2022 Fish Passage Plan

Appendix D

Operations for Non-Listed Species (Lamprey, etc.)

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1. INTRODUCTION

This Appendix describes structural improvements and special operations for lamprey and other non-listed fish species that may pass a project via the juvenile or adult passage facilities. These operations are regionally coordinated with the Fish Passage Operations & Maintenance (FPOM) workgroup and supplement operations for ESA-listed salmonids described in the current *Fish Passage Plan* (FPP) [1].

2. BONNEVILLE DAM

2.1. Lamprey Passage Improvements

2.1.1. Several adult lamprey passage improvements have been made to Bonneville Dam fish ladders, including:

i) Bradford Island: In 2004, a Lamprey Passage System (LPS) was installed to the FV 3-9 AWS channel and expanded with PIT-tag detection in 2006. In 2011, counting improvements, including video verification at the exit flume and 1" picket lead spacers were added. In 2012, these spacers were upgraded and improved to ensure sufficient lamprey passage while not interfering with adult salmonid passage. In 2014, NOAA Fisheries installed a picket lead sill ramp and ¾" spaced picket leads in the crowder slot. The remaining picket leads were raised with new spacers to 1.5" off the sill.

ii) Cascades Island: In 2006, half-duplex PIT-tag detectors were installed along the picket leads to help track lamprey. In 2009, an LPS was installed with a bollard floor guidance path and a variable-width entrance weir. In 2013, the LPS was extended to allow fully volitional passage to the forebay with PIT-tag detection and video verification at the new exit, adjacent to FV 5-9.

iii) Washington Shore: In 2001, guidance plates were installed over the diffuser grates. In 2005, a lamprey ramp and trap box were installed at the North Downstream Entrance (NDE). In 2008, an LPS was added to the FV 6-9 AWS channel, similar to the LPS at the Bradford Island FV 3-9 AWS. In 2010, 1" picket lead spacers were installed to provide lamprey passage under the leads. Since 2010, Fish Unit output is reduced at night during lamprey passage season (June 1–August 31) in order to operate the Washington Shore ladder entrances at a head of 0.5 feet and encourage lamprey to enter (see **FPP Chapter 2 - Bonneville Dam, section 2.4.2.13**). In 2011, NOAA Fisheries installed a picket lead sill ramp as well as ¾" crowder picket leads in the crowder slot. In 2013, the picket lead spacers were modified to provide a 1.5" gap off the sill. Additionally, the NDE lamprey trap was removed and replaced with a Lamprey Flume System (LFS) for attraction and guidance from the NDE area to an LPS that terminates in a trap box on the +55 deck.

[1] The annual Fish Passage Plan (FPP) is available online at: http://pweb.crohms.org/tmt/documents/fpp/

2.2. Adult Lamprey Passage Facilities

2.2.1. Spillway. The Cascades Island ladder entrance is equipped with a variable-width weir entrance gate. This entrance is coupled with a bollard field on the ladder floor, leading to an LPS located in the entrance bay. This LPS bypasses the overflow weirs and provides a direct route to the forebay. This LPS is currently being converted into a fully volitional passage route with an exit directly into the forebay, adjacent to the Cascades Island fish ladder exit**.**

2.2.2. Powerhouse One (PH1): At the Bradford Island ladder, the FV 3-9 AWS channel is equipped with an LPS that allows lamprey to bypass the serpentine section of the ladder and exit directly into the forebay adjacent to the ladder exit. The picket leads that block passage of adult salmonids into the AWS channel are raised 1" off the ladder floor, allowing lamprey to pass under the leads and into the AWS channel.

2.2.3. Powerhouse Two (PH2). The Washington Shore ladder FV 6-9 AWS channel is equipped with an LPS that allows lamprey to bypass the serpentine section of the ladder and exit directly into the exit channel of the ladder. The picket leads that block passage of adult salmonids into the AWS channel are raised 1.5" off the ladder floor, allowing lamprey to pass under the leads and into the AWS channel.

2.3. Adult Lamprey Migration Timing and Counting

2.3.1. Adult lamprey migration season at Bonneville Dam is March 1–November 30 with the majority of the run passing in June and July. LPS maintenance is scheduled December 1 through the end of February.

2.3.2. Adult lamprey counting is conducted in conjunction with other adult fish counting. The count schedule for the current year is defined in **FPP Chapter 2 - Bonneville Dam**, **Table BON-3.** In addition to count window operations, each volitional passage LPS is equipped with a mechanical counting system and video verification in the exit sections.

2.4. Lamprey Passage System (LPS) Operation & Maintenance

2.4.1. Adequate water depth will be maintained in all LPS flumes for lamprey passage.

2.4.2. Dewatering. When adult lamprey are recovered during dewaterings, they will be transported and released into the Bonneville forebay whenever possible. Fish recovered during dewaterings, including lamprey, will not be held for other uses.

2.4.3. Cleaning Criteria. When water level in an LPS flume drops below the required level, the water supply pump intakes must be cleaned and debris removed.

2.4.4. Trapping. All LPSs are designed for volitional passage; however, LPSs may be temporarily set up with a trap box at the terminus while new potential locations are tested for usage by fish. These trap boxes are operated solely by research groups who are responsible for monitoring, handling, and transportation of lamprey from the boxes.

2.4.5. Water Temperature. Temperatures will be monitored in each LPS. When water temperature reaches 70°F, all fish handling activities will be coordinated through FPOM to verify protocols that will be followed prior to any action. Fish handling activities in the Adult Fish Facility (AFF) will implement protocols in **Appendix G – Adult Trap Protocols**.

2.4.6. Winter Maintenance Season. LPS maintenance will be scheduled from December 1 through the end of February, including: remove and winterize water supply pumps; inspect all pumps and repair/replace where necessary; power-spray flumes and rest boxes to remove excess algal growth and any debris; inspect all joints and re-caulk where necessary.

3. THE DALLES DAM

3.1. Adult Lamprey

3.1.1. Passage improvements were made in the east fish ladder by installing four orifice ramps to eliminate 90° edges. Several concrete 90° edges were also rounded with 2" radius. Picket leads were raised 1.5" for both north and east count stations. Steel plates for lamprey attachment substrate were installed in the lower 14 weir orifices. Weir caps have been added to all entrance weirs on both the east and north ladder.

3.2. Juvenile Lamprey

3.2.1. Data are being collected in the powerhouse turbine cooling water strainers for informational purposes. These data will not be available as the strainers are being replaced with self-cleaning mechanisms.

3.3. Dewatering Collections

3.3.1. Lamprey are collected and returned to the forebay during fishway dewaterings. Tribal restocking efforts collect lamprey from some dewaterings. These lamprey are held for no longer than 10 hours.

4. JOHN DAY DAM

4.1. Adult Lamprey Facility

4.1.1. The South Ladder Lamprey Trap was installed in the winter of 2013 behind the count station picketed leads of John Day Dam's south fish ladder.

4.1.2. Entrance modifications at the JDA north ladder (JDA-N) were completed in 2013 and included installation of a Lamprey Passage Structure (LPS) immediately upstream of the new variable-width weir. The LPS runs from the entrance to a trap box on the lower fish entrance deck. The trap box is operated by research groups, Tribes in support of Translocation, and when needed, USACE, depending on the year. The operating groups are responsible for monitoring, handling, and transportation of lamprey from the boxes.

4.2. General Facility Protocols

4.2.1. The following protocols will be implemented by agencies operating the trap in order to ensure safe access for personnel, minimize handling stress to lamprey, and reduce impacts to salmonids migrating past the trap. These protocols will be coordinated with fish agencies and tribes through FPOM.

4.2.2. Users must have appropriate documentation for conducting research at the dam, including valid state transportation permits and federal and/or tribal permits that cover species targeted during the trapping period. Users shall comply with all fish handling conditions in the permits. If permit conditions are more restrictive than the protocols herein, users must follow the more restrictive directive. The U.S. Army Corps of Engineers (Corps) reserves the right to terminate trapping operations at any time.

4.2.3. Hard hats, long pants or raingear, steel-toed shoes or rubber boots are to be worn at all times. Shorts, tennis shoes, or sandals will not be permitted when operating the trap.

4.2.4. Users must be trained in the proper operation of the jib crane and hoist prior to operating the equipment in order to ensure fish and personnel safety. Currently, the John Day Project Safety Office, in conjunction with the Project rigging crew, have offered to provide training. Users may request training through the John Day Project Biologists.

4.2.5. Undesired fish will be released back into the fish ladder. In the unfortunate event of mortalities, see reporting requirements below.

4.2.6. Researchers shall perform no maintenance on Corps owned/installed equipment. Please contact the on-duty Project Biologist or Biotech to alert them of any problems.

4.2.7. Users must use a cotton mesh net or water retaining refuge net large enough to safely handle the largest fish passing the project during the trapping period.

4.2.8. Fish ladder water temperatures should be measured and recorded upon arrival and departure. Transport water should be within 2°F of the fish ladder water temperature and provided with aeration or oxygenation when needed.

4.2.9. Upper Temperature Limit. Currently there is no published literature to guide the determination of an appropriate upper temperature limit, above which the trap should not be operated. Trapping data for John Day Dam from 2008-2012 (Aaron Jackson, CTUIR) indicated an average mortality rate of 0.8% within the temperature range of 14.8–22.8°C (58.6–73.0°F) and no relation between mortality and water temperature (WQM tailrace). Therefore, there is a need for trap operators to collect additional water temperature and mortality data to inform the determination of upper thermal limit.

4.3. Notification & Documentation

4.3.1. Users will sign in and out of at the Project Fisheries office and notify them when they set up and close down the trap.

4.3.2. Users will record the times the trap is lowered and raised and which agency they are representing on the sheet provided by the Project Biologists.

4.3.3. Lamprey may be held up in the juvenile fish facility for to 48 hours. Researchers will notify Project Fisheries and the Control Room whenever lamprey are held.

4.3.4. Users will scan all collected lamprey for full- and half-duplex PIT-tags and provide code information of previously tagged animals to appropriate Corps personnel and interested parties. Because of their research value, tagged fish must be returned to the forebay.

4.3.5. Any and all mortalities must be immediately reported to a Project Biologist. The Project Biologist will examine the mortality and should take photos and file a memorandum for the record (MFR). The researcher shall give a detailed report including:

i) Species;
ii) Origin;
iii) Length (cm);
iv) Weight (g);
v) Tags: recovery of radio or acoustic tags, scanning for full and half-duplex PIT-tags;
vi) Injuries;
vii) Cause and time of death or discovery;
viii) Future preventative measures.

4.3.6. All mortalities are included in the Project Fisheries weekly report submitted to FPOM.

4.3.7. When trapping is complete for the season, users will properly shut down the trap. For example the basket should be placed in pass through mode by removing the upstream side panel or removing the entire basket from the fishway.

5. NWW PROJECTS

5.1. Improvements for Lamprey

5.1.1. At all projects, horizontal slots were cut at the bottom of the stem walls in the upper section of the ladders to allow adult lamprey attachment along a level pathway through the weirs. Picketed leads were raised and secured 1.5” off the ladder floor at the count stations to enable adult lamprey passage through a low-velocity passage route under the picketed leads around the adult fish count slot.

5.1.2. In the McNary (Oregon shore), Ice Harbor, Little Goose, and Lower Granite fish ladders, plating was attached on the diffuser gratings adjacent to the submerged orifices just above tailwater.

5.1.3. At Ice Harbor and Lower Monumental dams, ramps were installed in some of the upper ladder weirs from the ladder floor to the bottom of elevated salmon orifices to assist lamprey in maintaining attachment as they maneuver through these areas.

5.1.4. Lamprey passage structures were installed at one of the south shore entrances of the Oregon fish ladder at McNary and the south shore fish ladder at Ice Harbor.

5.1.5. Lamprey-friendly raceway tailscreens were installed at all of the juvenile fish facilities that collect fish for transportation (Lower Granite, Little Goose, and Lower Monumental). These tailscreens allow collected juvenile lamprey to volitionally pass through the mesh and return to the river rather than be transported. At Lower Granite and Little Goose, the tailscreen wire mesh diameter is 1.6 mm (0.063") with an open width/height of 8.6 mm (0.337"), open diagonal dimension of 12.1 mm (0.477") and overall screen open area of 71.0%. Lower Monumental changed to a perforated plate tailscreen that can be cleaned with brushes without entangling lamprey. The plate is $^{1}/_{4}$" thick with 0.312" x 1.0" slots spaced $^{1}/_{4}$" apart oriented vertically in a side-staggered pattern.

5.1.6. At McNary, the overflow screens in the sample and PIT-tag holding tanks were changed from slotted to round-hole perforated plates. The plates are 1/8" thick with 1/8" staggered holes that are small enough so that lamprey do not get caught in them.

5.1.7. When the adult and juvenile fish facilities are unwatered for annual or periodic maintenance, all projects perform routine maintenance on lamprey passageways.

5.2. <u>Operations for Lamprey</u>

5.2.1. At McNary Dam, unit trash racks will be raked during the winter maintenance period prior to January 16 to minimize the potential for lamprey entanglement in built-up debris when river flow increases. See **FPP Chapter 7 (MCN), section 2.3.1.1**.

5.2.2. At McNary Dam, ESBSs will be installed and operating between April 2 and April 15 (about two weeks later than other NWW projects) to allow juvenile lamprey passage directly through turbines without bypass collection. See **FPP Chapter 7 (MCN), section 2.3.2.2**.

5.2.3. At Ice Harbor, Lower Monumental, Little Goose, and Lower Granite, fallback adult lamprey collected off fish separators and other areas of the juvenile fish facilities will be released into the forebay rather than being bypassed back into the tailrace or transported downstream.

5.2.4. Turbine cooling water strainer inspections will be conducted once per month from mid-December until mid-June at the four lower Snake River dams, and from mid-December to mid-July at McNary Dam. If 10 or more juvenile lamprey are collected during the last sample date in June/July, an additional month of inspections should be made.