**U.S. ARMY CORPS OF ENGINEERS**
**WALLA WALLA DISTRICT**
**FISH FACILITIES WEEKLY REPORT**
**#19-2016**

**Project: McNary**
Biologists: Bobby Johnson and Denise Griffith
Dates: July 1 - 7, 2016

## Turbine Operation

McNary had available 14 units (out of 14 total units) for power generation. 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. The saw tooth unit priority for warm water temperature abatement began on July 2 at 1026 hours. The wet lab sample trough temperature had reached 67.8 degrees Fahrenheit at 0700 hours that morning. The saw tooth unit pattern is initiated at 68 degrees.

Table 1. Unit Outages at McNary Project.

| Units | Outage Dates | Outage Length | Reason |
|---|---|---|---|
| 12 thru 14 | Jul 5 | 1.4 hours total. | Extended-length submersible bar screen (ESBS) camera inspections. |
| 6 | Jul 6 | 6.6 hours. | Hub tapped. |

## Adult Fish Passage Facilities

McNary fisheries biologists performed measured inspections of the adult fishways on July 1, 3 and 5. Fisheries technicians monitored the ladders as shifts allowed. Adult salmonid fish counts, adult lamprey video monitoring and ladder water temperature monitoring continued.

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.

At the Washington exit, the regulating weir tripped an alarm and was reset on July 1.

At the Oregon exit, the regulating and tilting weirs set points were adjusted on July 3 and 5.

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.

Both ladders met all inspection point 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 is scheduled for completion in October. 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 24 degrees. Fish pump 2 is currently under contract for major overhaul with completion scheduled for mid-November.

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 July 5 from 1505 to 1515 hours for an inspection of the A and B secondary bypass lines junction. No problems were found. One sample was missed on the B side.

Secondary bypass occurred on July 1, 3, 5 and 7. This week, 200 juvenile lamprey and 296,602 smolts were bypassed.

Forebay Debris/Gatewell Debris/Oil: Forebay debris loads remained very light to minimal. Most of the debris was along the Oregon shore. The debris consisted 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.

A five gallon bucket lid was removed from slot 8C. No other problems were observed in the gatewell slots.

ESBSs/Vertical Barrier Screen (VBSs): ESBSs are deployed in all units. ESBS camera inspections occurred in units 12 through 14 on July 5. No problems were found. The ESBSs in slots 6B and 12C remained in timer mode. However, the screen in slot 12C appeared to come out of timer mode when the unit was returned to service. The electrical staff will examine the screen program.

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. A partial blockage was removed from the orifice in slot 10B on July 1. No injured fish or mortalities were noted.

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 systems functioned well. The sample gates are turned on and off every other day so that they are in service only during secondary bypass. The PIT tag sample gates remained turned off. The facility bypass lines provide a superior route for the fish over the PIT tag sample release lines downstream of the PIT tag sample gates.

Algae removal throughout the facility continued.

## River Conditions

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

Temperature monitoring continued. The probe in gatewell slot 8B failed on July 2, which was noted on July 6. It was also determined that day that many of the probes had been calibrated improperly. All probes were removed, batteries were checked and recalibration was begun immediately. No data was recorded for July 7. All probes were redeployed on July 7 and 8 except for the probe located at the navigation lock wing wall. A new probe was ordered to replace that one that had failed. Anchor QEA continues to 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 slated for spill.

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 |
| 200.0 | 165.5 | 100.0 | 82.7 | 67.8 | 67.0 | 6.0 | 6.0 |

## Other

Inline Cooling Water Strainers: Cooling water strainer examinations occurred on July 5. Six juvenile lamprey mortalities were removed. Seventy-three subyearling Chinook mortalities were also removed, 72 of which came from units 1 and 14.

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

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 |
|---|---|---|---|---|---|---|
| Jul 1 | Forebay | 0 | 1 | 0 | 1 | 9 |
| | Spill | 0 | 0 | 15 | 6 | 0 |
| | Powerhouse | 0 | 0 | 2 | 0 | 0 |
| | Outfall | 0 | 0 | 1 | 8 | 0 |
| Jul 2 | Forebay | 0 | 7 | 0 | 0 | 5 |
| | Spill | 2 | 4 | 53 | 18 | 0 |
| | Powerhouse | 0 | 0 | 7 | 0 | 0 |
| | Outfall | 4 | 3 | 0 | 5 | 0 |
| Jul 3 | Forebay | 0 | 0 | 0 | 0 | 6 |
| | Spill | 0 | 3 | 75 | 22 | 0 |
| | Powerhouse | 0 | 0 | 27 | 4 | 0 |
| | Outfall | 0 | 11 | 0 | 9 | 0 |
| Ju1 4 | Forebay | 0 | 0 | 0 | 2 | 0 |
| | Spill | 1 | 9 | 12 | 2 | 0 |
| | Powerhouse | 0 | 0 | 4 | 1 | 0 |
| | Outfall | 1 | 7 | 0 | 3 | 0 |
| Jul 5 | Forebay | 0 | 0 | 1 | 1 | 15 |
| | Spill | 0 | 1 | 11 | 11 | 0 |
| | Powerhouse | 0 | 0 | 5 | 5 | 0 |
| | Outfall | 0 | 13 | 3 | 4 | 0 |
| Jul 6 | Forebay | 1 | 0 | 0 | 1 | 21 |
| | Spill | 0 | 1 | 3 | 13 | 0 |
| | Powerhouse | 0 | 0 | 2 | 1 | 0 |
| | Outfall | 0 | 0 | 0 | 0 | 0 |
| Jul 7 | Forebay | 0 | 0 | 0 | 0 | 16 |
| | Spill | 0 | 1 | 11 | 10 | 0 |
| | Powerhouse | 0 | 0 | 4 | 1 | 0 |
| | Outfall | 0 | 6 | 0 | 5 | 0 |

Gull numbers remained low. Caspian tern numbers remained stable as they continued to feed in the spill, powerhouse and bypass outfall zones. Pelicans and cormorants continued to feed at the bypass outfall. Cormorant numbers have increased slightly. 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 and were observed inside the Oregon ladder exit on July 3. Grebe numbers fluctuated in the forebay. 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. The last day for the second shift is July 9. Boat hazing occurred twice this week. No boat hazing occurred July 1 due to illness. Boat hazing will conclude July 8.

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. An air stone was added to the new GBT chiller tank on July 3.

**Project: Ice Harbor**
Biologist: Ken Fone
Dates: July 1 - 7, 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 at the generator bus ground. The stator is being repaired to fix the problem.

Units are being operated within the 1% peak efficiency range (hard constraint), except for unit 3. Unit 3 is sometimes being operated a few megawatts below the peak efficiency range, due to the GDACS program needing to be updated with the narrower operating range of unit 3 since it became a fixed-blade unit.

## Adult Fish Passage Facilities

Fish facility personnel inspected the adult fishways on July 5, 6, and 7.

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 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 20%. The maintenance bulkhead was removed from gatewell slot 5B and installed into slot 2C on July 5 to facilitate the unit 2 head gate sill plate repair. Gatewell 2C was dipped for fish on July 6, prior to unwatering the slot. No fish were recovered.

STSs/VBSs: The STSs have been in continuous run mode since May 3, due to the presence of sockeye or subyearling Chinook in the Ice Harbor and/or Lower Monumental samples with average fork lengths under 120 mm. The STS for slot 5B remains uninstalled to facilitate the work on unit 5. Unit 2 STSs are in raised positions 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. The next monthly STS inspections are scheduled for the week of July 18.

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.

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. There were 3 subyearling Chinook mortalities encountered during sampling operations on July 7. These fish were most likely dead or dying when they came into the separator. One of the fish exhibited external symptoms of bacterial kidney disease and another fish had ventral scrapes and lacerations that could possibly be caused by a fish bite. The third fish did not exhibit any external signs of diseases or injuries.

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

July 4:

| Species | Sampled | #Descaled | Morts | Avian Marks |
|---|---|---|---|---|
| C-CH | 0 | --- | --- | --- |
| UC-CH | 0 | --- | --- | --- |
| C-CH-O | 18 | 0 | 0 | 0 |
| UC-CH-O | 36 | 0 | 0 | 0 |
| C-SH | 3 | 1 | 0 | 0 |
| UC-SH | 0 | --- | --- | --- |
| C-COHO | 0 | --- | --- | --- |
| UC-COHO | 0 | --- | --- | --- |
| C-SOCK | 0 | --- | --- | --- |
| UC-SOCK | 0 | --- | --- | --- |
| TOTAL | 57 | 1 | 0 | 0 |

July 7:

| Species | Sampled | #Descaled | Morts | Avian Marks |
|---|---|---|---|---|
| C-CH | 0 | --- | --- | --- |
| UC-CH | 0 | --- | --- | --- |
| C-CH-O | 24 | 0 | 1 | 0 |
| UC-CH-O | 66 | 0 | 2 | 0 |
| C-SH | 0 | --- | --- | --- |
| UC-SH | 0 | --- | --- | --- |
| C-COHO | 0 | --- | --- | --- |
| UC-COHO | 0 | --- | --- | --- |
| C-SOCK | 0 | --- | --- | --- |
| UC-SOCK | 0 | --- | --- | --- |
| TOTAL | 90 | 0 | 3 | 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 furrows 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 |
| 43.4 | 29.0 | 33.0 | 12.5 | 66.0 | 66.0 | 8.3 | 6.4 |

*Unit 1 scroll case temperature.

## Other

Inline Cooling Water Strainers: Turbine cooling water strainer inspections occurred on June 21 and 22. A total of 1 unclipped subyearling Chinook, 5 juvenile lamprey and 7 Siberian prawns (all mortalities) were found. The next monthly inspections are scheduled for the week of July 18

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 gulls and cormorants increased slightly from last week. Most of the gulls and pelicans were observed roosting on Eagle Island.

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

| Date | Gulls | Cormorants | Caspian Terns | Grebes | Pelicans |
|---|---|---|---|---|---|
| July 1 | --- | --- | --- | --- | --- |
| July 2 | --- | --- | --- | --- | --- |
| July 3 | --- | --- | --- | --- | --- |
| July 4 | 33 | 14 | 0 | 0 | 18 |
| July 5 | 23 | 12 | 2 | 0 | 28 |
| July 6 | 12 | 13 | 1 | 0 | 32 |
| July 7 | 23 | 21 | 2 | 0 | 32 |

*Avian counts after July 1 are taken 4 days per week.

## Research

NOAA Fisheries: From April 21 to June 30, 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: From May 7 through early July, PNNL (Pacific Northwest National Laboratory) researchers conducted 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: July 1 - 7, 2016

## Turbine Operation

The units are being operated within the hard constraint the 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. Units 2, 3, 4, 5 and 6 were rotated out of service for STS/VBS inspections on July 5 and 6. Unit 2 was removed from service at 0658 hours on July 7 for a thrust bearing pressure switch change with an estimated return to service on July 8, 2016.

## Adult Fish Passage Facility

The adult fishway was inspected by Corps and Anchor QEA biologists on July 1, 2, 3 and 6.

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 5.6, 5.0, 5.7 and 5.0 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 6.4, 6.0, 6.5 and 5.9 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 due to a bushing problem and will be replaced with the spare fish pump as time permits.

## 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 - 15% surface coverage. No oil problems were observed in the gatewells.

STSs/VBSs: STSs were operated in continuous-run mode. STS/VBS inspections were conducted July 5 and 6 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-other-day fish transport continued. Daily fish transport by barge ended on May 25, followed by every-day fish transport on May 27. No fish were transported on May 26.

## River Conditions

Spring spill operations were 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, barge docking and loading operations. On June 28, spill gate 2 was removed from service at 1830 hours on due to a position indication failure; the estimated return to service is undetermined. The spill pattern was adjusted and regionally coordinated. 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 |
| 41.3 | 28.8 | 17.0 | 15.4 | 67.4 | 65.1 | 5.0 | 4.0 |

*Scrollcase temperatures.

## Other

Inline Cooling Water Strainers: Cooling water strainers were inspected on July 7. There were no live fish recovered. Mortalities included 1 juvenile lamprey, 3 juvenile salmon and 5 Siberian prawns.

Invasive Species: No zebra or quagga mussels were observed during monitoring station inspections on July 4.

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 |
|---|---|---|---|---|---|---|
| July 1 | 1100 | 1 | 0 | 0 | 0 | 0 |
| July 2 | 1100 | 5 | 0 | 0 | 0 | 0 |
| July 3 | 1100 | 7 | 1 | 0 | 0 | 0 |
| July 4 | 1100 | 6 | 0 | 0 | 0 | 0 |
| July 5 | 1100 | 18 | 0 | 0 | 0 | 0 |
| July 6 | 1100 | 17 | 0 | 0 | 0 | 0 |
| July 7 | 1110 | 13 | 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**
Biologists: Richard Weis
Dates: July 1 - 7, 2016

## Turbine Operation

All turbine units were available for service this week except unit 5. Unit 5 was placed out of service for annual inspection on July 05. 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 remain in manual mode until repairs can be made.

Adult fishway inspections were performed on July 03, 05 and 07.

Fish Ladder: The ladder exit head differentials held steady at 0 feet (criteria ≤ 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 ≤ 0.3 ft.). The air bubbler used to prevent debris from collecting near the ladder exit operated satisfactorily. Installation of the emergency cooling water pumps began June 27. These pumps were "switched on" at 1100 hours on July 01.

Fishway Entrances and Collection Channel: Channel to tailwater head differentials ranged between 1.2 and 1.9 feet (criteria 1.0 to 2.0 ft.). SSE weir depths ranged between 7.9 and 8.4 feet (criteria ≥ 8.0 ft. or on sill). NPE weir depths ranged between 5.3 and 5.8 feet (criteria ≥7.0 ft. or on sill) and were on sill. NSE weir depths ranged between 4.5 to 4.8 feet (criteria ≥ 6.0 ft.) and were on sill. Collection channel surface water velocity measured at the north powerhouse ranged between 1.7 and 2.0 fps (criteria 1.5 to 4.0 fps).

Auxiliary Water Supply System: Fish pump 1 is being serviced. The estimated repair date has been extended again. 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 0 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 configured to the high crest position on May 26.

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

Orifices, Collection Channel, Dewatering Structure, and Flume: The juvenile bypass system is presently running with 22 open orifices. The number of opened orifices compensate for the removal of the weir motor gear box. Presently flume water is not controllable except by the number of orifices open.

Transportation Facility: Sampling and collection is occurring every day with fish 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 51,480 fish were collected. The descaling and mortality rates were 0.9% and 0.4% respectively. This weekly report period saw 1 adult lamprey removed from the raceways or sample and released one mile above the dam at Little Goose Landing.

## 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 |
| 40.3 | 29.3 | 11.9 | 9.1 | 69.1 | 68.5 | 5.7 | 4.9 |

*Ladder temperature.

## Other

Inline Cooling Water Strainers: All turbine unit cooling water strainers were last inspected on June 15. No fish were seen.

Invasive Species: The zebra mussel substrate monitor was inspected July 02. No mussels were seen.

Avian Activity: Bird counts and hazing commenced on April 1. See Table 2 below for the daily count details.

Table 2. Daily Avian Counts at Little Goose Dam, July 1 - 7, 2016.

| Date | Time (hours) | Gulls | Cormorants | Caspian Terns | Pelicans |
|---|---|---|---|---|---|
| July 1 | 1030 | 53 | 4 | 0 | 1 |
| July 2 | 0730 | 40 | 3 | 0 | 2 |
| July 3 | 1200 | 62 | 10 | 0 | 0 |
| July 4 | 1330 | 80 | 11 | 0 | 1 |
| July 5 | 0945 | 58 | 5 | 0 | 0 |
| July 6 | 1035 | 52 | 8 | 0 | 0 |
| July 7 | 0800 | 12 | 2 | 0 | 0 |

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

Gas Bubble Trauma: GBT examinations were performed July 04. No signs of GBT were seen.

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

**Project: Lower Granite**
Biologists: Elizabeth Holdren and Robert Horal
Dates: July 1 – 7, 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 4 was taken out of service at 0600 hours on July 5 for annual maintenance and is scheduled to return to service on July 22.

## Adult Fish Passage Facility

Automatic control system adjustments to trouble shoot internal functioning errors in the program are ongoing. Fish ladder observations indicate that the installation of a new control program has improved system performance. The system remained in automatic mode during the week. On June 25, the control system was having difficulty reading the NSE and SSE channel water depth due to the tailwater elevation dropping to 633.0 feet. On June 29, control system contractors reported that the SSE channel water sensors need to be relocated. This problem is still ongoing. Adult fish facilities were inspected by Corps or Anchor QEA biologists on July 1, 2, 3, and 7.

Fish Ladder: Fish ladder exit head differentials and depths over the weirs were in criteria (≤0.5' and 1.0-1.3', respectively) on all inspections. Picketed lead head differentials also met criteria (≤ 0.3'). No 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 except for a 0.7 feet reading taken on July 7. This was likely due to the control system not being able to read the channel reading accurately.

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', 6.0', and 5.5 feet. The control system reading for NPE elevations fluctuated between 628.0 and 628.1 while the gates are actually on sill due to 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.

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

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

Fish Ladder Temperature Control System: Fish ladder temperature control pumps were turned on for the summer passage season at 1506 hours on June 9. From 1334 hours to 1600 hours on July 6, Fish Ladder Temperature cooling pumps 1 and 2 were shut off to allow for velocity mapping of the ladder exit and installation of fish monitoring equipment.

## Juvenile Fish Passage Facility

Forebay Debris/Gatewell Debris/Oil: No debris was observed in the forebay this week.

ESBSs/VBSs: ESBSs are scheduled to be inspected in late August.

Orifices, Collection Channel, Dewatering Structure, Bypass Pipe: The collection channel is operating with 18-20 orifices open. Orifices are being cycled every three hours. At 0710 hours on July 7, maintenance staff determined that the Lower Granite juvenile collection channel south shore makeup water valve had failed. The valve is not expected to be returned to service until repairs can be made during the winter in water work window. The valve is currently set/stuck with in the operating range at ~30% open. Orifice valves will continue being operated to adjust collection channel water elevation as needed. Operation of orifices will be adequate in place of the south make up water valve without significant risks to fish passage.

Collection Facility: The facility is in collection for transport mode. NMFS/UW researchers did not collect fish this week and are likely done for the season.

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

## River Conditions

Summer spill in support of fish passage began at 0005 hours on June 21. Due to increasing water temperatures, a flat spill pattern with the no RSW (Table LWG-9, Fish Passage Plan) was implemented at 1401 hours on June 29. 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 |
| 42.9 | 32.0 | 19.9 | 17.6 | 68.0 | 66.0 | 5.0+ | 5.0 |

*Cooling water intake temperature.

## Other

Inline Cooling Water Strainers: Unit cooling water strainers are scheduled for inspection in late July.

Invasive Species: The zebra/quagga mussel substrate was inspected July 3. 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 |
|---|---|---|---|---|---|
| July 1 | 0932 | 0 | 0 | 0 | 0 |
| July 2 | 1226 | 0 | 0 | 0 | 0 |
| July 3 | 0932 | 0 | 0 | 0 | 0 |
| July 4 | 1210 | 2 | 2 | 0 | 0 |
| July 5 | 1220 | 0 | 0 | 0 | 0 |
| July 6 | 1033 | 0 | 0 | 0 | 0 |
| July 7 | 1300 | 0 | 0 | 0 | 0 |

GBT: Gas bubble trauma sampling has concluded for the season.

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

Fish Rescue Operation: No fish rescues occurred this week.

## Research

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

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

Anchor QEA "Sound and Vibration Effects on Adult Fish Passage through the Lower Granite Ladder": The second year of monitoring for 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.