



Independent Scientific Review Panel

for the Northwest Power & Conservation Council

851 SW 6th Avenue, Suite 1100

Portland, Oregon 97204

www.nwccouncil.org/fw/isrp

Memorandum (2017-13)

November 28, 2017

To: Henry Lorenzen, Chair, Northwest Power and Conservation Council

From: Steve Schroder, ISRP Chair

Subject: Review of proposal for *Pacific Lamprey Conservation Initiative Columbia River Basin Projects* (#2017-005-00)

Background

In response to the Northwest Power and Conservation Council's October 27, 2017 request, the ISRP reviewed a [proposal](#) titled *Pacific Lamprey Conservation Initiative Columbia River Basin Projects* (#2017-005-00). The Lamprey Initiative was developed to promote and coordinate implementation of conservation measures for Pacific lamprey in Alaska, Washington, Oregon, Idaho, and California. It is a cooperative effort among agencies and tribes to achieve long-term persistence of Pacific lamprey and support traditional tribal cultural use over the range of lamprey in the United States. The goal is to secure funding from the Fish and Wildlife Program and other entities to implement high priority lamprey restoration actions and monitoring and evaluation (M&E) that are currently unfunded or partially funded in the Columbia River Basin.

The Council's review request to the ISRP provides some further context and direction for the ISRP review: "The intent of this project is to address a critical emerging priority and support the efforts of the [Conservation Agreement for Pacific Lamprey](#) as outlined in the 2014 Fish and Wildlife Program. Based on this and the merit of the Pacific Lamprey Conservation Initiative your review should solely focus on the [operating guidelines](#) and project criteria that guide the implementation of the priority lamprey actions."

ISRP Recommendation

Meets Scientific Review Criteria (Qualified)

Qualifications:

The Lamprey Initiative proposal provides a comprehensive overview of the need for the Initiative, its history, and the procedures for generating, prioritizing, and funding projects. We

thank the proponents for their informative PowerPoint presentation on November 13, 2017 and for answering our numerous questions. Clearly it took a great deal of effort to achieve a coast-wide organizational structure capable of identifying, coordinating, and supporting work needed to restore Pacific lamprey. However, we believe the proponents need to consider the following qualifications and suggestions when moving forward to seek funding from the Council and BPA.

1. The ISRP supports the proponents' intentions to further evaluate population structure (objective #1 in the proposal) but emphasizes the need to focus research on the spatial scale and circumstances of local adaptation in fitness traits that might be jeopardized by translocation from other populations. None of the 20 deliverables included as examples of possible projects addressed objective #1. We urge the proponents to develop and implement studies to further elucidate regional population structure and the spatial scale of adaptations in the lamprey populations they seek to restore or enhance.
2. The proposal does not adequately explain how the Strategic Habitat Conservation (SHC) approach, described in the Adaptive Management section of the proposal, could be applied to individual Regional Management Unit (RMU) projects. The ISRP suggests that critical requirements of an adaptive management process are needed at the project level. A first step in any adaptive management approach is the formulation of quantitative and time explicit objectives. A section in each project proposal should be dedicated to listing these objectives. Additionally, each proposal should include an explanation of how project implementation and effectiveness will be evaluated. Combining quantitative objectives with appropriate monitoring and evaluation is an essential feature of adaptive management that should be strengthened at the project level.
3. The proponents should strengthen processes to reduce conflicts of interest and ensure the scientific objectivity of the Conservation Team during the proposal review process.

In addition to the proponents taking steps to ensure the Conservation Team's objectivity, we recommend that proposals containing research and assessment elements be reviewed by the ISRP to ensure sound study designs and to further alleviate concerns about potential conflicts of interest.

ISRP Comments

1. Clearly defined objectives and outcomes

This "umbrella project" proposal is intended to facilitate funding for high priority, but currently unfunded, opportunities to restore, monitor, and evaluate lamprey abundance and distribution within the Columbia Basin. It uses a process developed by the Pacific Lamprey Conservation Initiative to address the declines in abundance and distribution of Pacific lamprey, and

continuing threats to their existence in freshwater habitats throughout their U.S. range (Alaska, Washington, Oregon, Idaho, and California).

The proposal clearly lists seven qualitative objectives: 1) evaluate Pacific Lamprey population structure; 2) identify global issues that are impacting Pacific Lamprey; 3) provide public outreach; 4) facilitate data sharing; 5) identify and characterize Pacific Lamprey for the RMUs; 6) identify, secure, and enhance watershed conditions contained in the RMUs; and 7) restore Pacific lamprey to the RMUs. While comprehensive, the ISRP considers this list of objectives to be a suite of overarching goals rather than quantifiable objectives that could be used to measure progress.

The proposal describes how the Pacific Lamprey Conservation Initiative develops and prioritizes proposals for conservation action or research for each of 17 RMUs within the U.S. range. Four of these RMUs are in the Columbia River Basin. Regional Implementation Plans (RIPs) are developed for each RMU and updated annually to document the status of, threats to, and opportunities for lamprey restoration. The RIPs in turn guide development of RMU project proposals. The RIPs are submitted to a Conservation Team comprising representatives of the Initiative from throughout the Columbia River Basin. The Conservation Team prioritizes and submits prospective RMU projects to the Policy Committee for approval. The Policy Committee suggests where funding for approved projects may be obtained.

The proposal also describes the kinds of information that proponents of RMU projects are required to provide for consideration by the Conservation Team. One of the required sections asks for clear objectives and measurable metrics that can be tracked over time. The ISRP was told during an oral presentation by the proponents that quantitative and time explicit objectives would be required for each RMU project. Ensuring that objectives are part of the proposal process will provide a strong foundation for tracking the progress and effectiveness of individual projects and the overall program.

The Initiative's process for documenting threats and identifying opportunities for Pacific lamprey restoration in the four Columbia River RMUs appears to be consistent with guiding principles for Pacific lamprey conservation in the Council's Fish and Wildlife Program. The proponents included a brief description of 20 prospective projects ("deliverables") for Columbia River RMUs to serve as examples of the types of projects that could be considered for future funding. Each prospective project was linked to one of the Initiative's seven qualitative objectives. Based on this selection, it appears that the proponents are emphasizing actions to identify global threats (seven deliverables, most to test or refine methods) and restore lamprey abundance in the RMUs (seven deliverables involving improvements to passage and translocation). None of the example projects addressed objectives 1 (population structure), 3 (public outreach) or 4 (data sharing).

2. Sound scientific principles and methods

The Pacific Lamprey Conservation Initiative is an impressive collaboration among tribal, state, federal, and other interests to conserve an iconic species in decline. The dedication and long-term participation of such a large number of stakeholders is particularly noteworthy. The substantial efforts to assess the status of Pacific lamprey, obtain a conservation agreement with 30+ signatories, and develop an organizational process capable of undertaking conservation activities on a coast-wide scale are commendable.

The RIP development and project selection process communicated in the Lamprey Initiative is expected to identify and fill gaps that are not being addressed by current Columbia River Basin projects. Thus, the Initiative will strongly complement the Columbia River Basin focus of the Council's Fish and Wildlife Program.

Population structure knowledge gaps

One important knowledge gap is uncertainty about population structure in Pacific lamprey. Particularly uncertain is the extent to which Pacific lamprey home to natal spawning areas (philopatry) and if weak philopatry might limit or preclude local adaptation to major tributaries. The proposal states:

The first step ... was to delineate Pacific Lamprey into workable management units. To date there has not been strong evidence for reproductive isolation from collection locations (Goodman et al. 2008; Lin et al. 2008), even for those separated by large geographic distances (Northern California to Japan). Pacific Lamprey do not have strong site fidelity or resulting distinct population segments so inclusion of the whole U.S. range was determined to be necessary. The U.S. range is broken down into 17 Regional Management Units (RMUs). These RMUs were delineated based on both geography and jurisdiction of agencies and tribes working on lamprey restoration. This division facilitates a finer level of resolution for description of populations, distribution, and their habitats.

The ISRP has two concerns with this paragraph and subsequent reference to "populations." First, it is surprising that a topic of such importance for conservation is treated so superficially in the proposal. For example, the cited study by Goodman et al. (2008) found little evidence of reproductive isolation, but it was based on a technique that examined mtDNA fragments with relatively limited polymorphism, and mostly in samples of juveniles. In contrast, the cited study by Lin et al. (2008) was based on a technique that examined much greater polymorphism in genomic DNA of adults and **did** find evidence of significant genetic differentiation among several major tributaries in the Columbia Basin. More recent studies (not mentioned) have used more powerful genetic techniques to investigate population structure in the Columbia Basin and elsewhere (e.g., Spice et al. 2012, Hess et al. 2013, 2014; Clemens et al. 2017). Overall these studies suggest that philopatry in Pacific lamprey is likely much weaker than in Pacific salmon so that gene flow among tributaries is sufficient to prevent strong genetic

differentiation in neutral gene frequencies but is not so weak as to preclude genetic differentiation in adaptive gene frequencies that could maintain local adaptations.

Second, the term “population” is not defined in the proposal and is not used consistently. For example, the term population is absent from objectives #1-6 (consistent with the assumption that there is no reproductive isolation among tributaries within, or perhaps even among RMUs). In contrast, objective #6 refers to “*strategies for reintroducing Pacific lamprey to extirpated areas and advancing Pacific lamprey conservation through establishing self-sustaining populations within RMUs*” (implying reproductive isolation of populations within RMUs). The ISRP supports the proponents’ intentions to further evaluate population structure (objective #1 in the proposal) but emphasizes the need to focus research on the spatial scale or circumstances allowing local adaptation in fitness traits that might be jeopardized by translocation from other populations. We also note that none of the 20 deliverables included as examples of possible RMU projects addressed objective #1.

Project selection process

The ISRP is charged with assessing the scientific merit of the process and criteria that the Conservation Team uses to evaluate annual proposals for restoration actions or research within the four Columbia River RMUs. The proposal reviewed by the ISRP has a section titled “Proposal from RIP/RMU to the Conservation Team” that includes a total of 26 questions in six categories. Each reviewer within the Conservation Team is asked to evaluate and score the answer to each question as 2 if it fully meets criteria, 1 if it needs some additional information, or 0 if it is insufficient. The individual scores associated with each question are then totaled to represent an individual reviewer’s assessment of a proposed project.

A more formal description of the process for proposal development and selection within RMUs would be of value to participants in the Initiative. The ISRP has a number of questions about this process:

1. What is the process for composing and updating the RIP within each RMU?
2. Who develops the RIP for each RMU?
3. Do representatives from all signatories to the Initiative participate for each RMU?
4. Do organizations that are not signatories to the Initiative participate in the development of RIPs?
5. Are organizations that contribute to composing and updating RIPs also potential recipients of funds for projects proposed based on the RIP for that RMU?
6. How are potential conflicts of interest addressed in the process?
7. How is scientific objectivity assured within the process of composing and updating RIPs?

The ISRP has similar questions about the process within the Conservation Team:

1. Who composes the Conservation Team?
2. Are all signatories to the Initiative represented within the Conservation Team?
3. Do all signatories to the Initiative participate equally (1 signatory, 1 vote) on the Conservation Team?

4. Are participants on the Conservation Team also potential recipients of project funds? If so, how are potential conflicts of interest addressed?

It seems possible that Conservation Team reviewers may have conflicts of interest during the review process. The proponents indicated during the PowerPoint presentation to the ISRP that conflicts of interest have not been a problem to date because proposals have typically been supported by funds that must be spent in specific areas and time periods. Even under these circumstances, however, such conflicts are likely to arise, and the proponents are urged to follow standard processes for avoiding conflicts of interest and to take steps to ensure the Conservation Team's objectivity. In addition to these steps, we recommend that research and monitoring and evaluation proposals submitted to BPA for funding through "cost saving" monies undergo a review by the ISRP. Such a review will help to alleviate concerns about potential conflict of interest issues and also provide the project proponents with a constructive review of their proposed work. Minimizing conflict of interest issues will strengthen the Initiative and may promote fruitful partnerships among Initiative partners.

The format of 26 questions in six categories is a commendable tactic to foster objectivity in the assessment of individual projects. However, not all questions are pertinent to evaluating the quality of a project. For example, the first question, "What lamprey RMU population or portion of the river will benefit from action?" is a descriptor of the project that may determine eligibility but does not address quality. Accordingly, this question does not appear to warrant equal standing with questions such as: "How will the project provide meaningful and measurable results to improve lamprey populations and/or habitat conditions?" or "Does the monitoring framework provide clear objectives and measurable metrics that can be observed over time?" The proponents may wish to consider providing relative weights to their questions in order to improve the robustness of their project ranking system.

The scores achieved through the questionnaire are likely to vary widely among participants on the Conservation Team based on their individual biases and familiarity with proposed projects. If more objectivity is desired, an independent set of peer reviewers with no financial, research, or management ties to the proposed projects should be asked to provide input. Selected members of the Lamprey Technical Workgroup could be a source of peer reviewers. Social scientists have substantial experience in developing questionnaires of the type being proposed for use by the Conservation Team. Consultation with social scientists is advisable to achieve a questionnaire with less potential for bias or unexplainable variation among Conservation Team members.

In summary, there is a need to enhance assurances of scientific objectivity during proposal development within RMUs and subsequent assessment by the Conservation Team.

3. Provisions for monitoring and evaluation of results

Two levels of monitoring and evaluation are mentioned in the proposal. The first level occurs through periodic assessment of the threats, abundance, distribution, and status of Pacific Lamprey in each of the RMUs. This assessment entails a holistic appraisal of the cumulative effects of the conservation actions that have occurred over a five-year period. The five-year review is conducted to help prioritize future conservation efforts.

The second level of monitoring and evaluation is specified within each RMU project proposal. Each proposal is expected to contain a section on monitoring and evaluation. If the proposal entails M&E, it is expected to include measurable objectives that can be tracked over time and an explicit description of intended results. If a proposal does not entail M&E, it must describe how completion and project effectiveness will be documented.

Monitoring and evaluation within RMU project proposals is evaluated by the Conservation Team in one of the six categories of evaluation questions. Three questions are designed to determine if a monitoring framework exists, if clear objectives are provided, and if the proposal includes measurable metrics that can be observed over time. Two other questions – “How is completion of the project going to be documented?” and “Is the project’s effectiveness linked to another M&E project?” – are designed to evaluate proposals that do not include M&E. In summary, while M&E is addressed in the Conservation Team evaluation, it does not appear to be emphasized, nor does the quality of M&E appear to be assessed for individual projects.

The proposal includes several examples of research-oriented projects in the list of 20 deliverables. Understandably, for brevity, these examples did not describe specific hypotheses, methods, and other details expected in proposals for research. However, the current review process does not seem to allow for adequate description of hypotheses, methodologies, or statistical procedures to test hypotheses. We suggest that research proposals include sections providing more of these details to improve evaluations by the Conservation Team and the Lamprey Technical Committee. Also, whenever possible, research proposals should include statistical power analyses that describe the likelihood of distinguishing outcomes under alternative hypotheses.

4. Results and adaptive management: benefits to fish and wildlife

The Adaptive Management section of the proposal includes a description of the Strategic Habitat Conservation (SHC) approach used by the U.S. Fish and Wildlife Service. This general approach (the first level of M&E mentioned above) is relevant to the overall Initiative and to periodic revision of the RIPs. However, it does not appear to provide an adaptive management framework for individual RMU projects. The ISRP would like further explanation of SHC and how it might be applied to deliverables from individual RMU projects to determine if an alternative approach to adaptive management may be needed at the project level.

An important challenge for the Initiative will be establishing methods and metrics for determining the effects of restoration actions. If adult lamprey do not home to natal spawning areas, assessing the effects of restoration actions will depend primarily upon monitoring juvenile abundance. The proposal appropriately emphasizes promising new tools (such as eDNA, parentage-based tagging, and a suite of injectable acoustic, PIT, and elastomer tags that can be used on ammocoetes and migrating juveniles) that could greatly improve capabilities to monitor Pacific lamprey. A stronger adaptive management process could help to guide the development of these tools and to refine their use in future conservation endeavors.

Literature Cited

- Clemens, B.J., and 8 co-authors. 2017. Temporal genetic population structure and interannual variation in migration behavior of Pacific Lamprey *Entosphenus tridentatus*. *Hydrobiologia* 794: 223-240. <https://doi.org/10.1007/s10750-017-3096-4>
- Hess, J.E., N.R. Campbell, D.A. Close, M.F. Docker, and S.R. Narum. 2013. Population genomics of Pacific lamprey: adaptive variation in a highly dispersive species. *Mol. Ecol.* 22: 2898–2916. doi:10.1111/mec.12150
- Hess, J.E., C.C. Caudill, M.L. Keefer, B.J. McClraith, M.L. Moser, and S.R. Narum. 2014. Genes predict long distance migration and large body size in a migratory fish, Pacific lamprey. *Evol. Appl.* 7: 1192–1208. doi:10.1111/eva.12203
- Spice, E. K., D.H. Goodman, S.B. Reid, and M.F. Docker. 2012. Neither philopatric nor panmictic: microsatellite and mtDNA evidence suggests lack of natal homing but limits to dispersal in Pacific lamprey. *Mol. Ecol.* 21: 2916–2930. doi:10.1111/j.1365-294X.2012.05585.x