

ANNUAL REPORT OF OPERATIONS

FISH FACILITIES: 2007

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

Wells Hydroelectric Project
F.E.R.C. Project No. 2149

April 2008

FISH FACILITIES OPERATIONS ANNUAL REPORT FOR 2007

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. The ladders were operational 24 hours a day. A summary of the counting season by month is shown in Table 1. Attachment 1 shows the 24-hour record (0000-2400 PST) by species by day from May 1 through November 15th. Attachment 2 shows the annual summary from 1967 through 2007 of salmon and steelhead counts at Wells Dam using the historic 16-hour count format, and for comparison, Attachment 3 shows the 24-hour count totals for the years 1998 through 2007 in addition to the 16-hour count data from 1967 through 1997.

B. Monthly and annual fish counts of each species by ladder for 24-hour and 16-hour count periods are included in Tables 1 and 2, respectively (note that Table 1 includes bull trout [*Salvelinus confluentus*] and lamprey [*Lampetra tridentata*], while Table 2 does not). Table 3 shows the nighttime percent of total adult passage of salmon and steelhead. Broodstock for steelhead and spring, summer, and fall Chinook removed from the ladders are not included in the fish-passage summaries. Numbers of fish removed for broodstock are shown in Tables 4 and 5; of the 224 spring Chinook broodstock collected, only the 136 spring Chinook captured at the West Ladder trap at Wells Dam were excluded from the fish-passage summaries.

C. Bull trout passage records were first initiated at Wells Dam in 1999. In 2007, bull trout counts were recorded from May 1 through November 15 (see Table 1), and daily passage numbers for 2007 are found in Table 6. Additionally, the winter bull trout counts that were initiated during the winter of 2004-2005 have been continued annually. No bull trout have been observed using the fish ladders at Wells Dam during the winter counts.

D. Lamprey passage records were first initiated at Wells in 1995. Lamprey counts were recorded from May 1 through November 15, 2007 (see Table 1), and daily passage numbers for 2007 are shown in Table 7.

II. PROJECT OPERATIONS

A. Adult Fish Passage Facilities

The adult fish passage facilities were operated using the criteria documented in the Wells Habitat Conservation Plan (HCP), and in cooperation with the Fisheries Agencies and Tribes. Information from several years of radio-telemetry studies with both salmon and steelhead at Wells Dam showed that ladder passage time was reduced by closing the side entrance at both east and west ladders. Based upon approval of the Joint Fisheries Parties who serve on the Wells Coordinating Committee, a decision was made in 2001 to change the ladder operation

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

Routine inspection and maintenance was performed on the east ladder from December 19, 2006 through March 7, 2007 (winter 2006/2007 annual inspection/maintenance) and December 6 through December 27, 2007 (winter 2007/2008 annual inspection/maintenance); and on the west ladder from March 13 through March 30, 2007. Both ladders operated at criteria throughout the entire fish passage assessment period.

During the winter 2006/2007 annual inspection/maintenance of the east ladder, a flow-guidance baffle was installed on Weir 1 of the fishway to concentrate flow into the collection gallery. An investigation of hydraulic conditions in a scale model of the collection gallery and lower fishway identified the flow-guidance baffle as a possible solution for improving fish guidance through the collection gallery into the fishway. A radio-telemetry study to evaluate fish response to the flow-guidance baffle was conducted during the summer of 2007 (see Section V (D), below, regarding study results). Two aluminum traps, for the capture of adult lamprey, were also installed in each fishway at Pool 39. The traps are located against the side walls at the top of the overflow weir between Pools 38 and 39, and are used to collect study fish for a lamprey passage study (see Section V (F), below).

B. Juvenile Bypass Facilities

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

The spring 2007 operation of the juvenile bypass facilities began on April 12 and continued on a 24-hour schedule until the end of the spring migration on June 13. Spring bypass operations used 1.39 MAF (million acre feet) of water or an average of 11.09 thousand cubic feet per second (kcfs), which was 7.1 percent of the project inflow, over a 63-day period. Four hundred twenty (420) hours of forced spill (27.8 percent of the time) occurred during the spring bypass period, with the highest hour of forced spill occurring on May 8, with a spill rate of 116.7 kcfs.

Summer bypass operations began on June 14 and ran through August 26, for a total of 75 days. The summer operation used 1.24 MAF of water, or an average of 8.48 kcfs, which was 6.6 percent of the project inflow. During the summer bypass operating period, there were 79 hours (4.4 percent of the time) of forced spill.

The operation of the bypass in 2007 was consistent with operational timing specified in the Wells HCP. In the past, hydroacoustics and fyke netting provided real-time fish migration data. The fixed dates of bypass operation specified in the Wells HCP were established from 21 years of hydroacoustic data and 14 years of species composition information collected on juvenile run patterns and timing at Wells Dam.

III. WATER QUALITY

Average daily turbidity, water temperature and total dissolved gas readings from April 1 through November 15 are provided in Attachment 4. Historically, water-temperature data were collected at the turbine cooling-water intake at Unit 5. Since 2003, water temperatures have been measured at the fish-ladder attraction-flow pumps located in the tailrace of Wells Dam. Turbidity values are Secchi disc readings in feet. Total Dissolved Gas (TDG) data are reported for both the forebay and tailwater as the 12-hour high average (12h) in percent TDG. High TDG values were seen at the tailrace TDG monitoring station in late May and June (see Attachment 4).

IV. FISH PRODUCTION

The Washington Department of Fish and Wildlife (WDFW) is responsible for managing the commercial, sport, and non-game fish and wildlife resources of the state. The Wells and Methow hatcheries are owned and funded by Public Utility District No. 1 of Douglas County (District), and operated by WDFW. WDFW personnel provided the information on summer/fall Chinook and steelhead production at the Wells Hatchery (see Table 4) and spring Chinook production at the Methow Hatchery (see Table 5) in 2007.

V. FISH STUDIES AND PROGRAMS

The District funded several fish-related studies and programs during 2007. A summary of each follows.

A. Sockeye Salmon Enhancement

At the end of 2001, the Wells Coordinating Committee agreed to shift focus on the District's sockeye responsibility from an experimental sockeye hatchery program to a water-management planning tool for the Canadian Okanagan River. Untimely or excessive water released from Okanagan Lake was found to adversely affect the survival of both sockeye and kokanee during the winter and spring months when eggs are incubating in gravels. The new plan involved working with the Canadian fisheries parties to develop a model-based flow-management program to be used as a decision-making tool by river managers for preventing or minimizing the occurrence of damaging flows. 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 time was spent on the FWMT model development and the estimation of physical and biological model parameters.

To determine if the FWMT model could improve water-release practices, retrospective analyses were performed during 2004 using historical monthly records collected over the past twenty-five water years. The retrospective analyses indicated that the average improvement in salmon egg-to-emergence survival from water management was about 55 percent, equating to a savings of approximately 384,000 smolts per year. According to the model, estimated smolt savings from using the FWMT were better in a wet year (75%) rather than a dry year (38%) 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. On October 5, 2004, the Parties to the Wells HCP via the Hatchery Committee approved the FWMT

program as meeting the sockeye mitigation responsibility for unavoidable losses at Wells Dam.

2007 was the third year that the FWMT was used by Canadian fisheries and water managers to guide water-release decisions for the Canadian Okanagan River. The Operational Team comprising water managers and fisheries scientists, utilized the FWMT to make water-management decisions during an unusually chaotic water year, and by the end of the season, the team members reaffirmed their support for annual operational deployment of the FWMT and the team approach to decision making. Despite atypical climatic and hydrologic conditions experienced during the first three 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. Thus, the real-time performance of the FWMT has consistently matched expectations based upon the retrospective analyses performed in 2004. Considering the positive results of using the FWMT as predicted by the retrospective analyses and the confirmation of those results through the first three years of implementation, the District will continue to support the FWMT program in 2008.

B. Adult Fishway PIT-Tag Detection System

The National Marine Fisheries Service's 2000 Biological Opinion required that the District 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 fish migration season. The PIT-tag detection equipment located in each ladder consists of four coils in Pools 67 and 68. These pools are control weirs with two hanging-orifice passageways, and each orifice on each of the four weirs was equipped with a PIT-tag detection coil connected to a series of computers. These computers transmit the PIT-tag interrogation information directly to the PITAGIS Database. This system was tested with 198 sockeye salmon that were captured in the ladder, tagged with PIT-tags and marked with a visual tag. The system was also evaluated by an analysis of 1,315 in-river PIT-tagged adults. The analysis from both of these tests showed the system had a detection efficiency of 99.9%.

The adult traps in each fishway are below the PIT-tag detection system. Thus, PIT-tagged adult 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 each trap to provide detection of PIT-tagged fish collected at the traps. The plastic reducer for the PIT-tag detection antennas on the west ladder trap exit was damaged during 2005, and was removed for repair in October, near the end of the steelhead trapping season. Subsequent to the removal of the damaged assembly, Wells Hatchery staff used a hand-held wand detector to read PIT-tags from steelhead captured via the west ladder trap. The repaired detector assembly was re-installed prior to the adult spring Chinook migration in the spring of 2006.

Following the repair to the PIT-tag detector assembly on the exit from the west ladder in March of 2006, hatchery staff noticed that some PIT-tagged fish were still not being read by the antenna array. The District's PIT-tag system operation and maintenance (O&M) contractor determined that the apparent read failures were due to a malfunction of the wireless modem that transmits data from the PIT-tag reader at the trap exit to the computers in the dam. Following replacement of the modem, hatchery staff continued to observe PIT-tagged fish that had not been detected by the detection system. Upon further investigation, the O&M contractor determined that electromagnetic interference and physical noise from the pumps adjacent to the detection array were interfering with tag detection, and they recommended relocating the

detection array.

The District investigated options for relocating the detection array in 2007, selecting a location within the west fishway structure immediately below the west ladder trap. Fabrication of the new detection array is underway and installation is scheduled for the week of May 5, 2008.

C. Northern Pikeminnow Removal in the Wells Tailrace and Reservoir

As required by the Wells HCP, the District contracted for removal of and data collection on northern pikeminnow (*Ptychocheilus oregonensis*) from the Wells tailrace and reservoir in 2007. Northern pikeminnow have been identified as a major predator of juvenile salmonids. In 2007, the contractor used long-line gear to capture 20,470 northern pikeminnow. Of that total, 18,629 northern pikeminnow were at least 9 inches in fork length and 1,844 were less than 9 inches in fork length. These fish were captured during 4,096 hours of angling effort translating into an overall catch-per-unit-effort (CPUE) or fish-per-hour value of 5.0. 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.). A majority of the fish were captured within the Wells Tailrace (13,987), with the remainder (6,483) caught in the Wells Reservoir, including the lower 1-mile section of the Methow River.

D. Summer Chinook Radio-telemetry Study

In summer 2007, the District conducted a study evaluating summer Chinook passage times through the collection galleries of the fishways at Wells Dam. This study was conducted to determine whether a flow-guidance baffle improved fish passage via the east fishway at Wells Dam (no modification was made to the west ladder). Results indicated that the baffle has provided an improvement in ladder passage time (i.e., decreased passage time), and the Wells Coordinating Committee agreed in December 2007 that the District should install a similar baffle in the west ladder.

E. Bull Trout Radio-Telemetry

From 2001 through 2004, the District participated in regionally coordinated bull trout radio-telemetry studies. In support of these studies, 79 bull trout were radio-tagged at mid-Columbia River dams in 2001 and 2002. Passage times and migration rates for these fish were monitored at Rock Island, Rocky Reach, and Wells dams. Reservoir passage and tributary entrance times were also monitored. Monitoring for bull trout tagged in 2002 continued through December 2004, with no tags being detected in 2004. Based upon the 2001-2004 study results, the Wells Project and its operations do not appear to impact bull trout survival, migration, and spawning success.

As identified in the 2004 Bull Trout Biological Opinion, the District, in consultation with the FERC and the U.S. Fish and Wildlife Service (USFWS), developed the *Wells Hydroelectric Project Bull Trout Monitoring and Management Plan, 2004-2008*. The primary goal of this plan is to 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. In May and June 2007, the District tagged 10 adult bull trout at Wells Dam with radio transmitters and PIT tags, and monitored upstream and downstream passage through the dam and movements of tagged fish while in the Project area (dam, reservoir, and tailrace). Of the ten tagged fish, none passed upstream or downstream through Wells Dam in 2007. Four additional bull trout tagged in 2007 by the USFWS or Chelan PUD

passed upstream (n = 3) or downstream (n = 1) through Wells Dam. Additionally, four bull trout tagged by Chelan PUD in 2006 made valid (within one year from date of tagging) passes through Wells Dam (upstream=3, downstream=1). No conclusive instances of mortality resulted from these passage events, as confirmed by detected movement of each fish following each passage event.

In addition to the tagging of adult bull trout, the District agreed to PIT-tag sub-adult bull trout when encountered at Wells Dam or during the operation of rotary screw traps in the Methow River watershed. Fourteen sub-adult bull trout were PIT tagged at tributary traps in 2007. To date, two PIT-tagged fish have been recaptured. Recaptures consisted of, 1) a sub-adult bull trout recorded in Gold Creek two days after it was PIT tagged and released on 26 July 2007 from the Methow River smolt trap, and 2) an adult bull trout, originally tagged at Wells Dam, that was captured via hook-and-line angling on 20 June 2007 by the USFWS. No PIT-tagged sub-adult fish (those captured in the Methow watershed smolt trapping operations) have been detected passing the dam, and none have been detected subsequent to tagging in any of the tributary traps. There also have been no observations of sub-adult bull trout during either video surveillance of the fish ladders at Wells Dam, or during annual ladder maintenance activities.

Genetic samples have been taken from all radio- and PIT-tagged bull trout in an effort to determine the Core Areas and Local Populations of those fish that utilize the Wells Project area; the analysis of these samples by the USFWS is pending.

F. Lamprey Radio-telemetry Study

In fall 2007, the District performed a radio-telemetry study to investigate migration and passage behavior of adult lamprey migrating through Wells Dam. Adult lamprey were captured in the fishways at Wells Dam during August and September 2007. All captured lamprey meeting specific size criteria were tagged and released at or below Wells Dam. Fixed-station monitoring at Wells Dam was used to detect the movements of these tagged fish in and around the fishways. The purpose of this study was to provide the information needed to inform relicensing decisions related to adult lamprey passage through Wells Dam.

G. Total Dissolved Gas Monitoring at Wells Dam

In 2007, the volume of water in the Columbia River passing Wells Dam from April to September was 108 percent of the twenty-year average. The maximum hourly discharge recorded was 237,500 cfs on May 4. During 2007, TDG data were collected from the Wells Dam forebay and tailwater. The forebay TDG monitor recorded 12-hour average values of 100.9 – 113.2 percent. The tailwater monitor recorded 12-hour average values from 103.5 – 122.0 percent. Operations of the juvenile bypass system at Wells Dam resulted in only slight increases in Wells tailrace TDG values.

In 2007, a spill playbook was developed to guide Wells Project spill operations (specifically, the implementation of spread spill and concentrated spill) in a manner that further evaluated the results of the 2006 TDG study and that examined the spill playbook operating scenarios over a broader range of environmental conditions. There were no scheduled spill tests in 2007 and project operators were instructed to utilize the playbook only during forced spill events (when river flows exceeded flows needed to meet load). Specific objectives of the 2007 assessment included:

1. Evaluate TDG production for full gate (concentrated) spills over a range of operational

conditions.

2. Evaluate TDG production for spread spills over a range of operational conditions.
3. Evaluate indirect effects, and operational and logistical concerns for full gate spill that might limit their application for TDG management.
4. Collect additional TDG data in order to refine the relationships of spill momentum and submergence depth as they affect TDG production.

At the end of May 2007, it was determined that the logistics of operating gates 2 and 10, which require manual adjustments, made implementation of spread spills impractical. The District decided to emphasize a concentrated spill strategy for the remainder of the assessment.

River flows in spring 2007 were 108.7% of the 20-year average. The peak total river discharge at Wells Dam (based on 15-minute average data) was 271 kcfs, and the maximum spill flow was 155 kcfs. There were few spill events in excess of the fish bypass spill after May. Most of the spill events were of short duration, which did not meet the required 3-hour time period that is necessary to establish equilibrium conditions at the downstream TDG monitoring station (WELW); i.e., 3 hours provides for travel time and data collection time at the downstream monitoring station that is representative of the operational conditions at Wells Dam. Conclusions of the 2007 assessment are as follows:

1. 2007 was an above-average water year. During the 2007 fish passage season (April 1-September 15) Wells Dam was able to maintain compliance with the TDG standards 97% of the time.
2. Maintaining a spread spill pattern at Wells Dam, utilizing spill gates 2 and 10, was not logistically feasible for low and moderate ranges of spill. As a result, future low and moderate spill testing should focus on collecting TDG response values for spill focused through full gate spillway patterns.
3. Spill in 2007 was not of a sufficient duration to adequately test the performance of a full gate spill pattern to minimize TDG below Wells Dam.
4. Although spill events that were in excess of fish bypass spill and of a steady state (spill gate and generator operations unchanged) of at least 3 hours in duration were rare (6 total), data collected on Wells spill operations during 2007 were consistent with analytical results for the 2006 TDG Study.

VI. EXPENSES for the 2007 Calendar Year**A. Fish Passage and Production Facilities and Non-study Expenses**

	Total Costs	Minus Credits ¹
1. Operation of District Wells Hatchery a/c 537.2, 545.34	\$1,205,461	\$1,023,153
2. Supervision of Fish & Game Facilities a/c 537.3	\$190,697	\$190,697
3. Operation of District Methow Hatchery a/c 537.7, 545.5	\$994,586	\$280,292
4. Fish Management a/c 537.9, 545.8	\$468,275	\$468,275
5. Maintenance of District Fish Facilities a/c 545.2	\$8,819	\$8,819
6. Maintenance Miscellaneous Fish Related a/c 545.6	\$3,353	\$3,353
7. Annual Debt Service on Fish and Game Plant	\$3,703,890	\$3,703,890
Totals	\$6,575,081	\$5,678,479

¹Actual District costs calculated according to the terms of existing hatchery sharing agreements

B. Licensee Fisheries Study Costs

1. Fish Studies a/c 537.5	\$503,881
2. Fish Studies – Methow Hatchery Evaluation a/c 537.6	\$801,330
Total	\$1,305,211

Table 1. Wells Dam fish counts; Monthly Summaries for 24 hour count period; 2007

Month	Chinook Salmon						Coho	Sockeye	Steelhead		Total Steelhead	Bull Trout	Lamprey	
	Spring		Summer		Fall				Hatchery	Wild				
May	776	316					1,092		17	28	45	23	0	
June	1,265	436	256	27			1,984	731	4	14	18	29	0	
July			9,360	2,077			11,437	20,310	125	125	250	6	0	
August			3,628	1,469	171	99	5,367	1,184	807	798	1,605	1	13	
September					702	570	1,272	11	18	1,797	1535	3,332	0	22
October					685	342	1,027	1849	30	1,207	826	2,033	0	0
November					75	26	101	572		133	84	217	0	0
Total	2,041	752	13,244	3,573	1,633	1,037	22,280	2,432	22,273	4,090	3,410	7,500	59	35

Wells fish counts were made using WDFW conversion dates

Spring Chinook May 1 - June 28

Summer Chinook June 29 - August 28

Fall Chinook August 29 - November 15.

Table 2. Wells Dam fish counts; Monthly Summaries for 16 hour count period; 2007 (counting from 0400 - 2000 PST)

Month	Chinook Salmon						CA+CJ	Coho	Sockeye	Steelhead	
	Spring		Summer		Fall					Hatchery	Wild
	Adults	Jacks	Adults	Jacks	Adults	Jacks					
May	681	229								15	25
June	1,153	410	240	26			226		597	4	15
July			8,903	1,968			10,871		17,459	119	120
August			3,359	1,370	156	96	4,981		1,011	740	723
September					622	513	1,135	11	14	1,563	1,331
October					596	308	904	1,575	25	1,033	698
November					50	15	65	447		116	72
Total	1,834	709	12,502	3,364	1,424	932	18,222	2,033	19,106	3,590	2,984

Table 3. Wells Dam fish counts; Percentage of night passage, 2007 (Percent seen between the hours 000 - 0400 and 2000 - 2400)

Month	Chinook Salmon						CA+CJ	Coho	Sockeye	Steelhead	
	Spring		Summer		Fall					Hatchery	Wild
	Adults	Jacks	Adults	Jacks	Adults	Jacks					
May	12%	5%								12%	11%
June	9%	6%	6%	4%					18%	0%	-7%
July			5%	5%					14%	5%	4%
August			7%	7%	9%	3%			15%	8%	9%
September					11%	10%			22%	13%	13%
October					13%	10%		15%	17%	14%	15%
November					33%			22%		13%	14%
Total	10%	6%	6%	6%	13%	10%	18%	16%	14%	12%	12%

Wells fish counts were made using WDFW conversion dates

Spring Chinook May 1 - June 28

Summer Chinook June 29 - August 28

Fall Chinook August 29 - November 15.

Table 4. Production from the Wells Hatchery in 2007

	Summer Chinook	Summer Steelhead ¹
Adult broodstock trapped, 2007	1,338	391
Jacks broodstock trapped, 2007	--	0
Females spawned in 2007	582	207
Eggs taken, 2007	2,627,936	1,238,431
Eggs transferred, 2007	797,500	124,293 ²
Eggs for Lake Chelan release, 2007	103,400	0
Juveniles transferred (Ringold FH)		201,000 ³
Juveniles released, 2005 brood	333,587	0
Juveniles released, 2006 brood	406,199	451,374
Released to Lake Chelan, 2006 brood	39,756	0

1. Adult steelhead collected at Wells Dam for broodstock are held until spawning during the following year. Thus, the steelhead spawned in 2007 (designated 2007 brood) were actually collected in 2006.

2. Transfer to the Winthrop National Fish Hatchery

3. Steelhead transferred to Ringold Hatchery were 700 fpp, or 287 lbs. of steelhead.

Table 5. Spring Chinook Production from the Methow Hatchery in 2007

	Twisp R.	Chewuch R.	Methow R.
Adults trapped, 2007 brood	5	219 ¹	
Females spawned, 2007 brood	19	73 ²	
Eggs taken, 2007 brood	76,000	292,000	
Juveniles released, 2005 brood	27,658	232,841	156,633

1. In 2007, Spring Chinook adults were trapped at the West Ladder trap at Wells Dam (75 males and 61 females), the Methow Hatchery outfall channel (46 males and 37 females), and the Twisp tributary trap (5 males). Twisp-origin fish collected at the Methow Hatchery and Wells Dam were identified using genetic analysis. Only those fish collected from the West Ladder trap at Wells Dam were excluded from the fish passage summaries (see Tables 1-3).

2. The hatchery distinguished only the Twisp River fish in their report of the number of females spawned from all collection locations, and did not otherwise provide numbers of females spawned categorized by collection location. All non-Twisp fish were categorized as Methow-Composite (MetComp).

Table 6. Passage of Bull Trout at Wells Dam, 2007

Day	April	May	June	July	Aug	Sept	Oct	Nov
1	0	0	1	1	0	0	0	0
2	0	0	3	0	0	0	0	0
3	0	0	2	0	0	0	0	0
4	0	0	6	0	0	0	0	0
5	0	0	2	0	0	0	0	0
6	0	0	0	0	1	0	0	0
7	0	0	0	1	0	0	0	0
8	0	0	0	1	0	0	0	0
9	0	0	0	0	0	0	0	0
10	0	0	2	1	0	0	0	0
11	0	0	0	1	0	0	0	0
12	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0
14	0	1	2	0	0	0	0	0
15	0	0	3	0	0	0	0	0
16	0	0	0	0	0	0	0	
17	0	0	1	0	0	0	0	
18	0	1	0	0	0	0	0	
19	0	0	0	0	0	0	0	
20	0	1	2	1	0	0	0	
21	0	0	0	0	0	0	0	
22	0	1	2	0	0	0	0	
23	0	2	0	0	0	0	0	
24	0	1	1	0	0	0	0	
25	0	1	1	0	0	0	0	
26	0	5	0	0	0	0	0	
27	0	3	0	0	0	0	0	
28	0	0	0	0	0	0	0	
29	0	2	1	0	0	0	0	
30	0	4	0	0	0	0	0	
31	0	1		0	0		0	
Total	0	23	29	6	1	0	0	0
							Season total	59

Table 7. Passage of Lamprey at Wells Dam, 2007

Day	April	May	June	July	Aug	Sept	Oct	Nov
1	0	0	0	0	0	0	0	0
2	0	0	0	0	0	1	0	0
3	0	0	0	0	0	1	0	0
4	0	0	0	0	0	0	0	0
5	0	0	0	0	0	1	0	0
6	0	0	0	0	0	0	0	0
7	0	0	0	0	0	2	0	0
8	0	0	0	0	0	1	0	0
9	0	0	0	0	0	3	0	0
10	0	0	0	0	0	3	0	0
11	0	0	0	0	0	0	0	0
12	0	0	0	0	1	0	0	0
13	0	0	0	0	0	0	0	0
14	0	0	0	0	0	1	0	0
15	0	0	0	0	0	0	0	0
16	0	0	0	0	1	0	0	0
17	0	0	0	0	0	0	0	0
18	0	0	0	0	1	0	0	0
19	0	0	0	0	1	0	0	0
20	0	0	0	0	0	3	0	0
21	0	0	0	0	0	3	0	0
22	0	0	0	0	0	0	0	0
23	0	0	0	0	1	3	0	0
24	0	0	0	0	0	0	0	0
25	0	0	0	0	1	0	0	0
26	0	0	0	0	1	0	0	0
27	0	0	0	0	2	0	0	0
28	0	0	0	0	1	0	0	0
29	0	0	0	0	1	0	0	0
30	0	0	0	0	1	0	0	0
31	0	0	0	0	1		0	0
Total	0	0	0	0	13	22	0	0
Season total								35

Attachment 1. Wells Dam Daily Fish passage report, 2007.
Passage for the hours 0000 to 2400 PST.

May-07								Jun-07							
Date	Chinook		Coho	Sockeye	Steelhead Hat	Steelhead Wld	Lamprey	Date	Chinook		Coho	Sockeye	Steelhead Hat	Steelhead Wld	Lamprey
	Adults	Jacks							Adults	Jacks					
1					1	3		1	54	36				2	
2					2	2		2	46	21					
3	1					1		3	30	27					
4	6				1	3		4	40	36					
5	1				1			5	24	24					
6	2							6	9	11					
7	5					2		7	51	39					
8	17					4		8	18	19					
9	16				3	1		9	7	16					
10	5				2			10	47	36					
11	12				1	1		11	29	20				2	
12	10					3		12	14	14				1	
13	15				1	1		13	14	18	1			2	
14	16	1						14	17	10	3	1			
15	33				1			15	8	10	1				
16	24	2			1			16	23	11					
17	14	5						17	12	4	1				
18	51	5						18	4	5	1				
19	44	2			1			19	25	11	6	1			
20	23	7				2		20	20	11	8			1	
21	28	7						21	25	3	12				
22	21	14				2		22	20	8	14				
23	34	14						23	122	6	9			1	
24	86	23				1		24	50	4	27				
25	62	16						25	42	4	40				
26	63	42						26	27	7	65				
27	47	36						27	263	9	83			4	
28	24	25						28	224	16	131				
29	26	37			2	1		29	159	21	170			1	
30	56	58						30	97	6	159	2			
31	34	22				1									
Totals	776	316	0	0	17	28	0	Totals	1521	463	0	731	4	14	0

Attachment 1 (Continued). Wells Dam Daily Fish passage report, 2007.
Passage for the hours 0000 to 2400 PST.

Jul-07								Aug-07							
Chinook								Chinook							
Date	Adults	Jacks	Coho	Sockeye	Steelhead Hat	Steelhead Wild	Lamprey	Date	Adults	Jacks	Coho	Sockeye	Steelhead Hat	Steelhead Wild	Lamprey
1	285	13		339	1	1		1	174	67		133	4	8	
2	88	9		328		2		2	110	40		111	16	12	
3	324	30		465	2	1		3	455	86		199	26	18	
4	593	84		789	2			4	168	42		76	15	18	
5	259	34		647	1	1		5	45	24		52	9	18	
6	247	31		943	1	2		6	317	110		60	13	11	
7	319	61		1469	2	1		7	332	131		63	18	11	
8	172	63		1037	2	1		8	188	88		35	16	19	
9	453	60		709	2	2		9	262	95		89	30	35	
10	618	94		1201	3	1		10	212	96		77	20	26	
11	112	28		1348	3			11	112	53		41	20	17	
12	504	103		1252	3	4		12	75	36		27	26	23	1
13	192	67		1227	2	1		13	72	31		40	13	8	
14	309	69		1202	2	3		14	79	35		28	11	10	
15	801	134		948	10			15	78	31		16	13	23	
16	124	47		732	3	1		16	38	38		14	21	27	1
17	101	74		523	2	5		17	61	40		13	29	28	
18	125	63		648	1	2		18	53	46		5	16	26	1
19	262	103		619	2	7		19	69	36		9	19	21	1
20	213	35		468	5	5		20	40	21		10	15	10	
21	626	98		466	3	4		21	151	71		21	22	18	
22	163	46		410	6	1		22	33	44		15	20	19	
23	328	101		329	4	7		23	78	36		23	39	39	1
24	309	41		390	6	5		24	60	28		10	28	38	
25	204	75		379	12	9		25	32	10		4	40	48	1
26	411	145		405	12	12		26	120	38		2	54	42	1
27	243	106		242	7	7		27	34	22		1	48	26	2
28	259	91		197	14	17		28	180	74		4	43	33	1
29	219	73		214	7	8		29	33	24		2	44	27	1
30	233	71		187	2	6		30	27	31		1	44	51	1
31	264	28		197	3	9		31	111	44		3	75	88	1
Totals	9360	2077	0	20310	125	125	0	Totals	3799	1568	0	1184	807	798	13

Attachment 1 (Continued). Wells Dam Daily Fish passage report, 2007.
Passage for the hours 0000 to 2400 PST.

Sep-07								Oct-07							
Chinook								Chinook							
Date	Adults	Jacks	Coho	Sockeye	Steelhead Hat	Steelhead Wild	Lamprey	Date	Adults	Jacks	Coho	Sockeye	Steelhead Hat	Steelhead Wild	Lamprey
1	25	28		2	55	58		1	9	9	4		38	31	
2	72	31		2	64	76	1	2	5	6	1	2	50	42	
3	69	25			74	73	1	3	8	10	6	4	39	25	
4	17	20			16	22		4	13	13	18	5	86	57	
5	22	16		1	33	29	1	5	19	14	11	6	119	86	
6	20	19		2	48	45		6	15	8	10	2	44	38	
7	69	40		2	60	76	2	7	35	19	45	3	85	61	
8	56	39		1	60	48	1	8	22	9	10	1	29	21	
9	32	22		2	45	38	3	9	14	5	9		32	27	
10	38	23			62	58	3	10	18	10	16	1	45	29	
11	15	19			35	50		11	13	12	40	2	38	17	
12	46	33		2	71	38		12	27	23	37	1	65	47	
13	18	31			68	49		13	43	10	67	3	37	24	
14	19	7			58	67	1	14	37	17	66		62	39	
15	9	13			66	53		15	63	19	55		49	19	
16	27	31			138	115		16	66	24	74		70	33	
17	17	12			47	42		17	65	23	86		39	15	
18	8	18			46	35		18	40	8	57		43	15	
19	7	7		1	67	44		19	34	9	166		34	29	
20	4	8			60	41	3	20	24	21	75		18	21	
21	4	9			32	23	3	21	24	17	88		16	7	
22	23	18			60	54		22	24	15	105		11	7	
23	22	13	1		64	51	3	23	13	8	119		20	12	
24	4	10			34	21		24	10	8	81		18	14	
25	5	12			33	35		25	3	6	118		27	16	
26	3	11			56	28		26	5	5	74		13	13	
27	19	13	1	1	123	83		27	7	7	98		24	27	
28	12	13	2	2	74	60		28	6	2	83		22	11	
29	7	17	3		71	55		29	4		101		10	17	
30	13	12	4		77	68		30	5	4	64		10	9	
								31	14	1	65		14	17	
Totals	702	570	11	18	1797	1535	22	Totals	685	342	1849	30	1207	826	0

Attachment 1 (Continued). Wells Dam Daily Fish passage report, 2007.
Passage for the hours 0000 to 2400 PST.

Date	Nov-07						
	Chinook		Coho	Sockeye	Steelhead Hat	Steelhead Wild	Lamprey
Adults	Jacks						
1	10	2	85		12	6	
2	11	2	77		15	8	
3	7	5	60		7	10	
4	6	6	89		7	4	
5	11	2	64		14	7	
6	8	6	49		16	5	
7	3		38		11	5	
8	2	2	19		6	4	
9	3		17		7	2	
10	2		25		8	8	
11	1		9		7	3	
12	4	1	21		6	4	
13	3		9		4	5	
14	2		6		10	5	
15	2		4		3	8	
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
31							
Totals	75	26	572	0	133	84	0

Attachment 2. Wells Dam Annual Ladder Counts of Salmon and Steelhead for a 16-hour Daily Count Period (1967-2007)

Year	Chinook Spring	Chinook Summer	Chinook Fall	Chinook Trapped	Chinook Total	Coho	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
Mean	2,882	10,345	2,547	1,582	17,264	182	32,551	5,698	493	6,192	56,180	
Gmean	2,188	6,587	2,055	1,393	13,502	74	24,551	4,055	467	4,661	47,893	

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.

Attachment 3. Wells Dam Annual Ladder Counts of Salmon and Steelhead for a 16-hour Daily Count Period (1967-1997) and 24-hour Daily Count Period from 1998-2007.

Year	Chinook Spring	Chinook Summer	Chinook Fall	Chinook Trapped	Chinook Total	Coho	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	*	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

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.

Attachment 4. Wells Dam Daily Water Quality Report, 2007

Apr-07					May-07					Jun-07					Jul-07				
Date	Turbidity	Water Temp (F)	Forebay TDG	Tailwater TDG	Date	Turbidity	Water Temp (F)	Forebay TDG	Tailwater TDG	Date	Turbidity	Water Temp (F)	Forebay TDG	Tailwater TDG	Date	Turbidity	Water Temp (F)	Forebay TDG	Tailwater TDG
1		41	102%	107%	1	12	47	109%	111%	1	8	55	113%	115%	1	10	60	110%	110%
2		41	101%	110%	2	12	47	110%	112%	2	8	55	113%	114%	2	10	60	111%	111%
3		41	101%	111%	3	11	47	110%	111%	3	8	56	111%	114%	3	10	60	111%	112%
4		42	101%	110%	4	11	47	109%	110%	4	8	56	111%	114%	4	10	61	111%	112%
5		42	101%	106%	5	11	48	109%	114%	5	7	55	111%	112%	5	12	61	112%	113%
6		42	102%	108%	6	11	48	108%	111%	6	8	55	109%	111%	6	12	61	113%	115%
7		43	103%	106%	7	13	48	108%	108%	7	5	55	110%	114%	7	12	62	113%	114%
8		43	104%	104%	8	13	49	108%	113%	8	5	55	110%	114%	8	10	62	112%	113%
9		43	105%	105%	9	13	49	110%	119%	9	6	54	110%	112%	9	12	62	112%	113%
10		43	105%	105%	10	13	50	109%	111%	10	4	55	110%	111%	10	12	62	111%	112%
11		44	104%	104%	11	13	50	108%	109%	11	4	56	109%	111%	11	12	61	111%	112%
12		44	105%	106%	12	13	50	109%	110%	12	4	57	110%	111%	12	12	61	112%	113%
13		44	105%	110%	13	13	50	109%	111%	13	8	57	110%	111%	13	12	62	112%	113%
14		44	104%	108%	14	13	50	108%	115%	14	9	57	110%	113%	14	12	62	111%	112%
15		44	105%	113%	15	13	50	106%	108%	15	9	57	110%	112%	15	10	62	111%	112%
16		44	104%	106%	16	9	51	109%	110%	16	9	57	110%	111%	16	12	63	111%	112%
17		44	105%	107%	17	9	51	109%	112%	17	9	57	110%	110%	17	12	62	111%	112%
18		45	105%	109%	18	9	51	109%	112%	18	9	57	111%	112%	18	12	62	111%	112%
19		45	106%	111%	19	9	51	108%	112%	19	11	58	111%	113%	19	12	62	110%	112%
20		45	106%	109%	20	7	51	108%	112%	20	11	58	111%	113%	20	12	63	110%	111%
21		45	106%	109%	21	6	51	108%	110%	21	11	58	110%	112%	21	14	63	110%	111%
22		45	106%	108%	22	6	52	107%	111%	22	11	59	109%	110%	22	12	63	109%	111%
23		46	107%	108%	23	6	52	107%	110%	23	10	59	109%	110%	23	12	64	109%	110%
24		46	109%	110%	24	6	52	109%	110%	24	10	59	108%	109%	24	14	64	110%	111%
25		47	108%	110%	25	8	53	110%	112%	25	6	59	109%	111%	25	14	64	110%	111%
26		47	108%	111%	26	8	53	110%	114%	26	10	59	108%	109%	26	14	64	110%	113%
27		46	108%	109%	27	8	53	110%	112%	27	10	59	110%	112%	27	14	64	110%	112%
28		47	108%	109%	28	10	53	110%	113%	28	12	59	111%	113%	28	14	64	110%	113%
29		47	108%	110%	29	10	54	111%	115%	29	12	59	111%	112%	29	14	65	110%	113%
30		47	109%	110%	30	10	54	112%	116%	30	10	59	110%	111%	30	16	65	110%	113%
					31	8	54	112%	115%						31	16	65	110%	111%
Avg	0	44	105%	108%	Avg	10	51	109%	112%	Avg	8	57	110%	112%	Avg	12	62	111%	112%

Attachment 4 (continued). Wells Dam Daily Water Quality Report, 2007

Aug-07					Sep-07					Oct-07					Nov-07				
Date	Turbidity	Water Temp (F)	Forebay TDG	Tailwater TDG	Date	Turbidity	Water Temp (F)	Forebay TDG	Tailwater TDG	Date	Turbidity	Water Temp (F)	Forebay TDG	Tailwater TDG	Date	Turbidity	Water Temp (F)	Forebay TDG	Tailwater TDG
1	14	65	110%	111%	1	14	68	106%	105%	1	14	63			1	14	58		
2	14	66	110%	111%	2	14	68	105%	105%	2	14	63			2	14	58		
3	15	66	111%	111%	3	14	68	105%	104%	3	14	63			3	14	58		
4	12	66	110%	110%	4	14	69	106%	104%	4	14	63			4	14	57		
5	12	66	110%	111%	5	14	69	106%	105%	5	14	63			5	14	57		
6	12	66	112%	111%	6	14	69	105%	104%	6	14	63			6	14	57		
7	14	66	111%	111%	7	14	68	105%	104%	7	14	62			7	14	57		
8	14	66	110%	111%	8	14	68	104%	103%	8	14	63			8	14	57		
9	14	66	109%	110%	9	14	68	104%	103%	9	14	63			9	15	57		
10	14	66	109%	110%	10	14	68	104%	103%	10	16	63			10	16	57		
11	14	67	108%	109%	11	14	68	105%	103%	11	16	63			11	15	57		
12	14	67	109%	109%	12	14	67	106%	104%	12	16	63			12	15	56		
13	13	66	108%	109%	13	14	67	105%	105%	13	16	63			13	15	56		
14	14	67	107%	108%	14	14	67	105%	104%	14	16	63			14	14	56		
15	14	67	108%	109%	15	15	67	105%	104%	15	14	62			15	15	55		
16	16	67	109%	109%	16	15	67	105%	104%	16	14	62			16		55		
17	14	67	108%	109%	17	14	67			17	14	62			17		55		
18	12	67	107%	108%	18	14	66			18	14	62			18		54		
19	12	67	107%	108%	19	14	66			19	14	61			19		54		
20	13	67	106%	107%	20	14	66			20	14	61			20		54		
21	14	67	105%	107%	21	14	65			21	14	61			21		54		
22	12	67	105%	106%	22	14	65			22	16	61			22		53		
23	12	67	107%	107%	23	14	65			23	14	60			23		53		
24	12	68	107%	107%	24	14	65			24	14	61			24		52		
25	14	68	107%	107%	25	14	64			25	14	61			25		52		
26	14	68	106%	107%	26	14	65			26	14	60			26		52		
27	14	68	106%	106%	27	14	64			27	14	60			27		51		
28	14	68	105%	105%	28	14	64			28	14	59			28		51		
29	14	68	105%	104%	29	14	64			29	13	59			29		51		
30	14	68	106%	104%	30	14	64			30	13	59			30		51		
31	14	68	107%	106%	31	14	64			31	14	59							
Avg	14	67	108%	108%	Avg	14	67	105%	104%	Avg	14	62			Avg	14	55		

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