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March 11, 2016

Mr. Henry Lorenzen
Northwest Power and Conservation Council
851 S.W. Sixth Avenue, Suite 1100
Portland, Oregon 97204

Dear Chairman Lorenzen,

Thank you for the opportunity to provide comments on the Critical Uncertainties report. The ISAB/ISRP used the Northwest Power and Conservation Council (NPCC) critical uncertainties databases to develop research themes for the uncertainties, and provided scientific input on critical uncertainties priorities. We appreciate the effort, organizational structure, and critical thinking the ISAB/ISRP used to develop this report. We are generally supportive of the report but offer the following comments to help improve the identification, prioritization, and use of critical uncertainties in the development of the research plan.

Decisions vs. Questions

The Council F&W program has adopted an adaptive management approach to learn by doing. The start of the adaptive management loop requires a decision. If the Council continues to use an adaptive management approach, it may be useful to think of critical uncertainties in the form of the information needed to make or improve a decision rather than developing questions. The decision approach would focus on F&W program priorities, lead to different ranking of priorities, and better shaping of the research plan. In addition, a decision approach may foster expanded use of adaptive management across the entire program from hypothesis testing to policy decisions. The expression of critical uncertainties in the form of a needed decision also facilitates the use of decision theory, which provides a structured framework for decision making in the presence of uncertainty and is applied in many disciplines including economics, statistics, and ecology.

Addressing the Uncertainties

We agree with the ISAB/ISRP that many of the identified critical uncertainties are very broad and/or address complex questions. To make these more tractable in a research plan, we recommend the uncertainties be reduced to a series of specific hypotheses to be tested or parameters to be estimated. Having an integrated and stepwise approach to developing and addressing critical uncertainties is likely to lead to a research program that is easier to track as the Council reports on its research program.

Subbasin Based Program

The F&W program is spatially organized by subbasins. With few exceptions the current F&W program is a sum of individual projects that address subbasin needs and priorities. While this structure is effective at subbasin scale, it makes it difficult to synthesize and report information by themes identified in the Critical Uncertainties report. An alternate structure for tracking and synthesizing critical uncertainties is to assign individual subbasin project themes identified in the review, or possibly organize subbasin projects in programs that make sense to the Council. In this way reporting could occur at both the subbasin scale and by theme/program. Addressing critical uncertainties in this way would allow better tracking of the program and may help with making information more accessible (ISAB/ISRP theme - public engagement). The theme/program structure would also make it easier to develop synthesis reports, which may facilitate Council decisions by critical uncertainty theme/program.

The current project based structure of the F&W program focuses on addressing a series of isolated (e.g. subbasin specific) questions. Since salmon utilize subbasins, mainstems, estuary, plume, and ocean, organization of an integrated program based on the life cycle of a salmon may be very effective in the decision making process. In addition, the development of a model is one approach to organizing information to help with decisions. For example, in the 2008 Federal Columbia River Power System Biological Opinion (FCRPS BiOp) NOAA used salmon life cycle models to examine the effects of hydro actions on population viability under a range of future climate scenarios. NOAA's Adaptive Management Implementation Plan (AMIP) called for expansion of life cycle models. The ISAB reviewed "Life Cycle Models of Salmonid Populations in the Interior Columbia River Basin" (ISAB 2013-5). NOAA presented general modeling structure and the model metrics are stated to be consistent across models, so that information may be shared. Given the consistent modeling structure ocean/estuary, hatchery, and harvest models may be combined to address specific decisions or scenarios. The ISAB provided a positive review of life cycle models but indicated future model development is needed to provide greater coherence and integration to better address key questions or decisions, and explicitly identify the role of models in the adaptive management process. There is great opportunity to improve life cycle models to help with Council decisions.

Priorities and Integration

The Council F&W program mitigation program is based on hatcheries and habitat restoration/protection projects. In addition, the program supports a research, monitoring, and evaluation component to monitor high level indicators to track program effectiveness and provide information critical to decision making. Due to the listing of many fish populations in the Columbia Basin under the Endangered Species Act (ESA) the monitoring is also used to assess population viability and provide early warnings for high risk populations.

Given that hatcheries and habitat are key components of the Council program and receive a significant amount of funding, these areas naturally would fall out as high priorities for Council decisions. However, it is challenging to address these in the individual subbasin project framework. The ISAB/ISRP listed three possibilities to establish the infrastructure needed to address uncertainties (page 17) including the establishment of an "Institute", with multiple agencies having a goal of addressing critical uncertainties and to develop specialized research

teams to address the specific uncertainty, or to develop specific requests for proposals of specific critical uncertainties. Regardless of the approach, the ISAB/ISRP indicates the effectiveness of the program would be improved. We agree that a change in infrastructure/organization would benefit the program. The value of the integrated approach is the whole (e.g. integrated program) is greater than the sum of its parts (e.g. individual programs).

For example, co-managers proposed a basinwide framework to evaluate hatcheries in the "Recommendations for Broad Scale Monitoring to Evaluate the Effects of Hatchery Supplementation on the Fitness of Natural Salmon and Steelhead Populations". In addition, co-managers are extending life cycle models to inform decision makers about the influence of habitat restoration activities on the recovery and viability of ESA-listed salmon in the Columbia Basin. Incorporation of these proposed integrated approaches in the hatchery and habitat areas mentioned above could be very cost effective and beneficial to the Council's F&W program.

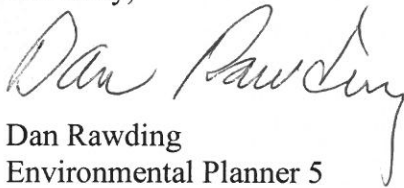
Missed Uncertainties

Some of the critical uncertainties in the tributary habitat section of the document are related to only habitat carrying capacity. Capacity is often associated with habitat quantity and productivity is often associated with habitat quality. Since productivity is often more important to population viability than capacity, we recommend that both habitat productivity and capacity be included as a critical uncertainty related to habitat.

Summary

It is a very challenging task to identify critical uncertainties in the Columbia basin F&W program. The ISAB/ISRP used the Northwest Power and Conservation Council's (NPCC) critical uncertainties databases to developed research themes for the uncertainties, and provided scientific input on critical uncertainties priorities. This is a good first step but can be improved by linking uncertainties with Council decisions and the adaptive management framework used for decision making within the Council's F&W program. We suggest that in addition to developing projects at the subbasin scale, integrating subbbasin projects into themes to address critical common critical uncertainties is likely to be more effective than individual subbasin approach that is currently being used.

Sincerely,



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