Appendix D Project Operations for Non-ESA Listed Fish Species (Lamprey, etc.)

This appendix is intended to define FPOM-recommended special operations for species other than salmonids (e.g., lamprey) that may pass a project via the juvenile or adult passage facilities.

1. Lamprey

Below are project-specific changes to support improving lamprey survival that have been implemented annually since approved regionally through FPOM or FFDRWG.

1.1. Bonneville Dam

When adult lamprey are recovered during dewaterings, they will be transported and released into the BON forebay whenever possible. No fish, including lamprey, will be held for other uses when recovered during dewaterings.

Several adult lamprey passage improvements have been made to fish ladders at BON. In 2004, a Lamprey Passage System (LPS) was added at the Bradford Island ladder to the FV 3-9 AWS channel, and received an expansion and PIT-tag detection in 2006. Counting improvements, including video verification at the exit flume, were added in 2001. Also in 2011, one-inch picket lead spacers were added, and in 2012 these spacers were upgraded and improved to insure sufficient lamprey passage while not interfering with adult salmonid passage.

At Cascades Island, half-duplex PIT-tag detectors were installed along the picket leads to help track lamprey in 2006. A LPS, complete with a bollard floor guidance path and a variable width entrance weir, were installed in 2009. This LPS is currently being expanded to allow fully volitional passage to the forebay.

The Washington Shore fish ladder received guidance plates installed over the diffuser grates in 2001. A lamprey ramp and trap box were installed at the North Downstream Entrance (NDE) in 2005. In 2008, a LPS was added to the FV 6-9 AWS channel, similar to the LPS at the Bradford Island FV 3-9 AWS. One-inch picket lead spacers were installed in 2010 for passage under leads, and in 2011, NOAA Fisheries installed a picket lead sill ramp. NOAA Fisheries also installed ¾-inch crowder picket leads at the count station. Improvements to the picket lead spacers are planned for 2013. Additionally, the NDE lamprey trap will be removed and replaced with a complete LPS and entrance guidance system in 2013.

During nighttime spill hours, Fish Unit output is reduced to operate the Washington Shore fish ladder entrances at 0.5 feet of head to encourage lamprey to enter the fish ladder. This operation occurs from June 01 –August 31.

1.1.1. Adult Lamprey Passage - Facilities Description:

1.1.1.1. Powerhouse One: At the Bradford Island ladder, the FV 3-9 AWS channel is equipped with a LPS that allows lamprey to bypass the serpentine section of the fish ladder

and exit directly into the forebay, adjacent to the fish ladder exit. The picket leads that block passage of adult salmonids into the AWS channel are raised off the floor of the ladder 1", allowing lamprey to pass under the leads and into the AWS channel.

1.1.1.2. Spillway. The Cascades Island fish ladder entrance is equipped with a variable width weir entrance gate. This entrance is coupled with a bollard field on the floor of the ladder, leading to a 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**.**

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

1.1.2. Adult Migration Timing and Counting

1.1.2.1. Adult lamprey migration season occurs from March 1 through November 30 with the majority of the run passing BON in June and July. Maintenance of the LPSs is scheduled for December 1 through the end of February.

1.1.2.2. Adult lamprey counting is conducted in conjunction with other adult fish counting. Counting hours and visual/video counting periods are shown in **Table BON-1.** In addition to count window operations, each volitional passage LPS is equipped with a mechanical counting system and video verification in the exit sections.

1.1.3. Lamprey Passage System (LPS) Operation & Maintenance

1.1.3.1. General. Maintain adequate water depth for lamprey passage in all LPS flumes.

1.1.3.2. Cleaning criteria. When water levels in an LPS flume drop below the required level, the water supply pump intakes must be cleaned and debris removed.

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

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

1.1.3.5. Winter maintenance season. The water supply pumps should be removed and winterized. The pumps should be inspected for damage and replaced if necessary. The

flumes and rest boxes should be power sprayed to remove excessive algal growth and any debris should be removed. All joints should be inspected and re-caulked if necessary.

1.2. The Dalles Dam

1.2.1. Adult lamprey. Passage improvements were made in the east fish ladder by installing 4 orifice ramps to eliminate 90° edges. Additional ramps are under planning. Several concrete 90°s were also rounded with 2" radius. Picket leads were raised 1.5" for both north and east count stations.

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

1.2.3. Dewatering collections. 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 more than 12 hours.

1.3. NWW Projects

1.3.1. Raceway tailscreens. By 2012, all of the juvenile fish facilities that are collector projects for transportation had implemented lamprey-friendly raceway tailscreens to allow collected lamprey to be returned to the river rather than transported. The new tailscreen has wire mesh with .063" diameter and 0.337" open width/height. The open diagonal dimension of the wire mesh is 0.477" with an overall screen open area of 71.0%. Lower Monumental tested a perforated plate tailscreen that can be cleaned with brushes without entangling lamprey. The perforated plate is 0.25" thick, with 0.312" x 1.0" slots oriented vertically, with a side-staggered slot pattern, and the slots spaced 0.25" apart. With the approveal from regional partners, the replacement of the remaining mesh screens at Lower Monumental with the perforated plate screens is scheduled for the 2012-2013 winter maintenance season.

1.3.2. McNary Dam. Unit trash racks are raked prior to January 15 to minimize the potential for lamprey entanglement in built-up debris when river flows increase. ESBS screens are placed into operation prior to April 16 (two weeks later than other NWW projects) to allow for juvenile lamprey passage directly through turbines without any bypass system collection. Since 2010, nighttime (2100-0400 hours) velocities are reduced at adult fishway entrances SFE and NFE by lowering the entrance weir depth to sill to encourage lamprey entrance into the fish ladder. This operation occurs to coincide with lamprey passage season, June 15–September 30. During the 2009-2010 winter maintenance period, horizontal slots were cut at the bottom of the stem walls in the upper section of the Oregon fish ladder to allow adult lamprey attachment through a level pathway through the weir. Plating was also attached on the diffuser gratings near the walls in the fish ladder to create a continuous path of attachment for lamprey.

1.3.3. Other Improvements for Adult lamprey. Adult lamprey passage improvements were made to upper fish ladder weirs at Ice Harbor Dam and Lower Monumental Dam during the winter of 2011-2012. These included cutting horizontal slots in weirs at the floor to allow adult lamprey attachment through a level pathway through the weir. Additionally,

ramps were installed from the fish ladder floor to the bottom of elevated salmon orifices in the upper ladder weirs to assist lamprey in maintaining attachment as they maneuver through these areas. Plates were installed on diffuser grating adjacent to orifices in the Ice Harbor north fish ladder to provide attachment surfaces for lamprey in higher-velocity areas. Similar lamprey orifices and plating are being installed in the Little Goose and Lower Granite Fish Ladders during the 2012-2013 winter maintenance period.In 2011, picketed leads were raised and secured 1.5" off of the floor of the adult fish ladder at the count stations at all projects. This was done to enable adult lamprey passage under the picketed leads, thereby providing a low-velocity passage route around the adult fish count slot for lamprey.

Fallback adult lamprey collected off of the fish separators and other areas of the juvenile fish facilities at Lower Monumental, Little Goose and Lower Granite are released into the forebay above the dams rather than being bypassed back into the tailrace or transported downstream.