U.S. ARMY CORPS OF ENGINEERS
WALLA WALLA DISTRICT
FISH FACILITIES WEEKLY REPORT
#16-2016

Project: McNary
Biologist: Bobby Johnson and Denise Griffith
Dates: June 10 - 16, 2016

Turbine Operation

McNary had available 14 units (out of 14 total units) for power generation and there were no turbine unit outages this week. The hard 1 percent peak efficiency constraint criteria began April 1. No turbine units ran outside the constraint.

Adult Fish Passage Facilities

McNary fisheries biologists performed measured inspections of the adult fishways on June 10, 12 and 16. Fisheries technicians monitored the ladders as shifts allowed. Adult fish counts and ladder temperature monitoring continued. Adult lamprey video monitoring and counting began June 15. The Oregon entrance water temperature probe was replaced on June 15. An improved probe deployment system for this location was installed on June 16.

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. Debris loads were minimal at both exits.

At the Washington exit, the regulating weir and tilting weir set points were adjusted on June 12 and 15, respectively. The tilting weir adjustment came after the biologist noted the count station differential was 0.5 to 0.6 feet. The Washington count station phone line failed and was repaired on June 15.

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 ladder, all inspection points met criteria.

At the Oregon ladder, entrance weirs NFEW2, NFEW3 and SFEW2 measured 7.7, 7.8 and 7.9 feet in depth, respectively, on June 12.

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. The bypass continues to function satisfactorily. The PUD crane, which failed last November, was reassembled and load tested this week.

Two of the three Oregon ladder fish pumps operated satisfactorily with no interruptions in service this week. Both pumps operated with blade angles of 24 degrees. The governor oil pump filter and filter indicator were replaced in fish pump 3 on June 11 and 14, respectively.

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 continued to supply 450 cubic feet per second (cfs) to the north powerhouse pool except from June 14 at 0800 hours to June 15 at 1200 hours when the juvenile system was in emergency bypass or being switch into or out of emergency bypass.

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 was one deviation from this schedule.

The side dewatering screen cleaning brush tripped an alarm on June 4 at 0125 hours as reported last week. The brush stalled while traveling upstream. At the time, it appeared debris had caused an overload on the brush drive motor.

On the night of June 11, the side brush tripped an alarm, but it is unknown if the side brush tripped an overload breaker. The roving operator reset the brush. On June 12, at 2137 hours, the side brush again tripped an alarm. The operator reset the device at 2300 hours. Later, in the morning, on June 13, the side brush tripped an alarm a third time. The brush was not reset. At 0650 hours, the mechanics began to examine the brush and later determined that it stalled at the same location each time. Electricians found that the drive motor was tripping an overload limit switch. The only way to properly repair the side brush was to dewater the channel control section. At 1030 hours, the juvenile facility was switched from secondary bypass to primary bypass so fish could be evacuated from the facility and preparations for emergency bypass could begin. The examination of accumulated fish in the sample tanks was completed by approximately 1200 hours. Most of the day's sample was missed with only 3.5 hours of secondary bypass occurring.

The side brush was operated manually. Following repeated attempts to run the brush, a full brush cycle was completed twice at about 0900 hours and once at 1600 hours. Fisheries technicians were instructed to monitor the channel hourly overnight. The side brush was set to run every 8 hours. At 2354 hours, the side brush again tripped an alarm. The roving operator was able to reset the device.

On June 14, at 0730 hours, the side brush was run manually twice. From 0800 to 1015 hours, the orifices were closed and the system was switched from primary to emergency bypass. The mechanics found that the brush bar drive gear was not making full contact on the drive rail gear teeth. The rail had a spot where the brush had repeatedly stalled. The mechanics added shims to the drive rail, which resolved the problem. However, the biologist noted the side screen was covered in aquatic vegetation and requested that the brush be examined more thoroughly. The next day, June 15, powerhouse mechanics determined that the brush was only contacting about 50 percent of the screen. They made adjustments to the brush strips until 100 percent screen contact was assured. The fisheries mechanics then cleaned the screen with wire brushes.

At 1045 hours, the orifices were closed and preparations were made to switch the system to primary bypass. When the emergency bulkheads were removed, 26 subyearling Chinook mortalities were noted. The fish appeared to have wedged themselves between the channel structure and the fiberglass bulkheads. This issue will be examined. By 1324 hours, the channel system was back in automatic mode with primary bypass occurring. The side screen brush was set to run every three hours. After checking all facility systems, the facility was switched to secondary bypass at 1415 hours. A partial sample was collected for the day with 7.25 hours of secondary bypass being missed.

Secondary bypass occurred on June 11, 13 and 15. This week, 2,200 juvenile lamprey and 113,603 smolts were bypassed.

Forebay Debris/Gatewell Debris/Oil: Forebay debris loads remained very light. The debris consisted mostly of woody material. The quantity of new incoming debris along the powerhouse and debris loads elsewhere remained minimal.

No high trash rack differential measurements were recorded and no trash racks were cleaned this week.

No problems were observed in the gatewell slots.

Extended-length Submersible Bar Screens (ESBSs)/Vertical Barrier Screen (VBSs): ESBSs are deployed in all units. ESBS camera inspections did not occur this week due to switching between primary, secondary and emergency bypass modes mentioned in the Juvenile Fish Passage Facility introduction section above. The ESBSs in slots 6B and 12C remained in timer mode.

VBS differential monitoring revealed no screens out of criteria. A total of six screens total were cleaned on June 13 and 15. No fish mortalities were observed. VBS rehabilitations continued with new mesh being installed on torn VBS sections.

Orifices, Collection Channel, Dewatering Structure, and Bypass Pipe: Forty-two orifices were in use. During VBS cleaning operations, orifices in the affected slots were closed, with makeup water coming from orifices in adjacent slots. For bypass system mode changes, orifices were closed and opened as mentioned above in the Juvenile Fish Passage Facility section introduction.

The side screen dewater cleaning brush issues are describe above. All other systems operated satisfactory when in automatic mode.

Bypass Facility: During the bypass season, primary and secondary bypass modes return all fish to the river. Emergency bypass mode returns the fish to the river by way of the modified north powerhouse ice and trash sluiceway as the facility is dewatered. Passive integrated transponder (PIT) tag detection occurs in the full flow pipe during primary bypass and throughout the facility during secondary bypass. There is no PIT tag detection during emergency bypass. Smolt monitoring occurs only on secondary bypass days.

All operational systems functioned well. The sample gates are turned on and off every other day so that they are in service only during secondary bypass. 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.

Algae removal throughout the facility continued.

River Conditions

River condition data during the week was provided by the smolt monitoring staff and is outlined in Table 1 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. The water temperature for June 15 came from the control room as the juvenile facility was dewatered.

Temperature monitoring continued. The barge dock and unit 1 tailwater sites are without probes as the new probes ordered have not yet been delivered. Anchor QEA will report temperature data in a separate report.

Routine spill in support of fish passage continued. Forty percent of river flow is spilled in the spring season. The summer spill season, with fifty percent of river flow spilled, began on June 16, at 0001 hours.

The spillgate in bay 22 was switched from split leaf to normal configuration and both standard spillgates in bays 19 and 20 became functional on June 16. The spill pattern in the Fish Passage Plan Table MCN-9 was implemented when the spillgates in bays 19 and 20 returned to service.

Table 1. 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
218.8	189.3	87.8	76.2	63.9	62.2	6.0	6.0

Other

Inline Cooling Water Strainers: The next cooling water strainer examinations will occur on July 5.
Invasive Species: The next mussel station examination will occur in late June.

Avian Activity: Avian counts are recorded in Table 2 below.

Table 2. McNary Project's Daily Avian Count.

Date	Zone	Gull	Cormorant	Tern	Pelican	Grebe
Jun 10	Forebay	0	0	0	4	27
	Spill	27	2	24	13	0
	Powerhouse	0	0	0	2	0
	Outfall	0	7	0	2	0
Jun 11	Forebay	3	0	1	2	31
	Spill	10	0	0	5	0
	Powerhouse	0	0	0	0	0
	Outfall	5	0	0	4	0
Jun 12	Forebay	0	0	0	0	15
	Spill	3	0	0	12	0
	Powerhouse	1	1	0	1	0
	Outfall	1	3	0	5	0
Jun 13	Forebay	0	0	0	4	15
	Spill	2	0	5	1	0
	Powerhouse	0	0	0	0	0
	Outfall	0	0	0	2	0
Jun 14	Forebay	35	0	0	0	47
	Spill	51	3	87	15	0
	Powerhouse	0	0	0	1	0
	Outfall	0	0	0	1	0
Jun 15	Forebay	0	0	0	0	43
	Spill	9	3	4	13	0
	Powerhouse	0	0	0	3	0
	Outfall	0	0	0	0	0
Jun 16	Forebay	0	0	1	2	43
	Spill	11	9	11	13	0
	Powerhouse	0	0	0	0	0
	Outfall	0	5	0	2	0

Gull numbers appeared to be fluctuating and they continued to feed in the spill zone. Most birds at the bypass outfall were unsuccessful. However, pelicans and cormorants have been accessing the west side of the outfall where an inverted sprinkler is not installed. When the juvenile system was in emergency bypass, all species except grebes were observed feeding at that outfall. Cormorant numbers remained fairly low. Pelican numbers have increased as they appear to be feeding on adult shad along the shorelines. Pelicans have been also feeding in the tailrace below

the juvenile facility separator at night. Pelicans were observed in the both ladders for the first time. On one occasion, one pelican flew out of the Washington ladder entrance. On another occasion, two pelicans flew out of the Oregon ladder exit. Caspian tern numbers increased as they continued to feed in the spill and forebay. Grebe numbers were stable in the forebay. Blue herons and ospreys were noted at times. One blue heron was feeding on adult shad from the Oregon ladder exit floating trash rack. Gulls, pelicans and cormorants were roosting on the rocks by the Washington shore boat dock, which is outside the forebay zone.

No grebes were observed in the gatewell slots.

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 two inverted sprinklers were repositioned to higher elevations on June 14 so the pump would no longer lose prime when shut off. The pump was also switched to automatic mode. Vegetation growing near the pump was also removed.

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 did not conduct non-lethal smolt stomach content examinations this week as the system was being switched to emergency bypass on June 14.

Project: Ice Harbor
Biologist: Ken Fone
Dates: June 10 - 16, 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 for runner replacement. Unit 1 was removed from service on June 14 at 1211 hours to investigate why it tripped a protective relay. Units are being operated within the 1% peak efficiency range (hard constraint).

Adult Fish Passage Facilities

Fish facility personnel inspected the adult fishways on June 13, 14, and 15.

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, except for differentials of 2.5' on June 13 and 14. These out of criteria readings may be related to calibration issues, but it is not certain at this point. The north powerhouse entrance (NFE-2) depth and channel/tailwater head differential were in criteria, except for a depth of 7.1' on June 15. This out of criteria reading was the result of the entrance gate being set in manual control at too high an elevation. 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 ran all week without any issues encountered. Five of the eight south shore AWS pumps have been in service since May 17 (instead of the usual six pumps). High channel/tailwater head differentials occur at the south shore entrance when six pumps are operating. On June 14, three of the operating south shore pumps and one of the operating north shore pumps lost power from 1211 hours to 1233 hours when unit 1 tripped a breaker, resulting in the loss of station service.

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%. 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 in slot 5B has not been installed to facilitate the work on unit 5. Unit 2 STSs are raised and stored in their gatewell slots, since unit 2 will not be operated for the rest of the year. Units 1, 3, 4, and 6 STSs and unit 3 VBSs were last inspected on May 17 and 18, with no problems found. The next inspections are scheduled for the week of June 20.

Orifices, Collection Channel, Dewatering Structure, and Bypass Pipe: The juvenile fish bypass operated with 18 to 20 orifices open. Orifices are routinely cycled and back-flushed three times per day. On the morning of June 13, the orifices for gatewell slots 3B and 3C were found closed. This was probably the result of human error when backflushing orifices the day before. Orifice 3BN and 3CN were re-opened on the morning of June 13. 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 (continued on next page).

June 13:

Species	Sampled	#Descaled	Morts	Avian Marks
C-CH	0	---	---	---
UC-CH	0	---	---	---
C-CH-O	50	1	0	1
UC-CH-O	27	0	1	0
C-SH	3	0	0	0
UC-SH	2	1	0	0
C-COHO	0	---	---	---
UC-COHO	0	---	---	---
C-SOCK	0	---	---	---
UC-SOCK	0	---	---	---
TOTAL	82	2	1	1

June 16:

Species	Sampled	#Descaled	Morts	Avian Marks
C-CH	0	---	---	---
UC-CH	0	---	---	---
C-CH-O	38	0	0	0
UC-CH-O	65	0	0	0
C-SH	1	0	0	0
UC-SH	0	---	---	---
C-COHO	0	---	---	---
UC-COHO	0	---	---	---
C-SOCK	0	---	---	---
UC-SOCK	0	---	---	---
TOTAL	104	0	0	0

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. With a few minor exceptions, there has been less turbulence observed in the flow over the RSW since then, even when dam operations at the time of the observations are similar to the operations occurring on May 17.

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
71.7	49.9	50.3	15.5	64.0	62.0	6.6	5.6

*Unit 1 scroll case temperature.

Other

Inline Cooling Water Strainers: Monthly turbine cooling water strainer inspections last occurred on May 17 and 18. A total of 33 juvenile lamprey and 5 Siberian prawns (all mortalities) were found. The next inspections of the turbine cooling water strainers are scheduled for the week of June 20. Transformer cooling water strainers were inspected on June 7. A total of 6 juvenile lamprey were found, with 4 of them being alive and returned to the river in good condition.

Invasive Species: No new exotic species have been found.

Avian Activity: The numbers of cormorants and pelicans observed around the project (Table 3) remained moderate. Contracted land-based hazing of piscivorous birds occurred for 16 hours per day. Boat-based hazing occurred for 8 hours per day, 3 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
June 10	2	19	0	0	25
June 11	0	5	0	0	19
June 12	0	45	0	0	35
June 13	0	10	0	0	23
June 14	4	18	0	0	13
June 15	0	5	0	0	12
June 16	6	7	0	0	7

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: June 10 - 16, 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 June 10, 11, 12 and 15.

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 sill criteria (criteria: ≥ 8' or on sill) on all inspections. While on sill, readings were 7.9, 6.6, 6.6 and 6.8 feet. South powerhouse channel/tailwater head was in criteria (1'-2') on all inspections.

SSE1 weir gate was in depth or sill criteria (criteria: ≥ 8' or on sill) on all inspections. While on sill, readings were 7.1, 7.0 and 7.2 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 report period. Pump 1 was out of service throughout this period and will remain 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 1 square yard of forebay debris observed during this period. Gatewell debris ranged from 0 - 8% surface coverage. No oil was observed in the gatewells.

STSs/VBSs: STSs were operating in continuous-run mode. STS inspections were conducted June 7 and 8 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: No problems occurred this period..

Transport Summary: The last daily barge departed the facility on May 25, followed by the first every-other-day barge departure on May 27. No fish were transported on May 26.

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
71.0	47.5	25.0	23.9	64.4	63.0	5.0	3.6

*Scrollcase temperatures.

Other

Inline Cooling Water Strainers: Cooling water strainers were inspected on June 1. There were no live fish recovered. Mortalities included 2 juvenile lamprey.

Invasive Species: No zebra or quagga mussels were observed during monitoring station inspections on June 5.

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. Hazing ended on June 2.

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

Date	Time	Gulls	Cormorants	CaspianTerns	Grebes	Pelican
June 10	1130	13	2	0	0	0
June 11	1100	23	2	0	0	0
June 12	1100	12	0	0	0	0
June 13	1100	15	0	0	0	0
June 14	1100	11	0	0	0	0
June 15	1120	16	0	0	0	0
June 16	1100	8	0	0	0	0

Research: Pacific Northwest National Laboratory/Battelle – Ice Harbor smolt survival study. Small numbers of smolts are taken from Lower Monumental's 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: June 10 - 16, 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 June 12, 14 and 16.

Fish Ladder: The ladder exit head differentials ranged between 0 and 0.1 feet (criteria $\leq$ 0.5 ft.). Water depths over the weirs ranged between 1.2 and 1.3 feet (criteria 1.0-1.3 ft.) and picketed lead differentials ranged between 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 8.0 and 8.7 feet (criteria $\geq$ 8.0 ft). NPE weir depths ranged between 5.8 and 6.3 feet (criteria $\geq$7.0 ft.) and were on sill. NSE weir depths ranged between 5.1 to 5.2 feet (criteria $\geq$ 6.0 ft.) and were on sill. Collection channel surface water velocity measured at the North powerhouse ranged between 1.6 and 1.9 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 June. Presently fish pump 2 and 3 are running. The average water velocity (the bottom, middle and top of the adult channel) at the NPE was 2.4 fps on June 15.

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 100 to 200 square feet.

Spillway Weir: The repair to spillbay 1 was completed by cannibalizing parts from spillbay 5 and a special spill pattern (without spillbay 5) was approved. The TSW was reconfigured to the high crest position on May 26.

ESBS/VBS: Electrical tests of ESBS brushes were performed June 15. Fish screen 2B tripped a breaker and would not reset. Electricians reset the limit switches and the screen returned to service. Drawdowns were performed on units 1-2 on June 16. All differentials met criteria.

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

Transportation Facility: Sampling is occurring every day as is the collection of fish. Fish transport by barge on an every-other-day basis continues.

Transport Summary: The collection and transportation facility operated within criteria this report period. A total of 170,383 fish were collected. Descaling and mortality rates were 0.8% and 0.2%, respectively. This weekly report period saw 2 adult lamprey removed from the raceways or the 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* (°F)		Water Clarity (Secchi disk - feet)	
High	Low	High	Low	High	Low	High	Low
68.0	50.7	20.5	14.9	65.0	64.4	6.0	5.0

*Ladder temperature.

Other

Invasive Species: The zebra mussel substrate monitor was inspection on June 15. No mussels were seen.

Inline Cooling Water Strainers: Cooling water strainers on all units were last inspected on June 15. No fish were seen.

Avian Activity: Bird counting and hazing commenced on April 01. See Table 2 below for details.

Table 2. Daily Avian Counts at Little Goose Dam, June 10 - 16, 2016.

Date	Time (hours)	Gulls	Cormorants	Caspian Terns	Pelicans
June 10	1100	36	0	0	0
June 11	1430	39	3	0	0
June 12	1300	15	5	0	0
June 13	1220	16	0	0	1
June 14	0800	18	1	0	0
June 15	1130	4	0	0	2
June 16	1400	11	3	0	0

*Bird counts are taken from a single observation, forebay and tailrace.

Gas Bubble Trauma: GBT examinations were performed June 13. No signs of GBT were seen.

Research: A 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: June 10 - 16, 2016

Turbine Operation

Units are being operated within the hard constraint 1% peak efficiency criteria. Unit 1 will remain out of service through February 2017 for Kaplan blade linkage repair. Unit 5 was out of service from 0630 to 1259 hours on June 15 for heat exchanger cleaning.

Adult Fish Passage Facility

Automatic control system adjustments monitoring for internal functioning errors in the program are ongoing. Observations of the fish ladder indicate the installation of a new control program has improved the system. The system remained in automatic mode this week. Adult fish facilities were inspected by Corps or Anchor QEA biologists on June 10, 11, 12, and 15.

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 0.0 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 differential 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 5.9', 5.7', 5.6', and 5.4 feet. The control system reading for NPE elevations fluctuate between 628.0 and 628.2 while the gates are actually on sill due to vibration of the sensor in the gate channel. 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 differential. North shore channel/tailwater head differential was in criteria (criteria 1'-2') on all inspections.

Collection Channel Velocity: 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. Pump 1 needs to be brought on line for reliability testing following winter maintenance. AWS pumps will need to be taken out of service to swap discharge bulkheads from pump 2 to pump 1.

Fish Ladder Temperature Control System: Fish ladder temperature control pumps were turned on for the summer passage season at 1506 hours on June 9.

Juvenile Fish Passage Facility

Forebay Debris/Gatewell Debris/Oil: An average of about 0.5 square yards of debris was observed in the forebay this week.

ESBSs/VBSs: ESBSs inspections are scheduled for late June.

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 Monday-Friday. NMFS/UW collected 65 clipped subyearling Chinook from the condition sample on June 14.

Transport Summary: Every-other-day barge transport continues with barges leaving Lower Granite on even number days in June.

River Conditions

Routine Spring spill in support of fish passage continues. 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
71.7	53.6	20.5	20.2	65.5	62.0	5.0	4.6

*Cooling water intake temperature.

Other

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

Invasive Species: Zebra/quagga mussel substrate was inspected June 5. 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. On June 14 at 1220 hours, there were 17 pelicans observed downstream of the powerhouse observation boundary.

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

Date	Time (hours)	Gulls	Cormorants	Caspian Terns	Pelicans
June 17	1212	5	0	0	2
June 18	1216	1	1	0	2
June 19	1015	4	0	0	2
June 20	0942	3	1	0	1
June 21	1220	5	0	0	4
June 22	1317	4	0	0	9
June 23	1614	9	0	0	1

GBT: Gas bubble trauma sampling was not conducted this week.

Adult Fish Trap Operations: The trap sample rate was changed May 15 at 1400 hours to 27% 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 300 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.

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.

Anchor QEA "Sound and Vibration Effects on Adult Fish Passage through the Lower Granite Ladder": The second year of monitoring for any adult fish passage delay through the ladder due to sound and vibration from the JFF construction will continue beginning 1 March through September 2016. The new PIT antennas in the ladder exit tunnel and capped on entrance weir 648 are queried weekly to correlate with sound signals from hydrophones and water particle movement signals from three triangulated accelerometers in each of three ladder locations: entrance weir, weir downstream of Diffuser 14, and exit pool. No fish are handled specifically for this study, only passage histories from previously PIT-tagged fish for other evaluations are recorded, but the turn pool swing gate used to direct adult fish into the adult trap and sort-by-code loop is moved into the loop closure position every Friday at 2:00 PM until Sunday at 2:00 PM between 1 March through 17 August to allow for passage rate PIT detection of un-obstructed adult spring/summer Chinook and Sockeye salmon and steelhead. Weekly progress reports are available for in-season review.

Anchor QEA "Lower Granite Ladder Temperature Reduction Structures Post-construction Evaluation of Adult Sockeye and Chinook Salmon Ladder Exit Success and Behavior": A Sonar camera will be installed on 20 June below the Lower Granite adult ladder exit to record adult sockeye and Chinook salmon exit success and behavior upon leaving the cooler water intake zone created by the recent install of the spray bar around the exit forebay area and the chimney around the Diffuser 14 intake. Passage timing recorded through the existing PIT array and the new PIT antennas in the ladder exit tunnel will be correlated with the temperature regime recorded through existing temperature probe stations and an additional temperature depth string installed at the outside edge of the spray bar plume. Three optical cameras installed over the water surface at the ladder exit bulkhead will record any adverse behavioral response of fish to the spray plume trajectories, such as jumping. During several days in early July and mid-August remote control boat transects of the spray affected forebay area will map resultant velocity magnitudes and trajectories measured by ADCP (Acoustic Doppler Current Profiler). Weekly progress reports are available for in-season review.