Testimony of
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This testimony concerns the 2000 Draft Biological Opinion by the National Marine Fisheries Service and U.S. Fish and Wildlife Service on the operation of the Federal Columbia River Power System and the Federal Caucus Draft Basinwide Salmon Recovery Strategy.

My name is James J. Anderson; I am an Associate Professor in the School of Aquatic and Fishery Sciences at the University of Washington and I have been fully engaged in Columbia River salmon research for two decades. Mr. Chairman, I thank you and the committee for this opportunity to testify in this hearing on the Draft Biological Opinion. In my testimony, I first put the salmon decline in a historical context and consider the future in which the region will use BiOp results. I then discuss the adequacy of several BiOp approaches.

The decline of salmon: We know that the decline of Columbia River salmon involved the interplay of climate/ocean fluctuations and the cumulative impact of human activities on salmon and their habitat (Anderson 2000a). Significant natural variations have occurred on decadal scales and these are loosely viewed as switches between two distinct climate regimes that may persist for two to three decades. The 20th century began in a cool wet regime favorable to salmon. It switched to a warm dry regime unfavorable to salmon about 1920. The climate returned to the cool wet regime during the development of the hydrosystem and then switched back to a warm regime over the past 20 years. It is important to note that the impacts of the hydrosystem development were partially masked by the good conditions of the wet regime and the recovery efforts of the past two decades were partially masked by the poor conditions of the dry regime. Recently the ocean has cooled and fish runs have improved (Anderson 2000b). It is unknown if this represents a switch to a cool regime or a short-term anomaly in a pattern of global warming.

If we have entered a favorable climate regime, then at the end of this decade fish runs could be abundant, independent of any restorative actions taken through the BiOp. More importantly, under this scenario the climate will eventually switch to the unfavorable regime perhaps in the second or third decade of the century. In the second scenario, global warming dominates the decadal cycles and the ocean continually warms. In both scenarios, conditions for salmon will degrade sometime in the future due to warm dry conditions. It is also inevitable that the competing demands for water and fish habitat will in the future be greater than they are today. Will the BiOp plan provide the information needed in a drier future with greater demands for the Columbia River's resources?

Can the BiOp evaluate recovery actions? The 2000 Draft Biological Opinion sets the course for research and actions to be taken over this decade to recover endangered salmon. Two important milestones are identified. In five years (2005), if the trend in the stocks has not significantly improved the program will be reopened for adjustments including dam-breaching. At year eight (2008), if the stock trend is downward the agencies will seek authority to breach the dams if the current science supports that recommendation.

This is not sufficient time to evaluate actions. The time between when the adults spawn and when the fisheries agencies have complete information on the returns of the progeny is 6 years. This means that for decisions at year five, complete information will be available only for fish that spawned this year and for year eight only information from spawners over the next few years will be available. Furthermore, ten to twenty years of returns are required to separate the effects of actions from the effects of climate variability (Peters and Marmorek 2000). Therefore, under the BiOp schedule, the decisions on the effectiveness of actions will depend on the state of the ocean over the next few years and will be essentially independent of the BiOp actions.

Can the BiOp measure the effectiveness of physical standards? Many BiOp actions are based on physical standards that produce desired changes in ecological attributes important for salmon e.g. water flow, sediment load and temperature. Although the standards are referred to as interim surrogates of performance, the BiOp does not specify how they will be connected to fish survival. It neither characterizes the potential range of the measures in terms of survival nor addresses if the desired changes are ineffective or even detrimental to fish.

Can the BiOp assess the effectiveness of dam breaching? The majority opinion within PATH claimed dam breaching was the most effective recovery action available (Marmorek et al. 1998). The NMFS Cumulative Risk Initiative (Kareiva et al. 2000), armed with new information, sided with the minority opinion in PATH and concluded that dam beaching on its own would not recover the stocks. CRI is vague as to what will recover the stocks but points to the estuary and the freshwater habitats as critical. If dam removal is a solution though, it requires a complex link between the smolts' hydrosystem experience and their survival in the estuary. Evaluating this linkage may be difficult or impossible in the time frame for decisions.

Does the BiOp assess the value of flow? The BiOp has an aggressive policy to increase flows in the rivers, claiming they will benefit fish through many life stages. The NMFS research has shown flow is largely insignificant to fish survival, or at best its benefits uncertain. Furthermore, flow augmentation is different from the seasonal and year-to-year variations in flow, and it has even less impact on survival. Under some situations, flow augmentation can be detrimental to fish (Anderson et al. 2000). The BiOp has no program to evaluate the actual impact of flow, where it is effective and where not. In some cases, there is sufficient information to establish a possible range of flow augmentation impacts but decades of observations may be required to identify mechanisms and narrow the uncertainty in the estimates. The BiOp virtually ignores the need for these studies. The reliance on physical standards is inadequate to effectively manage flow in the future when water resources will be in more demand than they are today.

Does the BiOp treat hatchery fish adequately? A significant number of wild spawning stocks have hatchery influence but the BiOp does not treat these influences in a consistent manner. For example, a high proportion of Snake River fall chinook spawners are thought to be hatchery strays, but it is still considered part of the ESU. In contrast, to keep Carson Creek hatchery fish from mixing with wild fish, they are clubbed as they attempt to spawn in streams. This is a considerable a public relations problem because the Carson Creek strain is very successful and returns in large numbers. Hatchery fish are also significant because the assessment of wild stock productivity for decisions in years five and eight depends on the fraction and success of hatchery fish spawning with the wild stocks. The decision to breach dams could rely on what we assume for the success of the hatchery fish. It is somewhat ironic, if the hatchery fish are successful river spawners, the BiOp could call for dam breaching.

The BiOp calls for hatchery reform to eliminate or minimize the harm to wild fish and on an interim basis to supplement the wild fish with genetically similar hatchery fish to avoid extinction. Even though hatchery fish are inextricably linked with wild fish, the recovery measures focus on naturally spawning salmon. If hatcheries represent successful ESUs then they should be considered when assessing the status of the ESUs. Perhaps instead of treating hatcheries as interim measures, they should be considered as genetic reservoirs, especially during periods of poor ocean conditions. At the beginning of the last century, hatchery fish were considered a solution to the problem. At the end of the last century, they were considered part of the problem. How will hatcheries be viewed in this new century? The BiOp needs to address this issue.

Are Stakeholders represented? There are many opinions on the causes for the decline of the salmon and how they can be recovered. The BiOp represents the Federal Caucus proposal for achieving a comprehensive, long-term strategic direction for actions in the basin. It solicits stakeholder contributions through consultation and corroboration refinements of the proposal, but there is no formal process for comments or for presenting alternative approaches. It is a difficult task. PATH had this goal, incorporating state, federal and tribal scientists in a formal decision framework. Unfortunately, many conclusions of PATH were discounted because of public perceptions of bias, undue complexity, and because new studies disproved critical

assumptions used in PATH. The relatively open but cumbersome PATH has been replaced by the closed and streamlined Federal Caucus process. In PATH, a steering committee set the direction of the research; the participants carried out the work and the results were synthesized by ESSA, the company hired to coordinate the workshops. In preparation of the BiOp, the overall framework and substantive issues were developed within the Federal Caucus. Community input came in the way of occasional workshops and written comments. The inputs that were incorporated related mostly to issues of model parameters and correcting obvious mistakes in the BiOp modeling framework. From my observations there is no mechanism to input substantive issues to the BiOp process.

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