



Independent Scientific Review Panel

for the Northwest Power & Conservation Council
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Memorandum (ISRP 2016-1)

January 13, 2016

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

From: Steve Schroder, ISRP Chair

Subject: Review of Proposed Habitat Suitability Assessment for Anadromous Salmonid Reintroduction in the Blocked Areas of the U.S. portion of the Upper Columbia Basin

Background

In response to the Northwest Power and Conservation Council's December 16, 2015 request, the ISRP reviewed the Spokane Tribe of Indians' proposal to assess the potential availability and suitability of habitat for anadromous salmon and steelhead survival in the U.S. portion of the Columbia River and its tributaries above Chief Joseph and Grand Coulee dams, from river mile 545.1 to river mile 745. The Spokane Tribe of Indians developed this proposal and proposes to implement it in collaboration with its other regional co-managers: the Confederated Tribes of the Colville Reservation, Coeur d'Alene Tribe of Indians, and Washington Department of Fish and Wildlife. The U.S. Geological Survey Columbia River Research Laboratory and NOAA Fisheries are also part of the collaborative group and would provide technical support.

This collaborative proposal was the only proposal submitted in response to the Council's request for proposals ([RFP](#)) to address part of Phase 1 of a multifaceted approach to investigate reintroduction of anadromous fish in the blocked waters of the upper Columbia River as called for in the [Anadromous Fish Mitigation in Blocked Areas Strategy](#) in the Council's 2014 Fish and Wildlife Program. Phase 1 of the investigation is to include:

- "Evaluate information from passage studies at other blockages and from previous assessments of passage at Grand Coulee and Chief Joseph dams.
- Investigate habitat availability, suitability and salmon survival potential in habitats above Grand Coulee. This might include selective releases of salmon and steelhead. Investigate the scientific feasibility and possible cost of upstream and downstream passage options for salmon and steelhead. Before funding new investigations, provide the Council with a report for consideration of subsequent work to advance the fish passage planning process.

- As part of Phase 1, the Council will engage in discussions with tribal, state, and federal agencies and others regarding the purpose, scope and progress of reintroduction efforts above Chief Joseph and Grand Coulee dams.”

This RFP targeted *one element* of Phase 1: the investigation into habitat potential. The species of interest are steelhead and Chinook and sockeye salmon. The habitat assessment, when linked with other elements of Phase 1, will inform reintroduction potential. The specific tasks in the RFP included:

- “Compile and synthesize what is known about both the area of interest and species of interest using existing studies, GIS information, reports, and local knowledge
- Identify areas where information is weak or lacking
- Identify and prioritize target reaches for potential field surveys using information from the compilation and synthesis in the first step
- As necessary, perform field studies in target reaches to evaluate existing habitat condition and suitability (may include water quality assessments, predation and competition and species risk assessments, etc.)
 - Outline proposed study design (e.g., see menu in monitoringmethods.org)
 - Summarize information at the reach level by attribute (e.g., valley width, channel type, slope, terrace height and width, sinuosity, stream width and depth, gradient, substrate, eroding banks, water quality attributes, etc.)
- Summarize and analyze previously existing and newly collected data to determine: a) what species and life histories can be supported by the existing habitat; b) salmon survival potential; and c) species interaction, particularly with native and non-native fishes.
 - Analyze information to determine suitability for the species of interest, based upon water quality, habitat condition, and species assemblages.
- Evaluate findings and report to Bonneville and the Council.
- Finally, compile a report describing the condition, suitability, and potential of the habitat for salmon/steelhead survival potential for the target reaches in the area of interest.”

Before submitting the proposal for ISRP review, the Council staff confirmed that the proposal met the threshold requirements outlined in the RFP. The proposal is part of a more comprehensive sequence of objectives and activities listed in the proposal’s Appendix A. The ISRP’s review, however, focuses on the scientific soundness of the proposed methodologies to assess the habitat potential and address the tasks specified in the RFP (i.e., activities under Objective 2 in Appendix A).

Recommendation: Meets Scientific Review Criteria (Qualified)

The key components for an effective assessment seem to be in place: cooperation and cost-sharing, workshops to compile expert opinion, remote sensing and GIS, modeling of intrinsic potential, analysis of migration barriers and EDT. With strong leadership, cooperation, and skilled analysts, this approach could provide a robust assessment to guide future decisions.

The ISRP concludes that the proposal meets scientific criteria with two Qualifications (listed below). These Qualifications and other specific ISRP comments can be addressed in the Council's proposal review and recommendation process and in BPA's contracting process. If implemented, the ISRP looks forward to reviewing a draft report when the assessment is completed.

Qualifications

1. Consideration of future suitability: Given the long-term nature of this reintroduction project, serious consideration must be given to expectations of future suitability, beyond current conditions, of habitat in blocked areas. The methodology should allow incorporation of information about expected patterns of land development and climate change. This proposal states *"where possible, we will incorporate physical data that have been shown to be important when considering the potential impacts of climate on salmonid IP [Intrinsic Potential]"* but gives no further details. The proposal should incorporate information that is currently available from climate change models, especially information relating to stream temperatures under various scenarios. For example, the [NorWeST](#) project provides high-resolution predictions of summer stream temperatures based on a comprehensive stream temperature database that was culled from more than 80 resource organizations. The [NorWeST](#) webpage hosts stream temperature data and geospatial map outputs from a regional temperature model for Northwest USA. The webpage also states *"a major goal of this project is to provide climate vulnerability and native trout refuge information to land managers and policymakers."*

2. Evaluation of Intrinsic Potential (IP): IP modeling will be used to assess the suitability of tributary habitats to support Chinook and steelhead within the blocked areas. However, the proposal does not adequately justify the use of IP modeling or consider the limitations of using habitat surveys for resident species to evaluate habitat potential for Chinook and steelhead. A more detailed description of the proposed IP modeling approach (including its assumptions, limitations, and the specific metrics to be obtained from existing GIS data or from other sources) would likely ameliorate these concerns. The proponents provide a few references on IP modeling, but the proposal would have benefited from a more detailed discussion. For example, how well has the IP approach characterized habitat potential of Chinook and steelhead in the eastern side of the Cascade Range where habitat issues such as extreme water temperatures may be encountered? How well can the IP approach distinguish the suitability of habitat to support Chinook versus steelhead?

Comments

The proposal is well organized and easy to read, but it only provides general descriptions of planned activities. This limits the potential for feedback that might be used to improve the project. The ISRP's specific comments are organized under the following five subheadings.

1. Synthesis of what is known about both the area of interest and species of interest using existing studies, GIS information, reports, and local knowledge, including identification of where information is weak or lacking

The proposal describes an ambitious but nicely organized process for synthesizing anecdotal information and existing data that have not been compiled or scrutinized. The strengths of the proposal are the emphasis on including multiple stakeholders, partnerships among the Tribes and WDFW, and technical support from USGS and NOAA. Although not explicitly mentioned, it appears from Proposal Table 1, that the proponents also plan to work with the U.S. Forest Service. Such collaboration should prove quite useful as PIBO surveys, Level 2 Forest Service stream survey data, and watershed condition rating data are all available for the project area.

Another strength of the proposal is the planned series of three workshops to iteratively accumulate and reach consensus about potential barriers to species reintroduction, inputs for EDT modeling, and results from modeling. The planning and design of the workshops will be critical to success, given the workshops' central role, but details were not provided and could not be reviewed.

The proposal also states that a Habitat Database would be developed, but no details were provided about its structure or how it would be managed. These elements need to be addressed early in the project to avoid confusion and delays.

A few references were provided to support statements that surveys of stream habitat for resident fishes (e.g., native redband trout) have already been conducted within the proposed study area. However, as noted in Qualification 2, the proposal must address potential concerns about use of existing habitat survey data for resident species to predict habitat suitability for anadromous Chinook and steelhead.

It seems that many hundreds of stream kilometers might be available for recolonization. The proposal does not mention whether intrinsic habitat potential would be evaluated for every stream shown in the map (Appendix C). Perhaps that effort would be feasible if the project relied solely on GIS data. Stream discharge has been incorporated in previous studies of salmon intrinsic habitat potential (e.g., Burnett et al. 2007). It is not clear, however, if that will occur in this case as the proposal does not specify which metrics will be obtained from GIS data. For example, can GIS provide data on bank full width? Will flow be estimated for each tributary shown in the study area map? What stream flow metric is best used for steelhead versus Chinook? Water temperature will be a critical factor in the blocked areas, yet there is no mention of water temperature information or information on potential riparian habitat.

Ideally a stratified random design for sampling should be used to achieve the level of accuracy needed for a reasonably comprehensive assessment of such a large area. Depending on the amount and the difficulty of compiling habitat information for blocked areas, perhaps it would be more cost-effective to identify migration barriers first and then to develop EDT models for habitat that exists below barriers, or above barriers that are easily breached.

2. Identification and prioritization of target reaches for potential field surveys using information from the synthesis

Intrinsic Potential (IP) modeling seems appropriate for developing a first approximation of priorities and has been used for this purpose in other broad scale assessments. For example, the report, *Habitat Intrinsic Potential Modeling of Selected Streams on the Outer Washington Coast for Anadromous Salmonid Fish* (Olympic Natural Resource Center, 2013), provides a good discussion on a broad scale prioritization assessment. However, as noted in Qualification 2, some additional discussion of the assumptions and limitations of IP modeling would be useful.

More detail on the consideration of potential interactions with non-native and/or invasive species would also be useful. This topic should be addressed at a general level now and in more detail in later phases of the project.

3. As necessary, description of field studies in target reaches to evaluate existing habitat condition and suitability (may include water quality assessments, predation and competition and species risk assessments, etc.)

- ***Outline of proposed study design (e.g., see menu in monitoringmethods.org)***
- ***Summary of information at the reach level by attribute (e.g., valley width, channel type, slope, terrace height and width, sinuosity, stream width and depth, gradient, substrate, eroding banks, water quality attributes, etc.)***

Field studies were not described in the proposal, so the ISRP could not evaluate their scientific merits or judge whether funding will be adequate. However, the general approach seems adequate and much of the field work probably can be done after an analysis of existing information. The proposal indicates that the types of data collected by field surveys in 2017 would be determined during a workshop in 2016. Given the limited budget for FY2017, what portion of the study area could feasibly be surveyed? What types of data collection are currently anticipated given knowledge from previous habitat studies for resident fishes? Would field work in 2017 be limited to verification of potential migration barriers?

It is also not clear to what extent migration barriers due to anthropogenic effects, identified in the WDFW data base, will be validated and whether there will be any additional assessments. Although beyond the scope of this RFP, field sampling to determine level 2 EDT parameters for future modeling will be a key element for long term success. Restoration of connectivity likely will be a relatively expensive one to address.

4. Summary and analysis of previously existing and newly collected data to determine: a) what species and life histories can be supported by the existing habitat; b) salmon survival potential; and c) species interaction, particularly with native and non-native fishes.

- **Analysis of information to determine suitability for the species of interest, based upon water quality, habitat condition, and species assemblages.**

The proposal refers to habitat surveys already conducted for resident species, but it would benefit from more description of the data collected during these surveys and how those data may or may not apply to Chinook and steelhead. For example, can current and future water temperature be identified as suitable for Chinook and steelhead? Have quantitative estimates of spawning and rearing habitats and their relative quality been identified for resident trout or kokanee?

Potential obstacles to this assessment's progress are the challenges of compiling standardized information and gaining consensus from numerous parties. The EDT method has been extensively applied, and so it is likely to gain acceptance among the parties given its history of use and peer review in the Basin. Technical support available from USGS and NOAA should be beneficial. Another feature of EDT is that its inputs are explicitly documented, which will facilitate the process of determining gaps for future surveys. Gap identification might be a key outcome of this phase of the study.

5. Report to Bonneville and Council describing the condition, suitability, and potential of the habitat for salmon/steelhead survival potential for the target reaches in the area of interest

The nature of the final report to the Council is not described in any detail, but the proposal provides a solid foundation and appropriate time schedule for report preparation. The project and final report could be improved if the Council could be more specific about the questions that need to be addressed, and the level of detail required, to help guide Council's decisions about implementing future phases of the project. The questions and direction currently provided in the Anadromous Fish Mitigation in Blocked Areas Strategy are quite general; they do not establish any specific criteria or thresholds that will help to *"provide the Council with a report for consideration of subsequent work to advance the fish passage planning process."* Thus, we encourage the proponents to work with Council staff to determine what additional detail would allow formatting and focus for a report that best meets Council needs and facilitates effective decision making.

The ISRP encourages the investigators to provide a comprehensive review of the potential for the habitat to support Chinook and steelhead in its report to Bonneville and the Council. This comprehensive approach is suggested in the chart in Appendix E, which suggests that this project will integrate the intrinsic modeling effort with an ongoing data review funded by other sources and workshops.

The proposal does not describe the administrative structure of the collaborative group. For example, will the Spokane Tribe be responsible for data analyses and reporting? As noted above, it would be useful to include a brief description of the basic structure and responsibilities for development of the Habitat Database. Additionally, how will cost sharing be verified? These issues should be addressed before funding is allocated.

Finally, the ISRP is reasonably confident that the proponents will be able to predict which species and life histories can be supported by existing habitat based on direct examination of that habitat. We are less confident about such predictions based on modeling of intrinsic habitat potential. It seems doubtful that IP habitat modeling can capture the effects of riparian condition, late summer flows and temperatures, and land uses or the influences of environmental conditions (e.g., climate regimes) outside the active stream channel.

General Comments (including issues beyond the scope of this proposal)

The reintroduction feasibility effort could benefit from developing life cycle models for the species proposed for reintroduction (see ISAB [2014-4](#) and [2013-5](#)). Life cycle models typically incorporate estimates of survival and annual variability in survival for each life stage, including downstream passage through the mainstem dams, residence in the ocean, and passage of adults through the dams and back to natal rearing areas. Harvest rates can be incorporated based on recent fisheries data. The models should be based on existing empirical data when possible, but it is reasonable to include assumptions where data are not available. The key purpose of the life cycle modeling effort would be to (1) identify critical data gaps and (2) determine the conditions that would be necessary to establish viable self-sustaining populations. If initial modeling suggests that a population is unlikely to be viable, is it possible to further investigate which life stages would be best targeted to improve survival through restoration or management actions?

Large-scale reintroductions can be viewed as big experiments. The investigations described in this proposal, together with life cycle modeling are useful for making decisions, but the predicted outcome will still be highly uncertain. It is essential to embrace this unknown with a plan that incorporates comprehensive monitoring and adaptive management.

References

- Burnett, K.M., G.H. Reeves, D.J. Miller, S. Clarke, K. Vance-Borland, and K. Christiansen. 2007. Distribution of salmon-habitat potential relative to landscape characteristics and implications for conservation. *Ecological Applications* 17:66-80.
- Olympic Natural Resource Center. 2013. Habitat Intrinsic Potential Modeling of Selected Streams on the Outer Washington Coast for Anadromous Salmonid Fish.