



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 (ISRP 2007-2)

March 29, 2007

To: Peter Paquet, Acting Fish and Wildlife Division Director, Northwest Power and Conservation Council

From: Eric Loudenslager, ISRP Chair

Subject: ISRP Response Loop Review of FY 2007 – 09 Proposal 2007-034-00:
Columbia Cascade Pump Screen Correction

Background

Proposal 2007-034-00 – *Columbia Cascade Pump Screen Correction* was submitted by the Washington Department of Fish and Wildlife (WDFW), Technical Applications Program (TAPPS) during the 2007 – 09 solicitation for projects to implement the Northwest Power and Conservation Council’s Fish and Wildlife Program. The sponsor proposed to replace outdated screens on pipes and other structures that connect to pumps that draw water from streams for irrigation with screens that comply with current standards for screen mesh size and current velocities in the vicinity of the water intake. In the preliminary review the ISRP requested a response to address questions about the severity of fish losses at pump diversions, more detail about the existing inventory of pump diversion sites, and monitoring and evaluation of effectiveness.

The sponsor did not respond to the ISRP preliminary review because the project was not prioritized for funding by the local group. Subsequently, the Council recommended funding the project conditional upon favorable ISRP review of the sponsor’s response to the ISRP’s concerns. In this memo the ISRP provides its review of the sponsor response.

Summary

The ISRP recommendation for proposal 2007-034-00 – *Columbia Cascade Pump Screen Correction* is: Meets Scientific Review Criteria – In Part (qualified).

In the preliminary 2007 – 09 proposal review the ISRP concluded “the proposal could be restructured to focus on the assessment portions of the project. More detail should be provided on how the assessment will be conducted. Once the assessment is complete and the pump sites prioritized, a proposal for funding to correct the screens and evaluate the effectiveness of the screens could be submitted.”

In the response to the ISRP, the proposal sponsor provided some additional information on how the assessment will be conducted, but otherwise did not adequately address the ISRP concerns, and continued to provide an inadequate plan for monitoring and evaluation. Consequently, the ISRP concludes that only the tasks associated with inventory and assessment of the pump diversion sites meets the ISRP scientific review criteria. Further consideration of moving forward with pump screen replacement proposal should be based on this inventory and assessment and include an adequate plan for monitoring and evaluating screen effectiveness.

ISRP Comments on Sponsor Responses to the ISRP

1. The background information is brief but to the point, and basically indicates that the extent of the problem related to salmonid mortality at pump withdrawal sites is not known. There are anecdotal accounts of fish being entrained during pump operation but a much more complete documentation of the severity of this problem would seem appropriate before funding an expensive program to upgrade screening at all pump locations. The proposal would be improved by a more detailed summary of the TAPPS pump screen inventory data for the Methow, Entiat, and Wenatchee, and Okanogan Basins and new screening criteria adopted by the CBFWA's Fish Screen Oversight Committee. Only one reference (Everest and Chapman 1992) is cited. More detailed information on the extent of the problem is needed.

The response provides a little more information about the problem in their first paragraph, but it does not reference any more scientific studies than in the original proposal. The Biological Opinion is mentioned, there is a reference to Bureau of Reclamation research on the effectiveness of several different screen manufacturers, and several quotes throughout the response document are attributed to a local WDFW watershed steward. However, overall the response does not provide the added detail about the extent of the problem requested by the ISRP.

Anecdotal accounts are helpful, but even the description given “*I have heard one account after another about juvenile fish clogging sprinkler heads from the irrigators that I was working with. I have personally observed dead fish entrained on poorly screened diversions with large debris accumulations, live fish in ditches behind poorly screened diversions (ditches that are dewatered in the winter), and dead fish and trapped fish in poor bypass systems.*” was for the Walla Walla subbasin and not for the area covered by this proposal.

The ISRP could easily be convinced that irrigation pump entrainment is a significant problem in the Columbia Cascade province, but the WDFW response gives little indication that serious effort has gone into identifying its damage to populations or extent in the Columbia Cascade beyond simply counting the number of water intakes by river system. The sponsor response provided minimal additional information on the pump screen inventory developed by TAPPS and the current standards for pumped irrigation diversion screens. The inventory information provides the number of known sites within each of the subbasins in the Columbia Cascade province and the physical information

from the sites (location, screen status, diversion volume, etc). Regarding the inventory, it would be helpful (and more compelling) if information was also provided on how the inventory was established and that it was reliable.

The sponsor provides a statement on the current standard for fish screens at pump diversions – 3/32 mesh opening and 0.2 ft/sec, along with citations of the work that form the basis for the current standard. Regarding the current standards, it would be more informative for the ISRP if sponsors had provided some detail on the investigations that provided information for the decision.

Throughout this response, and the original proposal, the sponsor takes the view that repairing and upgrading improperly screen pumps is a “no brainer” when it comes to benefits to fish (aquatic life in general). At the same time, the sponsor indicates that screen standards are evolving, and the presentation notes that intake screen size has decreased from ¼ to 3/32 of an inch, and water velocities through the screen have been decreased from 0.4 ft/sec to 0.2/ft sec. These observations provide support for the ISRP view that some effort should be expended on evaluating the efficacy of the proposed screening systems. It is certainly possible to determine the scope of the problem (document that appreciable losses are taking place) and that upgraded screens yield improvements to the losses, on a subset of the proposed sites.

2. The need to evaluate the impact of pump diversions is clearly indicated in the subbasin plans for the Columbia Cascade Province. This evaluation should be completed before launching a screen upgrade program. The proposal includes a thorough listing of relevant plans, other entities in the Columbia Basin working on screening projects, and ongoing projects in the Columbia Cascade Province that are producing fish that could benefit from correcting pumps that are killing fish. Can the proponents provide comprehensive information on the pumps that are causing fish mortality, and the specific interactions between this project and others projects that would benefit? Collaboration with specific projects funded in the Fish and Wildlife Program and described in the subbasin plan inventory is not described.

The sponsors indicate that an agency developed Screening Priority Index (SPI) would be used to prioritize the diversion, but they have not yet done this. The sponsor provides the algorithm used to calculate the SPI. Brief inspection of the calculation suggest that while it appears somewhat useful, it remains unclear how it would differentiate between different diversions within a subbasin, except based on cost and the amount of water diverted. It is not evident from the information provided that the SPI accounts for proximity to different abundance and life-history stages of anadromous salmonids. For example, a pump in a pool just downstream from a known spawning rifle would seem to be a much higher priority for inspection and upgrading than a pump in a pool just upstream from a spawning rifle. In any case, no evidence is provided that using the SPI in other settings has resulted in improved selection and prioritization of sites for remedial action. An index needs to be evaluated before it is routinely employed. If such evaluation has taken place, evidence is not provided.

It is not clear why the SPI calculation had not been completed prior to submitting the original proposal, and the response to the ISRP's request for more information indicates that this task has still not been done. Therefore, the WDFW response continues to be that prioritization will be contingent on funding. It is difficult to understand this argument, because the data to run SPI for withdrawal sites in the Columbia Cascade are already in hand.

The questions raised by the ISRP about coordination are not adequately addressed. The sponsor indicates that no formal interaction is planned, and that some level of general information transfer takes place among the restoration practitioners. There is a need to improve the interaction between this project and others that engage in stream restoration through riparian improvements, flood-plane reconnection, etc. This interaction would provide more compelling evidence that the sites selected were the most likely to provide benefits and that opportunities to establish the effectiveness of the actions were taken.

3. The objectives related to the assessment of the pump screens in the province are appropriate and would be an important contribution. Without further justification, the objectives related to installing new screens are premature. How were the costs for repairing screens estimated without knowing which screens would be fixed? The ISRP suggests that the project should be undertaken in a sequenced fashion, with the initial focus on understanding the severity of the problem with pumps, identifying those pump sites that have the greatest impact on listed fishes, and determining which irrigators would be willing to work on a cooperative project to correct the priority screens.

Using the average cost of screening 300 pumps in the Walla Walla subbasin seems reasonable, but that work was apparently done (according to information in the response) in 2001-2002, although some of the work may be more recent. The only information regarding increases in cost was a statement that they employed an inflation factor.

Once again, however, the response seems to hinge on running the SPI tool and then selecting sites based on the results. Had this already been done it would be possible to provide a better cost estimate.

The response states that WDFW will focus on one basin at a time, but does not indicate which subbasin (presumably from among the Wenatchee, Entiat, and Methow) will be assigned first priority or how priority order will be determined. Within each subbasin, SPI will be used to determine which pump withdrawals are having the greatest impact on fish – presumably to set priority order for screen improvements. But then, the response suggests (for both questions 3 and 4) that voluntary participation in the program by local irrigators will determine which pumps are screened. This response was confusing, as the ISRP could not tell if SPI results will set priorities or simply an irrigator's willingness to participate. If voluntary participation is the primary factor that determines which pump is screened, what assurances will there be that the biggest problems are being fixed? It seems prudent to determine which pumps will have priority before asking for funding.

4. There is relatively little detail provided on the work elements. What are the assessment and correction protocols of the Voluntary Cooperative Compliance Program? How will the screen assessments be conducted? What criteria will be used to judge the severity of the entrainment problem at a given site? Are any studies to quantify the severity of the problem planned? If so, what is the design?

With regard to the question about screen assessment procedures the response adequately describes the permitting process but does not provide much detail about the actual hazard assessment, which will apparently be assessed through the SPI tool.

The response to the questions about severity criteria, research on entrainment, or study design seems to be summed up in the following quote from a local watershed steward, *“Irrigation is so site specific that to quantify mortality for each given site and then prioritize those sites would be prohibitive.”* Nevertheless, the ISRP continues to believe that some things can be studied without excessive cost, e.g., pump rate, the location of the pump intake in the stream channel, and the presence of fish in water passing through the pump. These can be related to the estimated number of spawners upstream from the intake (available from spawning surveys) to help determine the risk of entrainment. Even anecdotal evidence from clogged sprinklers, dead fish in irrigation ditches, and other evidence of mortality would help. The thrust of the response to these questions is that studying the severity of the problem at each site is cost-prohibitive; however, the sponsor does not make a very convincing case that modest studies to examine the existence of a fish entrainment problem at most sites (or a statistically determined subset of sites) could not be done, or somehow would not be helpful.

5. There is no specific monitoring for effectiveness proposed, although there is presumably basin monitoring that will be useful. Even though we assume that WDFW staff are familiar with screens, and know what works and what does not, the lack of M&E is a deficiency. There are demonstrated benefits from screening irrigation intakes to any species that could be entrained in a water intake, not just salmon. The benefits to the fish and the overall effectiveness of this project would be enhanced if those specific screens that are most problematic could be identified and addressed first. It is likely that benefits will persist over the long-term, but this could not be substantiated without periodic M&E. The proponent's response should include a specific plan for monitoring effectiveness.

The response is limited to operating and maintaining the screens, which is really implementation monitoring, not effectiveness monitoring. While making sure that the screens are being properly operated and maintained is important, there is a continued need to make sure, through some sort of effectiveness monitoring program, that fish are not being entrained after the new screens are installed. The response that *“We know that the screens built to current criteria available from various private vendors are effective in protecting fish provided that they are installed and operated properly”* really does need to be verified in the field. The response provided to the ISRP would be more persuasive if it contained a reference to field verification of the screening technology other than the manufacturer’s claims.

The State of Washington has developed an assessment/guidance protocol for screening fish diversions – *Fish Protection Screen Guidelines for Washington State* (April 25, 2000) [available on line], and a monitoring protocol developed by the Washington Salmon Recovery Board – *Protocol for Monitoring Effectiveness of Instream Diversion Projects (MC-8)* (April 2004) [also available online]. These documents provide the criteria for evaluating diversions, and for implementation and effectiveness monitoring. The proposal does not cite either of these documents, it is not clear that the sponsor has incorporated the recommendations from these into the pump screen upgrades in the Columbia Cascade province. McMichael et al. (2004)¹ outline an implementation monitoring program to evaluate whether installed fish screens actually function according to the design criteria. This protocol is being used by project 199401500 - *Idaho Fish Screening and Passage Improvements* to evaluate whether updated fish screens are physically functioning as designed.

6. The facilities appear to be appropriate, but what is the actual WDFW office where the program would be located? The proponents appear to be well qualified to conduct the outreach and construction parts of the project. A lead person will be hired and trained specifically for this project. Will this person have the scientific background to successfully design and implement a program for monitoring screen effectiveness? The data collected will reside in the WDFW TAPPS database, but what is the specific information sharing strategy with the other agencies and entities would benefit from this project?

Sufficient detail was provided to answer these questions.

7. In summary, the ISRP suggests that the proposal should be restructured to focus on the assessment portions of the project. More detail should be provided on how the assessment will be conducted. Once the assessment is complete and the pump sites prioritized, a proposal for funding to correct the screens and evaluate the effectiveness of the screens could be submitted. The proponents need to demonstrate provisions for monitoring and evaluation of the proposed screening work, whether they or another division of WDFW or others are doing the evaluation.

¹ McMichael, G. A., J. A. Vucelick, C. S. Abernethy, and D. A. Neitzel. 2004. Comparing fish screen performance to physical design criteria. *Fisheries* 29 (7):10-16.

For each of the points above:

ISRP Suggestion

ISRP Evaluation of Sponsor's Response

The proposal could be restructured to focus on the assessment portions of the project.

No.

More detail should be provided on how the assessment will be conducted.

Additional details were provided on the SPI tool. No additional details were provided on field assessments, other than to assert such assessments would be cost-prohibitive.

Once the assessment is complete and the pump sites prioritized, a proposal for funding to correct the screens and evaluate the effectiveness of the screens could be submitted.

No.

The proponents need to demonstrate provisions for monitoring and evaluation of the proposed screening work, whether they or another division of WDFW or others are doing the evaluation.

Monitoring will be limited to making sure screens are being properly operated and maintained. No effectiveness monitoring is planned. The sponsors state "With all due respect, the screening problem is large enough without additional steps that would just add to the overall time and cost to get these important projects completed."

Conclusion

Reducing fish losses due to pump entrainment seems so self-evident that the sponsoring organization ought to want to demonstrate effectiveness in order to get the well-deserved credit for improving instream survival. The response seems to suggest that priority setting and effectiveness monitoring is an all-or-nothing proposition, and prioritizing all the sites and then monitoring the effectiveness of new screens is cost prohibitive. However, the ISRP remains convinced that with a little creative thinking the SPI tool can be used to prioritize the pumps beforehand and a subset of the pumps can be selected for effectiveness monitoring afterward. The region is essentially being asked to fund a substantial habitat improvement effort with little accountability, other than to demonstrate that the screens were installed and maintained. The ISRP's initial concerns were largely ignored in this response.