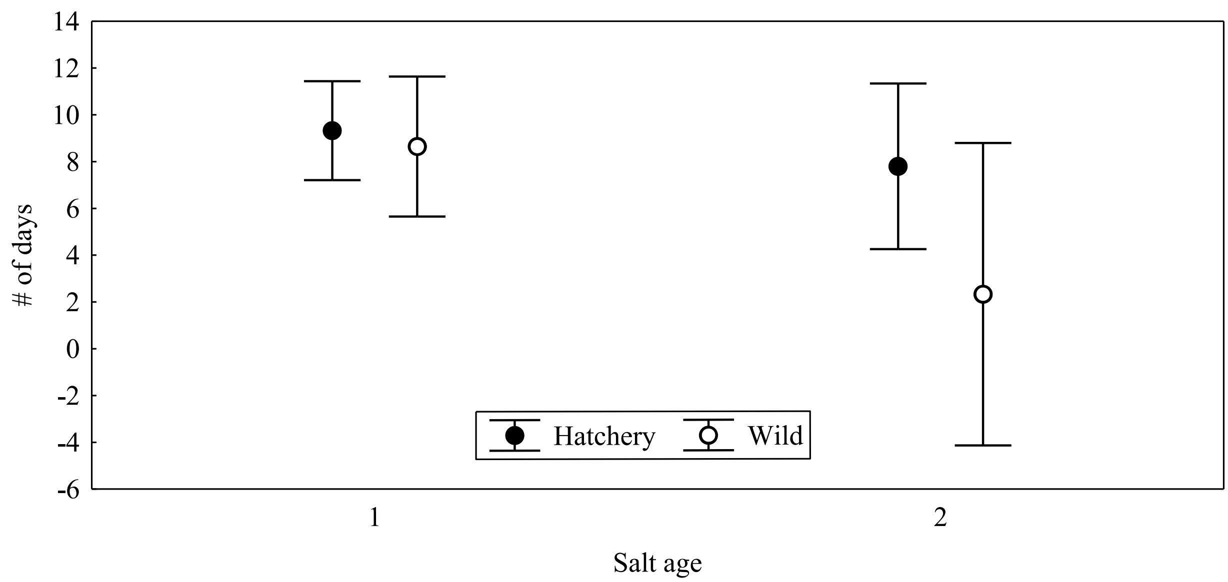

Figure 3. Mean travel days of summer steelhead from the Twisp River instream PIT tag array to the Twisp weir. Error bars are 95% confidence intervals.

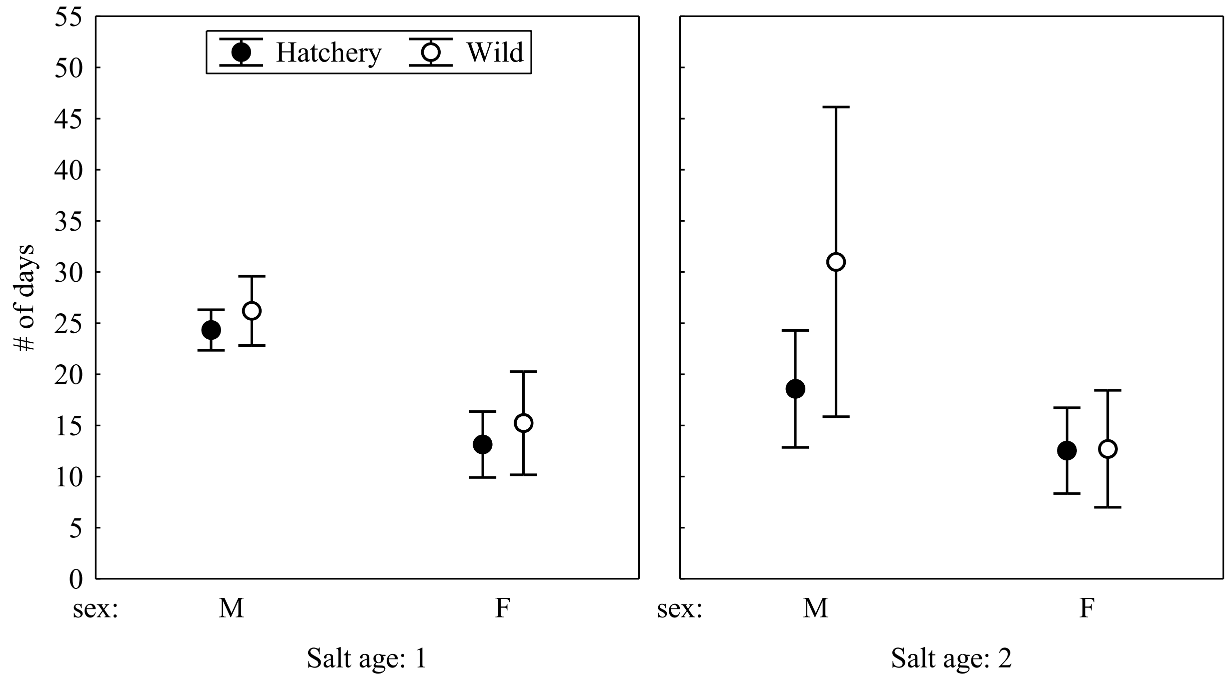

Figure 4. Mean travel days (kelt timing) of summer steelhead from last observation at the Twisp weir to first detection at the Twisp River instream PIT tag array. Error bars are 95% confidence intervals.

Spawn Timing and Redd Distribution

In the hatchery, some wild female steelhead (N = 21; 55.3% of the wild total) were injected with hormones to increase maturation timing and facilitate matings of wild and hatchery fish. Statistical tests included both females that were not injected with hormones and those that were. When hormone-injected fish were excluded, no significant differences in female spawn timing within the hatchery environment based on parentage were detected (Figure 5). Wild females without hormones and H x W females had mean spawn dates of 15 February and 16 February, respectively. The mean spawn date of H x H females within the hatchery was 18 February. Wild females injected with hormones had a mean spawn date of 11 March and spawned significantly later than wild females without hormones or H x W females (Tukey HSD: P = 0.01 and < 0.001, respectively). Hormone injections targeted the latest spawning fish, thus it is not surprising that injected females had a later spawn timing than non-injected females of the same genetic origin. Variation in the spawn timing of H x H females was high due to the low sample size (N = 5).

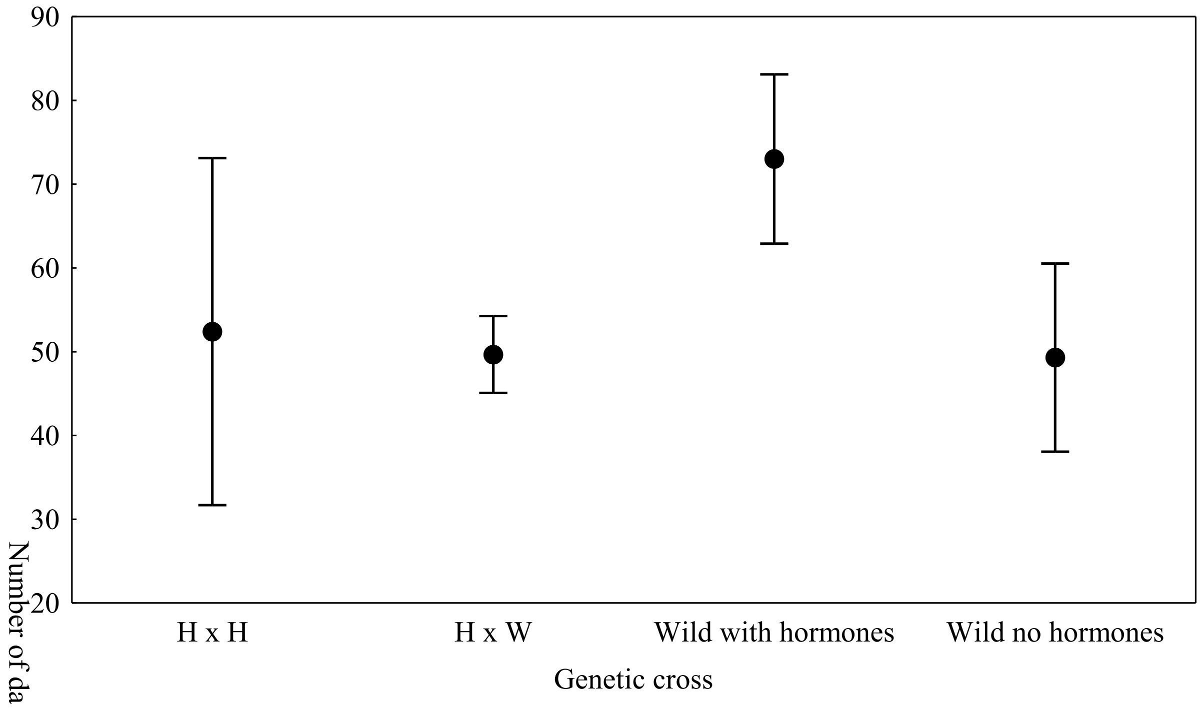

Figure 5. Spawn timing of 2009 brood female steelhead at Wells Hatchery by genetic cross. Spawning began on 29 December 2008 (Day 1). Error bars are 95% confidence intervals.

In the natural environment, local hatchery (Ad-only, AD+CWT, LYE, and RYE marks) and wild fish were sampled and tagged at the Twisp River weir prior to spawning. An estimated 24.3% ($N = 91$) of the steelhead sampled at the Twisp River weir were wild (Table 9). The proportion of wild steelhead in the spawning population above the Twisp weir was approximately 10% greater than the estimated proportion of wild steelhead in the Methow Basin (see table 7). Colored Floy tags allowed surveyors to document spawn timing of hatchery and wild fish. A total of 37 females were observed actively spawning or holding on redds above the weir, all of which had Floy tags. Based on recaptured fish (males and females) at the Twisp weir, the shed rate of Floy tags was 6.1% (6 sheds in 99 recaptures). There were no significant differences in female spawn timing, based on fish origin (Figure 6; Mann-Whitney U test: $P = 0.65$). In contrast to spawning in the hatchery environment that occurs much earlier within the year, hatchery and wild fish in the Twisp River had mean spawn dates of 3 May and 2 May, respectively. Observed spawn timing (new redds) within other areas in the Methow Basin suggested peak spawn timing occurred the last two weeks of April and the first week of May (Figure 7; Table 10). Distribution of redds above the Twisp Weir was determined through PIT tags deposited in redds and Floy tag observations. Redds were scanned prior to the spring freshet, and a total of 32 PIT tags were recorded above the Twisp Weir (Table 11). Recovery rate of PIT-tags from female steelhead released above the Twisp weir was 21.3% (150 total females tagged in the body cavity). No significant differences in redd distribution based on female origin (Figure 8; Mann-Whitney U test: $P = 0.34$) were detected.

Table 9. Summary of steelhead sampled at the Twisp weir. Wild fish and all known or assumed hatchery fish (AD+CWT, Ad-only, LYE, and RYE) were released upstream. Stray or unknown-origin hatchery fish were released downstream. HFN = un-marked hatchery fish.

Origin	Sex	Mark	Month			Total
			March	April	May	
Wild	F	None	1	41	7	49
	M	None	2	36	4	42
Hatchery	F	AD+CWT	0	26	3	29
		Ad-only	0	27	13	40
		HFN	0	8	5	13
		LYE	0	27	4	31
		None	0	0	1	1
		RYE	0	20	8	28
	M	AD+CWT	0	5	0	5
		Ad+LRE	0	1	0	1
		Ad+RV	0	1	0	1
		Ad-only	1	55	8	64
		HFN	0	14	3	17
		LGE	0	2	0	2
		LYE	1	43	6	50
		None	0	1	0	1
		RYE	0	3	0	3
Total			5	310	62	377

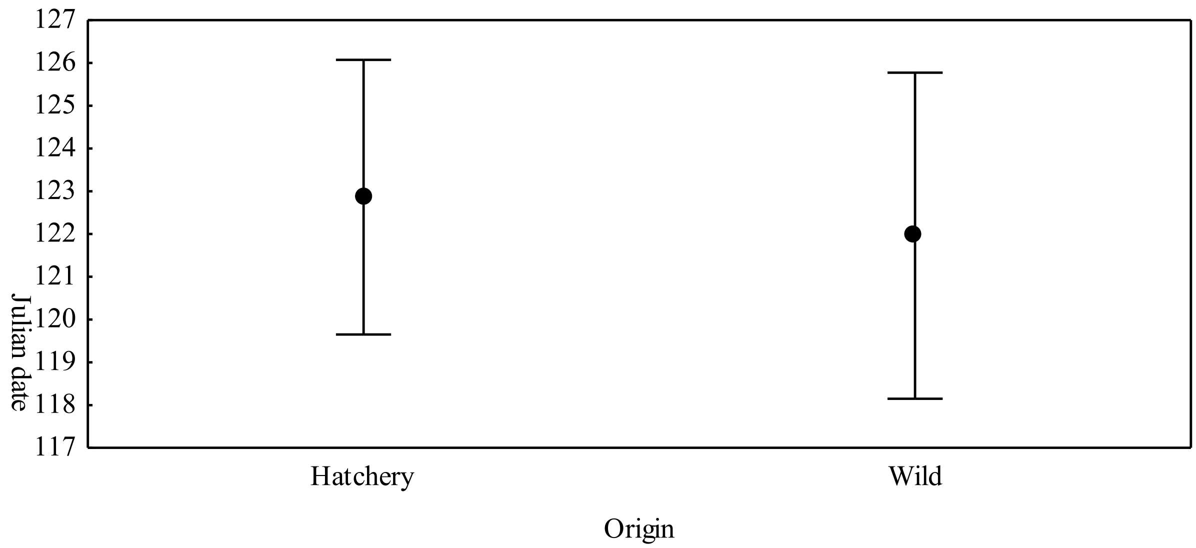

Figure 6. Spawn timing of 2009 brood female steelhead in the Twisp River. Error bars are 95% confidence intervals.

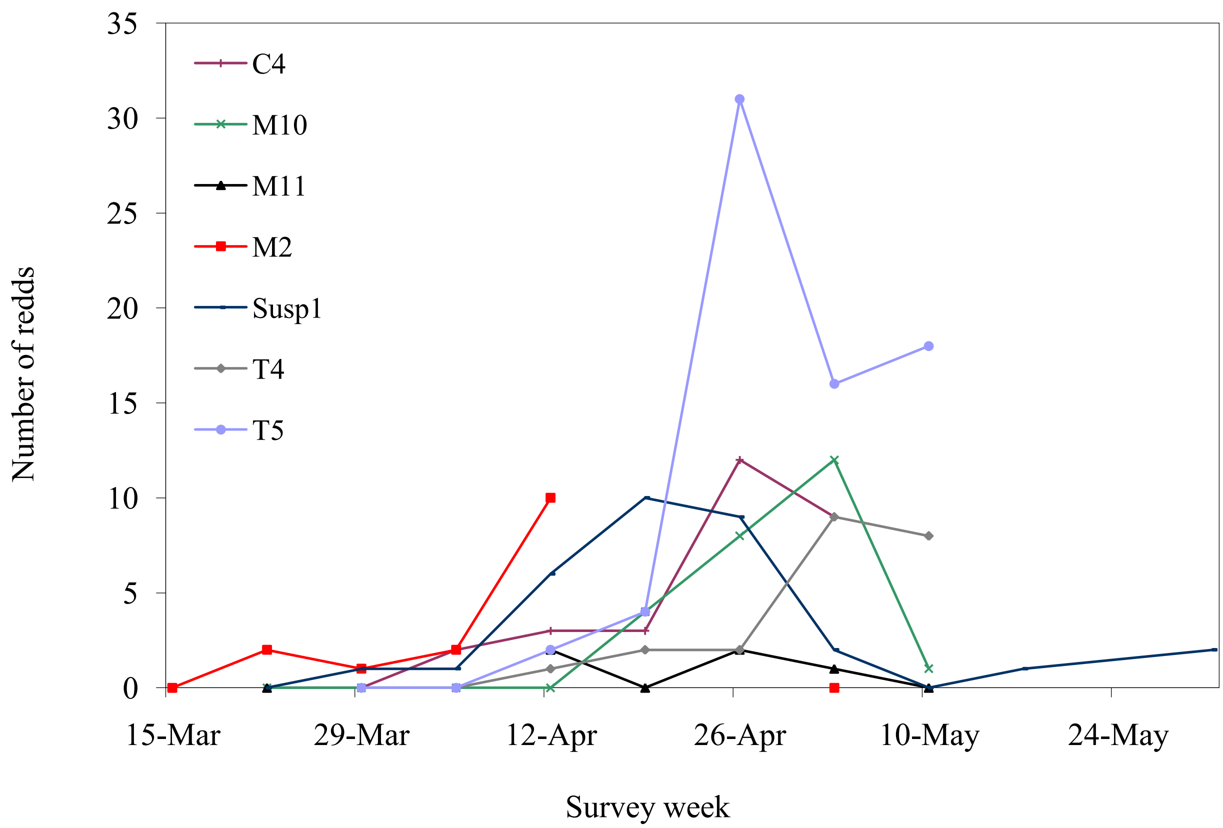

Figure 7. Temporal distribution of steelhead spawning in selected index areas within the Methow Basin in 2009.

Table 10. Methow River mainstem index reach and selected stream weekly redd counts by subbasin and week beginning (ns = not surveyed). No surveys were performed the week of 24 May. Mainstem index reaches are in bold.

Stream	Survey reach	Code	March			April				May				Total
			15	22	29	5	12	19	26	3	10	17	31	
Upper Methow subbasin														
Methow	Mazama Br.-Susp. Br.	**M11**	ns	0	ns	ns	2	0	2	1	0	ns	ns	5
Methow	Susp. Br.-Weeman Br.	**M10**	ns	0	0	0	0	4	8	12	1	ns	ns	25
E. Winters	Div. Dam -Hwy 20 Br.	EW2	ns	ns	ns	ns	0	2	0	0	0	ns	ns	2
E. Winters	Hwy 20 Br.-Conf.	EW1	ns	ns	ns	ns	0	0	0	ns	0	ns	ns	0
Lost	Lost River Br.-Conf.	L1	0	ns	ns	ns	0	1	2	3	0	ns	ns	6
Suspension	Entire length	SP1	ns	0	1	1	6	10	9	2	0	1	2	32
Little Susp.	Entire length	LSP1	ns	ns	ns	ns	1	0	ns	0	0	ns	ns	1
Hancock	Spring - Wolf Cr. Rd.	HA2	ns	ns	ns	0	ns	0	3	ns	ns	3	1	7
Hancock	Wolf Cr. Rd. - Conf.	HA1	ns	ns	ns	0	0	0	1	ns	ns	0	0	1
MH outfall	Entire length	MH1	0	0	0	3	4	2	1	1	ns	1	0	12
WNFH outfall	Entire length	WN1	0	0	1	1	20	6	4	3	ns	1	1	37
	Subbasin subtotal		0	0	2	5	33	25	30	22	1	6	4	128
Lower Methow subbasin														
Methow	Carlton-Up. Burma Br.	**M2**	0	2	1	2	10	ns	ns	0	ns	ns	ns	15
Beaver	Hwy 20-Confluence	BV1	0	1	6	3	3	ns	13	0	ns	ns	ns	26
	Subbasin subtotal		0	3	7	5	13	ns	13	0	ns	ns	ns	41
Twisp subbasin														
Twisp	B'milk Br.-Lit. Br. Cr.	**T5**	ns	ns	0	0	2	4	31	16	18	ns	ns	71
Twisp	Little Br. Cr.-Weir	**T4**	ns	ns	0	0	1	2	2	9	8	ns	ns	22
Little Bridge	Lower Br. - Conf.	LBC1	ns	ns	ns	0	1	ns	ns	9	7	0	ns	17
	Subbasin subtotal		ns	ns	0	0	4	6	33	34	33	0	ns	110
Chewuch subbasin														
Chewuch	8 Mile Cr.-Boulder Cr.	**C4**	ns	0	0	2	3	2	12	9	ns	ns	ns	28
Eightmile	Bridge - Confluence	EM1	ns	0	ns	0	ns	1	0	1	0	ns	ns	2
	Subbasin subtotal		ns	0	0	2	3	3	12	10	0	ns	ns	30

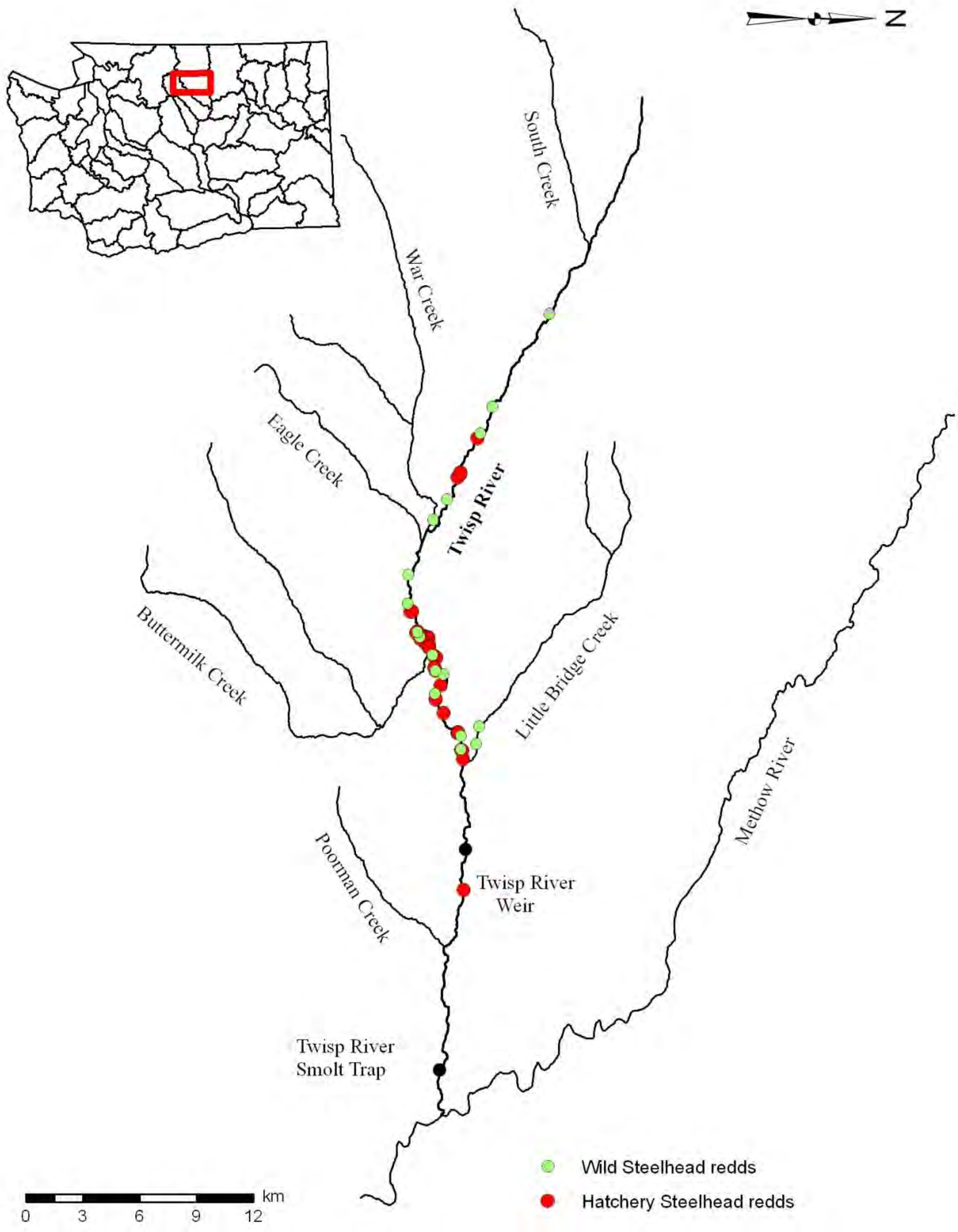

Figure 8. Spatial distribution of steelhead redds in the Twisp River subbasin based on PIT tag detections and Floy tag observations during 2009 surveys. Only includes redds with positive identification of fish origin through Floy observation or PIT detection.

Table 11. Detection of PIT tags in redds located above the Twisp weir. Total redd numbers are non-expanded counts from regular and /or intensive survey methods. No detections were made in T4 (poor survey conditions); the lone redd in T9 was not scanned.

Stream	Reach	Hatchery mark				Wild	Total	Total redds	Redds scanned	% PITs
		AD-CWT	Ad-only	LYE	RYE					
Twisp River	T8	0	0	0	0	0	0	4	4	0.0
	T7	0	1	1	1	0	3	24	19	15.8
	T6	3	3	2	3	2	13	60	60	21.7
	T5	2	6	1	1	3	13	71	71	18.3
L. Br. Creek	LBC2	0	0	0	0	0	0	1	1	0.0
	LBC1	0	1	0	0	2	3	17	17	17.6
B'milk Creek	BM1	0	0	0	0	0	0	2	2	0.0
Eagle Creek	EA1	0	0	0	0	0	0	2	2	0.0
War Creek	WR1	0	0	0	0	1	1	2	2	50.0
Total		5	11	4	5	8	33	183	178	18.5

Based on expanded redd counts, an estimated 1,030 steelhead redds were created in the Methow River basin in 2009 between 5 March and 12 June (Figures 9-12, Tables 12-15). Redd density within mainstem index areas was greatest in the Twisp River (9.6 per km). The density of redds in the Chewuch River index reach was 7.6 per km. Based on the male-to-female ratio of hatchery (0.809) and wild (0.556) steelhead calculated during broodstock collection activities and the assumption that a female constructed only one redd, the total redd count represents 1,836 fish, or 40.9% of the maximum estimated spawning escapement to the Methow River basin of 4,484 fish. Historic redd counts for each of the subbasins surveyed are listed in Appendices B1-B4.

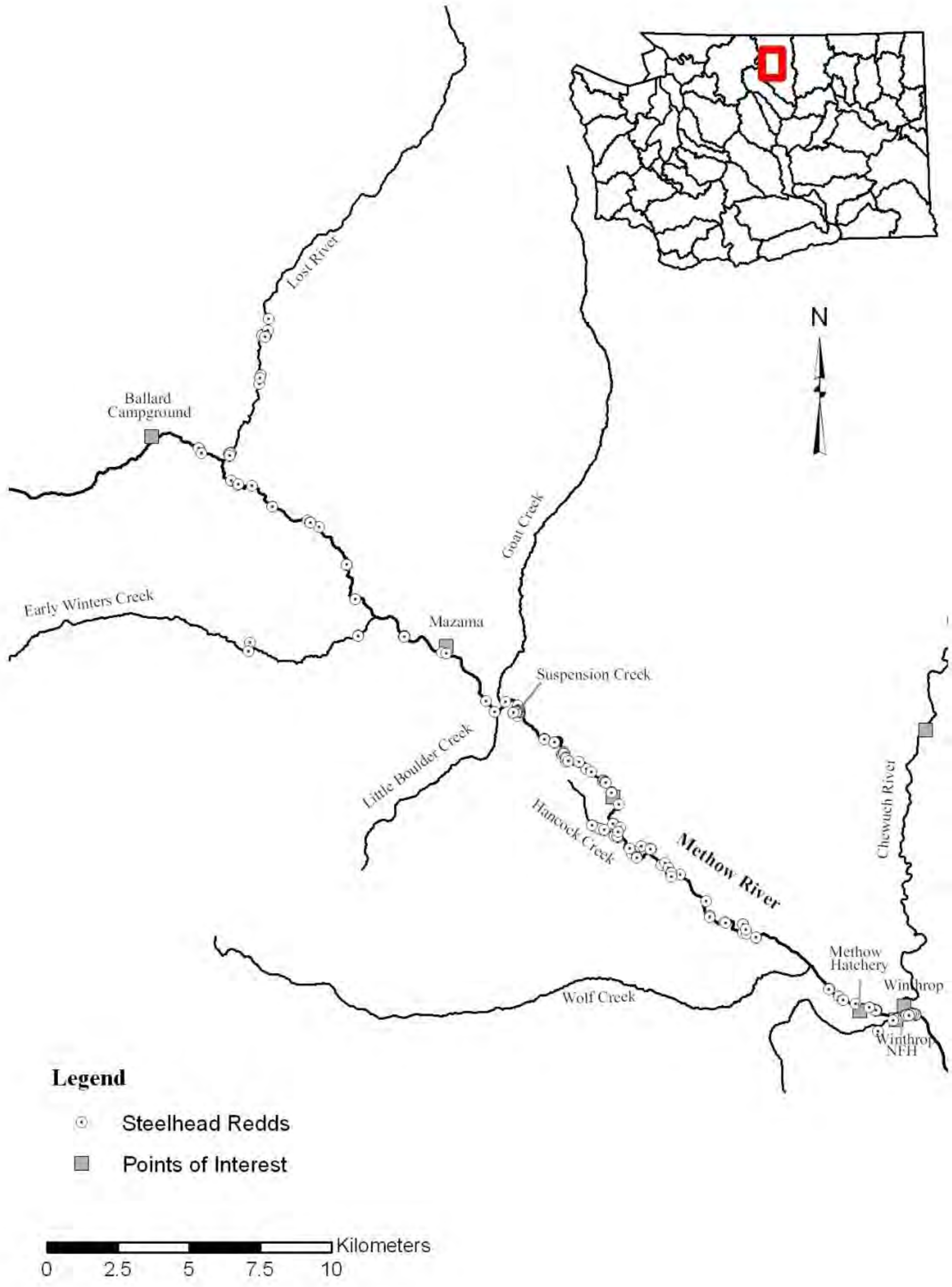

Figure 9. Spatial distribution of observed steelhead redds in the upper Methow River subbasin based on GPS waypoints collected during 2009 surveys. Does not include expanded redds.

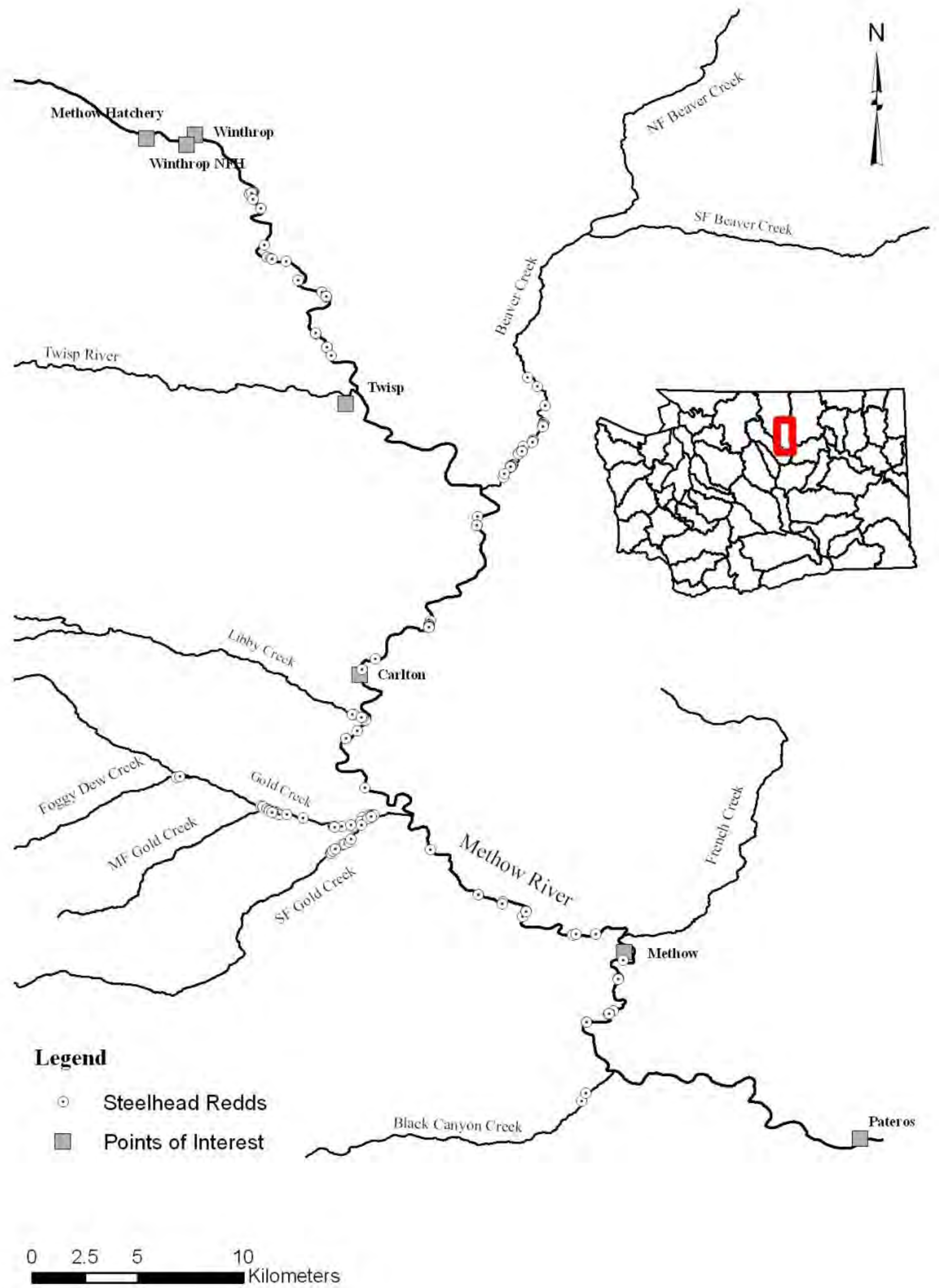

Figure 10. Spatial distribution of observed steelhead redds in the lower Methow River subbasin based on GPS waypoints collected during 2009 surveys. Does not include expanded redds.

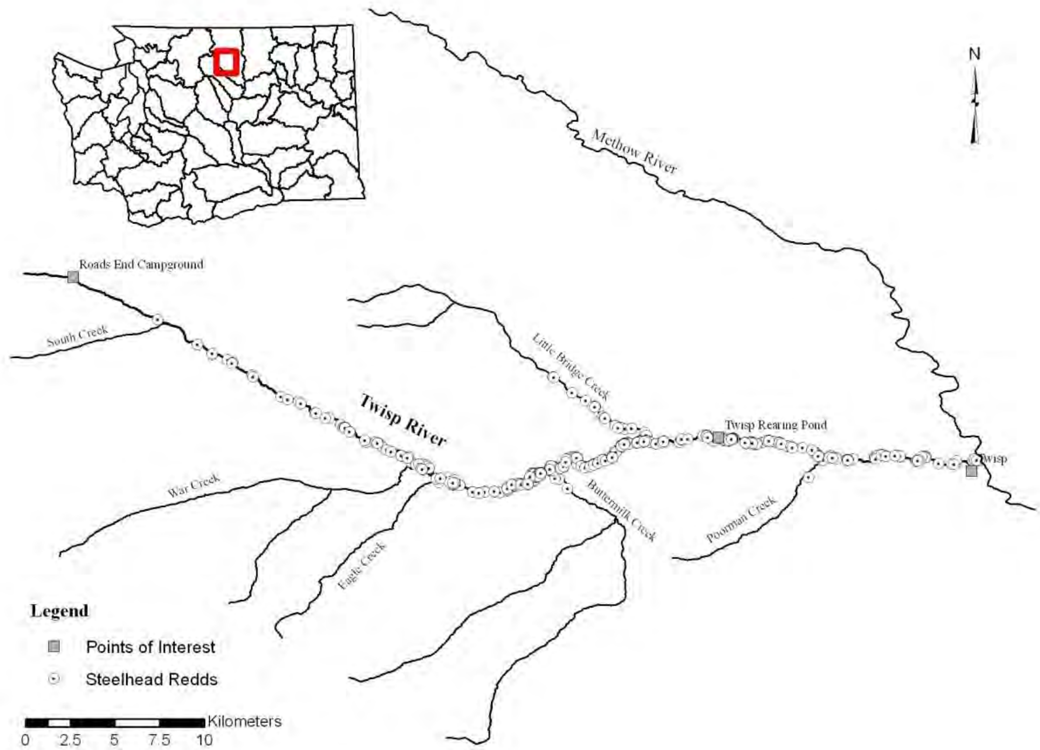

Figure 11. Spatial distribution of observed steelhead redds in the Twisp River subbasin based on GPS waypoints collected during 2009 surveys. Does not include expanded redds.

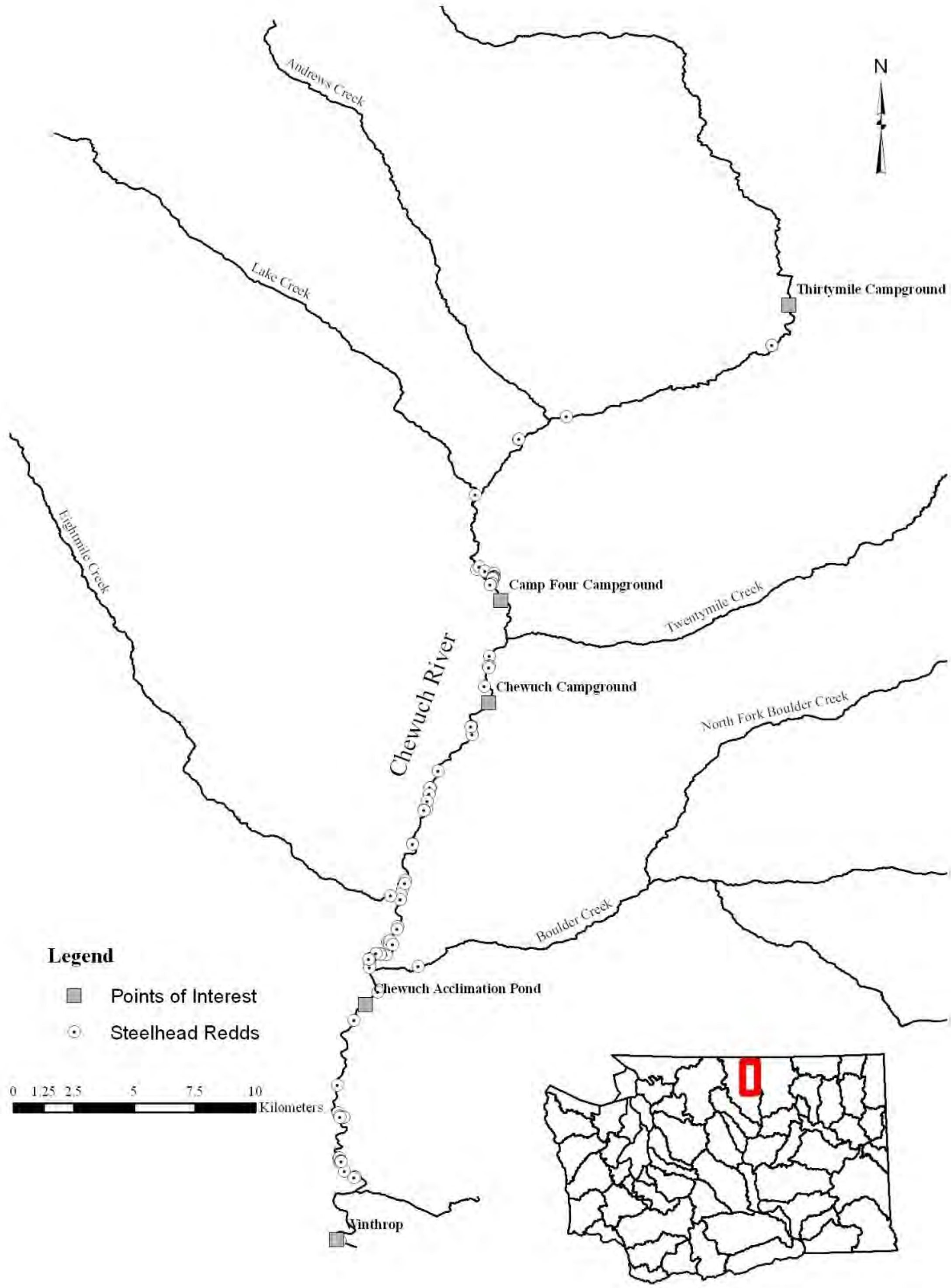

Figure 12. Spatial distribution of observed steelhead redds in the Chewuch River subbasin based on GPS waypoints collected during 2009 surveys. Does not include expanded redds.

Table 12. Upper Methow River mainstem and tributary expanded redd counts by section number and survey year. Rotating panel creeks are designated RP (ns = not surveyed). Expand rates for non-rotating panel reaches are based on visible to non-visible redd ratios during peak counts. Expand rates for rotating panel reaches are based on # of redds per km in surveyed reaches.

Stream reach	Code	Length (km)	2007	2008	2009	
					Expand rate	Redds
Upper Methow River mainstem						
Ballard Campground - Lost River	M15	4.0	2	6	0.62	5
Lost River - Gate Creek	M14	4.8	19	25	0.62	16
Gate Creek - Early Winters Creek	M13	4.2	11	19	0.62	11
Early Winters Creek - Mazama Bridge	M12	3.2	5	25	0.62	8
Mazama Bridge - Susp. Bridge	M11	4.0	24	27	index	5
Suspension Bridge - Weeman Bridge	M10	5.3	56	21	index	25
Weeman Bridge - Along Hwy 20	M9	9.0	14	34	0.48	94
Along Highway 20 - Wolf Creek	M8	2.2	1	1	0.48	0
Wolf Creek - Foghorn Dam	M7	1.8	0	10	0.48	10
Foghorn Dam - Winthrop Bridge	M6	2.7	0	10	0.48	2
Upper Methow River mainstem total		41.2	132	178		176
Upper Methow River tributaries						
Lost River (Sunset Cr. - Eureka Cr.)	L3	4.6	ns	ns	- -	ns
Lost River (Eureka Cr. - Lost River Br.)	L2	5.8	ns	ns	- -	11
Lost River (Lost River Br. - Confluence)	L1	0.8	10	3	- -	6
Early Winters (Klipchuck - Early Winters Br.)	EW5	1.4	ns	ns	- -	0
Early Winters (Early Winters Br. - Hwy 20)	EW4	2.1	ns	ns	- -	2
Early Winters (Highway 20 - Div. Dam)	EW3	2.9	4	0	- -	0
Early Winters (Div. Dam - Hwy 20 Br.)	EW2	0.3	2	0	- -	2
Early Winters (Hwy 20 Br. - Conf.)	EW1	0.5	0	0	- -	0
Suspension Creek (Entire length)	SP1	0.3	49	37	- -	32
Little Suspension Creek (Entire length)	LSP1	0.3	29	4	- -	1
Methow Hatchery Outfall (Entire length)	MH1	0.4	25	9	- -	12
Winthrop NFH Outfall (Entire length)	WN1	1.0	68	27	- -	37
Hancock Creek (Kumm Rd. - Wolf Cr. Rd.)	HA2	0.9	21	9	- -	7
Hancock Creek (Wolf Cr. Rd. - Conf.)	HA1	0.2	2	4	- -	1
RP-Wolf Creek (Rd 5505 access - footbridge)	W2	1.9	ns	ns	direct	0
RP-Wolf Creek (footbridge - Conf.)	W1	0.5	1	0	direct	0
RP-Little Boulder Creek (Hwy 20 - Conf.)	LBO1	0.2	0	0	direct	0
RP-Goat Creek (FR 52 Br. - Conf.)	GT1	2.2	0	0	direct	0
Upper Methow River tributary total		26.3	211	93		111

Table 13. Lower Methow River mainstem and tributary expanded redd counts by section number and survey year. Rotating panel creeks are designated RP (ns = not surveyed). Expand rates for non-rotating panel reaches are based on visible to non-visible redd ratios during peak counts. Expand rates for rotating panel reaches are based on the number of redds per km in surveyed reaches.

Stream reach	Code	Length (km)	2007	2008	2009	
					Expand rate	Redds
Lower Methow River mainstem						
Winthrop Bridge - MVID Dam	M5	8.0	0	0	0.67	23
MVID Dam - Twisp Confluence	M4	7.2	4	0	0.67	23
Twisp Confluence - Carlton	M3	21.1	0	5	0.67	24
Carlton - Upper Burma Bridge	M2	23.7	1	27	index	15
Upper Burma Bridge - Mouth	M1	20.1	2	86	0.67	17
Lower Methow River mainstem total		80.1	7	118		102
Lower Methow River tributaries						
Beaver Cr. (Lester Rd. Br. - Balky Hill Rd.)	BV3	5.0	9	0	none	0
Beaver Creek (Balky Hill Rd. - Hwy 20)	BV2	5.8	ns	15	0.50	23
Beaver Creek (Hwy 20 - Conf.)	BV1	3.4	9	38	index	26
RP-Gold Cr. Upper NF (11.4 rkm - Ranch)	GDN4	3.7	36	7	direct	0
RP-Gold Cr. Mid. NF (Ranch - N.F. Br.)	GDN3	0.9	5	1	direct	7
RP-Gold Cr. Mid. NF (N.F. Br. - Whisp. Pines)	GDN2	1.5	6	0	direct	6
RP-Gold Cr. Lower NF (Whisp. Pines - 2nd Br.)	GDN1	1.4	6	1	direct	5
RP-Gold Cr. SF (1st Br. - 1.7 rkm)	GDS3	0.7	25	6[a]	direct	5
RP-Gold Cr. SF (1.7 rkm - 0.6 rkm)	GDS2	1.1	6	9	direct	4
RP-Gold Cr. SF (0.6 rkm - Conf.)	GDS1	0.6	3	5[a]	direct	1
RP-Gold Cr. Mainstem (2nd Br. - Private Land)	GDM2	1.2	5	11	index	15
RP-Gold Cr. Mainstem (Private Land - Conf.)	GDM1	1.3	6	12	12.5	16
RP-Foggy Dew Creek (FR 200 - Conf.)	FD1	1.8	24	2	direct	2
RP-Black Canyon Cr. (2nd Br. - 0.8 rkm)	BC2	1.0	5	2	direct	2
RP-Black Canyon Cr. (0.8 rkm - Conf.)	BC1	0.8	5	2	direct	0
RP-Libby Creek (Lower Public Land)	LB4	1.0	6	2	- -	ns[b]
RP-Libby Creek (Low Pub Land - Realty Land)	LB3	1.1	6	2	- -	ns[b]
RP-Libby Creek (Realty Land)	LB2	0.3	2	1	direct	0
RP-Libby Creek (Realty Land - Conf.)	LB1	1.0	6	2	direct	5
Lower Methow tributary total		33.6	170	118[a]		117

[a] Updated based on spawning habitat validation.
[b] Impassable barrier in LB1.

Table 14. Twisp River mainstem and tributary expanded redd counts by section number and survey year. Rotating panel creeks are designated RP (ns = not surveyed). Expand rates for non-rotating panel reaches are based on visible to non-visible redd ratios during peak counts. Expand rates for rotating panel reaches are based on the number of redds per km in surveyed reaches.

Stream reach	Code	Length (km)	2007	2008	2009	
					Expand rate	Redds
Twisp River mainstem						
Road End CG. - South Cr. Br.	T10	4.6	ns	ns	none	0
South Cr. Br. - Poplar Flats CG.	T9	3.2	ns	ns	none	0
Poplar Flats CG. - Mystery Br.	T8	3.2	ns	0	none	0
Mystery Br. - War Cr. Br.	T7	6.9	ns	6	0.68	22
War Cr. Br. - Buttermilk Br.	T6	7.4	ns	42	0.68	109
Buttermilk Br. - Little Br. Cr.	T5	5.9	60	59	index	71
Little Br. Cr. - Twisp Weir	T4	3.8	13	30	index	22
Twisp Weir - Upper Poorman Br.	T3	3.5	5	18	0.60	47
Upper to Lower Poorman Bridge	T2	5.0	ns	16	0.60	47
Lower Poorman Br. - Confluence	T1	2.9	ns	6	0.60	10
Twisp River mainstem total		46.4	78	177		328
Twisp River tributaries						
Little Br. Cr. (Vetch Cr. - Upper Br.)	LBC3	3.0	1	0	- -	0
Little Bridge Cr. (Upp. Br. - Lower Br.)	LBC2	2.4	0	2	- -	1
Little Bridge Cr. (Lower Br. - Conf.)	LBC1	2.4	2	2	- -	17
MSRF pond outfall[1]	MSRF1	0.1	1	0	- -	0
RP-War Creek (log jam barrier - Conf.)	WR1	0.5	0	0	direct	2
RP-Eagle Creek (Rd 4430 - Conf.)	EA1	0.3	0	0	direct	2
RP-Buttermilk Cr. (Fork - Cattle Grd.)	BM2	2.1	0	1	direct	0
RP-Buttermilk Cr. (Cattle Grd. - Conf.)	BM1	2.0	0	0	direct	2
RP-South Creek (Falls - Conf.)	SO1	0.6	0	0	direct	0
Twisp River tributary total		13.4	4	5		24

[1] Methow Salmon Recovery Foundation pond outfall.

Table 15. Chewuch River mainstem and tributary expanded redd counts by section number and survey year. Rotating panel creeks are designated RP (ns = not surveyed). Expand rates for non-rotating panel reaches are based on visible to non-visible redd ratios during peak counts. Expand rates for rotating panel reaches are based on the number of redds per km in surveyed reaches.

Stream reach	Code	Length (km)	2007	2008	2009	
					Expand rate	Redds
Chewuch River mainstem						
Chewuch Falls - 30 Mile Bridge	C13	4.2	ns	ns	0.54	0
30 Mile Bridge - Road Side Camp	C12	4.6	ns	ns	0.54	4
Road Side Camp - Andrews Creek	C11	4.3	ns	ns	0.54	2
Andrews Creek - Lake Creek	C10	4.0	ns	ns	0.54	4
Lake Creek - Buck Creek	C9	2.2	ns	ns	0.54	0
Buck Creek - Camp 4	C8	2.4	ns	ns	0.54	34
Camp 4 - Chewuch Campground	C7	5.1	16	13	0.54	9
Chewuch CG. - Falls Creek CG.	C6	5.8	21	30	0.54	30
Falls Creek CG. - 8 Mile Creek	C5	3.7	7	22	0.54	11
8 Mile Creek - Boulder Creek	C4	3.7	19	55	index	28
Boulder Creek - Chewuch Bridge	C3	1.8	0	4	0.54	2
Chewuch Bridge - WDFW Land	C2	7.5	3	37	0.54	24
WDFW Land - Confluence	C1	5.1	0	25	0.54	7
Chewuch River mainstem total		54.4	66	186		155
Chewuch River tributaries						
Eightmile Creek (300m abv. div. - Bridge)	EM2	0.3	0	3	- -	0
Eightmile Creek (Bridge - Conf.)	EM1	0.5	1	0	- -	2
RP-Boulder Creek (Falls - 1st Bridge)	BD2	0.8	4	0	direct	1
RP-Boulder Creek (1st Bridge - Conf.)	BD1	0.8	4	0	direct	0
RP-Lake Creek (Black Lk. - 1st Bridge)	LK2	10.1	51	0	1.3	13
RP-Lake Creek (1st Bridge – Conf.)	LK1	0.8	4	0	index	1
RP-Andrews Creek (L. And. Cr. – 1st Br.)	AN2	0.3	2	ns	direct	0
RP-Andrews Creek (1st Bridge - Conf.)	AN1	0.2	1	0	direct	0
RP-Twentymile Creek (Falls - FR 5010)	TW2	0.9	0	0	direct	0
RP-Twentymile Creek (FR 5010 - Conf.)	TW1	0.1	5	0	direct	0
Chewuch River tributary total		14.8	72	3		17

The Twisp River mainstem was surveyed weekly (intensive) in all accessible reaches to generate a total redd count to compare with redd counts generated from existing methodologies utilizing expanded index area surveys. Index area redd counts were expanded when spawning was near completion, and river conditions were favorable. At that time, total redd counts derived from intensive surveys and expanded surveys were 198 and 291, respectively (Table 16). However, river conditions remained favorable for a short period after the initial expansion was conducted and additional redds were identified in index areas and were used in determining the final total redd count for the Twisp River. The total number of redds estimated for the Twisp River (see Table 14) was greater than the totals derived when comparing survey methodologies.

Based on biological sampling of the 2009 broodstock during trapping, hatchery-origin steelhead were evenly represented by 1-salt (47.2%) and 2-salt fish (52.8%) while the majority of wild fish were 1-salt fish (66.4%). Using expanded redd counts by tributary and the mean fecundity from Wells Hatchery broodstock by salt age and origin, an estimated 6,283,000 eggs were deposited in the Methow Basin (Table 17; see Chapter 1 for historic fecundities).

Table 16. Comparison of survey methods in Twisp River mainstem reaches for steelhead spawning surveys through 7 May 2009. Intensive surveys were conducted weekly. Expanded surveys consisted of weekly surveys in index reaches (T5 and T4) and one-time surveys in non-index reaches expanded by the proportion of visible redds in index reaches. Total redd counts for expanded surveys do not include redds that were found after initial expansions (surveys continued through 12 June 2009.

Reach	Intensive surveys	Expanded surveys	
	Redds	Expand rate	Redds
T10	0	0.79	0
T9	0	0.79	0
T8	0	0.79	0
T7	20	0.79	19
T6	52	0.79	94
T5	48	1.00	62
T4	14	1.00	21
T3	26	0.65	43
T2	30	0.65	43
T1	8	0.65	9
Total	198		291

Table 17. Expanded 2009 steelhead redds and estimated egg deposition in the Methow Basin based on 2009 Wells Hatchery broodstock mean fecundities (mean, %): Hatchery 1-salt (5,380, 40.27), Hatchery 2-salt (7,206, 34.23), Wild 1-salt (4,971, 14.09), Wild 2-salt (6,718, 11.41).

Mean (N, %)	Expanded redds	Proportion of redds	Estimated egg deposition			
			2006	2007	2008	2009
Upper Methow	287	27.86%	1,092,348	1,751,701	1,605,675	1,750,700
Chewuch	172	16.70%	427,996	704,766	1,119,825	1,049,200
Twisp	352	34.18%	2,484,932	418,774	1,078,350	2,147,200
Lower Methow	219	21.26%	1,156,228	903,939	1,333,125	1,335,900
Methow Basin	1,030	100.00%	5,161,504	3,779,180	5,136,975	6,283,000

Natural Replacement Rate (NRR)

A total of 1,124 steelhead were trapped and sampled at Wells Dam, of which 118 were determined to be wild. The total number of wild fish observed on the first trapping day of the week was expanded to the run-at-large to estimate the total number of wild fish returning to Wells Dam (N = 1,181). Expanded return at age was based on scale analysis of wild fish sampled during trapping, resulting in a total of 836 wild steelhead recruits from the Methow Basin prior to broodstock collection (N = 75) and Columbia River fishery-related mortality (N = 5; Table 18). The HRR of hatchery steelhead was significantly greater than the NRR for brood years 1996-2003 (Table 19; Mann-Whitney U test: $P < 0.01$). The NRR of the Methow Basin steelhead population (mean = 0.24 recruits per spawner) was less than the value necessary to replace the parent population (i.e., 1.0) in each of the eight brood years examined (see Table 19). The NRR values for Methow Basin steelhead were calculated using run-escapement values from both spawners and recruits at Wells Dam and adjusted using radio telemetry data (English et al. 2001, 2003). Ideally, these calculations should use the actual number of fish that spawned and only those progeny that survived to spawn or were harvested.

Table 18. Wild steelhead sampling at Wells Hatchery and expanded age composition by brood year of Methow Basin recruits (70.8% of wild returns to Wells Dam).

Brood year	Wild fish to Wells Dam			Expanded return at age (Methow Basin)				Total
	Total	Sampled	Sample rate	1.1	1.2, 2.1	1.3, 3.1, 2.2	2.3, 3.2	
2009	1,181	118	0.0999	37	452	309	38	836
2008	1,218	132	0.1084	14	645	182	21	862
2007	628	52	0.0828	0	218	198	28	444
2006	705	88	0.1248	6	147	307	40	500
2005	773	66	0.0854	8	249	290	0	547
2004	946	115	0.1216	11	518	134	6	669
2003	818	25	0.0306	0	0	510	69	579
2002	843	18	0.0214	33	199	299	67	598
2001	537	26	0.0484	15	292	73	0	380
2000	443	39	0.0880	24	169	105	16	314
1999	215	25	0.1163	6	49	98	0	153

Table 19. Run escapement and NRR of Methow Basin steelhead populations calculated from broodstock sampling at Wells Hatchery with corresponding HRR values from Wells Hatchery returns. Escapement values and recruits produced were derived from radio-telemetry data (English et al. 2001, 2003).

Parent brood	Run escapement	Brood at age				Recruits produced	NRR	HRR
		1.1	1.2, 2.1	1.3, 3.1, 2.2	2.3, 3.2			
1996	563	1999	2000	2001	2002	315	0.56	13.4
1997	2,427	2000	2001	2002	2003	684	0.28	14.9
1998	2,396	2001	2002	2003	2004	730	0.30	37.3
1999	1,574	2002	2003	2004	2005	167	0.11	47.4
2000	2,114	2003	2004	2005	2006	848	0.40	6.3
2001	3,709	2004	2005	2006	2007	595	0.16	40.5
2002	10,829	2005	2006	2007	2008	374	0.03	15.9
2003	5,604	2006	2007	2008	2009	444	0.08	26.9

Straying of Wells Hatchery Steelhead

Based on PIT tag recoveries of Wells Hatchery releases (brood years 2002-2004), hatchery steelhead have strayed into non-target tributaries in both the Methow and Okanogan basins. By brood year, Wells Hatchery steelhead have been identified in non-target locations at rates less than the 5% standard (Table 20). However, recovery locations and detection effort was limited, thus reported stray rates should be considered minimum values.

Table 20. Stray rates by brood year of Wells Hatchery steelhead (broods 2002-2004) based on PIT-tag observations during steelhead spawning periods (March-June) and expanded by release-group-specific tag rates.

Brood	# of strays	Expanded stray total	Adult returns	Stray rate (%)
2002	25	59	4,577	1.29
2003	30	59	6,129	0.96
2004	82	135	4,878	2.77

By spawn year, hatchery steelhead have comprised substantial proportions of the estimated spawning escapement in tributaries with PIT-tag antenna arrays (Table 21). Hatchery steelhead are not released in Beaver, Gold, or Libby creeks, so any hatchery fish spawning in these waters are considered strays. The four tributaries examined within the Methow and Okanogan Basins exhibited greater than 10% stray fish (sum total) within estimated spawning escapements at least one year. Since the inception of PIT tag antenna arrays at Wells Dam (January 2002), only four PIT-tagged hatchery steelhead released at or above Wells Dam were estimated to have migrated to out-of-basin non-target locations downstream of Wells Dam without first returning to Wells Dam.

Table 21. Expanded observations and estimated spawning escapement by tributary and spawn year of Wells Hatchery steelhead (broods 2002-2004) based on PIT tag observations during steelhead spawning periods (March-June) and expanded by release-group-specific tag rates. Values are proportions (%) of estimated spawning escapement in the recipient population.

Release river	Recipient population			
	Beaver Creek (Methow)	Gold Creek (Methow)	Omak Creek (Okanogan)	Libby Creek (Methow)
2005 - Methow Basin				
Twisp River	0.0	0.8	0.0	0.0
2006 - Methow Basin				
Chewuch River	5.7	2.3	11.9	0.0
Methow River	0.0	3.5	8.3	15.4
Twisp River	0.0	9.3	3.6	23.1
2006 - Okanogan Basin				
Okanogan River	0.0	4.7	0.0	0.0
Similkameen River	0.0	0.0	10.7	0.0
2007 - Methow Basin				
Chewuch River	9.7	3.3	10.5	11.4
Methow River	16.1	8.0	7.8	20.0
Twisp River	38.7	3.3	10.5	5.7
2007 - Okanogan Basin				
Okanogan River	0.0	0.0	0.0	0.0
Similkameen River	6.5	2.4	26.8	14.3
2008 - Methow Basin				
Chewuch River	0.0	0.0	2.0	0.0
Methow River	0.0	0.0	2.0	0.0
Twisp River	1.8	2.2	0.0	0.0
2008 - Okanogan Basin				
Okanogan River	0.0	0.0	0.0	0.0
Similkameen River	0.0	0.0	2.9	0.0

Discussion

Supplementation is intended to increase abundance of naturally produced fish while minimizing genetic and ecological impacts to the wild population. A comprehensive evaluation of supplementation requires that non-supplemented reference populations are identified in order to compare abundance and productivity metrics among populations over space and time. Identification and feasibility of reference populations is currently being addressed with outcomes likely forthcoming February 2011 (Andrew Murdoch, WDFW, personal communication)

The use of PIT tags as a research and management tool has become increasingly important for species such as steelhead. In contrast to Chinook salmon populations, spawning ground surveys for steelhead rarely provide spawning demographic information through the recovery of biological information from carcasses. With the increasing use of in-stream PIT-tag antenna arrays, run and spawning escapement, hatchery and wild contribution rates, and stray rates can be estimated. Based on PIT-tag detections at mainstem Columbia River dams and at tributary detection sites, fallback and double counting at Wells Dam were estimated to refine run escapement estimates above Wells Dam. The proliferation of instream antenna arrays will improve our ability to obtain acceptably accurate estimates of stray rates within and outside the Methow Basin. Furthermore, PIT-tag antenna arrays in the lower Methow and Okanogan Rivers would provide managers with data from which to develop more realistic estimates of run and spawning escapement.

The total redd count in the Methow River basin is typically lower than expected based on estimates of annual run escapement calculated during broodstock trapping at Wells Dam and subtraction of fish removed in fisheries. In 2009, comparisons were made between existing index area expansion counts and intensive total counts in the Twisp River mainstem reaches. Intensive total counts were lower than index area expansion counts. One challenge to estimating escapement through spawning ground surveys is the differing efficiency of individual surveyors in locating redds. In the Twisp subbasin, seven different surveyors (with varying levels of experience) contributed to the comparison of methodologies. In addition to differences in surveyor efficiency, individual stream reaches that are surveyed infrequently (i.e., tributaries) are subject to changes in channel morphology and habitat availability annually (e.g., beaver dams, loss of spawning substrate during spring freshets) that may affect the accuracy of expanded redd count estimates in some years. The evaluation of surveyor efficiencies, scheduled to begin spring 2011 will refine spawning ground escapement estimates and improve estimation methods.

For several years, analyses of spawn timing of hatchery and wild steelhead were based on data collected from Wells Hatchery broodstock. These data may not reflect spawn timing differences in the natural environment because hatchery broodstock are not subjected to natural rearing conditions (e.g., held on well water) and many wild fish at the hatchery are injected with hormones to promote maturation. For the current brood examined, no significant difference in spawn timing of hatchery and wild females was detected when comparisons were made with non-hormone-injected wild females. However, because wild females appear to have a wide range in spawn dates, a group of females that were hormone injected had significantly later spawn dates than both the hatchery (HxW) group and the non-hormone wild group. Had these females not been injected, they would have spawned even later. It is possible that the combination of warmer well water and altered photoperiod/shading in the hatchery environment affects maturation of hatchery and wild fish differently.

In 2009, spawn timing was assessed in the Twisp River subbasin based on spawning ground observations of Floy-tagged females. Similar to the spawn timing assessment in the hatchery environment, no differences were observed between spawn timing of hatchery and wild fish. The Twisp River weir sampling also focused on inserting PIT tags in the body cavity of female steelhead in order to detect tags deposited in redds. A total of 32 PIT tags (18% of redds scanned) were detected in redds constructed from fish sampled at the Twisp Weir. In 2009, redds were scanned near the end of the spawning season, when both stream flow and the probability of superimposition increase, reducing the likelihood of detecting PIT tags in redds. Thus, surveys in 2010 will attempt to scan redds more frequently to detect as many PIT tags as possible. Preliminary data from the Twisp Weir sampling suggest that a higher proportion of wild fish to hatchery fish use the Twisp subbasin relative to the estimated wild to hatchery proportion in the escapement to the Methow Basin.

The number of out-of-basin stray hatchery steelhead (e.g., Wenatchee Basin fish) upstream of Wells Dam was estimated to be 2,188 fish (2009 brood) increasing in number and relative abundance since 2006. Stray fish were assigned, using proportions derived from previous radio-telemetry studies, to either the Methow or Okanogan river basins for escapement purposes, but the actual spawning location of these fish is unknown. Based on sampling at the Twisp Weir, stray steelhead comprise a much lower proportion of overall spawning escapement (1.3%) relative to the run-at-large stray rate at Wells Dam (24.1%). Undoubtedly, some stray fish fall back below Wells Dam and migrate to their natal stream, but the majority may remain upstream as stray fish (Boggs et al. 2004). Straying is inherent within anadromous fish populations, particularly where hatchery releases occur (Schroeder et al. 2001), and may not be a cause for concern at low levels (e.g., < 5% of receiving population). However, straying at the level observed at Wells Dam within the 2009 brood likely poses a genetic risk to the receiving population, and greatly increases the uncertainty in estimates of spawning population abundance and genetic composition generated from sampling at Wells Dam. Antenna arrays designed to detect PIT tags in returning adult salmonids were installed in the Methow and Twisp rivers in 2008, and these arrays assist in monitoring the movement and spawning location of both local and stray hatchery and wild fish. However, this monitoring will not alleviate the genetic risks from high levels of straying, and managers may wish to consider 1) improved hatchery practices that promote more effective homing, and 2) adult management strategies that remove stray fish altogether.

Steelhead replacement rates (i.e., recruit to spawner) are well below the level necessary to achieve recovery goals. An assessment of the relative reproductive success of hatchery and wild steelhead is necessary to determine the fitness of both components of the spawning population. Understanding current differences in fitness is required to make informed adaptive management decisions regarding the use of hatchery fish, and to optimize detection of any effects of changes in hatchery operations or management (i.e., proportion of hatchery fish on the spawning grounds). Furthermore, determining the relative reproductive success may also improve our understanding of the productivity and carrying capacity of steelhead in the Methow Basin. Preliminary work at the Twisp River weir in 2009 has indicated that the weir could be used as the primary location for a relative reproductive success study for steelhead, and as a broodstock collection facility for a Twisp River local broodstock hatchery program. In 2010, Douglas County PUD and WDFW initiated a steelhead reproductive success study in the Twisp River. This study should help address key management questions regarding the use of hatchery steelhead to help recover the wild steelhead population.

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Appendix A. Summer steelhead run escapement, broodstock collection, fishery-related mortality, and maximum spawning escapement estimates at and above Wells Dam. Methow and Okanogan River escapements are based on radio-telemetry data (English et al. 2001, 2003), which account for 90.4% and 91.6% of the hatchery and wild escapement upstream of Wells Dam, respectively. Total count at Wells Dam includes passage from 15 June (run year) to 14 June (spawn year) for each brood year. For brood years 2007-2009, proportion of hatchery and wild fish at Wells Dam was estimated through run-at-large sampling; in previous years, proportions were calculated from broodstock trapping records. Estimated double counts and fallback were based on expanded PIT tag interrogation data. Estimated fishery mortality in the Columbia River, brood year 2004, includes fishery-related mortality in the Wells Dam tailrace; all other fishery mortality in the Columbia River occurred in the section between Wells Dam and Chief Joseph Dam.

Brood year	Total count at Wells Dam based on trapping		Wells Hatchery broodstock retained		Estimated double counts at Wells Dam		Estimated fallback below Wells Dam		Estimated fishery mortality (Columbia River)		Estimated run escapement (using radio-telemetry data)				Estimated fishery mortality				Local broodstock retained				Estimated maximum spawning escapement (using radio-telemetry data)			
											Methow		Okanogan		Methow		Okanogan		Methow		Okanogan		Methow		Okanogan	
	H	W	H	W	H	W	H	W	H	W	H	W	H	W	H	W	H	W	H	W	H	W	H	W	H	W
1999	2,871	236	383	29	- -	- -	- -	- -	- -	- -	1,443	147	806	43	- -	- -	- -	- -	- -	- -	- -	- -	1,443	147	806	43
2000	3,483	439	334	41	- -	- -	- -	- -	- -	- -	1,826	282	1,020	83	- -	- -	- -	- -	- -	- -	- -	- -	1,826	282	1,020	83
2001	6,090	546	323	26	- -	- -	- -	- -	- -	- -	3,345	368	1,869	108	- -	- -	- -	- -	- -	- -	- -	- -	3,345	368	1,869	108
2002	18,028	889	374	18	- -	- -	- -	- -	- -	- -	10,239	617	5,720	181	- -	- -	- -	- -	- -	- -	- -	- -	10,239	617	5,720	181
2003	8,907	816	274	27	- -	- -	- -	- -	455	9	4,743	552	2,650	162	254	13	120	2	- -	- -	1	4	4,489	539	2,529	156
2004	9,323	1,153	325	120	- -	- -	- -	- -	298	4	5,046	729	2,819	214	336	10	385	1	- -	- -	11	5	4,710	719	2,423	208
2005	8,869	840	346	69	- -	- -	- -	- -	426	5	4,696	542	2,623	159	679	9	528	3	- -	- -	15	3	4,017	533	2,080	153
2006	6,834	758	324	91	- -	- -	- -	- -	437	4	3,522	469	1,968	138	683	8	486	5	- -	- -	10	3	2,839	461	1,472	130
2007	6,468	610	345	46	- -	- -	- -	- -	523	2	3,248	398	1,815	117	- -	- -	- -	- -	- -	- -	4	7	3,248	398	1,811	110
2008	6,782	1,239	289	90	- -	- -	- -	- -	872	8	3,260	808	1,821	237	470	9	288	7	14	0	5	3	2,776	799	1,528	227
2009	8,877	1,200	300	75	144	19	396	52	444	5	4,404	743	2,460	218	636	11	446	5	8	8	5	11	3,760	724	2,009	202

Appendix B1. Upper Methow River subbasin steelhead redd counts by section and survey year. Section descriptions in bold indicate rotating panel tributaries. Ns = not surveyed.

River/section	Code	2002	2003	2004	2005	2006	2007	2008	2009
Upper Methow River									
Ballard CG. - Lost R.	M15	ns	15	27	17	3	2	6	5
Lost R. - Gate Cr.	M14	ns		10	51	0	19	25	16
Gate Cr. - Early Winters Cr.	M13	ns	215[a]	23	60	15	11	19	11
Early Winters Cr. - Mazama Br.	M12	ns		0	43	3	5	25	8
Mazama Br. - Susp. Br.	M11	70	44[a]	12	25	9	24	27	5
Susp. Br. - Weeman Br.	M10	156		8	52	26	56	21	25
Weeman Br. - Along Hwy 20	M9	ns		93	180	30	14	34	94
Along Highway 20 - Wolf Cr.	M8	ns	325[a]	0	9	0	1	1	0
Wolf Cr. - Foghorn Dam	M7	ns		0	9	5	0	10	10
Foghorn Dam - Winthrop Br.	M6	ns		0	34	0	0	10	2
Upper Methow River mainstem total		226	599	173	480	91	132	178	176
Lost River									
Sunset Cr. - Eureka Cr.	L3	ns	ns	17	6	ns	ns	ns	ns
Eureka Cr. - Lost River Br.	L2	10	25	11	7	ns	ns	ns	11
Lost River Br. - Confluence	L1	1	0	3	7	2	10	3	6
Early Winters Creek									
Klipchuck CG. - Early Winters Br.	EW5	ns	ns	0	0	ns	ns	ns	0
Early Winters Br. - Highway 20 Br.	EW4	ns	ns	0	0	ns	ns	ns	2
Highway 20 Br. - Diversion Dam	EW3	ns	ns	23	6	ns	4	0	0
Diversion Dam - Hwy 20 Br.	EW2	ns	ns	0	0	3	2	0	2
Hwy 20 Br. - Confluence	EW1	ns	ns	1	0	1	0	0	0
Methow River tributaries									
Suspension Creek	SP1	ns	ns	43	37	31	49	37	32
Little Suspension Creek	LSP1	ns	ns	ns[b]	ns[b]	ns[b]	29	4	1
MH Outfall	MH1	15	ns	18	15	14	25	9	12
WNFH Outfall	WN1	171	61	113	83	29	68	27	37
Hancock Cr.; Kumm Rd. to Wolf Cr. Rd.	HA2	ns	ns	ns	ns	ns	21	9	7
Hancock Cr.; Wolf Cr. Rd. to Conf.	HA1	ns	ns	3	0	0	2	4	1
Wolf Creek	W2	ns	ns	29	0	0	ns	ns	0
Wolf Creek	W1	ns	ns	8	0	0	1	0	0
Little Boulder Creek	LBO1	ns	ns	3	3	0	0	0	0
Goat Creek	GT1	ns	ns	33	4	0	0	0	0
Upper Methow River subbasin total		423	685	478	648	171	343	271	287

[a] Reaches M12-M14, M10 and M11, and M6-M9 were combined in 2003.
[b] Unsuitable habitat 2004 to 2006.

Appendix B2. Lower Methow River subbasin steelhead redd counts by section and survey year. Sections descriptions in bold indicate rotating panel tributaries. Ns = not surveyed.

River/section	Code	2002	2003	2004	2005	2006	2007	2008	2009
Lower Methow River									
Winthrop Br. - MVID Dam	M5	ns	89[a]	14	44	15	0	0	23
MVID - Twisp Confluence	M4	ns		24	50	0	4	0	23
Twisp Confluence - Carlton	M3	ns	69	38	123	44	0	5	24
Carlton - Upper Burma Bridge	M2	ns	99	33	79	28	1	27	15
Upper Burma Bridge - Mouth	M1	ns	58	42	67	10	2	86	17
Lower Methow River mainstem total		ns	315	151	363	97	7	118	102
Beaver Creek									
Lester Rd Br. - Balky Hill Rd	BV3	ns	ns	16 [b]	2	ns	9[c]	0	0
Balky Hill Rd - Hwy 20	BV2	ns	ns		14	ns	ns	15	23
Hwy 20 - confluence	BV1	70	15	21	39	21	9	38	26
Lower Methow River tributaries									
Gold Cr. Upper North Fork	GD-N4	ns	ns	0	22	15	36	7	0
Gold Cr. Upper North Fork (Index)	GD-N3	ns	ns	0	3	2	5	1	7
Gold Cr. Upper North Fork	GD-N2	ns	ns	0	16	3	6	0	6
Gold Cr. Lower North Fork (Index)	GD-N1	ns	ns	0	15	2	6	1	5
Gold Cr. South Fork	GD-S3	ns	ns	0	30	10	25	- -[d]	5
Gold Cr. South Fork (Index)	GD-S2	ns	ns	0	8	3	6	9	4
Gold Cr. South Fork	GD-S1	ns	ns	0	4	1	3	- -[d]	1
Gold Cr. - Mainstem (Index)	GD-M2	ns	ns	0	12	2	5	11	15
Gold Cr. - Mainstem	GD-M1	ns	2	0	15	3	6	12	16
Foggy Dew Creek	FD1	ns	ns	0	14	10	24	2	2
Black Canyon Creek	BC2	ns	ns	0	7	2	5	2	2
Black Canyon Creek	BC1	ns	ns	0	6	2	5	2	0
Libby Creek (Index)	LB4	ns	ns	0	7	2	6	2	ns[e]
Libby Creek	LB3	ns	ns	0	8	2	6	2	ns[e]
Libby Creek (Index)	LB2	ns	ns	0	2	1	2	1	0
Libby Creek	LB1	ns	ns	0	7	3	6	2	5
Lower Methow River subbasin total		70	332	188	594	181	177	225	219

[a] Reaches M5 and M4 were combined in 2003.
[b] Reaches BV2 and BV3 were combined in 2004.
[c] Partial survey.
[d] No expansion due to possible unsuitable habitat.
[e] Not accessible due to beaver dams.

Appendix B3. Twisp River subbasin steelhead redd counts by section and survey year. Section descriptions in bold indicate rotating panel tributaries. Ns = not surveyed.

River/section	Code	2001	2002	2003	2004	2005	2006	2007	2008	2009
				Twisp River						
Road End CG. - South Cr. Br.	T10	ns	ns	33	15	9	ns	ns[b]	ns	0
South Cr. Br. - Poplar Flats CG.	T9	ns	ns	5	9	6	4	ns[b]	ns	0
Poplar Flats CG. - Mystery Br.	T8	ns	ns	17	2	17	29	ns[b]	0	0
Mystery Br. - War Cr. Br.	T7	2	ns	36	88	112	47	ns[b]	6	22
War Cr. Br. - Buttermilk Br.	T6	40	ns	91	9	78	70	ns[b]	42	109
Buttermilk Br. - Little Br. Cr.	T5	47	156	322[a]	22	87	130	60	59	71
Little Br. Cr. - Twisp Weir	T4	100	194		94	25	34	13	30	22
Twisp Weir - Upper Poorman Br.	T3	48	ns	88	3	32	32	5	18	47
Up. P'man Br. - Low. P'man Br.	T2	46	ns	14	1	29	18	ns[b]	16	47
Lower Poorman Br. – Conf.	T1	29	ns	90	0	20	5	ns[b]	6	10
Twisp River mainstem total		312	350	696	243	415	369	78	177	328
				Twisp River tributaries						
Little Bridge Cr.	LBC3	ns	ns	ns	ns	3	0	1	0	0
Little Bridge Cr.	LBC2	ns	ns	ns	ns	4	1	0	2	1
Little Bridge Cr.	LBC1	ns	ns	ns	11	20	3	2	2	17
MSRF pond outfall	MSRF1	ns	ns	ns	2	11	0	1	0	0
War Creek	WR1	ns	0	0	0	2	3	0	0	2
Eagle Creek	EA1	ns	ns	ns	0	2	1	0	0	2
Buttermilk Creek	BM2	ns	ns	ns	0	13	5	0	1	0
Buttermilk Creek (Index)	BM1	ns	4	0	0	13	5	0	0	2
South Creek	SO1	ns	ns	ns	0	1	2	0	0	0
Twisp River subbasin total		312	354	696	256	484	389	82	182	352

[a] Reaches T4 and T5 were combined in 2003.
[b] Not surveyed due to prolonged high flow.

Appendix B4. Chewuch River subbasin steelhead redd counts by section and survey year. Sections descriptions in bold indicate rotating panel tributaries. Ns = not surveyed.

River/section	Code	2002	2003	2004	2005	2006	2007	2008	2009
				Chewuch River					
Chewuch Falls - 30 Mi. Br.	C13	ns	ns	0	0	ns	ns	ns	0
30 Mi. Br. - Road Side Camp	C12	ns	14	3	0	ns	ns	ns	4
Road Side Camp - Andrews Cr.	C11	ns	3	8	0	ns	ns	ns	2
Andrews Cr. - Lake Cr.	C10	ns	8	23	0	ns	ns	ns	4
Lake Cr. - Buck Cr.	C9	ns	9	0	0	ns	ns	ns	0
Buck Cr. - Camp 4	C8	ns	3	3	0	ns	ns	ns	34
Camp 4 - Chewuch CG.	C7	ns	6	10	0	ns	16	13	9
Chewuch CG. - Falls Cr. CG.	C6	ns	26	3	0	ns	21	30	30
Falls Cr. CG. - 8 Mile Cr.	C5	ns	44	8	0	ns	7	22	11
8 Mile Cr. - Boulder Cr.	C4	105	134	5	20	2	19	55	28
Boulder Cr. - Chewuch Br.	C3	ns	0	0	0	ns	0	4	2
Chewuch Br. - WDFW Land	C2	ns	35	8	0	ns	3	37	24
WDFW Land - Confluence	C1	ns	3	3	0	ns	0	25	7
Chewuch River mainstem total		105	285	74	20	2	66	186	155
				Chewuch River tributaries					
Eightmile Creek	EM2	5[a]	20[a]	0	11	0	0	3	0
Eightmile Creek	EM1			1	17	4	1	0	2
Boulder Creek	BD2	ns	0	0	5	6	4	0	1
Boulder Creek	BD1	4	0	0	2	1	4	0	0
Lake Creek	LK2	ns	ns	0	0	44	51	0	13
Lake Creek	LK1	1	1	0	0	4	4	0	1
Andrews Creek	AN2	ns	ns	0	1	1	2	0	0
Andrews Creek	AN1	ns	ns	0	1	1	1	0	0
Twenty mile Creek	TW2	ns	ns	0[b]	1[b]	4[b]	0	0	0
Twenty mile Creek	TW1	ns	ns				5	0	0
Chewuch River subbasin total		115	306	75	58	67	138	189	172

[a] Reaches EM2 and EM1 combined 2002 and 2003.
[b] Reaches TW2 and TW1 combined 2004 to 2006.

Chapter 5

2009 Brood Spring Chinook Salmon Spawning Ground Surveys Conducted in the Methow River Basin

Abstract

Spawning ground surveys were conducted to evaluate the spawn timing, spatial distribution, genetic composition, and to estimate the tributary-specific spawning escapement of spring Chinook salmon within the Methow River basin. Spawning ground surveys were performed on foot between 5 August and 25 September. A total of 490 spring Chinook salmon redds were constructed in the Methow River basin in 2009. The Methow River subbasin had the greatest number of redds (N = 323). The Chewuch River subbasin had fewer redds (N = 143) than the mainstem Methow River excluding hatchery outfalls (N = 255), and the fewest redds were located in the Twisp River (N = 24). An estimated 4,804 spring Chinook salmon migrated upstream of Wells Dam in 2009. After subtracting fish that were double counted at Wells Dam fish ladders (N = 59), moved downstream of Wells Dam without reascending (N = 176), collected for hatchery broodstock (N = 738), and those originating from Okanogan River releases (N = 376), the estimated run escapement to the Methow River basin was 3,690 fish. There were no significant differences in migration timing between hatchery and wild fish. Redd counts expanded by the male-to-female ratio from sampling at Wells Dam (4.39:1.00) suggest that the Methow River spawning population comprised 2,641 fish, or 71.6% of the estimated escapement. No estimates of poaching, predation, or pre-spawn mortality were made. Peak spawning occurred between 25 August and 9 September in index areas of all three subbasins. There were no significant differences in the spatial distribution of female carcasses or spawn timing between hatchery and wild fish within any subbasin. Wild fish comprised 35.1%, 24.8%, and 15.0% of the estimated spawning escapement in the Chewuch, Twisp, and Methow subbasins, respectively. The natural replacement rate (NRR) for the most recent brood year of spring Chinook salmon with complete recovery data (2003 brood) was highest in the Methow River subbasin (0.15 recruits per spawner). The geometric mean NRR for brood years 1992 to 2003 was less than 1.0 in each subbasin regardless of whether broodyears 1996 through 1998 were omitted (no spawning ground surveys in 1996 and 1998). Broodyear 2003 hatchery replacement rates (HRR) did not meet the target BAMP value. Target BAMP HRR values have not been met for any of the broodyears and stocks. Of the estimated total of coded-wire-tagged hatchery fish recovered on spawning grounds (N = 1,912), 16.3% were classified as within-basin strays from Methow Hatchery and 3.9% were stray fish from other basins.

Introduction

Spring Chinook salmon spawning ground surveys were used to evaluate spawn timing, spatial distribution, spawner demographics, and to estimate tributary-specific spawning escapement within the Methow River basin. Spring Chinook propagated at Methow Hatchery (MH) are used to supplement natural spawning populations in the Methow, Twisp, and Chewuch rivers. Returning hatchery adults should have migration timing, spawn timing, and redd distributions similar to those of naturally produced fish. Most spring Chinook salmon reared at MH were marked with unique coded-wire tags (CWT) based on their subbasin of release. In some cases, individual families, progeny from adults with elevated ELISA values, or juveniles released as subyearlings were also marked with unique CWT codes. Recovery of CWTs from spawning ground surveys provides the data necessary to estimate hatchery stray rates and the composition of spawners in target streams. Hatchery fish may stray within their basin of release, or to other river basins, and may contribute to the loss of genetic variation within or between populations. In the upper Columbia River basin, comprehensive spawning ground surveys are conducted for most spring Chinook salmon stocks and data are directly comparable.

The implementation of the Analytical Framework for Monitoring and Evaluating PUD Hatchery Programs (Hays et al. 2007) as proposed by the Murdoch and Snow (2008) included eight objectives designed to examine hypotheses regarding supplementation programs in the Methow Basin. This chapter addresses elements of the M&E Plan related to spring Chinook salmon spawning ground surveys in 2009 and data were collected that specifically address the following objectives:

Objective 1: Determine if supplementation programs have increased the number of naturally spawning and naturally produced adults of the target population relative to a non-supplemented population (i.e., reference stream), and if the change in the natural replacement rate (NRR) of the supplemented population is similar to that of the non-supplemented population.

- Ho: Number of hatchery fish that spawn naturally ≥ number of naturally and hatchery produced fish taken for broodstock
- Ho: Δ NOR/Max recruitment $_{\text{Supplemented population}} \geq \Delta$ NOR/Max recruitment $_{\text{Non-supplemented population}}$
- Ho: Δ NRR $_{\text{Supplemented population}} \geq \Delta$ NRR $_{\text{Non-supplemented population}}$

Objective 2: Determine if run timing, spawn timing, and spawning distribution of both natural and hatchery components of the target population are similar.

- Ho: Migration timing $_{\text{Hatchery age X}}$ = Migration timing $_{\text{Naturally produced age X}}$
- Ho: Spawn timing $_{\text{Hatchery}}$ = Spawn timing $_{\text{Naturally produced}}$
- Ho: Redd distribution $_{\text{Hatchery}}$ = Redd distribution $_{\text{Naturally produced}}$

Objective 4: Determine if hatchery adult-to-adult survival (i.e., hatchery replacement rate) is greater than natural adult-to-adult survival (i.e., natural replacement rate) and equal to or greater than the program specific HRR expected value based on survival rates listed in the BAMP (1998).

- Ho: HRR $_{\text{Year x}} \geq$ NRR $_{\text{Year x}}$
- Ho: HRR ≥ BAMP value (preferred)

Objective 5: Determine if stray rate of hatchery fish is below the acceptable levels to maintain genetic variation between stocks.

- Ho: Stray rate $_{\text{Hatchery fish}} \leq 5\%$ of total brood return

- Ho: Stray hatchery fish ≤ 5% of spawning escapement (based on run year) within other independent populations
- Ho: Stray hatchery fish ≤ 10% of spawning escapement (based on run year) of any non-target streams within independent populations

Methods

Migration Timing and Run Composition

Adult spring Chinook salmon were trapped and sampled at Wells Dam to assess migration timing, origin composition, and to collect broodstock for MH. All trapped fish were sampled for hatchery marks (i.e., CWT, fin-clips). Scale samples, sex, and fork length data were collected from all suspected wild fish, and wild fish retained for broodstock were also tissue sampled for DNA analysis to determine genetic origin (i.e., Twisp or non-Twisp). With the exception of adipose fin-clipped fish, all hatchery fish were sampled for scales, sex, and length, and passive integrated transponder (PIT) tags were inserted in the pelvic girdle of all released fish (hatchery and wild) to assess sex ratio of the 2009 brood and to examine the influence of size on carcass recovery rates. Adipose fin-clipped hatchery spring Chinook salmon were expected to return to the Methow and the Okanogan river basins. The Winthrop National Fish Hatchery (NFH) expected returns of age-4 ad-clipped fish from the 2005 brood and the Colville Confederated Tribes (CCT) expected returns of age-3 and age-5 ad-clipped fish from the 2004 and 2006 broods, respectively. We used the estimated age of these fish, determined via length-at-age regression analysis, to estimate escapement of adipose fin-clipped fish to the Methow and Okanogan basins. Adipose fin-clipped spring Chinook were not anesthetized so that they could be retained in consumptive fisheries. A few adipose fin-clipped fish that were accidentally exposed to anesthetic (MS-222) were marked with an anchor tag near the dorsal fin to allow exclusion from consumptive fisheries. We determined gender using secondary sexual characteristics (e.g., snout elongation, body depth). All trapped fish were either transported to MH as broodstock, placed back in the fish ladder upstream of the trap (east ladder only), or were released into the Columbia River upstream of Wells Dam.

We reviewed digital video records of fish passage at Wells Dam between 16 June and 30 June for both east and west ladders to exclude summer Chinook salmon from the spring Chinook salmon count and vice versa. Summer Chinook salmon were distinguished from spring Chinook salmon based on body color and shape. Numbers of double counted fish (i.e., re-ascensions) and fall back (i.e., fish that fell below without re-ascending) were estimated based on PIT-tag detections at instream interrogation sites and mainstem Columbia and Snake River dams. Proportions of fish detected at locations downstream of Wells Dam and records of fish migrating through Wells Dam multiple times were expanded to the estimated run-at-large at Wells Dam. No estimates of predation, pre-spawn mortality or illegal removal (i.e., poaching) were made.

Redd Distribution and Spawn Timing

The Methow River basin was divided into three geographic subbasins: Methow River (upstream of Twisp), Chewuch River, and Twisp River. Index areas of annual spawning activity were established within each subbasin based on historic survey information to estimate spawn timing of hatchery and wild fish. Spring Chinook salmon redds were individually marked with flagging tape that included survey date, redd number, and instream location on each flag. Each location was also recorded with hand-held global positioning system (GPS) devices for subsequent mapping and analyses. All mainstem reaches were surveyed weekly during the spawning season (August and September). Dewatered redds were quantified in areas where stream flow went subsurface following the completion of spawning. To assess the length of time that redds are detectable (redd life), existing redds were rated weekly with one of three descriptions: measurable (defined margins), identifiable (redd from the current season but not measurable), or undetectable. To compare redd life among subbasins, redds that were constructed prior to 31 August and were evaluated through 19 September were used to standardize the evaluation period. Female carcass locations (river kilometers [rkm]) were used as surrogates for spatial redd distribution by origin of fish because most hatchery fish in the Methow Basin lack externally visible marks, greatly limiting the ability to determine the origin of actively spawning fish.

Spawner Composition, Demographics, and Egg Deposition

Spawning population characteristics were derived from biological data collected from carcasses recovered during surveys. Location, origin, sex, fork length, post-orbital-to-hypural-plate (POH) length, egg retention (females), and scale samples were collected from each carcass when possible. Tissue samples were collected from wild, and a small number of hatchery fish for genetic analyses; most DNA samples from hatchery fish were collected at Methow Hatchery during spawning activities Carcass locations were recorded using hand-held GPS devices and all carcasses were sampled for CWTs using hand-held electronic detection wands. Most spring Chinook salmon released from Methow Basin hatcheries in recent years have been marked with only a CWT, requiring the use of electronic detectors. Most other hatchery fish released in the Upper Columbia are marked with an adipose fin-clip and CWT to designate hatchery origin. Snouts were sent to the WDFW CWT Lab for tag extraction and decoding. Scales were sent to the WDFW Scale Lab for age determination. Fish age was determined either through CWT or scale analysis. Scale analysis was also used to confirm origin for fish with no detectable hatchery mark (i.e., wild).

Egg retention was determined for female carcasses with an intact abdomen by counting the number of eggs present. The percentage of eggs retained was determined by dividing the number of eggs counted by the mean fecundity for the fish's specific age and origin derived from 2009 MH broodstock (WDFW, unpublished data). Female carcasses with intact abdominal cavities, a large number of eggs, and no external signs of spawning (i.e., eroded caudal fin) were categorized as pre-spawn mortalities. Estimated egg deposition was calculated using mean fecundities from MH broodstock (i.e., MetComp stock for Methow and Chewuch subbasins, Twisp stock for Twisp subbasin) and adjusted for mean egg-retention rates.

Natural Replacement Rate

The natural replacement rate (NRR) for each brood was calculated by adding the number of recruits (r) from successive return years that originated from the same brood year (i), and dividing the sum by the number of spawners (S) for that brood year calculated from expanded spawning ground surveys, as follows:

$$\text{NRR} = (r_{i+1} + r_{i+2} + r_{i+3} + \ldots)/S$$

Estimated spawning escapement was derived from redd counts expanded by fish-per-redd values. Prior to 2006, fish-per-redd values were calculated from Wells Dam counts and adjusted for the proportion of jacks (age-3 fish) in the run (Meekin 1967). Since 2006, fish-per-redd values have been calculated using the male-to-female sex ratio from run-at-large sampling at Wells Dam. In 2009, fish-per-redd values were calculated on the population remaining after broodstock collection. Recruits were expanded to account for non-selective fishery harvest and indirect mortality attributed to selective fisheries.

Stray Rates

The composition of hatchery-origin fish on spawning grounds, and associated stray rates were determined by expanding all CWT recoveries by the code-specific mark-retention rates and stream-specific sampling rates from spawning ground surveys. Hatchery fish were assigned to one of four categories depending on release and recovery location (local, Winthrop NFH, within-basin, or out-of-basin). Local fish were composed of Methow Hatchery fish recovered in the stream or subbasin from which they were released. Fish released from Winthrop NFH were expected to return to the Methow River but their within-basin stray rates are not addressed. All MH fish recovered in a stream or subbasin in the Methow River basin from which they were not released were considered within-basin strays. Out-of-basin strays included all fish recovered that were released outside the Methow River basin (i.e., other hatcheries).

Statistical Analyses

For all comparisons of hatchery and wild fish (except migration timing), only local hatchery fish were used within specific tributary release locations (i.e., Chewuch River recoveries that were released into the Chewuch River, etc.). Data were tested for normality using Shapiro-Wilk's *W*-tests and homogeneity of variances using Levene's tests. Data were transformed to achieve normal distributions when necessary. Nonparametric tests were used when normal distributions could not be achieved and variance was unequal between groups. All statistical tests were performed at a significance level of 0.05 (i.e., a 5% chance of erroneously rejecting a null hypothesis). Differences in migration timing among age classes of hatchery and wild fish were tested using Kruskal-Wallis analysis of variance (KW ANOVA). Post-hoc multiple comparisons were made for all run-timing groups. Redd life among subbasins was compared using ANOVA (log-transformed). Female carcass locations (river kilometers [rkm]) were used as surrogates for redd distribution because most hatchery fish lack externally visible marks, thus confounding the ability to determine origin of actively spawning fish. Spatial redd distribution of hatchery and wild fish within subbasins was compared using two-sample t-tests. Differences in spawn timing between hatchery and wild females within each subbasin were tested using analysis of covariance (ANCOVA) with elevation as the covariate. Spatial distribution of redds and spawn timing data were log(x+1) transformed because of non-normality. Comparisons of NRR and HRR by subbasin were tested using Mann-Whitney U-tests. Stray rates were tested using one-sample t-tests. Statistical tests for strays by brood year were conducted including fish removed in fisheries (i.e., harvest), because inclusion of harvested fish did not influence results of the analyses. Data transformations (i.e., square root, arcsine (square root), etc.) often will not normalize data sets that include many null values and few values greater than one. However, transformed data were used if transformations produced normal data. Comparisons of NRR and HRR by subbasin were tested using a Mann-Whitney U-test. Objective 1 of the M&E Plan requires the use of spatial reference populations. Reference populations are currently being investigated and once identified, similar data for those populations will be included in future reports.

Results

Migration Timing and Run Composition

The 2009 spring Chinook salmon migration to Wells Dam was monitored between 4 May and 30 June. During this period, the majority (94.8%) of fish migrated between 14 May and 16 June (Figure 1). There were no significant differences in migration timing between hatchery and wild fish. Differences in migration timing were present between, but not within age classes (ANOVA: $P < 0.001$; Figure 2). Hatchery and wild three-year-olds migrated to Wells Dam later than hatchery and wild four-year-olds and wild five-year-olds (multiple comparisons: $P \leq 0.01$ in all cases; Figure 2).

Based on PIT tag detections at Wells Dam fish ladders, an estimated 59 fish were double counted and 176 fish fell below Wells Dam without reascending. The total spring Chinook salmon run above Wells Dam (including broodstock) was 4,805 fish (Table 1). The run was composed primarily of hatchery fish (84.3%), the majority of which were not adipose fin-clipped. Based on spawning ground and broodstock recoveries of PIT-tagged fish, gender determination at Wells Dam was 91.6% accurate for adult female fish, 58.6% accurate for adult male fish, 99.2% accurate for age-3 male fish (i.e., jacks), and 0% accurate for age-3 female fish (i.e., jills; 19 fish sampled, 4 fish recovered). After correcting for sex determination errors and accounting for fish retained for broodstock, the male (including jacks) to female ratio of fish sampled at Wells Dam was 4.39 to 1.00. This equates to a fish-per-redd value of 5.39 assuming females only construct a single redd. After removing fish bound for the Okanogan River ($N = 376$) and fish collected for hatchery broodstock ($N = 738$), the estimated run escapement to the Methow River was 3,690 fish.

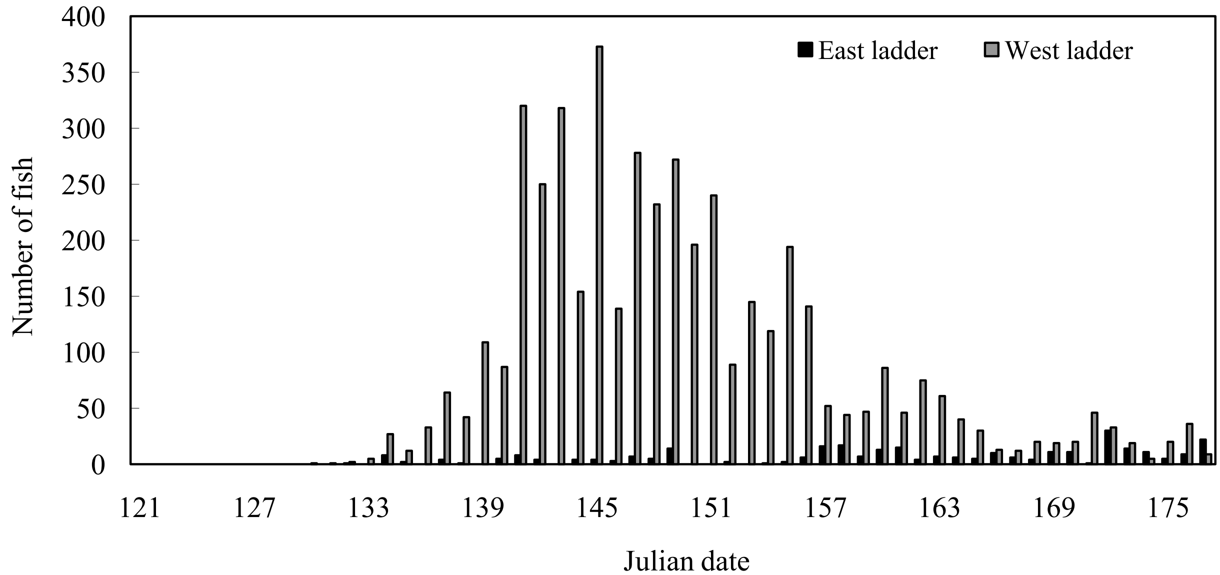

Figure 1. 2009 spring Chinook salmon migration timing to Wells Dam by ladder. All fish sampled during trapping operations are included.

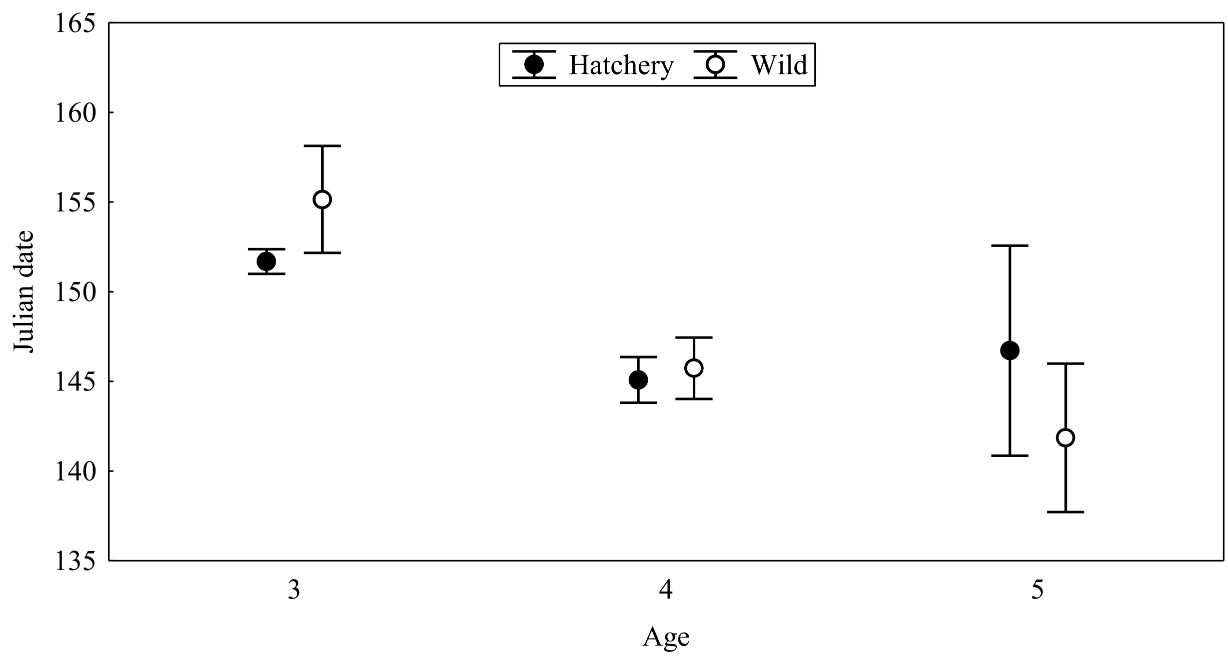

Figure 2. Mean migration timing (Julian date) to Wells Dam by age of hatchery and wild origin spring Chinook salmon in 2009. Error bars represent 95% confidence intervals.

Table 1. Estimated 2009 spring Chinook salmon run composition above Wells Dam based on trapping three consecutive days per week. Okanogan River returns from Colville Confederated Tribes (CCT) hatchery releases were based on estimated age of adipose fin-clipped fish (age-3 and age-5 fish). Estimated run above Wells Dam includes fish collected for broodstock (*N* = 738).

Origin	Mark	Adults		Age-3 fish	
		%	*N*	%	*N*
Hatchery	Coded wire tag only	52.1	922	81.3	2,468
	Ad-clip + CWT	7.4	131	0.0	0
	None	2.8	50	2.4	73
	Ad-clip only	1.8	32	0.0	0
	Ad-clip + CWT (CCT)	1.4	24	3.5	106
	Ad-clip only (CCT)	0.3	6	7.9	240
Wild	None	34.2	604	4.9	149
Total		100.0	1,769	100.0	3,036

Redd Distribution and Spawn Timing

Spawning ground surveys were performed on foot between 5 August and 25 September. The majority of redds (65.9%; *N* = 323) were found in the Methow River subbasin (Table 2; Figure 3). The greatest number of redds within that subbasin were found in the 9 km reach downstream of Weeman Bridge (*N* = 138). A total of 68 redds were found in Methow River tributaries (Table 2). The Chewuch River subbasin had 143 redds (Table 3; Figure 4) and 24 redds were found in the Twisp subbasin (Table 4; Figure 5). Most spring Chinook salmon redds constructed in 2009 were identifiable throughout the survey season. With the exception of the week of 20 September when only incomplete surveys were accomplished (i.e., spot-checks), at least 95% of redds in each subbasin were identifiable as 2009 spring Chinook salmon redds each week of surveys (Table 5). Since most redds were visible at the end of surveys, mean redd life should be considered minimum values and could be greater than values reported. Superimposition was the typical reason why redds became unidentifiable during the survey period. Additionally, there were no significant differences in mean redd life (minimum days visible) among subbasins (ANOVA: $P = 0.19$). Mean redd life (minimum days visible) ranged between 20 and 23 days (Chewuch: mean = 23, SD = 5.4; Methow: mean = 21, SD = 5.1; Twisp: mean = 20, SD = 0.4). There were no significant differences in the spatial distribution of hatchery and wild female carcasses in the Methow, Chewuch, or Twisp subbasins (Figure 6; one-sample t-tests: $P = 0.17$, 0.31, and 0.88, respectively).

Peak spawning occurred between 25 August and 9 September in index areas of all three subbasins. After adjusting for elevation, no significant differences in spawn timing (Julian date) between hatchery and wild females were detected within any subbasin (Figure 7; ANCOVA: Chewuch $P = 0.15$, Methow $P = 0.70$, Twisp $P = 0.87$).

Table 2. 2009 spring Chinook salmon redd distribution, estimated spawning escapement, and carcass recoveries in the Methow River subbasin.

Reach	Redds		Estimated spawning escapement	Carcasses				
				Recoveries			Expanded count	
	Count	Subbasin proportion (%)		H	W	Total	H	W
			Methow River mainstem					
M15	0	0.0	0	0	0	0	0	0
M14	11	3.4	59	6	3	9	39	20
M13	1	0.3	5	0	1	1	0	5
M12	10	3.1	54	9	6	15	32	22
M11	14	4.3	76	13	3	16	62	14
M10	44	13.6	237	66	9	76[a]	209	28
M9	138	42.9	744	162	31	195[a]	624	120
M8	11	3.4	59	28	3	31		
M7	11	3.4	59	28	1	29	176	7
M6	12	3.7	65	106	2	110[a]		
M5,4	3	0.9	16	6	1	7	14	2
Total	255	79.0	1,374	424	60	489[a]	1,156	218
			Lost River					
L2	9	2.8	48	2	1	3	47	23
L1	4	1.2	22	0	0	0		
Total	13	4.0	70	2	1	3	47	23
			Early Winters Creek					
EW5	0	0.0	0	0	0	0	0	0
EW4	3	0.9	16	0	0	0	41	13
EW3	7	2.2	38	3	1	4		
EW2,1	0	0.0	0	0	0	0	0	0
Total	10	3.1	54	3	1	4	41	13
			Methow River tributaries					
MH1	14	4.3	75	68	0	68	75	0
SP1	9	2.8	49	6	1	7	42	7
WLF2	5	1.5	27	5	0	5	27	0
WLF1	0	0.0	0	0	0	0	0	0
WN1	17	5.3	92	60	0	61[a]	92	0
Total	45	13.9	243	139	1	141[a]	236	7
Grand total	323	100.0	1,741	568	63	637[a]	1,480	261

[a] Includes fish of unknown origin.

Table 3. 2009 spring Chinook salmon redd distribution, estimated spawning escapement, and carcass recoveries in the Chewuch River subbasin.

Reach	Redds		Estimated spawning escapement	Carcasses				
				Recoveries			Expanded count	
	Count	Subbasin proportion (%)		H	W	Total	H	W
Chewuch River mainstem								
C13	2	1.4	11	1	1	2	6	5
C12	10	7.0	54	0	1	1	33	43
C11	4	2.8	22	3	3	6		
C10	4	2.8	22	3	4	7	9	13
C9	0	0.0	0	0	0	0	0	0
C8	7	4.9	38	3	5	8	14	24
C7	11	7.7	59	3	3	6	30	29
C6	30	20.9	162	20	19	39	83	79
C5	14	9.8	75	13	7	20	49	26
C4	26	18.2	140	35	6	41	120	20
C3	0	0.0	0	2	0	2		
C2	29	20.3	156	53	12	65	127	29
C1	6	4.2	32	10	1	11	29	3
Chewuch River tributaries								
EM1	0	0.0	0	0	0	0	0	0
Total	143	100.0	771	146	62	208	500	271

Table 4. 2009 spring Chinook salmon redd distribution, estimated spawning escapement, and carcass recoveries in the Twisp River subbasin.

Reach	Redds		Estimated spawning escapement	Carcasses				
				Recoveries			Expanded count	
	Count	Subbasin proportion (%)		H	W	Total	H	W
T10	0	0.0	0	0	0	0	0	0
T9	0	0.0	0	0	0	0	0	0
T8	0	0.0	0	0	0	0	0	0
T7	5	20.8	27	0	0	0		
T6	11	45.8	60	3	2	5	74	29
T5	3	12.5	16	12	4	16		
T4	3	12.5	16	2	0	2	16	0
T3	1	4.2	5	5	2	7	7	3
T2	1	4.2	5	0	0	0		
T1	0	0.0	0	0	0	0	0	0
Total	24	100.0	129	22	8	30	97	32

Table 5. Redd life summary of 2009 spring Chinook salmon redds by subbasin and week. RE = redds evaluated; RV = Redds visible. Redds were considered visible if they were new redds from last survey, were redds already discovered but still measurable (defined margins), or were not measurable but still apparent as redds from the current spawning season.

Subbasin	9 & 16 Aug		23-Aug		30-Aug		6-Sep		13-Sep		20-Sep	
	RE	RV (%)	RE	RV (%)	RE	RV (%)	RE	RV (%)	RE	RV (%)	RE	RV (%)
Chewuch	5	5 (100)	39	39 (100)	90	90 (100)	120	119 (99)	123	120 (98)	90	88 (98)
Methow	31	31 (100)	115	112 (97)	199	194 (97)	231	220 (95)	269	256 (95)	10	7 (70)
Twisp	0	0 (- -)	8	8 (100)	18	18 (100)	24	24 (100)	24	24 (100)	16	16 (100)
Grand total	36	36 (100)	162	159 (98)	307	302 (98)	375	363 (97)	416	400 (96)	116	110 (95)

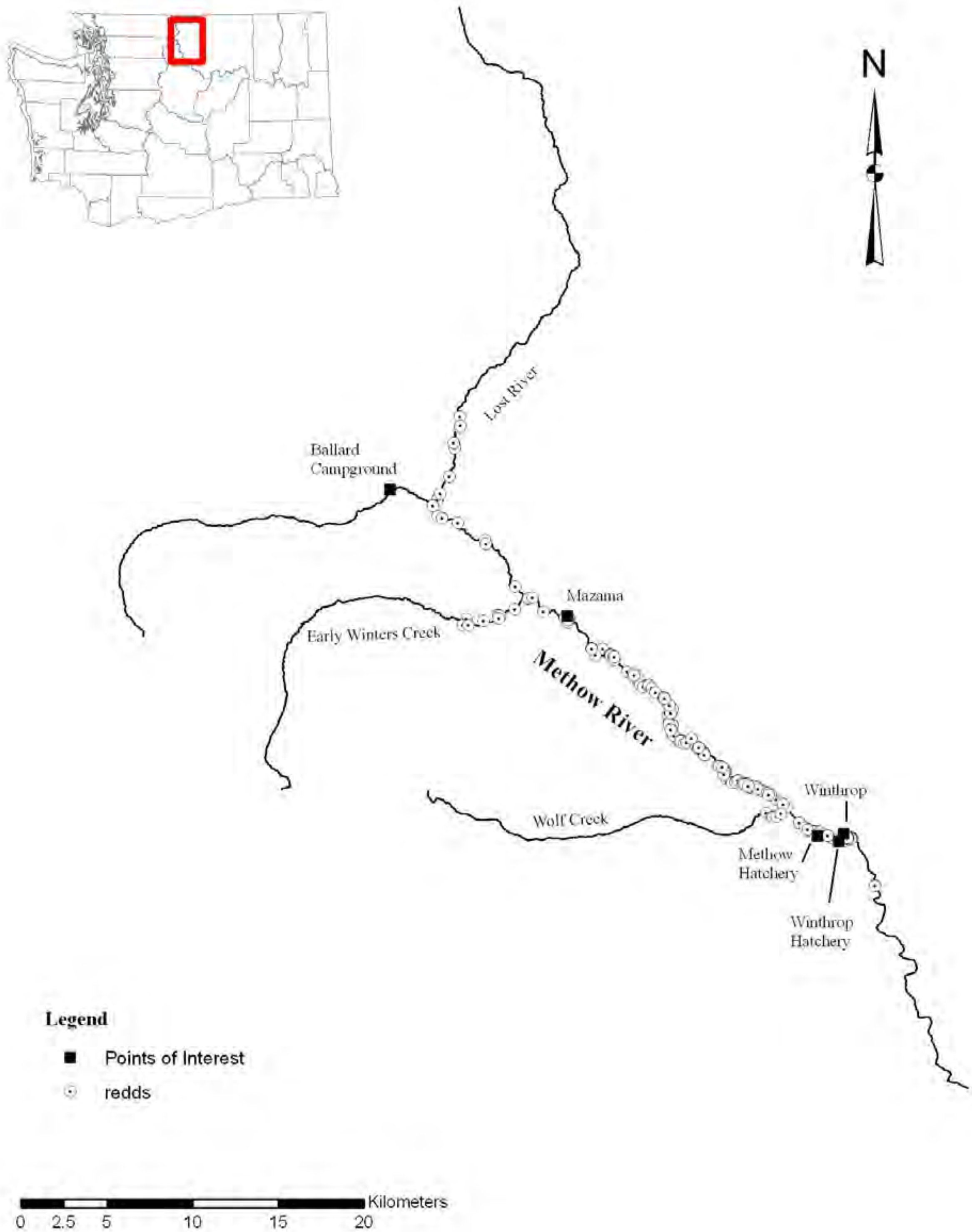

Figure 3. Spatial distribution of spring Chinook salmon redds in the Methow River subbasin based on GPS waypoints collected during 2009 surveys.

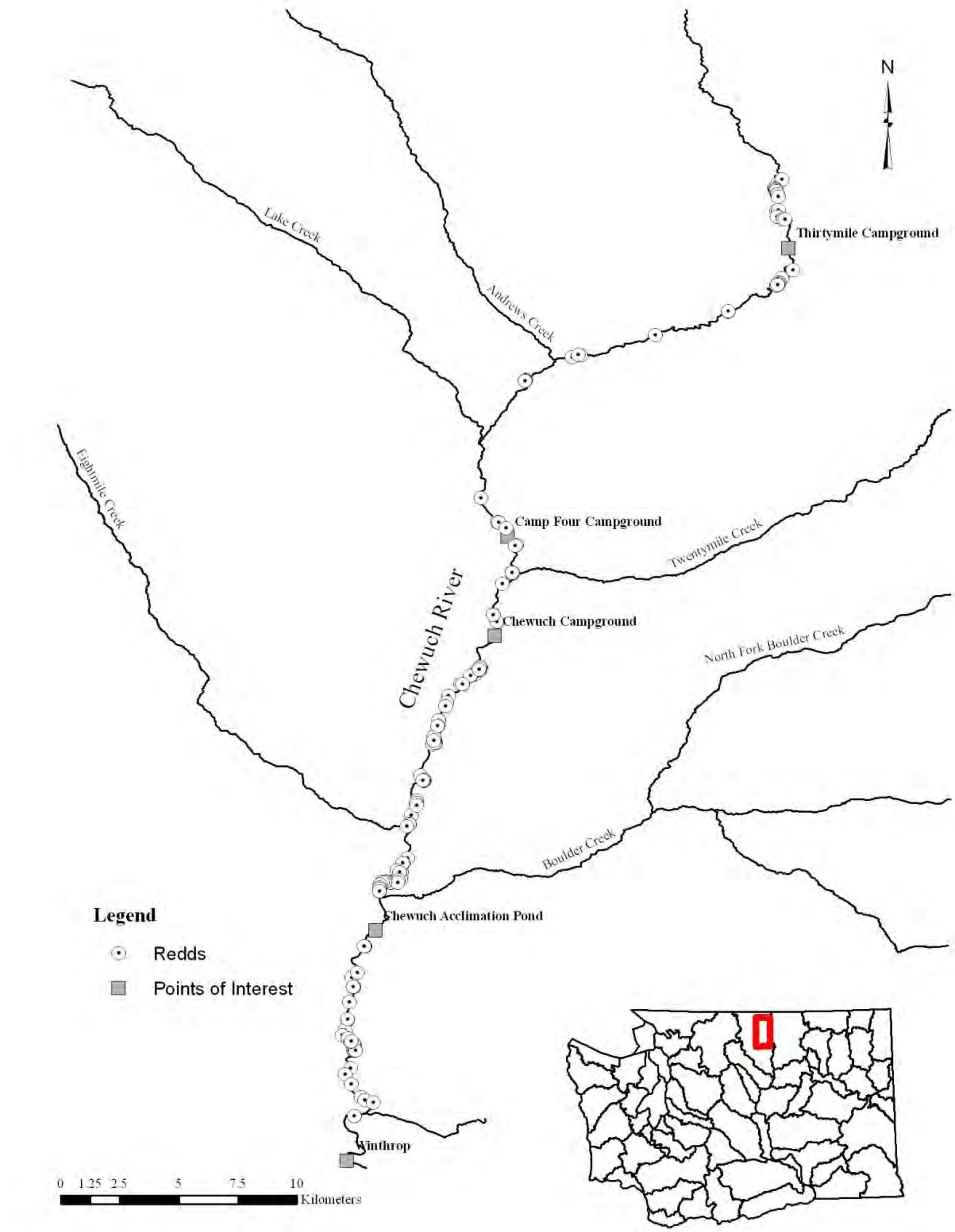

Figure 4. Spatial distribution of spring Chinook salmon redds in the Chewuch River subbasin based on GPS waypoints collected during 2009 surveys.

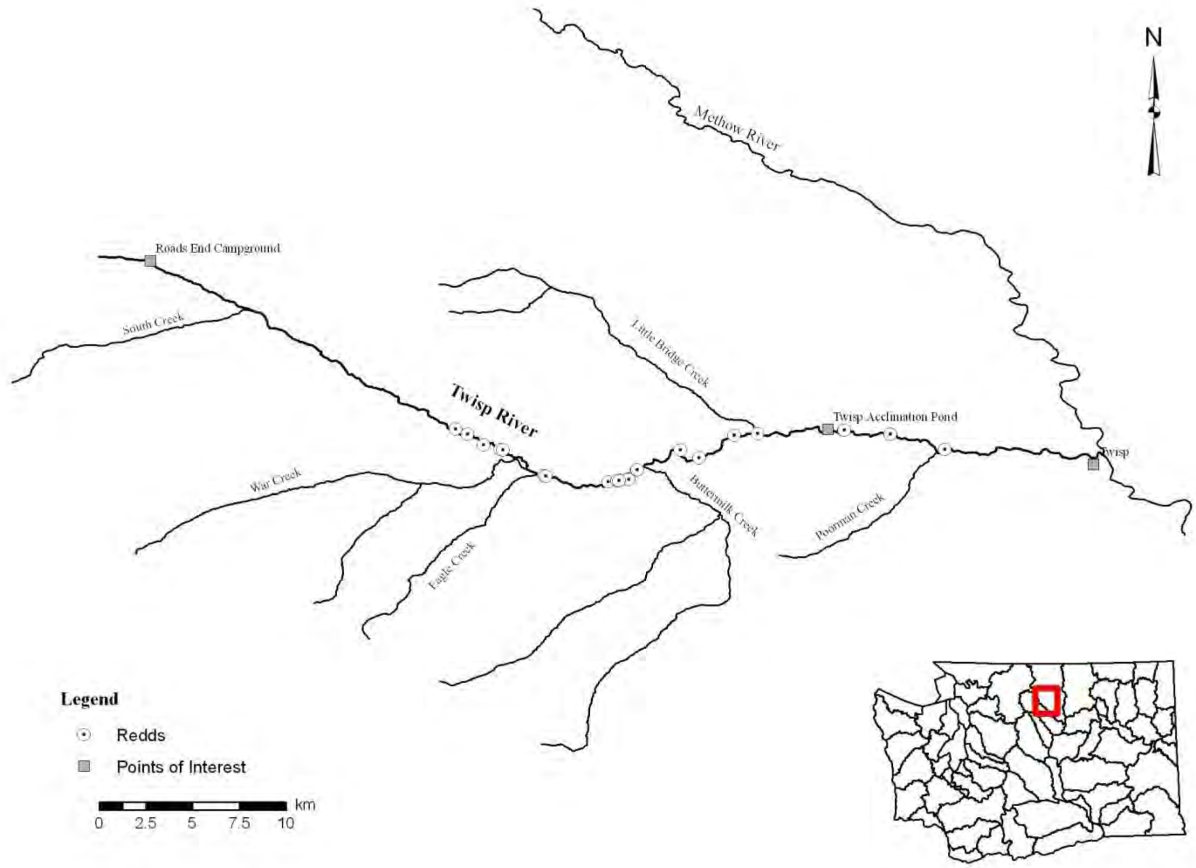

Figure 5. Spatial distribution of spring Chinook salmon redds in the Twisp River subbasin based on GPS waypoints collected during 2009 surveys.

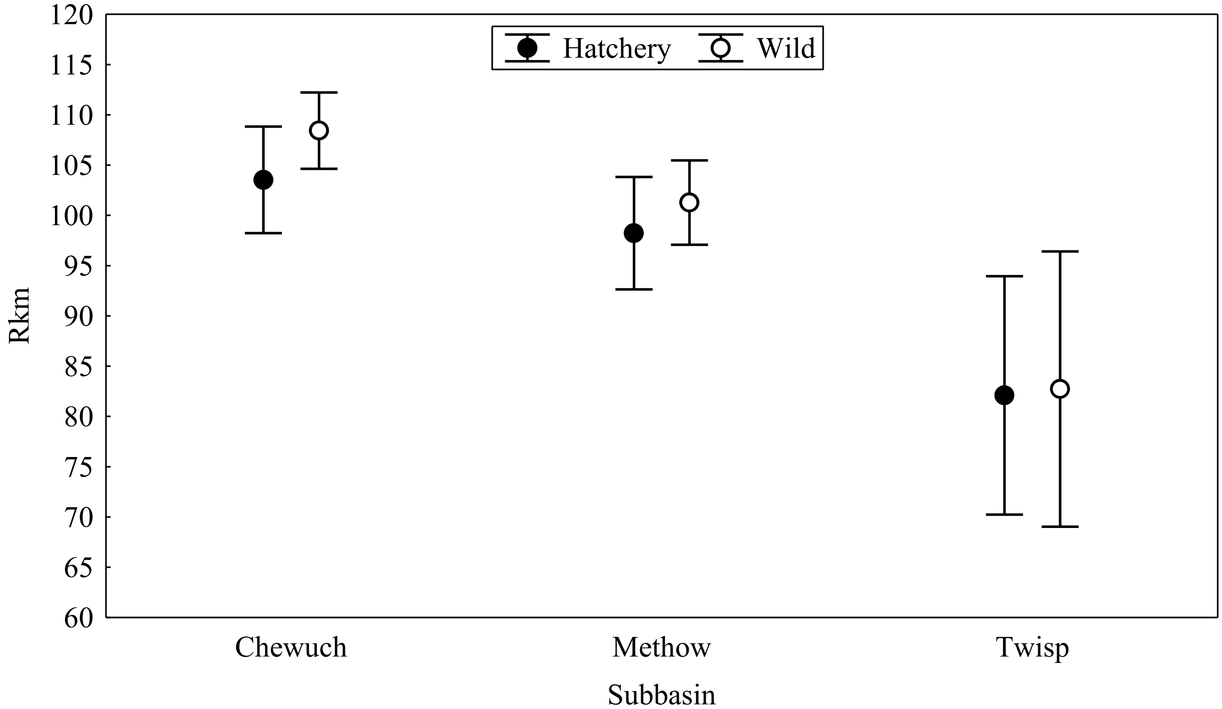

Figure 6. Mean redd distribution (rkm) of hatchery and wild females in the Methow River basin in 2009. Error bars represent 95% confidence intervals.

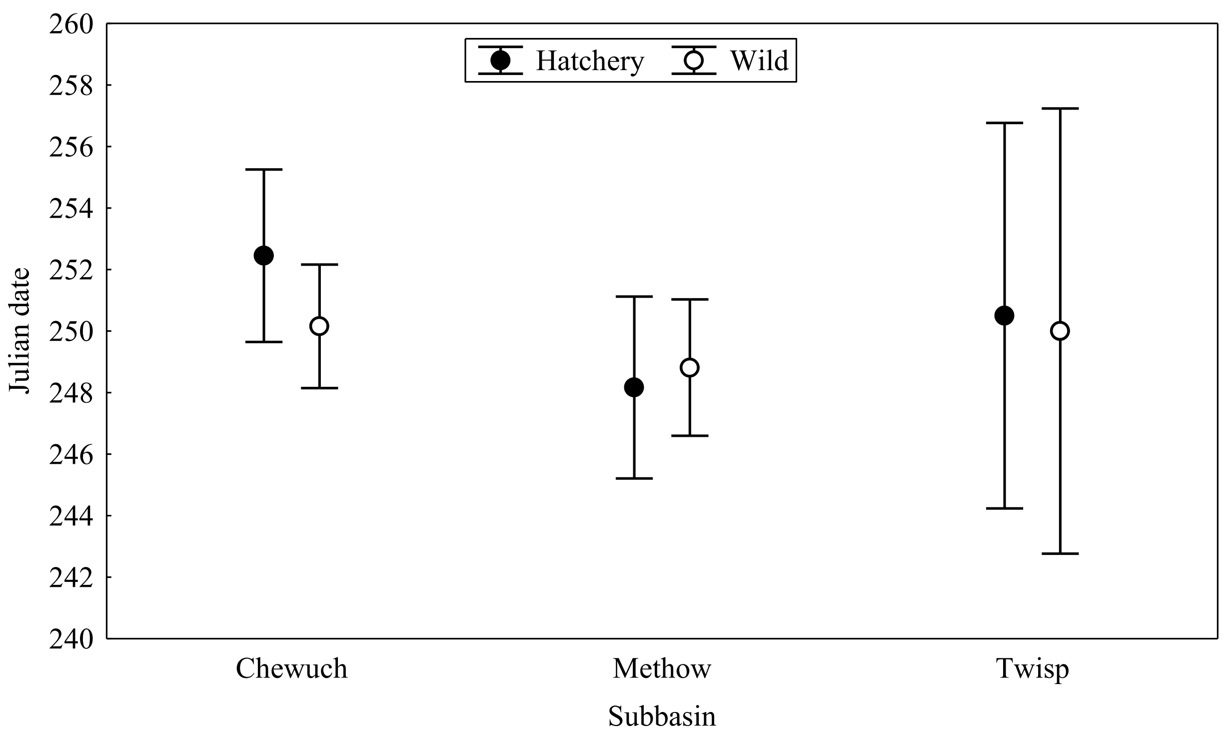

Figure 7. Mean spawn timing (Julian date) of hatchery and wild females in the Methow River basin in 2009. Error bars represent 95% confidence intervals.

Spawner Composition, Demographics, and Egg Deposition

Based on expanded redd counts, there were an estimated 2,641 spawners in the Methow River basin in 2009, of which 2,077 fish (78.6%) were hatchery origin (see Tables 2-4). The majority of carcasses (N = 637) were recovered in the Methow subbasin, followed by the Chewuch subbasin (N = 208), and the Twisp subbasin (N = 30; Table 6; Figures 8-10). Wild fish comprised the largest proportion of recovered carcasses in the Chewuch River subbasin (29.8%) followed by the Twisp River subbasin (26.7%) and the Methow River subbasin (9.9%). Estimated spawning escapement does not include hatchery or wild fish collected for broodstock.

Table 6. 2009 spring Chinook salmon carcass recoveries by origin, stock, and recovery subbasin. Age-4 ad-clip only fish were assumed to be from Winthrop NFH while age-3 and age-5 ad-clipped fish were assumed to originate from Okanogan Basin (CCT) releases. Out-of-basin strays were identified through CWT extraction and identification.

Origin	Release site/mark	Recovery subbasin		
		Chewuch	Methow	Twisp
Hatchery	Chewuch	62	60	0
	Methow	20	169	0
	Twisp	3	16	16
	Winthrop NFH	32	244	1
	Ad-clip only - WNFH	1	2	0
	Ad-clip only - CCT	12	5	2
	Out-of-basin strays	1	5	0
	No mark (Unknown hatchery)[a]	15	67	3
Wild	Wild	62	63	8
Unknown	No mark (unknown)	0	6	0
Total		208	637	30

[a] Includes lost tags and hatchery fish missing heads.

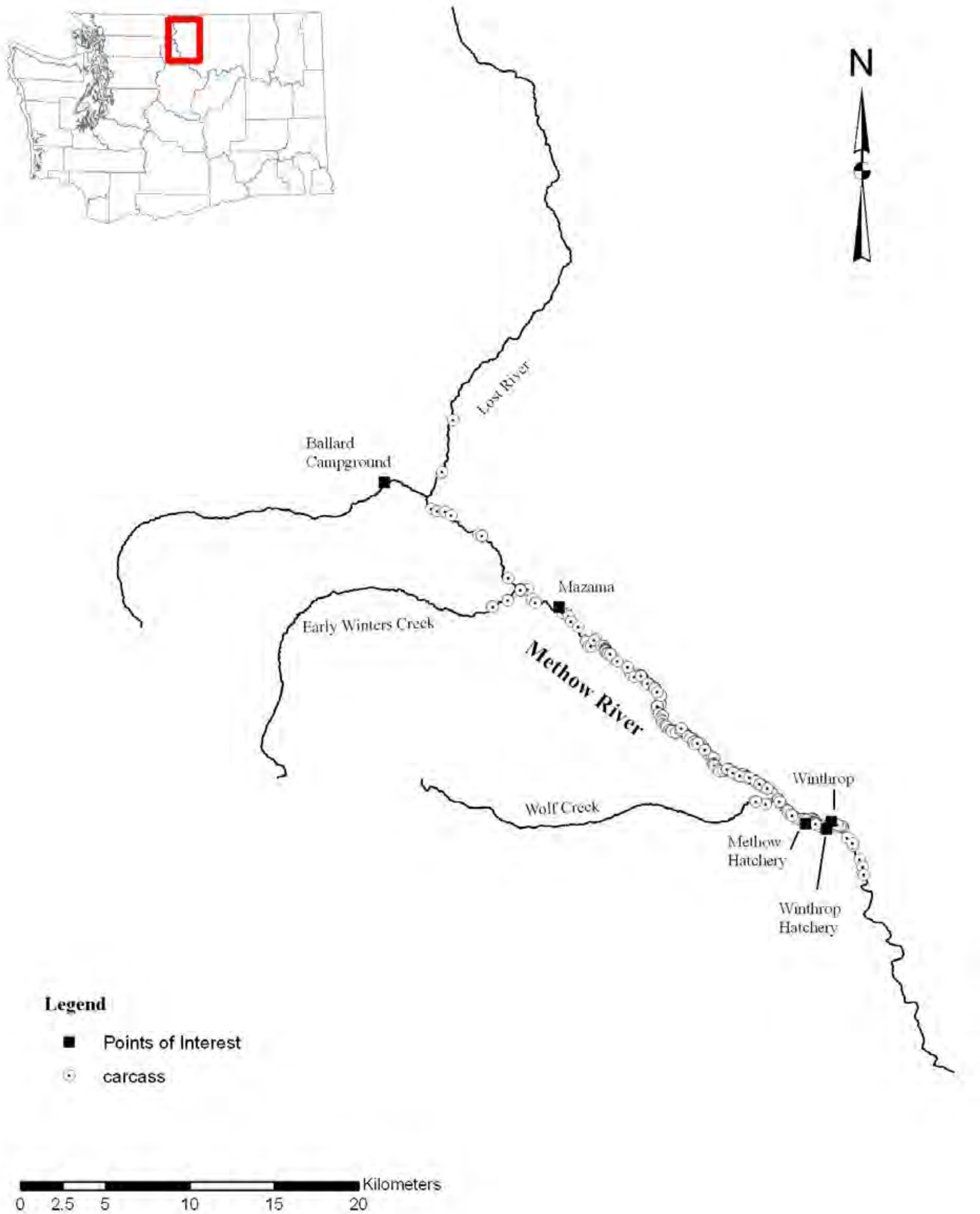

Figure 8. Spatial distribution of spring Chinook salmon carcasses in the Methow River subbasin based on GPS waypoints collected during 2009 surveys.

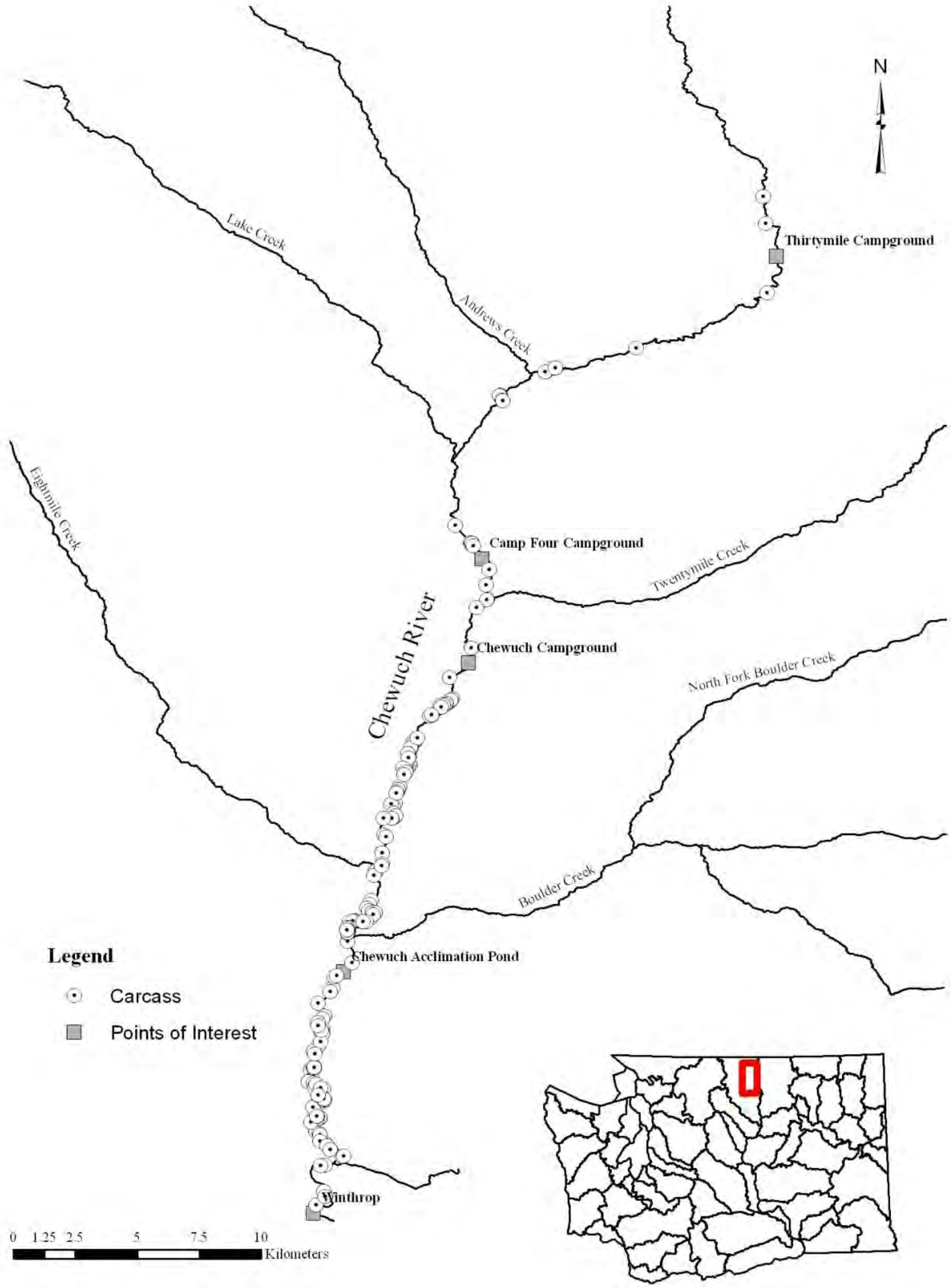

Figure 9. Spatial distribution of spring Chinook salmon carcasses in the Chewuch River subbasin based on GPS waypoints collected during 2009 surveys.

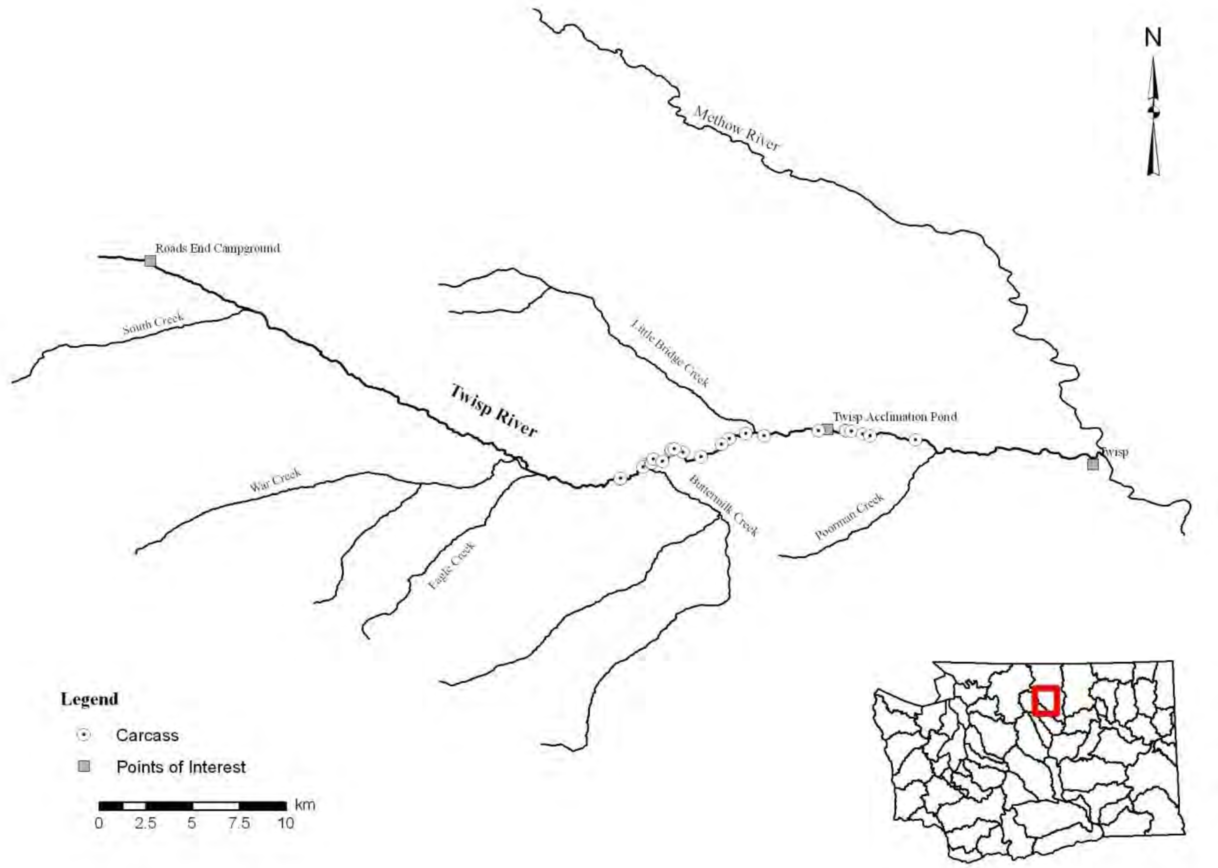

Figure 10. Spatial distribution of spring Chinook salmon carcasses in the Twisp River subbasin based on GPS waypoints collected during 2009 surveys.

Age, origin, gender, and length were determined for 868 of the 875 carcasses recovered (99.2%). Modal age of carcasses was age-3 (N = 508), accounting for 58.1% of confirmed hatchery and wild fish. Only 382 of 875 (43.7%) carcasses were wild or local Methow Hatchery fish recovered in their subbasin of release (Table 7); fish from Winthrop NFH comprised a large proportion of overall recoveries. We recovered 130 of the 637 fish PIT-tagged at Wells Dam that were estimated to be on the spawning grounds (20.4%). Carcass recovery rates increased as fish age increased (Table 8).

Egg retention was estimated for 186 of the 233 female carcasses examined. Using mean fecundities from MH broodstock (MetComp and Twisp), adjusting for mean egg-retention rates, and accounting for the proportion of hatchery and wild females by age class on the spawning grounds, an estimated total of 1,924,638 eggs were deposited in the Methow River basin (Table 9). Five redds in the upper Methow River were dewatered in 2009 and were not included in egg-deposition estimates.

Table 7. Mean POH length (*N*; SD) by age and sex of spring Chinook salmon carcasses recovered during Methow Basin spawning ground surveys in 2009. These data only include wild and Methow Hatchery fish recovered in their subbasin of release.

Age	Male		Female	
	Hatchery	Wild	Hatchery	Wild
		Chewuch subbasin		
1.1	44.4 (31; 3.1)	40.8 (4; 4.1)	- -	- -
1.2	59.4 (11; 5.6)	60.8 (19; 3.5)	60.1 (19; 3.0)	59.0 (38; 3.3)
1.3	- -	- -	64.0 (1; - -)	66.0 (1; - -)
		Methow subbasin		
1.1	42.4 (137; 2.4)	40.8 (6; 3.5)	46.0 (1; - -)	- -
1.2	58.6 (16; 3.5)	61.6 (25; 4.4)	59.4 (16; 3.7)	59.3 (25; 2.7)
1.3	- -	- -	67.0 (1; - -)	68.9 (7; 3.8)
		Twisp subbasin		
1.1	38.8 (11; 3.0)	44.5 (2; 6.4)	- -	- -
1.2	- -	62.5 (2; 3.5)	60.3 (3; 0.6)	57.5 (2; 0.7)
1.3	73.0 (1; - -)	74.0 (1; - -)	65.0 (1; - -)	68.0 (1; - -)

Table 8. Spawning ground recovery rates of hatchery spring Chinook salmon PIT-tagged at Wells Dam in 2009.

Recovery subbasin	Age			Total
	1.1	1.2	1.3	
Chewuch	8	8	0	16
Methow	81	29	2	112
Twisp	2	0	0	2
Total tagged	558	260[a]	19	837
Total collected in broodstock	44	136	17	198
Total identified below Wells Dam	3	0	0	3
Potential spawning total	511	124	2	637
Total recovered	91	37	2	130
Recovery rate (%)	17.8	29.8	100.0	20.4

[a] Includes 18 fish without confirmed age assumed to be 1.2 based on length and one fish aged 0.2.

Table 9. Estimated egg deposition for spring Chinook salmon in the Methow Basin in 2009. Mean fecundities were derived from Methow Hatchery broodstock (MetComp or Twisp) and adjusted according to hatchery and wild proportions by age class in each subbasin.

Subbasin	Females examined	Mean fecundity	Mean egg retention (%)	Redds	Subbasin proportion (%)	Estimated egg deposition		
						2007	2008	2009
Chewuch	73	3,965	0.3	143	29.5%	343,357	447,334	565,294
Methow	153	3,998	1.0	318[a]	65.6%	710,656	917,796	1,258,650
Twisp	7	4,204	0.2	24	4.9%	128,182	268,771	100,694
Total	233			485[a]	100.0%	1,182,195	1,633,901	1,924,638

[a] Total after removing five dewatered redds in the upper Methow River.

Natural Replacement Rate

Natural replacement rates for the latest complete brood (2003) were less than 1.0 in all subbasins (Methow = 0.15, Chewuch = 0.10, Twisp = 0.02; Table 10). Historical NRR values of the spring Chinook salmon stocks in the Methow River basin have not met replacement of the parent population (i.e., NRR ≥ 1.0) in eight of twelve broodyears. Parent broods from 1995-1998 had high NRR values relative to other years (Appendix A), in part due to the low density of spawners and improved ocean conditions. Also, estimated spawning escapement in 1996 and 1998 was not based on redd counts (Murdoch 2007). Comparisons between NRR and HRR only include broodyears in which both metrics were available. The HRRs were significantly greater than NRRs in the Chewuch and Twisp subbasins only when broodyears 1996 and 1998 were omitted (Chewuch Mann-Whitney U test: $P = 0.03$, Twisp Mann-Whitney U test: $P < 0.01$;Table 11). The HRR was significantly greater than NRR in the Methow subbasin whether or not broodyears 1996 and 1998 were included (Mann-Whitney U tests: $P = 0.01$ and <0.01, respectively; Table 11). The HRR was not significantly different than the expected BAMP value (4.5; BAMP 1998) in the Chewuch and Methow subbasins (one-sample t-tests; Chewuch: $P = 0.27$, Methow: $P = 0.94$) when all complete broodyears were analyzed (1992-2003; data were log(x+1) transformed). The HRR was significantly less than the BAMP value in the Twisp subbasin (one-sample t-test; $P = 0.047$).

Table 10. Estimated spawning escapement and NRR of spring Chinook salmon populations in the Methow River basin. Total expanded recruits were adjusted for harvest and indirect mortality associated with non-selective fisheries. Estimated spawning escapements in 1996 and 1998 were not based on redd counts (Murdoch 2007), and mean values are reported both with and without these brood years.

Broodyear (BY)	Est. spawning	Adult returns at age			Total expanded	NRR	
	escapement	1.1	1.2	1.3	recruits	Arithmetic	Geometric
			Chewuch River				
2003	489.60	0	15	33	50.25	0.10	- -
1992-2003 mean	380.49	2	98	31	152.30	3.09	0.71
1992-2003 mean (No BY 96, 98)	455.08	1	114	27	166.29	1.53	0.41
			Methow River and tributaries				
2003	604.80	0	59	27	90.12	0.15	- -
1992-2003 mean	1,058.82	5	96	48	164.38	2.34	0.40
1992-2003 mean (No BY 96, 98)	1,266.79	4	108	34	164.35	0.76	0.23
			Twisp River				
2003	43.20	0	1	0	1.05	0.02	- -
1992-2003 mean	197.91	8	88	28	142.57	3.12	0.71
1992-2003 mean (No BY 96, 98)	235.59	7	98	25	150.36	1.63	0.42

Table 11. Arithmetic mean NRR and HRR values for Methow basin spring Chinook salmon. All comparisons were analyzed using Mann-Whitney U-tests. Methow and Chewuch HRR values for 1996 and 1998 brood years are based on composite results (one CWT code for both release groups). Values are calculated both with and without brood years 1996 and 1998 because spawning escapements in these years were not based on redd counts.

Subbasin	Arithmetic mean (± SD) values for all years		
	NRR	HRR	*P*-value
Chewuch (92-03)[a]	3.09 (4.43)	4.48 (4.50)	0.17
Chewuch (92-95, 97, 99-03)[a]	1.53 (2.67)	3.74 (3.08)	0.03
Methow (92-03)[b]	2.34 (5.06)	5.64 (4.20)	0.01
Methow (92-95, 97, 99-03)[b]	0.76 (1.29)	4.77 (3.42)	<0.01
Twisp (92-03)[c]	3.12 (4.59)	3.45 (4.00)	0.08
Twisp (92-95, 97, 99-03)[c]	1.63 (3.15)	3.24 (4.32)	<0.01
Overall (92-03)	2.66 (4.35)	4.85 (4.05)	0.03
Overall (92-95, 97, 99-03)	1.13 (2.06)	4.07 (3.28)	<0.01

[a] Statistical test excludes 1995 and 1999 brood year (no hatchery program).
[b] Statistical test excludes 1992 brood year (no hatchery program).
[c] Statistical test excludes 1995 brood year (no hatchery program).

Stray Rates by Brood Year

When fish are retained for broodstock, it is unknown whether they would have eventually migrated to their natal (or release) streams or to "non-target" areas. Therefore, stray rates by brood year were calculated from only spawning ground recoveries and not the total brood return. All CWT recoveries of the 1992 and 1994 broods were within broodstock collections; stray rates were not calculated for these broods. There were no Twisp or Chewuch programs in brood year 1995. The Methow and Chewuch programs were maintained and released as an aggregate stock (Methow Composite) in the 1998 and 2000 brood years; stray rates could not be determined for the individual release sites.

Based on total expanded CWT recoveries, an estimated 26.5% of the 2003 brood Twisp spring Chinook salmon carcasses were recovered on spawning grounds of non-target areas (Appendix B). Excluding broods with no spawning ground recoveries (1992, 1994-1995), the recovery rate of Twisp River fish in stray areas (mean = 16.5%, SD = 12.2) was significantly greater than the 5% target (one-sample t-test: $P = 0.02$). Based on total expanded CWT recoveries, an estimated 36.1% of the 2003 brood Chewuch spring Chinook salmon were recovered on non-target spawning grounds. Excluding broods with no spawning ground recoveries (1994-1995, 1998, 2000), the recovery rate of Chewuch River fish in stray areas (mean = 20.7%, SD = 19.8) was not significantly different than the 5% target (one-sample t-test: $P = 0.08$). Spring Chinook salmon released into the Methow River typically exhibit lower stray rates than other programs. Of all the 2003 brood Methow spring Chinook salmon recovered, none were found on non-target spawning grounds. Excluding broods with no spawning ground recoveries (1992, 1994, 1998, 2000), the recovery rate of Methow River fish in stray areas (mean = 1.9%, SD = 2.1) was significantly less than the 5% target (one-sample t-test: $P < 0.001$).

Stray Rates within the Methow Basin

A total of 633 coded wire tags (CWT's) were successfully decoded from spring Chinook salmon collected during spawning ground surveys in the Methow River basin in 2009. These fish were expanded by tag-specific mark rates and stream-specific sample rates to account for 1,923 fish (Table 12, Appendix C). As a proportion of total CWT recoveries, most within-basin strays moved into the Chewuch River, while most out-of-basin strays moved into the Twisp River (Table 12). In 2009, CWT recovery data indicated that fish released in the Methow subbasin strayed less within the Methow Basin than fish released in the Chewuch and Twisp subbasins (Table 13).

Table 14 shows the proportion of CWT recoveries comprising the estimated spawning escapements from 2000-2009 by subbasin. For run years 2000 to 2009, Twisp hatchery spring Chinook salmon comprised significantly less than 10% of the estimated spawning escapement in the Methow and Chewuch subbasins (one-sample t-tests: $P < 0.001$). Methow and Chewuch hatchery spring Chinook salmon comprised significantly less than 10% of the estimated spawning escapement in the Twisp subbasin (one sample t-tests: $P < 0.001$). Data for run years 2002 through 2004 in the Chewuch and Methow subbasins were omitted from statistical analyses because release locations for the 1998 and 2000 broods could not be separated (same CWT code). Spring Chinook salmon released in the Methow comprised significantly less than 10% of the estimated spawning population in the Chewuch subbasin (one sample t-test: $P = 0.01$). Chewuch spring Chinook salmon did not comprise significantly less than 10% of the estimated spawning population in the Methow subbasin (one sample t-test: $P = 0.30$).

Table 12. Expanded CWT recoveries by subbasin in the Methow River basin in 2009.

Subbasin	Local (%)	Winthrop (%)	Within-basin strays (%)	Out-of-basin strays (%)	Expanded CWT recoveries
Chewuch	51.3	26.9	19.2	2.6	454
Methow	33.5	45.7	16.6	4.2	1,390
Twisp	89.0	5.5	0.0	5.5	79
Total	40.0	39.6	16.5	3.9	1,923

Table 13. Expanded CWT recoveries (%) by recovery and release streams in the Methow River basin in 2009.

Recovery stream	Release stream		
	Chewuch	Methow	Twisp
Chewuch River	55.7	13.9	9.4
Methow River	29.3	69.6	23.6
Lost River	5.6	4.4	0.0
Early Winters Creek	3.2	2.5	0.0
Suspension Creek	0.0	1.3	0.0
Wolf Creek	2.6	1.0	4.6
MH outfall	3.2	5.6	4.6
WNFH outfall	0.4	1.7	0.0
Twisp River	0.0	0.0	57.8
Total	100.0	100.0	100.0

Table 14. Proportion of CWT recoveries comprising estimated spawning escapement from 2000-2009 by subbasin.

Run year	Estimated spawning escapement			Hatchery stock (% of spawning escapement)					
	Hatchery	Wild	Total	Chewuch	Methow	Twisp	Winthrop	MetComp[a]	Out-of basin
				Chewuch River					
2000[b]	52	31	83	8.4	8.4	0.0	8.7	- -	18.5
2001	1,761	732	2,493	33.8	2.0	0.2	10.4	2.1	0.2
2002	588	78	666	3.6	0.0	0.0	7.9	69.7	0.0
2003	465	25	490	0.0	1.5	0.0	2.6	78.5	0.5
2004	289	46	335	5.1	1.1	0.0	3.0	70.7	0.0
2005	289	219	508	41.9	3.6	0.4	2.1	4.0	3.8
2006	378	135	513	28.8	3.2	0.9	5.5	- -	7.4
2007	203	74	277	20.0	8.4	0.0	8.9	- -	19.4
2008	166	86	252	26.7	4.5	0.0	17.3	- -	10.4
2009	500	271	771	30.8	9.9	1.5	16.0	- -	1.5
				Methow River					
2000	574	65	639	2.5	38.0	2.9	25.5	- -	0.0
2001	6,994	594	7,588	7.9	27.8	0.4	45.6	1.8	0.4
2002	1,644	86	1,730	0.6	4.6	1.1	28.3	47.1	0.0
2003	597	8	605	0.0	5.1	4.0	26.3	43.3	0.6
2004	622	199	821	3.6	4.5	4.4	16.9	35.6	0.0
2005	526	221	747	32.2	16.2	1.6	11.7	1.2	1.7
2006	942	128	1,070	22.8	25.2	4.6	19.1	- -	7.0
2007	545	152	697	12.3	6.8	7.2	36.6	- -	6.9
2008	468	172	640[c]	11.8	16.2	0.4	38.9	- -	3.1
2009	1,480	261	1,741	10.9	27.2	2.3	36.8	- -	3.4
				Twisp River					
2000	235	21	256	0.0	0.0	72.6	2.2	- -	0.0
2001	384	506	890	1.5	0.8	19.6	0.8	0.0	0.0
2002	60	181	241	0.0	0.0	9.1	12.1	3.1	0.0
2003	18	25	43	0.0	0.0	30.2	0.0	0.0	0.0
2004	98	243	341	0.0	0.0	19.7	1.2	1.3	4.4
2005	34	87	121	2.6	0.0	15.8	0.0	0.0	0.0
2006	100	65	165	0.0	2.5	40.0	2.8	- -	0.0
2007	65	40	105	0.0	0.0	55.2	0.0	- -	0.0
2008	126	40	166	2.7	0.0	60.1	0.0	- -	4.0
2009	97	32	129	0.0	0.0	55.6	3.4	- -	3.4

[a] Unable to determine release location for 1998 and 2000 MetComps (one tag code used for Methow and Chewuch-released fish in both broods).
[b] 2000 run year data not used in statistical analysis of Chewuch subbasin strays.
[c] Greater than estimated spawning escapement from fish-per-redd expanded redd counts; includes actual number of carcasses in reaches where total recoveries exceeded estimated escapement.

Stray Rates outside the Methow Basin

A total of 52 fish from Methow Hatchery were estimated to have strayed to spawning grounds outside the Methow River basin. Of these, 33 fish strayed into other spring Chinook salmon populations (e.g., Chiwawa and Entiat Rivers; Table 15). Historically, stray Methow Hatchery fish have comprised less than 5.0% of the overall estimated spawning escapement to the Entiat River (one-sample t-test: $P < 0.001$; Table 15).

Table 15. Methow Hatchery program strays by run year and recovery location.

Run year	Recovery location	CWT	Stock	Expanded recoveries	Estimated escapement	% of population
2006	Chiwawa River	631976	MetComp	2	529	0.38
1997	Entiat River	635551	Methow	1	89	- -[a]
2000	Entiat River	630130	Methow	6	175	3.43
2001	Entiat River	630613	Methow	3	485	0.62
2002	Entiat River	631024	MetComp	5	370	1.35
2003	Entiat River	631024	MetComp	6	259	2.32
2006	Entiat River	631976	MetComp	4	257	1.56
2007	Entiat River	632564	Twisp	6	245	2.45
2000	Similkameen River	630130	Methow	3	- -	- -
2001	Similkameen River	630614	Chewuch	5	- -	- -
2001	Similkameen River	631024	MetComp	5	- -	- -
2002	Similkameen River	631024	MetComp	5	- -	- -
2003	Similkameen River	631024	MetComp	1	- -	- -

[a] Fish was recovered during WDFW genetic study trapping and was not included in spawning escapement.

Unknown Hatchery Fish

Based on reach-specific carcass expansions, the proportion of unknown hatchery fish comprising total hatchery spawning escapement in the Methow River basin in 2009 was 12.2% ($N = 253$; Appendix L). Based on stream-specific carcass expansions, this proportion was 7.9% ($N = 165$). These totals are the number of fish identified through scale analysis as of hatchery origin but not accounted for through CWT expansions. This value is typically higher when sample rates are low in reaches with high spawning escapement.

Discussion

In 2009, the estimated redd-based spawning escapement in the Methow River basin represented 71.6% of the potential run escapement to the Methow River as estimated at Wells Dam. This value was similar to that reported in 2007 (81.0%) and higher than that reported in 2008 and 2006 (53.0 and 50.3%, respectively). In years when the male-to-female ratio is high, typically due to large numbers of jacks (e.g., 2009 = 4.39:1.0 and 2007 = 2.5:1), redd-based estimated spawning escapement represents a larger proportion of the estimated run above Wells Dam than in years with lower ratios. During years with low male-to-female ratios (lower numbers of males), spawn onset-to-completion timing may be longer, increasing the probability of mortality prior to fertilization; females may be waiting for males to spawn rather than having an abundance of males present during the spawning period.

Based on the number of carcasses recovered on the spawning grounds, wild fish comprised 21.4% of the estimated spawning escapement to the Methow River basin, but only 15.7% of the estimated run above Wells Dam. After removing wild and hatchery fish collected for broodstock (N = 121 and 617, respectively), the estimated run escapement of wild and hatchery fish to the Methow River basin was 632 and 3,058 fish, respectively. The estimated spawning escapement of wild and hatchery fish in the Methow River basin was 564 and 2,077 fish, respectively. These data suggest pre-spawn mortality and/or straying to other basins may be greater for hatchery fish (maximum = 32.1%) than for wild fish (maximum = 10.8%). In contrast, the proportion of pre-spawn mortalities recovered during stream surveys was similar between female wild and hatchery fish (4.8 and 5.9%, respectively). If differences in pre-spawn mortality exist between hatchery and wild females, the majority of this occurrence may precede the onset of surveys and therefore remain undetected. Pre-spawn mortality is currently undetectable for male fish.

There was no difference between hatchery and wild fish for spawn timing or spatial distribution of spawning in 2009. These data suggest that hatchery and wild populations are reproductively integrated in the natural environment. Divergence in spawn timing could suggest a genetic difference between hatchery and wild fish. However, surveys conducted weekly may not effectively document actual spawn timing; surveys conducted on a four day rotation may increase the precision by which spawn timing is estimated. Differences in spatial spawning distribution may indicate divergence in homing or habitat selection. Since statistical results are greatly influenced by sample size, low sample rates within areas believed to be used primarily by wild fish may decrease the likelihood of detecting actual divergence in habitat selection.

Run-at-large evaluation at Wells Dam using PIT tags has provided the opportunity to investigate aspects of the spring Chinook migration and spawning in the Columbia River basin that are difficult or impossible to determine through CWT analysis. Estimates of fallback and size-related bias of carcasses recovered during spawning ground surveys are being monitored to help explain differences between spawning escapements estimated via expanded redd counts, and the observed run size at Wells Dam. The utility of PIT tags relies heavily on existing interrogation sites, manual detection on spawning ground surveys, and detection during broodstock collection activities at local hatcheries. Data from 2009 allowed for estimates of dam fallback and eliminated double counting of fish that migrated through Wells Dam multiple times (fallback followed by re-ascension). As more in-stream PIT interrogation sites are developed, our ability to describe the fate of spring Chinook passing Wells Dam should increase. However, some monitoring gaps still exist that could be filled. Creel census personnel monitoring sport or tribal fisheries should be equipped with PIT tag detectors as part of their standard sampling equipment. Increased in-stream PIT monitoring in the Okanogan Basin would assist in describing the movements and spawning composition of spring Chinook stocks upstream of Wells Dam.

Methow Hatchery spring Chinook salmon are typically released in three locations in the Methow River basin, all of which incorporate surface-water rearing (i.e., acclimation) prior to release to increase homing fidelity. In 2009, an estimated 42% of the Twisp-released fish spawning in the Methow Basin spawned in areas other than the Twisp River, which was much higher than that in 2008 (2%) but similar to that in 2007 (49%). The majority of Twisp program adults returning to spawn in 2009 were three-year-old fish (73%); they received longer acclimation (41 days) than other Twisp broods. Though these fish received longer acclimation, an excess of male fish (mostly jacks) may increase straying. The abundance of Twisp-stock fish in the basin is relatively low and their prevalence typically comprises small proportions of the escapement within other spawning areas (e.g., Methow and Chewuch rivers). An estimated 44% of the Chewuch-released fish spawned in areas other than the Chewuch River, similar to the rate in 2008 (55%); because release numbers are much greater, contribution of these fish to other spawning areas can be high. An estimated 30% of Methow-released fish spawned in areas other than the Methow River subbasin which includes all streams except the Chewuch and Twisp Rivers; this proportion was much higher than that in 2008 (10%). For the broods that returned to spawn in 2009 (2004-2006), Methow program fish were acclimated on local river water an average of 135 and 129 days longer than Chewuch and Twisp program fish, respectively. Acclimation at the Twisp and Chewuch ponds does not appear to promote high homing fidelity to these streams as most brood years exhibit high within-basin stray rates; imprinting during surface-water rearing period at Methow Hatchery is a likely cause. However, within-basin straying in 2009 was above 30% for all release groups, suggesting that other factors also influence homing. Skewed male-to-female ratios in the run-at-large, often resulting from the prevalence of jacks (three-year-old fish), may have contributed to within-basin straying since males were likely searching and competing for females throughout the Methow Basin.

Overall, 3.9% of the estimated recoveries of CWT hatchery fish spawning in the Methow River basin strayed from other independent populations. These fish comprised 5.5 and 4.2% of the total CWT recoveries in the Twisp and Methow subbasins. Out-of-basin strays originated from Chiwawa, Clearwater, and Umatilla River releases. Current methodologies for estimating the origin of hatchery fish on spawning grounds incorporate stream-specific sample rates, and tag-specific marking rates. Some hatchery spring Chinook salmon produced outside the Methow River basin have low CWT mark rates and the presence of a single CWT code may greatly affect the estimated number of out-of-basin strays. When this situation occurs on a stream with a low overall sample rate (e.g., Lost River), the estimated contribution of that stock will likely be overestimated. Conversely, these stocks could also be underestimated (missed entirely) due to the low tag encounter rate.

The HRR must exceed the NRR of the target stock to meet Objective 4 of the M&E plan. Hatchery replacement rates for Chewuch and Twisp stock spring Chinook salmon released from Methow Hatchery have not met expected HRR values (Chapter 1) and in some years are no different than respective NRR values. During the period Methow River spring Chinook salmon were being listed (1996-1998), management decisions were made which likely produced dramatic shifts in the natural productivity of spring Chinook salmon in the Methow River basin. In 1996 and 1998, broodstock collection goals targeted 100% retention of the run-at-large at Wells Dam. However, several fish were released upstream (i.e., likely classified as summer Chinook salmon) and long-term data suggest that fish migrated above Wells Dam after the trapping period. Although no spawning ground surveys were conducted, progeny (i.e., wild returning adults) from these broodyears suggest that the low spawning escapement coupled with high ocean survival produced high NRR rates for the 1996-1998 broods. While NRR from these years is uncharacteristically high compared to other years, only the Methow subbasin HRR was significantly higher than NRR when all years are examined. If these brood years are excluded, HRR is significantly greater than NRR for Twisp and Methow stocks and for the Methow Basin overall. These results demand further examination of life stage survival rates in order to detect possible limiting factors to wild fish abundance (e.g., density dependence or reproductive success).

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Appendix A. Natural Replacement Rate (NRR) summary by subbasin for brood years 1992 through 2003 with corresponding hatchery replacement rates (HRR). NOR = natural origin recruits.

Parent brood	Est. spawning escapement	Return age 1.1	Return age 1.2	Return age 1.3	Total expanded recruits (NOR)	NRR	HRR
			Chewuch River				
1992	421.75	0	25	14	41.25	0.10	1.86
1993	184.34	2	69	21	95.53	0.52	1.13
1994	62.85	0	15	3	18.95	0.30	0.17
1995	6.09	1	12	19	33.69	5.53	- -
1996	8.00	0	13	86	102.02	12.75	0.58
1997	123.30	1	662	55	921.30	7.47	5.63
1998	7.00	11	23	19	62.69	8.96	14.29
1999	21.08	0	2	0	2.14	0.10	- -
2000	82.84	6	47	13	69.97	0.84	5.80
2001	2,493.22	0	205	49	265.09	0.11	8.68
2002	665.75	2	91	60	164.69	0.25	5.68
2003	489.60	0	15	33	50.25	0.10	1.02
			Methow River				
1992	924.26	0	44	43	92.38	0.10	- -
1993	759.56	5	79	32	119.66	0.16	2.11
1994	172.27	0	23	7	30.46	0.18	0.50
1995	27.39	1	54	18	77.30	2.82	10.17
1996	15.00	1	30	230	268.34	17.89	4.85
1997	152.45	21	348	50	537.66	3.53	5.06
1998	23.00	16	34	2	60.75	2.64	14.29
1999	70.27	3	2	0	4.32	0.06	1.60
2000	639.39	5	197	39	256.60	0.40	5.80
2001	7,587.84	3	183	36	231.13	0.03	7.55
2002	1,729.65	0	96	93	203.86	0.12	8.26
2003	604.80	0	59	27	90.12	0.15	1.90
			Twisp River				
1992	316.61	0	54	37	96.00	0.30	1.17
1993	426.42	5	27	17	50.48	0.12	0.64
1994	74.49	0	13	9	22.94	0.31	1.00
1995	12.17	0	26	12	39.30	3.23	- -
1996	8.00	0	11	56	69.10	8.64	6.47
1997	71.74	0	460	109	729.31	10.17	4.47
1998	11.00	24	72	21	138.15	12.56	2.30
1999	24.60	0	7	0	7.36	0.30	1.88
2000	256.27	37	264	17	339.31	1.32	2.70
2001	889.58	27	77	20	129.24	0.15	1.47
2002	241.09	0	47	35	88.65	0.37	14.33
2003	43.20	0	1	0	1.05	0.02	1.48

Appendix B. Methow Hatchery expanded CWT recoveries by program and brood year. Stray rate is the percent of spawning ground recoveries collected on non-target spawning grounds. T = target, NT = non-target, W = Wells Dam, Com. = commercial, Sp. = sport, Trbl. = tribal. 1998 and 2000 MetComp broods were not given unique CWT tag codes based on release river and are not included.

Brood	Broodstock			Spawning grounds		Ocean fishery			Freshwater fishery			Total	Stray rate	
	T	NT	W	T	NT	Com.	Sp.	Trbl.	Com.	Sp.	Trbl.		W/ harvest	No harvest
Chewuch spring Chinook salmon														
1992	0	1	38	0	0	0	0	0	0	0	0	39	- -	- -
1993	0	19	79	8	3	5	0	0	0	0	1	115	2.6%	2.8%
1994	0	0	3	0	0	0	0	0	0	0	0	3	- -	- -
1996	- -	15	15	0	4	0	0	0	6	0	1	41	9.8%	11.8%
1997	54	44	14	4	27	2	0	0	24	144	7	320	8.4%	18.9%
2001	15	46	2	323	321	0	0	0	2	0	0	709	45.3%	45.4%
2002	2	92	58	174	299	9	0	0	23	29	13	699	42.8%	47.8%
2003	15	3	8	7	22	2	0	0	2	2	0	61	36.1%	40.0%
Methow spring Chinook salmon														
1993	43	0	134	6	1	0	0	0	0	4	3	191	0.5%	0.5%
1994	0	0	1	0	0	0	0	0	0	0	0	1	- -	- -
1995	3	0	114	3	0	2	0	0	0	0	0	122	0.0%	0.0%
1996	200	0	58	221	8	0	0	0	2	0	11	500	1.6%	1.6%
1997	422	0	3	16	1	3	0	0	280	209	12	946	0.1%	0.2%
1998	- -	- -	- -	- -	- -	3	0	0	462	428	30	923	- -	- -
1999	93	0	- -	35	7	1	0	0	3	6	0	145	4.8%	5.2%
2000	- -	- -	- -	- -	- -	5	0	0	21	6	0	32	- -	- -
2001	289	0	5	182	23	3	0	0	0	0	0	503	4.6%	4.6%
2002	245	2	37	287	26	9	0	0	22	28	13	669	3.9%	4.4%
2003	37	6	5	4	0	1	0	0	2	2	0	57	0.0%	0.0%
Twisp spring Chinook salmon														
1992	0	0	21	0	0	0	0	0	0	0	0	21	- -	- -
1993	0	3	18	1	1	0	0	0	0	4	0	27	3.7%	4.3%
1994	0	0	4	0	0	0	0	0	0	0	0	5	- -	- -
1996	4	58	40	151	17	0	0	0	1	0	6	277	6.1%	6.3%
1997	21	6	- -	14	0	0	0	0	14	9	1	65	0.0%	0.0%
1998	1	8	- -	0	2	0	0	0	11	0	0	22	9.1%	18.2%
1999	3	25	- -	8	20	1	0	0	4	0	0	61	32.8%	35.7%
2000	22	12	- -	67	40	0	0	0	7	0	0	145	25.5%	26.8%
2001	2	0	1	33	7	0	0	0	0	0	0	43	16.3%	16.3%
2002	7	59	6	70	66	3	0	0	8	10	4	233	28.3%	31.7%
2003	2	2	6	21	13	1	0	0	2	2	0	49	26.5%	29.5%

Appendix C. Expanded coded wire tag (CWT) recoveries in 2009 by recovery location. Recoveries were expanded by tag-specific mark rates and stream (Methow River, Lost River, etc.) sample rates.

Recovery location	Brood year	Tag code	Release river	Stray status	Estimated escapement
Chewuch River	2004	051588	Methow	Winthrop	4
Chewuch River	2004	052181	Methow	Winthrop	4
Chewuch River	2004	632899	Chewuch	Local	4
Chewuch River	2005	051791	Methow	Winthrop	15
Chewuch River	2005	052177	Methow	Winthrop	4
Chewuch River	2005	052678	Methow	Winthrop	4
Chewuch River	2005	052877	Methow	Winthrop	7
Chewuch River	2005	054863	Methow	Winthrop	4
Chewuch River	2005	633294	Chewuch	Local	112
Chewuch River	2005	633395	Methow	Within-basin	7
Chewuch River	2006	052179	Methow	Winthrop	4
Chewuch River	2006	052574	Methow	Winthrop	34
Chewuch River	2006	053179	Methow	Winthrop	11
Chewuch River	2006	053180	Methow	Winthrop	19
Chewuch River	2006	053181	Methow	Winthrop	12
Chewuch River	2006	612713	Clearwater	Out-of-basin	4
Chewuch River	2006	612717	Clearwater	Out-of-basin	4
Chewuch River	2006	633687	Twisp	Within-basin	4
Chewuch River	2006	633864	Chiwawa	Out-of-basin	4
Chewuch River	2006	633866	Methow	Within-basin	68
Chewuch River	2006	633884	Chewuch	Local	117
Chewuch River	2006	634068	Twisp	Within-basin	8
Early Winters Creek	2005	052678	Methow	Winthrop	14
Early Winters Creek	2005	633294	Chewuch	Within-basin	14
Early Winters Creek	2005	633395	Methow	Local	14
Lost River	2005	633294	Chewuch	Within-basin	24
Lost River	2005	633395	Methow	Local	24
MH outfall[1]	2004	631187	Methow	Local	1
MH outfall[1]	2005	051791	Methow	Winthrop	2
MH outfall[1]	2005	052177	Methow	Winthrop	2
MH outfall[1]	2005	052178	Methow	Winthrop	1
MH outfall[1]	2005	633294	Chewuch	Within-basin	8
MH outfall[1]	2005	633395	Methow	Local	6
MH outfall[1]	2006	052574	Methow	Winthrop	7
MH outfall[1]	2006	053179	Methow	Winthrop	3
MH outfall[1]	2006	053180	Methow	Winthrop	2
MH outfall[1]	2006	053181	Methow	Winthrop	1
MH outfall[1]	2006	612713	Clearwater	Out-of-basin	1
MH outfall[1]	2006	633687	Twisp	Within-basin	5
MH outfall[1]	2006	633866	Methow	Local	23
MH outfall[1]	2006	633884	Chewuch	Within-basin	6

Appendix C, continued.

Recovery location	Brood year	Tag code	Release river	Stray status	Estimated escapement
MH outfall[1]	2006	634068	Twisp	Within-basin	1
Methow River	2004	051588	Methow	Winthrop	3
Methow River	2004	051591	Methow	Winthrop	6
Methow River	2004	052180	Methow	Winthrop	9
Methow River	2004	052181	Methow	Winthrop	15
Methow River	2004	632878	Twisp	Within-basin	3
Methow River	2004	632899	Chewuch	Within-basin	3
Methow River	2005	051791	Methow	Winthrop	59
Methow River	2005	052177	Methow	Winthrop	31
Methow River	2005	052678	Methow	Winthrop	28
Methow River	2005	052877	Methow	Winthrop	17
Methow River	2005	054863	Methow	Winthrop	17
Methow River	2005	094460	Umatilla	Out-of-basin	47
Methow River	2005	633281	Methow	Local	9
Methow River	2005	633294	Chewuch	Within-basin	51
Methow River	2005	633395	Methow	Local	60
Methow River	2005	633483	Twisp	Within-basin	9
Methow River	2006	052179	Methow	Winthrop	9
Methow River	2006	052574	Methow	Winthrop	148
Methow River	2006	053179	Methow	Winthrop	88
Methow River	2006	053180	Methow	Winthrop	23
Methow River	2006	053181	Methow	Winthrop	37
Methow River	2006	053575	Clearwater	Out-of-basin	3
Methow River	2006	054132	Clearwater	Out-of-basin	3
Methow River	2006	633687	Twisp	Within-basin	12
Methow River	2006	633864	Chiwawa	Out-of-basin	3
Methow River	2006	633866	Methow	Local	308
Methow River	2006	633884	Chewuch	Within-basin	69
Methow River	2006	634068	Twisp	Within-basin	6
Suspension Creek	2005	052177	Methow	Winthrop	7
Suspension Creek	2005	052178	Methow	Winthrop	7
Suspension Creek	2005	633395	Methow	Local	7
Suspension Creek	2006	052574	Methow	Winthrop	7
Suspension Creek	2006	053181	Methow	Winthrop	7
Twisp River	2004	632878	Twisp	Local	9
Twisp River	2005	633483	Twisp	Local	13
Twisp River	2006	053179	Methow	Winthrop	4
Twisp River	2006	612713	Clearwater	Out-of-basin	4
Twisp River	2006	633687	Twisp	Local	49
WNFH outfall[2]	2005	051791	Methow	Winthrop	6
WNFH outfall[2]	2005	052177	Methow	Winthrop	8
WNFH outfall[2]	2005	052178	Methow	Winthrop	5
WNFH outfall[2]	2005	052678	Methow	Winthrop	2

Appendix C, continued.

Recovery location	Brood year	Tag code	Release river	Stray status	Estimated escapement
WNFH outfall[2]	2005	052877	Methow	Winthrop	8
WNFH outfall[2]	2005	054863	Methow	Winthrop	8
WNFH outfall[2]	2006	052574	Methow	Winthrop	12
WNFH outfall[2]	2006	053179	Methow	Winthrop	12
WNFH outfall[2]	2006	053180	Methow	Winthrop	12
WNFH outfall[2]	2006	053181	Methow	Winthrop	7
WNFH outfall[2]	2006	633864	Chiwawa	Out-of-basin	2
WNFH outfall[2]	2006	633866	Methow	Local	9
WNFH outfall[2]	2006	633884	Chewuch	Within-basin	2
Wolf Creek	2005	633294	Chewuch	Within-basin	5
Wolf Creek	2006	052574	Methow	Winthrop	5
Wolf Creek	2006	633687	Twisp	Within-basin	6
Wolf Creek	2006	633866	Methow	Local	5
Wolf Creek	2006	633884	Chewuch	Within-basin	6

[1]Methow State Fish Hatchery outfall.
[2]Winthrop National Fish Hatchery outfall.

Appendix D. Estimated escapement from 2001 Methow River basin spawning ground surveys. The total of local (L), within-basin (WB) strays, Winthrop stock (Win), Methow+Chewuch (M+C), and out-of-basin (OB) strays are the sum total of expanded CWT recoveries. M+C are 1998 and 2000 brood fish for which release location cannot be determined. U = total number of hatchery fish unaccounted for through CWT and sample rate expansions.

Reach	Redds	Hatchery fish							Wild fish				Estimated
		L	WB	Win	M+C	OB	U	Total	1.1	1.2	1.3	Total	escapement
M15	0	0	0	0	0	0	0	0	0	0	0	0	0
M14	1	0	0	0	0	0	2	2	0	0	0	0	2
M13	2	19	18	0	0	0	5	6	0	0	0	0	6
M12	15							36	0	0	0	0	36
M11[a]	8	10	4	0	0	0	0	14	0	0	5	5	19
M10	445	1,713	433	2,532	80	0	502	989	0	67	14	81	1,070
M9	1,893							4,271	16	181	83	280	4,551
M8	100	0	0	0	0	0	225	225	0	6	9	15	240
M7	188	114	32	163	16	0	99	424	0	12	16	28	452
M6	272	172	69	328	9	9	45	632	0	15	7	22	654
M5	38	16	11	49	2	2	0	80	0	2	9	11	91
L2	56	28	0	0	0	0	6	34	0	0	101	101	135
L1	16	0	0	0	0	0	0	0	0	0	38	38	38
EW3	8	0	0	0	0	0	14	14	0	0	5	5	19
EW2	7	0	0	0	0	0	13	13	0	0	4	4	17
EW1	2	0	0	0	0	0	4	4	0	0	1	1	5
MH1	19	15	3	19	1	0	8	46	0	0	0	0	46
WN1	86	31	19	136	11	0	7	204	0	3	0	3	207
WLF1	0	0	0	0	0	0	0	0	0	0	0	0	0
Methow total	3,156	2,118	589	3,227	119	11	930	6,994	16	286	292	594	7,588
C12	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
C11	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
C10	11	9	9	0	0	0	8	26	0	0	0	0	26
C9	1	1	0	0	0	0	1	2	0	0	0	0	2
C8	23	22	1	2	1	0	6	32	1	19	3	23	55
C7	86	35	6	18	0	0	63	122	0	73	12	85	207
C6	146	71	5	18	9	0	61	164	0	169	18	187	351
C5	246	217	15	22	0	0	148	402	7	168	15	190	592
C4	185	192	6	61	16	3	63	341	0	86	18	104	445
C3	59	41	7	42	0	0	11	101	0	41	0	41	142
C2	101	104	13	13	13	0	49	192	0	51	0	51	243
C1	179	101	0	139	0	0	139	379	0	34	17	51	430
Chewuch total	1,037	793	62	315	39	3	549	1,761	8	641	83	732	2,493
T10	1	0	0	0	0	0	0	0	0	2	0	2	2
T9	0	0	0	0	0	0	0	0	0	0	0	0	0
T8	7	0	0	0	0	0	0	0	0	17	0	17	17
T7	29	0	0	0	0	0	0	0	0	70	0	70	70
T6	190	92	20	7	0	0	75	194	14	208	41	263	457
T5	79	38	0	0	0	0	43	81	4	97	8	109	190
T4	25	15	0	0	0	0	0	15	0	45	0	45	60
T3	21	0	0	0	0	0	51	51	0	0	0	0	51
T2	8	25	0	0	0	0	18	19	0	0	0	0	19
T1	10							24	0	0	0	0	24
Twisp total	370	170	20	7	0	0	187	384	18	439	49	506	890
2001 total	4,563	3,081	671	3,549	158	14	1,666	9,139	42	1,366	424	1,832	10,971

[a] Includes redds from Suspension Creek. ns = not surveyed (fire).

Appendix E. Estimated escapement from 2002 Methow River basin spawning ground surveys. The total of local (L), within-basin (WB) strays, Winthrop stock (Win), Methow+Chewuch (M+C), and out-of-basin (OB) strays are the sum total of expanded CWT recoveries. M+C are 1998 and 2000 brood fish for which release location cannot be determined. U = total number of hatchery fish unaccounted for through CWT and sample rate expansions.

Reach	Redds	Hatchery fish							Wild fish				Estimated
		L	WB	Win	M+C	OB	U	Total	1.1	1.2	1.3	Total	escapement
M15	0	0	0	0	0	0	0	0	0	0	0	0	0
M14	4	11	0	19	27	0	5	62	0	4	7	11	9
M13	29												64
M12	12	0	0	4	15	0	0	19	0	0	8	8	27
M11[a]	19	2	2	7	20	0	6	37	0	0	5	5	42
M10	36	6	2	7	50	0	13	78	0	0	2	2	80
M9	306	13	7	159	356	0	118	653	0	6	20	26	677
M8	1												2
M7	78	15	0	51	77	0	30	173	0	0	0	0	173
M6	116	17	8	98	153	0	75	351	1	11	7	19	257
M5	51												113
L2	40	3	0	24	76	0	1	104	0	0	15	15	88
L1	14								0	0	0	0	31
EW3	0	0	0	0	0	0	0	0	0	0	0	0	0
EW2	6	0	0	0	13	0	0	13	0	0	0	0	13
EW1	0	0	0	0	0	0	0	0	0	0	0	0	0
MH1	43	0	0	42	36	0	17	95	0	0	0	0	95
WN1	26	0	2	42	9	0	4	57	0	0	0	0	57
WLF1	1	0	0	0	1	0	1	2	0	0	0	0	2
Methow total	782	67	21	453	833	0	270	1,644	1	21	64	86	1,730
C12	3	0	0	0	0	0	0	0	0	0	7	7	7
C11	0	0	0	0	0	0	0	0	0	0	0	0	0
C10	0	0	0	0	0	0	0	0	0	0	0	0	0
C9	0	0	0	0	0	0	0	0	0	0	0	0	0
C8	10	0	0	3	14	0	5	22	0	0	0	0	22
C7	27	0	0	0	28	0	13	41	0	11	8	19	60
C6	27	2	0	9	30	0	10	51	0	2	7	9	60
C5	32	9	0	4	46	0	2	61	0	3	7	10	71
C4	113	0	0	19	217	0	0	236	0	4	14	18	250
C3	2								0	0	0	0	4
C2	47	9	0	15	151	0	2	177	0	0	12	12	104
C1	40								0	3	0	3	88
Chewuch total	301	20	0	50	486	0	32	588	0	23	55	78	666
T10	0	0	0	0	0	0	0	0	0	0	0	0	0
T9	0	0	0	0	0	0	0	0	0	0	0	0	0
T8	6	0	0	0	0	0	0	0	0	0	13	13	13
T7	14	7	0	0	0	0	1	8	0	0	23	23	31
T6	72	15	0	30	7	0	0	52	0	66	60	126	159
T5	13								0	0	19	19	29
T4	0								0	0	0	0	0
T3	0								0	0	0	0	0
T2	3								0	0	0	0	7
T1	1								0	0	0	0	2
Twisp total	109	22	0	30	7	0	1	60	0	66	115	181	241
2002 total	1,192	109	21	533	1,326	0	303	2,292	1	110	234	345	2,637

[a] Includes redds from Suspension Creek.

Appendix F. Estimated escapement from 2003 Methow River basin spawning ground surveys. The total of local (L), within-basin (WB) strays, Winthrop stock (Win), Methow+Chewuch (M+C), and out-of-basin (OB) strays are the sum total of expanded CWT recoveries. M+C are 1998 and 2000 brood fish for which release location cannot be determined. U = total number of hatchery fish unaccounted for through CWT and sample rate expansions.

Reach	Redds	Hatchery fish							Wild fish				Estimated
		L	WB	Win	M+C	OB	U	Total	1.1	1.2	1.3	Total	escapement
M15	0	0	0	0	0	0	0	0	0	0	0	0	0
M14	4	0	0	10	0	0	0	10	0	0	0	0	10
M13	0								0	0	0	0	0
M12	6	0	0	3	7	0	3	13	0	1	0	1	14
M11	7	0	1	4	4	0	8	17	0	0	0	0	17
M10	34	0	0	23	44	0	14	81	0	0	0	0	81
M9	105	13	5	61	118	0	49	246	4	0	2	6	252
M8	2	0	0	1	2	0	1	4	1	0	0	1	5
M7	20							48	0	0	0	0	48
M6	19	7	7	25	53	0	14	46	0	0	0	0	46
M5	5							12	0	0	0	0	12
L2	1	0	0	0	0	0	2	2	0	0	0	0	2
L1	0	0	0	0	0	0	0	0	0	0	0	0	0
EW3	3	0	0	4	4	0	1	7	0	0	0	0	7
EW2	1							2	0	0	0	0	2
EW1	0	0	0	0	0	0	0	0	0	0	0	0	0
MH1	13	5	0	10	13	0	3	31	0	0	0	0	31
Susp1	19	4	4	12	8	0	18	46	0	0	0	0	46
WN1	11	0	0	15	8	3	0	26	0	0	0	0	26
WLF1	2	0	0	3	2	0	0	5	0	0	0	0	5
Methow total	252	29	17	171	263	3	113	597	5	1	2	8	605
C12	0	0	0	0	0	0	0	0	0	0	0	0	0
C11	0	0	0	0	0	0	0	0	0	0	0	0	0
C10	0	0	0	0	0	0	0	0	0	0	0	0	0
C9	2	0	0	0	0	0	5	5	0	0	0	0	5
C8	14	0	0	0	34	0	0	34	0	0	0	0	34
C7	25	0	2	2	45	0	7	56	0	0	4	4	60
C6	16	0	0	0	31	0	2	33	0	0	6	6	39
C5	18	0	0	0	38	0	5	43	0	0	0	0	43
C4	49	0	0	3	94	0	24	114	0	0	4	4	118
C3	3							7	0	0	0	0	7
C2	51	0	4	2	92	2	11	111	4	2	5	11	122
C1	26	0	0	11	43	0	8	62	0	0	0	0	62
Chewuch total	204	0	6	18	377	2	62	465	4	2	19	25	490
T10	0	0	0	0	0	0	0	0	0	0	0	0	0
T9	0	0	0	0	0	0	0	0	0	0	0	0	0
T8	0	0	0	0	0	0	0	0	0	0	0	0	0
T7	1	0	0	0	0	0	1	1	0	0	1	1	2
T6	8	6	0	0	0	0	0	6	0	0	13	13	19
T5	7	9	0	0	0	0	0	9	4	4	0	8	17
T4	1	0	0	0	0	0	1	1	2	0	0	2	3
T3	1	0	0	0	0	0	1	1	0	0	0	0	2
T2	0	0	0	0	0	0	0	0	0	0	1	1	0
T1	0	0	0	0	0	0	0	0	0	0	0	0	0
Twisp total	18	15	0	0	0	0	3	18	6	4	15	25	43
2003 total	474	44	23	189	640	5	178	1,080	15	7	36	58	1,138

Appendix G. Estimated escapement from 2004 Methow River basin spawning ground surveys. The total of local (L), within-basin (WB) strays, Winthrop stock (Win), Methow+Chewuch (M+C), and out-of-basin (OB) strays are the sum total of expanded CWT recoveries. M+C are 1998 and 2000 brood fish for which release location cannot be determined. U = total number of hatchery fish unaccounted for through CWT and sample rate expansions.

Reach	Redds	Hatchery fish							Wild fish				Estimated
		L	WB	Win	M+C	OB	U	Total	1.1	1.2	1.3	Total	escapement
M15	0	0	0	0	0	0	0	0	0	0	0	0	0
M14	9	0	4	0	15	0	0	19	0	7	0	7	26
M13	14	0	8	0	32	0	0	40	0	0	0	0	40
M12	9	0	0	9	13	0	0	22	0	4	0	4	26
M11	10	4	0	0	12	0	0	16	0	12	0	12	28
M10	51	3	6	16	49	0	16	90	0	56	0	56	146
M9	104	13	28	45	82	0	35	203	3	90	0	93	296
M8	3	1	0	0	6	0	2	9	0	0	0	0	9
M7	16	0	0	12	24	0	10	46	0	0	0	0	46
M6 M5	17 0	3	3	11	21	0	7	45	0	4	0	4	49 0
L2	10	0	14	0	15	0	0	29	0	0	0	0	29
L1	5	0	0	3	3	0	0	6	0	8	0	8	14
EW3	10	0	0	0	15	0	7	22	0	7	0	7	29
EW2	0	0	0	0	0	0	0	0	0	0	0	0	0
EW1	0	0	0	0	0	0	0	0	0	0	0	0	0
MH1	9	5	5	2	13	0	1	26	0	0	0	0	26
Susp1	12	4	4	11	7	0	0	26	0	8	0	8	34
WN1	8	0	4	19	0	0	0	23	0	0	0	0	23
Methow total	287	33	76	128	307	0	78	622	3	196	0	199	821
C12	0	0	0	0	0	0	0	0	0	0	0	0	0
C11	0	0	0	0	0	0	0	0	0	0	0	0	0
C10	0	0	0	0	0	0	0	0	0	0	0	0	0
C9	0	0	0	0	0	0	0	0	0	0	0	0	0
C8	10	0	0	0	22	0	0	22	0	7	0	7	29
C7	2	0	0	0	3	0	2	5	0	1	0	1	6
C6	19	0	0	0	39	0	10	49	0	5	0	5	54
C5	27	4	0	4	53	0	0	61	0	16	0	16	77
C4	20	4	0	0	42	0	0	46	0	11	0	11	57
C3	0	0	0	0	0	0	0	0	0	0	0	0	0
C2	29	10	4	7	55	0	4	80	0	3	0	3	83
C1	10	0	0	0	21	0	5	26	0	3	0	3	29
Chewuch total	117	18	4	11	235	0	21	289	0	46	0	46	335
T10	0	0	0	0	0	0	0	0	0	0	0	0	0
T9	0	0	0	0	0	0	0	0	0	0	0	0	0
T8	1	0	0	0	0	0	0	0	0	2	0	2	2
T7	24	0	0	0	0	0	0	0	0	59	0	59	59
T6	62	31	0	0	0	0	15	46	4	102	0	106	152
T5	26	21	3	3	0	4	1	32	6	26	0	32	64
T4	9	6	0	0	0	0	5	11	0	11	0	11	22
T3	5	0	0	0	0	3	0	3	0	9	0	9	12
T2	8	0	0	0	0	3	0	3	3	14	0	17	20
T1	4	0	0	0	0	0	3	3	3	4	0	7	10
Twisp total	139	58	3	3	0	10	24	98	16	227	0	243	341
2004 total	543	109	83	142	542	10	123	1,009	19	469	0	488	1,497

Appendix H. Estimated escapement from 2005 Methow River basin spawning ground surveys. The total of local (L), within-basin (WB) strays, Winthrop (Win), Methow+Chewuch (M+C), and out-of-basin (OB) strays are the sum total of expanded CWT recoveries. M+C are 1998 and 2000 brood fish for which release location cannot be determined. U = total number of hatchery fish unaccounted for through CWT and sample rate expansions.

Reach	Redds	Hatchery fish							Wild fish				Estimated escapement
		L	WB	Win	M+C	OB	U	Total	1.1	1.2	1.3	Total	
M15	0	0	0	0	0	0	0	0	0	0	0	0	0
M14	7	0	0	0	0	0	0	0	0	18	0	18	18
M13	0	0	0	0	0	0	0	0	0	0	0	0	0
M12	10	0	0	0	0	0	10	10	0	15	0	15	25
M11	12	0	11	0	0	0	2	13	0	9	8	17	30
M10	45	11	41	11	4	0	5	72	0	35	7	42	114
M9	136	73	107	46	0	5	42	273	0	54	19	73	346
M8	5	0	9	0	0	0	2	11	0	2	0	2	13
M7	19	13	13	8	0	4	0	38	0	10	0	10	48
M6	18	10	23	7	1	2	2	45	0	1	0	1	46
M5	7	2	8	2	0	0	0	12	0	5	1	6	18
M4	0												0
L2	12	0	4	4	0	0	0	8	0	18	4	22	30
L1	1	0	0	0	0	0	1	1	0	2	0	2	3
EW3	0	0	0	0	0	0	0	0	0	0	0	0	0
EW2	0	0	0	0	0	0	0	0	0	0	0	0	0
EW1	2	0	0	0	0	0	2	2	0	3	0	3	5
MH1	8	4	8	4	0	0	0	16	0	4	0	4	20
Susp1	7	0	9	3	0	0	0	12	0	6	0	6	18
WN1	5	13	0	0	0	0	0	13	0	0	0	0	13
Methow total	294	126	233	85	5	11	66	526	0	182	39	221	747
C12	3	0	0	0	0	0	0	0	0	7	0	7	7
C11	1	0	0	0	0	0	0	0	0	2	0	2	2
C10	7	2	2	0	0	12	0	16	0	0	0	0	16
C9	0	0	0	0	0	0	0	0	0	0	0	0	0
C8	5	6	0	0	0	0	0	6	0	6	0	6	12
C7	16	5	0	0	2	0	0	7	2	25	4	31	38
C6	33	24	2	0	2	0	0	28	0	47	2	49	77
C5	32	22	0	0	2	0	4	28	0	47	0	47	75
C4	44	44	2	3	7	0	4	60	0	38	5	43	103
C3	10	17	2	0	0	0	1	20	0	3	0	3	23
C2	55	76	8	6	6	0	7	103	0	26	0	26	129
C1	11	13	3	1	1	0	3	21	0	5	0	5	26
Chewuch total	217	209	19	10	20	12	19	289	2	206	11	219	508
T10	0	0	0	0	0	0	0	0	0	0	0	0	0
T9	0	0	0	0	0	0	0	0	0	0	0	0	0
T8	0	0	0	0	0	0	0	0	0	0	0	0	0
T7	5	0	0	0	0	0	0	0	0	11	0	11	11
T6	24	4	4	0	0	0	3	11	0	35	7	42	53
T5	10	2	0	0	0	0	5	7	0	15	0	15	22
T4	3	3	0	0	0	0	0	3	0	3	0	3	6
T3	8	2	0	0	0	0	0	2	0	9	7	16	18
T2	4	9	0	0	0	0	0	9	0	0	0	0	9
T1	1	0	0	0	0	0	2	2	0	0	0	0	2
Twisp total	55	20	4	0	0	0	10	34	0	73	14	87	121
2005 total	566	355	256	95	25	23	95	849	2	461	64	527	1,376

Appendix I. Estimated escapement from 2006 Methow River basin spawning ground surveys. The total of local (L), within-basin (WB) strays, Winthrop stock (Win), and out-of-basin (OB) strays are the sum total of expanded CWT recoveries. U = total number of hatchery fish unaccounted for through CWT and sample rate expansions.

Reach	Redds	Hatchery fish						Wild fish				Estimated
		L	WB	Win	OB	U	Total	1.1	1.2	1.3	Total	escapement
M15	6	0	0	0	0	6	6	0	5	0	5	11
M14	17	2	0	0	0	13	15	0	11	3	14	32
M13	5	0	2	0	0	3	5	0	6	1	7	9
M12	20	10	6	4	0	15	35	0	3	0	3	38
M11	24	5	9	4	2	15	35	0	8	2	10	45
M10	36	10	13	25	0	14	62	0	3	3	6	68
M9	173	82	79	91	4	43	299	0	10	16	26	325
M8	9	3	7	0	0	4	14	0	3	0	3	17
M7	59											111
M6	46	64	74	32	0	27	197	0	0	0	0	86
M5	0											0
L2	26	0	0	0	8	0	8	0	41	0	41	49
L1	2	0	0	0	0	1	1	0	3	0	3	4
EW3	9	6	7	0	0	6	19	0	0	0	0	17
EW2	1											2
EW1	4	0	0	0	0	0	0	0	8	0	8	8
MH1	75	48	51	28	0	12	139	0	0	2	2	141
Susp1	36	23	11	11	0	23	68	0	0	0	0	68
WN1	21	0	10	27	0	2	39	0	0	0	0	39
Methow total	569	253	269	222	14	184	942	0	101	27	128	1,070
C12	1	0	0	0	0	2	2	0	0	0	0	2
C11	1	0	0	0	0	2	2	0	0	0	0	2
C10	9	9	0	2	0	1	12	0	5	0	5	17
C9	0											0
C8	10	5	0	1	1	8	15	0	3	1	4	19
C7	32	5	0	0	2	34	41	0	14	5	19	60
C6	54	23	7	4	16	22	72	0	20	10	30	102
C5	22	10	3	0	0	13	26	0	10	5	15	41
C4	63	31	3	14	3	32	83	0	29	15	44	118
C3	5											9
C2	51	36	6	3	19	17	81	0	3	12	15	96
C1	25	26	5	4	3	6	44	0	2	1	3	47
Chewuch total	273	145	24	28	44	137	378	0	86	49	135	513
T10	0	0	0	0	0	0	0	0	0	0	0	0
T9	0	0	0	0	0	0	0	0	0	0	0	0
T8	3	0	0	0	0	0	0	0	6	0	6	6
T7	19	9	0	0	0	0	9	0	18	9	27	36
T6	39	21	0	0	0	24	45	0	17	11	28	73
T5	15	19	3	0	0	2	24	0	4	0	4	28
T4	3	0	0	0	0	6	6	0	0	0	0	6
T3	2	4	0	0	0	0	4	0	0	0	0	4
T2	2	1	0	1	0	2	4	0	0	0	0	4
T1	4	5	0	0	0	3	8	0	0	0	0	8
Twisp total	87	59	3	1	0	37	100	0	45	20	65	165
2006 total	929	457	296	251	58	358	1,420	0	232	96	328	1,748

Appendix J. Estimated escapement from 2007 Methow River basin spawning ground surveys. The total of local (L), within-basin (WB) strays, Winthrop stock (W), and out-of-basin (OB) strays are the sum total of expanded CWT recoveries. U = total number of hatchery fish unaccounted for through CWT and sample rate expansions.

Reach	Redds	Hatchery fish						Wild fish				Estimated escapement
		L	WB	Win	OB	U	Total	1.1	1.2	1.3	Total	
M15	4	0	0	0	0	7	7	0	3	4	7	14
M14	12						21	0	10	11	21	42
M13	3	5	11	22	15	3	10	0	0	0	0	10
M12	13						25	0	5	15	20	45
M11	15	3	12	6	0	14	35	0	6	12	18	53
M10	19	0	14	7	0	26	47	0	13	7	20	67
M9	84	11	68	125	48	33	285	5	5	6	16	294
M8	2											7
M7	10	10	18	38	0	10	76	1	0	0	1	35
M6	12											42
L2	11	0	0	0	0	0	0	0	0	39	39	39
L1	0	0	0	0	0	0	0	0	0	0	0	0
EW3	3	0	0	0	0	0	0	0	0	10	10	10
EW2	0	0	0	0	0	0	0	0	0	0	0	0
EW1	0	0	0	0	0	0	0	0	0	0	0	0
GDN4	1	0	0	0	0	4	4	0	0	0	0	4
MH1	7	4	4	17	0	0	25	0	0	0	0	25
Susp1	0	0	0	0	0	0	0	0	0	0	0	0
WN1	3	0	0	10	0	0	10	0	0	0	0	10
Methow total	198	33	127	225	63	97	545	6	42	104	152	697
C12	5	0	0	0	0	18	18	0	0	0	0	18
C11	1	0	0	0	0	3	3	0	0	0	0	3
C10	0	0	0	0	0	0	0	0	0	0	0	0
C9	0	0	0	0	0	0	0	0	0	0	0	0
C8	7						10	0	7	7	14	24
C7	9	32	5	6	32	18	14	0	0	18	18	32
C6	23						69	0	0	11	11	80
C5	8	7	0	0	14	0	21	0	0	7	7	28
C4	9	7	4	4	0	10	25	0	0	7	7	32
C3	0	0	0	0	0	0	0	0	0	0	0	0
C2	13	8	0	8	8	7	31	0	7	8	15	46
C1	4	1	4	3	0	4	12	1	0	1	2	14
Chewuch total	79	55	13	21	54	60	203	1	14	59	74	277
T10	0	0	0	0	0	0	0	0	0	0	0	0
T9	0	0	0	0	0	0	0	0	0	0	0	0
T8	0	0	0	0	0	0	0	0	0	0	0	0
T7	7	0	0	0	0	0	0	0	0	24	24	24
T6	14	28	0	0	0	10	38	0	0	11	11	49
T5	9											32
T4	0											0
T3	0	18	0	0	0	9	27	2	0	3	5	0
T2	0											0
T1	0											0
Twisp total	30	46	0	0	0	19	65	2	0	38	40	105
2007 total	307	134	140	246	117	176	813	9	56	201	266	1,079

Appendix K. Estimated escapement from 2008 Methow River basin spawning ground surveys. The total of local (L), within-basin (WB) strays, Winthrop stock (W), and out-of-basin (OB) strays are the sum total of expanded CWT recoveries. U = total number of hatchery fish unaccounted for through CWT and sample rate expansions.

Reach	Redds	Hatchery fish						Wild fish				Estimated escapement
		L	WB	Win	OB	U	Total	1.1	1.2	1.3	Total	
M15	1	0	0	14	0	15	29	0	5	4	9	2
M14	17											36
M13	13	0	0	7	7	0	14	0	13	0	13	27
M12	9	0	0	19	0	0	19	0	0	0	0	19
M11	17	7	7	2	0	6	22	0	12	2	14	36
M10	31	8	4	12	0	7	31	0	30	4	34	65
M9	94	29	29	40	5	25	128	7	52	11	70	198
M8	4	0	2	3	0	0	5	0	2	1	3	8
M7	13	4	8	11	0	2	25	0	2	0	2	27
M6	20	26	12	33	3	1	75[a]	1	0	0	1	42
M5,4	3	1	0	4	0	1	6[a]	0	1	0	1	6
L2	10	0	3	6	0	0	9	0	16	0	16	21
L1	2											4
EW3	2	0	0	0	0	0	0	0	4	0	4	4
EW2,1	0	0	0	0	0	0	0	0	0	0	0	0
MH1	10	6	4	11	0	0	21	0	0	0	0	21
Susp1	7	0	0	10	0	0	10	0	5	0	5	15
WLF1	0	0	0	0	0	0	0	0	0	0	0	0
WN1	25	2	2	63	0	7	74[a]	0	0	0	0	53
Methow total	278	83	71	235	15	64	468[a]	8	142	22	172	584
C13	2	0	0	0	8	4	12	0	0	0	0	4
C12	4											8
C11	3	0	0	0	3	0	3	0	0	3	3	6
C10	7	0	0	0	0	8	8	0	7	0	7	15
C9	1	0	0	0	0	0	0	0	2	0	2	2
C8	7	0	0	2	0	0	2	0	8	5	13	15
C7	16	11	0	2	10	0	23	0	9	2	11	34
C6	21	14	1	3	3	5	26	1	6	11	18	44
C5	12	8	0	6	0	2	16	0	9	0	9	25
C4	19	16	4	8	0	0	28	0	12	0	12	40
C3	0	0	0	0	0	0	0	0	0	0	0	0
C2	21	13	5	12	0	3	33	2	6	3	11	44
C1	7	0	0	8	0	7	15	0	0	0	0	15
Chewuch total	120	62	10	41	24	29	166	3	59	24	86	252
T10	0	0	0	0	0	0	0	0	0	0	0	0
T9	0	0	0	0	0	0	0	0	0	0	0	0
T8	0	0	0	0	0	0	0	0	0	0	0	0
T7	18	27	4	0	3	0	34	0	4	0	4	38
T6	24	21	0	0	0	12	33	0	17	0	17	50
T5	26	31	1	0	3	2	37	3	15	0	18	55
T4	7	13	0	0	0	2	15	0	0	0	0	15
T3	2	3	0	0	0	1	4	0	0	0	0	4
T2	2	3	0	0	0	0	3	0	1	0	1	4
T1	0	0	0	0	0	0	0	0	0	0	0	0
Twisp total	79	98	5	0	6	17	126	3	37	0	40	166
2008 total	477	243	86	276	45	110	760[a]	14	238	46	298	1,002

[a] Greater than estimated spawning escapement from fish-per-redd expanded redd counts; includes actual number of carcasses in reaches where total recoveries exceeded estimated escapement.

Appendix L. Estimated escapement from 2009 Methow River basin spawning ground surveys. The total of local (L), within-basin (WB) strays, Winthrop stock (W), and out-of-basin (OB) strays are the sum total of expanded CWT recoveries. U = total number of hatchery fish unaccounted for through CWT and sample rate expansions.

Reach	Redds	Hatchery fish						Wild fish				Estimated escapement
		L	WB	Win	OB	U	Total	1.1	1.2	1.3	Total	
M15	0	0	0	0	0	0	0	0	0	0	0	0
M14	11	0	13	26	0	0	39	0	20	0	20	59
M13	1	0	0	0	0	0	0	0	5	0	5	5
M12	10	7	8	14	0	3	32	0	22	0	22	54
M11	14	19	10	24	0	9	62	0	14	0	14	76
M10	44	252	95	334	65	87	209	0	25	3	28	237
M9	138						624	8	96	16	120	744
M8	11											59
M7	11	63	23	67	0	23	176	5	2	0	7	59
M6	12											65
M5,4	3	5	0	5	0	4	14	0	2	0	2	16
L2	9	24	23	0	0	0	47	0	0	23	23	48
L1	4											22
EW5	0	0	0	0	0	0	0	0	0	0	0	0
EW4	3	14	13	14	0	0	41	0	0	13	13	16
EW3	7											38
EW2,1	0	0	0	0	0	0	0	0	0	0	0	0
MH1	14	30	19	19	1	6	75	0	0	0	0	75
Susp1	9	7	0	29	0	6	42	0	7	0	7	49
WLF2	5	5	17	5	0	0	27	0	0	0	0	27
WLF1	0	0	0	0	0	0	0	0	0	0	0	0
WN1	17	9	2	78	2	1	92	0	0	0	0	92
Methow total	323	435	223	615	68	139	1,480	13	193	55	261	1,741
C13	2	6	0	0	0	0	6	0	5	0	5	11
C12	10	11	0	0	0	22	33	10	33	0	43	54
C11	4											22
C10	4	6	0	0	0	3	9	0	13	0	13	22
C9	0	0	0	0	0	0	0	0	0	0	0	0
C8	7	5	0	0	5	4	14	0	24	0	24	38
C7	11	20	0	0	0	10	30	0	19	10	29	59
C6	30	25	4	30	4	20	83	4	75	0	79	162
C5	14	23	12	11	0	3	49	4	22	0	26	75
C4	26	60	10	33	3	14	120	3	17	0	20	140
C3	0											0
C2	29	56	29	19	0	23	127	0	29	0	29	156
C1	6	6	12	11	0	0	29	0	3	0	3	32
EM1	0	0	0	0	0	0	0	0	0	0	0	0
Chewuch total	143	218	67	104	12	99	500	21	240	10	271	771
T10-8	0	0	0	0	0	0	0	0	0	0	0	0
T7	5											27
T6	11	50	0	5	5	14	74	10	19	0	29	60
T5	3											16
T4	3	16	0	0	0	0	16	0	0	0	0	16
T3	1	6	0	0	0	1	7	0	0	3	3	5
T2	1											5
T1	0	0	0	0	0	0	0	0	0	0	0	0
Twisp total	24	72	0	5	5	15	97	10	19	3	32	129
2009 total	490	725	290	724	85	253	2,077	44	452	68	564	2,641

APPENDIX L
2010 LETTER INVITING NON-SIGNATORY PARTIES TO A MID-COLUMBIA FORUM

January 18, 2010

Mr. Gary James
Confederated Tribes of the Umatilla Indian Reservation
P.O. Box 638
Pendleton, Oregon 97801

Dear Gary:

You may recall that I periodically contact you on behalf of the Parties to the Wells, Rocky Reach, and Rock Island Habitat Conservation Plans (HCPs). This letter follows a similar letter sent in 2006-2009 inquiring about your interest in participating in a meeting with members of the HCP Coordinating, Hatchery, and Tributary Committees. As parties who were involved in negotiating the HCPs, but elected to not sign the HCPs, the Committees would like to again provide you with a progress report on implementation, as well as give you an opportunity to ask questions of Committee members.

If held, the meeting would be limited to your representatives as well as those from American Rivers, and invited representatives of Grant County PUD. The meeting would likely be a half-day session with a majority of the time available to address your questions and concerns; however, I would plan to work with you to shape an agenda and timeline beforehand.

Because the HCP Parties formally notified FERC of their intent to provide for continuing dialogue with the non signatories in this type of periodic meeting, I would appreciate it if you could provide a formal response to this letter by March 31. Should you have any questions, please feel free to contact me at 206-287-9130 or mschiewe@anchorqea.com.

Sincerely,

Michael H. Schiewe
Chair, HCP Coordinating Committees
Anchor QEA, L.L.C.

cc: Keith Truscott, Chelan PUD
Tom Kahler, Douglas PUD
Jim Craig, USFWS
Jerry Marco, Colville Tribes
Steve Parker, Yakama Nation
Bryan Nordlund, NMFS
Bill Tweit, WDFW
Tracy Hillman, Chair, HCP Tributary Committees

January 18, 2010

Ms. Brett Swift
American Rivers
320 SW Stark St., Suite 418
Portland, Oregon 97208

Dear Brett:

You may recall that I periodically contact you on behalf of the Parties to the Wells, Rocky Reach, and Rock Island Habitat Conservation Plans (HCPs). This letter follows a similar letter sent in 2006-2009 inquiring about your interest in participating in a meeting with members of the HCP Coordinating, Hatchery, and Tributary Committees. As parties who were involved in negotiating the HCPs, but elected to not sign the HCPs, the Committees would like to again provide you with a progress report on implementation, as well as give you an opportunity to ask questions of Committee members.

If held, the meeting would be limited to your representatives as well as those from the Confederated Tribes of the Umatilla Reservation, and invited representatives of Grant County PUD. The meeting would likely be a half-day session with a majority of the time available to address your questions and concerns; however, I would plan to work with you to shape an agenda and timeline beforehand.

Because the HCP Parties formally notified FERC of their intent to provide for continuing dialogue with the non signatories in this type of periodic meeting, I would appreciate it if you could provide a formal response to this letter by March 31. Should you have any questions, please feel free to contact me at 206-287-9130 or mschiewe@anchorqea.com.

Sincerely,

Michael H. Schiewe
Chair, HCP Coordinating Committees
Anchor QEA, L.L.C.

cc: Keith Truscott, Chelan PUD
Tom Kahler, Douglas PUD
Jim Craig, USFWS
Jerry Marco, Colville Tribes
Steve Parker, Yakama Nation
Bryan Nordlund, NMFS
Bill Tweit, WDFW
Tracy Hillman, Chair, HCP Tributary Committees

APPENDIX M
BULL TROUT MONITORING AND MANAGEMENT PLAN
2009 ANNUAL REPORT

BULL TROUT MONITORING AND MANAGEMENT PLAN
2009 ANNUAL REPORT

WELLS HYDROELECTRIC PROJECT

FERC PROJECT NO. 2149

March 30, 2010

Prepared by:

Bao Le
Long View Associates
Portland, Oregon
and
Public Utility District No. 1 of Douglas County
East Wenatchee, Washington

Prepared for:
Public Utility District No. 1 of Douglas County
East Wenatchee, Washington

For copies of this Annual Report, contact:

Public Utility District No. 1 of Douglas County
Attention: Relicensing
1151 Valley Mall Parkway
East Wenatchee, WA 98802-4497
Phone: (509) 884-7191
E-Mail: relicensing@dcpud.org

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EXECUTIVE SUMMARY

The goal of the Wells Hydroelectric Project (Wells Project) Bull Trout Monitoring and Management Plan (Bull Trout Plan) is to identify, develop, and implement measures to monitor and address potential project-related impacts on bull trout (*Salvelinus confluentus*) associated with the operations of the Wells Project and associated facilities (Douglas PUD 2004). The Bull Trout Plan was prepared and implemented to meet monitoring requirements stipulated in a U.S. Fish and Wildlife Service (USFWS) Biological Opinion (USFWS 2004) regarding implementation of the Wells Project Anadromous Fish Agreement and Habitat Conservation Plan (Wells HCP). The USFWS Biological Opinion monitoring requirements were also incorporated by the Federal Energy Regulatory Commission (FERC) into the existing Wells Project license in 2004. The Bull Trout Plan was developed in collaboration with the USFWS, National Marine Fisheries Service (NMFS), Washington Department of Fish and Wildlife (WDFW), the Colville Confederated Tribes, and the Yakama Nation, and was approved by the FERC. The Bull Trout Plan has four objectives, addressed by implementing various field study components from 2004 to 2008 at the Wells Project.

In accordance with Article 62 of the FERC license for the Wells Project, Douglas PUD is required to prepare and file with the Commission an annual report describing the activities required by the Bull Trout Plan. In December 2008, Public Utility District No. 1 of Douglas County (Douglas PUD) filed with the FERC, a final comprehensive report summarizing the results of all activities conducted under the Bull Trout Plan between January 2005 and July 2008.

In a letter to the FERC on December 29, 2008, Douglas PUD requested that the 2008 annual report filing (due March 31, 2009) be eliminated and instead include all remaining 2008 activities (August to December 2008) within the 2009 annual report that is scheduled to be filed with the FERC on March 31, 2010. This document summarizes the results of any additional activities conducted in 2008 that were not included in the Bull Trout Plan 2005-2008 Final Report (LGL and Douglas PUD, 2008) and any ongoing Bull Trout Plan activities that were conducted in 2009.

Results of ongoing implementation of Bull Trout Plan activities between August 2008 and December 2009 remain consistent with the previous 8 years of monitoring and evaluation. Stranding and entrapment surveys indicate that infrequent Project operations that result in lowering of the reservoir have not impacted adult or sub-adult bull trout in the Wells Project. Off-season fishway monitoring continues to indicate that adult and sub-adult bull trout are not passing Wells Dam during the winter months. To date, no sub-adult bull trout have been observed in Wells Dam fishways. Data collected from Methow River basin smolt collection operations confirm that sub-adult bull trout are present outside of the Wells Project. During these operations, a total of 41 sub-adult bull trout were captured and biological information recorded. Forty of these fish were PIT tagged. Six additional sub-adult bull trout were incidentally captured in the Methow River basin during hook and line sampling for residual steelhead with one of these fish being PIT tagged. Tag codes for all PIT tagged fish were uploaded to the PTAGIS database. Queries of the PTAGIS database show that none of the bull trout PIT tagged in the Methow Basin have since been detected at Wells Dam or outside the Methow Basin. In 2009, genetic samples were taken from 15 fish during the implementation of off-site smolt collection activities and provided to the USFWS for future genetic analysis. In addition to coordinating monitoring effort and information exchanges of Project-specific bull trout data, Douglas PUD continues to participate in regional activities that support bull trout conservation and recovery.

1.0 INTRODUCTION

In August 1993, Douglas, Chelan, and Grant Public Utility Districts (collectively, "mid-Columbia PUDs") initiated discussions to develop a long-term, comprehensive program for managing fish and wildlife that inhabit the mid-Columbia River basin (the portion of the Columbia River from the tailrace of Chief Joseph Dam to the confluence of the Yakima and Columbia rivers). These discussions first explored the possibility of developing an ecosystem-based plan for managing fish and wildlife resources inhabiting the mid-Columbia River basin. Due to the scope and scale of this conceptual plan, the negotiating parties decided to focus on an agreement for aquatic species inhabiting the mid-Columbia River basin including fish, plants, and animals. After extensive review, the negotiating parties determined that the best basin-wide approach would be to develop an agreement for anadromous salmonids, specifically: spring and summer/fall Chinook salmon (*Oncorhynchus tshawytscha*); sockeye salmon (*O. nerka*); coho salmon (*O. kisutch*); and steelhead (*O. mykiss*) (collectively, "Plan Species") which are under the jurisdiction of the National Marine Fisheries Service (NMFS).

On July 30, 1998, Public Utility District No. 1 of Douglas County (Douglas PUD), which operates the Wells Hydroelectric Project (Wells Project), submitted an unexecuted form of an Application for Approval of the Wells Project Anadromous Fish Agreement and Habitat Conservation Plan (Wells HCP) to the FERC and NMFS. To expedite the FERC's completion of formal consultation, Douglas PUD prepared a biological evaluation of the effects of implementing the Wells HCP on listed species under the jurisdiction of the U.S. Fish and Wildlife Service (USFWS).

In a letter to the FERC, the USFWS requested consultation under Section 7 of the ESA regarding the effects of hydroelectric project operations on bull trout in the Columbia River (letter from M. Miller, USFWS, to M. Robinson, FERC, dated January 10, 2000). The request for consultation was based on observations of bull trout in the study area. In its reply to the USFWS, the FERC noted that there was virtually no information on bull trout in the mainstem Columbia River. To begin to address this information gap, an initial radio telemetry study of bull trout in the mid-Columbia basin was requested by USFWS in 2000 and implemented from 2001 to 2004 by Douglas, Chelan, and Grant PUDs (BioAnalysts, Inc. 2004).

On November 24, 2003, Douglas PUD filed an application with the FERC for approval of the executed Wells HCP. The 2003 application for approval replaced the 1998 application with the executed form of the Wells HCP. On December 10, 2003, the USFWS received a request from the FERC for formal Section 7 ESA consultation to determine whether the proposed incorporation of the Wells HCP into the FERC license for operation of the Wells Project was likely to jeopardize the continued existence of the Columbia River distinct population segment (DPS) of ESA-listed bull trout, or destroy or adversely modify proposed bull trout critical habitat. In response to the FERC request, the USFWS issued a Biological Opinion (BO) pursuant to Section 7 of the ESA to assess the effects of implementing the HCP on bull trout and other listed species under the jurisdiction of the USFWS. The BO included an Incidental Take Statement outlining reasonable and prudent measures (RPMs) and associated terms and conditions to monitor and limit bull trout take at the Wells Project. On June 21, 2004, the FERC issued orders amending the license for the Wells Project to implement the terms of the Wells

HCP. The FERC incorporated the USFWS bull trout RPMs and terms and conditions into the existing Wells Project license, which are detailed in license articles 61, 62, and 63.

Article 61 of the license requires Douglas PUD to file with the FERC a Bull Trout Plan for implementing the USFWS bull trout RPMs and terms and conditions, which were designed to monitor and limit bull trout take associated with Wells Project operations. Article 61 further requires that Douglas PUD prepare the Bull Trout Plan in consultation with the USFWS, NMFS, Washington Department of Fish and Wildlife (WDFW), and interested Indian Tribes (Colville Confederated Tribes and the Yakama Nation). Following consultation with these stakeholders, on February 28, 2005, Douglas PUD filed with the FERC the "*Wells Hydroelectric Project Bull Trout Monitoring and Management Plan, 2004-2008*" (Douglas PUD 2004), which is referred to as the "Bull Trout Plan" in this document. The Bull Trout Plan was approved by the FERC on April 19, 2005.

Article 62 of the license requires Douglas PUD to prepare and file with the FERC an annual report of the status of activities required by the Bull Trout Plan. On March 26, 2008, Douglas PUD with approval from USFWS filed a request for an extension of time to submit the 2007 annual bull trout monitoring report and to consolidate the 2007 annual report with the final bull trout monitoring report, required to be filed with the FERC by December 31, 2008. On April 16, 2008, the FERC issued an order granting this request and per the order, Douglas PUD filed with the FERC a 2005-2008 final monitoring report that summarized all data collected to meet the Bull Trout Plan objectives outlined in the USFWS bull trout RPMs and terms and conditions, and the Wells Project license articles 61 and 62.

The next reporting deadline associated with the Bull Trout Plan was March 31, 2009 (2008 Annual Report). However, because the 2005-2008 final report contained bull trout monitoring activities for most of 2008, Douglas PUD requested and was granted permission, via the FERC's April 16, 2008 letter to Douglas PUD, to eliminate the March 2009 filing of the 2008 Annual Report and instead include all remaining 2008 activities within the 2009 annual report. This document serves as the 2009 annual report and summarizes the results of any additional bull trout activities in 2008 (that were not included in the Bull Trout Plan 2005-2008 Final Monitoring Report (LGL and Douglas PUD, 2008)).

Article 63 was a reservation of authority by the FERC to require the licensee to carry out specified measures for the purpose of participating in the development and implementation of a bull trout recovery plan. The USFWS has only recently reactivated the bull trout recovery planning process following a multi-year hiatus. In response to compliance with article 63 of the Wells Project license, Douglas PUD has and will continue to participate in the development of future recovery planning documents for bull trout.

2.0 GOALS AND OBJECTIVES

The goal of the Bull Trout Plan is to identify, develop, and implement measures to monitor and address potential project-related impacts on bull trout from Wells Project operations and facilities. The Bull Trout Plan was intended to be an adaptive approach, where strategies for meeting the goals and objectives may be negotiated under a collaborative effort with stakeholders based on new information and ongoing monitoring results. The plan was designed specifically to: (1) address ongoing project-related impacts through the life of the existing operating license; (2) provide consistency with recovery actions as outlined in the USFWS Draft Bull Trout Recovery Plan; and (3) monitor and minimize the extent of any incidental take of bull trout consistent with Section 7 of the ESA.

The Bull Trout Plan has four main objectives including: (1) identify potential project-related impacts on upstream and downstream passage of adult bull trout through the Wells Dam and reservoir and implement appropriate measures to monitor any incidental take of bull trout; (2) assess project-related impacts on upstream and downstream passage of sub-adult bull trout; (3) investigate the potential for bull trout entrapment or stranding in off-channel or backwater areas of Wells Reservoir; and (4) identify the core areas and local populations, as defined in the USFWS Draft Bull Trout Recovery Plan, of the bull trout that utilize the Wells Project Area.

Note that activities to support some objectives identified in the Bull Trout Plan were intended to be conducted in only the early phases of plan implementation (i.e., radio-tagging of bull trout at Wells Dam between 2005-2008 and comprehensive incidental take calculation for monitoring years 2001-2004 and 2005-2008). The results of these activities can be found in the Bull Trout Plan 2005-2008 Final Monitoring Report (LGL and Douglas PUD, 2008) and are considered completed tasks with the filing of that final report. For the purposes of continued annual reporting per Article 62, only ongoing Bull Trout Plan activities are reported herein.

Below is a brief summary of the Bull Trout Plan objectives. A more detailed strategic framework to implement each objective is summarized in the Bull Trout Plan 2005-2008 Final Monitoring Report (LGL and Douglas PUD, 2008).

2.1 Objective 1 - Adult Bull Trout Passage Monitoring

Strategy 1-1: Implement an adult bull trout telemetry program to monitor adult upstream and downstream passage in the Wells Project Area and implement appropriate measures to monitor any incidental take of bull trout.

Strategy 1-2: Analyze passage results and operational data to determine if correlations exist between passage times and passage events and project operations.

Strategy 1-3: Determine off-season adult bull trout passage through the adult fishway (numbers and times of year) at Wells for an experimental period 2004-2005. Per request by the USFWS, off-season fishway monitoring for adult bull trout passage has continued to date.

Strategy 1-4: Should upstream or downstream passage problems be identified, pursue the feasibility of options to modify upstream passage facilities or operations that reduce the impact to bull trout passage.

2.2 Objective 2 - Sub-adult Bull Trout Passage Monitoring

Strategy 2-1: The stakeholders agree at this time[1] that because of the inability to collect a sufficient sample size of sub-adult bull trout, it is not feasible to assess sub-adult passage at Wells. However, when encountered at the Wells Project, or in tributary traps, sub-adult bull trout will be PIT tagged.

Strategy 2-2: Determine off-season sub-adult bull trout passage through the adult fishway (numbers and times of year) at Wells for an experimental period from 2004 to 2005. Per request by the USFWS, off-season fishway monitoring for sub-adult bull trout passage has continued to date.

2.3 Objective 3 - Bull Trout Entrapment and Stranding Evaluation

Strategy 3-1: Evaluate Wells inflow patterns, reservoir elevations, and backwater curves to determine if stranding or entrapment of bull trout may occur.

2.4 Objective 4 - Identification of Core Area and Local Populations of Bull Trout that Utilize the Wells Project Area

Strategy 4-1: Gather genetic samples from radio-tagged and PIT tagged bull trout for comparison to baseline genetic samples from local populations and core areas.

Strategy 4-2: Work cooperatively with other agencies to obtain locations of radio-tagged fish outside the Project area.

3.0 STUDY AREA

3.1 Wells Bull Trout Plan Study Area

The study area for this report included all waters within the Wells Project, including the lower Okanogan and Methow rivers, the Wells Reservoir, Wells Dam, and Wells Tailrace, downstream to the "Gateway" location set at approximately 3 miles downstream from Wells Dam. Additional monitoring also took place at downstream hydroelectric projects and other accessible reaches of the mid-Columbia Basin including the Methow, Wenatchee, Entiat, Wenatchee and Okanogan rivers. PIT tagging activities also occurred in the Methow and Twisp rivers.

3.2 General Description of the Wells Hydroelectric Project Area

The Wells Project is located at river mile (RM) 515.6 on the Columbia River in the State of Washington. Wells Dam is located approximately 30 river miles downstream from the Chief Joseph Hydroelectric Project, owned and operated by the United States Army Corps of Engineers (COE), and 42 miles upstream from the Rocky Reach Hydroelectric Project owned and operated

[1] At the time that the Bull Trout Plan was prepared in 2004.

by Public Utility District No. 1 of Chelan County (Chelan PUD). The nearest town is Pateros, Washington, which is located approximately 8 miles upstream from the Wells Dam.

The Wells Project is the chief generating resource for Douglas PUD. It includes 10 generating units with a nameplate rating of 774,300 kW and a peaking capacity of approximately 840,000 kW. The design of the Wells Project is unique in that the generating units, spillways, switchyard, and fish passage facilities were combined into a single structure referred to as the hydrocombine. Fish passage facilities reside on both sides of the hydrocombine, which is 1,130 feet long, 168 feet wide, with a crest elevation of 795 feet mean sea level (msl) in height.

The Wells Reservoir is approximately 30 miles long. The Methow and Okanogan rivers are tributaries of the Columbia River within the Wells Reservoir. The Wells Project boundary extends approximately 1.5 miles up the Methow River and approximately 15.5 miles up the Okanogan River. The normal maximum surface area of the reservoir is 9,740 acres with a gross storage capacity of 331,200 acre-feet and usable storage of 97,985 acre-feet at elevation of 781 feet msl. The normal maximum water surface elevation of the reservoir is 781 feet msl (Figure 3.2-1).

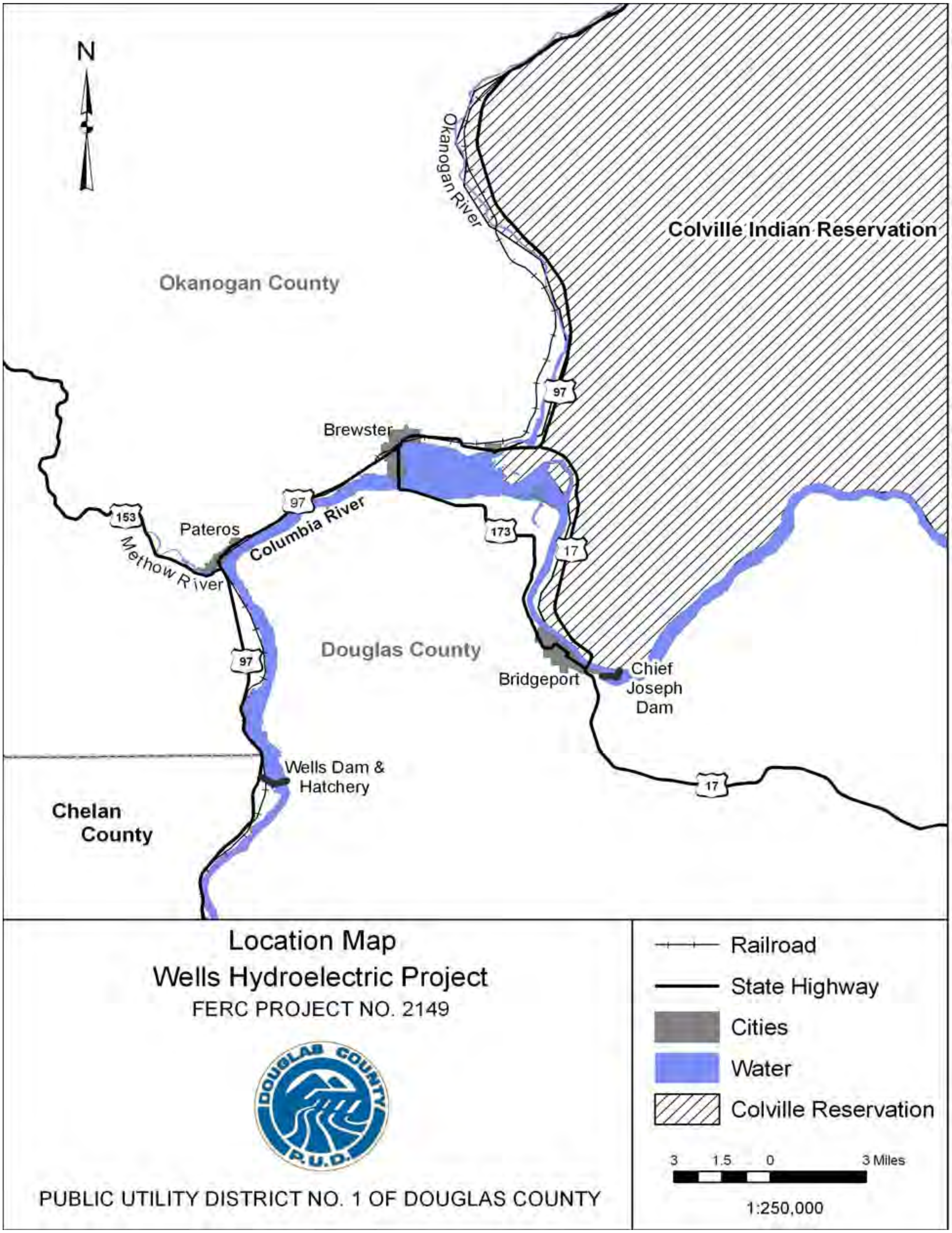

Figure 3.2-1 Location map of the Wells Project.

4.0 BACKGROUND AND EXISTING INFORMATION

4.1 Bull Trout Biology

Bull trout are native to northwestern North America, historically occupying a large geographic range extending from California north into the Yukon and Northwest Territories of Canada, and East to Western Montana and Alberta (Cavender 1978). They are generally found in interior drainages, but also occur on the Pacific Coast in Puget Sound and in the large drainages of British Columbia.

Bull trout currently occur in lakes, rivers and tributaries in Washington, Montana, Idaho, Oregon (including the Klamath River basin), Nevada, two Canadian Provinces (British Columbia and Alberta), and several cross-boundary drainages in extreme southeast Alaska. East of the Continental Divide, bull trout are found in the headwaters of the Saskatchewan River in Alberta, and the Mackenzie River system in Alberta and British Columbia (Cavender 1978; McPhail and Baxter 1996; Brewin and Brewin 1997). The remaining distribution of bull trout is highly fragmented.

Bull trout are a member of the char group within the family Salmonidae. Bull trout closely resemble Dolly Varden (*Salvelinus malma*), a related species. Genetic analyses indicate, however, that bull trout are more closely related to an Asian char (*Salvelinus leucomaenis*) than to Dolly Varden (Pleyte et al. 1992). Bull trout are sympatric with Dolly Varden over part of their range, most notably in British Columbia and a small portion of the Coastal-Puget Sound region of Washington State.

Bull trout are believed to have more specific habitat requirements than other salmonids (Rieman and McIntyre 1993). Growth, survival, and long-term persistence are dependent upon habitat characteristics such as clean, cold, connected, and complex instream habitat (USFWS et al. 2000), and stream/population connectivity. Stream temperature and substrate type, in particular, are critical factors for the sustained long-term persistence of bull trout. Spawning is often associated with the coldest, cleanest, and most complex stream reaches within basins. However, bull trout may exhibit a patchy distribution, even in pristine habitats (Rieman and McIntyre 1995), and should not be expected to occupy all available habitats at the same time (Rieman et al. 1997).

Bull trout exhibit four distinct life history types: resident, fluvial, adfluvial, and anadromous. The fluvial, adfluvial, and resident forms exist throughout the range of the bull trout (Rieman and McIntyre 1993), although each form is not present everywhere. The anadromous life history form is currently known only to occur in the Coastal-Puget Sound region within the coterminous United States (Volk 2000; Kraemer 1994; Mongillo 1993). Multiple life history types may be expressed in the same population, and this diversity of life history types is considered important to the stability and viability of bull trout populations (Rieman and McIntyre 1993).

The majority of growth and maturation for anadromous bull trout occurs in estuarine and marine waters, adfluvial bull trout in lakes or reservoirs, and fluvial bull trout in large river systems.

Resident bull trout populations are generally found in small headwater streams where fish remain their entire lives.

For migratory life history types, juveniles tend to rear in tributary streams for 1 to 4 years before migrating downstream into a larger river, lake, or estuary and/or nearshore marine area to mature (Rieman and McIntyre 1993). In some lake systems, age 0+ fish (less than 1 year old) may migrate directly to lakes, but it is unknown if this emigration is a result of density dependent effects from limited stream rearing habitat, or if these young-of-the-year actually survive in the lake environment (Riehle et al. 1997). Juvenile bull trout in streams frequently inhabit side channels, stream margins and pools with suitable cover (Sexauer and James 1993) with maximum summer water temperatures generally less than 16ºC (Dunham et al. 2003) and areas with cold hyporheic zones or groundwater upwellings (Baxter and Hauer 2000).

4.2 Status

On June 10, 1998, the USFWS listed bull trout within the Columbia River basin as threatened under the ESA (FR 63(111)). Later (November 1, 1999), the USFWS listed bull trout within the coterminous United States as threatened under the ESA (FR 64(210)). The USFWS identified habitat degradation, fragmentation, and alterations associated with dewatering, road construction and maintenance, mining, and grazing; blockage of migratory corridors by dams or other diversion structures; poor water quality; incidental angler harvest; entrainment into diversion channels; and introduced non-native species as major factors affecting the distribution and abundance of bull trout. They noted that dams (and natural barriers) have isolated population segments resulting in a loss of genetic exchange among these segments (FR 63(111)). The USFWS believes many populations are now isolated and disjunct. In October 2002, the USFWS completed the first draft of a bull trout recovery plan intended to provide information and guidance that will lead to recovery of the species, including its habitat (USFWS 2002). Threatened bull trout population segments are widely distributed over a large area and because population segments were subject to listing at different times, the USFWS adopted a two-tiered approach to develop the draft recovery plan for bull trout (USFWS 2002). In November 2002, the USFWS published in the federal register a proposed rule for the designation of critical habitat for the Klamath River and Columbia River distinct population segments of bull trout (67 FR 71235). In October 2004, the USFWS published a final rule in the Federal Register designating critical habitat for the Klamath River and Columbia River populations of bull trout (69 FR 59995). New critical habitat was proposed throughout the range of bull trout in January 14, 2010 (75 FR 2270), including all of the Wells Project waters except the Okanogan River.

In April 2008, the USFWS completed the 5-year status review for Columbia River bull trout with two recommendations: maintain “threatened” status for the species, and determine if multiple distinct population segments exist within the Columbia River that merit protection under the ESA. The recommendations intend to facilitate analysis of project effects over more specific and biologically appropriate areas, ultimately allowing a greater focus of regulatory protection and recovery resources (USFWS 2008a). The review also identified specific issues that limit the overall ability to accurately and quantitatively evaluate the current status of bull trout. Seven recommendations were made to improve future evaluation and management decisions, all of which are largely based on improvement and standardization of monitoring and evaluation techniques, better delineation and agreement of core areas and Recovery Units, and multi-agency cooperation and management (USFWS 2008b).

The Wells Project is situated within the Upper Columbia River Recovery Unit[2] and the USFWS has identified the Wenatchee, Entiat, and Methow rivers as its core areas. A core area represents the closest approximation of a biologically functioning unit for bull trout. A core area may function as a metapopulation for bull trout. Not all core areas are equal and each has specific functions that are unique. For example, the Entiat Core Area depends heavily on the mainstem Columbia River to provide overwintering, migration, and foraging habitats. The Wenatchee Core Area has populations using lake and riverine habitat (both the Wenatchee and Columbia rivers) for overwintering, migration, and foraging. Within a core area, many local populations may exist. A local population is assumed to be the smallest group of fish that is known to represent a regularly interacting reproductive unit. Nineteen local populations have been identified in the Wenatchee (7), Entiat (2), and Methow (10) core areas (USFWS 2002).

4.3 2001-2004 Mid-Columbia Bull Trout Radio Telemetry Study

Bull trout have been counted at Wells Dam since 1998. In 2000, due to the potential for operations at mid-Columbia dams to affect the movement and survival of bull trout, the USFWS requested that the three mid-Columbia PUDs evaluate the movement and status of bull trout in their respective project areas. At that time, little was known about the life-history characteristics (e.g., movements, distribution, habitat use, etc.) of bull trout in the mid-Columbia River. Therefore, in order to assess the operational effects of hydroelectric projects on bull trout within the mid-Columbia, a three PUD coordinated radio telemetry study was implemented beginning in 2001. The goal of the study was to monitor the movements and migration patterns of adult bull trout in the mid-Columbia River using radio telemetry (Figure 4.3-1). The number of bull trout to be collected and tagged at each dam (Rock Island, Rocky Reach, and Wells) was based on the proportion of fish that migrated past those dams in 2000.

From 2001 to 2003, bull trout were collected from the Wells, Rocky Reach, and Rock Island dams, radio-tagged, and monitored through 2004. Multiple-telemetry techniques were used to assess the movement of tagged bull trout within the study area. At Wells Dam, a combination of aerial and underwater antennas was deployed. The primary purpose for this system was to document the presence of bull trout at the project, identify passage times and determine their direction of travel (i.e., upstream/downstream). In addition to these systems, a number of additional telemetry systems were deployed to address specific questions posed by the USFWS and Douglas PUD. At Wells Dam, several additional systems were installed to identify whether tagged bull trout could enter, ascend, and exit specific gates and fish ladders. All possible access points to the adult fish ladders and the exits were monitored individually during the study period from 2001-2004, allowing the route of passage to be determined as well as the ability to establish the exact time of entrance and exit from the ladder system.

[2] Note that while the USFWS refers to the area encompassing the Wells Project as the Upper Columbia Recovery Unit for bull trout, the section of the Columbia River from Chief Joseph Dam to the confluence of the Yakima and Columbia rivers is generally termed the "mid-Columbia" for other watershed and salmon and steelhead recovery planning, and is the term used in this document when referring to the reach.

To assess bull trout movements into and out of the Wells Reservoir, fixed-telemetry monitoring sites were established at the mouth of the Methow and Okanogan rivers and periodic aerial telemetry surveys were conducted on the reservoir and throughout both watersheds (English et al. 1998, 2001). English et al. (1998, 2001) provide a detailed description of the telemetry systems at each of the dams and within the tributaries.

Overall, successful bull trout upstream and downstream passage was observed at the Wells Project. No bull trout injury or mortality was observed associated with the Wells Project. Radio-tagged bull trout that migrated upstream past Wells Dam utilized the Methow River subbasin during the bull trout spawning period. Key findings of the 2001 to 2004 study are used in this document to assess the 6-year average take analysis as stipulated in the Bull Trout Plan (Objective 1, Strategy 1-1) and are summarized in the results section of this document.

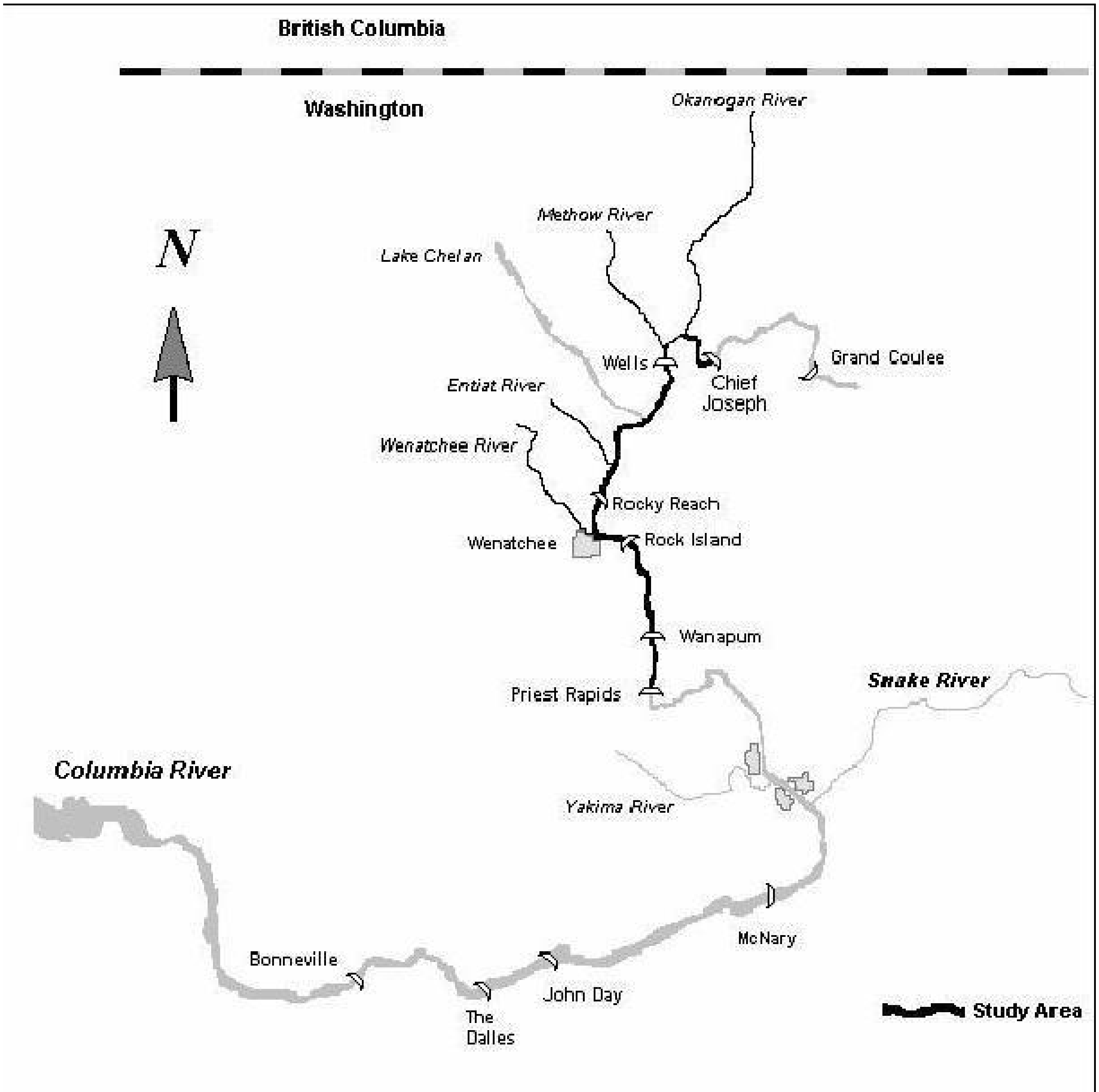

Figure 4.3-1 Study area for assessing migration patterns of bull trout in the mid-Columbia River (2001-2004).

4.4 2005-2008 Bull Trout Monitoring and Management Plan Activities

The goal of the Wells Project Bull Trout Plan is to identify, develop, and implement measures to monitor and address potential project-related impacts on bull trout associated with the operations of the Wells Project and associated facilities (Douglas PUD 2004). The Bull Trout Plan has four objectives, addressed by implementing various field study components from 2004 to 2008 at the Wells Project.

The first objective was to identify potential project-related impacts on upstream and downstream passage of adult bull trout (fish ≥ 400 mm in length) through Wells Dam and reservoir, and implement appropriate measures to monitor any incidental take of adult bull trout. To meet the first objective, radio telemetry was used to monitor upstream and downstream passage, and off-season video counting was done in the Wells Project fishways during the winter. Between 2005 and 2008, 26 adult bull trout were trapped at Wells Dam and radio-tagged. Concurrent with the implementation of the Bull Trout Plan, the USFWS and Chelan PUD radio-tagged and released 136 adult bull trout at other mid-Columbia River basin locations including the Methow River, and Rock Island and Rocky Reach dams (50 USFWS tags 2006-2008, 86 Chelan PUD tags 2005-2007).

From 2005 to 2008, 25 downstream passage events and 52 upstream passage events by 40 individual bull trout were recorded at Wells Dam. Of these, 17 downstream and 41 upstream passage events occurred within one year of tagging and release. Of all tags released from 2001 to 2004, there were 2 downstream passage events and 41 upstream passage events. Of these, 2 downstream and 38 upstream passage events occurred within one year of release. The take estimates for the Wells Project were based upon the number of unique upstream and downstream passage events that took place within one year of each bull trout being tagged and released. During the six-year study and eight years of monitoring, 19 downstream and 79 upstream passage events took place at Wells Dam by radio-tagged bull trout within one year of release. Taking into account all observed passage events a total of 27 downstream and 93 upstream passage events took place at Wells Dam. Radio-tagged bull trout passed downstream through the turbines or spillways as no downstream passage events were recorded via the fishways. Out of the 19 downstream passage events that occurred within one year of tagging, zero bull trout injury or mortality was observed at the Wells Project. Out of the 79 upstream passage events that occurred within one year of tagging, zero bull trout injury or mortality was observed at the Wells Project.

Upstream passage of adult bull trout through the fish ladders at Wells Dam has historically occurred between early May and late October, with peak passage typically occurring in May and June. During the 2005 and 2008 study, 214 adult bull trout were counted passing upstream through Wells Dam. The proportion of the bull trout population at Wells Dam that was radio-tagged was 24% (52/214 = 0.24).

Project operations did not appear to influence the movements of adult bull trout. Instead, adult bull trout passage events appeared to be more closely associated with water temperature, photoperiod and time of year with rather predictable patterns of upstream and downstream movement. Because no take (injury or mortality) was observed during the study, there was no need to investigate how Project operations affected take at Wells Dam.

During the 2005-2008 monitoring period, no adult bull trout were counted during the 24-hour off-season fishway counting period (November 16 to April 30).

No upstream or downstream passage problems were identified during this study. Passage times upstream through the fishway appeared reasonable relative to the species migration and spawn timing. Because no passage problems were identified during the study, there was no need to develop recommendations to change or modify the fishway operations at Wells Dam.

The second objective was to assess project-related impacts on upstream and downstream passage of sub-adult bull trout (fish <400 mm in length). During the development of the Bull Trout Plan, stakeholders agreed that because of the inability to collect a sufficient sample size of sub-adult bull trout at Wells Dam, it was not feasible to assess sub-adult passage. However, when encountered at Wells Dam, or in tributary traps, sub-adult bull trout would be PIT tagged. Douglas PUD provided funding, equipment, training, and coordination for the sub-adult bull trout PIT tag program. From 2004 to 2008, 67 sub-adult bull trout were PIT tagged in the Methow River sub-basin during standard tributary smolt trapping operations. Douglas PUD operated PIT tag detection systems year-round within the Wells Dam fishways during the study period (2005 to 2008) and no PIT tagged sub-adult bull trout were detected. Additionally, sub-adult bull trout were to be PIT tagged opportunistically when encountered at the Wells Project; however, no sub-adult bull trout were encountered at Wells Dam during the study period.

Off-season (November 16 to April 30) video monitoring of the Wells Dam fishways for sub-adult bull trout was conducted during each of the years of this study including the winter of 2004 and 2005 as required by the Bull Trout Plan. Additional off-season counting took place during the winters of 2006 and 2007. To date, no sub-adult bull trout have been observed utilizing the fishways at Wells Dam.

The third objective was to investigate the potential for sub-adult entrapment or stranding in off-channel or backwater areas of Wells Reservoir. Field surveys were conducted at potential bull trout stranding sites during a period of low reservoir elevation. High resolution bathymetric information, reservoir elevations, backwater curves, and inflow patterns were used to identify potential stranding sites for the survey. No stranded or entrapped bull trout of any size were found during the field surveys conducted in 2006 and 2008. No surveys were conducted during 2005 or 2007 because river operations were not low enough to warrant a survey.

The fourth objective was to identify the core areas and local populations of bull trout that utilize the Wells Project. Data from radio-tagged bull trout tracked during the 2005 to 2008 study period were analyzed with data from the 2001 to 2004 study. Bull trout that pass Wells Dam (either upstream or downstream) migrated into the Methow, Entiat, and Wenatchee rivers during the spawning period. Observed tributary entrances of bull trout detected at Wells Dam from 2005 to 2008 were 86% Methow River, 10% Entiat River, and 2% Wenatchee River. Genetic samples of all fish tagged at Wells Dam were submitted to the USFWS for analysis. The USFWS is responsible for analyzing the genetic samples and providing those results. To further support this objective (Strategy 4-2: Work cooperatively with other agencies to obtain locations of radio-tagged fish outside the project area), Douglas PUD regularly coordinated bull trout data and monitoring activities with other agencies including the USFWS, and Chelan PUD.

In summary, no mortality or injury was observed for bull trout (adult and sub-adult) passing through or interacting with the operations of the Wells Project during the take monitoring studies conducted between 2001 and 2008. No incidental take of bull trout was observed at the Wells Project, and the Wells Project is presumed to be within the incidental take levels authorized by the USFWS Biological Opinion Incidental Take Statement (USFWS 2004).

5.0 METHODOLOGY

For a more detailed description of the methodology to implement each Bull Trout Plan objective-strategy, please refer to the Bull Trout Plan 2005-2008 Final Monitoring Report (LGL and Douglas PUD, 2008).

6.0 RESULTS

6.1 Strategy 1-1: Adult bull trout telemetry program

6.1.1 Bull trout tagged by Douglas PUD

The telemetry program goal was to capture and radio-tag 10 adult bull trout at Wells Dam each year for three years (2005-2007). All tagging and monitoring data from January 2005 to July 2008 are included in the Bull Trout Plan 2005-2008 Final Monitoring Report (LGL and Douglas PUD, 2008).

An evaluation of station receiver data for the period of August 2008 to December 2009 at Wells Dam, Wells Dam tailrace, the gateway location, and at stations located at the Methow and Okanogan river mouths yielded no additional detection data. During the latter half of 2008, bull trout would have already entered the Methow River to access spawning and overwintering habitat located outside of the Wells Project Area. By 2009, most of the tags activated in earlier years would have expired and been unavailable in providing additional data.

6.2 Strategy 1-2: Correlations between passage events and Project operations

Between August 2008 and December 2009, no additional detections of tagged fish were observed at Wells Dam or within the Wells Project Area. Therefore no additional analysis between correlations of passage events at Well Dam and Project operations were conducted.

6.3 Strategy 1-3: Off-season fishway passage of adult bull trout

Off-season video monitoring of both Wells Dam fishways continued for the 2008-2009 and 2009-2010 winter periods (November 16 - April 30). During these monitoring periods, no adult bull trout were observed utilizing the fishways. Consistent with observations from year round fishway counts 2005-2008, adult bull trout passage through Wells Dam occurs between May and July each year.

6.4 Strategy 1-4: Modifications to passage facilities or operations

There has been no passage issues identified that limit upstream or downstream passage of adult bull trout at Wells Dam. Therefore, there is no need for modifications to current passage facilities or operations.

6.5 Strategy 2-1: Sub-adult PIT tagging program

Douglas PUD passively collected information from all PIT tagged fish, including bull trout, as they passed through the fishways at Wells Dam. Douglas PUD also scanned all bull trout incidentally captured at rotary screw traps and adult brood collection facilities. The information collected at the dam and in the tributaries was posted on the PTAGIS website, which is operated and maintained by the Pacific States Marine Fisheries Commission.

Between August 2008 and December 2009, no sub-adult bull trout were observed or captured at Wells Dam. Douglas PUD continues to provide support to WDFW for PIT tagging bull trout incidentally collected at off-site smolt collection facilities (Table 6.4-1). During the monitoring period at the Methow River basin trap sites, 41 sub-adult bull trout were captured and 40 of those 41 captured fish were PIT tagged. Tag information for all tagged fish was posted on the PTAGIS website (Charlie Snow, pers. comm.). The PTAGIS database shows that none of these PIT tagged bull trout have since been detected at Wells Dam or outside the Methow Basin at other Columbia Basin dams. One bull trout PIT-tagged in the Entiat River by the USFWS in 2008 was detected passing upstream through Wells Dam in June 2009. This is the first adult PIT-tagged bull trout to be detected at Wells Dam since monitoring started in 2001.

Within the Methow Basin there are 13 separate PIT-tag interrogations facilities, one of the most extensive PIT-tag interrogation networks in the Columbia Basin. Of the 107 bull trout that have been PIT-tagged by WDFW using Douglas PUD tags, numerous within basin detections have taken place. In 2008, 10 observations of PIT-tagged sub-adult bull trout took place at four different monitoring locations within the Methow Basin. Seven of these observations were at the one Twisp River in-stream interrogation site. In 2009, 11 observations of PIT-tagged sub-adult bull trout took place with all but one of these fish observed at the Twisp River monitoring station. The vast majority of tagging and recapture/observations have taken place within the Twisp River. Other detection sites where sub-adult bull trout have been observed include the lower Methow, middle Methow, Chewuch, Gold Creek and Eightmile detection sites.

In addition to bull trout sub-adults captured at these two Methow River basin trap sites, a total of 3, 2, and 1 fish were captured in the Twisp River, Early Winters Creek, and the Methow River, respectively, via hook and line sampling by WDFW. Only the fish captured in the Methow River was PIT tagged and the information posted on the PTAGIS website. No genetic samples were taken from any of these fish.

Table 6.4-1 Sub-adult bull trout PIT tagged in the Methow Basin, 2008-2009 (data from C. Snow, WDFW).

Year	Collection/tag site	# PIT tagged/# captured	# DNA sampled
2008*	Methow River trap	0/0	0
2008*	Twisp River trap	13/14	0
2009	Methow River trap	6/6	5
2009	Twisp River trap	21/21	10

*August to December only.

6.6 Strategy 2-2: Off-season fishway passage of sub-adult bull trout

Similar to off-season video monitoring of adult bull trout (Section 6.3), off-season video monitoring of the Wells Dam fishways for sub-adult bull trout (Section 6.3) continued for the 2008-2009 and 2009-2010 winter periods (November 16 - April 30). During these monitoring periods, no sub-adult bull trout were observed utilizing the fishways. To date, no sub-adult bull trout have been observed utilizing Wells Dam fishways at any time during the year.

6.7 Strategy 3-1: Inflow patterns, reservoir elevations, and backwater curves

On November 5, 2008, Douglas PUD conducted stranding surveys intended to document whether or not bull trout are becoming stranding in the Wells Reservoir during lower than normal reservoir surface elevation operations. The survey locations were selected based upon an analysis of detailed bathymetric maps produced in 2005 combined with Wells Reservoir hydraulic information. This effort identified several locations where stranding of sub-adult bull trout could potentially occur. Six total potential stranding locations were identified. These locations were the Methow River mouth, the Okanogan River mouth, the Kirk Islands, the shallow water habitat in the Columbia River directly across from the mouth of the Okanogan River, Schluneger Flats and the off-channel areas of the Bridgeport Bar Islands. Boat and foot surveys were conducted and included a combination of shoreline transects and inspection of isolated sanctuary pools. Similar to previous bull trout stranding surveys, no bull trout were observed during the 2008 survey which suggests that bull trout are able to avoid stranding and entrapment areas in the event of a Wells reservoir drawdown.

6.8 Strategy 4-1: Genetic sampling program

During the latter half of 2008 (August to December), no additional genetic samples were collected as a result of Bull Trout Plan activities. In 2009, 15 genetic samples were collected from sub-adult bull trout captured during off-site smolt collection activities in the Methow River basin (Table 6.4-1). All samples will be sent to the USFWS Abernathy Fish Technology Center for analysis. Genetic analysis results are not yet available.

6.9 Strategy 4-2: Participation in information exchanges and regional efforts

Douglas PUD continues to coordinate with regional tribal, state, and federal agencies, to promote the exchange of bull trout information and to ensure that local and regional bull trout monitoring efforts are coordinated in the Upper Columbia River.

7.0 CONCLUSIONS

Six years of tagging results and eight years of monitoring results, as reported in the Bull Trout Plan 2005-2008 Final Report, demonstrate no project-related impacts to adult or sub-adult bull trout from passage through the Wells Project, nor by stranding/entrapment due to lowering of the reservoir elevation. Douglas PUD has also determined there are no apparent correlations between project operations and downstream passage events, and that there is no upstream movement of adult or sub-adult bull trout through the Wells Dam fishways during the off-season period of November 16 through April 30. Bull trout captured and tagged at Wells Dam were radio-tracked to the Methow and Entiat Core Areas during spawning periods, and have also demonstrated movement between these systems by successfully passing upstream and downstream through Wells Dam.

Results of ongoing implementation of Bull Trout Plan activities between August 2008 and December 2009 remain consistent with the previous 8 years of monitoring and evaluation. Stranding and entrapment surveys indicate that infrequent Project operations that result in lowering of the reservoir have not impacted adult or sub-adult bull trout in the Wells Project. Off-season fishway monitoring continues to document that adult and sub-adult bull trout are not passing Wells Dam during the winter months. To date, no sub-adult bull trout have been observed in Wells Dam fishways. Data collected from Methow River basin smolt collection operations indicate that sub-adult bull trout are present outside of the Wells Project. During these operations, a total of 41 sub-adult bull trout were captured and biological information recorded. Forty (98%) of these fish were PIT tagged. Six additional sub-adult bull trout were captured in the Methow River basin via hook and line sampling with 1 of these fish being PIT tagged. Tag codes for all PIT tagged fish were uploaded to the PTAGIS database. Queries of the PTAGIS database show that none of these PIT tagged bull trout have since been detected at Wells Dam but have been detected moving within the many tributaries to the Methow River. Only one PIT-tagged bull trout has been detected at Wells Dam. This fish was detected moving upstream through the fishways at Wells Dam during June 2009, one year after being tagged in the Entiat River by the USFWS. In 2009, genetic samples were taken from 15 fish during the implementation of off-site smolt collection activities and provided to the USFWS for future genetic analysis. In addition to coordinating monitoring effort and information exchanges of Project specific bull trout data, Douglas PUD continues to participate in regional activities that support bull trout conservation and recovery.

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APPENDIX N
TWISP RIVER WEIR STEELHEAD OPERATIONS PROTOCOL

Twisp River Weir Steelhead Operations Protocol

ESCAPEMENT GOAL

The weir will be used to control the number and origin of the steelhead spawning upstream of the weir. The draft Hatchery and Genetic Management Plan (HGMP) for Twisp steelhead integrated recovery program identifies minimum of 161 spawners and 316 spawners to achieve full seeding based on the ICTRT intrinsic potential analysis. Approximately 78% (3-year mean) of Twisp River steelhead redds are found upstream of the weir. Based on the intrinsic habitat potential analysis and assuming the weir is 100% efficient, the spawning population above the weir should be between 125 (161 x 0.78) and 247 (316 x 0.78) spawning adults. However, because there is uncertainty in both the intrinsic potential analysis and the reproductive of success of hatchery fish the following protocols for releasing steelhead upstream of the weir will be followed until empirical data is available:

- All wild fish will be passed upstream.

- Local hatchery origin fish will be randomly passed upstream as necessary to achieve a 1:1 hatchery:wild ratio. If in-season assessments determine that the minimum spawning escapement target may not be attainable, additional hatchery fish may be passed upstream.

EXCESS HATCERY FISH PROCEDURES

- Out-of-basin stray hatchery fish will be killed. If the origin of the fish is known, biological data will be collected for hatchery evaluation purposes (sex, length, age).

- Adipose fin present hatchery fish will be killed as they are not available for harvest.

- If the recreational sport fishery in the Methow River is open, excess adipose fin-clipped fish will be transported and released in the lower river as best as can be accomplished so that they may "recycle" through the fishery area.

- Excess adipose fin-clipped fish that are recaptured at the weir after having been recycled, or after the Methow River fishery has closed, will be killed.

- All fish killed will be frozen and dispersed within the Twisp Basin for nutrient enhancement purposes.

APPENDIX O
CONFLICT-OF-INTEREST POLICY

Conflict of Interest Policy
HCP Hatchery Committees
20 October 2010

Introduction

Members of the Wells, Rocky Reach, and Rock Island Habitat Conservation Plans Hatchery Committees (HC members) represent a variety of federal, state, and tribal governments, and Douglas and Chelan County Public Utility Districts (PUDs). In the normal course of business, HC members are periodically called upon to prepare Requests for Proposals (RFPs), and review and recommend funding for research, monitoring, or evaluation proposals and study plans; some of which may have been prepared by HC members, their professional colleagues, persons with whom they may share a personal relationship, or where there may be a financial interest. Because the HC members recognize that such relationships may influence or appear to influence a member's judgment or views regarding the merits of a proposal or study plan, or the capability of an organization or individual to undertake a study, the HC has established the following policy for managing conflicts of interest.

Conflict of Interest Policy

General Approach

HC members have a personal responsibility to alert the HC of any possible conflict of interest that may influence or appear to influence their position on a proposed study or program. The HC Chair will request disclosure of possible conflict of interest by the committee members prior to discussion or decisions on proposed studies or programs. On a case-by-case basis, the HC shall determine whether a particular situation presents a potential conflict of interest that needs to be addressed, and the HC may require HC members to recuse themselves from the discussion of a proposal or study plan, from formal review of a proposal or study plan, or from a decision to approve or reject a proposal or study plan. The HC may decide to allow a member with a potential conflict of interest to participate by a simple majority vote. HC members may employ an alternate HC member in cases where such action removes the conflict, avoiding disenfranchisement of his/her member organization. Among the HC members, the PUD representatives are in the unique position of responsibility for, and funding of, all HCP studies and programs, and thus have an interest in all outcomes of the HC. For purposes of this policy, this position will not be considered a conflict of interest, and therefore, the PUD representatives shall participate in all funding decisions within the HC.

Definitions

For the purposes of this policy, conflicts of interest may include the following situations:

Employment: The situation where Principal Investigator (PI) or key personnel are employees of a HC member's employing organization

Personal relationships: The situation where PI or key personnel are the spouse or domestic partner, parent, sibling, child, father-in-law, mother-in-law, brother-in-law, sister-in-law, son-in-law, or daughter-in-law of a HC member

Professional relationships: The situation where PI or key personnel have a history of regular professional collaboration with a HC member

Financial benefit: The situation where a HC member has a financial interest in the approval and award of a proposal

Preparation of RFPs

HC members or third parties involved in developing a RFP shall not submit a proposal for that RFP as a PI or key personnel. HC members will automatically recuse themselves from the RFP development process if they plan to submit a proposal.

Review of Proposals

HC members shall not participate in the HC review of proposals prepared by a PI or key personnel where there is a conflict of interest due to employment, personal relationships, professional relationships, or financial benefit (as defined in the Definitions section). HC members will automatically recuse themselves from voting on these studies. However, at the discretion of the HC, a HC member with a conflict of interest may on a case-by-case basis participate in discussion of a proposal or study plan.

APPENDIX P
DOUGLAS 2011 M&E IMPLEMENTATION PLAN

IMPLEMENTATION OF COMPREHENSIVE MONITORING AND EVALUATION OF HATCHERY PROGRAMS FUNDED BY DOUGLAS COUNTY PUD

Submitted to

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Submitted by

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October 2010

Introduction

The Douglas County PUD Monitoring and Evaluation Plan (M&E Plan; Wells HCP Hatchery Committee 2007) describes eight objectives specific to the hatchery programs funded by Douglas County PUD and two regional objectives that are related to artificial propagation. These same objectives have been identified in the M&E Plan for Chelan County PUD (Murdoch and Peven 2005) and are designed to address key questions regarding the use of supplementation as mitigation for mortality associated with the operation of Wells Hydroelectric Project. All objectives have specified indicators (i.e., primary) that will be measured and compared against target values established in the M&E Plan. Specific tasks and methodologies to be used in accomplishing the objectives are provided in the M&E Plan.

The primary focus of this proposal is the first eight objectives outlined in the M&E Plan, but additional regional objectives are included where warranted. Both disease (Objective 9) and non-target taxa (Objective 10) monitoring have been identified as important components of the M&E Plan. These regional objectives will be implemented once experimental designs have been developed and approved by the Wells HCP Hatchery Committee.

Successful implementation of the M&E Plan requires a continuation and potential expansion of existing relationships between the WDFW and other entities conducting similar field work in the Upper Columbia River Basin. Certain objectives require data to be collected from both target and reference populations. Field activities (i.e., data collection) not conducted by the WDFW, that are also required to implement the M&E Plan (i.e., reference populations) are not included in this proposal.

Addressing all the objectives within the M&E Plan will require multiple years of data collection. Several objectives may be adequately addressed after one year or five years (Table 1), and may require only periodic monitoring (e.g., every five or ten years). This proposal and budget encompasses one year of work in which WDFW will furnish all supervision, labor, services, materials, tools, and equipment necessary to implement the Monitoring and Evaluation Plan of hatchery programs funded by Douglas County PUD. All statistical analyses will be conducted consistent with the Analytical Framework for Monitoring and Evaluating PUD Hatchery Programs (Hays et al. 2007).

Table 1. A potential long-term implementation schedule of objectives outlined in the Douglas County PUD M&E Plan.

Objective	Year of implementation									
	1-4	5	6-9	10	11-14	15	16-19	20	21-24	25
1	X	X	X	X	X	X	X	X	X	X
2	X	X		X		X		X		X
3	X				X				X	
4	X	X	X	X	X	X	X	X	X	X
5	X	X	X	X	X	X	X	X	X	X
6	X	X	X	X	X	X	X	X	X	X
7	X	X	X	X	X	X	X	X	X	X
8	X	X		X		X		X		X
9	Experimental design not complete									
10	Experimental design not complete									

Reference Streams

Reference streams or populations are a critical component of the M&E Plan (Goodman 2004; ISRP & ISAB 2005). Data collected from reference populations will be included in the analysis for objectives 1 and 7. Depending on the reference population, data collected may also be included in the analysis for objectives 3, 4, 5, and 8. Suitability of a population as a reference or control for target populations for ongoing hatchery programs funded by Douglas County Public Utility District (DCPUD) has not yet been determined. The Hatchery Evaluation Technical Team (HETT) is currently evaluating potential spatial reference streams for all supplemented populations in the Methow and Okanogan Rivers. The HETT will recommend to the Wells HCP HC, reference populations that should be incorporated into the M&E Plan. Historical data may or may not exist for some proposed reference populations. If data has been collected, an assessment of the methodology used must also be conducted to determine if the historical data is suitable for inclusion in the analysis. As part of the M&E Plan, future data collection activities in the reference populations should use similar methodologies and metrics as those used in treatment populations.

WORK PLAN BY OBJECTIVE

Objective 1: Determine if a) supplementation programs have increased the number of naturally spawning and naturally produced adults of the target population relative to a non-supplemented population (i.e., reference stream) and b) the changes in the natural replacement rate (NRR) of the supplemented population are similar to that of the non-supplemented population.

Hypotheses:

- Ho_1: Number of hatchery fish that spawn naturally > number of naturally and hatchery produced fish taken for broodstock.
- Ha_1: Number of hatchery fish that spawn naturally ≤ number of naturally and hatchery produced fish taken for broodstock.
- Ho_2: $\Delta NOR/Max\ recruitment_{\text{Supplemented population}} \geq \Delta NOR/Max\ recruitment_{\text{Non-supplemented population}}$
- Ha_2: $\Delta NOR/Max\ recruitment_{\text{Supplemented population}} < \Delta NOR/Max\ recruitment_{\text{Non-supplemented population}}$
- Ho_3: $\Delta\ NRR_{\text{Supplemented population}} \geq \Delta\ NRR_{\text{Non-supplemented population}}$
- Ha_3: $\Delta\ NRR_{\text{Supplemented population}} < \Delta\ NRR_{\text{Non-supplemented population}}$

General Approach

Spawning ground, broodstock, and harvest data (e.g., selective fisheries) will be the source of all abundance, composition, and productivity information required for this objective. Identification of suitable non-supplemented populations will be problematic in the Upper Columbia Basin because some species/races do not have populations that have not been either supplemented or influenced by hatchery fish (e.g., summer Chinook). For those supplemented populations without a suitable spatial reference population, temporal references may be used (i.e., prior to hatchery intervention). Temporal reference populations may also be initiated if deemed necessary, by discontinuing hatchery releases in a target population for a predetermined period of time (i.e., at least one generation minimum).

Methodology

Standard spawning ground survey methodology outlined in Appendix F of the M&E Plan (Spawning ground surveys) and data analysis outlined Appendix G of the M&E Plan (Relative Abundance) will be used under this objective. WDFW will coordinate with other Agencies (i.e., USFWS, USFS, Tribes) that conduct spawning ground surveys to ensure methodologies and sample rates are consistent with methodologies used in this objective (Table 2). Spawning/carcass surveys will be conducted for Methow Basin spring Chinook (WDFW); Methow Basin steelhead (WDFW); and Okanogan steelhead (CCT). The use of a composite spring Chinook broodstock in the Methow and Chewuch Rivers suggests that the Methow and Chewuch spawning aggregates be treated as a single group. The combined group (i.e., MetChew) is supported by genetic data, which concluded that both spawning aggregates are very closely related (Snow et al. 2007). However, differences in spawner abundance and carrying capacity of the two subbasins may require that each subbasin be treated independently for data analysis purposes.

Table 2. Methodologies used to determine biological information used in Objective 1.

Population	Spawning ground methodology	Spawner composition	Age composition
Methow steelhead	Expanded index	Wells Dam	Wells Dam
Twisp steelhead	Total ground	Twisp weir	Twisp weir
Okanogan steelhead [a]	Total ground	Wells Dam	Wells Dam
Methow sp. Chinook	Total ground	Carcasses	Wells Dam
Chewuch sp. Chinook	Total ground	Carcasses	Wells Dam
Twisp sp. Chinook	Total ground	Carcasses	Wells Dam

[a] Conducted by CCT.

Schedule of Activities

Table 3. Schedule for conducting spawning ground surveys and data analysis (D = data collection; A = data analysis).

Target population	J	F	M	A	M	J	J	A	S	O	N	D
Methow/Okanogan steelhead	A	A	D	D	D	D	A	A	A	A	A	A
Methow Basin spring Chinook	A	A	A	A	D	D	D	D	D	A	A	A

Objective 2: Determine if the run timing, spawn timing, and spawning distribution of both the natural and hatchery components of the target population are similar.

Hypotheses:

- Ho_4: Migration timing $_{\text{Hatchery Age X}}$ = Migration timing $_{\text{Naturally produced Age X}}$
- Ha_4: Migration timing $_{\text{Hatchery Age X}}$ ≠ Migration timing $_{\text{Naturally produced Age X}}$
- Ho_5: Spawn timing $_{\text{Hatchery}}$ = Spawn timing $_{\text{Naturally produced}}$
- Ha_5: Spawn timing $_{\text{Hatchery}}$ ≠ Spawn timing $_{\text{Naturally produced}}$
- Ho_6: Redd distribution $_{\text{Hatchery}}$ = Redd distribution $_{\text{Naturally produced}}$
- Ha_6: Redd distribution $_{\text{Hatchery}}$ ≠ Redd distribution $_{\text{Naturally produced}}$

General Approach

A properly integrated hatchery program produces fish that have similar life history traits as naturally produced fish. Differences in any of these behavioral life history traits may affect progeny survival. Migration timing in the Columbia River of both juvenile and adult fish will be assessed using PIT tags when available. Migration timing into spawning tributaries will be assessed at broodstock collection locations, or using in-stream PIT antenna arrays. In 2009, in-stream antenna arrays were installed in the lower Methow and Twisp rivers to assess the distribution and migration timing of adult hatchery and wild steelhead. These antennas, in conjunction with arrays installed by other researchers (i.e., USGS) will be used to assess steelhead and spring Chinook run timing and distribution throughout the Methow Basin.

Spawn timing and redd distribution data for spring Chinook will be collected during spawning ground surveys. We propose selecting index reaches to evaluate spawn timing in reaches where similar proportions of hatchery and naturally produced fish are expected to spawn (based on carcass recovery data). The use of index reaches will eliminate any potential bias in spawn timing due to differences in spawning locations. For fish that are not adipose fin clipped, the female carcass recovery date will allow for a comparison of the relative spawn timing. Carcass recovery locations will be used as a surrogate for spawning location.

For summer steelhead, WDFW will conduct an evaluation in the Twisp River using visual observation of spawning fish to evaluate spawn timing and location. All steelhead sampled at the Twisp River weir in 2011 will be externally Floy-tagged based on stock and origin, and surveyors will conduct intensive surveys to quantify redd distribution and collect observational data from Floy-tagged fish. Additionally, adult female steelhead will be PIT-tagged in the body cavity to maximize the likelihood that PIT tags will be expelled into redds. Redds will be scanned with portable PIT tag antennas to confirm the origin of females observed spawning, and to provide spawn timing information for redds where no visual observations of spawners were made. Further, temporary in-stream PIT antennas will be installed in selected Methow Basin tributaries to assess whether surveys are conducted in all spawning areas, and to estimate spawner abundance in areas where conducting systematic surveys is problematic (e.g., Lost River). Funding for increased spawning ground surveys, PIT tag monitoring, and Floy Tag detections above baseline Douglas PUD M&E activities will be funded by the Bonneville Power Association (BPA) through contracts 49080 and 47950.

Methodology

Migration Timing

As previously stated, when available, PIT tags will be used to evaluate differences in migration timing in the Columbia River. During broodstock collection activities at mainstem dams, tributary traps, and the Twisp River weir, PIT tags will be inserted in all fish captured and released in excess of broodstock requirements so that data on migration timing to spawning tributaries can be collected (Table 4). Migration timing into spawning tributaries will be assessed using PIT antenna arrays deployed at long-term sites in the lower Methow and Twisp rivers, utilizing antennas installed by other researchers within the Methow and Okanogan Basins (e.g., USGS), and using PIT antennas installed on a temporary basis in selected tributaries.

Table 4. Methods and locations used for evaluating differences in migration timing between hatchery and naturally produced salmon and steelhead.

Target population	Migration timing	
	Columbia River*	Spawning tributary
Methow spring Chinook	Wells Dam, PIT tags, CWTs	Twisp Weir, Chewuch PIT array
Methow steelhead	Wells Dam, PIT tags, VIE	Twisp Weir, PIT arrays in select tribs
Okanogan steelhead	Wells Dam, PIT tags, Ad clip	Omak Cr. Weir/Zosel Dam

* PIT tags will be used when available (i.e., in conjunction with other objectives).

Spawn Timing

All spawn timing information necessary for evaluating differences between hatchery and naturally produced salmon and steelhead will be collected during spawning ground surveys (M&E Plan Appendix F). Specific spawn timing information will only be collected within index spawning areas. Index areas identified are likely to have a similar proportion of hatchery and naturally produced fish spawning based on carcass recoveries between 2003 and 2006 (Table 5). Carcass recovery date of female spring Chinook salmon will be used to examine relative differences in spawn timing.

Determining the relative spawn timing of steelhead in the natural environment is problematic because not all hatchery fish are adipose fin clipped. In 2011, an evaluation of steelhead spawn timing in the Methow Basin will be conducted utilizing female steelhead Floy-tagged at the Twisp River weir. Floy tag colors will be alternated every other year between hatchery and wild fish to control for any potential color effects on reproductive success. In 2011, male and female hatchery fish will be tagged with red and pink tags, and males and female wild fish with blue and chartreuse tags, respectively. Approximately 85% of the steelhead in the Twisp River spawn upstream of the Twisp River weir (mean 2003-2005). Steelhead will be captured and tagged at the Twisp River weir between 1 March and 15 June. All fish captured will be examined to determine origin (VIE, PIT, CWT, or eroded fins), age, and tagged with colored anchor tags depending on stock and origin. Surveyors will record the tag color and date of all female steelhead observed during surveys and record GPS locations of all redds. Surveyors will also record the incidence of non Floy-tagged fish upstream of the Twisp River weir to determine weir capture efficiency. Because redd residence time of steelhead can be very low, female steelhead will be PIT-tagged in the body cavity to encourage tag expulsion into the redd. Surveyors will periodically scan completed redds for PIT tags to confirm female origin, or to identify female origin for redds where no visual observations of spawners occurred. Sampling at the Twisp River weir will be accomplished in conjunction with an on-going relative reproductive success study of steelhead in the Twisp River which receives funding through this implementation plan, and BPA contract No. 49080.

Table 5. Potential tributary index areas identified for each respective target population used for evaluating differences in spawn timing between hatchery and naturally produced salmon and steelhead.

Target population	Historical reach(s)
Twisp spring Chinook	Twisp River (T5 - T6)
Chewuch spring Chinook	Chewuch River (C4 - C6)
Methow spring Chinook	Methow River (M9 - M11)
Twisp steelhead	Twisp River (T4 - T10)

Spawning Distribution

Redd distribution data will also be collected during spawning ground surveys (M&E Plan Appendix F). The origin of spawners will be identified from carcasses (i.e., scales or CWT), and carcass recovery location (i.e., rkm) of female spring Chinook will be used to determine redd distribution. Overall steelhead redd distribution will be determined from GPS location information for each redd observed. Distribution by origin of spawning adult steelhead cannot be determined without application of an additional mark (e.g., floy tag) because not all hatchery steelhead were adipose fin-clipped. Steelhead spawning distribution by origin of spawning adults will be assessed at the Twisp River weir in 2011. Surveys will be conducted at least weekly in the Twisp River to assess distribution of Floy-tagged females and to scan for PIT tags as previously described. Resident rainbow, residual hatchery steelhead, and cutthroat trout females will also be PIT-tagged in the body cavity to determine if these species or resident stages contribute to steelhead redd count estimates. Additionally, temporary in-stream PIT tag antenna arrays will be placed in selected tributaries to assist with spawning distribution evaluation. These arrays are expected to provide a reliable, cost-effective means of corroborating current survey methodologies with observed steelhead use, and assessing steelhead spawning distribution (if any) in locations where spawning is presumed to not occur, or where surveys are difficult to conduct.

Schedule of Activities

Table 6. Schedule for conducting migration timing, spawn timing, and spawning distribution field activities and data analysis (D = data collection; A = data analysis).

Target population	J	F	M	A	M	J	J	A	S	O	N	D
Methow steelhead	A	A	D	D	D	D	D	D	D	D	A	A
Methow spring Chinook	A	A	A	A	D	D	D	D	D			

Objective 3: Determine if genetic diversity, population structure, and effective population size have changed in natural spawning populations as a result of the hatchery program. Additionally, determine if hatchery programs have caused changes in the phenotypic characteristics of natural populations.

Hypotheses related to the genetic diversity, population structure, and effective population size (Ho 7-9) were addressed in the 2008-2010 work plans and will not be addressed in 2011. Hypotheses for 2011:

- Ho_{10}: Age at Maturity $_{\text{Hatchery}}$ = Age at Maturity $_{\text{Naturally produced}}$
- Ha_{10}: Age at Maturity $_{\text{Hatchery}}$ ≠ Age at Maturity $_{\text{Naturally produced}}$
- Ho_{11}: Size (length) at Maturity $_{\text{Hatchery Age X and Gender Y}}$ = Size (length) at Maturity $_{\text{Naturally produced Age X and Gender Y}}$
- Ha_{11}: Size (length) at Maturity by age and gender $_{\text{Hatchery}}$ ≠ Size (length) at Maturity by age and gender $_{\text{Naturally produced}}$

General Approach

Genotypes of hatchery and naturally produced populations will be sampled and monitored based upon the schedule outlined in Appendix H of the Douglas PUD M&E Plan. Priority of analysis was based upon recovery needs or relative risk a hatchery program may have on the naturally produced population. Differences in phenotypic characteristics that may arise as a result of hatchery programs (i.e., domestication) will be measured using historical (i.e., prior to current hatchery programs) and recent data collected from wild fish and broodstock or carcasses recovered on the spawning grounds. Data related to additional important phenotypic characteristics will be collected and analyzed as part of Objective 2 (e.g., run timing, spawn timing, and spawning location), Objective 4 (e.g., fecundity), and Objective 7 (e.g., size and age at smolt migration).

Methodology

Data for monitoring phenotypic characteristics (i.e., age at maturity and size at maturity) will be collected annually as part of the broodstock collection protocol (M&E Plan Appendix B). Broodstock for all programs are not collected randomly from the run at large with respect to sex, origin, or age. Trapping activities do provide an opportunity to collect data from a random sample from the run at large (i.e., those fish collected during broodstock trapping and released upstream). Historically, information related to the spawning population was derived from broodstock, carcasses, or a combination of both. Recent data suggest that these methods are biased and additional sampling at broodstock collection sites is required (Zhou 2002; Murdoch et al. 2005). Broodstock collection sites are located near or below a majority of the spawning locations (Table 7). All fish trapped, or a random sample depending on the stock, will be sampled to determine origin, age, and size. Additionally, PIT tags may be inserted into adult fish released upstream of Wells Dam to address other M&E Plan objectives (i.e., migration timing, Objective 2; stray rates, Objective 5).

Table 7. Broodstock collection locations for stock assessment and phenotypic characterization of hatchery and naturally produced fish.

Stock	Primary location	Secondary location
Methow Basin spring Chinook	Wells Dam	Twisp weir
Methow/Okanogan steelhead	Wells Dam	Twisp weir / Priest Rapids Dam

Schedule of Activities

Table 8. Schedule for conducting size and age at maturity comparisons (D = data collection; A = data analysis).

Target population	J	F	M	A	M	J	J	A	S	O	N	D
Methow/Okanogan steelhead	D	D	D	D	A	A	D	D	D	D	D	D
Methow spring Chinook	A	A	A	A	D	D	D	D	D			

Objective 4: Determine if the hatchery adult-to-adult survival (i.e., hatchery replacement rate) is greater than the natural adult-to-adult survival (i.e., natural replacement rate) and equal to or greater than the program specific expected value (BAMP 1998).

Hypotheses:

- Ho_{12}: $HRR_{\text{Year } x} \geq NRR_{\text{Year } x}$
- Ha_{12}: $HRR_{\text{Year } x} < NRR_{\text{Year } x}$
- Ho_{13}: HRR ≥ BAMP value (preferred)
- Ha_{13}: HRR < BAMP value

General Approach

The survival advantage from the hatchery (i.e., egg-to-smolt) must be sufficient to overcome lower post-release survival (i.e., smolt-to-adult) in order to produce a greater number of returning adults than if broodstock were left to spawn naturally. If a hatchery program cannot produce a biologically significant greater number of adults than naturally spawning fish, the program should be modified or discontinued. More simply, the hatchery replacement rate should always be greater than the natural replacement rate.

Hatchery programs in the Upper Columbia River were initially designed based on observed mean survival rates for each stock (BAMP 1998). Performance of the hatchery programs will be assessed using those expected survival rates and the number of broodstock collected on a brood year basis. Harvest augmentation hatchery programs will only be compared to the expected HRR value because a corresponding NRR is not available or applicable (e.g., Wells summer Chinook).

Methodology

Smolt to adult (SAR) and HRR values will be calculated for each stock. SAR values are currently calculated using CWT recoveries from all locations (harvest, hatcheries, and spawning grounds), except for steelhead, which is calculated based on sampling that occurs at Priest Rapids Dam or Wells Dam. HRR values that fall below the expected values or NRR (M&E Plan Appendix G) will be evaluated to determine whether in-hatchery (M&E Plan Appendix C) or out of hatchery (M&E Plan Appendix D) factors contributed to the reduced survival.

Schedule of Activities

Table 9. Schedule of activities for hatchery evaluation activities (D = data collection; A = data analysis).

Target population	J	F	M	A	M	J	J	A	S	O	N	D
Methow/Okanogan steelhead	A/D	A/D	D	D	D	D	D	D	D	D	D	D
Wells summer Chinook	A/D	A/D	D	D	D	D	D	D	D	D	D	D
Methow Basin spring Chinook	A/D	A/D	D	D	D	D	D	D	D	D	D	D

Objective 5: Determine if the stray rate of hatchery fish is below the acceptable levels to maintain genetic variation.

Hypotheses:

- Ho_{14}: Stray rate $_{\text{Hatchery fish}}$ < 5% of total brood return
- Ha_{14}: Stray rate $_{\text{Hatchery fish}}$ ≥ 5% of total brood return
- Ho_{15}: Stray hatchery fish < 5% of spawning escapement (based on run year) within other independent populations
- Ha_{15}: Stray hatchery fish ≥ 5% of spawning escapement (based on run year) within other independent populations
- Ho_{16}: Stray hatchery fish < 10% of spawning escapement (based on run year) of any non-target streams within independent populations
- Ha_{16}: Stray hatchery fish ≥ 10% of spawning escapement (based on run year) of any non-target streams within independent populations

General Approach

Excessive strays from hatchery programs pose significant genetic risk (loss of genetic variation between populations) and must be monitored in order to determine the magnitude of the problem and develop reasonable and appropriate recommendations. Stray rates will be monitored using CWT recoveries from Chinook spawning ground surveys. The Regional Mark Information System (RMIS) database will provide all necessary CWT information needed when calculating stray rates for each brood year or within and outside basin stray rates based on spawning escapement estimates.

Brood year stray rates will require multiple year CWT recoveries (i.e., all age classes) from broodstock and carcass recoveries on the spawning grounds. The estimated number of strays for the entire brood year will be calculated by dividing the number of strays by the total number of hatchery fish that returned. Stray rates within, and between independent populations will be calculated in a similar manner as brood year stray rates, except on an annual basis and based on the estimated spawning escapement.

Collecting stray rate information for steelhead poses the greatest challenge because carcasses are not available for examination. When available, radio tag information and/or adult PIT tag monitoring may provide adequate information for evaluating stray rates. Some data needed for evaluating stray rates for the Methow/Okanogan steelhead will be collected during broodstock trapping activities at Wells Dam (M&E Plan Appendix B), and through operation of the Twisp River weir when assessing spawn timing (see Objective 2). Stray rates in other tributaries may need to be calculated by other types of sampling (i.e., PIT tags, radio tags, hook and line, electroshocking) if warranted. Antenna arrays installed by WDFW and other researchers should provide tributary stray rate information, provided that adequate numbers of juvenile fish are PIT tagged prior to release (hatchery fish) or within natal streams (wild fish). Tagging of hatchery steelhead under Objective 7 (see Table 14) should satisfy within-basin and out-of-basin stray rate monitoring goals of fish destined for release in the Methow Basin.

Methodology

Stray rates will be calculated using procedures outlined in the spawning ground survey methodology (M&E Plan Appendix F). As stated previously, information needed to evaluate steelhead stray rates will occur during broodstock collection activities at Wells Dam, operation of the Twisp weir and antenna array, and through other proposals. However, direct observations on the spawning grounds by other Agencies (e.g., USFWS, CCT, or USGS) or via PIT tags may be required in non-target streams (Table 10).

Table 10. Proposed methodologies used to evaluate stray rates for target and non-target streams.

Hatchery program	Target stream	Method
Methow steelhead	Methow, Twisp, Chewuch	PIT/Observation/creel*
Okanogan steelhead	Okanogan, Similkameen	PIT/Observation/creel*
Methow Basin spring Chinook	Methow, Twisp, Chewuch	CWT
Wells summer Chinook	Wells Hatchery	CWT

* The number of strays will also be estimated during broodstock collection activities or PIT tag detections at Columbia River or tributary dams/detectors where applicable.

Schedule of Activities

Table 11. Schedule for data analysis to determine stray rates of hatchery fish (D = data collection; A = data analysis).

Target population	J	F	M	A	M	J	J	A	S	O	N	D
Methow steelhead	A	A	D	D	D	D						
Okanogan steelhead	A	A	D	D	D	D						
Methow Basin spring Chinook	A	A						D	D			
Wells summer Chinook	A	A								D	D	

Objective 6. Determine if hatchery fish were released at the programmed size and number.

Hypotheses:

- Ho_{17}: Hatchery fish $_{\text{Size at release}}$ = Programmed $_{\text{Size at release}}$
- Ha_{17}: Hatchery fish $_{\text{Size at release}}$ ≠ Programmed $_{\text{Size at release}}$
- Ho_{18}: Hatchery fish $_{\text{Number released}}$ = Programmed $_{\text{Number released}}$
- Ha_{18}: Hatchery fish $_{\text{Number released}}$ ≠ Programmed $_{\text{Number released}}$

General Approach

The HCP outlines the number and size at which fish of each program are to be released. The programmed size and number of fish for each program will be compared to actual values at release each year. The number of broodstock collected and the assumptions (i.e., sex ratio, fecundity, and survival) in the broodstock collection protocol are important components that need to be considered. A program's failure to meet the HCP standards (e.g., over or under program goals) will be evaluated taking into account the number of broodstock and assumptions. The size of fish will be compared using a representative sample collected immediately prior to release.

Methodology

The number and size of fish released will be calculated according to methodologies outlined in the M&E Plan (Appendix C). An annual review of size and number of fish from each program will be compared to those values defined in the HCP. If release targets were achieved within acceptable levels (i.e., 10% +/- of HCP defined values) then no change would be recommended. If release targets are not achieved then causation will be determined and recommendations will be made based upon the results of the evaluation. A review of the broodstock protocols will occur every five years (or more frequently if necessary) concurrently with an evaluation of the number of fish released from each program.

Schedule of Activities

Table 12. Schedule of activities to determine the number and size of fish released (D = data collection; A = data analysis).

Target population	J	F	M	A	M	J	J	A	S	O	N	D
Wells steelhead	D	D	D	D	D	A	D	D	D	D	D	D
Wells summer Chinook	D	D	D	D	D	D	D	A	D	D	D	D
Methow spring Chinook	D	D	D	D	D	A	D	D	D	D	D	D

Objective 7: Determine if the proportion of hatchery fish on the spawning grounds affects the freshwater productivity (i.e., number of smolts per redd) of supplemented streams when compared to non-supplemented streams.

Hypotheses:

- Ho_{19}: Slope of Ln(juveniles/redd) vs redds $_{\text{Supplemented population}}$ = Slope of Ln(juveniles/redd) vs redds $_{\text{Non-supplemented population}}$
- Ha_{19}: Slope of Ln(juveniles/redd) vs redds $_{\text{Supplemented population}}$ ≠ Slope of Ln(juveniles/redd) vs redds $_{\text{Non-supplemented population}}$
- Ho_{20}: The relationship between proportion of hatchery spawners and juveniles/redd is ≥ 1.
- Ha_{20}: The relationship between proportion of hatchery spawners and juveniles/redd is < 1.

General Approach

Supplementation should result in an increase in the natural production of the target stock. Given variability in abundance of adult salmonid populations in the Upper Columbia River Basin, monitoring juvenile production (e.g., smolts/redd) should provide a direct assessment of the efficacy of hatchery fish in rebuilding natural populations. Monitoring the freshwater production of both supplemented and non-supplemented populations may provide an early indication of the reproductive success of hatchery fish on the spawning grounds (i.e., no out of basin effects on survival). Conversely, without a smolt monitoring program, changes in smolt production may be masked by out of basin effects. Thus, subsequent recommendations concerning hatchery program modifications may be misdirected.

Smolt monitoring programs are currently ongoing for most treatment streams (Table 13). Coordination with the Agencies operating the various traps is ongoing to ensure similar levels of effort and methodologies are used.

Table 13. Population and location of smolt traps that may be used in examining the influence of hatchery fish on freshwater productivity.

Population	Smolt trap	Size	Agency
Methow Basin spring Chinook	Methow	1 - 8 ft trap; 1 - 5 ft trap	WDFW
Twisp spring Chinook	Twisp	1 - 5 ft trap	WDFW
Methow Basin steelhead	Methow	1 - 8 ft trap; 1 - 5 ft trap	WDFW
Twisp steelhead	Twisp	1 - 5 ft trap	WDFW
Okanogan steelhead	Okanogan	1 - 8 ft trap; 1 – 5 ft trap	CCT

Comparisons between supplemented and unsupplemented populations require extensive data sets, with potentially high annual variability that may require years before the efficacy of the program can be determined. Furthermore, the Wells steelhead program began decades before the HCP was signed and pretreatment data may not be available.

Methodology

Procedures for this objective are outlined in Appendix E of the M&E Plan. Juvenile monitoring requires an extensive trapping period (Table 15) over many successive generations due to the diverse life history of spring Chinook (subyearling and yearling emigrants) and summer steelhead (multiple age class smolts). Random scale samples must be collected for all stocks with multiple age class smolts in order to calculate the number of smolts produced from each brood year. Whenever possible, direct measurements of the proportion of hatchery fish on the spawning grounds will be conducted (i.e., Twisp weir).

Current estimates of egg to smolt survival for Methow spring Chinook are much lower than expected. Based on scale analysis of returning Chinook adults, we assumed that at the Methow smolt trap all yearling emigrants were spring Chinook and subyearling emigrants were summer Chinook. Results of DNA sampling at the Methow River trap during the fall of 2006 and 2007 indicated that the majority of subyearling Chinook captured were spring Chinook. Because of this, fall trapping and DNA sampling will be conducted at the Methow smolt trap. Provided no unmarked subyearling hatchery fish are released prior to trapping, we propose to conduct DNA sampling during the spring period to determine the extent of subyearling spring Chinook spring emigration at the Methow smolt trap. Sampling and analysis needs will be assessed annually to determine whether adequate information has been collected to identify typical composition trends of spring and fall Chinook migrants.

The low abundance of steelhead and yearling Chinook captured at smolt traps in the Methow Basin limits the sample size to conduct migration timing comparisons and life stage survival estimates (e.g., PIT tag recaptures). The installation of PIT tag antenna arrays in the lower Twisp and Methow rivers will provide additional opportunities to assess migration behavior and survival, provided an adequate number of fish are PIT tagged. We propose to conduct additional PIT tagging of juvenile steelhead and Chinook that are encountered during ongoing sampling activities. These fish would be captured via hook-and-line angling, seine netting, backpack electroshocker, or rescued from de-watering areas via traps, nets, or electroshocking equipment. Additional effort for steelhead tagging conducted in the Twisp River will address sample size requirements for an on-going relative reproductive success study funded under BPA contract # 49080. Tagging methodologies will be consistent with ongoing activities in the Wenatchee and Entiat basins following protocols developed under the ISEMP (Table 14).

For life-stage survival comparisons and to monitor stray rates, migration patterns, rate, and speed within the basin, we propose that comparison groups of hatchery steelhead be tagged at Wells Hatchery prior to release (Table 14). Comparison groups of hatchery spring Chinook and steelhead were historically tagged at each smolt trap, but tag rates were likely too low to provide meaningful comparisons. Further, PIT tagging at the Methow trap likely incorporated fish from hatchery programs not covered under the M&E Plan (i.e., WNFH) because release time and hatchery mark are often the same for steelhead and spring Chinook released from WDFW and USFWS hatcheries in the Methow Basin. Since releases of similar fish from these hatcheries have exhibited different survival rates (Townsend and Skalski 2004), tagging should occur at the hatchery of origin to ensure that evaluations are conducted with target stocks.

Table 14. PIT tagging goals for remote sampling (wild fish) and in-hatchery tagging (hatchery fish) in the Methow Basin.

Target population	Wild fish		Hatchery fish	
	Steelhead	Age-0 Chinook	Target population	Steelhead
Methow	500	500	Methow (ad-clipped)	10,000
Twisp	2,000[a]	500	Methow (non-clipped)	10,000
Chewuch	500	500		
Misc. tribs	500			
Total	3,500	1,500		20,000

[a] *Includes 1,500 fish tagged and funded though BPA contract No. 49080.*

Schedule of Activities

Table 15. Schedule of activities for smolt monitoring programs in the Methow Basin (D = data collection; A = data analysis).

Target population	J	F	M	A	M	J	J	A	S	O	N	D
Methow Basin steelhead	A	D/A	D/A	D	D	D	D	D	D	D	D	D/A
Twisp steelhead	A	D/A	D/A	D	D	D	D	D	D	D	D	D/A
Methow Basin spring Chinook	A	D/A	D/A	D	D	D	D	D	D	D	D	D/A
Twisp spring Chinook	A	D/A	D/A	D	D	D	D	D	D	D	D	D/A
Methow summer Chinook	A	D/A	D/A	D	D	D	D	D	D	D	D	D/A

Objective 8: Determine if harvest opportunities have been provided using hatchery returning adults where appropriate (e.g., Wells Chinook salmon).

Hypotheses:

- Ho_{21}: Harvest rate ≤ Maximum level to meet program goals
- Ha_{21}: Harvest rate > Maximum level to meet program goals
- Ho_{22}: Escapement ≥ Maximum level to meet supplementation goals
- Ha_{22}: Escapement < Maximum level to meet supplementation goals

General Approach

In years when the expected returns of hatchery adults are above the levels required to meet program goals (i.e., broodstock, natural escapement), surplus fish may be available for harvest. Harvest of returning adults is the goal of some programs (e.g., Wells summer Chinook) and an ancillary benefit of other programs (e.g., Methow/Okanogan steelhead). Contribution to fisheries, whether incidental or directed, will be monitored using CWT recoveries on a brood year basis. Target harvest rates have not been outlined in the M&E Plan. Hence, a qualitative assessment of the contribution rates of hatchery fish to fisheries versus broodstock or spawning grounds is required to determine if the objective has been met.

One approach, based on the goal of the hatchery program, is to compare CWT recoveries by recovery location (i.e., broodstock, fisheries, or spawning grounds). For example, a majority of the CWT recoveries for harvest augmentation programs should occur in fisheries. Conversely, supplementation programs should have a majority of the CWT recoveries occur on the spawning grounds.

Methodology

Robust statistically valid creel programs will be conducted for all sport fisheries in the Upper Columbia River to estimate harvest of hatchery fish from Douglas County PUD funded hatchery programs (M&E Plan Appendix D). Creel survey programs will be designed and implemented by WDFW Fish Management staff. Creel surveys in the Upper Columbia River are also an important component in calculating the HRR (Objective 4) because most CWT recoveries occur within the Upper Columbia River, the exception being summer Chinook. Significant time lags in reporting CWT recovery data to the Regional Mark Information System (RMIS) database requires a continual requerying of recovery data until the number of estimated fish does not change. The number of fish and proportion by brood year for CWT recoveries will be summarized in several categories (Table 16).

Table 16. Categories for CWT recoveries of hatchery fish released from Douglas County PUD funded programs.

Category	Estimated number of fish (%)

Broodstock	Total	Target stream	Nontarget streams
Spawning ground	Total	Target stream	Nontarget streams
Fisheries	Total	Commercial	Sport
Commercial	Ocean	Columbia River Treaty	Columbia River non-Treaty
Sport	Ocean	Columbia River	Terminal

Schedule of Activities

Table 17. Schedule of activities to determine harvest rates of hatchery fish (D = data collection; A = data analysis).

Target population	J	F	M	A	M	J	J	A	S	O	N	D
Methow/Okanogan steelhead	D	D	D	A	A	A		D	D	D	D	D
Wells summer Chinook	A	A					D	D	D	D		
Methow basin spring Chinook	A	A										

DELIVERABLES

Annual Reports: A draft annual report will be provided to the District by 1 April. A final report will be provided to the HCP HC within 30 days of receiving comments on the draft report. The annual report will summarize all field activities conducted during the contract period. The format of the report will be similar to the 2009 annual report that have been provided to the District, with each task reported in a separate chapter. Primary indicators and the data used in calculations during each task will also be presented in each chapter. Secondary and tertiary indicators will be reported if needed to calculate the primary indicator.

Chapter 1. Hatchery Brood Report

a. Broodstock
    - Number collected
    - Age composition
    - Size at maturity

b. Juvenile
    - Number released
    - Size at release

c. Hatchery replacement rates

Chapter 2. Harvest

a. Hatchery fish
    - Number
    - Location
    - Stray rates

b. Wild fish
    - Number

Location

Chapter 3. Smolt Monitoring

a. Smolt production
   - Number of smolts (captured and total estimate)
   - Smolts/redd
   - Size at emigration
   - Age at emigration

b. Survival
   - Egg to emigrant survival
   - Number of fish PIT tagged
   - Smolt to smolt survival

c. Remote PIT tagging
   - Number tagged

Chapter 4. Steelhead Spawning Ground Surveys

a. Migration timing

b. Spawn timing

c. Redd distribution
   - Number of redds
   - Spawning escapement
   - Spawner composition
   - Number of NOR
   - NRR
   - Stray rates

Chapter 5. Chinook Spawning Ground Surveys

a. Migration timing

b. Spawn timing

c. Redd distribution
   - Number of redds
   - Spawning escapement
   - Spawner composition
   - Number of NOR
   - NRR
   - Stray rates

Five-Year Summary Report: In addition to the annual report, a draft five-year summary report will be developed and provided to the District no later than 1 July 2011, depending on the completion of reference stream analysis. A final report will be provided to the HCP HC within 30 days of receiving comments on the draft report. The format of the five-year summary report will be similar to the M&E Plan and results will be presented by objective, not by task as in the annual reports.
Statistical analysis of data will be based on the statistical design that is currently under development. All raw data used in the statistical analysis will also be presented in the report.

Recommendations: Recommendations to modify the M&E Plan or reporting will occur on an annual basis and again at the five-year summary. Initially, changes to protocols or methodologies may be necessary to ensure the data required in the M&E Plan is collected. Changes to the M&E Plans' implementation or hypotheses will be included in the five-year summary report. Recommendations will be consistent with the hatchery program goals and will be included in a separate section of the summary report.

Presentations: A formal presentation (i.e., power point format) of the M&E Plan results will be provided to Douglas PUD or the HCP HC at their convenience. Presentations will include the status of all hatchery programs in meeting their objectives, potential problems and recommendations. Similar presentations of annual results from field activities can be requested and provided if warranted.

COORDINATION BETWEEN DOUGLAS PUD AND HATCHERY STAFF

The WDFW Supplementation Research Team (a.k.a. Methow Field Office) has been directly involved in the evaluation, development, and implementation of the hatchery programs since 1992. Currently, the WDFW is contracted by Douglas PUD not only to operate its hatcheries, but also to implement the Evaluation Plan developed when the Methow Hatchery program came online.

Coordination with hatchery staff has been a continual process. Hatchery staff conducts routine sampling at the hatcheries and data is provided to us for inclusion in monthly reports. However, special meetings with the hatchery staff are typically conducted prior to significant events (i.e., broodstock collection, spawning, release of juveniles) to ensure proper methodologies are used and critical data is collected. Evaluation staff is present at all significant events and collect data needed for evaluation purposes.

Additional coordination between evaluation staff, hatchery staff, and the WDFW ESA Permitting biologist is often required to ensure that conditions of ESA Section 10 permits are not violated. The ESA permitting biologist is co-located with evaluation staff, which allows for efficient and effective communication on a daily basis in order to ensure compliance with existing permits. Currently, all ESA reporting related to the hatchery programs is the responsibility of the WDFW Permitting Biologist (0.5 FTE). Given the limited resources dedicated to ESA Permit reporting and the extensive workload required to meet reporting requirements, this relationship is critical to ensuring hatchery programs operate within the conditions of the permit.

Monthly reports have served as a primary mode of coordination and are used to keep Douglas PUD as well as HCP Committee members and co-managers informed on all hatchery and evaluation related activities. Unless otherwise requested by Douglas PUD, the role of monthly reports will remain the same. Upon request, additional information can be included in the monthly reports.

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