CENWW-OD-WL SPURGEON (1130) 7 October, 2015

MEMORANDUM THRU:
Kimberley Oldham, Operations Project Manager, Lower Monumental Dam

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

SUBJECT: Submission of 2015 Juvenile Fish Collection and Bypass Report, Lower Monumental Dam Juvenile Fish Facility.

1. Enclosed find the 2015 Juvenile Fish Collection and Bypass Report for Lower Monumental Dam as requested.

2. If you have any questions contact Bill Spurgeon at Lower Monumental Dam, (509) 282-7211.

WILLIAM F. SPURGEON
Supervisory Fisheries Biologist, Lower Monumental Dam

Enclosure

2015 Juvenile Fish Collection and Bypass Report
Lower Monumental Dam Juvenile Fish Facility

Prepared by

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Blue Leaf Environmental

7 October, 2015

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Introduction

Juvenile fish transportation and bypass operations occurred for the twenty third year at Lower Monumental Dam Juvenile Fish Facility (JFF) in 2015. The bypass system was watered up at 1430 hours on March 24, and STSs were installed on March 22 through March 26. The JFF was watered up for testing on March 25. Primary bypass occurred March 24 through March 31. From April 1 through April 13 bypass was intermittently interrupted every third day for fish condition monitoring. From April 14 through 0700 on May 1 condition monitoring occurred every other day. Early season condition monitoring involved 24 hour sampling on target days. During this period, 1,383 fish were examined and returned to the river. These fish are included in the 2015 season spreadsheet (Appendices 1-4). No outside research was done this season.

Collection for transport began at 0700 hours on May 1 and ended at 0700 hours on October 1. On October 1 the facility was returned to primary bypass and continued in bypass mode through December 15. Smolt collection in the 2015 season was 1,167,619. This includes expanded numbers of those sampled during pre-transport. This is nearly half of the 2,146,639 fish collected in the 2014 season and slightly more than the 1,114,869 fish collected in the 2013 season. Of the 1,167,619 fish collected in the 2015 season, 783 were trucked, 1,067,152 were barged, and 98,227 were bypassed.

Pacific States Marine Fisheries Commission (PSMFC) technicians examined 1,264 fish for gas bubble trauma (GBT) in 2015. Examinations were conducted once a week from April 17 through July 22.

The passive integrated transponder (PIT) tag system detected 20,348 tagged fish coming through the JFF from April 1 to October 1. None of these 20,348 PIT tagged fish are included in the bypass numbers.

This season's total collection by species group included: 514,612 clipped yearling Chinook, 127,462 unclipped yearling Chinook, 66,316 clipped subyearling Chinook, 108,154 unclipped subyearling Chinook, 252,560 clipped steelhead, 69,705 unclipped steelhead, 5,840 clipped sockeye, 850 unclipped sockeye, and 22,120 clipped/unclipped coho. Full powerhouse screening and bypass operations continued through December 15, 2015.

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 Raymond A. Addis, biological technicians: Shelly Montoya, Johnny Polasik, Jon Saylor, and truck driver / maintenance personnel: Rick Blevins and Kenneth Fletcher. Quality control tasks were conducted by Blue Leaf Environmental biologists Hannah Begley and Colin Frank. Smolt monitoring was conducted by Pacific States Marine Fisheries Commission (PSMFC) biologist Wm. Monty Price and Washington Department of Fish and Wildlife (WDF&W) biologist Sharon Lind. PSMFC technicians Carol Williams and Dawn Kunkel were involved in fish sampling, and smolt monitoring quality control and data keeping tasks.

Facility Modifications

The following modifications were made to the JFF prior to or during the 2015 fish collection season:

1. To accommodate the needs of the avian action plan, an area has been prepared with storage and concrete pads for deploying propane cannons at the LoMo tailrace.
2. The drive cable of the mechanical screen cleaner (primary dewatering) was replaced with a lugged drive belt to reduce maintenance requirements and cable related failures in season.
3. A water line was rerouted in the mechanical electrical room to move it away from electrical panels. (Safety)

River Conditions

During the 2015 season, the average daily flow did not exceeded 100.0 kcfs. The highest daily average flow for the season was 77.6 kcfs on April 3. The lowest daily average flow for the season occurred on September 5 with a flow of 12.8 kcfs. The average flow for the season was 36.1 kcfs. Spill occurred for 152 days from April 3 through midnight on August 31, with a maximum daily average spill of 31.0 on April 18 and 19. The RSW (Removable Spillway Weir) was put into operation when BiOp spill began on April 3, and was taken out of service for the season on August 11.

River temperature averaged 63.3^{o} F for the season and ranged from 49.4^{o} F in mid-April, to 71.5^{o} F in mid-July. A comparison of daily powerhouse flow and spill is shown in Figure 1. Average monthly flow and spill for the 2011-2015 collection seasons are provided in Table 1.

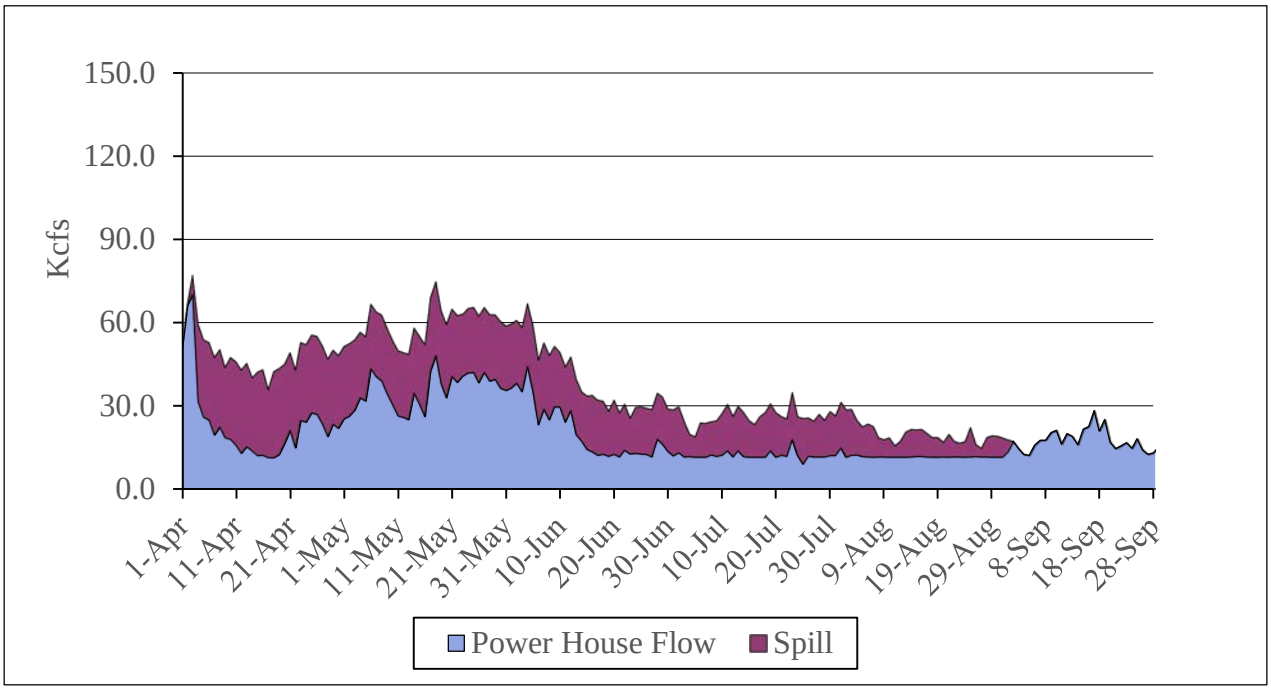
Fish Collection

Migration and Collection

Pre-transport primary bypass occurred from March 24 through May 1. Fish collection for transportation began at 0700 hours on May 1 and continued until 0700 hours on October 1. An estimated 1,167,619 juvenile salmonids were collected in 2015 (Table 2). Within each species

group, the number collected and percent of the total collection was: 514,612 clipped yearling Chinook (44.1%), 127,462 unclipped yearling Chinook (10.9%), 66,316 clipped subyearling Chinook (5.7%), 108,154 unclipped subyearling Chinook (9.3%), 252,560 clipped steelhead (21.6%), 69,705 unclipped steelhead (6.0%), 5,840 clipped sockeye/kokanee (0.5%), 850 unclipped sockeye/kokanee (0.1%), and 22,120 clipped/unclipped coho (1.9%). 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, 2015.



By the end of May, 86.1% 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 98.7 and 99.9%, respectively. The months of August, September, and October contributed 0.1% of the total collection, and were responsible for the collection of 1.2% of the year's unclipped subyearling Chinook.

The peak daily collection total and date for each species group were: clipped yearling Chinook 74,266 (May 6), unclipped yearling Chinook 13,411 (May 6), clipped subyearling Chinook 7,400 (June 5), unclipped subyearling Chinook 7,150 (June 5), clipped steelhead 21,800 (May 2), unclipped steelhead 5,200 (May 9), clipped sockeye 1,300 (May 18), unclipped sockeye 200 (May 7, 8, 9 and 18), and clipped/unclipped coho 2,800 (May 17). Total daily collection in 2015 peaked at 109,200 (May 9). 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

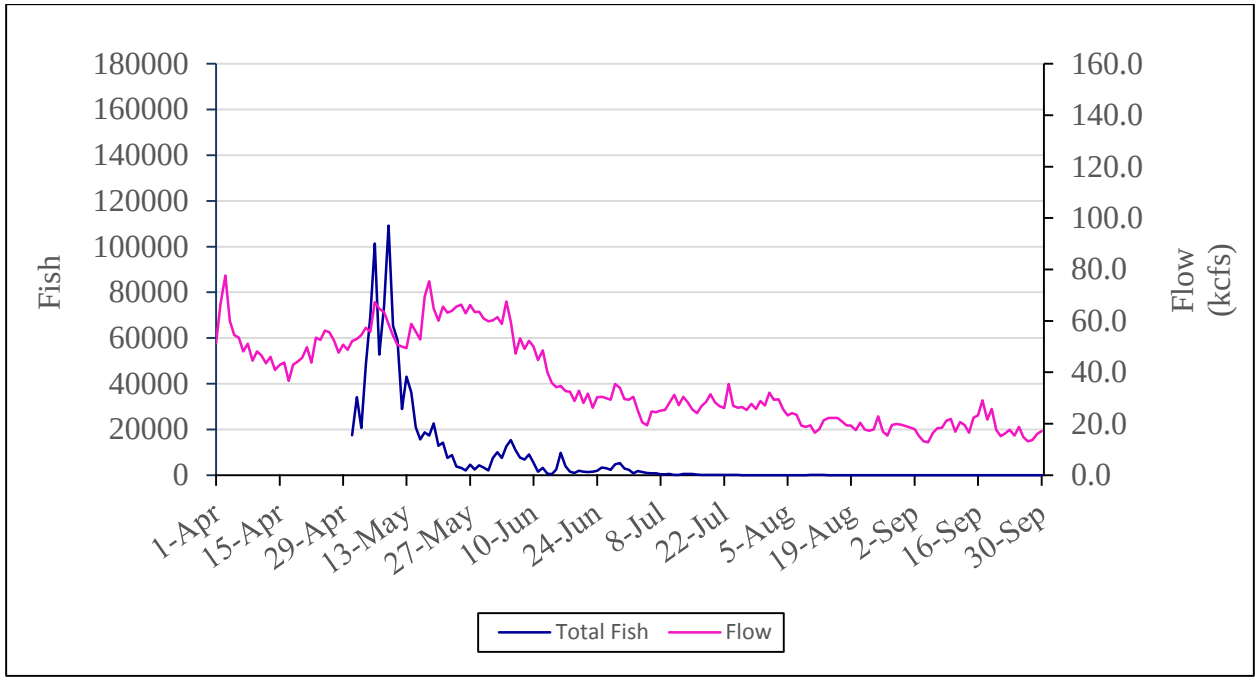
A total of 761 adult salmonids fell back through the juvenile bypass system and were bypassed from the separator between April 1 and October 1, 2015 (Table 4). The total includes: 178 adult Chinook salmon, 34 jack Chinook salmon, 224 clipped steelhead, 312 unclipped steelhead, 4 clipped sockeye, 3 unclipped sockeye, 1 clipped coho, and 5 unclipped coho. The total number of fallbacks in 2015 was the lowest in the last 5 years with the 2011 operating year being the highest. 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 2015 were steelhead. The months of May and June accounted for 45.5% and August and September 37.3% of the steelhead fallback in 2015 (Table 5). Spring/summer Chinook accounted for 67.5% and fall Chinook accounted for 32.5% 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, 2011-2015.

Month	2011	2012	2013	2014	2015	Average
Flow						
April	108.3	121.5	59.7	75.2	50.0	82.9
May	141.9	105.5	82.2	100.9	60.3	98.2
June	171.9	88.7	56.4	84.5	41.0	88.5
July	93.4	45.9	34.0	45.5	27.0	49.2
August	39.9	27.6	23.4	26.8	21.0	27.7
Sept.	34.4	21.6	19.4	20.2	18.2	22.8
Spill						
April	27.9	37.5	27.4	26.4	25.7	29.0
May	49.2	29.5	26.3	29.3	24.2	31.7
June	59.1	28.3	21.7	25.9	19.3	30.9
July	25.9	18.2	16.0	17.1	14.1	18.3
August	16.9	14.0	11.0	13.1	8.5	12.7
Sept.	0.4	0.4	0.2	0.3	0.2	0.3

Figure 2. Daily juvenile salmonid collection, all species combined, versus daily average river flow at Lower Monumental Dam, 2015.



The condition of adult salmonids was evaluated as they were released from the separator. Their condition was predominantly good to fair with 94.8% of the fallbacks rated in these categories (Table 6). Condition ratings of the 748 adults examined (excluding sockeye and coho) were as follows: 625 good (83.6%), 84 fair (11.2%), 30 poor (4.0%), and 9 were dead (1.2%). The number of each species group of dead adult salmonids was: 2 clipped steelhead, and 7 unclipped steelhead. Adult Chinook had a higher percentage of good/fair fish (96.1%) than adult steelhead (94.0%).

Table 2. Annual collection, bypass, and transport at Lower Monumental Dam, 2011-2015.

	Yearling Chinook		Subyearling Chinook		Steelhead		Sockeye/Kokanee		Coho	
Year	Clipped	Unclip.	Clipped	Unclip.	Clipped	Unclip.	Clipped	Unclip.	Clip/Un.	Total
Collection										
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
2014	868,447	271,339	104,635	152,371	536,410	150,324	13,550	31,858	17,705	2,146,639
2015	514,612	127,462	66,316	108,154	252,560	69,705	5,840	850	22,120	1,167,619
Bypass										
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
2014	175	67	236	380	237	112	0	0	0	1,207
2015	34,051	26,431	201	417	31,786	5,011	0	30	300	98,227
Truck										
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
2014	0	5	150	1,617	11	2	0	2	0	1,787
2015	0	0	8	760	14	1	0	0	0	783
Barge										
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
2014	867,541	271,038	103,940	149,906	536,007	150,172	13,544	31,566	17,705	2,141,419
2015	480,257	100,972	65,845	106,548	220,464	64,610	5,821	819	21,816	1,067,152
Total Transported										
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
2014	867,541	271,043	104,090	151,523	536,018	150,174	13,544	31,568	17,705	2,143,206
2015	480,257	100,972	65,853	107,308	220,478	64,611	5,821	819	21,816	1,067,935

Table 3. Annual peak collection dates at Lower Monumental Dam, 2011-2015.

Year	Yearling Chinook		Subyearling Chinook		Steelhead		Sockeye/Kokanee		Coho	Total
	Clipped	Unclip.	Clipped	Unclip.	Clipped	Unclip.	Clipped	Unclip.	Clip/Un	
2011	May 16	May 15	June 3	June 1	May 16	May 19	May 29	May 9	May 21	May 16
	109,701	19,851	4,700	8,609	48,060	26,269	1,600	1,045	1,791	192,388
2012	May 6	May 6	June 6	June 28	May 7	May 21	May 15	May 21	May 19	May 6
	56,755	15,480	7,034	8,453	23,900	11,220	100	1,390	1,200	97,045
2013	May 15	May 14	June 11	June 10	May 14	May 14	May 18	May 20	May 14	May 14
	50,035	15,400	7,766	12,347	52,900	18,700	1,600	1,000	2,200	138,800
2014	May 7	May 2	June 6	June 6	May 2	May 2	May 20	May 2	May 19	May 7
	90,000	31,400	9,750	9,400	50,800	10,000	6,200	3,400	2,000	156,800
2015	May 6	May 6	June 5	June 5	May 2	May 9	May 18	May 7+	May 17	May 9
	74,226	13,411	7,400	7,150	21,800	5,200	1,300	200	2,800	109,200

Table 4. Annual totals of adult salmonids released from the juvenile fish separator at Lower Monumental Dam, 2011-2015.

Year[1]	Adult Chinook	Jack Chinook	Clipped Steelhead	Unclipped Steelhead	Total
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]
2014	163	58	321	992	1,561[3,2]
2015	178	34	224	312	761[3,2]

[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, 2015.

Month	Adult Chinook	Jack Chinook	Clipped Steelhead	Unclipped Steelhead	Total
April	0	0	27	49	76
May	31	5	70	152	258
June	20	0	7	15	42
July	75	5	12	4	95
August	16	2	29	40	87
September	33	19	75	52	179
October	4	3	4	0	11
Total	178	34	224	312	748

[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, 2015.

Condition	Adult Chinook	Jack Chinook	Clipped Steelhead	Unclipped Steelhead	Total
Good	157	34	183	251	625
Fair	14	0	30	40	84
Poor	7	0	9	14	30
Dead	0	0	2	7	9
Total	178	34	224	312	748

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

Separator Efficiency

The separator is designed with bar spacing to allow only smaller smolts, subyearling Chinook and sockeye, to divert to the A side of the collection facility. Larger smolts, steelhead and yearling Chinook, divert to the B side through wider spaced bars. Separator efficiency for 2015 by species group was: clipped yearling Chinook 87.1%, unclipped yearling Chinook 79.6%, subyearling Chinook 60.8%, clipped steelhead 83.2%, unclipped steelhead 74.9%, clipped sockeye/kokanee 41.4%, and unclipped sockeye/kokanee 60.7% (Table 7).

Table 7. Annual separator efficiency in percent at Lower Monumental Dam, 2011-2015.

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
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
2014	70.6	68.0	59.1	78.8	32.5	38.0	44.3
2015	87.1	79.6	60.8	83.2	74.9	41.4	60.7

[1] This category includes unclipped hatchery fish.

Sampling

Consistent with the 2015 Fish Operations Plan (FOP) Appendix B and guidance provided by the Technical Management Team (TMT), and the 2015 BiOp, 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 1 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.

Fish were sampled every third day (24 hour sampling) from April 1 through April 13 and every other day from April 13 through May 1 to monitor fish condition, ensure systems were operating correctly, and to train personnel on facility operation and sampling protocols. This type of sampling is termed "sampling for condition". The total number of fish sampled during the April 1 through May 1 period was 1,383. The number sampled within each species group was: 477 clipped yearling Chinook, 373 unclipped yearling Chinook, 3 clipped subyearling Chinook, 0 unclipped subyearling Chinook, 442 clipped steelhead, 82 unclipped steelhead, 0 clipped sockeye, 3 unclipped sockeye, and 3 hatchery coho.

Total sampling includes both "sampling for condition" as well as "sampling for transport" which was conducted during the 2015 operating year. Sampling for transport was conducted daily from

May 1 through October 1. A total of 16,415 fish (1.4% of the collection) was sampled in 2015. Within each species group, the number and percent sampled of those collected in that group was: 3,462 clipped yearling Chinook (0.7%), 1,124 unclipped yearling Chinook (0.9%), 2,336 clipped subyearling Chinook (3.5%), 5,868 unclipped subyearling Chinook (5.4%), 2,480 clipped steelhead (1.0%), 741 unclipped steelhead (1.1%), 63 clipped sockeye/kokanee (1.1%), 9 unclipped sockeye/kokanee (1.1%), and 332 clipped/unclipped coho (1.5%) (Table 8).

Average weekly sample rates can be found in Table 9 and ranged from 0.5% to 100%.

Table 8. Annual percentage sampled of each juvenile salmonid species group at Lower Monumental Dam, 2011-2015.

	Yearling Chinook		Subyearling Chinook		Steelhead		Sockeye/Kokanee		Coho	
Year	Clipped	Unclip.	Clipped	Unclip.	Clipped	Unclip.	Clipped	Unclip.	Clip/Un.	Total
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
2014	0.6	0.7	4.9	7.8	0.7	0.8	0.6	0.8	0.7	1.4
2015	0.7	0.9	3.5	5.4	1.0	1.1	1.1	1.1	1.5	1.4

Transportation

An estimated 1,067,935 juvenile salmonids (91.5% of the collection) were transported from Lower Monumental Dam in 2015. Of these, approximately 783 were transported by truck and 1,067,152 by barge. Within each species group, the number transported and percent of those collected in that group was: 480,257 clipped yearling Chinook (93.3%), 100,972 unclipped yearling Chinook (79.2%), 65,853 clipped subyearling Chinook (99.3%), 107,308 unclipped subyearling Chinook (99.2%), 220,478 clipped steelhead (87.3%), 64,611 unclipped steelhead (92.7%), 5,821 clipped sockeye/kokanee (99.7%), 819 unclipped sockeye/kokanee (96.4%), and 21,816 clipped/unclipped coho (98.6%). Daily truck and barge transportation numbers are provided in Appendix Table 3.

There was no early season trucking from this site this year. Juvenile fish were trucked by midi-tanker from August 15 through October 1. 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 783 fish (0.1% of the collection) were transported by truck in 2015 (Table 2). Within each species group, the number trucked and percent of those collected in that group was: 0 clipped yearling Chinook (0.0%), 0 unclipped yearling Chinook (0.0%), 8 clipped subyearling Chinook (0.0%), 760 unclipped subyearling Chinook (0.7%), 14 clipped steelhead (0.0%), 1 unclipped steelhead (0.0%), 0 clipped sockeye/kokanee, 0 unclipped sockeye/kokanee (0.0%), and 0 clipped/unclipped coho (0.0%).

Juvenile fish collected at Lower Monumental Dam from May 1 through August 14 were transported by barge. An estimated 1,067,152 fish (91.4% of the collection) were transported by barge in 2015 (Table 2). Within each species group, the number barged and percent of those collected in that group was: 480,257 clipped yearling Chinook (93.3%), 100,972 unclipped yearling Chinook (79.2%), 65,845 clipped subyearling Chinook (99.3%), 106,548 unclipped subyearling Chinook (98.5%), 220,464 clipped steelhead (87.3%), 64,610 unclipped steelhead (92.7.%), 5,821 clipped sockeye/kokanee (99.7%), 819 unclipped sockeye/kokanee (96.4%), and 21,816 clipped/unclipped coho (98.6%).

Bypass

During the 2015 season (April 1 to October 1) a total of 98,227 fish were bypassed, 8.4% of the collection (Table 2). Within each species group, the number bypassed and percent of those collected in that group was: 34,051 clipped yearling Chinook (6.6%), 26,431 unclipped yearling Chinook (20.7%), 201 clipped subyearling Chinook (0.3%), 417 unclipped subyearling Chinook (0.4%), 31,786 clipped steelhead (12.6%), 5,011 unclipped steelhead (7.2%), 0 clipped sockeye/kokanee (0.0%), 30 unclipped sockeye/kokanee (3.5%), and 300 clipped/unclipped coho (1.4%). These numbers include fish examined for GBT during the transport season after June 16. This does not include fish bypassed by the PIT tag diversion system.

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

1. Condition sampling and secondary bypass occurred from 0700 April 1 through 0700 hours May 1 (see condition sampling frequency in Sampling section); a total of 97,716 fish were bypassed at these times during this period. Within each species group, the number bypassed was: 34,051 clipped yearling Chinook, 26,431 unclipped yearling Chinook, 110 clipped subyearling Chinook, 0 unclipped subyearling Chinook, 31,784 clipped steelhead, 5,010 unclipped steelhead, 0 clipped sockeye/kokanee, 30 unclipped sockeye/kokanee, and 300 clipped/unclipped coho. These numbers include fish examined for GBT during this primary bypass period.
2. GBT inspections during the transport period of May 1 through October 1 accounted for a total of 475 fish bypassed. Within each species group the number bypassed was: 0 clipped yearling Chinook, 0 unclipped yearling Chinook, 91 clipped subyearling Chinook, 381 unclipped subyearling Chinook, 2 clipped steelhead, and 1 unclipped steelhead.
3. The PTAGIS3 database revealed that 20,348 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 the composition of bypassed PIT-tagged fish was: 6,564 hatchery spring/summer Chinook, 3,570 hatchery fall Chinook, 125 hatchery Chinook of unknown run, 1188 wild spring/summer Chinook, 69 wild fall Chinook, 530 wild Chinook of unknown run, 3 Chinook of unknown run or rearing disposition, 5,755 hatchery steelhead, 951 wild steelhead, 7 steelhead of unknown rearing, 1,185 hatchery sockeye, 77 wild sockeye, 215 hatchery coho, and 109 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 groups for 2015 included: Siberian prawn (48,243), juvenile shad (19,015), juvenile Pacific lamprey (2,121), channel catfish (1,901), sculpin (994), crappie (988), juvenile and adult smallmouth bass (779), and sucker spp. (662).

The number of juvenile shad (19,015) in 2015 is far greater than the 8,590 collection of the 2014 operating year. Other incidental fish species numbers collected at the facility have increased as well. Historically juvenile crappie was one of the most encountered incidental species. Their numbers this year have increased from 267 in 2014 to 988 in 2015. Estimated numbers of some groups may also become exaggerated high or low, due to the low sample rates at the time of their collection. This season we found a large increase in the number of walleye collected from 92 in 2014 to 377 in 2015.

Some variability in past years is explained by facility problems which have been found and corrected, however, many incidental species show mild to strong decline. Juvenile lamprey numbers continued to decline in 2015. In 2010 the collection of the juvenile (silver/macrothalmia) lamprey was 218,102; by 2014 they dropped to 29,511 and in 2015 they reached a mere 2,121. The brown lamprey (ammocoete) collection in 2014 was 110 and dropped to 0 in 2015. A summary of incidental fish collection 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 2015 was 2.6%. The annual descaling rate by species group was: clipped yearling Chinook (3.0%), unclipped yearling Chinook (3.0%), clipped subyearling Chinook (1.3%), unclipped subyearling Chinook (1.6%), clipped steelhead (4.6%), unclipped steelhead (4.7%), clipped sockeye/kokanee (3.2%), unclipped sockeye/kokanee (22.2%), and clipped/unclipped coho (2.7%), (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 1.9% in 2013 and 2014 to a high of 3.0% in 2011.

The highest weekly descaling rate for all species combined was 7.1% for the week ending October 1 (with fewer than 100 fish sampled in a week of condition sampling), while the lowest rate (0.0%) occurred September 24 (Table 12). Daily descaling rates are provided in Appendix Table 2.

Other Injuries and Disease

Injury data was gathered from a subsample of 100 of the dominant species and not more than 100 each of the non-dominant species. There were 12,552 fish examined for injury and disease in 2015. The most common symptom observed in 2015 was fin injury. A vast majority of fin injuries were observed to be split caudal fins, however other fin injuries were included in this category also. Split caudal fins have been defined as a split in the caudal fin membrane that extends the full length of the fin to the caudal peduncle. Split fin injuries are primarily observed in the lower lobe of the caudal fin within each species rearing and run type, aside from subyearling Chinook, where most fin injuries were located at the center of the caudal fin. Fin injuries were found on 14.3% of all fish examined. The incidence of fin injury was: clipped yearling Chinook 10.1%, unclipped yearling Chinook 10.6%, clipped subyearling Chinook 15.9%, unclipped subyearling Chinook 18.5%, clipped steelhead 10.0%, unclipped steelhead 10.7%, clipped sockeye/kokanee 33.3%, unclipped sockeye/kokanee 11.1%, and clipped/unclipped coho 14.3%. The high incident of fin injury in clipped sockeye was not split fin, but highly frayed caudal fins. Fin hemorrhaging occasionally coincided with split fin injuries.

Fin hemorrhaging is the discharge of blood outside the fin tissue. Fin hemorrhaging is a sign of trauma and was found on 4.0% of all fish examined for injuries in 2015. The incidence of fin hemorrhaging by species group was: clipped yearling Chinook 1.5%, unclipped yearling Chinook 2.8%, clipped subyearling Chinook 5.3%, unclipped subyearling Chinook 7.1%, clipped steelhead 0.6%, unclipped steelhead 0.8%, clipped sockeye/kokanee 4.8%, unclipped sockeye/kokanee 0.0%, and clipped/unclipped coho 0.9%.

Table 9. Weekly sample rates in percent and sample totals at Lower Monumental Dam, 2015.

Week Ending	Weekly Rate (%)	Yearling Chinook		Subyearling Chinook		Steelhead		Sockeye/Kokanee		Coho	
		Clipped	Unclip.	Clipped	Unclip.	Clipped	Unclip.	Clipped	Unclip.	Clip/Un.	Totals*
9-Apr	10.0	22	31	0	0	35	18	0	1	0	107
16-Apr	4.6	64	51	0	0	27	3	0	1	0	146
23-Apr	1.9	144	120	3	0	113	26	0	1	0	407
30-Apr	1.0	210	142	0	0	177	19	0	0	1	549
7-May	0.8	1,289	372	0	2	885	115	0	1	7	2,671
14-May	0.5	1,286	208	0	14	408	129	0	2	32	2,079
21-May	0.9	341	105	0	61	288	178	52	2	92	1,119
28-May	2.4	87	40	52	125	263	129	11	0	73	780
4-Jun	3.6	19	39	678	576	175	93	0	1	119	1,700
11-Jun	1.7	0	3	429	485	18	8	0	0	5	948
18-Jun	5.3	0	4	371	736	43	16	0	0	1	1,171
25-Jun	9.9	0	1	347	894	2	1	0	0	2	1,247
2-Jul	5.0	0	3	257	798	5	3	0	0	0	1,066
9-Jul	10.0	0	4	119	537	9	1	0	0	0	670
16-Jul	20.3	0	1	64	480	11	1	0	0	0	557
23-Jul	24.8	0	0	5	180	2	0	0	0	0	187
30-Jul	25.0	0	0	1	66	4	0	0	0	0	71
6-Aug	25.0	0	0	1	44	1	0	0	0	0	46
13-Aug	25.0	0	0	0	98	0	0	0	0	0	98
20-Aug	85.6	0	0	5	155	0	0	0	0	0	160
27-Aug	100.0	0	0	1	225	1	0	0	0	0	227
3-Sep	100.0	0	0	1	138	1	0	0	0	0	140
10-Sep	100.0	0	0	1	126	0	0	0	0	0	127
17-Sep	100.0	0	0	1	57	3	0	0	0	0	61
24-Sep	100.0	0	0	0	60	6	1	0	0	0	67
1-Oct	100.0	0	0	0	11	3	0	0	0	0	14
Total Sampled		3,462	1,124	2,336	5,868	2,480	741	63	9	332	16,415
% of Sample		21.1	6.8	14.2	35.7	15.1	4.5	0.4	0.1	2.0	100.0
% of Collection		0.7	0.9	3.5	5.4	1.0	1.1	1.1	1.1	1.5	1.4

* Daily 24 hour sampling at Lower Monumental Dam began this year on May 1.

Other common injuries included: blood pooling, bird marks, fish marks, fungus and *Columnaris*.

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 2.8% of all fish examined. The incidence of blood pooling by species group was: clipped yearling Chinook 0.1%, unclipped yearling Chinook 0.6%, clipped subyearling Chinook 4.7%, unclipped subyearling Chinook 5.2%, clipped steelhead 0.7%, unclipped steelhead 0.9%, clipped sockeye/kokanee 0.0%, unclipped sockeye/kokanee 11.1%, and clipped/unclipped coho 0.0%.

Bird marks were observed on 2.4% of all fish examined. The incidence of bird marks by species group was: clipped yearling Chinook 1.7 %, unclipped yearling Chinook 1.9%, clipped subyearling Chinook 0.9%, unclipped subyearling Chinook 0.8%, clipped steelhead 6.3%, unclipped steelhead 7.2%, clipped sockeye/kokanee 3.2%, unclipped sockeye/kokanee 0.0%, and clipped/unclipped coho 2.7%.

Fish marks were found on 1.3% of all fish examined. Fish marks were found on all species and rearing types with the exception of sockeye.

Fungus was found on 0.7% of all fish examined. Fungus was found on all species and rearing types with the exception of sockeye and clipped coho. 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 has been seen on coho and steelhead 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 has also been found in the dorsal region. This year both clipped and unclipped subyearling Chinook showed signs with rates of 0.6% and 1.1%, respectively. In contrast to previous years and despite high water temperatures, we did not see an increase in the incidence of *Columnaris* this season.

The maximum daily *Columnaris* rate in 2015 for subyearling Chinook was 30.8% (only 14 fish examined). In 2014, it reached a high of 55.6% (only 9 fish sampled). Increased mortality in the summer months is frequently attributed to *Columnaris*.

Mortality

Annual facility mortality for all groups combined was 0.1% in 2015 (Table 13) and totaled 1,457 fish. Within each species group, the number of facility mortalities and percent of those collected in that group was: 304 clipped yearling Chinook (0.1%), 59 unclipped yearling Chinook (0.0%), 262 clipped subyearling Chinook (0.4%), 429 unclipped subyearling Chinook (0.4%), 296 clipped steelhead (0.1%), 83 unclipped steelhead (0.1%), 19 clipped sockeye/kokanee (0.3%), 1 unclipped sockeye/kokanee (0.1%), and 4 clipped/unclipped coho (0.0%). Total annual facility mortality was 0.1% in all of the last 6 years except 2011 (0.3%). Weekly mortality rates had a high of 3.2% for the week ending July 9 and a low of 0.0% for multiple weeks (Table 14). Daily mortality rates are provided in Appendix Table 2.

Annual sample mortality for all groups combined was 0.9% in 2015 (Table 15) and totaled 153 fish. The number of sample mortalities and mortality rate by species group was: 29 clipped yearling Chinook (0.8%), 16 unclipped yearling Chinook (1.4%), 20 clipped subyearling Chinook (0.9%), 47 unclipped subyearling Chinook (0.8%), 29 clipped steelhead (1.2%), 10 unclipped steelhead (1.3%), 0 clipped sockeye/kokanee (0.0%), 0 unclipped sockeye/kokanee (0.0%), and 2 clipped/unclipped coho (0.6%). 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 0.1% in 2015 and totaled 9 fish. The number of post-sample mortalities and mortality rate by species group was: 4 clipped subyearling Chinook (0.2%), 4 unclipped subyearling Chinook (0.1%), and 1 clipped steelhead (0.0%). The highest post-sample mortality rate (0.7%) occurred in 2004 and the lowest (0.0%) in 1999.

Annual truck mortality in 2015 was 0.0% (0 of 783 fish). The number of truck mortalities and mortality rate by species group was: 0 clipped subyearling Chinook (0.0%) and 0 unclipped subyearling Chinook (0.0%). The annual truck mortality rate in 2014 was 1.1%.

Research

Gas Bubble Trauma Monitoring (PSMFC)

Juvenile Chinook and steelhead were sampled once a week for GBT from April 17 through July 22 in 2015. 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 1,264 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. Prior to collection for transport the GBT fish were bypassed to the river after examination. Fish were carried to the raceways and transported from May 2 to June 16, then, from June 17 through the end of GBT monitoring the fish were again bypassed as the Corps found carrying buckets to the raceways up and down all the stairways unsafe. Weekly GBT sampling continued for up to eight hours or until 100 fish had been sampled per species group. The number of fish sampled for GBT, by species group was: 194 clipped yearling Chinook, 88 unclipped yearling Chinook, 157 clipped subyearling Chinook, 455 unclipped subyearling Chinook, 280 clipped steelhead, and 90 unclipped steelhead. In the 2015 season, 0 fish showed signs of GBT in the fins.

Table 10. Estimated collection of incidental species at Lower Monumental Dam, 2015.

Common Name	Scientific Name	Exp. Sample	Separator	Total Collection[1]
American shad (Adult)	*Alosa sapidissima*	35	120	155
American shad (Juvenile)	*A. sapidissima*	18,980	35	19,015
Banded Killifish	*Fundulus diaphanus*	0	0	0
Bullhead (misc.)	*Amierus* spp.	52	3	55
Bull Trout	*Salvelinus confluentus*	0	0	0
Brown Trout	*Salmo trutta*	0	0	0
Channel catfish	*Ictalurus punctatus*	1,862	39	1,901
Chiselmouth	*Acrocheilus alutaceus*	0	0	0
Common carp	*Cyprinus carpio*	4	6	10
Crappie	*Pomoxis* spp.	962	26	988
Kokanee	*Oncorhynchus nerka*	0	0	0
Mosquitofish	*Gambusia affinis*	0	0	0
Northern Pikeminnow	*Ptychocheilus oregonensis*	19	2	21
Pacific lamprey (Adult)	*Lampetra tridentatus*	86	1	87
Pacific lamprey (Juvenile)	*L. tridentatus*	2,120	1	2,121
Pacific lamprey (Ammocoete)	*L. tridentatus*	0	0	0
Peamouth	*Mylocheilus caurinus*	95	1	96
Rainbow Trout[2]	*Oncorhynchus mykiss*	0	82	82
Redside Shiner	*Richardsonius balteatus*	0	0	0
Sandroller	*Percopsis transmontana*	1	0	1
Sculpin	*Cottus* spp.	994	0	994
Siberian Shrimp/Prawn	*Exopalaemon modestus*	48,243	0	48,243
Smallmouth bass	*Micropterus dolomieu*	777	2	779
Largemouth bass	*Micropterus salmoides*	0	0	0
Sucker (misc.)	*Catostomus* spp.	504	158	662
Sunfish (misc.)	*Lepomis* spp.	53	2	55
Tadpole Madtom	*Nosturus gyrinus*	0	0	0
Whitefish	*Prosopium spp.*	3	0	3
White Sturgeon	*Acipenser transmontanus*	0	2	2
Walleye	*Stizostedion vitreum*	315	22	337
Warmouth	*Lepomis gulosus*	0	0	0
Yellow perch	*Perca flavescens*	182	6	188
Others	----------	5	2	7
Total		75,292	510	75,802

[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.

Table 11. Annual descaling rates in percent for fish sampled at Lower Monumental Dam, 2011-2015.

	Yearling Chinook		Subyearling Chinook		Steelhead		Sockeye/Kokanee		Coho	
Year	Clipped	Unclip.	Clipped	Unclip.	Clipped	Unclip.	Clipped	Unclip.	Clip/Un.	Total
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
2014	2.4	1.8	1.2	1.3	3.5	1.8	5.3	3.8	2.3	1.9
2015	3.0	3.0	1.3	1.6	4.6	4.7	3.2	22.2	2.7	2.6

Table 12. Weekly descaling rates in percent for fish sampled at Lower Monumental Dam, 2015.

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
9-Apr	0.0*	9.7*	---	---	0.0*	0.0*	---	0.0*	---	2.8
16-Apr	0.0*	4.0*	---	---	0.0*	0.0*	---	0.0*	---	1.4
23-Apr	2.8	2.5	0.0*	---	3.5	0.0*	---	0.0*	---	2.7
30-Apr	3.3	1.4	---	---	1.7	0.0*	---	---	0.0*	2.2
7-May	2.7	4.9	---	0.0*	4.7	4.4	---	0.0*	0.0*	3.7
14-May	3.4	2.4	---	0.0*	5.4	11.8	---	50.0*	0.0*	4.2
21-May	2.7	0.0	---	0.0*	3.8	4.5	0.0*	50.0*	1.1*	2.7
28-May	5.9*	0.0*	0.0*	2.4	8.1	2.3	18.2*	---	8.2*	5.2
4-Jun	5.3*	0.0*	0.7	0.7	4.0	3.3*	---	0.0*	1.7	1.3
11-Jun	---	0.0*	1.6	2.9	0.0*	0.0*	---	---	0.0*	2.2
18-Jun	---	0.0*	0.0	0.8	2.4*	0.0*	---	---	0.0*	0.6
25-Jun	---	0.0*	2.3	1.4	0.0*	0.0*	---	---	0.0*	1.6
2-Jul	---	0.0*	2.4	1.9	0.0*	0.0*	---	---	---	2.0
9-Jul	---	0.0*	2.5	2.1	0.0*	0.0*	---	---	---	2.1
16-Jul	---	0.0*	3.2*	0.4	0.0*	0.0*	---	---	---	0.7
23-Jul	---	---	0.0*	2.8	0.0*	---	---	---	---	2.7
30-Jul	---	---	0.0*	1.6*	25.0*	---	---	---	---	2.9*
6-Aug	---	---	0.0*	4.5*	0.0	---	---	---	---	4.3*
13-Aug	---	---	---	2.0*	---	---	---	---	---	2.0*
20-Aug	---	---	0.0*	3.9	---	---	---	---	---	3.8
27-Aug	---	---	0.0*	4.0	0.0*	---	---	---	---	4.0
3-Sep	---	---	---	0.7	0.0*	---	---	---	---	0.7
10-Sep	---	---	0.0*	0.8	---	---	---	---	---	0.8
17-Sep	---	---	0.0*	1.8*	0.0*	---	---	---	---	1.6
24-Sep	---	---	---	0.0*	0.0*	0.0*	---	---	---	0.0
1-Oct	---	---	---	0.0*	33.3*	---	---	---	---	7.1
Total Descaled	103	33	31	95	112	34	2	2	9	421
Total Examined	3,433	1,108	2,316	5,783	2,451	731	63	9	330	16,224
Percent Descaled	3.0%	3.0%	1.3%	1.6%	4.6%	4.7%	3.2%	22.2%	2.7%	2.6%

--- 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, 2011-2015.

Year	Yearling Chinook		Subyearling Chinook		Steelhead		Sockeye/Kokanee		Coho	Total
	Clipped	Unclip.	Clipped	Unclip.	Clipped	Unclip.	Clipped	Unclip.	Clip/Un.	
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
2014	0.1	0.1	0.3	0.3	0.0	0.0	0.0	0.9	0.0	0.1
2015	0.1	0.0	0.4	0.4	0.1	0.1	0.3	0.1	0.0	0.1

Table 14. Weekly facility mortality rates in percent at Lower Monumental Dam, 2015.

Week Ending	Yearling Chinook		Subyearling Chinook		Steelhead		Sockeye/Kokanee		Coho	Total
	Clipped	Unclip.	Clipped	Unclip.	Clipped	Unclip.	Clipped	Unclip.	Clip/Un.	
9-Apr	0.5	0.0	-	-	-	0.0	0.0	-	-	0.1
16-Apr	0.0	0.1	-	-	-	0.0	0.0	-	-	0.0
23-Apr	0.0	0.0	0.0	-	-	0.0	0.2	-	-	0.0
30-Apr	0.0	0.0	-	-	-	0.0	0.0	0.00	0.0	0.0
7-May	0.1	0.1	-	0.0	0.0	0.1	0.2	0.00	0.0	0.1
14-May	0.0	0.0	-	0.0	0.0	0.1	0.0	0.00	0.0	0.1
21-May	0.1	0.1	-	0.1	0.0	0.1	0.1	0.00	0.0	0.1
28-May	0.3	0.3	0.6	0.1	0.0	0.2	0.3	0.00	0.0	0.2
4-Jun	1.7	0.5	0.2	0.0	0.0	0.6	0.3	0.00	0.0	0.2
11-Jun	-	0.4	0.2	0.2	0.0	0.4	0.0	0.00	0.0	0.2
18-Jun	-	0.0	0.5	0.2	0.0	1.4	0.9	-	0.0	0.3
25-Jun	-	0.0	0.9	0.4	0.0	0.0	0.0	-	0.0	0.5
2-Jul	-	0.0	1.0	0.5	-	3.0	11.7	-	-	0.7
9-Jul	-	0.0	3.0	3.2	-	3.3	0.0	-	-	3.2
16-Jul	-	0.0	1.3	1.4	-	2.0	25.0	-	-	1.5
23-Jul	-	-	10.0	1.9	-	0.0	-	-	-	2.1
30-Jul	-	-	0.0	2.3	-	0.0	-	-	-	2.1
6-Aug	-	-	25.0	0.0	-	0.0	-	-	-	0.5
13-Aug	-	-	-	0.0	-	-	-	-	-	0.0
20-Aug	-	-	0.0	0.0	-	-	-	-	-	0.0
27-Aug	-	-	0.0	0.0	-	0.0	-	-	-	0.0
3-Sep	-	-	100.0	2.2	-	0.0	-	-	-	2.9
10-Sep	-	-	0.0	0.0	-	-	-	-	-	0.0
17-Sep	-	-	0.0	0.0	-	0.0	-	-	-	0.0
24-Sep	-	-	-	0.0	-	0.0	0.0	-	-	0.0
1-Oct	-	-	-	0.0	-	0.0	-	-	-	0.0

--- No fish collected during the week.

Table 15. Annual sample mortality in percent at Lower Monumental Dam, 2011-2015.

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
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
2014	0.2	0.2	0.9	1.6	0.1	0.2	0.0	0.4	0.0	0.9
2015	0.8	1.4	0.9	0.8	1.2	1.3	0.0	0.0	0.6	0.9

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 from March 1 through November 10.

Unit	Dates out of service	Reason out of service
All Units	Feb 20-21	BPA scheduled line outage
All Units	March 16-19	Trash rack raking
All Units	March 30-31	STS installation
All Units	Monthly(2-3 days)	STS/VBS inspection
All Units	July 25	Line Outage for T-2 Doble Testing
Unit 1	All Year	Awaiting overhaul
Unit 2	Nov 9 – est. Jan 17	Annual Maintenance
Unit 3	June 24 – July 16	Annual Maintenance
	July 20	Headgate cylinder removal
	August 18	Install flow meter on AC turbine bearing pump
Unit 4	March 31 – April 1	High Amp draw STS
	August 10	Obtain headgate for Unit 5 outage
	August 31	Headgate and cylinder transfer
	Sept 28 – Nov 9	Annual Maintenance
Unit 5	April 13	Headgate removal
	July 23	PM on JO 1 Breaker
	August 10 - 27	Annual Maintenance
	August 31	Headgate and cylinder transfer
	Sept 10	Hub oil sampling

Unit	Dates out of service	Reason out of service
Unit 6	Aug 31 – Sept 24	Annual Maintenance
	Sept 28	Headgate cylinder removal

Debris/Trash Racks

Trash rack raking occurred on March 16, 17, 18, and 19. A total of 26 cubic yards of debris was removed in this operation. With low flows throughout the year debris was exceptionally light this season.

Submersible Screens

The submersible traveling screens (STSs) were inspected and tested on March 18 and were installed from March 30 through March 31. After installation, inspection was done monthly by underwater video camera through November. Only 1 STS problem required repair during the 2015 season. The STS in slot 4A had high amp draw on March 31. The unit was removed from service and the STS was replaced on April 1.

STSs were operated in "cycle" mode while the average fork length of subyearling Chinook and/or sockeye/kokanee were greater than 120 mm (March 24 through May 15, and, from July 7 through July 21), and in continuous "run" mode when either was less than 120 mm (May 15 through July 7, and, July 21 through August 6).

Vertical Barrier Screens

The vertical barrier screens (VBSs) were inspected by underwater video camera on August 4 and 5. Additionally, they were spot-checked monthly during STS inspections. No problems were found.

Gatewells

Dipping the bulkhead slots (gatewells) yielded 18.5 cubic yards of debris this season. Gatewells were normally less than 10% covered. Gatewells did not exceed the 50% debris criterion in 2015 with the exception of preparation for initial STS deployment. Occasional oil sheens were dealt with by floating oil absorbent pads in the affected gatewells.

Orifices/Collection Channel

During the 2015 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 during the 2012 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 2016.

The compressed air screen cleaner functioned well. The mechanical screen cleaner cable drive was upgraded to a belt drive during the winter maintenance season. No breakdowns occurred during the transport season but occasional adjustment of the mechanical screen cleaner was required. As usual, the system as a whole functioned very well keeping debris from plugging the inclined screen.

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.

PIT-tag diversion gate position sensors were installed eight 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

Fish were transported by barge from May 1 through August 14. Barge loading went very smoothly this season with one exception. On May 11 the barge collided with the center cell and then with the horizontal timbers on the upstream half of the barge dock. Damage occurred and the contractor is being required to repair the damage.

The guide for the downstream mooring bit, having been deformed in a collision by a barge years ago, has caused the downstream floating mooring bit to stick 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 transported by truck from August 14 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 to treat and/or ease outbreaks of *columnaris*.

Recommendations

1. 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.
2. 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)
3. 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, 2015.

See Excel Spreadsheet “2015 Fish Numbers LoMo.xls”.

Appendix Table 2. Daily number of fish trucked and barged from Lower Monumental Dam, 2015.

See Excel Spreadsheet “2015 Fish Numbers LoMo.xls”.

Appendix Table 3. Percent descaling and daily facility mortality numbers at Lower Monumental Dam, 2015.

See Excel Spreadsheet “2015 Fish Numbers LoMo.xls”.

Appendix Table 4. Daily number of adult fallbacks and fallback mortality at Lower Monumental Dam, 2015.

See Excel Spreadsheet “2015 Fish Numbers LoMo.xls”.