CENWW-OD-WL SPURGEON (1130) 31 October, 2013

MEMORANDUM THRU:
Robert Witham, Operations Project Manager, Lower Monumental Dam

FOR Chief, Operations Division
ATTN: John Bailey / Ann Setter

SUBJECT: Submission of 2013 Juvenile Fish Collection and Bypass Report, Lower Monumental Dam Juvenile Fish Facility.

1. Enclosed find the 2013 Juvenile Fish Collection and Bypass Report for Lower Monumental Dam as requested.

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

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Supervisory Fisheries Biologist, Lower Monumental Dam

Enclosure

2013 Juvenile Fish Collection and Bypass Report
Lower Monumental Dam Juvenile Fish Facility

Prepared by

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31 October, 2013

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Introduction

Juvenile fish transportation and bypass operations occurred for the twenty first year at Lower Monumental Dam Juvenile Fish Facility (JFF) in 2013. The bypass system was watered up at 1430 hours on March 21, and STSs were installed on March 19 through 21. The JFF was watered up for testing on March 21. Primary bypass occurred from March 21 through March 31, and was then intermittently interrupted for fish condition monitoring every third day until collection for transport began at 0700 on May 7. During this period, 1,772 fish were examined and returned to the river. These fish are not included in the 2013 season spreadsheet (Appendices 1-4) as collection for transport had yet to begin. Pacific Northwest National Laboratory (PNNL) conducted research at Lower Monumental JFF this season from June 1 through July 6.

Collection for transport began at 0700 hours on May 7 and ended at 0700 hours on October 1. The facility was returned to primary bypass at that time and continued in bypass mode through December 15. Smolt collection for the 2013 season was 1,114,869 which is 10.9% lower than that of 2012 (1,251,388), 29.5% lower than 2011 (1,582,908), 4.6% greater than 2010 (1,065,931), and 5.7% lower than 2009 (1,182,585). Of the 1,114,869 fish collected in the 2013 season, 3,412 were trucked, 1,095,954 were barged, and 13,893 were bypassed.

Pacific States Marine Fisheries Commission (PSMFC) technicians examined 1,845 fish for gas bubble trauma (GBT) in 2013. Examinations were conducted once a week from April 4 through August 8. Only those GBT fish examined during collection for transportation are included in the bypass numbers.

The passive integrated transponder (PIT) tag system detected 58,903 tagged fish coming through the JFF from April 1 to October 1, of which 14,787 were diverted to the river or failed to be detected moving to the raceways, the sample, or the exits. None of these 58,903 PIT tagged fish are included in the bypass numbers.

This season's total collection by species group included: 351,719 clipped yearling chinook, 118,229 unclipped yearling chinook, 61,709 clipped subyearling chinook, 108,369 unclipped subyearling chinook, 334,849 clipped steelhead, 123,933 unclipped steelhead, 4,388 clipped sockeye, 3,674 unclipped sockeye, and 7,999 clip/unclip coho. Full powerhouse screening and bypass operations continued through December 15, 2013.

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 Holdren, biological technicians: K.C. Deife, Shelly Montoya, Grant Silver, Pamela Kostka, and truck driver / maintenance personnel: Rick Blevins and Kenneth Fletcher. Representing Pacific States Marine Fisheries Commission (PSMFC) was biologist Wm. Monty Price and Washington Department of Fish and Wildlife (WDF&W) biologist Sharon Lind. PSMFC technicians Carol Williams and Dawn Kunkel conducted 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 2013 fish collection season:

1. Replaced all raceway tailscreens with an improved slotted perforated plate system. (lamprey improvement program)
2. Replaced porosity unit perforated plates with plates which have narrower slots.
3. A concrete ramp was installed along the transition flume to remove a stumbling hazard in accessing the separator booth.
4. Handrails were added in numerous locations where one might accidently step off an elevated area.

River Conditions

During the 2013 season, the average daily flow exceeded 100.0 kcfs on 7 days and did not exceed 150 kcfs. The highest daily average flow for the season was 134.5 kcfs on May 15. The lowest daily average flow for the season occurred on September 2 with a flow of 12.1 kcfs. The average flow for the season was 45.7 kcfs. Spill occurred for 152 days from April 3 through midnight on August 31, with a maximum daily average spill of 31.9 on May 2. The RSW was put into operation when Court ordered spill began on April 3, and was taken out of service for the season on August 31.

River temperature averaged 59.4^{o} F for the season and ranged from 43.4^{o} F in early April, to 70.1^{o} F in early September. A comparison of daily powerhouse flow and spill is shown in Figure 1. Average monthly flow and spill for the 2009-2013 collection seasons are provided in Table 1.

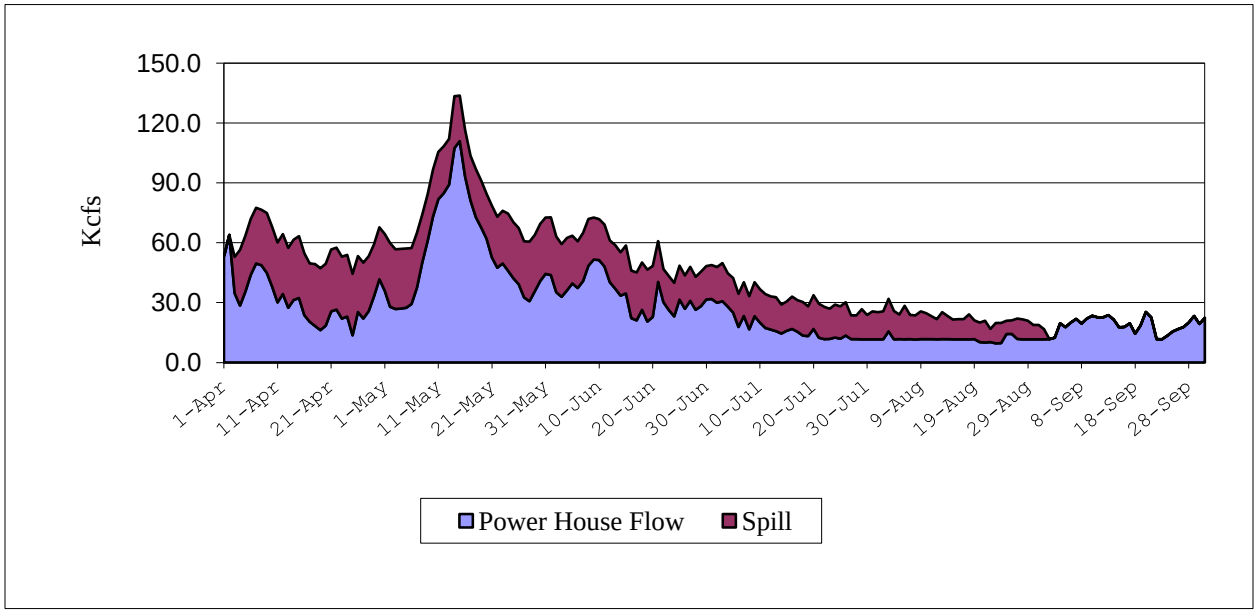
Fish Collection

Migration and Collection

Pre-transport primary bypass occurred from March 21 through May 7. Fish collection for transportation began at 0700 hours on May 7 and continued until 0700 hours on October 1. An

estimated 1,114,869 juvenile salmonids were collected in 2013 (Table 2). Within each species group, the number collected and percent of the total collection was: 351,719 clipped yearling chinook (31.5%), 118,229 unclipped yearling chinook (10.6%), 61,709 clipped subyearling chinook (5.5%), 108,369 unclipped subyearling chinook (9.7%), 334,849 clipped steelhead (30.0%), 123,933 unclipped steelhead (11.1%), 4,388 clipped sockeye/kokanee (0.4%), 3,674 unclipped sockeye/kokanee (0.3%), and 7,999 clip/unclip coho (0.7%). Post-season bypass occurred from October 1 through December 15. Daily collection and bypass numbers are provided in Appendix Table 1.

Figure 1. Comparisons of daily powerhouse flow and spill at Lower Monumental Dam, 2013.



By the end of May, 84.7% 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 97.0% and 99.3%, respectively. The months of August, September, and October contributed 0.7% of the total collection, and were responsible for the collection of 6.8% of the year's unclipped subyearling chinook.

The peak daily collection total and date for each species group were: clipped yearling chinook 50,035 (May 15), unclipped yearling chinook 15,400 (May 14), clipped subyearling chinook 7,766 (June 11), unclipped subyearling chinook 12,347 (June 10), clipped steelhead 52,900 (May 14), unclipped steelhead 18,700 (May 14), clipped sockeye 1,600 (May 18), unclipped sockeye 1,000 (May 20), and clip/unclip coho 2,200 (May 14). Total daily collection in 2013 peaked at 138,800 (May 14). 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.

Adult Fallbacks

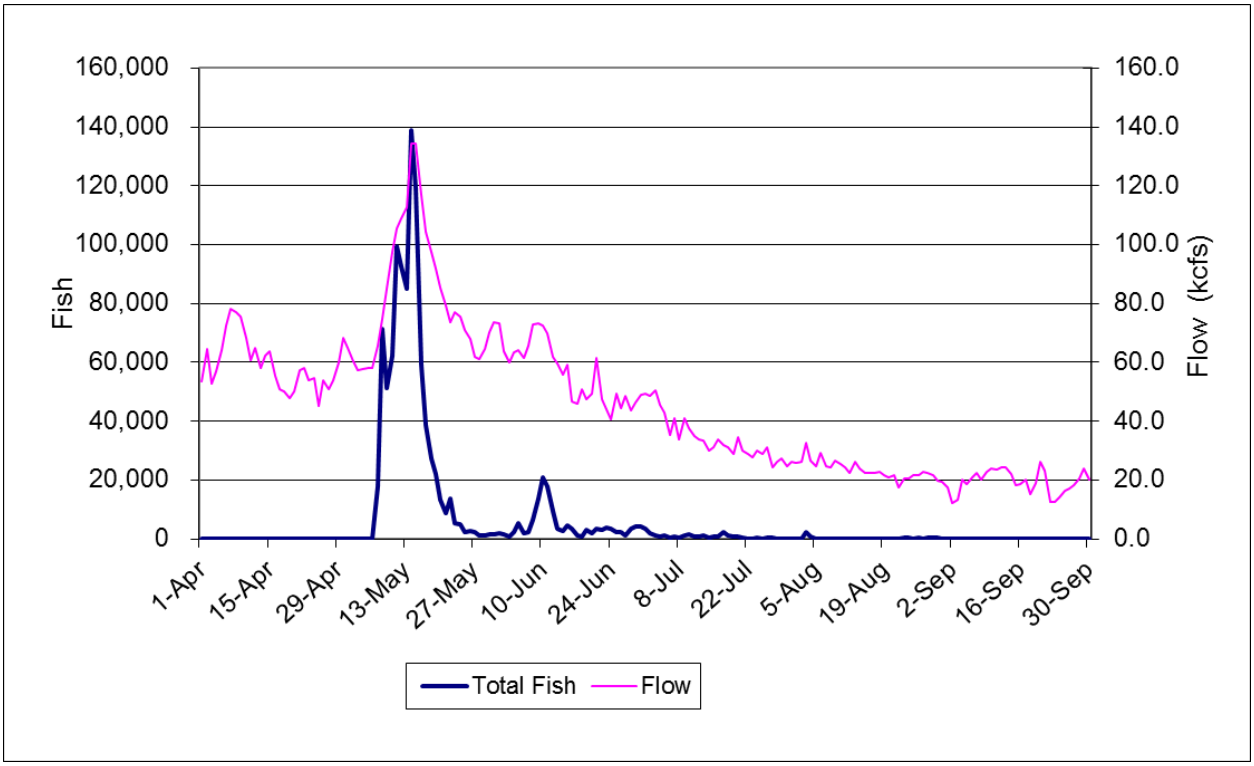
A total of 1,294 adult salmonids fell back through the juvenile bypass system and were bypassed from the separator between April 1 and October 1, 2013 (Table 4). The total includes: 135 adult chinook salmon, 89 jack chinook salmon, 556 clipped steelhead, 505 unclipped steelhead, 2 clipped sockeye, and 7 unclipped sockeye. The total fallback number in 2013 was typical for this facility over the past 5 years with the 2011 operating year being the highest and 2010 and 2013 tied for the lowest. The daily number 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 2013 were steelhead. The months of May and June accounted for 43.0% and August and September 54.0% of the steelhead fallback in 2013 (Table 5). Spring/summer chinook accounted for 37.9% and fall chinook accounted for 62.1% of chinook fallbacks. Monthly adult salmonid fallback peaked in May, with a second peak in September.

Table 1. Comparisons of average monthly flow and spill at Lower Monumental Dam, 2009-2013.

Month	2009	2010	2011	2012	2013	Average
Flow						
April	86.9	40.6	108.3	121.5	59.7	83.4
May	115.6	65.0	141.9	105.5	82.2	102.0
June	111.2	127.2	171.9	88.7	56.4	111.1
July	48.7	46.8	93.4	45.9	34.0	53.8
August	30.4	29.1	39.9	27.6	23.4	30.1
Sept.	22.2	22.6	34.4	21.6	19.4	24.1
Spill						
April	25.7	18.1	27.9	37.5	27.4	27.3
May	33.8	28.8	49.2	29.5	26.3	33.5
June	25.4	36.8	59.1	28.3	21.7	34.3
July	17.5	18.3	25.9	18.2	16.0	19.2
August	16.4	14.1	16.9	14.0	11.0	14.5
Sept.	0.2	0.3	0.4	0.4	0.2	0.3

Figure 2. Daily juvenile salmonid collection, all species combined, versus daily average river flow at Lower Monumental Dam, 2013.



The condition of adult salmonids was evaluated as they were released from the separator. Their condition was predominantly good to fair with 92.3% of the fallbacks rated in these categories (Table 6). Condition ratings of the 1,285 adults examined (excluding the 9 sockeye) were as follows: 1,000 good (77.9%), 185 fair (14.4%), 77 poor (6.0%), and 23 were dead (1.8%). The number of each species group of dead adult salmonids was: 1 clipped chinook, 9 clipped steelhead, and 13 unclipped steelhead. Adult chinook had a higher percentage of good/fair fish (95.6%) than steelhead (92.0%).

Table 2. Annual collection, bypass, and transport at Lower Monumental Dam, 2009-2013.

	Yearling Chinook		Subyearling Chinook		Steelhead		Sockeye/Kokanee		Coho	
Year	Clipped	Unclip.	Clipped	Unclip.	Clipped	Unclip.	Clipped	Unclip.	Clip/Un.	Total
Collection										
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
2011	592,941	172,598	76,552	176,205	355,269	176,206	8,326	11,719	13,092	1,582,908
2012	394,107	143,211	106,551	145,438	293,773	140,551	320	13,069	14,368	1,251,388
2013	351,719	118,229	61,709	108,369	334,849	123,933	4,388	3,674	7,999	1,114,869
Bypass										
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
2011	109,943	17,304	3,344	5,227	51,470	17,673	160	798	1,104	207,023
2012	4,235	1,286	5,954	6,979	4,253	1,564	0	0	0	24,271
2013	79	50	5,784	7,646	237	97	0	0	0	13,893
Truck										
2009	0	7	31	650	1	2	0	0	49	740
2010	1	2	13	1,423	0	2	0	0	0	1,441
2011	0	38	46	5,324	1	4	0	2	66	5,481
2012	2	6	87	1,932	0	0	0	6	2	2,035
2013	0	2	201	3,192	4	13	0	0	0	3,412
Barge										
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
2011	481,872	154,883	72,591	164,197	303,228	158,228	8,126	10,706	11,903	1,365,734
2012	389,454	141,830	100,150	135,840	289,404	138,923	320	13,052	14,356	1,223,329
2013	351,214	118,070	55,493	96,942	334,411	123,768	4,388	3,670	7,998	1,095,954
Total Transported										
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
2011	481,872	154,921	72,637	169,521	303,229	158,232	8,126	10,708	11,969	1,371,215
2012	389,456	141,836	100,237	137,772	289,404	138,923	320	13,058	14,358	1,225,364
2013	351,214	118,072	55,694	100,134	334,415	123,781	4,388	3,670	7,998	1,099,366

Table 3. Annual peak collection dates at Lower Monumental Dam, 2009-2013.

	Yearling Chinook		Subyearling Chinook		Steelhead		Sockeye/Kokanee		Coho	
Year	Clipped	Unclip.	Clipped	Unclip.	Clipped	Unclip.	Clipped	Unclip.	Clip/Un	Total
2009	May 20 31,600	May 20 4,600	June 4 10,300	June 6 11,400	May 22 32,400	May 23 9,400	May 21 2,500	May 27 700	May 20 1,100	May 22 69,300
2010	May 19 40,261	May 19 7,908	June 11 26,000	June 10 35,800	May 22 12,200	May 21 7,000	May 26 100	May 22 100	June 5 1,600	June 10 74,800
2011	May 16 109,701	May 15 19,851	June 3 4,700	June 1 8,609	May 16 48,060	May 19 26,269	May 29 1,600	May 9 1,045	May 21 1,791	May 16 192,388
2012	May 6 56,755	May 6 15,480	June 6 7,034	June 28 8,453	May 7 23,900	May 21 11,220	May 15 100	May 21 1,390	May 19 1,200	May 6 97,045
2013	May 15 50,035	May 14 15,400	June 11 7,766	June 10 12,347	May 14 52,900	May 14 18,700	May 18 1,600	May 20 1,000	May 14 2,200	May 14 138,800

Table 4. Annual totals of adult salmonids released from the juvenile fish separator at Lower Monumental Dam, 2009-2013.

Year[1]	Adult Chinook	Jack Chinook	Clipped Steelhead	Unclipped Steelhead	Total
2009	178	118	1,030	576	1,914[3]
2010	162	27	642	389	1,226[3]
2011	254	152	557	1,142	2,110[3]
2012	152	116	403	812	1,484[3]
2013	135	89	556	505	1,294[3]

[1] Seasons varied in length.
[2] Coho are included in the total.
[3] Clipped and/or unclipped sockeye are included in the total.

Table 5. Monthly totals of adult salmonids[1] released from the juvenile fish separator at Lower Monumental Dam, 2013.

Month	Adult Chinook	Jack Chinook	Clipped Steelhead	Unclipped Steelhead	Total
April	0	2	2	4	8
May	23	8	159	255	445
June	10	5	11	31	57
July	16	16	9	8	49
August	14	3	90	87	194
September	69	50	279	117	515
October	3	5	6	3	17
Total	135	89	556	505	1,285

[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, 2013.

Condition	Adult Chinook	Jack Chinook	Clipped Steelhead	Unclipped Steelhead	Total
Good	114	71	449	366	1,000
Fair	15	9	69	92	185
Poor	5	9	29	34	77
Dead	1	0	9	13	23
Total	135	89	556	505	1,285

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

Separator Efficiency

Separator efficiency for 2013 by species group was: clipped yearling chinook 62.8%, unclipped yearling chinook 67.6%, subyearling chinook 21.6%, clipped steelhead 88.1%, unclipped steelhead 68.3%, clipped sockeye/kokanee 45.7%, and unclipped sockeye/kokanee 59.5% (Table 7).

Table 7. Annual separator efficiency in percent at Lower Monumental Dam, 2009-2013.

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
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
2011	80.6	83.1	54.5	60.5	42.1	42.3	54.3
2012	70.5	65.7	49.4	84.2	61.8	31.3	51.8
2013	62.8	67.6	21.6	88.1	68.3	45.7	59.5

[1] This category includes unclipped hatchery fish.

Sampling

Consistent with the 2013 Fish Operations Plan (FOP) Appendix B and guidance provided by the 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 7 at 0700 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.

Sampling is diverting and segregating groups of fish in a consistent fashion so that data collected from those segregated groups will accurately represent the sum total of the fish being collected in real time. Sampling is not the act of evaluating those groups.

Limited sampling took place in accordance with the FOP from April 1 through May 6. 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 the April 1 through May 6 period was 1,772. The number sampled within each species group was: 447 clipped yearling chinook, 504 unclipped yearling chinook, 1 clipped sub yearling chinook, 7 unclipped sub yearling chinook, 708 clipped steelhead, 103 unclipped steelhead, no clipped sockeye, 2 unclipped sockeye, and no hatchery coho.

Sampling during collection for transport began at 0700 hours on May 7. Sampling was conducted daily through August 14. From August 14 through October 1 the sampling schedule was frequently changed. These changes progressed as follows: sampling for condition every

third day, alternate day sampling, every day sampling, sampling for condition every third day, alternate day sampling, and finally back to every day sampling. These changing sampling schemes were dictated by FPOM in response to mortality rates relating to *columnaris* disease. A total of 47,517 fish (4.3% of the collection) was sampled during this period in 2013 (Table 8). Within each species group, the number and percent sampled of those collected in that group was: 3,740 clipped yearling chinook (1.1%), 2,197 unclipped yearling chinook (1.9%), 10,206 clipped subyearling chinook (16.5%), 24,124 unclipped subyearling chinook (22.3%), 4,801 clipped steelhead (1.4%), 2,089 unclipped steelhead (1.7%),75 clipped sockeye/kokanee (1.7%), 81 unclipped sockeye/kokanee (2.2%), and 204 clip/unclip coho (2.6%).

Average weekly sample rates ranged from 0.9% to 100% (Table 9).

Transportation

An estimated 1,099,366 juvenile salmonids (98.6% of the collection) were transported from Lower Monumental Dam in 2013. Of these, approximately 3,412 were transported by truck and 1,095,954 by barge. Within each species group, the number transported and percent of those collected in that group was: 351,214 clipped yearling chinook (99.9%), 118,072 unclipped yearling chinook (99.9%), 55,694 clipped subyearling chinook (90.3%), 100,134 unclipped subyearling chinook (92.4%), 334,415 clipped steelhead (99.9%), 123,781 unclipped steelhead (99.9%), 4,388 clipped sockeye/kokanee (100.0%), 3,670 unclipped sockeye/kokanee (99.9%), and 7,998 clip/unclip coho (100%). 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, 2009-2013.

	Yearling Chinook		Subyearling Chinook		Steelhead		Sockeye/Kokanee		Coho	
Year	Clipped	Unclip.	Clipped	Unclip.	Clipped	Unclip.	Clipped	Unclip.	Clip/Un.	Total
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
2011	0.7	1.0	4.8	10.1	1.0	1.2	1.6	1.9	2.2	2.1
2012	2.2	2.8	8.9	12.2	3.4	3.2	2.8	3.7	3.2	4.4
2013	1.1	1.9	16.5	22.3	1.4	1.7	1.7	2.2	2.6	4.3

There was no early season trucking from this site this year. Juvenile fish were trucked by midi-tanker from August 21 through October 1, when not in bypass mode. A salt solution of 2.5 grams per liter (g/l) (6 pounds per 300 gallons of water) is used routinely in the mini and midi-tankers to treat or ease the *columnaris* symptoms common at this time of year. A total of 3,412 fish (0.31% of the collection) were transported by truck in 2013 (Table 2). Within each species group, the number trucked and percent of those collected in that group was: no clipped yearling chinook, 2 unclipped yearling chinook (0.0%), 201 clipped subyearling chinook (0.3%), 3,192 unclipped subyearling chinook (2.9%), 4 clipped steelhead (0.0%), 13 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 7 through August 14. An estimated 1,095,954 fish (98.3% of the collection) were transported by barge in 2013 (Table 2). Within each species group, the number barged and percent of those collected in that group was: 351,214 clipped yearling chinook (99.9%), 118,070 unclipped yearling chinook (99.9%), 55,493 clipped subyearling chinook (89.9%), 96,942 unclipped subyearling chinook (89.5%), 334,411 clipped steelhead (99.9%), 123,768 unclipped steelhead (99.9%), 4,388 clipped sockeye/kokanee (100.0%), 3,670 unclipped sockeye/kokanee (99.9%), and 7,998 clip/unclip coho (100.0%).

Bypass

During the juvenile transport season (May 7 to October 1) a total of 13,893 fish were bypassed, 1.2% of the collection (Table 2). Within each species group, the number bypassed and percent of those collected in that group was: 79 clipped yearling chinook (0.0%), 50 unclipped yearling chinook (0.0%), 5,784 clipped subyearling chinook (9.4%), 7,646 unclipped subyearling chinook (7.1%), 237 clipped steelhead (0.1%), 97 unclipped steelhead (0.1%), no clipped sockeye/kokanee, no unclipped sockeye/kokanee, and no clip/unclip coho. These numbers include fish examined for GBT during the transport season and fish given to PNNL for their research project during the transport season. This does not include fish bypassed by the PIT tag diversion system or fish bypassed during late season trucking when bypassing was required due to high mortality rates.

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

1. Primary bypass occurred from April 1 through May 6, a total of 1,808 fish were sampled for condition and then bypassed during this period. As collection for transport had yet to begin, these fish are not accounted for in the appendix. Sampling occurred during this period for fish condition monitoring (COE). Within each species group, the number evaluated and bypassed of each group through this period was: 471 clipped yearling chinook, 517 unclipped yearling chinook, 1 clipped subyearling chinook, 7 unclipped subyearling chinook, 707 clipped steelhead, 103 unclipped steelhead, no clipped sockeye/kokanee, 2 unclipped sockeye/kokanee, and no clip/unclip coho. These numbers include fish examined for GBT during this primary bypass period. A total of 728 fish were checked for GBT symptoms from April 4 through May 6. These fish are not included in the facility bypass total.
2. GBT inspections during the transport period of May 7 through October 1 accounted for a total of 1,117 fish bypassed. Within each species group the number bypassed was: 79 clipped yearling chinook, 50 unclipped yearling chinook, 182 clipped subyearling chinook, 474 unclipped subyearling chinook, 235 clipped steelhead, and 97 unclipped steelhead.
3. Pacific Northwest National Laboratory (PNNL) utilized 12,708 fish collected from the sample for their research purposes. Within each species group, the number submitted to PNNL was: 5,600 clipped subyearling chinook and 7,108 unclipped subyearling chinook (See; Research Section). These fish were all returned to the river and are included in the bypass numbers of this report.

4. From August 14 to September 18, the sampling and subsequent collection for transportation schedule changed frequently. These changes included: sampling for condition every third day, sampling for 24 hours every other day, and finally, back to every other day sampling with collection for transport. During this period a total of 68 fish were evaluated and bypassed. Within each species group, the number bypassed of each group through this period was: 2 clipped subyearling chinook, 64 unclipped subyearling chinook, and 2 clipped steelhead. During the intermittent primary bypass operations there was no sampling through which to estimate bypass numbers.
5. The PTAGIS3 database revealed that 58,903 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, 58,903 PIT-tagged fish were detected at Lower Monumental Dam in 2013. Of these, 26,071 were bypassed through the PIT tag diversion below the separator to the river (44.3%), 448 were last interrogated by the sample monitor (0.8%) (transported), 17,597 last interrogated by the raceway monitors (29.9%) (transported), and 14,787 were last interrogated at monitors that do not constitute exits to the river or transport system (25.1%) (fish disposition unknown).

The composition of bypassed PIT-tagged fish was: 10,871 hatchery spring/summer chinook, 5,616 hatchery fall chinook, 1,122 hatchery chinook of unknown run, 3,307 wild spring/summer chinook, 126 wild fall chinook, 2,098 wild chinook of unknown run, 724 chinook of unknown run or rearing disposition, 11,299 hatchery steelhead, 3,407 wild steelhead, 1,185 steelhead of unknown rearing, 775 hatchery sockeye, 79 hatchery coho, and 66 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 at 100% of the collection. At that time they are easily removed while working up the sample, 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 2013 included: sucker spp. (720), juvenile shad (5,014), juvenile and adult smallmouth bass (428), peamouths (1,994), channel catfish (420), Sculpin (579), juvenile pacific lamprey (63,741), and Siberian prawn (12,969).

Juvenile shad numbers were at 5,014, but did not approach the 2011 operating year collection of 23,201. Other fish species numbers collected at the facility have decreased as well, although some of the problems encountered last year with possible escapement prior to sampling for those fish that swim close to the bottom of the tanks may have been corrected. Fish numbers fluctuate from year to year and what we find is a reflection of that, but this year we again saw an unprecedented falloff on the collection of mountain whitefish and sandrollers. Historically juvenile crappie were one of our most encountered incidental species, however, their numbers have continued to drop from year to year and were again low again this year. Estimated numbers of some groups may also become exaggerated due to the low sample rates at the time of collection. The yellow perch numbers did pick up a bit this year in comparison to previous years, and this season we found juvenile largemouth bass in the sample.

Juvenile lampreys are no longer seen in numbers seen in the past. In 2010 the collection of the juvenile (silver) lamprey was 218,102 and in 2013 the collection counts were 64,551. The brown lamprey (ammocoete) collection in 2013 was 810, while it was only 76 in 2012. This could be the result of escapement prior to sampling. A modification has been made in exit hatches in the drain hopper wall of the sample holding tanks and porosity unit plates were changed to ones with smaller slots which likely account for the collection of lamprey increasing during the last few years. A summary of incidental fish collection and disposition is provided in Table 10.

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 2013 was 1.9%. The annual descaling rate by species group was: clipped yearling chinook 2.7%, unclipped yearling chinook 2.9%, clipped subyearling chinook 1.5%, unclipped subyearling chinook 1.2%, clipped steelhead 4.2%, unclipped steelhead 3.5%, clipped sockeye/kokanee 0.0%, unclipped sockeye/kokanee 4.9%, and clip/unclip coho 2.0% (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 3.0% in 2011.

The highest weekly descaling rate for all species combined was 11.7% for the week ending April 4 (fewer than 100 fish sampled for the week), while the lowest rate (0.3%) occurred the week of August 29 (Table 12). Daily descaling rates are provided in Appendix Table 2.

Table 9. Weekly sample rates in percent and sample totals at Lower Monumental Dam, 2013.

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*
04-Apr	100.0	2	55	0	0	2	5	0	0	0	64
11-Apr	100.0	12	32	0	1	51	17	0	2	0	115
18-Apr	100.0	115	114	1	5	84	33	0	0	0	352
25-Apr	100.0	108	104	0	1	341	30	0	0	0	584
02-May	100.0	148	150	0	0	133	13	0	0	0	444
09-May	1.2	566	321	0	0	665	164	0	0	1	1,717
16-May	0.9	2,445	638	37	9	1,925	675	1	1	46	5,777
23-May	1.2	268	175	22	14	657	324	47	42	28	1,577
30-May	7.9	72	145	66	62	533	370	18	9	21	1,296
06-Jun	24.7	143	252	1,313	1,488	256	229	7	18	63	3,769
13-Jun	8.8	49	158	2,637	3,472	128	54	2	6	30	6,536
20-Jun	28.5	23	72	2,126	2,718	76	97	0	2	4	5,118
27-Jun	31.5	11	77	1,882	3,994	88	60	0	0	4	6,116
04-Jul	20.4	1	38	1,071	2,748	139	28	0	1	4	4,030
11-Jul	28.9	1	16	365	1,438	21	3	0	0	2	1,846
18-Jul	26.0	0	3	192	1,725	3	2	0	0	0	1,925
25-Jul	35.3	0	1	96	842	2	1	0	0	0	942
01-Aug	52.3	0	1	58	622	1	1	0	0	0	683
08-Aug	38.3	0	6	86	1,318	1	0	0	0	1	1,412
15-Aug	50.0	0	0	3	110	0	0	0	0	0	113
22-Aug	100.0	0	0	6	125	0	0	0	0	0	131
29-Aug	100.0	0	0	144	1,994	3	0	0	0	0	2,141
05-Sep	100.0	0	0	35	302	0	0	0	0	0	337
12-Sep	100.0	0	1	18	268	0	0	0	0	0	287
19-Sep	100.0	0	1	12	228	2	4	0	0	0	247
26-Sep	100.0	0	0	16	241	1	5	0	0	0	263
01-Oct	100.0	0	0	20	399	0	4	0	0	0	423
Total Sampled		3,964	2,360	10,206	24,124	5,112	2,119	75	81	204	48,245
% of Sample		8.2%	4.9%	21.2%	50.0%	10.6%	4.4%	0.2%	0.2%	0.4%	100.0%
% of Collection		1.1%	2.0%	16.5%	22.3%	1.5%	1.7%	1.7%	2.2%	2.6%	4.3%

* 24 hour sampling at Lower Monumental Dam began this year on May 7.

Other Injuries and Disease

Injury data was gathered from a sub sample of 100 of the dominant species and not more than 100 each of the non-dominant species. There were 19,877 fish examined for injury and disease in 2013. The most common symptom observed in 2013, 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 and is mostly found on subyearling chinook. Evidence of blood pooling was found on 7.3% of all fish examined. The incidence of blood pooling by species group was: clipped yearling chinook 0.2%, unclipped yearling chinook 0.4%, clipped subyearling chinook 7.3%,

unclipped subyearling chinook 15.0%, clipped steelhead 0.0%, unclipped steelhead 0.1%, clipped sockeye/kokanee 0.0%, unclipped sockeye/kokanee 0.0%, and clip/unclip coho 0.0%.

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 1.8% of all fish examined for injuries in 2013. The incidence of hemorrhaging by species group was: clipped yearling chinook 1.2%, unclipped yearling chinook 1.6%, clipped subyearling chinook 1.7%, unclipped subyearling chinook 3.1%, clipped steelhead 0.2%, unclipped steelhead 0.1%, clipped sockeye/kokanee 0.0%, unclipped sockeye/kokanee 0.0%, and clip/unclip coho 0.5%.

Other common injuries included bird marks, body fungus, body damage, and folded opercula. Bird marks were observed on 2.3% of all fish examined. The incidence of bird marks by species group was: clipped yearling chinook 2.5%, unclipped yearling chinook 2.3%, clipped subyearling chinook 1.2%, unclipped subyearling chinook 1.1%, clipped steelhead 5.6%, unclipped steelhead 5.1%, clipped sockeye/kokanee 1.4%, unclipped sockeye/kokanee 3.7%, and clip/unclip coho 3.6.

Fungus was found on 0.3% of all fish examined. Fungus was found on all species and rearing types with the exception of clipped sockeye. 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 most frequently in subyearling chinook but is seen on coho as well. Typically 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. It was also found in the dorsal region this year. This year both clipped and unclipped subyearling chinook showed signs. *Columnaris* rates for the species above were: clipped subyearling chinook 0.9% and unclipped subyearling chinook 3.5%. 2013 daily *columnaris* rate at this facility for the unclipped subyearling chinook reached a high of 50.0% on September 26. The last 3 weeks of September had an average daily rate of 4.5% which was lower than that for the same period in 2012 at 14.5%. However, the *columnaris* rate this year cannot be compared to 2012 because this year the JFF did not collect fish every day as was done in 2012. The mortality rate in 2013, as in 2012, mirrored the *columnaris* rate during this time.

Mortality

Annual facility mortality for all groups combined was 0.1% in 2013 (Table 13) and totaled 1,610 fish. Within each species group, the number of facility mortalities and percent of those collected in that group was: 426 clipped yearling chinook (0.1%), 107 unclipped yearling chinook (0.1%), 231 clipped subyearling chinook (0.4%), 589 unclipped subyearling chinook (0.5%), 197 clipped steelhead (0.1%), 55 unclipped steelhead (0.0%), no clipped sockeye/kokanee, 4 unclipped sockeye/kokanee (0.1%), and 1 clip/unclip coho (0.0%). Total annual facility mortality was 0.1% in all of the last 5 years except 2011 which was 0.3. Weekly mortality rates had a high of 27.6% for the week ending September 5 and a low of 0.0% for the week ending September 12 (Table 14). Daily mortality rates are provided in Appendix Table 2.

Annual sample mortality for all groups combined was 1.0% in 2013 (Table 15) and totaled 487 fish. The number of sample mortalities and mortality rate by species group was: 9 clipped yearling chinook (0.2%), 6 unclipped yearling chinook (0.3%), 86 clipped subyearling chinook (0.8%), 369 unclipped subyearling chinook (1.5%), 12 clipped steelhead (0.3%), 5 unclipped steelhead (0.2%), and no clipped sockeye/kokanee, unclipped sockeye/kokanee, or clip/unclip coho. Sample mortality for all groups combined has ranged from a high of 2.0% in 2011 to a low of 0.4% in 2009 and 2010.

Annual post-sample mortality for all groups combined was 0.2% in 2013 and totaled 87 fish. The number of post-sample mortalities and mortality rate by species group was: 1 clipped yearling chinook (0.0%), 26 clipped subyearling chinook (0.2%), 54 unclipped subyearling chinook (0.2%), 4 clipped steelhead (0.1%), and 2 unclipped steelhead (0.1%). The highest post-sample mortality rate (0.7%) occurred in 2004 and the lowest (0.0%) in 1999.

Annual truck mortality in 2013 was 0.9% (30 of 3,412 fish). The number of truck mortalities and mortality rate by species group was: 30 unclipped subyearling chinook (0.9%). The annual truck mortality rate in 2012 was 1.0%.

Research

Gas Bubble Trauma Monitoring (PSMFC)

Juvenile chinook and steelhead were sampled once a week for GBT from April 4 through August 8 in 2013. The GBT inspections were stopped early due to small numbers of available fish. Typically it would have ended when spill stopped on August 31. This season 1,845 fish were sampled for GBT. PSMFC personnel examined up to100 individuals of each of the following groups: yearling chinook, subyearling chinook, and juvenile steelhead. The fish were searched for evidence of bubbles in paired and unpaired fins, and in the eye, as per Fish Passage Center GBT protocols. After examination the fish were bypassed to the river. Weekly GBT sampling continued for up to eight hours or until 100 fish had been sampled per species group. The number sampled for GBT by species group was: 303 clipped yearling chinook, 213 unclipped yearling chinook, 182 clipped subyearling chinook, 474 unclipped subyearling chinook, 546 clipped steelhead, and 127 unclipped steelhead. In the 2013 season, no fish showed signs of GBT.

Multi-Dam Performance Study of Juvenile Salmonid Passage and Survival Using Acoustic Telemetry

The purpose of this two year project was to conduct a biological assessment of juvenile salmonid passage and survival through Little Goose Dam (LGS) and Lower Monumental Dam (LMN) using JSAT acoustic telemetry technology. The project was initiated to support the 2008 FCRPS Biological Opinion RPA 52 (NOAA Fisheries 2008, NOAA Fisheries 2010) and the Memorandum of Agreement between the Treaty Tribes and Action Agencies (3 Treaty Tribes-Action Agencies). This research project was performed by Battelle-Pacific Northwest Division, (Pacific Northwest National Laboratory (PNNL)).

Table 10. Estimated collection of incidental species at Lower Monumental Dam, 2013.

Common Name	Scientific Name	Exp. Sample	Separator	Total Collection[1]
American shad (Adult)	*Alosa sapidissima*	9	70	79
American shad (Juvenile)	*A. sapidissima*	5,012	2	5,014
Banded Killifish	*Fundulus diaphanus*	0	0	0
Bullhead (misc.)	*Amierus* spp.	16	0	16
Bull Trout	*Salvelinus confluentus*	0	0	0
Channel catfish	*Ictalurus punctatus*	365	55	420
Chiselmouth	*Acrocheilus alutaceus*	1	0	1
Common carp	*Cyprinus carpio*	45	22	67
Crappie	*Pomoxis* spp.	161	4	165
Kokanee	*Oncorhynchus nerka*	0	0	0
Mosquitofish	*Gambusia affinis*	3	0	3
Northern Pikeminnow	*Ptychocheilus oregonensis*	5	2	7
Pacific lamprey (Adult)	*Lampetra tridentatus*	32	6	38
Pacific lamprey (Juvenile)	*L. tridentatus*	63,725	16	63,741
Pacific lamprey (Ammocoete)	*L. tridentatus*	810	0	810
Peamouth	*Mylocheilus caurinus*	1,980	14	1,994
Rainbow Trout[2]	*Oncorhynchus mykiss*	0	200	200
Redside Shiner	*Richardsonius balteatus*	2	0	2
Sandroller	*Percopsis transmontana*	11	0	11
Sculpin	*Cottus* spp.	579	0	579
Siberian Shrimp/Prawn	*Exopalaemon modestus*	12,969	0	12,969
Smallmouth bass	*Micropterus dolomieu*	427	1	428
Largemouth bass	*Micropterus salmoides*	12	0	12
Sucker (misc.)	*Catostomus* spp.	569	151	720
Sunfish (misc.)	*Lepomis* spp.	95	2	97
Tadpole Madtom	*Nosturus gyrinus*	2	0	2
Whitefish	*Prosopium spp.*	18	1	19
White Sturgeon	*Acipenser transmontanus*	0	6	6
Walleye	*Stizostedion vitreum*	7	2	9
Warmouth	*Lepomis gulosus*	0	0	0
Yellow perch	*Perca flavescens*	10	5	15
Others	----------	27	2[2]	29
Total		86,892	562	87,454

[1] Incidental species collection estimates are based on (sampled number of group expanded by the sample rate) plus separator count. All incidental fish in the sample and the separator are removed and bypassed.
[2] Rainbow trout are classified by morphological characteristics, but this may include misidentified juvenile steelhead. We had juvenile largemouth bass this year as well.

Table 11. Annual descaling rates in percent for fish sampled at Lower Monumental Dam, 2009-2013.

	Yearling Chinook		Subyearling Chinook		Steelhead		Sockeye/Kokanee		Coho	
Year	Clipped	Unclip.	Clipped	Unclip.	Clipped	Unclip.	Clipped	Unclip.	Clip/Un.	Total
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
2011	4.5	2.2	2.7	1.8	5.9	4.7	1.5	3.7	4.3	3.0
2012	2.7	1.5	1.1	1.0	3.2	3.0	0.0	4.1	2.7	2.0
2013	2.7	2.9	1.5	1.2	4.2	3.5	0.0	4.9	2.0	1.9

Only subyearling chinook salmon were collected from the Lower Monumental JFF for the 2013 portion of this study. They were surgically implanted with both JSAT acoustic transmitters and passive integrated transponder (PIT) tags. Tagged fish were released at five locations within the study area, from upstream of LGS to below LMN. Acoustic receivers were deployed in transects across the river channel at 10 different locations for monitoring the movement of these fish.

This year's portion of this project took place from June 1 through July 6, 2013. The numbers of fish taken for this project and their disposition are summarized below.

	Yearling Chinook	Steelhead	Subyearling Chinook
Total Received from Sample	0	0	12,708
Number of Incidental Mortalities	0	0	173
Number of Intentional Mortalities	0	0	168
Number Tagged and Released	0	0	11,778
Number Bypassed, Unused	0	0	589

Table 12. Weekly descaling rates in percent for fish sampled at Lower Monumental Dam, 2013.

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
04-Apr	0.0*	13.5*	---	---	0.0*	0.0*	---	---	---	11.7*
11-Apr	8.3*	6.3*	---	0.0*	3.9*	0.0*	---	0.0*	---	4.3
18-Apr	1.6	1.5	0.0*	0.0*	13.2*	0.0*	---	---	---	3.6
25-Apr	2.9	2.7	---	0.0*	2.5	5.9*	---	---	---	2.8
02-May	2.7	1.0	---	---	2.4	0.0*	---	---	---	1.9
09-May	3.2	4.3	---	---	3.6	0.6	---	---	0.0*	3.3
16-May	2.5	2.9	0.0*	0.0*	4.9	2.7	0.0*	0.0*	4.3*	3.4
23-May	1.5	1.8	0.0*	0.0*	4.7	5.5	0.0*	4.8*	7.1*	3.7
30-May	8.6*	0.7	0.0*	0.0*	3.9	2.3	0.0*	11.1*	0.0*	2.9
06-Jun	2.9	0.8	1.1	0.9	0.9	5.2	0.0*	0.0*	0.0*	1.3
13-Jun	0.0*	2.0	0.8	0.8	1.8	4.1*	0.0*	16.7*	0.0*	0.9
20-Jun	0.0*	4.2*	1.7	1.1	3.2*	5.8*	---	0.0*	0.0*	1.5
27-Jun	30.0*	9.2*	2.3	1.0	5.9*	3.4*	---	---	0.0*	1.6
04-Jul	0.0*	0.0*	2.2	1.3	2.3	11.1*	---	0.0*	0.0*	1.6
11-Jul	0.0*	0.0*	2.3	1.6	0.0*	66.7*	---	---	0.0*	1.8
18-Jul	---	0.0*	2.2	2.5	0.0*	0.0*	---	---	---	2.4
25-Jul	---	0.0*	1.2*	2.0	0.5*	0.0*	---	---	---	2.0
01-Aug	---	0.0*	5.6*	0.9	0.0*	0.0*	---	---	---	1.3
08-Aug	---	0.0*	0.0*	0.6	0.0*	---	---	---	0.0*	0.6
15-Aug	---	---	0.0*	0.9	---	---	---	---	---	0.9
22-Aug	---	---	0.0*	1.6	---	---	---	---	---	1.6
29-Aug	---	---	0.8	0.3	0.0*	---	---	---	---	0.3
05-Sep	---	---	0.0*	1.3	---	---	---	---	---	1.2
12-Sep	---	0.0*	0.0*	1.1	---	---	---	---	---	1.0
19-Sep	---	0.0*	0.0*	2.2	0.0*	0.0*	---	---	---	2.0
26-Sep	---	---	8.3*	2.6	0.0*	0.2*	---	---	---	3.2
01-Oct	---	---	0.0*	1.8	---	0.0*	---	---	---	1.7
Total Descaled	100	62	153	267	189	70	0	4	4	849
Total Examined	3,673	2,151	9,900	23,087	4,552	1,987	75	81	204	45,710
Percent Descaled	2.7%	2.9%	1.5%	1.2%	4.2%	3.5%	0.0%	4.9%	2.0%	1.9%

--- 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, 2009-2013.

Year	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
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
2011	0.2	0.2	0.7	0.8	0.2	0.2	0.5	1.8	0.1	0.3
2012	0.1	0.1	0.3	0.5	0.0	0.1	0.0	0.1	0.1	0.1
2013	0.1	0.1	0.3	0.5	0.0	0.0	0.0	0.1	0.0	0.1

Table 14. Weekly facility mortality rates in percent at Lower Monumental Dam, 2013.

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
04-Apr	---	---	---	---	---	---	---	---	---	---
11-Apr	---	---	---	---	---	---	---	---	---	---
18-Apr	---	---	---	---	---	---	---	---	---	---
25-Apr	---	---	---	---	---	---	---	---	---	---
02-May	---	---	---	---	---	---	---	---	---	---
09-May	0.1	0.1	---	---	0.1	0.0	---	---	0.0	0.1
16-May	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1
23-May	0.2	0.1	0.3	0.1	0.0	0.0	0.0	0.1	0.0	0.1
30-May	0.5	0.2	0.3	0.1	0.1	0.1	0.0	0.0	0.0	0.1
06-Jun	0.0	0.1	0.1	0.1	0.3	0.2	0.0	0.0	0.4	0.1
13-Jun	0.0	0.0	0.2	0.0	0.6	0.8	0.0	0.0	0.0	0.1
20-Jun	0.0	0.3	0.5	0.3	2.2	0.4	---	0.0	0.0	0.4
27-Jun	0.0	0.6	0.3	0.2	1.4	0.8	---	---	0.0	0.2
04-Jul	100.0	0.0	0.2	0.2	1.5	0.0	---	0.0	0.0	0.2
11-Jul	0.0	0.0	0.7	0.7	0.0	0.0	---	---	0.0	0.6
18-Jul	---	0.0	1.2	0.8	0.0	0.0	---	---	---	0.8
25-Jul	---	0.0	3.5	1.3	0.0	0.0	---	---	---	1.5
01-Aug	---	0.0	4.4	1.3	0.0	0.0	---	---	---	1.6
08-Aug	---	5.0	3.1	1.5	0.0	---	---	---	0.0	1.6
15-Aug	---	---	33.3	6.4	---	---	---	---	---	7.1
22-Aug	---	---	0.0	1.6	---	---	---	---	---	1.5
29-Aug	---	---	16.0	10.1	0.0	---	---	---	---	10.5
05-Sep	---	---	48.6	25.2	---	---	---	---	---	27.6
12-Sep	---	0.0	0.0	0.0	---	---	---	---	---	0.0
19-Sep	---	0.0	8.3	0.4	0.0	0.0	---	---	---	0.8
26-Sep	---	---	25.0	5.0	0.0	0.0	---	---	---	6.1
01-Oct	---	---	15.0	2.3	---	0.0	---	---	---	2.8

--- No fish collected during the week.

Table 15. Annual sample mortality in percent at Lower Monumental Dam, 2009-2013.

	Yearling Chinook		Subyearling Chinook		Steelhead		Sockeye/Kokanee		Coho	
Year	Clipped	Unclip	Clipped	Unclip.	Clipped	Unclip.	Clipped	Unclip.	Clip/Un.	Total
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
2011	0.0	0.0	0.7	3.5	0.1	0.0	0.0	0.0	2.1	2.0
2012	0.3	0.1	0.7	2.5	0.2	0.3	0.0	0.6	0.0	1.0
2013	0.2	0.3	0.8	1.5	0.3	0.2	0.0	0.0	0.0	1.0

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.

Below is a summary of unit outages and cause.

Unit	Dates out of service	Reason out of service
All Units	Monthly	STS/VBS inspection.
All Units	March 18-21	Trash rack raking and STS installation
All Units	August 19-26	Doble testing
Unit 1	July 1-25	Annual Maintenance
	July 29	Headgate cylinder removal
	August 30	Blown actuator seal on entry hatch
Unit 2	March 20-21	Insufficient orifice availability to fill juvenile channel prior to bypass water-up
	April 4	Supply breaker failed to close
	July 1	Loss of meter inputs
	September 9 – October 29	Annual Maintenance
Unit 3	April 4	Supply breaker failed to close
	August 12 – September 4	Annual Maintenance
	September 5	Headgate cylinder removal
Unit 4	March 4	Exciter inspection
	May 6-7	Lockout relay control panel tripped at shutdown
	June 17-28	Annual Maintenance
	July 1	Headgate cylinder removal
	July 30	Relay testing
Unit 5	March 5	Slip ring cleaning and PNNL hydrophone installation

Unit	Dates out of service	Reason out of service
	March 12-14	Faulty voltage regulator
	March 22-25	Brake problem
	October 1	PNNL removal of cluster arrays
Unit 6	March 5	Slip ring cleaning and PNNL hydrophone installation
	March 19-20	Insufficient orifice availability to fill juvenile channel prior to bypass water-up
	April 2	Headgate cylinder removal and brake solenoid repair
	July 29 – August 17	Annual Maintenance

Debris/Trash Racks

Trash rack raking occurred between March 18 and 20. A total of 85 cubic yards of debris was removed in this operation. Generally speaking, debris was light this season.

Submersible Screens

The submersible traveling screens (STSs) were inspected and tested on March 5 and were installed from March 19 through 21. After installation, inspection was done monthly by underwater video camera through November. No STS problems required repair during the 2013 season. Last year inferior mesh fasteners were replaced with upgrades and this prevented failures this season.

STSs were operated in "cycle" mode while the average fork length of subyearling chinook and/or sockeye/kokanee were greater than 120 mm (March 19 through May 13), and in continuous "run" mode when either was less than 120 mm (May 13 to July 23). From July 23 through December 15 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 on July 8, 9 and 10. Additionally, they were spot-checked monthly during STS inspections. No problems were found.

Gatewells

Dipping the bulkhead slots (gatewells) yielded 20 cubic yards of debris this season. Gatewells were normally less than 10% covered. Gatewells exceeded the 50% debris criterion only on April 20 and 21 this season. This gatewell debris was removed on Monday, April 22. Occasional oil sheens were dealt with by floating oil absorbent pads in the affected gatewells.

Orifices/Collection Channel

During the 2013 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 not a problem this season with low flows and a minimal debris load typifying the season. 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.

Primary Dewaterer

A major problem occurred regarding the primary dewaterer last season. Two weir stem drive gear assemblies failed. Weirs that were no longer useable were set to an acceptable elevation and an adjustment nut was used to hold them in place. A new automatic weir drive system is being researched and should be installed during the winter maintenance period of 2015.

The mechanical screen cleaner maintained a clean screen throughout the fish passage season. 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 at the separator were not a problem this year. Water level remained fairly consistent at the separator with the automated weirs of the primary dewaterer in manual. As has been the case for the last few years, the separator was run at a higher water level to assure no problem with exposed separator bars would occur.

No problems occurred with the PIT-tag diversion gates this season. Gate position sensors were installed seven 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 8 through August 14. Barge loading went very smoothly this season. The guide for the downstream mooring bit, having been deformed in a collision by a barge years ago, has caused a problem with the floating mooring bit sticking low in the guides. Additionally, it has occasionally taken on water. Plans are being made to refurbish all the mooring bits and repair/replace the damaged downstream mooring bit guide.

Truck Loading Operations

Juvenile fish were not transported from August 14 to August 21 due to a high mortality rate related to *columnaris*. From August 21 through August 30, alternate days' collection was transported with non-transport days bypassed. Trucking did not occur from August 30 at 1335

hours until September 4 at 0955 hours due to high mortality caused by *columnaris*. Trucking of alternate days' collection resumed September 4 at 0955 hours and continued through September 18 at 0700 hours. At that time operation changed to collecting fish every day and transporting them on an alternate day schedule. This continued through October 1 at 0700.
Throughout the late season the midi-tanker was used because of low fish numbers. A 2.5 mg/l salt solution was used to treat and/or ease outbreaks of *columnaris*.

Recommendations

1. 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.
2. Install a shear boom across the forebay to direct debris to the spillway during the high flow/high debris period to reduce orifice fouling and associated fish injury.
3. Research changing the drive system of the primary dewatering mechanical screen cleaner to a system with reduced maintenance required. Most mechanical screen cleaner failures are related to the drive cable and/or sheave attached to the drive motor shaft. (The correction of this problem may be done this winter)
4. Research converting the porosity unit upstream of the separator to a third stage of the separator designed for the removal and bypassing of fry and juvenile lamprey. The concept has been discussed with COE's engineer Ryan Laughery and he is optimistic regarding its feasibility and functionality. (in AMRIP)
5. Research converting the pipe system between the PIT facility counter tanks and the PIT facility holding tank exits with an open system that eliminates the need to hold fish in the PIT system holding tanks. This also has been discussed with Laughery and he believes it can be accomplished.

APPENDIX TABLES

Appendix Table 1. Daily collection and bypass numbers and river conditions at Lower Monumental Dam, 2013.

Appendix Table 2. Daily number of fish trucked and barged from Lower Monumental Dam, 2013.

Appendix Table 3. Percent descaling and daily facility mortality numbers at Lower Monumental Dam, 2013.

Appendix Table 4. Daily number of adult fallbacks and fallback mortality at Lower Monumental Dam, 2013.