ANNUAL REPORT OF OPERATIONS

FISH FACILITIES: 2004

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

March 2005

FISH FACILITIES OPERATIONS ANNUAL REPORT FOR 2004

WELLS HYDROELECTRIC PROJECT, NO. 2149

Located on the Columbia River at River Mile 515.8

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 viewing video records of fish swimming past 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 through November 15th. Attachment 2 shows the annual summary from 1967 through 2004 of salmon and steelhead counts at Wells Dam in the historic 16-hour count format, and for comparison, Attachment 3 shows the 24-hour count totals for the years 1998 through 2004 instead of the 16-hour count totals.

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. Table 3 shows the nighttime percent of total adult passage of salmon and steelhead. Broodstock removed from the ladders for spring, summer and fall chinook and steelhead are not included in the fish passage summaries. Numbers of fish removed for broodstock are shown in Tables 4 and 5.

C. Bull trout (*Salvelinus confluentus*) were listed as "Threatened" under the Endangered Species Act on June 10, 1998 for the Klamath and Columbia rivers. Bull trout passage records were first initiated at Wells in 1999. Bull trout counts were recorded from May 1 through November 15, 2004 (see Table 1). Daily passage of Bull trout for 2004 is found in Table 6.

D. Lamprey (*Lampetra tridentata*) passage records were first initiated at Wells in 1995. Lamprey counts were recorded from May 1 through November 15, 2004 (see Table 1). Daily passage of lamprey for 2004 is shown in Table 7.

II. PROJECT OPERATIONS

A. Adult Fish Passage Facilities

The adult fish passage facilities were operated using the criteria established by the Wells Long-Term Settlement Agreement and more recently incorporated into 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 gate from a six-foot opening to an eight-foot opening.

Routine inspection and maintenance was performed on the east ladder from February 11 to 24,

and December 13 through 31, 2004; and on the west ladder from January 1 through February 5, 2004. The ladder operated at criteria through the entire fish passage assessment period.

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 combines 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, 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 2004 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. Over 63 days, 1.1 MAF (million acre feet) of water or 8.1% of the project inflow was used for spring bypass operations. During the spring bypass period, there was forced spill for three hours or 0.2% of the time. Summer bypass operations began on June 14 and ran through August 26, for a total of 74 days. The summer operation used 1.1 MAF of water, which was 6.9% of the project inflow. During the summer bypass operating period, there was no forced spill.

The operation of the bypass in 2004 was consistent with operational timing specified in both the Wells Settlement Agreement and the Wells Dam HCP. In the past, hydroacoustics and fyke netting have provided real-time fish migration data. The fixed dates were established from 21 years of hydroacoustic 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 are shown in Attachment 4 from April 1 through November 15. Starting in 2003, water temperature was collected at the fish ladder attraction flow pumps located in the tailrace of Wells Dam. Historically, water temperature data have been collected at the turbine cooling water intake at Unit 5. Turbidity values are Secchi disc readings in feet. Total Dissolved Gas (TDG) is reported for both the forebay and tailwater as the 12-hour high average (12h) in percent TDG.

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).

V. FISH STUDIES AND OBSERVATIONS

The District funded several fish related studies during 2004. 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 an Okanagan River water management plan for the protection of incubating sockeye eggs. Untimely or excessive water released from Okanogan Lake has been found to adversely affect the survival of both sockeye and kokanee during the winter and spring months when eggs are incubating in gravels in lake and river environments. The new plan involved working with the Canadian fisheries parties to develop a model-based flow management program to aid in the reduction of damaging flows. The Fish Water Management Tools (FWMT) program developed a model that allows both fish and water managers 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 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 years. The retrospective analyses indicated that the average improvement in salmon 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 are better in a wet year (75%) rather than a dry year (38%) because of the avoidance of egg scour. The best improvement year showed a 443-percent improvement. On October 5, 2004, the fisheries parties to the Wells HCP Hatchery Committee and the Wells HCP Coordinating Committee approved the FWMT program as meeting the sockeye mitigation responsibility for unavoidable losses at Wells Dam. The District will continue to support the FWMT program in 2005.

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 Pools 67 and 68. Thus, PIT-tagged adult fish that were diverted from the fishway at each trap were not monitored by the PIT-tag detection system. To increase the efficiency of the PIT-tag detection system, additional PIT-tag detectors were installed in 2004, one was placed on the exit of each trap to provide detection of PIT-tagged fish collected at the traps.

C. Northern Pikeminnow Removal in the Wells Tailrace and Reservoir

The District contracted for removal of and data collection on northern pikeminnow (*Ptychochelius oregonensis*) from the Wells tailrace and reservoir. Northern pikeminnow have been identified as a major predator of juvenile salmonids. In 2004, the contractor used long-line gear to capture 19,562 northern pikeminnow. Of that total, 16,588 northern pikeminnow were over 9" in fork length and 2,974 were less than 9" in fork length. These fish were captured during 4,715 hours of angling effort translating into an overall catch-per-unit-effort (CPUE) or fish-per-hour value of 4.2. 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 lower Wells Reservoir (10,072 fish during 2,415 angling hours, CPUE = 4.2). Significant numbers of pikeminnow (8,686) were also captured in the tailrace area below Wells Dam during 2,063 hours of effort (CPUE = 4.2). Anglers also caught 737 pikeminnow in the lower 1-mile stretch of the Methow River during 189 hours of effort (CPUE = 3.9). Finally, low CPUE (1.4) from efforts in the upper Wells Reservoir yielded only 67 pikeminnow over 48 hours.

An alternative CPUE measure reported by the contractor was 0.005 fish per hook-hour. This was calculated as the total number of fish caught, divided by the product of the number of hooks fished per day, the number of days fished, and the number of hours fished per day. Over the 115-day fishing season, fishing effort equaled 3,780,000 hook hours.

D. Total Dissolved Gas Monitoring at Wells Dam

The volume of water passing Wells Dam in 2004 was below average (95.9 MAF, or 86 percent of average), and the maximum hourly discharge recorded was 217,000 cubic feet per second on June 29. During 2004, TDG data were collected from the forebay and tailwater of Wells Dam. The forebay TDG monitor recorded 12-hour average levels from 102.0 – 113.5%. The tailwater monitor recorded 12-hour average levels between 101.6 – 113.7%. Operation of the juvenile bypass system at Wells Dam resulted in only slight increases in dissolved gasses in the Columbia River.

E. Bull Trout Radio-Telemetry

Starting in 2001 and continuing through 2004, the District has participated in regionally coordinated bull trout telemetry studies. A study initiated in 2001 radio tagged 79 bull trout at mid-Columbia River dams in 2001 and 2002. The passage times and migration rates for these fish were monitored at Rock Island, Rocky Reach and Wells dams. Reservoir passage and tributary monitoring was also conducted. Monitoring for bull trout tagged in 2002 with 24-month radio tags continued through December 2004, but no tags were detected during 2004. Based upon the results of these studies, Wells project operations do not appear to negatively influence bull trout survival, migration and spawning success.

In consultation with the FERC and the U.S. Fish and Wildlife Service per the 2004 Biological Opinion on bull trout, the District has developed the *Wells Hydroelectric Project Bull Trout Monitoring and Management Plan, 2004-2008*. The primary objective 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. The District will tag ten adult bull trout at the project each year for three consecutive years with two-year life-span radio transmitters, beginning in May 2005. The District will monitor upstream and downstream passage through Wells Dam and track and

monitor monthly movements of tagged fish while in the Project area (dam and reservoir) from 2005 through July 2008.

VI. EXPENSES for the 2003 Calendar Year

A. Fish Passage Facilities

1.	Operation of District Wells Hatchery	$803,990
2.	Supervision of Fish & Game Facilities	$184,074
3.	Operation of District Methow Hatchery	$823,115
4.	Maintenance of District Fish Facilities	$50,042
5.	Maintenance, Miscellaneous Fish Related	$2,761
6.	Annual Debt Service on Fish and Game Plant	$2,648,588
		$4,512,570

B. Licensee Fisheries Study Costs

1.	Fish Studies	$736,655
2.	Fish Studies - Methow Hatchery Evaluation	$438,656
3.	Mid-Columbia Endangered Species Studies	$41,935
		$1,217,246

Table 1. Wells Dam fish counts; Monthly Summaries for 24-hour count period; 2004

	Chinook Salmon													
	Spring		Summer		Fall		Total			Steelhead		Total		
Month	Adults	Jacks	Adults	Jacks	Adults	Jacks	Chinook	Coho	Sockeye	Hatchery	Wild	Steelhead	Bull Trout	Lamprey
May	2180	37					2217			24	50	74	29	6
June	2435	141	1401	13			3990		6127	4	52	56	16	5
July			23718	819			24537		70367	224	692	916	2	68
August			6355	541	641	51	7588		1466	571	1138	1709		152
September					3660	402	4062	46	87	2298	2741	5039		139
October					864	79	943	202	6	569	832	1401		33
November					80		80	43		27	95	122		
Total	4,615	178	31,474	1,373	5,245	532	43,417	291	78,053	3,717	5,600	9317	47	403

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; 2004
(counting from 0400 - 2000 PST)

	Chinook Salmon									
	Spring		Summer		Fall				Steelhead	
Month	Adults	Jacks	Adults	Jacks	Adults	Jacks	Coho	Sockeye	Hatchery	Wild
May	1,997	35							18	47
June	330	131	1,076	12				5,223	3	49
July			22,707	785				58,416	214	654
August			6,084	508	581	49		1,245	521	1,012
September					3,372	377	34	69	1,871	2,160
October					747	67	168	6	470	701
November					72		32		25	80
Total	2,327	166	29,867	1,305	4,772	493	234	64,959	3,122	4,703

Table 3. Wells Dam fish counts; Percentage of night passage, 2004
(% seen between the hours 000 - 0400 and 2000 - 2400)

	Chinook Salmon									
	Spring		Summer		Fall				Steelhead	
Month	Adults	Jacks	Adults	Jacks	Adults	Jacks	Coho	Sockeye	Hatchery	Wild
May	8%	5%							25%	6%
June	86%	7%	23%	8%				15%	25%	6%
July			4%	4%				17%	4%	5%
August			4%	6%	9%	4%		15%	9%	11%
September					8%	6%		21%	19%	21%
October					14%	15%			17%	16%
November					10%				7%	16%
Total	50%	7%	5%	5%	9%	7%		17%	16%	16%

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 2004

	Summer Chinook	Summer Steelhead[1]
Adult broodstock trapped 2004	1,192	462
Jacks broodstock trapping 2004	6	0
Females spawned in 2004	504	161
Eggs taken, 2004	1,875,125	710,420
Eggs transferred 2004	1,133,025	255,728
Juveniles Released 02 brood	306,810	0
Juveniles released 03 brood	425,271	355,935
Lake Chelan (eyed eggs)	50,000	0

1. Steelhead collected for broodstock are held and spawned during the following year, thus, the 2003 brood were actually collected at Wells Dam during 2002.

Table 5. Spring Chinook Production from the Methow Hatchery in 2004

	Twisp R.	Chewuch R.	Methow R.
Adults trapped 2004 brood	75	16	279
Females spawned 2004 brood	36	148[1]	
Eggs taken 2004 brood	137,064[2]	234,621	279,404[2]
Juveniles released 2002 brood	58,074	254,238	181,235

1. The hatchery reported the number of females spawned from the Chewuch River and all Methow River collection locations as a combined total of 148, and did not provide numbers of females spawned categorized by collection location.
2. Brood are from a combination of captive brood, hatchery outfall and CWT identified fish collected in neighboring basins.

Note: In 2004, Spring Chinook adults were trapped at the Chewuch and Twisp tributary traps, the Methow Hatchery outfall channel, the Winthrop National Hatchery outfall, and Foghorn Dam. There were no adults transferred to the Winthrop National Hatchery.

Table 6. Passage of Bull Trout at Wells Dam, 2004								
Day	April	May	June	July	Aug	Sept	Oct	Nov
1		0	0	0	0	0	0	0
2		0	1	1	0	0	0	0
3		0	0	0	0	0	0	0
4		0	0	0	0	0	0	0
5		0	1	0	0	0	0	0
6		4	3	0	0	0	0	0
7		1	0	0	0	0	0	0
8		0	1	0	0	0	0	0
9		0	0	0	0	0	0	
10		2	0	0	0	0	0	
11		0	0	0	0	0	0	
12		0	1	0	0	0	0	
13		0	0	0	0	0	0	
14		1	0	0	0	0	0	
15		0	0	0	0	0	0	
16		1	0	0	0	0	0	
17		2	0	0	0	0	0	
18		2	0	0	0	0	0	
19		2	0	0	0	0	0	
20		1	0	0	0	0	0	
21		1	2	1	0	0	0	
22		5	1	0	0	0	0	
23		0	0	0	0	0	0	
24		4	0	0	0	0	0	
25		2	0	0	0	0	0	
26		1	1	0	0	0	0	
27		0	2	0	0	0	0	
28		0	1	0	0	0	0	
29		0	2	0	0	0	0	
30		0	0	0	0	0	0	
31		0		0	0		0	
Total	0	29	16	2	0	0	0	0
						Season total		47

Attachment 1. Wells Dam Daily Fish Passage Report, 2004.

Passage for the hours 0000 to 2400 PST

	May-04								Jun-04							
	Chinook								Chinook							
Date	Adults	Jacks	Coho	Sockeye	Steelhead Hat	Steelhead Wld	Lamprey		Date	Adults	Jacks	Coho	Sockeye	Steelhead Hat	Steelhead Wld	Lamprey
1	5				6		0		1	45	4				1	0
2	13				14	8	0		2	35	2			1		0
3	23				3	16	0		3	109	4				1	1
4	31					1	1		4	34						0
5	30					3	2		5	17	1				1	0
6	114					2	0		6	32	9				2	0
7	113						0		7	22	6					0
8	88	1					0		8	10	1					0
9	164					1	0		9	18	3				3	0
10	90					1	0		10	7	5				2	0
11	23						0		11	1	3					0
12	19						1		12	6	2					1
13	27					2			13	6					1	0
14	78					3			14	13	5		1		3	0
15	149								15	5	10		2			0
16	38	1				3			16	6	6		10		2	0
17	106								17	42	3		13		3	0
18	87								18	23			11	1	2	0
19	30	2			1	2			19	23			17		3	0
20	107					2			20	182	4		50			0
21	234	2				1			21	31	2		82	1	2	0
22	128	3							22	39	4		111		4	0
23	41					1			23	405	3		160		6	0
24	75	5					2		24	257	4		198		2	0
25	57	4				1			25	50	1		202		1	0
26	46	1				1			26	447	15		356		2	0
27	32	3							27	277	25		798		2	1
28	57	2							28	293	19		933		4	1
29	58	9				1			29	258	7		1098			1
30	34	3							30	1143	6		2085	1	5	
31	83	1				1										
					24											
Totals	2180	37	0	0	48	50	6		Totals	3836	154	0	6127	4	52	5

Attachment 1. Wells Dam Daily Fish Passage Report, 2004 (Continued).
Passage for the hours 0000 to 2400 PST

	Jul-04								Aug-04							
	Chinook								Chinook							
Date	Adults	Jacks	Coho	Sockeye	Steelhead Hat	Steelhead Wld	Lamprey		Date	Adults	Jacks	Coho	Sockeye	Steelhead Hat	Steelhead Wld	Lamprey
1	782	35		3076	1022	1	0		1	100	13		144	8	16	3
2	1536	28		5095	1185	3	6		2	544	19		229	17	49	2
3	826	38		4272	1148	2	0		3	180	15		114	9	49	1
4	1289	36		4323	1334	2	0		4	342	16		108	13	32	2
5	1147	25		3463	1274	4	3		5	161	21		103	5	25	3
6	1090	42		4361	2176	10	1		6	323	26		118	18	57	4
7	777	54		4915	1905	3	1		7	713	63		109	17	49	6
8	197	12		3839	1511	3	0		8	638	40		118	21	42	6
9	1298	46		4163	1930	5	0		9	282	23		44	16	29	6
10	1498	42		3287	1279	5	2		10	118	17		40	9	20	4
11	548	27		3195	1032	3	0		11	196	17		20	9	26	3
12	649	22		2450	1240	9	2		12	218	14		15	32	51	9
13	440	14		2057	575	30	0		13	117	22		15	16	35	13
14	381	24		1979	824	14	2		14	273	10		9	25	25	3
15	903	38		2582	860	5	1		15	487	38		28	23	33	6
16	162	10		1345	523	3	1		16	129	8		29	6	40	6
17	1095	41		1952	745	8	4		17	221	19		25	11	38	4
18	1540	34		2283	882	6	5		18	94	17		14	8	32	3
19	301	10		1784	1123	9	8		19	223	18		20	19	26	0
20	155	3		1614	744	12	4		20	252	21		19	13	46	2
21	1309	31		1801	879	43	0		21	128	13		13	18	35	11
22	1135	31		1544	855	8	7		22	154	26		24	52	67	11
23	268	30		1221	662	8	3		23	56	18		11	18	40	5
24	373	29		945	478	10	3		24	34	7		16	10	16	1
25	446	19		627	221	7	1		25	28	5		14	6	12	7
26	513	12		704	410	34	6		26	108	12		20	21	46	8
27	630	16		490	251	8	0		27	129	13		9	35	44	5
28	855	11		358	185	43	0		28	107	10		14	53	41	3
29	792	10		194	45	34	2		29	267	22		16	33	57	6
30	396	21		257	56	25	3		30	244	20		5	19	29	5
31	387	28		191	80	22	3		31	130	9		3	11	31	4
Totals	23718	819	0	70367	27434	379	68		Totals	6996	592	0	1466	571	1138	152

Attachment 1. Wells Dam Daily Fish Passage Report, 2004 (Continued).
Passage for the hours 0000 to 2400 PST

	Sep-04								Oct-04							
	Chinook								Chinook							
Date	Adults	Jacks	Coho	Sockeye	Steelhead Hat	Steelhead Wld	Lamprey		Date	Adults	Jacks	Coho	Sockeye	Steelhead Hat	Steelhead Wld	Lamprey
1	29	9		2	13	26	4		1	43	3	1		62	50	2
2	171	23		8	30	47	9		2	7	3	8		36	50	2
3	115	10		4	32	41	8		3	11	4	4		30	30	0
4	147	19		11	23	45	9		4	44	6	8		35	43	1
5	151	16		1	18	37	7		5	9	5	2		30	47	0
6	242	13		11	44	70	10		6	10	5	5		26	36	0
7	294	16		11	26	50	20		7	21	2	8		30	41	0
8	179	14		10	42	62	9		8	25	3	6		33	42	1
9	263	6		6	124	90	6		9	43	5	11	2	11	24	3
10	337	19			94	113	4		10	47	6	12	2	29	31	4
11	204	12		4	113	108	3		11	53	2	15	1	42	43	1
12	53	2		2	86	89	5		12	44		24		23	37	0
13	92	14		3	34	20	5		13	42	2	7	1	12	22	3
14	146	17		2	58	90	1		14	34	7	4		11	13	1
15	142	12			74	103	1		15	44	2	5		6	23	4
16	36	11		4	111	120	5		16	28				13	14	3
17	66	14		1	126	177	9		17	22	1	1		6	10	0
18	296	25			129	154	4		18	11	2	10		7	16	1
19	70	39	3		215	197	1		19	22	4	1		5	10	0
20	64	14	1	3	89	112	3		20	20	3	7		22	56	2
21	74	6	3		168	145	2		21	25		6		9	46	0
22	78	16		1	76	83	3		22	22		7		13	28	0
23	45	10	3		84	98	1		23	31	2	5		11	16	1
24	43	13	4		125	161	0		24	17	1	4		20	19	1
25	60	9	6		69	81	3		25	4	1	7		4	10	0
26	62	14	7		52	77	1		26	29	1	1		1	16	0
27	45	9	3	1	58	53	0		27	42	1	2		8	13	0
28	82	7	5	2	66	92	1		28	70	3	12		11	9	0
29	21	5	6		31	55	1		29	15	1	2		3	8	0
30	53	8	5		88	145	4		30	16	1	7		9	8	1
									31	13	3	10		11	21	2
Totals	3660	402	46	87	2298	2741	139		Totals	864	79	202	6	569	832	33

Attachment 1. Wells Dam Daily Fish Passage Report, 2004 (Continued).
Passage for the hours 0000 to 2400 PST

Nov-03

Date	Chinook Adults	Chinook Jacks	Coho	Sockeye	Steelhead Hat	Steelhead Wld	Lamprey
1	16		3		8	4	0
2	12		5		3	17	0
3	10		5			3	0
4	4		6		1	9	0
5	12		7		1	9	0
6			2		1	8	0
7	3		5		2	9	0
8	3		4		1	6	0
9	3		2		4	4	0
10	2		2		1	3	0
11	5				1	6	0
12	4				2	9	0
13	5		1		2	4	0
14			1			3	0
15	1					1	0
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
31							
Totals	80	0	43	0	27	95	0

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 1998-2004.

YEAR	Chinook Spring	Chinook Summer	Chinook Fall	CHINOOK TRAPPED	TOTAL CHINOOK	COHO	Sockeye	STEEL Steelhead	HEAD TRAPPED	STEEL HEAD	TOTAL SALMONIDS	COUNT INCLUSIVE
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	387	2,389	917	1,665	5,358	4	17,703	4,128	509	4,637	27,702	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	363	4,108	1,200	1,219	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	5/01-11/16

*Note: Chinook counts include jacks.

WDFW counting dates Spr. Chinook May 1 - June 28; Sum. Chin June 29 - Aug 28; Fall Chinook, Aug 29 - Nov 15.

** Note Broodstock trapped from ladders are not included in totals with the exception of spr. chinook in 1996 and 1998

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

YEAR	Chinook Spring	Chinook Summer	Chinook Fall	CHINOOK TRAPPED	TOTAL CHINOOK	COHO	Sockeye	STEEL Steelhead	STEEL HEAD TRAPPED	TOTAL STEEL HEAD	TOTAL SALMONIDS	PERIOD OF COUNT INCLUSIVE
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	387	2,389	917	1,665	5,358	4	17,703	4,128	509	4,637	27,702	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	340	3,799	1,067	1,219	6,425		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		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	2493	31,172	5265	558	39,488	234	64959	7825	452	8,277	112,958	5/01-11/15
Mean	2,678	9,240	2,481	1,654	16,105	122	32,887	5,654	502	6,156	55,264	
Gmean	1,911	5,959	1,983	1,488	12,670	62	24,465	3,919	474	4,532	46,740	

*Note: Chinook counts include jacks.

WDFW counting dates Spr. Chinook May 1 - June 28; Sum. Chin June 29 - Aug 28; Fall Chinook, Aug 29 - Nov 15.

** Note Broodstock trapped from ladders are not included in totals with the exception of spr. chinook in 1996 and 1998

Attachment 4. Wells Dam Daily Water Quality Report, 2004

Apr-04					May-04					Jun-04					Jul-04				
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	104%	105%	1	11	48	107%	110%	1	10	54	107%	109%	1	10	60	110%	112%
2		41	105%	105%	2	14	48	107%	110%	2	12	54	108%	109%	2	11	60	110%	111%
3		42	107%	107%	3	12	47	108%	111%	3	11	54	108%	110%	3	11	60	110%	112%
4		40	108%	108%	4	12	48	108%	112%	4	12	54	109%	110%	4	14	61	110%	111%
5		42	107%	107%	5	12	49	108%	111%	5	7	55	109%	110%	5	14	61	111%	112%
6		43	107%	107%	6	13	49	107%	110%	6	11	55	108%	109%	6	14	61	110%	112%
7		43	107%	107%	7	15	49	108%	109%	7	11	55	107%	109%	7	14	60	110%	112%
8		43	107%	107%	8	13	48	107%	108%	8	11	55	107%	110%	8	14	60	110%	111%
9		43	107%	107%	9	10	49	107%	109%	9	11	55	108%	110%	9	14	60	110%	112%
10		44	108%	108%	10	9	49	108%	109%	10	10	55	108%	109%	10	14	60	110%	111%
11		44	111%	110%	11	9	49	107%	109%	11	12	55	107%	109%	11	12	60	110%	111%
12		45	109%	112%	12	9	49	106%	108%	12	12	56	107%	108%	12	14	60	111%	112%
13		45	109%	111%	13	7	49	107%	108%	13	9	55	106%	108%	13	14	61	111%	113%
14		44	108%	110%	14	11	49	106%	108%	14	14	55	106%	107%	14	14	61	112%	113%
15		44	107%	109%	15	11	50	107%	108%	15	9	56	106%	108%	15	15	62	112%	114%
16		44	107%	110%	16	14	50	107%	109%	16	9	56	107%	109%	16	13	62	111%	112%
17		44	108%	111%	17	14	51	107%	108%	17	7	56	108%	109%	17	15	63	112%	113%
18		45	107%	110%	18	12	51	107%	109%	18	7	56	108%	110%	18	15	62	111%	112%
19		45	107%	111%	19	14	51	107%	109%	19	12	57	108%	111%	19	15	62	111%	112%
20		45	107%	111%	20	14	52	108%	109%	20	12	57	109%	110%	20	15	63	110%	111%
21		45	106%	109%	21	14	52	108%	110%	21	13	58	109%	111%	21	11	63	111%	112%
22		45	106%	109%	22	9	52	108%	109%	22	16	58	110%	111%	22	13	63	111%	112%
23		46	106%	109%	23	9	52	107%	108%	23	16	58	110%	111%	23	13	64	111%	113%
24		46	105%	108%	24	9	53	107%	109%	24	16	59	110%	111%	24	13	64	112%	113%
25		46	106%	108%	25	7	52	107%	109%	25	13	60	109%	111%	25	16	64	111%	113%
26		46	107%	110%	26	12	52	108%	109%	26	15	60	110%	111%	26	15	64	114%	113%
27		46	108%	111%	27	14	52	107%	109%	27	9	60	110%	111%	27	14	64	113%	113%
28		46	106%	110%	28	11	53	107%	109%	28	9	60	110%	111%	28	14	64	113%	113%
29		46	106%	110%	29	11	53	106%	110%	29	13	60	110%	112%	29	14	64	113%	114%
30		47	107%	110%	30	11	53	107%	108%	30	12	60	110%	112%	30	7	64	112%	113%
					31	11	53	107%	108%						31	16	64	112%	113%
Avg		**44**	**107%**	**109%**	**Avg**	**11**	**50**	**107%**	**109%**	**Avg**	**11**	**57**	**108%**	**110%**	**Avg**	**13**	**62**	**111%**	**112%**

Attachment 4. Wells Dam Daily Water Quality Report, 2004 (continued)

Aug-04						Sep-04						Oct-04						Nov-04				
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	15	65	112%	112%		1	13	67	109%	113%		1	15	66				1	13	57		
2	13	65	112%	112%		2	14	67	108%	107%		2	15	65				2	14	58		
3	11	65	111%	112%		3	14	67	105%	105%		3	15	65				3	13	58		
4	11	65	111%	112%		4	14	67	105%	104%		4	15	65				4	13	57		
5	15	65	110%	112%		5	16	67	105%	105%		5	14	65				5	13	57		
6	15	65	109%	111%		6	16	67	105%	105%		6	15	65				6	13	57		
7	15	65	109%	109%		7	6	67	105%	105%		7	14	65				7	15	57		
8	13	65	109%	109%		8	14	67	106%	106%		8	14	64				8	11	57		
9	13	66	110%	111%		9	14	67	105%	105%		9	14	64				9	14	57		
10	12	66	110%	111%		10	14	66	105%	105%		10	15	64				10	14	57		
11	13	65	111%	112%		11	14	66	104%	103%		11	14	63				11	14	57		
12	13	65	112%	113%		12	14	67	104%	103%		12	15	63				12	15	56		
13	13	66	111%	112%		13	14	67	103%	102%		13	14	63				13	15	56		
14	12	66	111%	111%		14	14	66	102%	102%		14	13	63				14	15	56		
15	15	67	110%	110%		15	14	66	103%	102%		15	14	63				15	13	55		
16	15	67	110%	111%		16	14	66				16	14	62				16		55		
17	15	67	109%	110%		17	14	66				17	13	62				17		55		
18	15	67	109%	110%		18	14	66				18	14	62				18		55		
19	13	67	109%	110%		19	14	66				19	14	61				19		54		
20	11	67	109%	110%		20	14	65				20	12	61				20		54		
21	11	67	109%	110%		21	14	65				21	14	61				21		54		
22	15	67	107%	108%		22	13	65				22	15	60				22		53		
23	15	67	107%	108%		23	15	66				23	14	60				23		53		
24	15	67	107%	108%		24	14	66				24	14	60				24		53		
25	14	67	106%	108%		25	15	66				25	14	59				25		53		
26	7	67	107%	108%		26	15	66				26	14	59				26		52		
27	7	66	108%	108%		27	15	66				27	15	59				27		52		
28	7	67	107%	107%		28	15	66				28	14	59				28		52		
29	11	67	107%	107%		29	14	66				29	12	59				29		51		
30	15	67	107%	107%		30	14	66				30	12	58				30		51		
31	14	68	109%	109%								31	13	58								
Avg	**13**	**66**	**109%**	**110%**		**Avg**	**14**	**66**	**105%**	**105%**		**Avg**	**14**	**62**				**Avg**	**14**	**55**		