U.S. ARMY CORPS OF ENGINEERS
WALLA WALLA DISTRICT
FISH FACILITIES WEEKLY REPORT
#12-2016

Project: McNary
Biologist: Bobby Johnson and Denise Griffith
Dates: May 13 – 19, 2016

Turbine Operation

McNary had available 13 to 14 units (out of 14 total units) for power generation this week. Turbine unit outages are recorded in Table 1 below. The hard 1 percent peak efficiency constraint criteria began April 1. No turbine units ran outside the constraint.

Table 1. Unit Outages at McNary Project.

Units	Outage Dates	Outage Length	Reason
5	May 14	2.1 hours.	Torn vertical barrier screen (VBS) found and replaced.
9 to 14	May 17	8.4 hours total.	Trash rack cleaning.
4 to 8	May 18	8.5 hours total.	Trash rack cleaning.
14	May 18–19	24.1 hours.	Unit examination and testing.
1 to 3	May19	6.2 hours total.	Trash rack cleaning.

Adult Fish Passage Facilities

The McNary fisheries biologists performed measured inspections of the adult fishways on May 13, 16 and 19. Fisheries technicians monitored the ladders as shifts allowed. Adult fish counts resumed April 1. National Oceanic & Atmospheric Administration (NOAA) fisheries personnel performed their monthly inspection on May 18.

The Oregon count station computer tripped a surge protection breaker on May 16. The electrical staff will examine the circuits in the count station when time allows.

Fish Ladder Exits: The head over weir criteria at both exits are to be within 1.0 to 1.3 feet. The differential criteria at the count stations are to be within 0.0 to 0.5 feet. Both ladder exits met all criteria during measured inspections.

In the Washington exit area, debris loads were minimal to light. The regulating and tilting weir set points were adjusted on May 13.

At the Oregon exit, debris loads were minimal. However, woody debris was scattered along the Oregon shoreline. The regulating weir set point was adjusted on May 13, 16 and 19. The tilting weir set point was adjusted on May 13 and 19.

Oregon exit traveling screen differential monitoring revealed no problems.

Fishway Entrances and Collection Channel: Criteria for all entrances are pool differentials measuring between 1.0 and 2.0 feet, and weir depths measuring 8.0 feet or deeper.

At the Washington and Oregon ladders, all inspection points met criteria.

The Oregon ladder collection channel surface velocities averaged 1.7 feet per second.

Auxiliary Water Supply System: The Wasco County Public Utility District (PUD) turbine unit in the Washington ladder remains out of service for runner replacement, which has been delayed to an undetermined date. A contractor brought a crane on project to support PUD personnel on May 18. The bypass continues to function satisfactorily.

Two of the three Oregon ladder fish pumps operated satisfactorily with one interruption in service this week. Both pumps were out of service nine minutes in support of cooling water testing on May 13. Both pumps operated with blade angles of 26 degrees. Fish pump 2 is currently under contract for major overhaul with completion scheduled for September 2016. The overhaul contractor remains on project.

The juvenile facility continues to supply 450 cubic feet per second (cfs) to the north powerhouse pool.

Juvenile Fish Passage Facility

The fish passage season consists of alternating days of primary and secondary bypass modes. The switch occurs every morning at 0700 hours. There were two deviations from this schedule. The May 17 data day ran from 0645 hours on May 16 to 0645 hours on May 17 to insure the technician on duty could attend mandatory training. Sampling occurred from 0700 hours on May 18 to 0520 hours on May 19 due to a debris blockage in the B side secondary bypass line.

On May 19 at approximately 0500 hours, the technician on duty noted the B side flume overflowing at the junction of the B side secondary bypass gate and raceway flume line. The technician called the project biologist. With low light levels, the description of the problem was incomplete. The biologist asked the technician if there were fish on the ground. A few minutes later, the technician called back saying there were fish on the ground. The biologist told the technician to switch to primary bypass, which reduced the flow and fish numbers in the flume. The switch occurred at 0520 hours. The switch was scheduled to occur at 0700 hours. No further fish loss occurred from the overflow. At about 0530 hours, the biologist arrived to help the technician with the fish salvage, which is recorded in Table 2 below. CH denominates

Chinook salmon and SH indicates steelhead. One subyearling Chinook and one non-clipped steelhead were returned to the river alive.

Table 2. Smolt Mortalities on May 19.

Species	Yearling CH	Subyearling CH	Clipped SH	Non-clipped SH	Coho	Sockeye
Overflow	5	1	1	2	10	9
Blockage	4	1	0	1	0	2

At about 0610 hours, the B side sample tank was isolated and the B side sample gate was left open to sample. This allowed the fish remaining in the separator a sanctuary location if they exited the separator by way of the B side flume. At about 1235 hours, the A side gate was also left open as a camera inspection had not yet clarified the location of the blockage. Later, an access hatch was installed at the junction of the A and B side secondary bypass lines and no blockage was found. At 1617 hours, an access hatch was added to the B side secondary bypass line where the B side direct barge loading gate had been replaced. About eight feet downstream at another joint, a blockage of woody material was found. An access hatch was installed here also and the blockage was removed by 1700 hours. See Table 2 above for the mortalities found in the blockage. Together there were 36 total mortalities due to the blockage. At 1712 hours, both sample gates were turned off. By 1815 hours, final flow adjustments had been completed.

The electronic fish counters estimated 221 smolts in the A and B side sample tanks. These fish were quickly released unharmed the next day by Pacific States Marine Fisheries Commission (PSMFC) personnel.

Emergency procedures were restated to all technicians. Water sources were shown to all staff members and fish salvage buckets were left out for easy access. Technicians were instructed in how to use the new access hatches for inspections. Weep holes above all joints above the junction of the A and B side secondary bypass lines will be installed next week. Also, the small openings at the junction of the A and B side secondary bypass lines and raceway flumes will be covered. The electrical staff will examine the installation of better ground lighting in the near future.

Secondary bypass occurred on May 14, 16 and 18. This week, 6,800 juvenile lamprey and 417,656 smolts were bypassed.

Forebay Debris/Gatewell Debris/Oil: Forebay debris loads remained heavy, consisting mostly of woody material. Some of the debris remained along the Oregon shore. The quantity of new incoming debris along the powerhouse remained light. Some debris is passing over the top spillway weirs (TSWs). A light debris load remained along the spillway.

No high trash rack differential measurements were recorded. All trash racks were cleaned from May 17 to 19. There were 17.3 ten-yard truckloads of woody water and tumbleweeds removed. No fish mortalities were observed. Two large logs were also removed. One live juvenile lamprey was returned to the river unharmed.

No problems were observed in the gatewell slots.

Extended-length submersible bar screen (ESBSs)/VBSs: ESBSs are deployed in all units. ESBS camera inspections did not occur this week due to trash rack cleaning. The ESBS in slot 12C remained in timer mode.

VBS differential monitoring revealed eight screens out of criteria. These and 14 other screens were cleaned on May 13, 14 and 19. During the cleaning, one juvenile lamprey and 40 smolt mortalities were noted.

On May 13, during a scheduled inspection, the VBS in slot 5C was found damaged but serviceable. On May 14, this VBS was removed and the screen from slot 5A was installed in slot 5C. A rehabilitated VBS was then installed in 5A slot. No mortalities were noted when the torn screen in slot 5C was removed. The screen from 5A slot was cleaned before installation into the new slot. No mortalities were seen in slot 5A during the VBS removal.

VBS inspections of screens in slots 7C, 8C, 9C, 10C, 11B, 11C, in unit 12, in unit 13, in slots 14 B and 14C on May 14, 16 and 19 revealed no problems. Three smolt mortalities were noted when the screens were cleaned. Only the VBS in slot 14C has not yet been inspected this year.

VBS rehabilitations continued with new mesh being installed on the torn VBS sections.

Orifices, Collection Channel, Dewatering Structure, and Bypass Pipe: Forty two orifices were in use. During VBS cleaning, VBS inspections, VBS exchange and trash rack cleaning, orifices in the affected slots were closed, with makeup water coming from orifices in adjacent slots. Orifice valve actuators were repaired in slot 3C.

All systems functioned satisfactory in automatic mode.

Bypass Facility: During the bypass season, primary and secondary bypass modes return all fish to the river. Passive integrated transponder (PIT) tag detection occurs in the full flow pipe during primary bypass and throughout the facility during secondary bypass. Smolt monitoring occurs only on secondary bypass days.

The sample gates are turned on and off every other day so that they are in service only during secondary bypass. The sample gates were left open on May 19 as described above.

All other operational systems functioned well. The PIT tag sample gates remained turned off. The facility bypass lines provide a superior route for the fish over the PIT tag sample release lines downstream of the PIT tag sample gates.

On May 15, the PSMFC computer in the wet lab “tripped off” repeatedly. The cause was the backup battery, which was removed.

River Conditions

River condition data during the week was provided by the smolt monitoring staff and is outlined in Table 3 below. The data period runs from 0700 to 0700 hours each day. Flows and spill are recorded in one-thousand cubic feet per second. Temperatures are recorded in degrees Fahrenheit.

Routine spring spill in support of fish passage continued with both TSWs in place and operating. Forty percent of river flow is spilled during the spring season.

On May 18, from 0907 to 1006 hours, the TSW in spillbay 19 was closed and the deck above the TSW was covered so a contractor crane could cross the deck and park above the PUD unit. The spill pattern was adjusted during the closure as previously coordinated regionally.

Table 3. River Conditions at McNary Dam.

Daily Average River Flow		Daily Average Spill		Water Temperature (Unit 1 scroll case)		Water Clarity (Secchi disk - feet)	
High	Low	High	Low	High	Low	High	Low
282.0	245.8	112.8	48.4	57.9	56.6	6.0	6.0

Other

Inline Cooling Water Strainers: The next cooling water strainer examinations will occur May 31.

Invasive Species: The next mussel station examination will occur in late May.

Avian Activity: Avian counts are recorded in Table 4 below.

Gull numbers remained fairly high and they continued to feed in the spill zone. Most gulls at the bypass outfall were unsuccessful. The inverted sprinklers at the outfall appear to be affecting feeding patterns. Grebe numbers have increased in the forebay. Foresters terns appear to be feeding in the forebay at times. Most other birds observed on project appeared to be roosting. Ospreys were also noted at times. Gulls, pelicans and cormorants were roosting on the rocks by the Washington shore boat dock, which is outside the forebay zone.

One grebe was observed in gatewell slot 6A on May 19. The bird was removed from the slot on May 22.

United States Department of Agriculture – Animal and Plant Health Inspection Service – Wildlife Services (USDA–APHIS–WS) hazing personnel continued two shifts and boat hazing three days a week.

The bypass outfall sprinklers have been functioning satisfactory. The sprinklers supply pump intake is being cleaned twice a week. The pump remained in manual mode.

Table 4. McNary Project's Daily Avian Count.

Date	Zone	Gull	Cormorant	Tern	Pelican	Grebe
May 13	Forebay	0	0	0	0	0
	Spill	146	0	0	0	0
	Powerhouse	24	1	0	2	0
	Outfall	21	0	0	0	0
May 14	Forebay	2	0	0	0	0
	Spill	95	0	0	1	0
	Powerhouse	0	0	0	0	0
	Outfall	25	0	0	0	0
May 15	Forebay	0	0	0	0	0
	Spill	185	0	0	2	0
	Powerhouse	0	0	0	0	0
	Outfall	27	1	0	0	0
May 16	Forebay	0	0	0	0	30
	Spill	75	0	0	0	0
	Powerhouse	0	0	0	0	0
	Outfall	5	0	0	0	0
May 17	Forebay	2	0	0	0	24
	Spill	74	0	0	1	0
	Powerhouse	0	0	0	1	0
	Outfall	5	0	0	0	0
May 18	Forebay	2	0	0	0	6
	Spill	70	0	0	3	0
	Powerhouse	0	0	0	3	0
	Outfall	0	0	0	0	0
May 19	Forebay	2	0	0	1	15
	Spill	152	0	0	2	0
	Powerhouse	17	0	0	0	0
	Outfall	45	0	0	0	0

Research

GBT: Gas bubble trauma (GBT) monitoring continues with monitoring occurring twice a week during the spill season.

USGS: A United States Geological Survey fisheries biologist conducted non-lethal smolt stomach content examinations on May 17. Thirty yearling Chinook smolts, three of which were non-clipped, were examined.

Project: Ice Harbor
Biologist: Ken Fone
Dates: May 13 – 19, 2016

Turbine Operation

Unit 5 was taken out of service on March 14 at 1117 hours, due to an oil leak from the blade packing. The packing is being replaced to fix the leak. Unit 2 was taken out of service on April 25 at 0606 hours to prepare the unit for runner replacement. Units 1, 3, 4, and 6 were taken out of service one at a time on May 17 and 18 for STS inspections. Units are being operated within the 1% peak efficiency range (hard constraint).

Adult Fish Passage Facilities

Fish facility personnel inspected the adult fishways on May 16, 18, and 19.

Fish Ladders: The north fish ladder inspection areas (head differentials at fishway exit and picketed leads, and depth over weirs) were in criteria on all inspections. The south fish ladder inspection areas (head differentials at fishway exit and picketed leads, and depth over weirs) were in criteria on all inspections. Criteria for head differentials at ladder exits and picketed leads, and depth over the weirs are 0.5 feet or less, 0.3 feet or less, and 1.0-1.3 feet, respectively. The water surface above the fish ladder exits were clear of debris and the bubblers were operating satisfactorily.

Fishway Entrances and Collection Channel: The south shore entrance (SFE-1) depth and channel/tailwater head differential were in criteria on all inspections. The north powerhouse entrance (NFE-2) depth and channel/tailwater head differential were in criteria on all inspections. The north shore entrance (NSE-1) depth and channel/tailwater head differential were in criteria on all inspections. Fishway entrance criteria are 8 feet depth or greater, or on sill. Channel/tailwater differential criteria are 1 – 2 feet.

The south shore channel velocity was in criteria. The channel velocity criterion is 1.5-4.0 feet/second.

Auxiliary Water Supply (AWS) System: Two of the three north shore AWS pumps were operated during the week. Six of the eight south shore AWS pumps were operated, until May 17 when only five pumps were operated the rest of the week because of a high channel/tailwater head differential at the south shore entrance with six pumps running.

Juvenile Fish Passage Facility

Forebay Debris/Gatewell Debris/Oil: There was no debris observed in the forebay. The surface debris coverage in each gatewell slot ranged from 0% to 10%. Oil sheens were observed in the

5A and 5C gatewell slots during the week. Oil absorbent pads remain in the slots. The sheens were residual oil from the unit 5 blade packing oil leak. The maintenance bulkhead is installed in gatewell slot 5B and the slot is unwatered to reduce the water leakage into unit 5.

STSs/VBSs: The STSs have been in continuous run mode since May 3, due to the presence of sockeye or subyearling Chinook in the sample with average fork lengths under 120 mm. The STS for slot 5B has not been installed yet to facilitate the work on unit 5. Units 1, 3, 4, and 6 STSs and Unit 3 VBSs were inspected on May 17 and 18, with no problems found.

Orifices, Collection Channel, Dewatering Structure, and Bypass Pipe: The juvenile fish bypass is operating with 20 orifices open. Orifices are routinely cycled and back-flushed three times per day. The avian abatement hydrocannon at the end of the outfall pipe is operating normally.

Juvenile Fish Facility: The juvenile fish facility is operating in bypass mode except when collecting fish for the sample.

Fish Sampling: Fish sampling occurs twice a week, on Mondays and Thursdays. Sampling results are contained in Table 1 below.

Table 1. Fish condition sampling results at Ice Harbor Dam.

May 16:

Species	Sampled	#Descaled	Morts	Avian Marks
C-CH	16	1	0	0
UC-CH	1	0	0	0
C-CH-O	0	---	---	---
UC-CH-O	5	0	0	0
C-SH	90	7	0	4
UC-SH	37	2	0	1
C-COHO	2	0	0	0
UC-COHO	2	0	0	0
C-SOCK	0	---	---	---
UC-SOCK	0	---	---	---
TOTAL	153	10	0	5

May 19:

Species	Sampled	#Descaled	Morts	Avian Marks
C-CH	4	0	0	0
UC-CH	3	1	0	0
C-CH-O	0	---	---	---
UC-CH-O	4	0	0	0
C-SH	66	0	0	0
UC-SH	31	0	0	1
C-COHO	3	0	0	0
UC-COHO	0	---	---	---
C-SOCK	0	---	---	---
UC-SOCK	1	0	0	0
TOTAL	112	1	0	1

Removable Spillway Weir (RSW): Spill for fish passage began on April 3 at midnight. On May 17, spill gate 2 was completely closed from 1010 hours to 1014 hours in an attempt to free up any stuck submerged debris that could possibly be causing observed turbulence in the water flowing over the RSW. The turbulence returned when the gate was re-opened and seemed to be formed from certain hydraulic conditions further upstream in the forebay. Fish facility staff will continue to monitor the flow over the RSW for turbulent conditions that could harm fish, along with the project operations and environmental conditions that are occurring at the time.

River Conditions

River conditions during the week are outlined in Table 2 below.

Table 2. River conditions at Ice Harbor Dam.

Daily Average River Flow (kcfs)		Daily Average Spill (kcfs)		Water Temperature* (^{o}F)		Water Clarity (Secchi disk - feet)	
High	Low	High	Low	High	Low	High	Low
102.6	85.0	68.0	41.0	57	56	6.7	5.8

*Unit 1 scroll case temperature.

Other

Inline Cooling Water Strainers: Turbine cooling water strainer inspections occurred on May 17 and 18. A total of 33 juvenile lamprey and 5 Siberian prawns (all mortalities) were found.

Invasive Species: No new exotic species have been found.

Avian Activity: The numbers of gulls, cormorants, and pelicans observed around the project (Table 3 below) decreased from last week. Contracted land-based hazing of piscivorous birds occurred for 16 hours per day. Boat-based hazing occurred for 8 hours per day, 5 days per week. Land-based hazing was generally effective at keeping birds out of the zones immediately adjacent to the dam. Boat-based hazing was effective at scaring birds out of the stilling basin and the area just downstream from the end of the outfall pipe.

Table 3. Daily maximum piscivorous bird counts at Ice Harbor Dam.

Date	Gulls	Cormorants	Caspian Terns	Grebes	Pelicans
May 13	10	14	0	1	14
May 14	0	25	0	0	21
May 15	0	15	0	0	30
May 16	2	14	0	0	15
May 17	14	98	0	0	21
May 18	1	11	0	0	1
May 19	0	16	0	0	21

Research

NOAA Fisheries: Beginning on April 21, tissue samples were taken weekly from clipped juvenile Chinook and monthly from clipped juvenile steelhead obtained from the smolt monitoring sample by NOAA (National Oceanographic and Atmospheric Administration) Fisheries researchers to study the relationship of the physiological condition of Chinook and the incidence of delayed mortality, as well as the physiological benefit salmonids derive from estuarine habitat restoration.

PNNL: Beginning on May 7, PNNL (Pacific Northwest National Laboratory) researchers began weekly releases of acoustic-tagged dead juvenile salmonids through the RSW for an assessment of whether dead tagged fish are falsely recorded as live fish downstream at the detection station. This information will help in the formulation of the study design of next year's Biological Opinion performance standard evaluation.

Project: Lower Monumental
Biologists: Bill Spurgeon and Raymond Addis
Dates: May 13 – 19, 2016

Turbine Operation

The units are being operated within the hard constraint 1% peak efficiency criteria. Unit 1 was removed from service on December 10, 2014 for Unit rehabilitation with an estimated return to service date of January 12, 2017.

Adult Fish Passage Facility

The adult fishway was inspected by Corps and Anchor QEA biologists on May 13, 14, 15 and 18.

Fish Ladders: Fishway exit head differentials and depths over the weirs were within criteria (≤ 0.5' and 1.0'-1.3', respectively) on all inspections. Picketed lead head differentials were in criteria (≤ 0.4' and ≤ 0.3' for north and south shore fishways, respectively) on all inspections.

Fishway Entrances and Collection Channel: NSE1 and NSE2 weir gates were in depth criteria (criteria: ≥ 8' or on sill) on all inspections. North shore channel/tailwater head was in criteria (1'-2') on all inspections.

SPE1 and SPE2 weir gates were in depth or sill criteria (criteria: ≥ 8' or on sill) on all inspections. While on sill, readings were 7.4 feet. South powerhouse channel/tailwater head was in criteria (1'-2') on all inspections.

SSE1 weir gate was in sill criteria (criteria: ≥ 8' or on sill) on all inspections with the exception of the May 15 inspection with a reading of 7.4 feet. The powerhouse operator was informed and SSE1 weir gate was manually placed at sill. While on sill, all readings were 7.7 feet.

SSE2 was in criteria (6' above sill) on all inspections. South shore channel/tailwater head was in criteria (1'-2') on all inspections.

Auxiliary Water Supply System: AWS pumps 2 and 3 were operated throughout this period. Pump 1 was out of service throughout this period and will be out of service throughout this season unless an emergency occurs. This unit has a bushing problem.

Juvenile Fish Passage Facility

Forebay Debris/Gatewell Debris/Oil: There was an average of 3 square yards of forebay debris observed during this period. Gatewell debris ranged from 0-20% surface coverage. No oil problems were observed in the gatewells.

STSs/VBSs: STSs were operating in continuous-run mode. STS inspections were conducted May 3 and 4 with all screens found in good operating condition.

Orifices, Collection Channel, Dewatering Structure, and Flume: The collection channel was operated with 19 orifices open.

Collection Facility: Collection for transport began at 0700 hours on May 1.

Transport Summary: Every-day fish transport by barge began on May 2.

River Conditions

Routine Spring spill in support of fish passage was initiated at 0001 hours on April 3. Spill was either halted or limited during tailrace transitioning, and barge docking and loading operations. River conditions during the week are outlined in Table 1 below.

Table 1. River conditions at Lower Monumental Dam.

Daily Average River Flow (kcfs)		Daily Average Spill (kcfs)		Water Temperature (^{o}F)*		Water Clarity (Secchi disk - feet)	
High	Low	High	Low	High	Low	High	Low
97.4	80.5	41.0	28.5	57.0	54.3	4.3	3.4

*Scrollcase temperatures.

Other

Inline Cooling Water Strainers: Cooling water strainers were inspected on May 5. There were no live fish recovered. Mortalities included 360 juvenile lamprey, 71 salmon smolts, 10 steelhead smolts and 1 Siberian prawn.

Invasive Species: No zebra mussels were observed during monitoring station inspections on May 1.

Avian Activity: Daily tailrace counts of feeding piscivorous birds are summarized in Table 2 below. Gulls and cormorants were the dominant species observed during inspections this week. Hazing met the standard from the avian action plan through this time period.

Table 2. Tailrace counts of foraging piscivorous birds at Lower Monumental Dam.

Date	Time	Gulls	Cormorants	CaspianTerns	Grebes	Pelican
May 13	1130	18	0	0	0	0
May 14	1115	8	0	0	0	0
May 15	1100	15	0	0	0	0
May 16	1100	18	0	0	0	0
May 17	1100	12	0	0	0	0
May 18	1100	2	0	0	0	0
May 19	1100	4	0	0	0	0

Research: Pacific Northwest National Laboratory/Battelle – Ice Harbor smolt survival study. Small numbers of smolts are taken from the Lower Monumental collection for use in this study. See the ANCHOR QEA weekly report for a summary of these fish.

Project: Little Goose
Biologist: Richard Weis
Dates: May 13 – 19, 2016

Turbine Operation

All turbine units were available for service this week. Hard constraint 1% peak efficiency criteria are in effect. No violations to report.

Adult Fish Passage Facility

The new Fishway Control System still does not work properly. This system will be in manual mode until repairs can be made.

Adult fishway inspections were performed on May 15, 17 and 19.

Fish Ladder: The ladder exit head differentials ranged between 0.0 and 0.1 feet (criteria $\leq$ 0.5 ft.). Water depths over the weirs held steady at 1.2 feet (criteria 1.0-1.3 ft.) and picketed lead differentials ranged between 0.0 and 0.1 feet (criteria $\leq$ 0.3 ft.). The air bubbler used to prevent debris from collecting near the ladder exit operated satisfactorily.

Fishway Entrances and Collection Channel: Channel to tailwater head differentials ranged between 1.0 and 1.7 feet (criteria 1.0 to 2.0 ft.). SSE weir depths ranged between 8.4 and 8.9 feet (criteria $\geq$ 8.0 ft). NPE weir depths ranged between 6.0 and 6.7 feet (criteria $\geq$7.0 ft.) and were on sill. NSE weir depths ranged between 5.0 to 5.7 feet (criteria $\geq$ 6.0 ft.) and were on sill. Collection channel surface water velocity measured at the North powerhouse ranged between 1.9 and 2.2 fps (criteria 1.5 to 4.0 fps).

Auxiliary Water Supply System: Fish pump 1 is still awaiting installation. The estimated repair date has been extended again and is now the end of May. Presently fish pumps 2 and 3 are in service. Water velocity measured at the north Powerhouse using the Rickly velocity equipment was not conducted this week.

Juvenile Fish Passage Facility

Forebay Debris/Gatewell Debris/Oil: The trash/shear boom is currently still on shore. Efforts are underway to have it repaired. Woody debris in the immediate forebay was estimated between 5,000 to 5,800 square feet.

Spillway Weir: The repair to spillbay 1 was completed by cannibalizing parts from spillbay 5 and a special spill pattern was approved. The TSW is in service and in the low crest configuration.

ESBS/VBS: Drawdown tests were performed on units 1-4 on May 19 with satisfactory results.

Orifices, Collection Channel, Dewatering Structure, and Flume: The juvenile bypass system is presently running with 22 open orifices. The number of opened orifices is adjusted to compensate for the weir motor gear box being removed. Presently, flume water is not controllable except by the number of orifices open. This has been an issue for considerable period of time.

Transportation Facility: Fish sampling and fish transport by barge is occurring daily.

Transport Summary: The collection and transportation facility operated within criteria this report period. A total of 223,206 fish were collected this week. The descaling and mortality rates were 1.2% and 0.02% respectively. This weekly report period saw 0 adult lamprey removed from sample and released in the forebay.

River Conditions

River conditions during the week are outlined in Table 1 below.

Table 1. River conditions at Little Goose Dam.

Daily Average River Flow (kcfs)		Daily Average Spill (kcfs)		Water Temperature* (^{o}F)		Water Clarity (Secchi disk - feet)	
High	Low	High	Low	High	Low	High	Low
97.4	83.2	29.2	24.8	55.5	53.5	3.8	2.8

*Ladder temperature.

Other

Inline Cooling Water Strainers: Inline cooling water strainers on all units were last inspected on April 17. A total of 22 juvenile lamprey mortalitiess were removed.

Invasive Species: The zebra mussel substrate monitor was inspection on May 17. No mussels were seen.

Avian Activity: Bird counting and hazing commenced on April 01. See Table 3 below for details.

Table 2. Daily Avian Counts at Little Goose Dam, May 6 - 12, 2016.

Date	Time (hours)	Gulls	Cormorants	Caspian Terns	Pelicans
May 13	1130	37	7	0	0
May 14	1030	13	0	0	0
May 15	0730	20	4	0	0
May 16	1230	9	0	0	0
May 17	1045	95	0	0	2
May 18	1115	11	0	0	0
May 19	1000	52	0	0	0

*Bird counts are taken from a single observation, Forebay and Tailrace.

Gas Bubble Trauma: GBT sampling was performed on May 16. No signs of GBT were seen.

Research: The FGE (Fish Guidance Efficiency) emergency gate closure study is being performed on units 2 and 3 for 2016.

Project: Lower Granite
Biologists: Elizabeth Holdren, Robert Horal
Dates: May 13 – 19, 2016

Turbine Operation

Units are being operated within the hard constraint of the 1% peak efficiency criteria. Unit 1 was removed from service at 0915 hours April 12 for Kaplan blade linkage repair. Unit 1 is expected to return to service February 2017.

Adult Fish Passage Facility

The automatic fish ladder control system was upgraded during the winter maintenance outage. Automatic control system adjustments to trouble shoot internal functioning errors in the program are ongoing. Problems continue with the system tailrace elevation sensors and gate depth sensors readings being inconsistent with physical staff gauge readings. Entrance gates found out of criteria during ladder inspections due to fish ladder control system problems are manually adjusted to depth or sill criteria and left in hand mode until contractors make adjustments. On May 18, the contractor recalibrated all of the control system sensors and plans to install a new version of the program next week. The system remained in auto mode this week for continued evaluation. Adult fish facilities were inspected by Corps or Anchor QEA biologists on May 13, 14, 15, and 18.

Fish Ladder: Fish ladder exit head differential and depth over the weirs were in criteria (≤0.5' and 1.0-1.3', respectively) on all inspections. Picketed lead head differential was in criteria (≤ 0.3'). An average of about 0.75 square yards of debris was observed near the fish ladder exit.

Fish Ladder Entrances and Collection Channel: SSE1 and SSE2 weir gates were in depth criteria (criteria ≥8' or on sill) on all inspections. South shore channel/tailwater head was in criteria (criteria 1'-2') on all inspections.

NPE1 and NPE2 weir gates were in sill criteria (criteria ≥8' or on sill) on all inspections. While on sill, the gate depth readings were 6.4', 6.5', 6.8', and 6.4 feet. NPEs remain set at an elevation of 628.1 feet to prevent the control system from lowing the gates below their limits and spooling the cables. Control system and physical readings continue to be inconsistent. North powerhouse channel/tailwater head differential was in criteria (criteria 1'-2') on all inspections.

NSE1 was in criteria (criteria ≥7' or on sill) on all inspections. NSE2 has been out of service since 2011 and remains set with a chain fall hoist in the closed position to improve channel/tailwater head differentials. The North shore channel/tailwater head differential was in criteria (criteria 1'-2') on all inspections.

Fish have been found stranded on the North shore collection channel walkway due to the combination of increased river flows, the close proximity to the spill, and strong upstream winds. Mortalities included 1 sandrollers on May 18.

Collection Channel Velocity: The collection channel average velocity was in criteria (criteria 1.5-4.0 fps) on all inspections.

Auxiliary Water Supply System: The fish ladder is in two pump operation with AWS pumps 2 and 3 in service. Pump 1 is in standby mode pending a bulkhead swap.

Fish Ladder Temperature Control System: N/A.

Juvenile Fish Passage Facility

Forebay Debris/Gatewell Debris/Oil: An average of about 24.3 square yards of debris was observed in the forebay this week.

ESBSs/VBSs: ESBSs inspections are scheduled for May 21 and 22.

Orifices, Collection Channel, Dewatering Structure, Bypass Pipe: The collection channel is operating with 18-19 orifices open. Orifices are being cycled every three hours.

Collection Facility: The facility is in collection for transport mode. IDFG continued collecting genetic samples from yearling Chinook and juvenile steelhead Monday-Friday. Fish are being collected for NOAA in river survival and transport studies. Fish marking is occurring Monday-Friday. NMFS/UW collected a subsample of NOAA on fish May 17.

Transport Summary: Everyday fish transport by barge continued.

River Conditions

Spring spill in support of fish passage is ongoing. River conditions during the week are outlined in Table 1 below.

Table 1: River conditions at Lower Granite Dam.

Daily Average River Flow (kcfs)		Daily Average Spill (kcfs)		Water Temperature* (F^o)		Water Clarity (Secchi disk - feet)	
High	Low	High	Low	High	Low	High	Low
102.7	86.9	20.5	20.3	53.0	52.5	5.0	2.6

*Cooling water intake temperature.

Other

Inline Cooling Water Strainers: Unit cooling water strainer inspections are scheduled for late May.

Invasive Species: The zebra/quagga mussel substrate was inspected on May 1. No organisms were found.

Avian Activity: Piscivorous bird counts began March 26 with observations being taken from the top of the navigation lock. Avian hazing started April 1. Daily piscivorous bird counts are summarized in Table 2 below.

Table 2. Daily piscivorous bird counts at Lower Granite Dam.

Date	Time (hours)	Gulls	Cormorants	Caspian Terns	Pelicans
May 13	1043	4	0	0	4
May 14	1200	3	0	0	3
May 15	1134	6	1	0	2
May 16	1441	5	0	0	12
May 17	1431	7	0	0	7
May 18	1300	3	0	0	9
May 19	1258	4	0	0	5

GBT: Gas bubble trauma sampling occurred May 19. No signs of gas bubble trauma were seen.

Adult Fish Trap Operations: The trap sample rate was changed May 15 at 1400 hours to 27% daily trap rate M-F (20% overall). The adult trap diversion gate in the turnpool area is changed to the ladder passage position from about 1400 hours Friday to 1300 hours Sunday to facilitate the sound vibration study.

Fish Rescue Operation: No fish rescues occurred this week.

Research

Idaho Fish and Game (IDFG) Genetic Stock Identification: This study aims to enumerate and characterize natural production of yearling Chinook and juvenile steelhead above LGR with regards to age composition and genetic stock profiles. IDFG will sample Monday through Friday through mid-June with a goal of collecting 2,000-5,000 genetic samples from yearling Chinook and juvenile steelhead.

Nez Perce Tribe (NPT)/U. of Idaho (UI)/Columbia River Intertribal Fisheries Commission (CRITFC) – Kelt Study: NPT began steelhead kelt collection March 31. This research project investigates steelhead kelt physiology and endocrinology to evaluate the feasibility and success of rehabilitating strategies. NPT will transport up to 150 kelts to Dworshak National Fish Hatchery as part of this study.

National Marine Fisheries Service (NMFS)-Monitoring the Migrations of Wild Snake River Spring/Summer Chinook: This study is monitoring the migration behavior and survival of wild spring/summer Chinook salmon. The specific goals are to characterize the migration timing and estimate parr-to-smolt survival to LGR of wild Chinook populations as they migrate from their

natal rearing areas and determine migration patterns and what environmental factors influence those patterns. Fish were PIT-tagged during the summer of 2015 in natal streams and are diverted to the Sort-By-Code tanks at LGR.

National Marine Fisheries Service (NMFS) In-River Survival: NMFS staff has begun PIT-tagging Chinook and steelhead smolts for their Survival Study to compare smolt to adult returns of in-river migrating smolts to the smolt to adult returns of transported smolts. PIT-tagged fish are held for 24 hours before being bypassed to the LGR tailrace.

Northwest Fisheries Science Center (NMFS) Columbia Basin Research University of Washington "Within-season indicators of fish condition related to differential delayed mortality" Smolt to Adult Survival Rates and Delayed Mortalities: NMFS are collecting out migrant juvenile spring-summer and yearling fall, subyearling Chinook for ongoing monitoring and research project. Staff condition sampling of fish use fourteen measurements related to energetic reserves, smoltification, and health indices. Weekly sampling will occur April 5 through July 26 and approximately monthly through October.

U.S. Geological Survey (USGS) "Describing the diet of migrating juvenile fall Chinook salmon": NMFS/University of Washington is collecting stomach contents through lavage or dissection from sacrificed fish for USGS for dietary evaluation.