ANNUAL REPORT OF OPERATIONS

FISH FACILITIES: 2011

Public Utility District No. 1 of Douglas County
1151 Valley Mall Parkway
East Wenatchee, Washington
98802-4497

Wells Hydroelectric Project
FERC Project No. 2149

March 2012

FISH FACILITIES OPERATIONS ANNUAL REPORT FOR 2011

WELLS HYDROELECTRIC PROJECT NO. 2149

Located on the Columbia River at River Mile 515.6

I. FISH COUNT AND RIVER CONDITIONS

A. Enumeration of adult salmon and steelhead using fish ladders at Wells Dam began on May 1 and continued through November 15. Counting was accomplished by reviewing digital video records of fish passing ladder windows. Monthly counts of each species for 24-hour and 16-hour count periods in 2011 are included in Tables 1 and 2, respectively. Table 3 shows the nighttime percent of total passage of adult salmon and steelhead. Adult steelhead, and spring and summer Chinook, and coho salmon were removed from the ladders for broodstock and are not included in the count summaries of Tables 1 and 2, but are listed in Table 4. Attachment A shows the 24-hour fish passage (0000-2400 PST) at Wells Dam by species by day from May 1 through November 15. Attachment B shows the annual ladder counts of salmon and steelhead (16-hour count) at Wells Dam from 1967 through 2011. For comparison, Attachment C shows the 24-hour count totals for the years 1998 through 2011 (24-hour counts commenced in 1998).

B. Bull trout (*Salvelinus confluentus*) passage records were first initiated at Wells Dam in 1999. In 2011, 44 migratory-sized bull trout were counted between May 1 and November 15 (see Attachment A). As in past years, no sub-adult sized bull trout were counted in the fish ladders at Wells Dam. Starting in the winter of 2004-2005, Public Utility District No. 1 of Douglas County (Douglas PUD), following a request from the U.S Fish and Wildlife Service (USFWS), has also conducted winter bull trout counts (November 16 – April 30). During the past seven years of winter bull trout counting, no bull trout have been observed using the fish ladders at Wells Dam.

C. Douglas PUD first initiated adult lamprey (*Lampetra tridentata*) passage counts at Wells Dam in 1995. In 2011, lamprey counts were recorded from May 1 through November 15, and two lamprey were counted during that period. Daily passage numbers are shown in Attachment A.

II. PROJECT OPERATIONS

A. Adult Fish Passage Facilities

In 2011, Douglas PUD operated the adult fish-passage facilities at Wells Dam per the criteria documented in the Wells Habitat Conservation Plan (HCP), and in cooperation with the Fisheries Agencies and Tribes (See HCP Section 15, Appendix A: Adult Fish Passage Plan). Information from several years of radio-telemetry studies with both salmon and steelhead at Wells Dam showed that fishway passage time was reduced by closing the side entrance at both east and west fishways. Based upon approval of the Joint Fisheries Parties, who serve on the Wells HCP Coordinating Committee, a decision was made in 2001 to change the fishway-operation criteria

at Wells Dam including the closure of the side entrance on each ladder and increasing the opening of the end gates from a six-foot opening to an eight-foot opening.

Douglas PUD inspects the fishways at Wells Dam 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 bi-annual inspection and maintenance from January 6 through January 26, 2011. The east fishway was again taken out of service in 2011 for inspection and annual maintenance from December 7 through December 22, 2011. The west fishway was out of service for inspection and annual maintenance from the 16th through the 29th of December 2010, and received bi-annual inspection and maintenance in January 2012. Besides annual and bi-annual servicing of the fishways, the hydromechanics at Wells Dam also replaced the drain valves in the collection gallery of the west fishway in 2011, with the intention of increasing control over the drainage process and improving drainage rates.

B. Juvenile Bypass Facilities

The juvenile bypass facilities at Wells Dam are designed to attract downstream-migrating fish to surface passage through spill instead of through deep-water turbine intakes. The hydrocombine design of Wells Dam incorporates the spillway and powerhouse components of the dam into a single 1,130-foot-long section, where all flow through the dam must pass. Five spillways (numbers 2, 4, 6, 8 and 10), located above paired turbine intakes, are equipped with bypass flow barriers and baffles. Because of the hydrocombine design, flow through the turbine intakes attracts juvenile salmonid migrants to the bypass facilities, where they are further attracted by water velocities at slotted bypass baffles and pass the project with a small volume of bypass spill.

Douglas PUD initiated and terminated Wells bypass operations in 2011 as guided by the Wells HCP Coordinating Committee in accordance with Section 4.3 of the Wells HCP and the *2011 Bypass Operating Plan*. The initiation and termination dates for the bypass system in 2011 were based upon 21 years of hydroacoustic data and 14 years of species composition data on run patterns of juvenile hatchery and wild salmonids at Wells Dam. Analysis of the run-timing information at Wells Dam indicated that on average initiating the bypass system on April 12th would provide a non-turbine passage alternative for 95.5 percent of the spring emigrants. Similarly, running the bypass system through August 26th would, on average, provide non-turbine passage for 95 percent of the summer emigrants.

Flows at Wells Dam during the 2011 juvenile migration (April – August) were at 122 percent of the twenty-year average, and the third highest during that period (behind 1996 and 1997). Douglas PUD initiated spring bypass operations on April 12th at 0000 hours, and operated the bypass continuously through June 13th at 2400 hours for a total of 63 days. Spring bypass operations utilized a total volume of 18.83 million acre-feet (MAF), or 5.0 percent of total project discharge volume.

Douglas PUD initiated summer bypass operations on June 14th at 0000 hours and continued until August 26th at 2400 hours, for a total of 74 days. Summer bypass operations utilized 25.86 MAF, or 5.1 percent of the total discharge volume. Douglas PUD operated the bypass system continuously during the transition period between the spring and summer juvenile fish migrations.

Based on analysis conducted by Columbia Basin Research, Douglas PUD provided bypass passage for 99.2 percent of the yearling Chinook, 98.1 percent of the steelhead, 100 percent of the sockeye, and 99.6 percent of the sub-yearling Chinook passing Wells Dam in 2011.

The *2011 Bypass Operating Plan* included measures for complying with Federal Energy Regulatory Commission (FERC) requirements for maintaining minimum automatic-gate-opening capacity at Wells Dam and Washington Department of Ecology (Ecology) requirements for compliance with total-dissolved-gas (TDG) standards. Douglas PUD achieved compliance with the requirements of both FERC and Ecology by systematic removal of bypass barriers under increasing discharge as described in the *2011 Bypass Operating Plan*. The strategy for compliance with the Ecology TDG standards included the concentration of spill through the center of Wells Dam and spilling over the discharge from active turbine units, and this strategy also sufficed for compliance with the FERC gate-capacity standard.

Exceptionally high flows began in mid-May and persisted into August 2011. To meet the Ecology and FERC requirements, Douglas PUD removed bypass barriers on Spillway 6 on May 16, and, with increasing flows, removed bypass barriers from Spillways 4 and 8 on May 20, and finally Spillway 2 on June 1, near the peak of the hydrograph. As flows declined, reinstallation of barriers occurred in the reverse order of their removal, to maintain the bulk of the spill in the center of the project. Thus, barriers were reinstalled in Spillways 2, 4, 8, and 6 on July 5, 18, 29, and August 4, respectively.

III. WATER QUALITY

A. Temperature Monitoring at Wells Dam

Daily water temperature and total dissolved gas readings from April through September, 2011, are provided in Attachment D. Historically, water-temperature data were collected at the turbine cooling-water intake at Unit 5. A comparative analysis of water temperature data collected from the cooling-water intake and data collected in the Wells forebay and tailrace indicated that the historical water temperature sampling site (cooling water pipe) was recording temperatures several degrees Fahrenheit higher than river water temperatures collected at the two in-water monitoring stations. Since 2003, water temperatures have been measured at the intake for the fish ladder attraction-flow pumps located in the tailrace of Wells Dam.

B. Total Dissolved Gas Monitoring at Wells Dam

The Wells Project was operated in 2011 according to the 2011 Wells Hydroelectric Project Gas Abatement Plan (GAP) that was a modified version of the original GAP developed in 2009 and subsequently modified in 2010. The 2009 GAP, approved by the Ecology on February 28, 2009, described operational measures intended to meet state water quality standards for TDG.

The Wells Project 2009 GAP introduced the latest numerical model developed by the University of Iowa's IIHR-Hydroscience and Engineering Hydraulic Research Laboratories. The two-phase flow computational fluid dynamics tool was used to predict hydrodynamics of TDG distribution within the tailrace of Wells Dam and further identify operational configurations that would

minimize TDG production at the project. As described in an April 2009 report, the model demonstrated that Wells Dam can be operated to meet the TDG fish-spill waiver standards during the passage season with flows up to "7Q-10 levels" (246,000 cfs). Engineers determined that the most effective spillway operation for minimizing TDG at the Wells Project was a concentrated spill pattern through Spillway No. 7 with surplus flow volume through adjacent spillways in a defined pattern. This configuration creates surface-oriented flows by engaging submerged spillway lips below the ogee, thus increasing degasification at the tailrace surface, decreasing supersaturation at depth, and preventing the bank attachment of high-TDG waters. These principles were the basis of the 2009 Wells Project Spill Playbook and were fully implemented for the first time during the 2009 fish passage (spill) season as part of the GAP. The 2010 GAP and Spill Playbook were approved by Ecology on April 9, 2010 and amended on July 1, 2010. The 2011 GAP and Spill Playbook were approved by Ecology on March 31, 2011.

Columbia River flows at Wells Dam in 2011 were the third-highest on record. Flows for all months during the spill season were higher than the monthly 16-year average. Average monthly river flow at the Wells Project was 27.9 percent higher in April and 59.2 percent higher in July than the 16-year average for those respective months. The average flow in 2011 was 45.0 percent (59.4 kcfs) higher than the previous 16-year average. The maximum hourly flow observed during the spill season was 327.8 kcfs on June 5 and flows frequently exceeded the 7Q-10 value of 246.0 kcfs. The average monthly flow for all of June exceeded the 7Q-10 value for the Wells Project. Of the 137 days during the spill season, there were 34 instances (24.8% of the monitoring period) where daily average flows at the Wells Project exceeded the 7Q-10 value.

Except for April, average monthly spill (calculated from daily averages) at the Wells Project in 2011 was higher than the previous 16-year average. Average spill volume ranged from 10.0 kcfs in April, to 112.3 kcfs in June. Hourly spill exceeded the juvenile bypass spill volume almost continuously from May 11th to July 20th, 2011. On June 5th forced spill reached 185.5 kcfs, the maximum hourly value for the 2011 season. High spill events in June were attributed to both flow volumes in excess of the Project's hydraulic capacity, and flows in excess of the power system needs and/or transmission system capacity.

During the 2011 monitoring season, the TDG criterion for the forebay of Wells Dam was exceeded 75 of 137 days (55.0%). At the request of Ecology, Douglas PUD conducted an in-season evaluation of the 2011 fish passage season to assess compliance with the TDG waiver water quality standards, TDG physical monitoring and biological monitoring for gas bubble trauma (GBT) at Wells Dam. The evaluation indicated that flows in 2011 at Wells Dam were the third-highest on record. Compared to the 10-year average, spill started early, peaked early and total river flow past Wells Dam was almost twice the long-term historic average. These high flows caused excessive forced spill at each hydroelectric project resulting in prolonged, elevated levels of total dissolved gas throughout the Columbia River system. The evaluation found that the primary source of this elevated TDG entering the mid-Columbia was the operation of federal projects upstream of Wells Dam; primarily Chief Joseph and Grand Coulee dams. Although spill deflectors at the Chief Joseph Dam strip some dissolved gases, TDG levels in the forebay of Wells Dam were consistently above the 115 percent compliance criteria. At Grand Coulee Dam, spill operations produced TDG levels above 120 percent beginning in mid-May and sustained these levels until mid-July. TDG levels in the Grand Coulee Dam tailrace consistently exceeded 135 percent from late May to mid-June, peaking above 140 percent in early June.

The Wells Project had three compliance criteria for the 2011 fish passage waiver as described in the 2011 GAP: 1) average TDG in the tailrace cannot exceed 125 percent for one hour or 2) 120 percent for 12 continuous hours (12C-High), and 3) TDG in the downstream Rocky Reach forebay cannot exceed 115 percent 12C-High. These compliance criteria are waived when flows exceed the 10-year flood flow volume (7Q-10 = 246 kcfs) or when incoming water is out of compliance (>115% TDG 12C-High) in the Wells Dam forebay.

1) Wells Tailrace 125% hourly standard

In the Wells Dam tailrace, the hourly average TDG value exceeded 125 percent for 996 hours on 51 of 137 days during the spill season. On 96 percent of the days where hourly TDG values exceeded 125 percent (49 of 51 days), hourly average flow values exceeded 246 kcfs (7Q-10 flood flows at Wells Dam; standards waived). On the remaining 2 days when flows were less than 246 kcfs, TDG in the Wells forebay exceeded 115 percent.

Of the 67 days when Wells forebay 12C-High TDG was below 115 percent and flows were below 7Q-10, measured values show the highest hourly average did not exceed 125 percent on 65 days. On July 21, the tailrace (WELW) sensor went offline due to an equipment malfunction. A calculated estimate of TDG based upon the spill/flow equation for Wells Dam, using the highest hourly spill percentage of 23 percent at 181.8 kcfs, generated a maximum hourly TDG between 117.7 – 121.2 percent (n = 11 July hourly observations 23-24% spill percentage, 187-226.8 kcfs).

2) Wells Tailrace 120% 12C-High standard

The 12C-High TDG value in the tailrace exceeded 120 percent on 65 of 137 days. Of those 65 days, daily average flows were above 246 kcfs/7Q-10 flood flow for 31 days. On the remaining 34 days, when daily average flows were less than 246 kcfs, 12C-High TDG in the Wells forebay exceeded 115 percent on 32 days. The remaining 2 days had 12C-High Wells forebay TDG slightly below 115 percent (114.2-114.8%). In total, there were 74 days (137-63=74 days) where flows were below 7Q-10 and incoming Wells forebay TDG was less than the 115 percent criterion.

3) Rocky Reach Forebay 115% 12C-High standard

The 12C-High TDG value in the Rocky Reach forebay exceeded 115 percent on 77 of 137 days. Of the 77 days when the standard was exceeded in the Rocky Reach forebay, daily average flows exceeded 7Q-10 on 34 days. Of the remaining 43 days, Wells forebay exceeded 115 percent TDG on 39 days. On the 4 days when incoming TDG in the Wells forebay was below 115 percent, the Wells Project exceeded the TDG standard in the Rocky Reach forebay. These exceedances occurred May 16-18 and July 20. In total, there were 64 days (137-73=64 days) where flows were below 7Q-10 and incoming Wells forebay TDG was less than the 115 percent criterion.

At the Wells Project, average compliance for all three TDG standards was at least 96.0 percent during the 2011 fish passage season. This is exceptionally high compliance, given that it was the third highest flow year on record, and with two turbine units off line due to unscheduled maintenance.

TDG data are reported for both the forebay and tailwater as the 12-hour high continuous average (12C-High) in percent TDG (see Attachment D)

IV. FISH PRODUCTION

The Washington Department of Fish and Wildlife (WDFW) manages the commercial, sport, and non-game fish and wildlife resources of the State of Washington. The Wells and Methow hatcheries are owned and funded by Douglas PUD and operated by WDFW. WDFW personnel provided the information on summer/fall Chinook and steelhead production at the Wells Hatchery (Table 5) and spring Chinook production at the Methow Hatchery (Table 6) through 2011.

V. FISH STUDIES AND PROGRAMS

Douglas PUD funded several fish-related studies and programs during 2011. A summary of each follows.

A. Wells Subyearling Chinook Life-history Study

In 2011, Douglas PUD initiated a multi-year study of life-history diversity of subyearling Chinook salmon originating upstream of Wells Dam. The study focused on determining outmigration timing and size-at-migration, information necessary for estimating survival of migratory summer/fall Chinook salmon. Douglas PUD conducted a pilot study in 2011 to investigate spatial and temporal distribution of subyearling Chinook in the Wells Reservoir and to identify sampling locations and determine methods capable of capturing the necessary numbers of subyearling Chinook for the life-history investigation. In 2011, Douglas PUD staff tagged and released 13,223 subyearling Chinook, and successfully captured over 17,000 wild subyearling Chinook. The highest catch-per-unit-effort (CPUE) occurred in clear water with cobble substrate just beyond the plume of Okanogan River water downstream from the Okanogan-Columbia confluence. Douglas PUD monitors these passive integrated transponder (PIT)-tagged individuals as they move through the Columbia River hydrosystem and will track their progress through their return migration as adults. A final report of 2011 tagging efforts and migration tracking will be available in the spring of 2012.

B. Wells Juvenile Bypass Timing Verification Study

In the spring of 2011, Douglas PUD conducted an analysis comparing 2005 through 2010 migration timing of salmon and steelhead to the timing of operation of the Wells juvenile bypass system. According to the Wells HCP, Wells bypass operations must provide bypass passage for 95 percent of the spring and summer HCP Plan Species outmigration. Results of the analysis indicated that the spring operation was covering steelhead and sockeye salmon, but fell just short of full coverage for yearling Chinook in two of six years (2005 and 2007). Summer bypass operations were found to fully cover migrating subyearling Chinook; indeed, bypass operations could have been shut down earlier in each of the 6 years analyzed and still would have provided greater than 95 percent protection. Based on this analysis, juvenile bypass operations at Wells Dam will be adjusted in 2012 to commence at 0000 hours on April 9 (three days earlier than the previous start date of April 12) and end at 2400 hours on August 19 (7 days earlier than the previous end date of August 26). Following the 2011 juvenile bypass period, Douglas PUD

conducted an analysis of the spring and summer migration season to evaluate whether Douglas PUD would have met the HCP standard for passing at least 95 percent of summer and spring migrants with the then-current bypass operations dates (April 12 – August 26) and the agreed-upon new spill start and stop dates of April 9 and August 19, respectively. The analysis verified that under either the current or the new (2012) bypass dates, greater than 95 percent of both the spring and summer juvenile migration would have passed during bypass operations in 2011.

C. Sockeye Salmon Enhancement

At the end of 2001, the Wells HCP Coordinating Committee agreed to shift the focus of Douglas PUD's sockeye responsibility from an experimental sockeye hatchery program located at Cassimer Bar to a water-management planning tool for the Canadian Okanagan River. Seasonal patterns of water releases from Okanagan Lake were found to adversely affect the production of both sockeye and kokanee. Douglas PUD worked with the Canadian fisheries parties to develop a model-based flow-management program for use as a decision-making tool by river managers for preventing or minimizing losses to sockeye and kokanee production. The Fish Water Management Tool (FWMT) is the model developed to allow both fish and water managers, collectively, to determine how releases of water would affect kokanee and sockeye resources, flood control, water-dependent recreation, and irrigators. During 2003, considerable effort was spent on the development of the FWMT and the estimation of physical and biological model parameters.

To determine whether the FWMT model could improve water-release practices, retrospective analyses were performed during 2004 using historical monthly records collected over the previous twenty-five water years. The retrospective analyses indicated that the annual improvement in salmon egg-to-emergence survival from the implementation of the FWMT was on average 55 percent. According to the model, estimated smolt savings from using the FWMT were better in a wet year (75 percent) rather than a dry year (38 percent) because of the avoidance of egg scour. The best results from the FWMT retrospective analyses demonstrated a 443 percent improvement in salmon survival during one historic water year. In all years the FWMT provided greater than the 7 percent required mitigation for juvenile sockeye losses at Wells Dam. On October 5, 2004, the Parties to the Wells HCP via the Hatchery Committee approved the FWMT program as fulfilling Douglas PUD's sockeye hatchery mitigation responsibility for unavoidable losses of juvenile sockeye at Wells Dam.

2011 was the seventh year that the FWMT was used by Canadian fisheries and water managers to guide water-release decisions for the Canadian Okanagan River. Despite atypical climatic and hydrologic conditions experienced during the first seven years of implementation, the Operational Team has managed river flows and lake levels with the FWMT in a manner that effectively minimized property damage and fisheries losses. The real-time performance of the FWMT has consistently exceeded expectations based upon the retrospective analyses performed in 2004, resulting in consistently strong returns of sockeye salmon to the Canadian Okanagan, and a rebound in the kokanee population in Okanagan Lake.

D. Adult Fishway PIT-Tag Detection System

The National Marine Fisheries Service's (NMFS) 2000 Biological Opinion required that Douglas PUD install adult PIT-tag detectors in the two adult fishways at Wells Dam. A PIT-tag detection

system was installed in the winter of 2001-2002 and began collecting data during the 2002 adult migration. Analysis from tests of system performance indicated a detection efficiency of 99.9 percent.

Because the adult traps in each fishway are below the PIT-tag detection system, PIT-tagged fish diverted from the fishway at each trap were not monitored by the PIT-tag detection system. To increase the coverage of the system, additional PIT-tag detectors were installed in 2004 on the exit of the east and west fishway traps; the system on the trap on the west fishway was upgraded in 2008 to increase detection efficiency.

E. Northern Pikeminnow Removal in the Wells Tailrace and Reservoir

Northern pikeminnow (*Ptychocheilus oregonensis*) are a major predator of juvenile salmonids in the Columbia Basin. As required by the Wells HCP, Douglas PUD continued the implementation of a program for removal of and data collection on northern pikeminnow from the Wells Project (tailrace and reservoir) in 2011. The pikeminnow removal contractor used set-line gear to capture 16,302 northern pikeminnow in 2011. Of that total, 14,296 were at least 9 inches in total length and 2,006 were less than 9 inches in total length. These fish were captured during 5,205 hours of angling effort translating into an overall CPUE or fish-per-hour value of 3.1. Angling effort was determined by total hours spent to pull, check, and reset lines as well as travel and preparation time (tying hooks, assembling lines, etc.). Six thousand seven hundred seventy-eight (6,778) fish were captured in the lower Wells Reservoir (Methow confluence to Wells Dam), 2,164 in the upper Wells Reservoir (Methow confluence to the tailrace of Chief Joseph Dam), 2,349 in the lower Methow River, and 5,011 in the Wells tailrace. From 1995 through 2011, the pikeminnow removal programs sponsored by Douglas PUD have removed approximately 228,000 pikeminnow from the Wells Project.

F. Adjustment of Fishway Entrance Head-differentials to Assist Pacific Lamprey

In July 2011, the HCP Wells Coordinating Committee approved implementation of a 1.0-foot head differential at Wells Dam fishway entrances (lamprey operations) during the 2011 lamprey migration to enhance lamprey entrance success. Studies in 2009 and 2010 at Wells Dam indicated that the reduction of the fishway collection gallery-to-tailwater head differential from 1.5 feet to 1.0 foot may enhance lamprey entrance efficiencies into the Wells Dam fishways by reducing velocities at the entrance. Prior to approving the changes, an evaluation of the effects of the change in entrance velocities on steelhead passage rates was conducted. The evaluation showed no differences in passage rates for steelhead in 2009 and 2010. Timing of the initiation of lamprey operations at Wells Dam fishways was based on lamprey passage numbers at Rocky Reach Dam and began at 1700 hours on August 19, 2011. The 1.0-foot differential was implemented from 1700 hours to 0059 hours each night from August 19 to September 30, 2011.

G. Bull Trout Monitoring and Management Plan

During 2011, Douglas PUD continued to implement the Wells Bull Trout Monitoring and Management Plan (Bull Trout Plan) based upon the plan approved by the USFWS and the FERC in 2005. 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 associated with the operations of the Wells Hydroelectric Project and associated facilities (Douglas PUD 2004). The Bull Trout Plan was prepared and implemented to meet monitoring requirements stipulated in the USFWS

Biological Opinion regarding implementation of the Wells HCP. The USFWS Biological Opinion monitoring requirements were also incorporated by the FERC into the existing Wells Project license in 2004. The Bull Trout Plan was developed in collaboration with the USFWS, NMFS, WDFW, the Colville Confederated Tribes, and the Yakama Nation, and was approved by the FERC.

The first objective of the Bull Trout Plan 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 performed 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 Public Utility District No. 1 of Chelan County (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 tagging and release of each bull trout. During the six-year study and eight years of monitoring, 19 downstream and 79 upstream passage events occurred at Wells Dam by radio-tagged bull trout within one year of tagging and 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, no 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, no 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 through 2008 study, 214 adult bull trout were counted passing upstream through Wells Dam, and 24 percent (52) were radio-tagged.

Project operations did not appear to influence the movements of adult bull trout. Instead, adult bull trout exhibited rather predictable patterns of upstream and downstream movement, with passage events apparently associated with water temperature, photoperiod, and time of year or life-cycle events. Because no take (injury or mortality) occurred during or subsequent to the study, there have been no investigations into how Project operations affect take at Wells Dam. Year round monitoring for bull trout continues at Wells Dam fish-counting stations. No upstream or downstream passage problems have been identified, either during the 2005-2008

telemetry studies, or subsequent passive monitoring efforts. Thus, no recommendations to change or modify fishway operations at Wells Dam have been developed.

The second objective of the Bull Trout Plan 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. Thus, Douglas PUD agreed to PIT-tag sub-adult bull trout when encountered at Wells Dam or in tributary traps, and provided funding, equipment, training, and coordination for the sub-adult bull trout PIT-tag program. In addition, adults have been incidentally captured and tagged during monitoring and evaluation activities for Douglas PUD's anadromous salmonid hatchery programs.

Four adult bull trout were incidentally captured at Wells Dam during Douglas PUD's Chinook brood collection activities in the spring of 2011. All of these fish were PIT-tagged and subsequently released back into the fishways to continue their migration. One of these fish was later detected at the Twisp River PIT-tag interrogation location on October 12, 2011. Another fish PIT-tagged at Wells Dam was released and subsequently detected at the Gold Creek (tributary to the Methow River) interrogation location on September 28, 2011. The other two adult bull trout tagged at Wells Dam in 2011 have not been detected to date. This outcome is not surprising given the low detection probabilities for the riverine PIT-tag detection arrays, especially during the spring freshet.

One of the five fish PIT-tagged at Wells Dam in 2010 during brood collection activities was detected in the Twisp River on July 5th and again in the lower Methow River near the Columbia on October 4th of 2010. In 2011, this fish was detected at Rocky Reach Dam and then at Wells Dam in early and mid-July, respectively. This fish appeared to make a spawning migration to the Twisp River in 2010, exited the Methow in the fall of 2010, successfully passed downstream over Wells and Rocky Reach dams between October 2010 and July 2011, then successful re-ascended these projects in July 2011.

Thirty-six adult bull trout (>440 mm) were captured by the PUD's contractor at the Twisp Weir in 2011. Twenty-six of these fish did not have a PIT tag but were PIT-tagged prior to release. Seven of these 36 fish were fish captured and tagged in 2010 and 3 were fish captured twice in 2011. DNA samples were collected from adults captured at the Twisp River Weir in 2010 and 2011, and these samples will be passed along to the USFWS for future microsatellite analysis.

Bull trout behavior within the Methow Basin during 2011 remained similar to previous years; however, few PIT-tag detections were recorded in the spring of 2011 due to a protracted spring freshet that damaged many of the PIT-tag detection arrays and significantly reduced the detection efficiencies of the few remaining interrogation sites. Similarly, bull trout encounters at the Twisp Weir were also down in 2011 when compared to prior years. The abnormally high flows in 2011 prevented the operation of the weir for nearly two months because river flows exceeded the operational tolerance of the weir. As in past years, adult bull trout were detected migrating upstream into the Twisp River in the spring (May and June). After spawning in August and September, a consistent downstream migration was exhibited by adults moving out of the Twisp River and into the lower Methow and Wells reservoir.

Counts of bull trout passing Wells Dam in 2011 remained similar to counts during 2008 through 2010, but showed a slight increase in observations. Adult bull trout counts at the Wells Project were 43, 43, 44 and 66, respectively for the years 2008 through 2011. Off-season fishway video monitoring continues to indicate that bull trout are not passing Wells Dam during January to April. In late December 2011, two bull trout were salvaged in the east fish ladder during maintenance activities. During 2011, 97 percent (64 of 66) of the bull trout passing through Wells Dam fish ladders did so during the months of May through July, with the last observation in early November 2011. This timing is consistent with past years, and indicates bull trout passage at the dam is largely a seasonal migration independent of Project operations.

To date, no sub-adult bull trout have been observed in Wells Dam fishways. After reviewing video of the 66 bull trout that were observed in the fish ladders in 2011, all of these fish were classified as adults. These fish had an average estimated total length of 21 inches and ranged from 15-28 inches (380-710 mm). In August 2011 a Methow Core Area (MCA), PIT-tagged (2010) sub-adult bull trout was detected at the Rocky Reach Juvenile Fish Bypass facility and was therefore moving downstream. This fish was 170 mm (7 inches) when tagged in August 2010, suggesting that it may have been a sub-adult at the time it passed Wells Dam (sometime before August 29th 2011). To date, over 100 sub-adult bull trout have been PIT-tagged in the MCA by Douglas PUD contractors. The 2011 detection would be the first confirmed MCA sub-adult observed at a mid-Columbia project. This preliminary data suggests that sub-adults in the MCA stay close to their natal habitats relative to adult conspecifics.

Incidental captures of sub-adult bull trout by Douglas PUD's hatchery monitoring and evaluation rotary screw traps were consistent with previous years. Twenty-one sub-adult bull trout were captured in the Twisp River (six year average = 20.1). Two sub-adult bull trout were captured in the Methow River (six year average = 1.8). DNA samples were taken from all of these fish. Alex Repp (WDFW, Biologist) is the current custodian of these samples. DNA samples from previous years are being held by the WDFW and the USFWS for future analyses. Douglas PUD contractors conducting hook and line, backpack electroshocking, and netting for residual steelhead in the Methow Basin incidentally captured 14 sub-adult bull trout in 2011. All of these fish were subsequently PIT-tagged and released unharmed. Tag codes for all PIT-tagged fish were uploaded to the PTAGIS database.

Douglas PUD biologists conducted a bull trout stranding survey in the Wells Project on June 10th 2011, following operations at the project that lowered the reservoir below 773 feet above mean sea level (MSL). No bull trout were observed during this sampling. Past stranding and entrapment surveys have indicated that infrequent Project operations that result in lowering of the reservoir have not impacted adult or sub-adult bull trout in the Wells Project.

In accordance with Article 63 of the Wells Dam operating license, Douglas PUD continued participation in the development of a bull trout recovery plan with regional USFWS authorities. This participation included attending June 29th 2011 and August 29th 2011 recovery planning meetings, and data sharing at the request of the USFWS. Douglas PUD will participate in the review of the Bull Trout Recovery Plan following its release in the spring of 2012.

In summary, since monitoring began in 2001, no mortality or injury has been observed for bull trout passing through the Wells Project. No incidental take of bull trout has been 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).

In early 2011 the USFWS initiated an Endangered Species Act (ESA) Section 7 consultation on the proposed relicensing of the Wells Project. This consultation was concluded on March 16th 2012 when the USFWS issued a final Biological Opinion and Incidental Take Statement for the relicensing of the Wells Project. Douglas PUD provided the USFWS with biological data and information related to this consultation.

VI. EXPENSES for the 2011 Calendar Year

A. Fish Passage and Production Facilities and Non-study Expenses

		Total Costs
1.	Operation of District Wells Hatchery a/c 537.2, 545.34	$1,235,412.63
2.	Supervision of Fish & Game Facilities a/c 537.3	$410,094.20
3.	Operation of District Methow Hatchery a/c 537.7, 545.5	$890,719.61
4.	Fish Management a/c 537.9, 545.8	$626,496.18
5.	Maintenance of District Fish Facilities a/c 545.2	$63,718.68
6.	Maintenance Miscellaneous Fish Related a/c 545.6	$1,438.65
7.	Annual Debt Service on Fish and Game Plant	$4,466,727.58
	Totals	$7,694,606.53

B. Licensee Fisheries Study Costs

1.	Fish Studies a/c 537.5	$457,885.52
2.	Fish Studies – Methow a/c 537.6	$901,494.92
	Total	$1,359,380.44

Table 1. 2011 Wells Dam fish counts (24-hour count period) summarized by month.

	Chinook Salmon											
	Spring		Summer		Fall		All Chinook			Steelhead		
Month	Adults	Jacks	Adults	Jacks	Adults	Jacks	A+J	Coho	Sockeye	Hatchery	Wild	Total
May	2,211	704					2,915			26	97	123
June	1,942	3,265	135	79			5,421		257	3	1	4
July			19,622	4,365			23,987		104,822	108	134	242
August			10,064	4,021	247	140	14,472		6,416	1824	1450	3274
September					1,786	1,620	3,406	535	12	3792	2081	5873
October					726	635	1,361	4,796	1	1536	841	2377
November					130	53	183	465		74	102	176
Totals	4,153	3,969	29,821	8,465	2,889	2,448	51,745	5,796	111,508	7,363	4,706	12,069
Totals A+J	8,122		38,286		5,337							

Chinook counted per WDFW conversion dates: Spring Chinook May 1 - June 28; Summer Chinook June 29 - August 28; Fall Chinook August 29 - November 15

Table 2. 2011 Wells Dam fish counts (16-hour count period [0400 - 2000 PST]) summarized by month.

	Chinook Salmon											
	Spring		Summer		Fall		All Chinook			Steelhead		
Month	Adults	Jacks	Adults	Jacks	Adults	Jacks	A+J	Coho	Sockeye	Hatchery	Wild	Total
May	2,148	688					2,836			22	91	113
June	1,792	3085	127	78			5,082		234	3	1	4
July			19,126	4,211			23,337		91,586	101	122	223
August			9,590	3,893	208	107	13,798		5,553	1,710	1,334	3044
September					1,691	1524	3,215	490	12	3,590	1,924	5514
October					659	599	1,258	4410	1	1398	767	2165
November					107	39	146	383		62	92	154
Totals	3,940	3,773	28,843	8,182	2,665	2,269	49,672	5,283	97,386	6,886	4,331	11,217
Totals A+J	7,713		37,025		4,934							

Chinook counted per WDFW conversion dates: Spring Chinook May 1 - June 28; Summer Chinook June 29 - August 28; Fall Chinook August 29 - November 15

Table 3. 2011 Wells Dam fish counts summarized by percentage of night passage (% observed between 0000 - 0400 and 2000 – 2400, PST).

	Chinook Salmon											
	Spring		Summer		Fall		All Chinook			Steelhead		
Month	Adults	Jacks	Adults	Jacks	Adults	Jacks	A+J	Coho	Sockeye	Hatchery	Wild	Total
May	3%	2%					3%			15%	6%	8%
June	8%	6%	6%	1%			6%		9%	0%	0%	0%
July			3%	4%			3%		13%	6%	9%	8%
August			5%	3%	16%	24%	5%		13%	6%	8%	7%
September					5%	6%	6%	8%	0%	5%	8%	6%
October					9%	6%	8%	8%	0%	9%	9%	9%
November					18%	26%	20%	18%		16%	10%	13%
Totals	5%	5%	3%	3%	8%	7%	4%	9%	13%	6%	8%	7%
Totals A+J	5%		3%		8%							

Table 4. Fish trapped from the ladders at Wells Dam and retained for hatchery broodstock and thus not included in the ladder counts in 2011.

Species	Chinook	Steelhead	Coho	Total
Number retained	120	326	80	526

Table 5. Production from the Wells Hatchery in 2011.

	Summer Chinook	Summer Steelhead	Coho
Adults spawned	1,132	323	NA
Eggs taken	2,413,716	907,500	NA
Eggs transferred	1,219,000	70,975[1]	NA
Eggs transferred (Lake Chelan)	161,000	NA	NA
Juveniles transferred (Banks Lake)	NA	194,396	NA
Juveniles released, yearlings	446,313	428,004	48,399
Juveniles released, subyearlings	442,821	NA	NA

1. Transfer to the Winthrop National Fish Hatchery

Table 6. Spring Chinook production from the Methow Hatchery in 2011.

	Twisp R.	Methow Composite[1]
Adults trapped	58	285
Adults spawned	50	257
Eggs taken	24,092	733,077
Juveniles released	67,031	497,855

1. All non-Twisp fish were categorized as Methow-Composite (MetComp).

Attachment A. Wells Dam daily fish passage (24-hour count) for May 2011.

	Chinook				Steelhead			
Date	**Adults**	**Jacks**	**Coho**	**Sockeye**	**Ad-clipped**	**Ad-present**	**Lamprey**	**Bull Trout**
1	0	0	0	0	5	4	0	0
2	0	0	0	0	0	4	0	0
3	0	0	0	0	0	6	0	0
4	0	0	0	0	0	3	0	0
5	0	0	0	0	1	3	0	0
6	0	0	0	0	1	2	0	0
7	1	0	0	0	0	1	0	0
8	1	0	0	0	2	2	0	0
9	1	0	0	0	0	2	0	0
10	1	0	0	0	1	4	0	0
11	5	0	0	0	2	7	0	0
12	8	1	0	0	1	4	0	0
13	11	0	0	0	0	7	0	0
14	67	0	0	0	4	9	0	0
15	59	15	0	0	0	7	0	0
16	58	5	0	0	2	4	0	1
17	53	7	0	0	3	2	0	0
18	73	21	0	0	0	2	0	0
19	154	16	0	0	1	6	0	0
20	140	17	0	0	1	1	0	0
21	146	32	0	0	2	1	0	1
22	189	34	0	0	0	1	0	1
23	82	14	0	0	0	1	0	0
24	146	29	0	0	0	1	0	0
25	105	19	0	0	0	0	0	0
26	200	63	0	0	0	1	0	0
27	211	75	0	0	0	3	0	0
28	255	127	0	0	0	1	0	0
29	103	61	0	0	0	2	0	3
30	89	108	0	0	0	4	0	1
31	53	60	0	0	0	2	0	1
Totals	**2,211**	**704**	**0**	**0**	**26**	**97**	**0**	**8**

Attachment A (continued). Wells Dam daily fish passage (24-hour count) for June 2011.

	Chinook				Steelhead			
Date	**Adults**	**Jacks**	**Coho**	**Sockeye**	**Ad-clipped**	**Ad-present**	**Lamprey**	**Bull Trout**
1	99	127	0	0	0	0	0	1
2	123	172	0	0	1	0	0	1
3	110	177	0	0	1	0	0	3
4	110	172	0	0	0	0	0	5
5	39	170	0	0	0	0	0	2
6	54	84	0	0	1	0	0	0
7	68	162	0	0	0	0	0	1
8	79	110	0	0	0	0	0	1
9	87	137	0	0	0	0	0	0
10	87	159	0	0	0	0	0	0
11	79	126	0	0	0	1	0	1
12	37	158	0	0	0	0	0	1
13	61	81	0	0	0	0	0	1
14	62	123	0	0	0	0	0	2
15	100	128	0	0	0	0	0	1
16	68	130	0	1	0	0	0	4
17	57	145	0	0	0	0	0	1
18	69	108	0	0	0	0	1	3
19	28	121	0	0	0	0	0	3
20	50	72	0	0	0	0	0	1
21	65	76	0	0	0	0	0	1
22	93	90	0	3	0	0	0	0
23	59	110	0	3	0	0	0	0
24	46	104	0	8	0	0	0	1
25	46	73	0	9	0	0	0	1
26	21	59	0	10	0	0	0	0
27	58	53	0	30	0	0	0	1
28	99	38	0	29	0	0	0	0
29	60	47	0	70	0	0	0	0
30	75	32	0	94	0	0	0	1
Totals	**2,077**	**3,344**	**0**	**257**	**3**	**1**	**1**	**37**

Attachment A (continued). Wells Dam daily fish passage (24-hour count) for July 2011.

	Chinook				Steelhead			
Date	**Adults**	**Jacks**	**Coho**	**Sockeye**	**Ad-clipped**	**Ad-present**	**Lamprey**	**Bull Trout**
1	39	27	0	70	0	0	0	2
2	26	22	0	110	0	0	0	1
3	32	25	0	140	0	0	0	2
4	44	30	0	252	0	1	0	0
5	65	23	0	378	0	0	0	1
6	97	46	0	486	0	1	0	2
7	200	42	0	858	0	0	0	1
8	339	41	0	1,278	0	0	0	0
9	336	48	0	1,672	0	0	0	1
10	410	64	0	2,231	1	1	0	0
11	295	45	0	3,027	0	1	0	2
12	331	49	0	3,292	1	0	0	0
13	877	195	0	4,893	0	5	0	1
14	628	149	0	3,921	0	2	0	0
15	946	188	0	5,017	0	0	0	2
16	785	185	0	5,234	1	3	0	1
17	1,226	276	0	6,763	1	0	0	0
18	841	127	0	5,781	0	5	0	1
19	917	171	0	6,645	2	4	0	0
20	1,522	236	0	7,328	5	5	0	0
21	890	199	0	6,173	8	10	0	0
22	913	213	0	5,787	5	7	0	0
23	951	230	0	5,562	8	10	0	1
24	839	239	0	4,863	8	4	0	0
25	1,408	196	0	5,051	9	11	0	1
26	610	174	0	3,498	2	6	1	0
27	676	153	0	3,567	13	7	0	0
28	1,018	299	0	3,513	13	4	0	0
29	808	258	0	3,053	5	15	0	0
30	804	184	0	2,493	4	15	0	0
31	749	231	0	1,886	22	17	0	0
Totals	**19,622**	**4,365**	**0**	**104,822**	**108**	**134**	**1**	**19**

Attachment A (continued). Wells Dam daily fish passage (24-hour count) for August 2011.

	Chinook				Steelhead			
Date	**Adults**	**Jacks**	**Coho**	**Sockeye**	**Ad-clipped**	**Ad-present**	**Lamprey**	**Bull Trout**
1	512	196	0	1,292	9	12	0	0
2	661	261	0	851	10	5	0	0
3	665	182	0	657	12	11	0	0
4	633	195	0	785	19	15	0	0
5	787	216	0	682	25	31	0	0
6	494	282	0	443	32	13	0	0
7	501	160	0	322	33	33	0	0
8	345	88	0	234	12	23	0	0
9	526	126	0	211	37	19	0	0
10	443	131	0	232	14	13	0	0
11	297	172	0	159	27	39	0	0
12	371	177	0	79	36	36	0	0
13	224	179	0	98	39	24	0	0
14	530	326	0	105	54	45	0	0
15	196	125	0	50	26	22	0	0
16	366	242	0	42	34	47	0	0
17	204	84	0	28	46	43	0	0
18	228	91	0	35	80	62	0	0
19	337	118	0	23	98	79	0	0
20	135	72	0	23	78	67	0	0
21	343	92	0	3	106	103	0	0
22	186	56	0	9	42	29	0	0
23	124	77	0	2	31	29	0	0
24	115	57	0	12	111	80	0	0
25	157	55	0	12	112	87	0	0
26	315	98	0	11	124	82	0	0
27	157	68	0	6	137	104	0	0
28	212	95	0	7	169	122	0	0
29	55	52	0	2	50	55	0	0
30	106	45	0	1	95	58	0	1
31	86	43	0	0	126	62	0	0
Totals	**10,311**	**4,161**	**0**	**6,416**	**1,824**	**1,450**	**0**	**1**

Attachment A (continued). Wells Dam daily fish passage (24-hour count) for September 2011.

	Chinook				Steelhead			
Date	**Adults**	**Jacks**	**Coho**	**Sockeye**	**Ad-clipped**	**Ad-present**	**Lamprey**	**Bull Trout**
1	87	70	0	1	130	93	0	0
2	104	71	1	6	153	91	0	0
3	161	89	0	0	135	80	0	0
4	112	53	0	0	90	81	0	0
5	136	32	0	0	144	74	0	0
6	70	44	0	3	127	67	0	0
7	102	38	0	0	78	52	0	0
8	58	52	1	0	91	70	0	0
9	79	45	0	1	194	107	0	0
10	57	70	4	0	141	77	0	0
11	57	73	1	0	134	74	0	0
12	20	38	0	1	132	67	0	0
13	55	26	0	0	78	40	0	0
14	52	43	4	0	82	57	0	0
15	45	46	5	0	125	73	0	0
16	117	42	7	0	154	109	0	0
17	51	21	2	0	101	69	0	0
18	23	25	3	0	100	70	0	0
19	49	44	5	0	103	87	0	0
20	35	35	10	0	67	39	0	0
21	34	52	14	0	88	44	0	0
22	35	63	29	0	202	88	0	0
23	32	50	37	0	175	77	0	0
24	28	84	35	0	169	58	0	0
25	26	91	58	0	131	42	0	0
26	28	75	37	0	103	45	0	0
27	15	80	29	0	84	41	0	0
28	39	88	73	0	161	64	0	0
29	37	37	70	0	132	65	0	0
30	42	43	110	0	188	80	0	0
Totals	**1,786**	**1,620**	**535**	**12**	**3,792**	**2,081**	**0**	**0**

Attachment A (continued). Wells Dam daily fish passage (24-hour count) for October 2011.

	Chinook				Steelhead			
Date	**Adults**	**Jacks**	**Coho**	**Sockeye**	**Ad-clipped**	**Ad-present**	**Lamprey**	**Bull Trout**
1	37	41	124	1	151	62	0	0
2	27	31	115	0	126	57	0	0
3	10	18	39	0	68	30	0	0
4	20	22	59	0	79	48	0	0
5	21	55	88	0	82	35	0	0
6	23	28	118	0	93	43	0	0
7	34	26	196	0	77	40	0	0
8	19	24	269	0	87	41	0	0
9	37	15	194	0	121	26	0	0
10	33	20	77	0	39	26	0	0
11	34	24	86	0	49	21	0	0
12	32	19	132	0	70	43	0	0
13	10	31	186	0	51	45	0	0
14	19	20	182	0	37	30	0	0
15	31	22	181	0	46	36	0	0
16	25	17	173	0	35	22	0	0
17	33	38	127	0	49	36	0	0
18	31	19	112	0	42	34	0	0
19	16	26	162	0	38	9	0	0
20	24	20	226	0	29	20	0	0
21	21	16	200	0	16	13	0	0
22	12	18	265	0	26	11	0	0
23	36	22	286	0	26	22	0	0
24	8	7	133	0	8	8	0	0
25	12	9	166	0	11	13	0	0
26	27	6	149	0	19	16	0	0
27	19	7	157	0	20	16	0	0
28	22	11	183	0	13	8	0	0
29	22	9	130	0	13	11	0	0
30	16	8	173	0	9	12	0	0
31	15	6	108	0	6	7	0	0
Totals	**726**	**635**	**4,796**	**1**	**1,536**	**841**	**0**	**0**

Attachment A (concluded). Wells Dam daily fish passage (24-hour count) for November 1-15, 2011.

	Chinook				Steelhead			
Date	**Adults**	**Jacks**	**Coho**	**Sockeye**	**Ad-clipped**	**Ad-present**	**Lamprey**	**Bull Trout**
1	13	8	69	0	6	13	0	0
2	15	7	61	0	9	9	0	0
3	11	0	58	0	3	8	0	0
4	12	6	66	0	4	6	0	0
5	22	5	55	0	9	7	0	1
6	19	7	24	0	5	4	0	0
7	10	2	27	0	5	7	0	0
8	2	5	15	0	5	1	0	0
9	4	3	19	0	5	9	0	0
10	8	1	19	0	4	7	0	0
11	6	2	13	0	1	11	0	0
12	6	1	9	0	6	3	0	0
13	0	4	11	0	6	9	0	0
14	2	2	10	0	3	3	0	0
15	0	0	9	0	3	5	0	0
Totals	**130**	**53**	**465**	**0**	**74**	**102**	**0**	**1**

Attachment B. Wells Dam Annual Ladder Counts of Salmon and Steelhead for a 16-hour Daily Count Period (1967-2011).

Year	Chinook Spring	Chinook Summer	Chinook Fall	Chinook Trapped	Chinook Total	Coho[1]	Sockeye	Steelhead	Steelhead Trapped	Steelhead Total	Total Salmonids	Count Dates Include:
1967	1,157	12,504	2,732	2,004	18,397	255	113,232	1,474	171	1,645	133,529	5/21-11/19
1968	4,931	8,922	2,623	2,277	18,753	221	81,530	2,112	413	2,525	103,029	5/01-11/15
1969	3,599	6,846	2,929	2,873	16,247	29	17,352	1,391	530	1,921	35,549	5/01-11/15
1970	2,670	8,003	4,388	1,745	16,806	62	50,667	1,597	399	1,996	69,531	5/01-11/15
1971	3,168	5,988	2,030	1,793	12,979	161	48,172	3,782	358	4,140	65,452	4/30-11/15
1972	3,616	4,141	2,419	1,694	11,870	665	33,398	1,894	354	2,248	48,181	4/30-11/15
1973	2,937	5,052	2,650	2,088	12,727	331	37,178	1,820	627	2,447	52,683	4/30-11/15
1974	3,420	4,567	1,114	2,893	11,994	112	16,716	580	260	840	29,662	5/01-10/31
1975	2,225	8,522	3,806	3,253	17,806	25	22,286	517	227	744	40,861	5/01-10/31
1976	2,759	7,901	3,843	2,518	17,021	99	27,619	4,664	337	5,001	49,740	5/01-11/15
1977	4,211	7,527	3,260	2,628	17,626	68	21,973	5,282	355	5,637	45,304	5/01-11/15
1978	3,615	6,419	1,336	2,259	13,629	77	7,458	1,621	356	1,977	23,141	5/01-10/31
1979	1,103	10,080	1,108	2,352	14,643	63	22,655	3,695	367	4,062	41,423	5/01-11/16
1980	1,182	4,892	709	1,827	8,610	82	26,573	3,443	372	3,815	39,080	5/01-11/22
1981	1,935	4,276	686	1,533	8,430	26	28,234	4,096	650	4,746	41,436	5/01-11/22
1982	2,401	3,349	2,064	700	8,514	357	19,005	7,984	590	8,574	36,450	5/01-11/22
1983	2,869	2,821	1,150	942	7,782	82	27,925	19,525	670	20,195	55,984	5/01-11/30
1984	3,280	5,941	1,812	1,094	12,127	104	81,054	16,632	690	17,322	110,607	5/01-11/25
1985	5,257	4,456	2,097	1,689	13,499	72	53,170	19,867	750	20,617	87,358	5/01-11/22
1986	3,150	4,178	1,143	1,118	9,589	87	34,876	13,303	650	13,953	58,505	5/01-11/14
1987	2,344	3,142	3,253	1,275	10,014	42	39,948	5,493	603	6,096	56,100	5/01-11/13
1988	3,036	2,775	1,935	1,364	9,110	75	33,980	4,401	651	5,052	48,217	5/01-10/31
1989	1,740	3,333	1,435	2,147	8,655	14	15,895	4,600	716	5,316	29,880	5/01-10/31
1990	981	3,354	749	1,109	6,193	32	7,597	3,815	735	4,550	18,372	5/01-11/07
1991	779	2,028	827	1,525	5,159	21	27,492	7,751	726	8,477	41,149	5/01-11/15
1992	1,623	1,967	1,503	895	7,980	28	41,844	7,027	658	7,685	57,537	5/01-11/15
1993	2,444	3,603	1,228	1,780	9,055	19	28,038	2,494	633	3,127	40,239	5/01-11/16
1994	257	4,891	3,017	2,287	10,452	3	1,662	2,163	620	2,783	14,900	5/01-11/15
1995	103	3,076	1,229	2,164	6,572	6	4,801	942	619	1,561	12,940	5/01-11/15
1996	*	2,389	917	1,665	4,971	4	17,703	4,128	509	4,637	27,315	5/01-11/15
1997	971	2,721	766	1,655	6,113	8	25,754	4,107	630	4,737	36,612	5/01-11/15
1998	*	3,799	1,067	1,559	6,425	0	4,135	2,520	460	2,980	13,540	5/01-11/15
1999	345	7,787	2,548	938	11,618	224	12,388	3,504	416	3,920	28,150	5/01-11/15
2000	2,435	9,673	3,049	1,327	16,484	0	53,351	5,575	369	5,944	75,779	5/01-11/15
2001	10,414	35,990	8,634	556	55,594	473	64,819	16,251	392	16,643	137,529	5/01-11/15
2002	7,098	59,540	5,573	556	72,767	104	9,594	8,253	373	8,626	91,091	5/01-11/15
2003	4,480	43,480	7,397	556	55,913	137	24,684	8,721	374	9,095	89,829	5/01-11/15
2004	2,493	31,172	5,265	558	39,488	234	64,959	7,825	452	8,277	112,958	5/01-11/15
2005	4,831	30,842	3,110	563	39,346	273	46,891	6,331	417	6,748	93,258	5/01-11/15
2006	3,996	26,345	4,658	575	35,574	399	18,880	5,877	368	6,245	61,098	5/01-11/15
2007	2,543	15,866	2,356	521	21,286	2,033	19,106	6,574	379	6,953	49,378	5/01-11/15
2008	2,739	20,954	5,788	415	29,896	925	145,067	8,622	370	8,992	207,924	5/01-11/15
2009	7,932	28,148	5,914	473	41,994	2,415	116,964	23,578	367	23,945	185,791	5/01-11/15
2010	7,985	27,462	3,765	593	39,212	996	255,083	11,696	367	12,063	307,354	5/01-11/15
2011	8,122	38,286	5,337	120	49,792	5,796	111,508	12,069	326	11,543	164,004	5/01-11/15
Mean	3,120	11,380	2,725	1,477	18,612	260	42,084	6,307	481	6,792	68,283	
Gmean	2,339	7,220	2,185	1,297	14,454	31	27,933	4,398	459	5,018	53,272	

Chinook counts include jacks. WDFW counting dates: spring Chinook, May1-June 28; summer Chinook, June 29-August 28; Fall Chinook, August 29-November 15.

*All spring Chinook were trapped for broodstock at Wells Dam; 387 in 1996, and 363 in 1998. [1]Does not include coho broodstock trapped at Wells Dam; 254 in 2010, 80 in 2011.

Attachment C. Wells Dam Annual Ladder Counts of Salmon and Steelhead for a 24-hour Daily Count Period from 1998-2011.

Year	Chinook Spring	Chinook Summer	Chinook Fall	Chinook Trapped	Chinook Total	Coho[1]	Sockeye	Steelhead	Steelhead Trapped	Steelhead Total	Total Salmonids	Count Dates Include
1998	*	4,108	1,200	1,582	6,890	0	4,669	2,984	460	3,444	15,003	5/01-11/15
1999	345	7,787	2,548	938	11,618	224	12,388	3,504	416	3,920	28,150	5/01-11/15
2000	2,587	10,156	3,418	1,327	17,488	0	59,944	6,280	369	6,649	84,081	5/01-11/15
2001	10,871	38,126	9,591	556	59,144	612	74,490	18,528	392	18,920	153,166	5/01-11/15
2002	7,626	62,623	6,472	556	77,277	132	10,768	9,478	373	9,851	98,028	5/01-11/15
2003	4,702	46,391	8,253	556	59,902	168	28,977	9,963	374	10,337	99,384	5/01-11/15
2004	4,793	32,847	5,777	558	43,975	291	78,053	9,317	452	9,769	132,088	5/01-11/15
2005	4,996	31,763	3,461	563	40,783	348	55,559	7,203	417	7,620	104,310	5/01-11/15
2006	4,376	27,196	5,043	575	37,190	409	22,075	6,674	368	7,042	66,716	5/01-11/15
2007	2,793	16,817	2,670	521	22,801	2,432	22,273	7,500	379	7,879	55,385	5/01-11/15
2008	3,134	22,435	6,423	415	32,407	1,191	165,334	9,808	370	10,178	209,110	5/01-11/15
2009	8,174	29,525	6,326	473	44,498	2,989	134,937	25,422	367	25,789	208,213	5/01-11/15
2010	8,257	28,950	4,256	593	42,056	1,234	291,766	12,929	367	13,296	348,352	5/01-11/15
2011	8,122	38,286	5,337	120	51,865	5,796	111,508	12,069	326	12,395	181,564	5/01-11/15

Chinook counts include jacks. WDFW counting dates: spring Chinook, May1-June 28; summer Chinook, June 29-August 28; Fall Chinook, August 29-November 15.
*All spring Chinook were trapped for broodstock at Wells Dam; 387 in 1996, and 363 in 1998. [1]Does not include coho broodstock trapped at Wells Dam; 254 in 2010, 80 in 2011.

Attachment D. Wells Dam Daily Water Quality Report, 2011.

	April			May			June			July		
		TDG%			TDG%			TDG%			TDG%	
	Temp (C)	Forebay	Tailrace	Temp (C)	Forebay	Tailrace	Temp (C)	Forebay	Tailrace	Temp (C)	Forebay	Tailrace
Day	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean
1	.	.	.	7.8	106.1	108.0	11.2	126.6	135.3	13.5	116.1	122.4
2	.	.	.	7.7	106.8	108.7	11.5	126.9	137.3	13.3	118.2	128.2
3	.	.	.	7.8	106.6	108.3	11.7	125.4	135.4	13.6	118.5	128.8
4	.	.	.	7.9	106.6	108.4	11.8	127.9	136.4	14.0	117.5	125.6
5	.	.	.	8.1	107.9	109.5	11.9	126.4	136.5	14.2	117.3	125.9
6	5.0	113.5	108.0	8.3	108.3	110.1	11.9	126.1	136.1	14.1	118.3	127.7
7	5.0	111.6	108.5	8.3	108.5	110.4	11.8	124.5	133.9	14.4	119.0	126.0
8	5.1	103.5	101.6	8.5	108.0	109.7	11.6	120.6	130.1	14.6	117.0	124.3
9	5.3	108.0	108.8	8.6	107.7	109.2	11.4	121.2	128.3	14.6	117.5	123.1
10	5.5	107.6	107.5	8.7	108.2	110.4	11.5	121.2	128.4	14.3	118.6	125.0
11	5.7	107.1	107.5	8.8	108.7	111.6	11.7	121.1	NA	14.4	118.1	123.4
12	5.9	106.7	108.6	8.9	104.8	108.5	12.0	122.1	NA	14.8	114.0	117.6
13	6.0	106.8	109.2	9.1	108.8	112.1	12.2	121.4	NA	15.1	117.3	124.0
14	6.0	102.2	104.9	9.2	110.8	114.6	12.4	117.2	112.2	15.2	116.9	123.7
15	6.1	101.4	103.8	9.0	112.2	115.7	12.3	120.9	130.7	15.2	117.1	122.3
16	6.3	103.7	106.3	8.9	115.1	117.2	12.2	121.6	131.1	15.3	116.1	120.0
17	6.5	103.8	106.2	9.2	114.4	117.1	12.4	122.7	130.4	15.3	115.7	119.3
18	6.5	103.7	105.8	9.5	111.8	116.4	12.5	123.0	130.0	15.6	115.5	119.9
19	6.6	103.3	105.5	9.9	113.3	119.7	12.6	123.1	129.3	15.7	115.0	120.0
20	6.7	103.3	105.5	10.1	117.6	123.5	12.9	123.8	130.8	15.7	114.6	124.6
21	6.7	97.6	99.6	10.3	118.3	127.1	13.1	124.3	128.8	15.9	114.9	121.9
22	6.8	103.6	105.4	10.4	119.7	128.9	13.1	124.4	128.7	15.9	114.0	121.6
23	6.9	104.9	107.2	10.4	121.8	128.3	13.2	122.3	128.7	16.2	115.1	121.4
24	7.1	105.8	107.9	10.6	121.6	127.8	13.1	120.6	125.9	16.3	113.3	121.7
25	7.2	106.0	108.1	10.6	120.4	125.3	13.1	121.8	124.3	16.3	115.6	120.1
26	7.2	104.1	106.3	10.6	119.2	125.6	13.0	120.8	126.5	16.2	114.7	115.8
27	7.3	104.1	106.2	10.5	119.4	129.9	13.1	118.1	122.8	16.6	114.9	115.3
28	7.4	105.4	107.5	10.6	122.4	132.1	13.3	118.4	125.1	16.6	114.9	114.4
29	7.3	104.7	106.9	10.8	125.9	134.7	13.6	114.7	123.0	16.7	115.7	117.1
30	7.5	104.9	106.9	11.0	126.1	135.6	13.6	115.1	121.1	16.9	116.3	117.9
31	.	.	.	11.1	125.6	133.5	.	.	.	17.0	115.4	115.9
Mean	6.4	105.1	106.4	9.4	114.0	118.6	12.4	122.1	127.1	15.3	116.2	121.8

The Wells tailrace TDG sensor was destroyed by debris on June 11th and replace on June 14th.

Attachment D (continued). Wells Dam Daily Water Quality Report, 2011.

	August			September		
		TDG%			TDG%	
Day	Temp (C) Mean	Forebay Mean	Tailrace Mean	Temp (C) Mean	Forebay Mean	Tailrace Mean
1	17.2	111.7	111.1	18.8	106.8	107.0
2	17.3	114.5	112.5	18.8	106.1	105.7
3	17.2	114.2	113.5	18.8	105.9	105.6
4	17.2	110.2	109.9	18.8	106.9	106.8
5	17.6	114.2	115.2	18.8	107.9	107.6
6	17.8	113.9	116.8	18.8	107.3	107.1
7	17.8	113.6	114.7	18.8	107.5	107.4
8	17.9	113.5	114.6	18.7	107.5	107.6
9	17.9	113.6	114.7	18.7	108.0	108.2
10	17.9	113.4	114.6	18.9	108.8	109.0
11	18.0	110.8	112.1	19.2	108.6	108.6
12	18.1	111.9	113.3	19.3	107.9	107.6
13	18.2	111.9	113.2	19.3	107.5	107.2
14	18.2	111.2	112.9	19.2	104.6	104.3
15	18.2	110.6	112.2	19.2	107.4	106.8
16	18.1	109.1	110.7	.	.	.
17	18.1	110.5	112.2	.	.	.
18	18.0	110.3	112.6	.	.	.
19	18.1	110.2	112.4	.	.	.
20	18.4	110.2	112.0	.	.	.
21	18.3	111.2	112.8	.	.	.
22	18.3	110.5	112.2	.	.	.
23	18.3	108.9	112.1	.	.	.
24	18.6	109.4	111.2	.	.	.
25	18.8	109.4	111.0	.	.	.
26	18.8	109.6	111.1	.	.	.
27	18.9	109.2	109.4	.	.	.
28	19.1	109.4	109.1	.	.	.
29	19.0	109.9	109.6	.	.	.
30	19.0	108.9	108.9	.	.	.
31	18.9	108.4	108.2	.	.	.
Mean	18.2	111.1	112.2	18.9	107.2	107.1