

## **2021 Lamprey Monitoring and Research Considerations - Mainstem Columbia and Snake River**

### **Context**

Pacific lamprey are understudied relative to other anadromous fishes and has severely declined in abundance throughout the Columbia River Basin. The need to restore Pacific lamprey throughout the Columbia River Basin has increased in prominence over the last two decades, with the signing of the Conservation Agreement for Pacific lamprey in 2012 and lamprey actions being now included in the recently completed Columbia River System Operations Environmental Impact Statement (EIS) and associated Record of Decision (ROD). Pacific lamprey is an essential trust resource for the Columbia River Treaty Tribes (Nez Perce, Yakama, Umatilla, and Warm Springs) and the federal government has obligations and responsibilities to protect and conserve this species. The tribes continue to be at the forefront of the lamprey restoration efforts and have lead and guided lamprey monitoring, research, and restoration activities, including juvenile research. Sampling of juvenile and larval lamprey within the juvenile bypass systems (JBS) provides key long-term monitoring data and supports research that informs important knowledge gaps and critical uncertainties. To date, this JBS sampling of lamprey has been opportunistic and been conducted by the Smolt Monitoring Program (SMP) as an ‘add on’ activity in collaboration with various key partners. Indeed, most of the past key juvenile lamprey research and studies to date, including screen impingement/entrainment, swimming performance, tagging feasibility, and now acoustic telemetry studies, were made possible in large part due to the sampling that occurs at John Day (JDA) Dam Smolt Monitoring Facility (SMF). Through the 2008 Columbia Basin Fish Accords MOA, the tribes collaborated with the U.S. Army Corps of Engineers (USACE) to develop and implement a 10 – year Pacific lamprey Passage Improvements Implementation Plan. An Accords Extension was signed, and the tribes continue to collaborate on the planning and prioritizing of passage improvements identified in the 2018 Columbia Basin Fish Accords Extension Pacific lamprey Passage Improvement Plan.

Changes to the SMP and fish condition sampling at mainstem dams are being considered, which may have a considerable impact on lamprey monitoring and research activities. Consideration of sampling needs for **both juvenile salmonids and lamprey** will help integrate monitoring and research efforts across multiple funding/programs. Juvenile lamprey monitoring and research objectives include:

- 1) Determine relative contribution of translocated adult progeny to the total natural production of larval and juvenile lamprey passing JDA Dam.
- 2) Describe life history characteristics of larval and juvenile lamprey emigrating from the Columbia River Basin.
- 3) Monitor larval and juvenile behavior and survival associated with each possible passage route at individual mainstem Columbia and Snake river dams.

Meeting these objectives requires some form of representative sampling, with sufficient intensity/timing to obtain adequate sample size. Sampling location(s) is variable across objectives. While a long-term and integrated sampling strategy supporting both salmonid and lamprey passage management is developed, maintaining some consistency with recent sampling efforts will help inform Objectives 1 and 2.

### **2021 Proposal for Juvenile Bypass System Sampling**

Conduct a 'Lamprey Monitoring' pilot study at JDA Dam SMF beginning in 2021. The target species would be Pacific lamprey. Sampling would begin in the earliest month feasible (for example by March 1<sup>st</sup>) and continue through end of July (\*the vast majority of juvenile lamprey run ends by mid-July, so sampling past end of July is not necessarily critical for lamprey sampling purposes). We recommend the adoption of flexibility in the sampling rates to maximize lamprey collection. For example, increasing the sampling rates overall during the early run (e.g., the month of March when juvenile salmonid numbers are still very low) will help ensure adequate numbers of lamprey are collected annually (with very little impacts to juvenile salmonid sampling). In addition, increasing the sampling rates intermittently during high discharge events (particularly during turbid water conditions) will also help maximize the collection of lamprey throughout the run timing (with minimum impacts to juvenile salmonid sampling).

- Alternative A (preferred): Resume 24-h SMP operations every other day (similar to 2019 and prior years)
- Alternative B: Conduct sampling 4 – 8 h per day with sampling occurring during the late nighttime or early morning hours when more lamprey are likely to be encountered (with flexible operation of JDA Dam SMP during periods of peak juvenile outmigration to maximize numbers collected for juvenile tagging studies).
- Alternative D: Resume daily 24-h sampling at JDA Dam (similar to pre-2016 operation)

In addition, if 24-h sampling is infeasible, we recommend a subset of 24-h monitoring (approximately 6-12 days) to occur throughout the sampling duration (focusing on seasonal high discharge events when juvenile lamprey numbers are higher). This monitoring will involve sampling every hour or two hours to help assess the distribution of lamprey migration within the 24-h period (which is critical information in understanding the relative proportion of lamprey collected during the new reduced sampling period (4-8 h)).

### **Significance of JDA Dam SMF as a Sampling Location**

The JDA Dam SMP has historically served many important roles in the monitoring of both salmonids and lamprey over the years. It has provided vital data related to 1) run timing (both seasonal and within day), 2) abundance indices and relative abundance, 3) life history and life stage related migration behavior, and 4) condition monitoring (which contributes key information related to mortalities / injuries related to various threats, including predation and screen / structural anomalies). It has also provided key samples for genetic analysis and study fishes for many passage and other related research.

The Confederated Tribes of the Umatilla Indian Reservation (CTUIR), the Confederated Tribes and Bands of the Yakama Nation, and the Nez Perce Tribe have been collecting adult Pacific lamprey from Bonneville (BON), The Dalles (TDA), and JDA dams and releasing them into rivers and streams within ceded lands since the early 2000s. Juvenile lamprey offspring of these translocated adults can be identified through genetic tagging techniques and used to address objectives 1 and 2 above. JDA Dam is the most useful and appropriate location for collecting outmigrating juvenile Pacific lamprey to address these objectives. JDA Dam is the first hydropower project downstream of all three tribal translocation program release locations in the Umatilla, Grande Ronde, Yakima, Upper Columbia, and Snake River basins. Therefore, juvenile lamprey collected in the juvenile bypass system at JDA Dam can be genotyped and used to monitor and evaluate tribal Pacific lamprey translocation programs. Juvenile

lamprey sampling could be relocated to McNary Dam; however McNary Dam is above the Umatilla River and would not allow for evaluation of CTUIR translocation. Juvenile sampling could likewise be relocated to BON Dam as it is also located downstream of all three translocation programs. However, catch rates of juvenile lamprey in the bypass system at BON Dam are lower than JDA Dam. Increasing the sampling rates at McNary and BON dams are likely problematic as this will also result in a substantial increase in the collection of juvenile salmonid samples as well. In addition, juvenile collections at BON would also be comprised of lamprey from river basins that enter the Columbia below JDA including the Deschutes, Klickitat, Wind, and Hood rivers. Thus, the relative proportion of translocation offspring juveniles would be lower at BON and sample sizes of translocation progeny may be too small to address objectives 1 and 2 above.

### **Sampling Strategies for Individual Objectives**

Objective 1: Determine relative contribution of translocated adult progeny to the total natural production of larval and juvenile lamprey passing JDA Dam.

Objective 2: Describe life history characteristics of larval and juvenile lamprey emigrating from the Columbia River Basin.

Approach: Continue effort initiated at JDA in 2017 to monitor larval and juvenile Pacific lamprey outmigration in the mainstem Columbia River. Collect tissue samples from a representative subset of lamprey for genetic analysis to determine larval and juvenile natal origins, relative contribution of CRITFC member tribe translocation programs to lamprey abundance, relative abundance by stream segment/tributary, and age and size at migration. Estimate relative proportion of translocation vs. volitional larval and juvenile production in the Columbia River basin above JDA Dam. Annual collection of approximately 1000 juvenile and 500 larval tissue samples at JDA is needed to achieve this objective.

To achieve this objective, we will need to:

- Collect a representative sample across the run time of Pacific lampreys migrating through JDA Dam and being collected in the juvenile bypass.
- Collect data on timing of out migration (within 24-h periods and across days throughout the run).
- Collect tissue samples from a subset of lamprey for genetic analysis, about 1000 juvenile samples annually taken via a consistent sample rate across the run (e.g., ~10-20% rate). Larval samples could have a lower total sample size (~500) target given the lower encounter rates.
- Continue collection of condition data on larval and juvenile lamprey collected in the JDA Dam juvenile bypass including predation, injury, mortality, disease (including fungus), length, weight, condition factor, and life stage proportion.

Objective 3. Monitor larval and juvenile behavior and survival associated with each possible passage route at individual mainstem Columbia and Snake river dams

Approach: Utilizing JDA Dam juvenile bypass as a source for collection of juvenile Pacific lampreys for use in juvenile lamprey acoustic and PIT tagging passage studies at JDA, TDA, and BON dams.

Juvenile lamprey passage is identified as a critical uncertainty and as the highest priority to the tribes and USACE with millions of dollars spent to develop a juvenile lamprey acoustic tag. Conducting passage studies is a significant component of the agreements made by the USACE for lamprey actions in the Fish Accords extension. The tribes intend to begin implementing multi-year, multi-dam, passage studies over the next several years. Collection of juveniles at or above the dam of interest for tagging and release will be an important consideration for these passage studies.

Phase I: Lower Granite, Little Goose, McNary dams (2022-2023)

Phase II: JDA, TDA, BON dams (2024-2025)

Phase III: Lower Monumental, Ice Harbor, McNary dams (2026-2028)

To achieve this objective, we will need to:

- Collect approximately 1000 juvenile lamprey annually for use in acoustic tagging passage studies at BON, JDA, McNary, Lower Granite and possibly other Snake River dams as needed.
- Collection of juveniles throughout the run timing, focusing on peaks of juvenile lamprey outmigration (often associated with high discharge and turbid water conditions). Pulsed nature of juvenile lamprey outmigration may require flexibility of JBS operation to maximize collection during periods of peak outmigration activity.

Millions of dollars are being allocated for upcoming studies in the coming years and the impact of these suggested changes will essentially “nullify” and “abolish” our ability to learn from these upcoming studies (without a liable source location to collect the study fish).

## **Conclusion**

For these reasons described above, the JDA MOC (as well as the Memo from Fish Passage Center) does not meet our needs for monitoring Pacific lamprey juvenile outmigration now as well as into the future. Furthermore, the SMFs at Lower Monumental Dam and Rock Island Dam are also critical locations for juvenile lamprey needed for the Snake and Upper Columbia rivers acoustic telemetry studies planned in the near future. The money that has been spent up to this point towards juvenile tag development would literally be for “nothing” if we do not have adequate access to fish collected at the JDA Dam SMF (as well as Lower Monumental and Rock Island dam SMFs).

The suggested changes at JDA Dam SMF impact not only the Corps passage studies via acoustic telemetry and other passage studies, but also the BPA Accords project deliverables that rely on these facilities for supplementation effectiveness monitoring. The Corps and partners signed the Pacific lamprey Conservation Agreement to work towards conservation of Pacific Lamprey in a proactive manner; eliminating this monitoring without consideration for lamprey goes against this agreement to consider lamprey for all projects. It runs contrary to everything that the parties’ signatures stand for on the conservation agreement. It runs counter to the ACOE commitment to help the tribal agencies restore Pacific Lamprey populations as a tribal trust resource. We, the tribes, can assist the Corps in streamlining these processes, but we need ACOE’s commitment to do their share. We argue that the small amount of cost savings gained by ACOE as a result of this recommended modification is nearly

negligible in comparison to the value of the information gained for long-term lamprey research by continuing to implement and sustain the rigor of JDA Dam SMF monitoring.