U.S. ARMY CORPS OF ENGINEERS
WALLA WALLA DISTRICT
FISH FACILITIES WEEKLY REPORT
#13-2016

Project: McNary
Biologist: Bobby Johnson and Denise Griffith
Dates: May 20 – 26, 2016

Turbine Operation

McNary had available all 14 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
14	May 20	3.7 hours.	Torn vertical barrier screen (VBS) found and replaced.
3, 5 & 6	May 24	1.2 hours total.	Extended-length submersible bar screen (ESBS) camera inspections.

Adult Fish Passage Facilities

McNary fisheries biologists performed measured inspections of the adult fishways on May 20, 22 and 26. Fisheries technicians monitored the ladders as shifts allowed. Adult fish counts continued. Temperature probes will be deployed on May 27 and monitoring will begin June 1.

In mid-May, two heat pumps were replaced, one at each of the two ladder passive integrated transponder (PIT) tag stations. Each station has 2 heat pumps.

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.

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 more. All ladder entrances met all criteria during measured inspections.

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. Components from the PUD crane that failed on November 18, 2015 have been repaired. A mobile crane is being used to reassemble the failed crane. The bypass continues to function satisfactorily.

Two of the three Oregon ladder fish pumps operated satisfactorily with no interruptions in service this week. 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 no deviations from this schedule. Secondary bypass occurred on May 20, 22, 24 and 26. This week, 4,900 juvenile lamprey and 93,005 smolts were bypassed.

Thirty-five of 43 temperature probes will be deployed by the Anchor QEA staff by May 31. The remaining 8 probes will be deployed on June 2.

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 and no trash racks were cleaned this week.

No problems were observed in the gatewell slots.

ESBSs/VBSs: ESBSs are deployed in all units. ESBS camera inspections occurred in units 3, 5 and 6 this week. No problems were found. The ESBS in slot 12C remained in timer mode.

VBS differential monitoring revealed no screens out of criteria. The screen in slot 5B was cleaned on May 26. During the cleaning, no fish mortalities were noted.

On May 20, during a scheduled inspection, the VBS in slot 14C was found damaged. The unit was removed from service and the screen was replaced with a rehabilitated VBS. No fish mortalities were noted when the torn screen in slot 14C was removed. VBS inspections are now completed.

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 and inspections, orifices in the affected slots were closed, with makeup water coming from orifices in adjacent slots. Orifice valve actuators were repaired in slots 1A, 2C and 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. 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 B side sample gate was found to be two seconds slow on May 26 (a 2 percent error rate) as the actuator air fittings were leaking. Two samples were missed while the fittings were replaced. The extra seconds added to the previous samples and the two missed samples were equivalent in time gained and lost, so no adjustments were necessary.

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.

A gear on the B side sample tank crowding device was repositioned and a stick was removed from the junction of the secondary bypass and sample return to river lines on May 25. A differential warning thermometer was installed in the sample trough on May 26. When there is a temperature difference of 2 degrees Fahrenheit between the trough and B side sample tank, an alarm will sound. Access hatches, opening covers and weep holes were completed in the B side secondary bypass line this week.

Two adult lamprey were removed from the sample tanks on May 23. The sample rate was one percent.

River Conditions

River condition data during the week was provided by the smolt monitoring staff and is outlined in Table 2 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 in the spring season.

Table 2. 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
265.8	196.6	106.3	78.9	58.9	56.7	6.0	4.9

Other

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

Invasive Species: The mussel station examinations on May 26 revealed no problems.

Avian Activity: Avian counts are recorded in Table 3 below.

Table 3. McNary Project's Daily Avian Count.

Date	Zone	Gull	Cormorant	Tern	Pelican	Grebe
May 20	Forebay	1	0	0	2	68
	Spill	68	0	0	0	0
	Powerhouse	0	0	0	0	0
	Outfall	1	0	0	0	0
May 21	Forebay	0	1	0	0	35
	Spill	96	1	0	2	0
	Powerhouse	0	0	0	0	0
	Outfall	25	0	0	0	0
May 22	Forebay	0	0	0	0	37
	Spill	189	1	0	0	0
	Powerhouse	0	0	0	0	0
	Outfall	57	0	0	1	0
May 23	Forebay	3	0	0	0	40
	Spill	55	0	0	0	0
	Powerhouse	0	0	0	1	0
	Outfall	7	0	0	0	0
May 24	Forebay	0	0	0	0	54
	Spill	47	0	0	2	0
	Powerhouse	1	0	0	0	0
	Outfall	0	0	0	4	0
May 25	Forebay	0	0	3	0	60
	Spill	50	0	0	0	0
	Powerhouse	3	0	0	0	0
	Outfall	0	0	0	0	0
May 26	Forebay	1	1	1	0	55
	Spill	49	0	9	5	0
	Powerhouse	0	0	0	1	0
	Outfall	4	0	0	1	0

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. Most other birds observed on project appeared in low numbers. 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.

One grebe was removed from gatewell slot 6A on May 22. One grebe entered slots 6B and 10B on May 26. Both birds immediately passed to the juvenile bypass channel. One grebe was removed from the collection channel in the afternoon. The other bird remained in the channel.

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.

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.

Project: Ice Harbor
Biologist: Ken Fone
Dates: May 20 – 26, 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. Disassembly of unit 2 began this week.

Units are being operated within the 1% operating efficiency range (hard constraint).

Adult Fish Passage Facilities

Fish facility personnel inspected the adult fishways on May 23, 24, and 25.

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 in operation during the week. Five of the eight south shore AWS pumps have been operating since May 17 (instead of six pumps). High channel/tailwater head differentials occur at the south shore entrance when six pumps operate.

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 15%. 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 were raised and stored in their gatewell slots on May 24 and 25, 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 inspected on May 17 and 18, with no problems found.

Orifices, Collection Channel, Dewatering Structure, and Bypass Pipe: The juvenile fish bypass operated with 19 to 20 orifices open. Orifices are routinely cycled and back-flushed three times per day. The mechanical screen cleaner at the primary dewaterer was taken out of service on May 26 when the brush lift cable was found broken. Personnel will monitor the water level in the primary dewaterer and keep the downstream section clean with the squeegee and air burst system until the mechanical screen cleaner is repaired. 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. The unclipped yearling Chinook mortality observed in the May 26 sample was already dead when it entered the separator.

Table 1. Fish condition sampling results at Ice Harbor Dam (continued on next page).

May 23:

Species	Sampled	#Descaled	Morts	Avian Marks
C-CH	5	0	0	0
UC-CH	1	0	0	0
C-CH-O	0	---	---	---
UC-CH-O	14	0	0	0
C-SH	45	1	0	3
UC-SH	26	1	0	0
C-COHO	2	0	0	0
UC-COHO	1	0	0	0
C-SOCK	21	0	0	0
UC-SOCK	1	0	0	0
TOTAL	116	2	0	3

May 26:

Species	Sampled	#Descaled	Morts	Avian Marks
C-CH	11	0	0	0
UC-CH	2	0	1	0
C-CH-O	0	---	---	---
UC-CH-O	8	0	0	0
C-SH	71	5	0	2
UC-SH	30	2	0	1
C-COHO	0	---	---	---
UC-COHO	6	0	0	0
C-SOCK	4	0	0	0
UC-SOCK	2	0	0	0
TOTAL	134	7	1	3

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. There was generally less turbulence observed in the flow over the RSW this week, although dam operations at the time of the observations were 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
106.1	74.3	59.9	22.2	56.0	56.0	7.0	6.4

*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.

Invasive Species: No new exotic species have been found.

Avian Activity: The numbers of gulls, cormorants, and pelicans observed around the project fluctuated during the week (Table 3 below). Contracted land-based hazing of piscivorous birds occurred 16 hours per day. Boat-based hazing occurred 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 20	2	12	0	0	11
May 21	0	10	0	1	27
May 22	0	55	0	0	35
May 23	2	56	0	1	19
May 24	16	13	0	0	5
May 25	12	8	0	0	4
May 26	10	14	0	0	6

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 20 – 26, 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 20, 21, 22 and 25.

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 7.5, 7.5, 7.9 and 5.4 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 with the exception of the May 21 inspection with a reading of 6.2 feet. The powerhouse operator was informed and SSE1 weir gate was manually placed at sill. While on sill, all readings were 7.6 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 for the rest of 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 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 ended on May 25, with alternate day fish transport by barge beginning on May 27.

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
102.2	71.9	45.0	27.1	57.2	55.5	4.6	3.2

*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 salmonid 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 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 20	1100	0	0	0	0	0
May 21	1100	0	0	0	0	0
May 22	1100	0	0	0	0	0
May 23	1100	0	0	0	0	0
May 24	1100	0	0	0	0	0
May 25	1100	0	0	0	0	0
May 26	1100	3	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: May 20 – 26, 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. The system will be in manual mode until repairs can be made. Adult fishway inspections were performed on May 20, 24 and 26.

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 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 0.9 and 1.9 feet (criteria 1.0 to 2.0 ft.). SSE weir depths ranged between 7.9 and 8.9 feet (criteria $\geq$ 8.0 ft). NPE weir depths ranged between 5.5 and 6.2 feet (criteria $\geq$7.0 ft.) and were on sill. NSE weir depths ranged between 4.5 to 5.4 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 2.1 fps (criteria 1.5 to 4.0 fps).

Auxiliary Water Supply System: Fish pump 1 is awaiting installation. The estimated repair date has been extended and is now the end of May. Presently, fish pumps 2 and 3 are in operation. 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 on shore. Efforts are underway to have it repaired. Woody debris in the immediate forebay was estimated between 1,500 to 5,200 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: Drawdowns were performed on units 1-4 on May 19. All results met criteria.

Orifices, Collection Channel, Dewatering Structure, and Flume: The juvenile bypass system is presently operating 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 some time.

Transportation Facility: Sampling is occurring every day and the JFF collected and transported fish by barge daily until May 25. The first every-other-day barge departure is scheduled for May 27.

Transport Summary: The collection and transportation facility operated within criteria this report period. A total of 110,771 fish were collected. The descaling and mortality rates were 1.3% and 0.07% respectively. This weekly report period saw 1 adult lamprey removed from the raceways 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
102.3	74.2	30.8	22.1	56.0	55.3	3.9	3.2

*Ladder temperature.

Other

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

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

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

Table 2. Daily Avian Counts at Little Goose Dam, May 20 - 26, 2016.

Date	Time (hours)	Gulls	Cormorants	Caspian Terns	Pelicans
May 20	0730	34	0	0	0
May 21	0715	23	0	0	0
May 22	1330	141	0	0	0
May 23	1330	112	8	0	0
May 24	0715	58	2	0	0
May 25	1110	57	0	0	0
May 26	0700	50	0	0	0

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

Gas Bubble Trauma: GBT examinations were performed on May 23. No signs of GBT were seen.

Research: The FGE (Fish Guidance Efficiency) emergency gate closure study is in progress on units 2 and 3 for the 2016 season.

Project: Lower Granite
Biologists: Elizabeth Holdren, Robert Horal
Dates: May 20 – 26, 2016

Turbine Operation

Units are being operated within the hard constraint 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 in February 2017. Units 2, 3, 4, 5, and 6 were rotated out of service May 21 and 22 for VBS inspections. Unit 4 was taken out of service May 23 at 0839 hours for brush gear cleaning due to a field ground. Unit 4 returned to service the same day at 1527 hours.

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. This week, contractors installed a new program in the control system. The system remained in automatic mode this week for continued evaluation. Adult fish facilities were inspected by Corps or Anchor QEA biologists on May 20, 21, 22, and 25.

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 1.0 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 7.1', 6.4', 6.8', and 6.0 feet. Control system and physical reading continue to be inconstant. 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 except a 6.9 foot reading on May 25. 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 2 clipped yearling Chinook on May 21.

Collection Channel Velocity: The average collection channel 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. Auxiliary water supply pumps 2 and 3 were off line on May 26 from 1356 hours to 1411 hours due to contractors pushing a wire cart into the main control breaker, tripping station service power off line.

Fish Ladder Temperature Control System: N/A.

Juvenile Fish Passage Facility

Forebay Debris/Gatewell Debris/Oil: An average of about 11.8 square yards of debris was observed in the forebay this week.

ESBSs/VBSs: ESBSs were inspected May 21 and 22. No reportable issues were observed.

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 fish on May 24.

Transport Summary: Daily barge transport continued until May 25. No barge transport took place on May 26. Every other day fish transport by barge will begin May 27.

River Conditions

Routine 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
107.0	76.6	20.5	20.3	57.2	52.5	4.1	3.4

*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 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 20	1402	2	0	0	2
May 21	1300	6	0	0	0
May 22	0928	6	0	0	0
May 23	1209	4	1	0	2
May 24	1443	0	0	0	10
May 25	1406	0	0	0	7
May 26	1241	1	0	0	1

GBT: Gas bubble trauma sampling occurred May 26. 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 sound vibration study.

Fish Rescue Operation: No fish rescue 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.