Response to Comments on Proposal 10

Proposal Number: 10
Proposal Name: A Tool For Evaluating Risks And Benefits Of Hatchery Programs
Proposal Sponsors: Washington Department of Fish and Wildlife, Northwest Indian Fisheries Commission, and Mobrand Biometrics

1. *Origin of question /concern*: ISRP, from general comments on proposals addressing action #184.

Question/concern: Proposal does not adequately address the issue of large-scale synthetic analytical tools and approaches. Proposal is weak in directly addressing needs described in the RFS.

Response: The proposal definitely does not describe the approach that was asked for in the proposal, which we interpreted as a PVA-based approach. Based on our experience on the Puget Sound and Willamette/Lower Columbia River technical recovery teams (TRT) using this type of analyses for more general evaluations of salmon status, we concluded that analyses such as what were asked for in the proposal cannot be done at present because: 1) the data just are not there to support it; 2) a large-scale synthetic effort requires knowledge of the metapopulation dynamics in these regions, which remains elusive; and 3) PVAs and similar analyses tend to emphasize abundance and productivity (two of the four viable salmonid population parameters), while ignoring spatial structure and diversity. We feel the ISRP comments back up this contention, and we believe this is also supported by the fact that only two proposals were submitted. At the same time, no alternative systematic, transparent approach exists for evaluating risks of artificial production in the Columbia River or elsewhere. Faced with the same needs within our own agencies, we responded with a proposal that we believe could provide useful interim evaluations at a minor cost until better data and analytical techniques become available. We believe this would result in a huge step forward in making sense of risks posed by hatchery operations. We concluded that the ISRP and H/H Subgroup agree with this point.

2. *Origin of question /concern*: ISRP, from direct answers to RFS questions regarding proposal 10

Question/concern: Ability to apply the approach over multiple populations or ESUs will vary with the data available. Fewer data means more reliance on expert opinion.

Response: Data quantity and quality will be an issue that must be grappled with no matter what approach is used. The large-scale synthetic tool that was asked for in the RFS, if available, would give certain answers only where high quality data were available. Elsewhere, the answers would be more uncertain. Our own experiences on TRT's and other review groups in applying risk assessment tools have convinced us that even with sophisticated analytical tools, the paucity of high-quality data in large areas of the

recovery domains would result in huge uncertainties and unevenness in the quality of the results.

Expert opinion is no substitute for data, but these uncertainties may very well have to be dealt with, at least in part, by expert opinion. Use of expert opinion is common in many risk analyses because they often address rare events where large amounts of data are not available (Bedford and Cooke 2001). The underlying assumption here is that variability in expert opinion can be used to represent variability in different parameters used in the model. The potential problems with this have been widely discussed in the risk analysis literature and include biases in how the experts are chosen and individual cognitive, motivational, and structural biases (Otway and von Winterfeldt 1992). There is no magic, technical solution to avoid these problems other than trying to guard against them where possible. Our approach, however, which will include experts options for dealing with missing or poor-quality data, will be as broadly applicable as a more analytical approach and provide more evenness in the quality of results across populations and programs. In addition, our use of expert opinion (as opposed to many expert systems) will be transparent.

3. *Origin of question /concern*: ISRP, from introductory material regarding proposal 10

Question/concern: Proposed project will result in an expert system subject to continuous restructuring as new empirical information comes in or it would simply freeze today's admittedly inadequate information as to outcomes of new approaches (reform). This would seem to make the project continuing, rather than a nine-month project with a clear useful end product. The funding agency should carefully consider whether or not it wishes to start what may turn out to be a 10-12 year project.

Response: Any system for evaluating risks and benefits of hatchery propagation will have to be continually updated as new empirical information comes in. That is after all the nature of science. We surmise, however, that the ISRP's concern is that we will have to reconvene our expert group and repeat our decision process and analysis periodically at great expense, whereas with a mathematical model all that might be needed is a reparameterization, or reformulation of an equation. We did not address this issue in the proposal, but it is a concern to us as well because of the expense and time that could be involved. Of special concern is the time required of our volunteer experts.

Our assessment is that updating need not be a continuous large-scale funding commitment. First, there is the possibility of updating the models. We have proposed using an interdisciplinary workgroup to develop consensus models for how risk is propagated through a system form the source of the hazard to the endpoints. It is possible that our basic understanding could change during the next decade, but we believe that that is unlikely. Although analytical techniques will almost certainly become more sophisticated, a key factor in deciding whether to update the models is whether it changes the basic results that are needed for decision making. In our experience, a more likely scenario is that if the approach proves worthwhile helping decisions on the Columbia

River, the policy makers may want it to do more with it than we initially proposed. The value of such a determination is more likely to arise from the ISRP or ISAB than from us.

Second is the issue of updating the expert opinion used to parameterize the models where that is needed. Assuming we do a good job of sampling expert opinion, we would not expect expert opinion to change based on scientific findings unless substantial new research became available. At that point, which is likely to be in 10-15 years, the original approach intended by the RFCS may be more appropriate than updating our approach. Consequently, we would not expect updating information to have a great impact on this in the short term. If it were necessary, updating could be simple or more involved depending on the perceived need and funding available for it. The simplest method would be for one of the principals to suggest a change based on new empirical information and send it out for comment to all the experts; the most complex and expensive would be to reconvene the experts periodically to revise the tool. The latter would be considerably less costly than the initial development because the process and basic foundation will have already been established. We expect, however, that this initial expert process will prove to be so valuable that even a full reconvening of the expert panel, every three years for example, would be considered affordable.

4. *Origin of question /concern*: ISRP, from primary review comments and questions for improvement of the proposal

Question/concern: Risk assessment terminology in the proposal is confusing. “Risk” is used interchangeably with “hazard”.

Response: The reviewers are correct. Risk terminology has not been standardized among the various disciplines from which we have drawn ideas and methods. In several places in the proposal, we used “risk” where “hazard” would have been more appropriate. In general, we use “hazard” consistent with Currens and Busack (1995), where a hazard is an event that can cause a loss. In the proposal, however, we use the broad-sense definition of risk that incorporates both the notion of an adverse consequence and the uncertainty that it will occur, which is synonymous with “vulnerability” of Currens and Busack (1995). More precisely, we treat risk as a set of scenarios, each of which has a probability of occurring and a consequence, following Kaplan and Garrick (1981). In the past (Currens and Busack 1995) we have used “risk” in the narrow sense of the likelihood of a loss. Our adoption of a broader view of risk is consistent with the evolution of the technical concept of risk that has been documented and supported by the National Research Council (NRC 1996).

5. *Origin of question /concern*: ISRP, from primary review comments and questions for improvement of the proposal

Question/concern: Proposal refers to “risk-benefit” analysis without explicitly explaining benefits.

Response: We agree with the ISRP that the proposal is unclear on this point. What we mean by benefit is a biological benefit, as opposed to a cultural or societal benefit. Broader social benefits of artificial production are important for determining the role of hatcheries in salmon recovery, but incorporating these in a risk-benefit analysis is beyond the scope of our proposal. The benefits we are interested in are directly linked to the four population viability criteria described in McElhany et al. (2000)—growth, abundance, diversity, and spatial structure—that are widely used in assessing salmon recovery. When we refer to risk-benefit analysis, we mean biological trade off that often occurs in artificial production programs between the risk of a loss due to one kind hazard and the potential benefits in one of the characteristics of viable salmon populations. A typical risk-benefit scenario, for example, is the trade off between increased abundance expected from a supplementation program and the loss of fitness caused by domestication.

6. *Origin of question /concern*: ISRP, from primary review comments and questions for improvement of the proposal

Question/concern: Proposal should include methods for evaluating the quality of the resulting consensus model.

Response: To answer this we need to review the process we intend to follow. First, our interdisciplinary work group will identify the important hazards, the variables contributing to risk from those hazards and how to combine and weight these factors. In doing this we expect to take advantage of all pertinent literature and existing models. This first "expert" product is called the consensus model. This model will then be distributed to a broad expert base for comment and for parameterization. The finalized, parameterized version, reflecting the probabilistic risk distributions is the second and final "expert" product. These represent hypotheses that can be best tested or falsified by empirical studies. Methods have been developed for evaluating expert opinion, but they generally involve testing the expert approach on a situation where the outcome is known. We do not have the background information to do this; if we did, our approach would not be needed. Another approach would be to use two expert groups, one to develop the model, and one to critique it. We do not see the advantage of this method over our planned approach, because our approach already deals with differences of opinion. We are open to suggestion, but we feel at this point that if we sample a large group of knowledgeable geneticists, and develop a product that reflects the diversity of thought from that group, we are unlikely to find a group more qualified to judge it than those who developed it. One problem that will frequently occur is experts being willing to express an opinion quantitatively, but have little confidence in that opinion. There are methods that can be used to reflect this uncertainty such as those used by the Forest Ecosystem Management Assessment Team (FEMAT) (http://www.environment.pdx.edu/fem.htm).

7. *Origin of question /concern*: ISRP, from primary review comments and questions for improvement of the proposal

Question/concern: An itemized budget should be provided.

Response: An itemized budget follows. In developing the budget we have built on experiences and lessons learned from participating in countless processes in the Region, and taken the approach of paying for as much professional assistance is needed to make the project a success. The budget includes a significant amount of salary for personnel at WDFW and NWIFC for development of the biological foundation of the process, but also includes funding for three key services that will come from outside the agencies: 1) project management, to insure the project achieves milestones and meets deadlines; 2) meeting facilitation, to insure that the time we ask of our interdisciplinary group is efficiently used and to allow us to participate rather than preside over the meetings; and 3) survey development, to insure that our survey process is effective.

Itemized Budget for Proposal 10

	Months	FTE	Monthly Rate	Total
Salaries and Benefits				
C. Busack, WDFW geneticist	9	0.25	$6,902	$15,530
A, Marshall, WDFW geneticist	9	0.20	$5,349	$9,628
K. Brakensiek, NWIFC ecologist	9	0.25	$5,000	$11,250
Project Manager	9	0.20	$6,000	$10,800
Contracted Services				
Meeting Facilitation				$8,000
Questionnaire development				$10,000
Development of tool web presentation				$20,000
Interdisciplinary Group				
Travel				$5,000
Per Diem				$5,000
Miscellaneous				
Literature Review				$500
Publications, printing, etc.				$2,000
Total Direct Costs				$97,708
Indirect Costs (at 25%)				$24,427
Total				$122,135

8. *Origin of question /concern*: H/H Subgroup, from general comments

Question/concern: Principal investigator(s) should be identified and history of complex project leadership (BPA or otherwise) described.

Response: The project has two principal investigators, Craig Busack and Ken Currens. Both investigators have had extensive experience managing Bonneville Power

Administration (BPA) projects, although neither has a long record as a principal investigator for BPA projects. Craig Busack has been a key participant as a geneticist in the BPA-funded Yakima/Klickitat Fisheries Project (YKFP) since the late 1980's. He is currently responsible for development of YKFP domestication monitoring plans, and served as head of the monitoring implementation planning team during the period of overall monitoring plan development. Ken Currens was a subcontractor on the BPA-funded YKFP project, during which he developed the first model for hatchery risk assessment and used it to evaluate the YKFP project. He was also project manager for several BPA-funded genetic studies while he was employed at Oregon State University. He is currently a principal investigator on a BPA-funded freshwater mussel project proposed by the Confederated Tribes of the Umatilla Indian Reservation. He most recently completed projects as a principal investigator on multiyear genetics studies in Alaska funded by the Exxon Valdez Oil Spill research program and in Washington funded by the Hatchery Scientific Review Group.

Literature Cited

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