CENWW-OD-WL SPURGEON (1130) 19 November, 2010

MEMORANDUM THRU:
Jack Heffling, Operations Manager, Lower Monumental Dam

FOR Chief, Operations Division
ATTN: John Bailey / Tim Dykstra

SUBJECT: Submission of 2010 Juvenile Fish Collection and Bypass Report, Lower Monumental Dam Juvenile Fish Facility.

1. Enclosed find the 2010 Juvenile Fish Collection and Bypass Report for Lower Monumental Dam as requested.

2. If you have any questions contact Bill Spurgeon or Elizabeth Lindsey at Lower Monumental Dam, (509) 282-7211 and (509) 282-7216, respectively.

WILLIAM F. SPURGEON
Supervisory Fisheries Biologist, Lower Monumental Dam

Enclosure

2010 Juvenile Fish Collection and Bypass Report
Lower Monumental Dam Juvenile Fish Facility

Prepared by

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U.S. Army Corps of Engineers

and

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Washington Department of Fish and Wildlife

27 October, 2010

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TRANSPORT OPERATIONS - LOWER MONUMENTAL DAM

Introduction

Juvenile fish transportation and bypass operations occurred for the eighteenth year at Lower Monumental Dam Juvenile Fish Facility (JFF) in 2010. The bypass system was watered up and STSs were installed on March 23 and 24. The JFF was watered up for testing on March 30. Primary bypass occurred from March 23 through May 3. Primary bypass was interrupted for fish condition monitoring every third day from April 1 through May 3. During this period 934 fish were examined and returned to the river. These fish are not included in the 2010 season spreadsheet (Appendices 1-4) as collection had not yet begun. No research was done at Lower Monumental JFF this season.

Collection for transport occurred from 0001 hours on May 4 to 0700 hours on October 1. At that time the facility was returned to primary bypass. Smolt collection for the 2010 season was 1,065,007, which is about 10% fewer than that of 2009 (1,182,585) and roughly half of that collected in 2008 (2,097,408). Of the 1,065,007 fish collected in the 2010 season, 1,441 were trucked, 1,056,199 were barged, and 6,137 were bypassed.

Pacific States Marine Fisheries Commission (PSMFC) technicians examined 1,423 fish for gas bubble trauma (GBT) in 2010. Examinations were conducted once a week from April 1 through August 31 to encompass the duration of the spill season. Only those GBT fish examined during the transportation season are included in the bypass numbers.

The passive integrated transponder (PIT) tag system detected 65,073 PIT tagged fish coming through the JFF from April 1 to October 1, of which 47,110 were diverted to the river or failed to be detected moving to the raceways, the sample, or the exits. None of these 65,073 PIT tagged fish are included in the bypass numbers.

This season's total collection by species group included: 215,435 clipped yearling chinook, 89,934 unclipped yearling chinook, 192,968 clipped subyearling chinook, 316,986 unclipped subyearling chinook, 155,299 clipped steelhead, 84,071 unclipped steelhead, 530 clipped sockeye, 995 unclipped sockeye, and 8,789 clip/unclip coho. Full powerhouse screening and bypass operations continued through December 20, 2010.

Juvenile hatchery chinook salmon, hatchery coho salmon, and hatchery steelhead in the Snake River Basin are normally designated by fin clips, usually the adipose fin but occasionally one of the pectoral or ventral fins. Before 1998, Idaho Fish and Game (IDFG) was the only agency that released sizeable numbers of unclipped hatchery fish. Starting in 1998, increasing numbers of unclipped hatchery fish were released by state, federal, tribal, or other agencies (FPC). Therefore the reported clipped/unclipped fish collected, sampled, bypassed, and transported no longer represent hatchery/wild origins of these fish. As of the 2005 report, juvenile salmonids are designated as clipped/unclipped not hatchery/wild. Coho were reintroduced by the tribes and if clipped or not they are all hatchery progeny.

Corps of Engineers personnel included: supervisory biologist Bill Spurgeon, assistant biologist Elizabeth Lindsey, biological technicians: Shelly Montoya, Ken Bennett, Rick Blevins, K.C. Deife and Nathan Malkow and truck driver / maintenance personnel: Kenneth Fletcher. Representing Pacific States Marine Fisheries Commission (PSMFC) was biologist Monty Price and Washington Department of Fish and Wildlife (WDF&W) biologist Sharon Lind. PSMFC technicians Carol Williams, Dawn Kunkel, and Wanda Blackwell conducted the fish sampling, and were responsible for the numerous quality control and data keeping tasks.

Facility Modifications

The following modifications were made to the JFF prior to or during the 2010 fish collection season:

1. A plate was installed in the exit trough of the "A" side sample counter tank to make crowding the fish from the tank faster and less stressful for the fish. The plate limits the fish to the exit side of the trough.
2. The STS camera van was modified. A fold-back boom was fabricated and installed so that one of the employees that conduct the inspections each month would not have to lift and insert the exiting boom extension. The boom is the element that suspends and supports the camera during inspection.
3. Wasted spaces in the JFF building and JFF shop were converted to useful storage space.
4. Access stairs were built over the bypass flume near the separator operator building.

River Conditions

During the 2010 collection season, the average daily flow exceeded 100.0 kcfs on 21 days and exceeded 150 kcfs on 9 of these days. The highest daily average flow for the season was 217.4 kcfs on June 6. The lowest daily average flow for the season occurred on September 26 with a flow of 12.3 kcfs. The average flow for the season was 54.9 kcfs. Spill occurred for 152 days from April 3 through September 1, with a maximum spill of 101.5 on June 6.

River temperature averaged 56.9^{o} F for the season and ranged from 43.5^{o} F on April 1 to 67.3^{o} F on August 14. A comparison of daily powerhouse flow and spill is shown in Figure 1. Average monthly flow and spill for the 2006-2010 collection seasons are provided in Table 1.

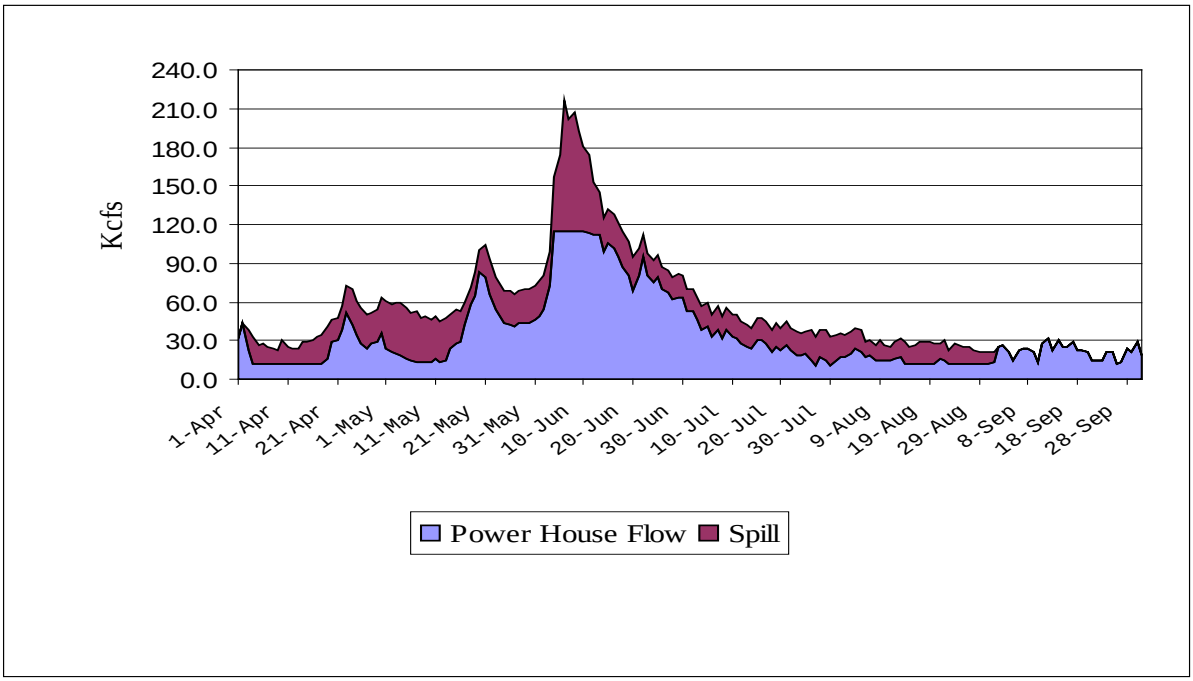
Fish Collection

Migration and Collection

Pre-transport primary bypass occurred from March 23 to May 4. Fish collection for transportation began at 0001 hours on May 4 and continued until 0700 hours on October 1. An estimated 1,065,007 juvenile salmonids were collected in 2010 (Table 2). Within each species

group, the number collected and percent of the total collection was: 215,435 clipped yearling chinook (20.2%), 89,934 unclipped yearling chinook (8.4%), 192,968 clipped subyearling chinook (18.1%), 316,986 unclipped subyearling chinook (29.8%), 155,299 clipped steelhead (14.6%), 84,071 unclipped steelhead (7.9%), 530 clipped sockeye/kokanee (0.05%), 995 unclipped sockeye/kokanee (0.1%), and 8,789 clipped/unclipped coho (0.8%). While 2010 saw an increase in the subyearling chinook due to hatchery releases, there was a sharp drop in the number of steelhead and sockeye collected. Post-season bypass occurred from October 1 through December 20. Daily collection and bypass numbers are provided in Appendix Table 1.

Figure 1. Comparisons of daily powerhouse flow and spill at Lower Monumental Dam, 2010.



By the end of May, 37.9% of the total yearly collection had arrived. The percent of the total collection arriving by the end of June and the end of July was 90.4% and 99.5%, respectively. The months of August and September contributed about 0.5% of the total collection, and were responsible for the collection of 1.5% of the year's unclipped subyearling chinook.

The peak daily collection total and date for each species group were: clipped yearling chinook 40,261 (May 19), unclipped yearling chinook 7,908 (May 19), clipped subyearling chinook 26,000 (June 11), unclipped subyearling chinook 35,800 (June 10), clipped steelhead 12,200 (May 22), unclipped steelhead 7,000 (May 21), clipped sockeye 100 (May 26, June 9, 14, 16), unclipped sockeye 100 (May 22, 23, 25, 31, June 4, 14, 16), and clip/unclip coho 1,600 (June 5). Total daily collection in 2010 peaked at 74,800 (June 10). Peak collection date and daily collection total by species group are listed in Table 3. Daily collection of all species

combined versus total flow is shown graphically in Figure 2.

Table 1. Comparisons of average monthly flow and spill at Lower Monumental Dam, 2006-2010.

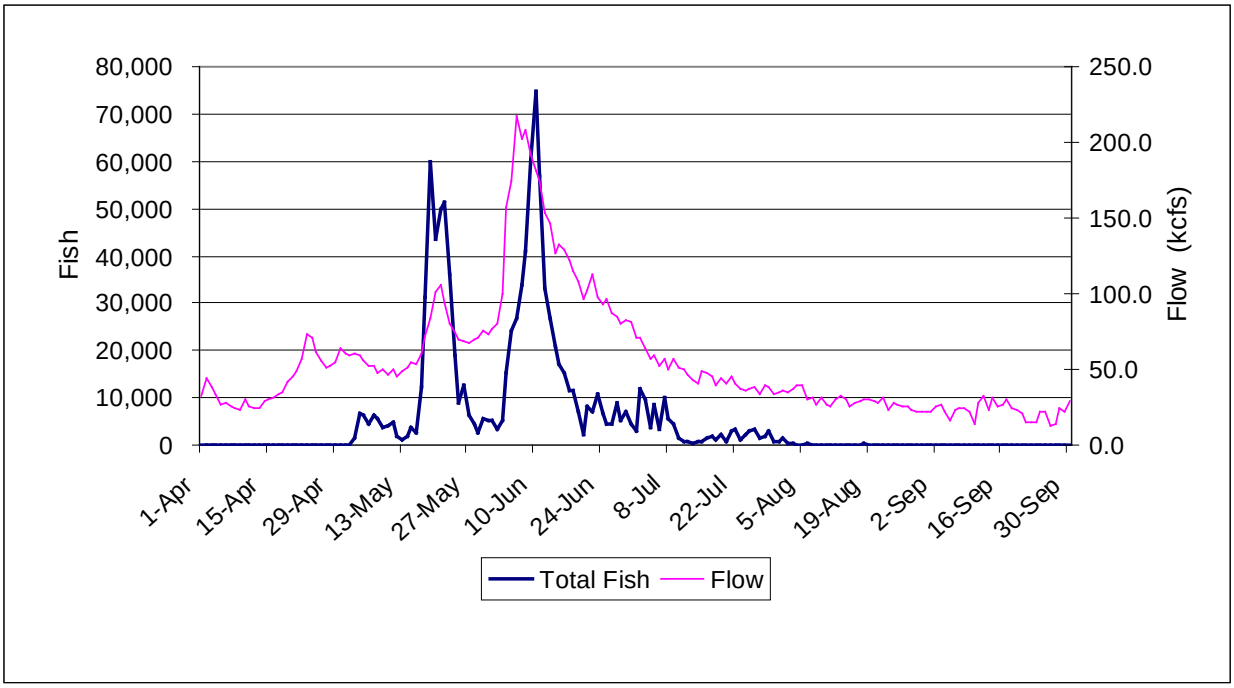
Month	2006	2007	2008	2009	2010	Average
Flow						
April	124.7	46.1	51.2	86.9	40.6	69.9
May	138.3	77.8	113.4	115.6	65.0	102.0
June	90.3	45.4	126.6	111.2	127.2	100.1
July	40.5	30.9	54.8	48.7	46.8	44.3
August	26.6	23.7	34.1	30.4	29.1	28.8
Sept.	21.1	18.1	21.8	22.2	22.6	21.2
Spill						
April	29.5	21.6	24.2	25.7	18.1	23.8
May	37.5	20.6	35.0	33.8	28.8	31.1
June	24.8	20.7	33.4	25.4	36.8	28.2
July	16.0	15.8	16.9	17.5	18.3	16.9
August	14.0	11.3	17.0	16.4	14.1	14.6
Sept.	0.3	0.3	0.4	0.2	0.3	0.3

Adult Fallbacks

A total of 1,226 adult salmonids fell back through the juvenile bypass system and were bypassed from the separator between April 1 and October 1, 2010 (Table 4). The total includes: 162 adult chinook salmon, 27 jack chinook salmon, 642 clipped steelhead, 389 unclipped steelhead, 6 clipped sockeye, and no coho. The total fallback number in 2010 was the second highest in the past 5 years with the 2009 operating year coming in as the highest. All groups showed a marked decrease in their numbers from 2009. Hatchery steelhead, wild steelhead, and jack chinook showed the biggest change. The daily numbers of adult fallbacks and fallback mortalities at Lower Monumental Dam can be found in Appendix Table 4.

As has been the case in previous years, most adult fallbacks in 2010 were steelhead. During the months of April and May 39.5% of the steelhead fallback occurred (Table 5). Spring/summer chinook accounted for 56.1% and fall chinook accounted for 43.9% of chinook fallbacks. Monthly adult salmonid fallback peaked in May, with a second peak in September.

Figure 2. Daily juvenile salmonid collection, all species combined, versus daily average river flow at Lower Monumental Dam, 2010.



The condition of adult salmonids was evaluated as they were released from the separator. Their condition was predominantly good to fair with 93.4% of the fallbacks rated in these categories (Table 6). Condition ratings of the 1,220 adults examined were as follows: 966 good (79.2%), 173 fair (14.2%), 60 poor (4.9%), and 21 were dead (1.7%). The number and species group of dead adult salmonids was: 17 clipped steelhead and 4 unclipped steelhead. Adult chinook had a higher percentage of good/fair fish (99.5%) than steelhead (92.2%).

Table 2. Annual collection, bypass, and transport at Lower Monumental Dam, 2006-2010.

	Yearling Chinook		Subyearling Chinook		Steelhead		Sockeye/Kokanee		Coho	
Year	Clipped	Unclip.	Clipped	Unclip.	Clipped	Unclip.	Clipped	Unclip.	Clip/Un.	Total
Collection										
2006	890,118	197,940	141,435	108,124	724,143	201,807	10,425	17,227	23,173	2,314,392
2007	238,259	33,735	17,441	25,229	449,158	119,033	3,561	593	13,524	900,533
2008	804,634	173,342	123,909	118,226	495,988	273,524	24,915	2,973	79,897	2,097,408
2009	250,165	63,625	136,847	188,835	398,056	115,117	11,460	4,469	14,011	1,182,585
2010	215,435	89,934	192,968	316,986	155,299	84,071	530	995	8,789	1,065,007
Bypass										
2006	17,163	9,227	2,612	3,650	37,178	4,234	0	446	149	74,659
2007	993	31	1,416	2,656	3,943	1,399	0	0	0	10,438
2008	600,095	101,070	774	1,469	347,937	191,131	17,013	743	70,648	1,330,880
2009	1,332	120	2,905	2,921	4,931	1,680	0	1	1	13,891
2010	1,046	46	91	495	3,140	1,319	0	0	0	6,137
Truck										
2006	0	4	63	516	1	2	0	2	0	588
2007	0	3	14	222	102	46	1	0	17	405
2008	1	3	89	2,093	3	2	0	3	0	2,194
2009	0	7	31	650	1	2	0	0	49	740
2010	1	2	13	1,423	0	2	0	0	0	1,441
Barge										
2006	872,118	188,583	138,456	103,705	686,427	197,460	10,398	16,614	23,024	2,236,785
2007	236,922	33,644	15,940	22,171	444,804	117,441	3,551	579	13,505	888,557
2008	204,260	72,178	122,769	114,466	147,912	82,336	7,902	2,226	9,246	763,295
2009	248,620	63,462	133,622	184,820	392,911	113,380	11,458	4,462	13,950	1,166,685
2010	214,220	89,844	192,538	314,702	151,968	82,617	530	991	8,789	1,056,199
Total Transported										
2006	872,118	188,587	138,519	104,221	686,428	197,462	10,398	16,616	23,024	2,237,373
2007	236,922	33,647	15,954	22,393	444,906	117,487	3,552	579	13,522	888,962
2008	204,261	72,181	122,858	116,559	147,915	82,338	7,902	2,229	9,246	765,489
2009	248,620	63,469	133,653	185,470	392,912	113,382	11,458	4,462	13,999	1,167,425
2010	214,221	89,846	192,551	316,125	151,968	82,619	530	991	8,789	1,057,640

Table 3. Annual peak collection dates at Lower Monumental Dam, 2006-2010.

Year	Yearling Chinook		Subyearling Chinook		Steelhead		Sockeye/Kokanee		Coho	Total
	Clipped	Unclip.	Clipped	Unclip.	Clipped	Unclip.	Clipped	Unclip.	Clip/Un	
2006	May 17	May 2	May 31	June 8	May 19	May 19	May 20	May 4	May 23	May 19
	56,007	16,500	9,250	12,703	42,328	14,631	1,946	1,445	2,142	119,017
2007	May 14	May 14	June 10	June 11	May 15	May 15	May 17	May 12	May 15	May 15
	56,011	7,921	1,896	3,389	120,895	27,761	747	200	2,836	207,762
2008	May 21	May 21	June 6	June 6	May 21	May 21	May 21	May 23	May 23	May 21
	390,000	61,045	10,360	5,976	192,388	109,104	10,000	448	47,463	810,597
2009	May 20	May 20	June 4	June 6	May 22	May 23	May 21	May 27	May 20	May 22
	31,600	4,600	10,300	11,400	32,400	9,400	2,500	700	1,100	69,300
2010	May 19	May 19	June 11	June 10	May 22	May 21	May 26	May 22	June 5	June 10
	40,261	7,908	26,000	35,800	12,200	7,000	100	100	1,600	74,800

Table 4. Annual totals of adult salmonids released from the juvenile fish separator at Lower Monumental Dam, 2006-2010.

Year[1]	Adult Chinook	Jack Chinook	Clipped Steelhead	Unclipped Steelhead	Total
2006	133	8	844	646	1,631
2007	78	17	458	295	848
2008	195	43	586	394	1,219[2]
2009	178	118	1,030	576	1,914[4]
2010	162	27	642	389	1,226[3]

[1] Seasons varied in length.
[2] One clipped Coho included in the total.
[3] Six clipped sockeye are included in the total.
[4] Ten clipped and 2 unclipped sockeye are included in the total.

Table 5. Monthly totals of adult salmonids released from the juvenile fish separator at Lower Monumental Dam, 2010.

Month	Adult Chinook	Jack Chinook	Clipped Steelhead	Unclipped Steelhead	Total
April	0	0	10	6	16
May	16	2	234	157	409
June	57	1	146	87	291
July	26	2	25	17	70
August	5	1	81	69	156
September	55	19	137	50	261
October	3	2	9	3	17
Total	162	27	642	389	1,220

[1]Neither Coho or Sockeye are included in this table.

Table 6. Condition of adult salmonids[1] released from the juvenile fish separator at Lower Monumental Dam, 2010.

Condition	Adult Chinook	Jack Chinook	Clipped Steelhead	Unclipped Steelhead	Total
Good	157	26	475	308	966
Fair	4	1	112	56	173
Poor	1	0	38	21	60
Dead	0	0	17	4	21
Total	162	27	642	389	1220

[1]Neither Coho or Sockeye are included in this table.

Separator Efficiency

Separator efficiency for 2010 by species group was: clipped yearling chinook 78.9%, unclipped yearling chinook 65.2%, subyearling chinook 54.2%, clipped steelhead 83.6%, unclipped steelhead 55.0%, clipped sockeye/kokanee 11.3%, and unclipped sockeye/kokanee 56.3% (Table 7).

Table 7. Annual separator efficiency in percent at Lower Monumental Dam, 2006-2010.

Year	Clipped Yearling Chinook A-side	Unclipped[1] Yearling Chinook A-side	Subyearling Chinook A-side	Clipped Steelhead B-side	Unclipped[1] Steelhead B-side	Clipped Sockeye/ Kokanee A-side	Unclipped Sockeye/ Kokanee A-side
2006	55.5	56.4	57.1	86.2	65.3	38.2	29.8
2007	60.4	62.9	54.3	93.3	82.7	40.6	47.2
2008	53.9	52.0	51.6	90.6	67.1	35.1	19.5
2009	58.8	53.2	54.4	92.3	71.4	40.3	38.9
2010	78.9	65.2	54.2	83.6	55.0	11.3	56.3

[1] This category includes unclipped hatchery fish.

Sampling

Consistent with the 2010 Fish Operations Plan (FOP) Appendix B and guidance provided by Technical Management Team (TMT), the juvenile fish transportation program allows for a variable start date, based on expected river flows. During years when the spring seasonal average river flow in the Snake River is expected to equal or exceed 65 kcfs, transport operations will begin on staggered start dates between April 21 and May 1 at Lower Granite, Little Goose, and Lower Monumental Dams. Prior to a dam's transport start date, all fish collected will be bypassed to the river. In years when the spring seasonal average river flow is expected to be below 65 kcfs, transport operations at Lower Monumental Dam will start on April 1. This year TMT put out a system operational request (SOR) delaying the start of transportation at Lower Monumental Dam until May 4 at 0001 hours. The SOR was based on PIT tag travel time data showing that in-river migration of juvenile spring chinook passing Lower Granite dam would arrive at Lower Monumental approximately 7 days later. As stipulated in the FPP all fish sampled during this time were bypassed.

Limited sampling took place for two purposes in accordance with the FOP from April 1 through May 3. Fish were sampled to monitor fish condition, ensure systems were operating correctly, and to train personnel on facility operation and sampling protocols. This type of sampling, "sampling for condition", was conducted every third day. The total number of fish sampled during this period was 934. The number sampled within each species group was: 208 clipped yearling chinook, 176 unclipped yearling chinook, no sub yearling chinook, no unclipped sub yearling chinook, 425 clipped steelhead, 125 unclipped steelhead, no clipped sockeye, no unclipped sockeye, and no hatchery coho. In all, 3.7% of all fish sampled in 2010 were sampled during this period.

Sampling support for transport began at 0001 hours on May 4. Sample examinations were conducted daily through August 15, and on alternate days thereafter through October 1. A total of 24,513 fish (2.3% of the collection) was sampled in 2010 (Table 8). Within each species group, the number and percent sampled of those collected in that group was: 4,118 clipped yearling chinook (1.9%), 1,593 unclipped yearling chinook (1.8%), 2,804 clipped subyearling

chinook (1.5%), 10,866 unclipped subyearling chinook (3.4%), 3,439 clipped steelhead (2.2%), 1,523 unclipped steelhead (1.8%), 9 clipped sockeye/kokanee (1.7%), 22 unclipped sockeye/kokanee (2.2%), and 139 clip/unclip coho (1.6%). Average weekly sample rates ranged from 1.0% to 100% (Table 9).

Transportation

An estimated 1,057,640 juvenile salmonids (99.3% of the collection) were transported from Lower Monumental Dam in 2010. Of these, approximately 1,441 were transported by truck and 1,056,199 by barge. Within each species group, the number transported and percent of those collected in that group was: 214,221 clipped yearling chinook (99.4%), 89,846 unclipped yearling chinook (99.9%), 192,551 clipped subyearling chinook (99.8%), 316,125 unclipped subyearling chinook (99.7%), 151,968 clipped steelhead (97.9%), 82,619 unclipped steelhead (98.3%), 530 clipped sockeye/kokanee (100.0%), 991 unclipped sockeye/kokanee (99.6%), and 8,789 clipped/unclip coho (100.0%). Daily truck and barge transportation numbers are provided in Appendix Table 3.

Table 8. Annual percentage sampled of each juvenile salmonid species group at Lower Monumental Dam, 2006-2010.

	Yearling Chinook		Subyearling Chinook		Steelhead		Sockeye/Kokanee		Coho	
Year	Clipped	Unclip.	Clipped	Unclip.	Clipped	Unclip.	Clipped	Unclip.	Clip/Un.	Total
2006	0.9	1.2	5.8	11.6	1.0	1.2	1.4	1.4	1.8	1.8
2007	1.0	1.6	24.7	39.4	1.6	2.0	2.9	6.1	2.5	3.0
2008	1.1	1.6	6.9	12.7	1.4	1.4	1.3	2.8	0.9	2.2
2009	1.5	1.9	7.5	10.6	1.9	2.1	1.3	2.1	6.3	3.9
2010	1.9	1.8	1.5	3.4	2.2	1.8	1.7	2.2	1.6	2.3

There was no early season trucking from this site this year. Juvenile fish were trucked by midi-tanker from August 16 to October 1. A salt solution of 2.5 milligrams per liter (mg/l) (6 pounds per 300 gallons of water) is used as needed in the midi-tanker to treat or ease suspected outbreaks of *columnaris*. A total of 1,441 fish were transported by truck in 2010 (Table 2). Within each species group, the number trucked and percent of those collected in that group was: 1 clipped yearling chinook (0.0%), 2 unclipped yearling chinook (0.0%), 13 clipped subyearling chinook (0.0%), 1,423 unclipped subyearling chinook (0.5%), no clipped steelhead, 2 unclipped steelhead (0.0%), no clipped sockeye/kokanee, no unclipped sockeye/kokanee, and no clip/unclip coho.

Juvenile fish were transported by barge from Lower Monumental Dam from May 4 through August 16. An estimated 1,056,199 fish (99.2% of the collection) were transported by barge in 2010 (Table 2). Within each species group, the number barged and percent of those collected in that group was: 214,220 clipped yearling chinook (99.4%), 89,844 unclipped

yearling chinook (99.9%), 192,538 clipped subyearling chinook (99.8%), 314,702 unclipped subyearling chinook (99.3%), 151,968 clipped steelhead (97.9%), 82,617 unclipped steelhead (98.3%), 530 clipped sockeye/kokanee (100.0%), 991 unclipped sockeye/kokanee (99.6%), and 8,789 clip/unclip coho (100.0%).

Bypass

Primary bypass occurred from March 23 through May 3. Sampling at this time was for fish condition monitoring (COE). During the juvenile transport season (May 4 to October 1) a total of 6,137 fish were bypassed, 0.6% of the collection (Table 2). Within each species group, the number bypassed and percent of those collected in that group was: 1,046 clipped yearling chinook (0.5%), 46 unclipped yearling chinook (0.05%), 91 clipped subyearling chinook (0.05%), 495 unclipped subyearling chinook (0.2%), 3,140 clipped steelhead (2.0%), 1,319 unclipped steelhead (1.6%), no clipped sockeye/kokanee (0.0%), no unclipped sockeye/kokanee (0.0%), and no clip/unclip coho (0.0%). These numbers include fish examined for GBT during the transport season, but not fish bypassed by the PIT tag system.

Juvenile salmonids were bypassed rather than transported for the following purposes this season.

1. A total of 1,210 fish were checked for GBT symptoms from May 4 through September 1. All GBT evaluated fish were taken from the porosity control unit and were bypassed via the adult fish release pipe.
2. Fish sampled for condition monitoring from April 1 through May 3 were bypassed to the river. During this period a total of 934 fish were bypassed. Within each species group, the number bypassed and percent of those collected in that group was: 208 clipped yearling chinook (4.8%), 176 unclipped yearling chinook (9.9%), no clipped subyearling chinook (0.0%), no unclipped subyearling chinook (0.0%), 425 clipped steelhead (11.0%), 125 unclipped steelhead (7.6%), no clipped sockeye/kokanee (0.0%), no unclipped sockeye/kokanee (0.0%), and no clip/unclip coho (0.0%). In all, 3.7% of all fish sampled in 2010 were sampled during this period. These fish are not included in the bypass numbers.
3. Fish were sampled from 1500 hrs on May 2 to 0001 hrs May 4 to obtain data for transportation calculations. During this time the facility was in secondary bypass. These sampled fish were returned to the river. During this period a total of 4,927 fish were bypassed and they are included in the bypass numbers of the appendix. Within each species group, the number bypassed for this event was: 896 clipped yearling chinook, no unclipped yearling chinook, no clipped subyearling chinook, no unclipped subyearling chinook, 2,836 clipped steelhead, 1,195 unclipped steelhead, no clipped sockeye/kokanee, no unclipped sockeye/kokanee, and no clip/unclip coho.
4. The PTAGIS3 database revealed that 136,976 PIT-tagged fish of different species groups were bypassed through the PIT tag system. These fish are not included in the facility bypass total.

PIT-tag diversion gates are set to bypass PIT-tagged fish when sample rates are 20% or higher, and during sampling intervals when fish were being collected for research (this prevents anesthetizing study fish a second time).

The fish rearing designation used by PTAGIS is hatchery/wild not clipped/unclipped; therefore you will find said designation used to report the PIT tag numbers in the following section rather than the clipped/unclipped designation used throughout the rest of this report. According to the PTAGIS3 database, 65,073 PIT-tagged fish were detected at Lower Monumental Dam in 2010. Of these, 41,071 were bypassed through the PIT tag diversion system to the river (63.1%), 914 were last interrogated by the sample monitor (1.4%) (transported), 17,049 last interrogated by the raceway monitors (26.2%) (transported), and 6,039 were last interrogated at monitors that do not constitute exits to the river or transport system (9.3%) (fish disposition unknown). The composition of bypassed PIT-tagged fish was: 2,060 hatchery spring/summer chinook, 26,913 hatchery fall chinook, 1,656 hatchery chinook of unknown run, 2,531 wild spring/summer chinook, 1 wild fall chinook, 1,442 wild chinook of unknown run, 58 chinook of unknown run or rearing disposition, 4,170 hatchery steelhead, 1,513 wild steelhead, 3 steelhead of unknown rearing, 527 hatchery sockeye, 35 wild sockeye, 67 hatchery coho, and 95 orphans. An unknown number of other fish were bypassed incidentally with the PIT-tagged fish as the PIT-tag diversion gates opened and closed to divert the PIT tagged fish.

Incidental Species

Non-target fish species that were too large to pass through the separator bars were recorded and bypassed through the adult release pipe at the separator. Those that were small enough to pass through the separator bars were either sampled and bypassed, or held in the raceways and transported with the juvenile salmonids. Fortunately, most incidentals generally arrive late in the season while we are sampling 100% of the collection. At that time they are easily removed while sampling, therefore avoiding transport. Sample fish from each incidental species were counted and their total numbers were calculated using the sample rate. These numbers were then added with separator counts of the same group to estimate the total collection for each species. The most common incidental species for 2010 included: juvenile (silver) lamprey (218,102), juvenile and adult shad (35,934), sucker spp. (6,486), Siberian prawn (8,599), sucker misc. (6,486), sculpins (3,449), peamouths (3,225), juvenile (ammocoete) lamprey (2,802), whitefish (2,301), and juvenile and adult smallmouth bass (1,271). The groups showing the largest increase from last year were juvenile shad and siberian prawns. Shad numbers often fluctuate from year to year. Prawn numbers have increased each year since their arrival. Estimated numbers of some groups may be exaggerated due to the low sample rates on the days they occurred. This includes all groups of lamprey. We did not see a lot of crappie in the sample again this year. Historically the crappie has been one of our most frequently seen incidentals. Another fish missing again in the sample this year was the sandroller. Only one sandroller was found in the sample this season. Yellow perch numbers have also dropped from previous years. A summary of incidental fish collection and disposition is provided in Table 10.

Table 9. Weekly sample rates in percent and sample totals at Lower Monumental Dam, 2010.

Week Ending	Weekly Rate (%)	Yearling Chinook Clipped	Yearling Chinook Unclip.	Subyearling Chinook Clipped	Subyearling Chinook Unclip.	Steelhead Clipped	Steelhead Unclip.	Sockeye/Kokanee Clipped	Sockeye/Kokanee Unclip.	Coho Clip/Un.	Totals*
1-Apr	0.0	0	0	0	0	0	0	0	0	0	0
8-Apr	0.0	0	0	0	0	0	0	0	0	0	0
15-Apr	0.0	0	0	0	0	0	0	0	0	0	0
22-Apr	0.0	0	0	0	0	0	0	0	0	0	0
29-Apr	0.0	0	0	0	0	0	0	0	0	0	0
6-May	3.1	131	42	0	0	328	78	0	0	1	580
13-May	5.3	355	119	0	2	821	178	0	0	9	1,484
20-May	2.7	2,436	459	0	1	901	341	0	0	36	4,174
27-May	1.1	883	275	3	4	509	313	1	3	15	2,006
3-Jun	3.1	127	139	203	40	251	178	5	11	21	975
10-Jun	1.0	97	193	705	1,037	518	271	1	1	40	2,863
17-Jun	1.1	46	96	813	794	63	88	2	2	11	1,915
24-Jun	1.7	21	43	257	537	27	38	0	0	2	925
1-Jul	2.4	5	32	275	569	15	23	0	0	1	920
8-Jul	4.4	10	97	359	1,864	4	2	0	2	1	2,339
15-Jul	7.2	0	19	69	586	1	5	0	0	0	680
22-Jul	12.2	3	32	57	1,590	0	2	0	1	2	1,687
29-Jul	10.5	1	32	37	1,619	0	0	0	1	0	1,690
5-Aug	11.3	1	10	8	431	0	2	0	0	0	452
12-Aug	26.0	1	1	3	190	0	1	0	0	0	196
19-Aug	66.0	0	2	3	522	1	1	0	0	0	529
26-Aug	100.0	0	1	4	418	0	1	0	1	0	425
2-Sep	100.0	0	1	2	138	0	0	0	0	0	141
9-Sep	100.0	0	0	1	118	0	0	0	0	0	119
16-Sep	100.0	0	0	1	42	0	1	0	0	0	44
23-Sep	100.0	1	0	0	41	0	0	0	0	0	42
30-Sep	100.0	0	0	2	189	0	0	0	0	0	191
1-Oct	100.0	0	0	2	134	0	0	0	0	0	136
Total Sampled		4,118	1,593	2,804	10,866	3,439	1,523	9	22	139	24,513
% of Sample		16.8	6.5	11.4	44.3	14.0	6.2	0.1	0.1	0.6	100.0
% of Collection		1.9	1.8	1.5	3.4	2.2	1.8	1.7	2.2	1.6	2.3

* 24 hour sampling at Lower Monumental Dam began this year on May 4.

Fish Condition

Descaling

Descaling data was collected from all live sample fish (full sample) rather than just a portion (subsample). Full sample data collection provides a larger sample size and therefore a better representation of fish condition.

The descaling rate for all fish sampled in 2010 was 2.5%. The annual descaling rate by species group was: clipped yearling chinook 3.2%, unclipped yearling chinook 2.2%, clipped subyearling chinook 2.3%, unclipped subyearling chinook 1.6%, clipped steelhead 4.2%, unclipped steelhead 3.7%, clipped sockeye/kokanee 0.0%, unclipped sockeye/kokanee 4.8%, and clip/unclip coho 3.6% (Table 11). The highest rate ever recorded at the JFF was 6.7 in 1993. Rates of the last five years have ranged from a low of 1.8% in 2009 to a high of 4.9% in 2007.

The highest weekly descaling rate for all species combined was 5.4% for the week ending September 23; while the lowest rate (0.0%) occurred the week ending August 12 (Table 12). Fewer than 100 fish were sampled during each of these weeks. Daily descaling rates are provided in Appendix Table 2.

Other Injuries and Disease

Injury data was gathered from a sub sample of 100 fish of each group per day or as many as were available. There were 14,989 fish examined for injury and disease in 2010. The most common symptom observed in 2010, as has been the case in other years, was blood pooling. Blood pooling is defined as the vasodilatation of the capillaries in fins (also referred to as fin pinkness). It seems to be a symptom of anesthetic use during higher water temperatures. Evidence of blood pooling was found on 10.6% of all fish examined. The incidence of blood pooling by species group was: clipped yearling chinook 1.7%, unclipped yearling chinook 2.3%, clipped subyearling chinook 5.3 %, unclipped subyearling chinook 20.1%, clipped steelhead 7.2%, unclipped steelhead 6.0%, clipped sockeye/kokanee 0.0%, unclipped sockeye/kokanee 0.0%, and clip/unclip coho 2.4%.

Fin hemorrhaging is not to be confused with blood pooling. Hemorrhaging is the discharge of blood outside the body. Fin hemorrhaging is a sign of trauma. Hemorrhaging was found on 4.3% of all fish examined for injuries in 2010. The incidence of hemorrhaging by species group was: clipped yearling chinook 1.6%, unclipped yearling chinook 3.2%, clipped subyearling chinook 4.4%, unclipped subyearling chinook 8.0%, clipped steelhead 0.2%, unclipped steelhead 0.3%, clipped sockeye/kokanee 0.0%, unclipped sockeye/kokanee 0.0%, and clip/unclip coho 1.6%.

Other common injuries included bird marks, body fungus, body damage, and folded opercula. Bird marks were observed on 1.7% of all fish examined. Most of the bird mark injuries were on clipped and unclipped steelhead (5.0% of clipped steelhead, and 4.0% of unclipped steelhead).

Fungus was found on 0.6% of all fish examined. The majority of the fungus was on clipped steelhead (1.9%) and unclipped steelhead (2.5%). The occurrence of fungus is generally seen early in the season while the water is still relatively cold.

Columnaris was seen again this year. It occurs more frequently in subyearling chinook but has been seen on coho as well. Most often it is found on the fish during the warmer water conditions of July, August, and September. Peamouth also appear to be susceptible to this disease. Columnaris can be recognized by the presence of yellowish lesions on the belly, as well

as some damage to the gills, pelvic fins, snout, and caudal fins. This year only unclipped subyearling chinook (2.2%) showed signs of *columnaris.*

Mortality

Annual facility mortality for all groups combined was 0.1% in 2010 (Table 13) and totaled 1,230 fish. Within each species group, the number of facility mortalities and percent of those collected in that group was: 168 clipped yearling chinook (0.1%), 42 unclipped yearling chinook (0.1%), 326 clipped subyearling chinook (0.2%), 366 unclipped subyearling chinook (0.1%), 191 clipped steelhead (0.1%), 133 unclipped steelhead (0.2%), no clipped sockeye/kokanee (0.0%), 4 unclipped sockeye/kokanee (0.4%), and no clip/unclip coho (0.0%). Total annual facility mortality has ranged from a low of 0.1% in 1997, 1999, and from 2006 through 2010 to a high of 0.5 % in 2001. Weekly mortality rates had a high of 9.5% for the week ending September 23 and a low of 0.0% for the week ending May 6 (Table 14). Daily mortality rates are provided in Appendix Table 2.

Annual sample mortality for all groups combined was 0.4% in 2010 (Table 15) and totaled 93 fish. The number of sample mortalities and mortality rate by species group was: 7 clipped yearling chinook (0.2%), 2 unclipped yearling chinook (0.1%), 16 clipped subyearling chinook (0.6%), 57 unclipped subyearling chinook (0.5%), 6 clipped steelhead (0.2%), 4 unclipped steelhead (0.3%), no clipped sockeye/kokanee (0.0%), 1 unclipped sockeye/kokanee (4.6%), and no clip/unclip coho (0.0%). Sample mortality for all groups combined has ranged from a low of 0.3% in 2008 and 2010 to a high of 1.1% in 1996, 1997, and 1998.

Annual post-sample mortality for all groups combined was 0.31% in 2010 and totaled 77 fish. The number of post-sample mortalities and mortality rate by species group was: 1 clipped yearling chinook (0.02%), 10 clipped subyearling chinook (0.36%), and 63 unclipped subyearling chinook (0.58%), 2 clipped steelhead (0.06%) and 1 unclipped steelhead (0.07%). The highest post-sample mortality rate (0.7%) occurred in 2004 and the lowest (0.0%) in 1999.

Annual truck mortality for all groups combined in 2010 was 0.14% (2 of 1,441 fish). The number of truck mortalities and mortality rate by species group was: 2 unclipped yearling chinook (0.14%). The annual truck mortality rate in 2009 was 0.27%.

Table 10. Estimated collection of incidental species at Lower Monumental Dam, 2010.

Common Name	Scientific Name	Exp. Sample	Separator	Total Collection[1]
American shad (Adult)	*Alosa sapidissima*	30	103	133
American shad (Juvenile)	*A. sapidissima*	35,673	128	35,801
Bullhead (misc.)	*Amierus* spp.	10	1	11
Bull Trout	*Salvelinus confluentus*	1	3	4
Channel catfish	*Ictalurus punctatus*	132	90	222
Chiselmouth	*Acrocheilus alutaceus*	261	1	262
Common carp	*Cyprinus carpio*	118	105	223
Crappie	*Pomoxis* spp.	731	20	751
Kokanee	*Oncorhynchus nerka*	50	0	50
Northern Pikeminnow	*Ptychocheilus oregonensis*	51	2	53
Pacific lamprey (Adult)	*Lampetra tridentatus*	8	0	8
Pacific lamprey (Juvenile)	*L. tridentatus*	218,102	0	218,102
Pacific lamprey (Ammocoete)	*L. tridentatus*	2,802	0	2,802
Peamouth	*Mylocheilus caurinus*	3,204	21	3,225
Rainbow Trout[2]	*Oncorhynchus mykiss*	0	10	10
Sandroller	*Percopsis transmontana*	1*	1	2
Sculpin	*Cottus* spp.	3,449	0	3,449
Siberian Shrimp/Prawn	*Exopalaemon modestus*	8,585	14	8,599
Smallmouth bass	*Micropterus dolomieu*	1,266	5	1,271
Sucker (misc.)	*Catostomus* spp.	6,176	310	6,486
Sunfish (misc.)	*Lepomis* spp.	200	0	200
Tadpole Madtom	*Noturus gyrinus*	10	0	10
Whitefish	*Prosopium spp.*	2,301	0	2,301
White Sturgeon	*Acipenser transmontanus*	0	3	3
Walleye	*Stizostedion vitreum*	2	10	12
Warmouth	*Lepomis gulosus*	0	0	0
Yellow perch	*Perca flavescens*	2	2	4
Others	----------	119	16[2]	135
Total		283,284	845	284,129

[1] Incidental species collection estimates are based on (sampled number of group expanded by the sample rate) plus separator count.
[2] Rainbow trout are classified by morphological characteristics.
*Only one sandroller sampled. For that sample rate we would have gotten 100 fish, which was unlikely.

Table 11. Annual descaling rates in percent for fish sampled at Lower Monumental Dam, 2006-2010.

	Yearling Chinook		Subyearling Chinook		Steelhead		Sockeye/Kokanee		Coho	
Year	Clipped	Unclip.	Clipped	Unclip.	Clipped	Unclip.	Clipped	Unclip.	Clip/Un.	Total
2006	4.2	3.9	2.0	1.8	4.5	7.2	5.7	8.8	4.3	3.3
2007	4.5	3.6	2.8	4.0	5.6	7.3	2.9	10.5	7.1	4.9
2008	4.2	3.4	3.0	3.5	7.0	5.8	3.3	3.3	3.8	4.3
2009	2.2	1.3	1.2	1.0	3.2	2.6	2.0	3.4	1.8	1.8
2010	3.2	2.2	2.3	1.6	4.2	3.7	0.0	4.8	3.6	2.5

Research

Gas Bubble Trauma Monitoring (PSMFC)

Juvenile chinook and steelhead were sampled once a week for GBT from April 05 through September 01 in 2010. This season 1,423 fish were sampled for GBT. PSMFC personnel examined up to100 individuals each of: juvenile yearling chinook, subyearling chinook and steelhead for bubbles in the paired and unpaired fins, or the eye, as per Fish Passage Center GBT protocols. After examination fish were bypassed to the river. Weekly GBT sampling would continue for up to eight hours or until 100 fish had been sampled per species group. The number sampled for GBT by species group was: 216 clipped yearling chinook, 77 unclipped yearling chinook, 91 clipped subyearling chinook, 495 unclipped subyearling chinook, 407 clipped steelhead, and 137 unclipped steelhead. In 2010 only a couple of early season fish showed signs of GBT.

Operation and Maintenance

Turbine Operations

Efforts were made to operate all turbine units within one percent of the peak efficiency from April 1 to October 31. Deviations were infrequent and brief or required by BPA with the exception of unit 4 failing to stop on command on October 5. It was out of the 1% criteria from 0944-1048 hours. Through this time it was essentially in speed no load.

Unit outages from April 1 through October 1 were fairly common. The unit and total time unavailable during this period was: Unit 1 (925.3 hours), Unit 2 (968.5 hours), Unit 3 (110.4 hours), Unit 4 (504.3 hours), Unit 5 (1140.7 hours) and Unit 6 (451 hours). Causes included: trash rack raking, STS/VBS installation and inspection, annual maintenance, exciter inspection, and Doble testing on transformer T-2. It is impractical to list these occurrences and the time required individually in this report, but most are noted in the Lower Monumental seasonal weekly reports.

Table 12. Weekly descaling rates in percent for fish sampled at Lower Monumental Dam, 2010.

Week Ending	Yearling Chinook Clipped	Yearling Chinook Unclip.	Subyearling Chinook Clipped	Subyearling Chinook Unclip.	Steelhead Clipped	Steelhead Unclip.	Sockeye/Kokanee Clipped	Sockeye/Kokanee Unclip.	Coho Clip/Un.	Total
1-Apr	---	---	---	---	---	---	---	---	---	---
8-Apr	---	0.0	---	---	---	0.0	---	---	---	0.0
15-Apr	0.0	0.0	---	---	0.0	0.0	---	--	---	0.0
22-Apr	0.0	0.0	---	---	2.9	0.0	---	---	---	0.5
29-Apr	3.0	3.1	---	---	0.7	1.0	---	---	---	1.4
6-May	6.2	2.7	---	---	3.4	1.5	---	---	0.0	3.8
13-May	3.1	1.8	---	0.0	2.6	2.9	---	---	11.1	2.8
20-May	2.8	2.2	---	0.0	4.8	4.2	---	--	0.0	3.3
27-May	3.8	1.9	0.0	0.0	7.4	3.1	0.0	0.0	6.7	4.3
3-Jun	5.1	1.5	2.7	2.9	5.0	4.4	0.0	0.0	9.5	3.8
10-Jun	3.2	2.6	1.9	2.2	4.5	4.7	0.0	0.0	0.0	2.8
17-Jun	2.3	0.0	2.3	1.6	6.4	6.6	0.0	0.0	0.0	2.1
24-Jun	5.3	2.5	2.8	1.7	11.1	6.5	---	---	50.0*	2.6
1-Jul	0.0	3.4	1.9	0.8	0.0	6.7	---	---	0.0	1.3
8-Jul	0.0	1.1	2.6	1.8	0.0	0.0	---	0.0	0.0	1.6
15-Jul	---	5.3	4.5	1.5	0.0	0.0	---	---	---	1.9
22-Jul	33.3*	3.1	1.9	1.5	---	0.0	---	100.0*	0.0	1.6
29-Jul	0.0	16.1*	0.0	2.0	---	---	---	0.0	---	2.3
5-Aug	100.0*	0.0	0.0	1.2	---	0.0	---	---	---	1.4
12-Aug	0.0	0.0	0.0	0.0	---	0.0	---	---	---	0.0
19-Aug	---	0.0	0.0	0.2	0.0	0.0	---	---	---	0.2
26-Aug	---	0.0	25.0*	1.6	---	0.0	---	0.0	---	1.8
2-Sep	---	0.0	0.0	0.9	---	---	---	---	---	0.9
9-Sep	---	---	0.0	1.8	---	---	---	---	---	1.7
16-Sep	---	---	0.0	4.9*	---	0.0	---	---	---	4.7*
23-Sep	0.0	---	---	5.6*	---	---	---	---	---	5.4*
1-Oct	---	---	0.0	1.1	---	---	---	---	---	1.1
Total Descaled	132	37	62	169	145	56	0	1	5	607
Total Examined	4,102	1,692	2,697	10,313	3,447	1,503	9	21	139	23,923
Percent Descaled	3.2	2.2	2.3	1.6	4.2	3.7	0.0	4.8	3.6	2.5

--- No fish sampled during the week.

* Fewer than 100 fish sampled during the week.

Table 13. Annual facility mortality in percent at Lower Monumental Dam, 2006-2010.

Year	Yearling Chinook		Subyearling Chinook		Steelhead		Sockeye/Kokanee		Coho	Total
	Clipped	Unclip.	Clipped	Unclip.	Clipped	Unclip.	Clipped	Unclip.	Clip/Un.	
2006	0.1	0.1	0.2	0.2	0.1	0.1	0.3	1.0	0.0	0.1
2007	0.1	0.2	0.4	0.7	0.1	0.1	0.3	2.4	0.0	0.1
2008	0.1	0.1	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.1
2009	0.1	0.1	0.2	0.2	0.1	0.1	0.0	0.1	0.1	0.1
2010	0.1	0.1	0.2	0.1	0.1	0.2	0.0	0.4	0.0	0.1

Table 14. Weekly facility mortality rates in percent at Lower Monumental Dam, 2010.

Week Ending	Yearling Chinook		Subyearling Chinook		Steelhead		Sockeye/Kokanee		Coho	Total
	Clipped	Unclip.	Clipped	Unclip.	Clipped	Unclip.	Clipped	Unclip.	Clip/Un.	
1-Apr	---	---	---	---	---	---	---	---	---	---
8-Apr	---	---	---	---	---	---	---	---	---	---
15-Apr	---	---	---	---	---	---	---	---	---	---
22-Apr	---	---	---	---	---	---	---	---	---	---
29-Apr	---	---	---	---	---	---	---	---	---	---
6-May	0.0	0.1	---	---	0.0	0.1	---	---	0.0	0.0
13-May	0.1	0.1	---	0.0	0.0	0.0	---	---	0.0	0.1
20-May	0.1	0.1	---	5.0	0.1	0.2	---	--	0.0	0.1
27-May	0.1	0.0	0.0	0.0	0.1	0.1	0.0	0.3	0.0	0.1
3-Jun	0.1	0.0	0.1	0.0	0.2	0.2	0.0	0.0	0.0	0.1
10-Jun	0.3	0.0	0.1	0.0	0.1	0.2	0.0	0.0	0.0	0.1
17-Jun	0.0	0.0	0.1	0.1	0.3	0.1	0.0	0.0	0.0	0.1
24-Jun	0.0	0.0	0.3	0.0	0.0	0.1	---	---	0.0	0.1
1-Jul	0.0	0.0	0.2	0.0	0.2	0.0	---	---	0.0	0.1
8-Jul	0.0	0.0	0.2	0.1	0.9	1.4	---	0.0	0.0	0.1
15-Jul	---	0.0	1.3	0.6	25.0	0.0	---	---	---	0.6
22-Jul	0.0	0.0	2.8	0.3	---	5.0	---	50.0	0.0	0.4
29-Jul	10.0	0.0	1.2	0.5	---	---	---	0.0	---	0.5
5-Aug	0.0	0.0	1.3	0.8	---	0.0	---	---	---	0.8
12-Aug	0.0	0.0	25.0	1.2	---	0.0	---	---	---	1.6
19-Aug	---	0.0	0.0	0.8	0.0	0.0	---	---	---	0.7
26-Aug	---	0.0	0.0	1.0	---	0.0	---	100.0	---	1.2
2-Sep	---	0.0	0.0	3.6	---	---	---	---	---	3.5
9-Sep	---	---	0.0	3.4	---	---	---	---	---	3.4
16-Sep	---	---	0.0	2.4	---	0.0	---	---	---	2.3*
23-Sep	0.0	---	---	9.8	---	---	---	---	---	9.5*
1-Oct	---	---	0.0	2.1	---	---	---	---	---	2.1

--- No fish collected during the week. * Partial sample week.

Table 15. Annual sample mortality in percent at Lower Monumental Dam, 2006-2010.

	Yearling Chinook		Subyearling Chinook		Steelhead		Sockeye/Kokanee		Coho	
Year	Clipped	Unclip	Clipped	Unclip.	Clipped	Unclip.	Clipped	Unclip.	Clip/Un.	Total
2006	0.5	0.2	0.5	1.0	0.3	0.4	1.4	2.7	0.0	0.6
2007	0.4	0.1	0.6	1.0	0.5	0.8	0.0	0.0	0.0	0.6
2008	0.2	0.2	0.4	0.4	0.2	0.1	0.0	0.0	0.0	0.3
2009	0.1	0.4	0.4	0.5	0.1	0.2	0.0	1.0	0.2	0.4
2010	0.2	0.1	0.6	0.5	0.2	0.3	0.0	4.6	0.0	0.4

Debris/Trash Racks

Trash rack raking occurred between March 21 and 22. A total of 12.0 cubic yards of debris was removed in this operation.

Submersible Screens

The submersible traveling screens (STSs) were inspected and tested on March 18 and were installed on March 23 and 24. Screen inspection began with the on deck inspection March 18. Inspection was done monthly by underwater video camera thereafter through November. The only STS problems during the 2010 season were in gatewells 4B, 5B and 5C (July inspection). The STS in 4B was raised to untangle the STS camera tether from the screen frame. Screens 5B and 5C had missing clips on the seam overlap and were repaired or replaced the same day they were discovered.

STSs were operated in “cycle” mode while the average fork length of subyearling chinook and/or sockeye/kokanee were greater than 120 mm (March 23 through June 1), and in continuous “run” mode when either was less than 120 mm (June 1 to August 10). From August 10 to December 16 they again were operated in cycle mode as fish length exceeded 120 mm.

Vertical Barrier Screens

The vertical barrier screens (VBSs) were inspected by underwater video camera in July. Additionally, they were spot-checked monthly during STS inspections. No problems were found.

Gatewells

Dipping the bulkhead slots (gatewells) yielded 19.4 cubic yards of debris this season. Gatewells were normally less than 10% covered. No gatewells exceeded the 50% debris criterion this season.

Orifices/Collection Channel

During the 2010 season the number of open orifices varied from 18 to 21 according to

forebay level. With the Lower Monumental reservoir at minimum operating pool, water discharge through an orifice is reduced. During this period, extra orifices were opened to supply additional water to the adult fishway. Orifices were cycled and backflushed with air daily to remove debris. Orifice fouling was a problem while high flows and a large debris load were occurring. Orifice lights were checked daily. If a light was not working, the operating orifice was switched to the other orifice in the slot until repairs could be made. Changes in positioning last years frequently failing orifice lights brought their operating life back into acceptable limits.

Primary Dewaterer

The primary dewaterer mechanical screen cleaner cable began slipping on the sheave on August 31. It was taken out of service for the remainder of the season and the bubbler system maintained a clean screen. The compressed air screen cleaner functioned well, as usual, and the system as a whole functioned very well keeping debris from plugging the inclined screen. No other breakdowns occurred during the transport season but occasional adjustment of the cables and cable tension device of the mechanical screen cleaner was required.

Wet Separator/Distribution and Sampling Systems

Sudden water level drops occurred at the separator again this year. Water level fluctuations in the forebay, automatic adjustments of the weirs at the primary dewaterer, and the closing and opening of orifices were the main causes. As has been the case for the last few years, the separator was run at a higher water level to mitigate this problem. The tech section at the dam is investigating the problem to pin down the root cause so that a solution can be formulated.

A Smith Root counter box worked poorly in early April. The cause was a loose wire at the plug. It was repaired after 2 days of investigation.

No problems occurred with the PIT-tag diversion gates this season. Gate position sensors were installed four years ago. These sensors act to prevent the over-travel problem we once had and by so doing they eliminated gate failure problems caused by metal fatigue.

Barge Loading Operations

Barge loading operations occurred from May 4 through August 16. Barge loading went very smoothly this season. The downstream mooring bit guide for the downstream mooring bit, having been deformed in a collision by a barge years ago, has had a problem with sticking low in the guides and not floating. Additionally it has been taking on water. Plans are being made to pull the mooring bit and take measurements to find the problem.

Truck Loading Operations

Juvenile fish were trucked by midi-tanker from August 16 to October 1. Throughout the late season the midi-tanker was used because of low fish numbers. A 2.5 mg/l salt solution was used on most trips in the midi-tanker to treat and/or ease suspected outbreaks of *columnaris*.

Recommendations

1. Design and fabricate screened overflow weirs on the sides of the separator to maintain a minimum water level and prevent water level drops in the separator.
2. Replace the separator adult fish release pipe with a pipe of larger diameter for the ease of accommodating larger fish.
3. Resolve the separator sudden water loss problem so that separator efficiency can be improved and fish safety can be achieved at optimum separator water levels. Also make sure the alarm system for the primary dewaterer will sound when the mechanical screen cleaner stops moving during its cycle.

APPENDIX TABLES

Appendix Table 1. Daily collection and bypass numbers and river conditions at Lower Monumental Dam, 2010.

Appendix Table 2. Daily number of fish trucked and barged from Lower Monumental Dam, 2010.

Appendix Table 3. Percent descaling and daily facility mortality numbers at Lower Monumental Dam, 2010.

Appendix Table 4. Daily number of adult fallbacks and fallback mortality at Lower Monumental Dam, 2010.