



Independent Scientific Review Panel

for the Northwest Power & Conservation Council
851 SW 6th Avenue, Suite 1100
Portland, Oregon 97204
isrp@nwcouncil.org

Memorandum (ISRP 2009-23)

June 23, 2009

To: W. Bill Booth, Council Chair

From: Eric Loudenslager, ISRP Chair

Subject: Review of Accord Proposal, Willamette Falls Lamprey Escapement Estimate (2008-308-00)

Background

At the Council's June 3, 2009 request the ISRP reviewed the Confederated Tribes of the Warm Springs Reservation of Oregon's Columbia River Basin Fish Accord proposal titled Willamette Falls Lamprey Escapement Estimate Project (2008-308-00). The project intends to develop quantitative measures for indices of abundance and escapement estimates for adult Pacific lamprey at Willamette Falls. Proposed objectives will address the lack of population information in the Willamette River and address how lamprey behavior and vulnerability to predation may affect abundance estimates.

Recommendation

Meets Scientific Criteria (in part):

- *Objective 3 meets criteria*
- *Response requested for Objectives 1 and 2*

The project proponents initially should undertake the work at one or two passage locations to resolve uncertainties, as detailed below, unless they can present a good rationale for implementing a full-scale project (five locations) at this time. Specifically, more details are requested on the methods that will be employed to investigate the feasibility of the half-duplex PIT tag census technique and the development of a protocol for monitoring and indexing abundance. This should include a statistical estimate of how many lampreys would have to be tagged to obtain a valid escapement estimate.

Summary Comments

Overall, this project has worthwhile objectives, a reasonable approach if adaptive management is practiced, and a qualified project team. It will increase our knowledge of a species of concern about which surprisingly little is known. The proposal is concise, easy to read, and well thought out.

However, the ISRP concludes that the uncertainties and assumptions underlying this project are too many and too great to justify full-scale implementation of the project at this time (i.e.,

installation of PIT tag detectors at five passage locations and underwater cameras at two locations). The approach proposed by the proponents seems worth investigating, but at a smaller initial scale. The proponents should be encouraged to develop a pilot project that identifies major uncertainties and clearly describes the approach and specific methods for testing/resolving these uncertainties in response to this ISRP review. For example, a pilot project might only use one passage location fitted with a PIT tag detector and an underwater camera and maybe another fitted with just a detector. The proponents should also consider/test whether mark/recapture methods that do not employ PIT tag technology would be effective in estimating abundance. If PIT tags are employed then optimal use of the information provided through the tagging should be made (e.g., what life history information can be obtained? What is residence time below the Falls? Can passage survival be estimated?) In short, the proponents should view this project as a logical, step-wise progression rather than an immediate, full-scale effort.

There seems to be at least nine different groups (agencies, Tribes, etc.) involved in lamprey research in the Columbia River Basin, and there is a potential for major overlap in the work. While the proponents state their work will be consistent with them all, the ISRP notes that the CRITFC plan is not complete (as per proposal 2008-524-00 – Lamprey Passage Design). The ISRP therefore strongly supports Objective 3. The proponents should also coordinate with other planned or ongoing projects employing PIT tagging of lamprey in the Willamette – this should be achieved by implementation of the latter objective.

It is possible that “watershed specific” (subbasin) information will be important to gather to develop local projects. However, there is merit in focusing the work in selected streams and the Willamette is a key candidate for such a lamprey Intensively Monitored Watershed (IMW) given there is still a run present. The proponents do recognize the difficulty, however, of doing detailed work on a larger river.

Specific Comments

1. Technical Justification, Program Significance and Consistency, and Project Relationships (sections B-D)

Until there is a better understanding of the limiting factors for lamprey throughout their life cycle, it will be difficult to develop a plan for their recovery/rehabilitation. Both marine and freshwater survival trends in lamprey must be tracked to assess and address limiting factors. Interspecific relationships such as any correlations with trends in salmon abundance also need investigation. A comprehensive study is required to understand why lampreys have declined coastwide (ISAB 2008-5¹).

Nevertheless, a project of this kind is justified. Other than some studies directed at upriver passage difficulties for adult lamprey at Bonneville Dam, there has been very little done to better understand the reasons for the dramatic declines in lamprey populations. Lamprey populations are in serious jeopardy throughout the Columbia River Basin. At present, the Willamette River is considered to be the major production area for lamprey in the Basin. However, there are no reliable ways of estimating abundance of adult lamprey returning to the Willamette above Willamette Falls. Because the primary Pacific lamprey tribal fishery in the Columbia River Basin

¹ ISAB 2008-5 Snake River Spill-Transport Review: www.nwcouncil.org/library/isab/isab2008-5.htm

is located at Willamette Falls and there are fish passage and fish counting facilities in place, this location is appropriate

Lamprey research and restoration is called for in the Council's Fish and Wildlife Program, specifically in the Willamette River Subbasin Plan, and in the Council's 2005 Research Plan. The proposal is related to numerous ongoing and planned projects throughout the Columbia Basin.

The proponents have provided a substantial literature review, although the proposal would be improved if they had attached a copy of the key reference "Clemens et al. 2006" on radio-tagged lamprey in the Willamette River.

2. Objectives, Work Elements, and Methods (section F)

In general, the description of objectives and methods was adequate, although it is apparent that because of the novelty of the project, the first year will be mainly devoted to refining techniques and determining the feasibility of Objectives 1 and 2.

More details about lamprey collection and tagging would have been helpful. Although the project proponents are not yet sure how many half-duplex PIT-tags will be needed to produce a statistically sound population estimate, an estimate of the target number of tagged lamprey in 2010 would have given us a better understanding of the initial level of effort. Based on lamprey harvest over the past few years, how many adults are anticipated to be captured by dip netting (page 7) during the migration season? Will adult lamprey be tagged over the entire span of spring/summer migration or until a quota of tagged fish is reached? Is it possible to test the assumption of no tagging-related mortality by holding some lamprey for a few days before releasing them? Finally, how often will creel surveys be conducted during the fishing season?

This project is directed at developing and testing methods for estimating abundance of adult lamprey returning to the Willamette above Willamette Falls. To accomplish this, the proponents propose to install PIT tag detectors at five passage locations near the Falls and underwater cameras for enumerating lamprey at two of these locations. The proponents propose to obtain estimates of abundance using mark-recapture methodology. There are many uncertainties associated with this approach. These include:

- 1) can enough lamprey be caught and PIT tagged to provide reliable estimates of abundance
- 2) can PIT tags be successfully detected (detection rate) at the passage locations
- 3) can lamprey be reliably counted by the underwater cameras at the passage locations
- 4) can issues related to fallback and multiple counts of the same individuals be resolved
- 5) can mortality of lamprey due to predation below the Falls be estimated successfully

These are significant uncertainties that could jeopardize the success of the project. The proponents clearly recognize these uncertainties.

The proposal would also be improved by information/references on whether or not implantation of PIT tags affect behavior and physiology of lamprey. If this work has not been done, the studies need to be incorporated in the proposal.

The proponents state:

“If lamprey implanted with PIT tags can be read by PIT tag interrogators at four lamprey passage locations over Willamette Falls (Figure 1), and lamprey passing through the passage structure can be counted via underwater camera (located adjacent to PIT tag antennae), the ratio of tagged to untagged lamprey can be calculated at the fishway and the expansion applied to passage locations with no counting camera.”

Is the expansion of the data a feasible method? It seems to have a number of interrelated uncertainties about it, as mentioned above. More detailed review of statistical methods is needed in light of these possible problems.

The formation of a lamprey working group (Objective 3) is a worthwhile objective and appears to be well on its way.

3. M&E (section G, and F)

The proponents propose to use the results of this work to develop an index of abundance of returning adult lamprey that could be used, in conjunction with other metrics, for monitoring and evaluating cumulative success of lamprey restoration projects in the Willamette Subbasin.

The Monitoring section describes the various sampling contingencies but does not indicate whether long-term monitoring, including periodic calibration of the abundance model based on repeated PIT-tag experiments, will be undertaken. We assume that long-term monitoring and data quality assurance are integral to this project. The plan does depend on the success of a number of unproven technologies such as lamprey PIT tagging, lamprey PIT tag recovery, and lamprey video. A staged approach is advisable – the PIT-tagging technology needs to be checked out first. More evidence should be presented indicating that statistical methodologies are available to accommodate the uncertainties of tag detection and visibility difficulties. For example the proponents state that estimates of tag loss and predation can be accomplished by using simulation and bootstrap techniques, but more evidence, such as literature references, should be provided to document that these approaches can adequately address anticipated uncertainties.

In Section G the proponents give a good summary of the monitoring issue and should be complimented for proposing to apply adaptive management to the problem. There are likely to be start up glitches and involvement of PIT-tagging experts may be needed to overcome them.