U.S. ARMY CORPS OF ENGINEERS
WALLA WALLA DISTRICT
FISH FACILITIES WEEKLY REPORT
#08-2016

Project: McNary
Biologist: Bobby Johnson and Denise Griffith
Dates: April 15 - 21, 2016

Turbine Operation

McNary had available 12 to 14 units (out of 14 total units) for power generation this week. Turbine unit outages are recorded in Table 1 below. The hard 1 percent peak efficiency constraint criteria began April 1. No turbine units ran outside the constraint.

Table 1. Unit Outages at McNary Project.

Units	Outage Dates	Outage Length	Reason
3 & 4	Apr 18–20	2.3 days.	Bus connection related to station service upgrades contract.

Adult Fish Passage Facilities

The McNary fisheries biologist performed measured inspections of the adult fishways on April 18, 20 and 21. Fisheries technicians monitored the ladders as shifts allowed. Adult fish counts resumed April 1.

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

In the Washington exit area, debris loads remained heavy. The debris was mostly tumbleweeds. Picketed leads were cleaned as required, including over the weekend. The operators cleaned the leads on April 17 after a technician reported the count station differential at 0.7 feet. A log was removed from tilting weir 335 on April 18. The count station window brush was repaired on April 18. A rattlesnake was removed from the navigation lock restroom the fish counters use on April 21. The set point for all tilting weirs was adjusted on April 21.

At the Oregon exit, debris loads were minimal. A technician found the tilting weirs out of sequence on April 15. The operators immediately reset the exit. The regulating weir tripped an alarm and was reset on April 18. The regulating weir set point was adjusted on April 15, 18 and 21.

Oregon exit traveling screen differential monitoring revealed no problems.

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

At the Washington ladder, all inspection points were in criteria.

At the Oregon south powerhouse entrance, weir SFEW1 measured 7.9 feet in depth on April 18 and 20. Weir SFEW2 measured 7.9 feet in depth on April 18. Higher tailwater elevations possibly contributed to these readings.

All other Oregon ladder inspection points were in criteria. However, on April 21, at 1848 hours, the north entrance pool tailwater sensor failed, triggering an alarm. The operator switched the entrances to manual mode in order to maintain criteria. On April 22, at 0955 hours, the electrical staff completed installing and testing a new sensor.

Collection channel surface velocities averaged 1.8 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.

Two of the three Oregon ladder fish pumps operated satisfactorily with one interruption in service this week. On April 15, from 0942 to 1002 hours, the pumps were out of service to allow switching to another electrical bus. Both operated with blade angles of 25 degrees. Fish pump 2 is currently under contract for major overhaul with completion scheduled for September 2016.

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 was one deviation in the schedule. On April 19, from 1533 to 1543 hours, the system was switched into and out of secondary bypass twice for technician training. The sample gates remained off. Secondary bypass occurred on April 16, 18 and 20. This week, 4,825 juvenile lamprey and 195,301 smolts were bypassed.

Forebay Debris/Gatewell Debris/Oil: The forebay debris load remained heavy, consisting mostly of woody material. The quantity of new incoming debris along the powerhouse remained light. Some debris is going over the top spillway weirs (TSWs). However, the operators recorded flushing large numbers of tumbleweeds through the navigation lock from April 19 to April 21.

No high trash rack differential measurements were recorded this week.

No problems were observed in the gatewell slots. Woody material was removed from the gatewell slots.

Extended-length submersible bar screens (ESBSs)/Vertical Barrier Screen (VBSs): ESBSs are deployed in all units. ESBS camera inspections will begin in mid-May. The ESBS in slot 12C remains in timer mode.

VBS differential monitoring revealed no screens out of criteria. However, the screen in slot 6A was cleaned on April 21. One smolt mortality was noted. VBS rehabilitations continued.

Orifices, Collection Channel, Dewatering Structure, and Bypass Pipe: Forty two orifices were in use. Orifice valve actuator rehabilitations continue.

All systems functioned satisfactory in automatic mode.

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

The sample gates are turned on and off every other day so that they are in service only during secondary bypass. The gates and all 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.

Woody material was prevalent throughout the system.

The A-side sample tank anesthesia chamber release valve oil reservoir was replaced on April 21.

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. This week, due to flow in excess of powerhouse capacity, 44 to 52 percent of flow was spilled. On April 21, the spillbay 5 hoist motor was replaced. The hoist was out of service for six hours. The bay was open and the spill pattern remained in criteria.

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
324.8	293.7	160.0	128.0	51.6	50.2	4.9	4.2

Other

Inline Cooling Water Strainers: The next cooling water strainer examinations will occur May 3.

Invasive Species: The next mussel station examinations will occur in late April.

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
Apr 15	Forebay	0	0	0	0	0
	Spill	12	4	0	1	0
	Powerhouse	0	0	0	0	0
	Outfall	1	4	0	1	0
Apr 16	Forebay	0	0	0	0	1
	Spill	5	0	0	0	0
	Powerhouse	0	0	0	0	0
	Outfall	0	0	0	0	0
Apr 17	Forebay	3	0	0	0	1
	Spill	3	0	0	0	0
	Powerhouse	0	0	0	0	0
	Outfall	0	0	0	0	0
Apr 18	Forebay	2	0	0	0	0
	Spill	30	0	0	0	0
	Powerhouse	0	0	0	0	0
	Outfall	15	1	0	0	0
Apr 19	Forebay	0	0	0	0	1
	Spill	28	0	0	0	0
	Powerhouse	0	0	0	0	0
	Outfall	10	0	0	0	0
Apr 20	Forebay	0	0	0	0	0
	Spill	1	0	0	0	0
	Powerhouse	0	0	0	0	0
	Outfall	0	0	0	0	0
Apr 21	Forebay	3	2	0	0	4
	Spill	23	0	0	0	0
	Powerhouse	0	0	0	0	0
	Outfall	2	0	0	0	0

Gulls were observed feeding in the spill zone and occasionally at the bypass outfall. The inverted sprinklers at the outfall appear to be affecting feeding patterns so far. Birds were observed in the other zones but not in great numbers. Ospreys, blue herons, and loons 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.

United States Department of Agriculture – Animal and Plant Health Inspection Service – Wildlife Services (USDA–APHIS–WS) hazing personnel began a second shift on April 17. Boat hazing began on April 18 and will occur three days a week.

The bypass outfall sprinklers have been functioning satisfactory. The sprinklers' supply pump intake is being cleaned twice a week. However, the pump appears to be losing prime. On April 21, from 0900 to 1645 hours, the pump was taken out of service for examination of the lower check valve. No problems were found. It was determined the new inverted sprinklers are at a lower elevation which is allowing the pump to lose prime when off. The pump will be left on until the sprinkler heads can be raised.

Research

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

USGS Research: A United States Geological Survey fisheries biologist began weekly non-lethal smolt stomach content examinations on April 19. Thirty-seven yearling Chinook, one steelhead and one sockeye smolt were examined.

Project: Ice Harbor
Biologist: Ken Fone
Dates: April 15 - 21, 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. The other units were taken out of service one at a time for STS inspections on April 19 and 20.

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

Adult Fish Passage Facilities

Fish facility personnel inspected the adult fishways on April 18, 20, and 21.

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

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

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

Auxiliary Water Supply (AWS) System: Two of the three north shore AWS pumps were operated during the week. Six of the eight south shore AWS pumps were operated throughout the week. South shore AWS pump 1 was out of service from 0736 hours to 0829 hours on April 18 to replace a broken conduit.

Juvenile Fish Passage Facility

Forebay Debris/Gatewell Debris/Oil: There was approximately 12 square yards of debris observed in the forebay. The surface debris coverage in each gatewell slot ranged from 0% to 14%. Oil sheens were observed in 5A and 5C gatewell slots during the week. Oil absorbent

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

STSs/VBSs: The STSs are operating in cycle run mode. The STS for slot 5B has not been installed yet to facilitate the work on unit 5. Units 1, 2, 3, 4, and 6 STSs were inspected on April 19 and 20. There were no problems found.

Orifices, Collection Channel, Dewatering Structure, and Bypass Pipe: The juvenile fish bypass is operating with 20 to 21 orifices open. The orifices in unit 5 gatewell slots have been closed since the start of the season, because unit 5 has been out of service. The avian abatement hydrocannon at the end of the outfall pipe has been out of service this season due to a leaking expansion joint in the hydrocannon water line. A replacement expansion joint is being ordered.

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 the next page).

April 18:

Species	Sampled	#Descaled	Morts	Avian Marks
C-CH	58	0	0	1
UC-CH	42	0	0	0
C-CH-O	0	---	---	---
UC-CH-O	0	---	---	---
C-SH	18	0	0	0
UC-SH	5	0	0	0
C-COHO	0	---	---	---
UC-COHO	0	---	---	---
C-SOCK	0	---	---	---
UC-SOCK	0	---	---	---
TOTAL	123	0	0	1

April 21:

Species	Sampled	#Descaled	Morts	Avian Marks
C-CH	58	0	0	0
UC-CH	40	0	0	0
C-CH-O	0	---	---	---
UC-CH-O	0	---	---	---
C-SH	27	0	0	2
UC-SH	4	0	0	0
C-COHO	0	---	---	---
UC-COHO	0	---	---	---
C-SOCK	0	---	---	---
UC-SOCK	0	---	---	---
TOTAL	129	0	0	2

Removable Spillway Weir: Spill for fish passage began on April 3 at midnight. The RSW is operating normally.

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* (°F)		Water Clarity (Secchi disk - feet)	
High	Low	High	Low	High	Low	High	Low
107.5	90.8	67.4	45.6	53.0	52.0	6.2	4.7

*Unit 1 scroll case temperature.

Other

Inline Cooling Water Strainers: Monthly turbine cooling water strainer inspections occurred on April 19 and 20. A total of 1 unclipped juvenile Chinook and 4 juvenile lamprey (all mortalities) were found.

Invasive Species: No new exotic species have been found.

Avian Activity: The numbers of gulls, cormorants, and pelicans observed around the project (Table 3 below) increased from last week. Beginning April 1, contracted land-based hazing of piscivorous birds occurred for 8 hours per day, changing to 16 hours per day starting on April 10. Boat-based hazing began on April 10 for 8 hours per day, 3 days per week. The hazing was generally effective at keeping birds out of the zones immediately adjacent to the dam, including the fish bypass outfall pipe.

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

Date	Gulls	Cormorants	Caspian Terns	Grebes	Pelicans
April 15	7	31	0	0	15
April 16	5	12	0	0	2
April 17	12	55	0	0	20
April 18	10	32	0	0	0
April 19	74	36	0	0	22
April 20	20	36	0	0	3
April 21	53	43	0	0	11

Research: On April 21, NOAA Fisheries researchers began taking tissue samples weekly from clipped juvenile Chinook to study how the physiological condition of smolts is related to their delayed mortality.

Project: Lower Monumental
Biologists: Bill Spurgeon and Raymond Addis
Dates: April 15 - 21, 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 April 15, 16, 17 and 20.

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 with the exception of the 16 April inspection; readings of 7.4 and 7.5 feet respectively. The operator was informed at 1500 on 16 April. They found that part of the system was no longer in automatic mode. The system was adjusted and was found back in criteria when checked by fish facility personnel at 1630 hours on 16 April. North shore channel/tailwater head was in criteria (1'-2') on all inspections.

SPE1 and SPE2 weir gates were in depth criteria (criteria: ≥ 8' or on sill) on all inspections with the exception of the 16 April inspections; reading of 6.7 feet on both. The operator was informed at 1500 hours on 16 April, found the automatic system not working correctly and positioned SPE1 and SPE2 at sill. South powerhouse channel/tailwater head was in criteria (1'-2') on all inspections.

SSE1 weir gate was in depth criteria (criteria: ≥ 8' or on sill) on all inspections.

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 40 square yards of forebay debris observed during this period. No oil was observed in gatewells.

STSs/VBSs: STSs are operating in cycle-run mode. STS inspections are scheduled for May 3-5.

Orifices, Collection Channel, Dewatering Structure, Flume: The collection channel was operated with 20 orifices open. Orifice 31 was found open without an attraction light on April 15. The operator was informed and switched to orifice 32.

Collection Facility: Alternate day twenty-four hour condition sampling began on April 15.

Transport Summary: Collection for transport will begin May 1 at 0700 hours.

River Conditions

Routine spring spill in support of fish passage was initiated at 0001 hours on April 3. 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
101.8	85.5	28.6	26.5	52.4	52.0	3.8	2.2

*Scrollcase temperatures.

Other

Inline Cooling Water Strainers: Cooling water strainers were inspected on April 5. There were no live fish recovered. Mortalities included 51 juvenile lamprey.

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

Avian Activity: Gulls and cormorants were the dominant piscivorous bird species observed during fish ladder inspections this week.

Research: No onsite research is in progress at this time.

Project: Little Goose
Biologist: Richard Weis
Dates: April 15 - 21, 2016

Turbine Operation

All turbine units were available for service this week except units 3 and 5. Unit 5 was placed out of service on April 04 at 0700 hours, to inspect for rotor cracks. Unit 3 was forced out of service due to a screen cleaner brush electrical fault on April 19. Unit 3 returned to service on April 20 at 1515 hours. 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 April 17, 19 and 21.

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

Fishway Entrances and Collection Channel: Channel to tailwater head differentials ranged between 1.1 and 1.8 feet (criteria 1.0 to 2.0 ft.). SSE weir depths ranged between 8.1 and 8.8 feet (criteria $\geq$ 8.0 ft). NPE weir depths ranged between 6.0 and 6.5 feet (criteria $\geq$7.0 ft.) and were on sill. NSE weir depths ranged between 4.6 to 5.7 feet (criteria $\geq$ 6.0 ft.) and were on sill. Collection channel surface water velocity measured at the North powerhouse ranged between 1.6 and 1.9 fps (criteria 1.5 to 4.0 fps).

Auxiliary Water Supply System: Fish pump 1 is still awaiting installation. Presently fish pump 2 and 3 are in service. Water velocity measurements at the north Powerhouse using the Rickly velocity equipment was not conducted this week.

Juvenile Fish Passage Facility

Forebay Debris/Gatewell Debris/Oil: The trash/shear boom is currently still on shore. Efforts are underway to have it repaired. Woody debris in the immediate forebay was estimated between 2,400 to 2,600 square feet.

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

ESBS/VBS: On April 19, electrical tests were performed on all fish screens. Fish screen 3C was found with no power. Electricians found an electrical fault in the screen and the unit was placed out of service.

Orifices, Collection Channel, Dewatering Structure, and Flume: The juvenile bypass system is presently running with 21 open orifices in secondary by-pass mode.

Transportation Facility: Sampling began on Saturday, April 9 and continues on odd numbered days this month. The juvenile fish facility is presently running in secondary by-pass mode.

Transport Summary: The collection and transportation facility operated within criteria this report period. A total of 552,161 fish were bypassed for just 3 days of sampling. The descaling and mortality rates were 0.3% and 0.0% respectively. This weekly report period saw 0 adult lamprey removed from sample and released in the tailrace. Fish transport will begin May 02. Collection for transportation begins May 01.

River Conditions

River conditions during the week are outlined in Table 1.

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
102.5	87.3	30.9	26.3	52.0	50.3	3.8	2.8

*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 is scheduled for inspection in late April.

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

Date	Time (hours)	Gulls	Cormorants	Caspian Terns	Pelicans
April 15	1245	60	8	6	0
April 16	1110	83	24	0	0
April 17	0700	84	37	0	0
April 18	1530	83	8	0	0
April 19	0640	85	9	0	0
April 20	1115	42	4	0	0
April 21	1130	118	9	0	0

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

Research: No onsite research is in progress at this time.

Project: Lower Granite
Biologists: Elizabeth Holdren, Robert Horal
Dates: April 15 - 21, 2016

Turbine Operation

All units are being operated within hard constraint 1% peak efficiency criteria. Unit 1 was removed from service April 12 for Kaplan blade linkage repair and is expected return to service February 18, 2017. Unit 6 was out of service from 0200 to 0955 hours on April 17 due to exciter failure.

Adult Fish Passage Facility

The automatic fish ladder control system was upgraded during the winter maintenance outage. Ongoing adjustments to the automatic control system are being made to address internal functioning errors in the programs. Feat Engineering and a consultant software engineer from Go-Tek installed a new PLC control program and modified the Factory Talk screens and tags in the control room March 29. Problems with the system continue. 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 manual mode until programmers return to make adjustments. At 1702 hours on April 18, the contractors lowered tail-water sensors 3.5 feet and returned the control system to auto mode. At 1510 hours April 20 all gate were again returned to local mode due to system functioning errors. Adult fish facilities were inspected by Corps or Anchor QEA biologists on April 15, 16, 17, and 20.

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 1.5 square yards of debris was observed near the fish ladder exit.

Fishway 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 inspection. While on sill, the gate depths were 7.3', 6.9', 6.2', and 6.4 feet. At 1030 hours on April 20, NPE1 and NPE2 were found to have slack cables. Both gates were adjusted to bring the cable to sill elevation of 628.0 feet and left in local mode. Slack can lead to cables spooling and overall gate failure. Corps biologists continued monitoring all gates.

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').

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. The return to service of pump 1 is pending bulkhead installation.

Fish Ladder Temperature Control System: N/A.

Juvenile Fish Passage Facility

Forebay Debris/Gatewell Debris/Oil: An average of about 16.3 square yards of debris was observed in the forebay this week.

ESBSs/VBSs: ESBSs and VBS are scheduled to be inspected in late April.

Orifices, Collection Channel, Dewatering Structure, Bypass Pipe: The collection channel is in operation with no problems reported. Orifices are being cycled every three hours.

Collection Facility: The collection facility is in secondary bypass mode. Daily condition sampling is occurring. Fish were collected April 18 and 19 for NOAA's in river survival study.

Transport Summary: Fish transport is not occurring at this time.

River Conditions

Spring spill 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
106.0	89.7	20.4	20.3	52.0	48.4	4.7	3.0

*Cooling water intake temperature.

Other

NSE Collection Channel Walkway: Fish have been found stranded on the NSE collection channel walkway due to the combination of increased river flows, the close proximity to the spill, and a strong upstream wind. Mortalities included 1 subyearling Chinook fry, 10 sandrollers, and 1 peamouth on April 16, and 5 sandrollers on April 20.

Inline Cooling Water Strainers: Unit cooling water strainers were inspected April 21. No live lamprey were recovered. Mortalities included 361 juvenile lamprey. No juvenile salmonids or incidental species were recovered.

Invasive Species: Zebra/quagga mussel substrate was inspected April 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. There were 24 pelicans observed on the island 2.5 miles below Lower Granite April 16. 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
April 15	1548	5	0	0	0
April 16	1315	2	0	0	0
April 17	0900	1	0	0	0
April 18	1235	2	0	0	0
April 19	1555	14	0	0	1
April 20	0845	8	0	0	0
April 21	1400	5	0	0	0

GBT: Gas bubble trauma sampling occurred April 21. No signs of gas bubble trauma were seen.

Adult Fish Trap Operations: The trap sample rate was changed April 14 at 1400 hours to 27% daily trap rate M-F (19% overall). The adult trap diversion gate in the turn pool area is changed to the ladder passage position from 1400 hours Friday to 1300 hours Sunday to facilitate sound vibration study.

Fish Rescue Operation: No fish rescues occurred this week.

Research

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

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

National Marine Fisheries Service (NMFS)-Monitoring the Migrations of Wild Snake River Spring/Summer Chinook: This study is monitoring the migration behavior and survival of wild spring/summer Chinook salmon. The specific goals are to characterize the migration timing and estimate parr-to-smolt survival to LGR of wild Chinook populations as they migrate from their natal rearing areas and determine migration patterns and what environmental factors influence those patterns. Fish were PIT-tagged during the summer of 2015 in natal streams and are diverted to the Sort-By-Code tanks at LGR.

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

Northwest Fisheries Science Center (NMFS) Columbia Basin Research University of Washington "Within-season indicators of fish condition related to differential delayed mortality" Smolt to Adult Survival Rates and Delayed Mortalities: NMFS 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 staff are collecting stomach contents through lavage or dissection from sacrificed fish for USGS for dietary evaluation. Up to 900 subyearling Chinook will be PIT tagged and release into the Lower Granite bypass facility to evaluate 8mm PIT tag detection efficiency.