U.S. ARMY CORPS OF ENGINEERS
WALLA WALLA DISTRICT
FISH FACILITIES WEEKLY REPORT
#17-2016

Project: McNary
Biologists: Bobby Johnson and Denise Griffith
Dates: June 17 - 23, 2016

Turbine Operation

McNary had available 13 to 14 units (out of 14 total units) for power generation. Units 9 and 10 were out of service from June 20, at 0619 hours, to June 22, at 1502 hours, for delta bus tie in. 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 17, 19 and 23. Fisheries technicians monitored the ladders as shifts allowed. Adult salmonid fish counts, adult lamprey video monitoring and ladder water temperature monitoring continued. National Oceanic & Atmospheric Administration (NOAA) Fisheries personnel performed their monthly inspection on June 22.

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 and debris loads remained minimal.

The regulating weir set point was adjusted on June 23 at both exits.

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 both 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. The bypass continues to function satisfactorily. The PUD crane, which failed last November, returned to service 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. 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.

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 system was in primary bypass on June 19, from 1355 to 1410 hours, to remove a stick from the junction of the secondary bypass and sample return to river lines. No samples were missed.

Secondary bypass occurred on June 17, 19, 21 and 23. This week, 400 juvenile lamprey and 299,603 smolts were bypassed.

Forebay Debris/Gatewell Debris/Oil: Forebay debris loads remained very light. The debris consisted mostly of woody material and aquatic vegetation. 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. The next scheduled trash rack cleaning is planned for June 27 to 30.

A very small amount of hydraulic fluid was removed with absorbent pads from slot 9A on June 21.

Extended-length Submersible Bar Screens (ESBSs)/Vertical Barrier Screen (VBSs): ESBSs are deployed in all units. ESBS camera inspections did not occur as originally planned as the scheduled biologist had a medical appointment. The ESBSs in slots 6B and 12C remained in timer mode.

VBS differential monitoring revealed no screens out of criteria and none were cleaned. 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. Orifice valve actuators were repaired in slot 8B. All other orifice valve actuators were examined and adjusted as required.

All systems operated satisfactory when 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.

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.

The facility secondary PIT tag computer was rebooted on June 19.

Ballasts were replaced in the light fixtures above the perforated plate on June 23.

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.

Temperature monitoring continued. A malfunctioning probe in spillbay 22 was replaced and a probe was deployed off the barge dock on June 19. The probe in the unit 5 forebay trolley became lodged on June 19 and was removed later. This probe was reinstalled in the forebay by unit 5 on June 22. A camera inspection on June 23 revealed no problems in the unit 5 trolley. The probe was reinstalled in the trolley later that day. A probe will be installed at the unit 1 tailwater site next week. Anchor QEA will document temperature data in a separate report.

Routine spill in support of fish passage continued. During the summer spill season, fifty percent of river flow is spilled.

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
203.3	145.0	102.0	72.5	64.1	62.1	6.0	6.0

Other

Inline Cooling Water Strainers: Cooling water strainer examinations will occur on July 5.

Invasive Species: The mussel station examinations on June 23 revealed no problems.

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 17	Forebay	0	0	2	0	0
	Spill	0	1	2	12	0
	Powerhouse	0	0	0	2	0
	Outfall	0	2	0	2	0
Jun 18	Forebay	2	0	0	3	17
	Spill	42	0	0	16	0
	Powerhouse	0	0	0	0	0
	Outfall	0	7	0	5	0
Jun 19	Forebay	3	0	0	1	31
	Spill	0	9	25	15	0
	Powerhouse	0	0	5	3	0
	Outfall	0	1	0	5	0
Jun 20	Forebay	0	0	2	0	70
	Spill	0	6	21	12	0
	Powerhouse	0	0	15	7	0
	Outfall	0	4	0	3	0
Jun 21	Forebay	0	0	2	2	0
	Spill	0	3	111	7	0
	Powerhouse	0	0	3	1	0
	Outfall	0	3	11	7	0
Jun 22	Forebay	0	2	1	0	5
	Spill	2	1	10	10	0
	Powerhouse	1	0	1	3	0
	Outfall	0	0	1	2	0
Jun 23	Forebay	0	0	0	0	20
	Spill	4	0	56	8	0
	Powerhouse	0	0	0	1	0
	Outfall	0	2	0	10	0

Gull numbers appeared to have decreased and they continued to feed in the spill zone. Pelicans and cormorants continued to feed at the bypass outfall. Cormorant numbers remained fairly low. Pelican numbers remained stable as they appear to be also feeding on adult shad along the shorelines. Pelicans continued to feed in the tailrace below the juvenile facility separator at night. Caspian tern numbers remained stable as they continued to feed in the spill zone. However, they were also noted in the powerhouse and bypass outfall zones at times. Grebe numbers fluctuated in the forebay. Blue herons and ospreys were noted at times. 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 working 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.

Research

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

USGS: United States Geological Survey fisheries biologists did not conduct non-lethal smolt stomach content examinations this week. The next scheduled examinations are on June 28.

Project: Ice Harbor
Biologist: Ken Fone
Dates: June 17 - 23, 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 when it tripped a protective relay action at the generator bus ground. The stator is being repaired or replaced to fix the problem.

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 20, 22, and 23.

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 2.4' and 2.5' on June 20 and 21, respectively. These out of criteria readings may be related to calibration issues and the difficulty of obtaining accurate elevation readings of fluctuating tailwater levels caused by project spill. The north powerhouse entrance (NFE-2) depth and channel/tailwater head differential were in criteria, except for a depth of 6.1' on June 20. This out of criteria reading was the result of the entrance gate being set in manual control at too high an elevation. The gate was lowered down to sill to resolve the problem. 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 in operation during the week. Five of the eight south shore AWS pumps were in operation.

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 for slot 5B has not been installed yet 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 6 VBSs were inspected on June 21 and 22, with no problems found.

Orifices, Collection Channel, Dewatering Structure, and Bypass Pipe: The juvenile fish bypass operated with 20 orifices open. Orifices are routinely cycled and back-flushed three times per day. The avian abatement hydrocannon pump was observed to be not operating on June 22 for unknown reasons. The pump was restarted and the hydrocannon was back in operation the same day.

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 20:

Species	Sampled	#Descaled	Morts	Avian Marks
C-CH	0	---	---	---
UC-CH	0	---	---	---
C-CH-O	9	0	0	0
UC-CH-O	19	0	0	0
C-SH	1	1	0	1
UC-SH	0	---	---	---
C-COHO	0	---	---	---
UC-COHO	0	---	---	---
C-SOCK	0	---	---	---
UC-SOCK	0	---	---	---
TOTAL	29	1	0	1

June 23:

Species	Sampled	#Descaled	Morts	Avian Marks
C-CH	0	---	---	---
UC-CH	0	---	---	---
C-CH-O	28	1	0	0
UC-CH-O	71	2	0	0
C-SH	1	0	0	0
UC-SH	0	---	---	---
C-COHO	0	---	---	---
UC-COHO	0	---	---	---
C-SOCK	0	---	---	---
UC-SOCK	0	---	---	---
TOTAL	100	3	0	0

Removable Spillway Weir (RSW): Spill for fish passage began on April 3 at midnight. In mid-May, deep furrows were observed in the surface of the water flowing over the RSW, which produced turbulence and splashing in the otherwise laminar flow. The turbulence 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 in mid-May.

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
50.8	41.6	35.3	12.4	65.0	64.0	6.4	6.0

*Unit 1 scroll case temperature.

Other

Inline Cooling Water Strainers: Turbine cooling water strainer inspections occurred on June 21 and 22. One unclipped subyearling Chinook, 5 juvenile lamprey and 7 Siberian prawns (all mortalities) were found.

Invasive Species: No new exotic species have been found.

Avian Activity: The numbers of piscivorous birds counted around the project are shown in Table 3 below. The numbers of cormorants decreased from last week, while the numbers of gulls and pelicans increased. Contracted land-based hazing of piscivorous birds occurred for 16

hours per day, changing to 8 hours per day on June 19. Boat-based hazing for 8 hours per day, 3 days per week, ended on June 18. 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 17	6	13	2	0	27
June 18	4	0	0	0	15
June 19	10	20	0	0	57
June 20	4	9	0	0	18
June 21	5	4	0	0	19
June 22	16	1	0	0	15
June 23	9	13	0	0	29

Research

NOAA Fisheries: Beginning on April 21, tissue samples were taken as often as 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 Laboratories) 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 17 - 23, 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. Unit 3 was removed from service at 0955 hours of June 18, due to a broken linkage in the governor cabinet, and returned to service at 1708 hours on June 20.

Adult Fish Passage Facility

The adult fishway was inspected by Corps and Anchor QEA biologists on June 17, 18, 19 and 22.

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 5.5, 6.4, 5.8 and 6.0 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. While on sill, readings were 6.1, 6.7, 5.8, and 6.1 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 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 0 square yard of forebay debris observed during this period. Gatewell debris ranged from 0 - 10% surface coverage. No oil problems were observed in the gatewells.

STSs/VBSs: STSs were operated 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: Every-day barging changed to alternate day barging on May 25. No barges departed the facility on May 26.

River Conditions

Spring spill operation was initiated at 0001 hours on April 3, followed by the initiation of the summer spill program on June 21. 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
47.1	41.2	26.6	16.4	65.1	64.0	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. Conditions 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	Terns	Grebes	Pelicans
June 17	1100	6	0	0	0	0
June 18	1100	13	0	0	0	0
June 19	1100	8	1	0	0	0
June 20	1100	1	2	0	0	0
June 21	1100	12	1	0	0	0
June 22	1100	0	1	0	0	0
June 23	1050	13	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: Rick Weis
Dates: June 17 - 23, 2016

Turbine Operation

All turbine units were available for service this week. Hard constraints of 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 19 and 21.

Fish Ladder: The ladder exit head differentials held steady at 0.0 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 held steady at 0.0 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 1.3 and 1.8 feet (criteria 1.0 to 2.0 ft.). SSE weir depths ranged between 7.4 and 8.4 feet (criteria $\geq$ 8.0 ft). NPE weir depths ranged between 5.5 and 6.1 feet (criteria $\geq$7.0 ft.) and were on sill. NSE weir depths ranged between 4.6 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 1.8 and 1.9 fps (criteria 1.5 to 4.0 fps).

Auxiliary Water Supply System: Fish pump 1 is being repaired. The estimated repair date has been extended again and is now the end of June. Presently fish pump 2 and 3 are running. Water velocity averaged from the bottom, middle and top of the adult channel at 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 at 20 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 was repositioned to the high crest configuration on May 26.

ESBS/VBS: Electrical tests of ESBS brushes were performed on June 15. Fish screen 2B tripped a breaker and would not reset. Electricians reset the limit switches and screen was returned to service. Drawdown measurements 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 open compensate for the removal of the weir motor gear box. Presently flume water is not controllable except by the number of opened orifices.

Transportation Facility: Fish collection and sampling is occurring daily with transport by barge occurring on an every-other-day basis.

Transport Summary: The collection and transportation facility operated within criteria this report period. A total of 110,462 fish were collected. The descaling and mortality rates were 1.1% and 0.2% respectively. This weekly report period saw 2 adult lamprey removed from the raceways or 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
50.1	40.2	14.3	12.3	63.8	63.0	4.8	4.5

*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 in 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 daily count details.

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

Date	Time (hours)	Gulls	Cormorants	Caspian Terns	Pelicans
June 17	None	0	0	0	0
June 18	1330	10	2	0	2
June 19	1430	0	1	0	1
June 20	1400	2	1	0	0
June 21	0730	0	0	0	1
June 22	1215	0	0	0	0
June 23	0800	1	1	0	0

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

Gas Bubble Trauma: GBT was performed on June 20. No signs of GBT were seen.

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

Project: Lower Granite
Biologist(s): Elizabeth Holdren and Robert Horal
Dates: June 17 - 23, 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 6 was forced out of service from 0212 to 1600 hours on June 20 due to a faulty ESBS ground in gatewell slot B. Unit 6 was removed from service at 0630 hours on June 23 to facilitate the installation of transducers to monitor Environmentally Acceptable Lubricants (EAL).

Adult Fish Passage Facility

Automatic control system adjustments to troubleshoot 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 June 17, 18, 19, and 22.

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 differentials were 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 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 5.4', 5.9', 5.5', 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 the vibration of the sensor in the gate channel. The 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. North shore channel/tailwater head differential was in criteria (criteria 1'-2') on all inspections except for a 0.6 feet reading taken June 22. This reading was taken during a coordinated bulkhead swap to bring Auxiliary Water Pump 1 on line to test operational reliability.

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 1 and 3 in service. Pump 2 is in standby mode. Auxiliary water supply pumps 1-3 were offline

June 22 at 1501 hours to remove discharge bulk heads and return fish pump 1 to service. Fish pump 1 and pump 3 were returned to service at 1750 hours, June 22.

Fish Ladder Temperature Control System: Fish ladder temperature control pumps were turned on for the summer passage season at 1506 hours on June 9. Fish ladder temperature control pumps were removed from service from 0830 to 1547 hours on June 20 for the installation of post-passage behavior monitoring equipment to assess fish response to the temperature control system. Additional equipment is scheduled to be installed July 6-7.

Juvenile Fish Passage Facility

Forebay Debris/Gatewell Debris/Oil: An average of about 1.0 square yards of debris was observed in the forebay this week.

ESBSs/VBSs: ESBSs inspections are scheduled for late June. The Unit 6 ESBS in gatewell slot 6B went out of service on 0212 hours June 20 due to a grounding issue. The ESBS was replaced and returned to service at 1600 hours on June 20.

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 concluded the collection of genetic samples from yearling Chinook and juvenile steelhead on June 17. NMFS/UW did not collect fish this week.

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

River Conditions

Summer spill in support of fish passage began June 21 at 0005 hours. 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
54.1	42.0	20.6	18.6	62.0	59.9	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: The 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. 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
June 17	1106	2	0	0	5
June 18	1216	1	1	0	2
June 19	0904	1	0	0	6
June 20	0950	1	0	0	4
June 21	1348	1	0	0	6
June 22	1130	0	0	0	0
June 23	1400	0	0	0	0

GBT: Gas bubble trauma sampling was not conducted this week and will likely conclude for the season.

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. One adult bull trout was collected at the adult trap on June 17. This fish was genetically sampled, PIT tagged, and released to the fish ladder.

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 personnel 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 adult fish passage delay through the ladder in response to sound and vibration from JFF construction will continue 1 March through September 2016. Weekly PIT tag detections from the ladder exit tunnel and entrance weir 648 are correlate with sound signals from hydrophones and water particle movement signals from three triangulated accelerometers at the entrance weir, weir downstream of Diffuser 14, and exit pool. Passage histories from fish previously PIT-tagged for other evaluations are used. The turn pool swing gate used to divert fish into the adult trap is moved to the non-trapping ladder passage position at about 1400 hours Friday to about 1400 hours Sunday March 1 through August 17 to allow for unobstructed passage rate PIT tag detections. 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 was installed 20 June below the Lower Granite adult ladder exit to record sockeye and Chinook salmon ladder exit success and behavior in response to cooler water at the forebay exit and Diffuser 14 intake chimney. Passage time recorded through the PIT tag arrays in the ladder exit tunnel. Passage time will be correlated with temperatures recorded through existing temperature probe stations and a temperature depth string at the outside edge of spray bar. Three optical cameras above the water surface at the ladder exit will record behavioral response of fish to the spray plume trajectories. Remote control boat transects of the spray affected forebay area will map velocity magnitudes and trajectories measured by ADCP (Acoustic Doppler Current Profiler) early July and mid-August. Weekly progress reports are available for in-season review.