Comments on NOAA Fisheries Technical Memorandum: Passage of Juvenile and Adult Salmonids at Columbia and Snake River Dams by Ferguson, et al.

The technical memorandum (Memo) contains a review of information about juvenile and adult fish passage at Columbia and Snake River dams, which should provide support in formulating and implementing management measures pursuant to the Federal Columbia River Power System Biological Opinion (FCRPS BiOp) and other hydropower-related mitigation programs. The document is a good reference document for existing studies at the hydrosystem projects. The drawback is that little life cycle context is provided relative to the information. Some emphasis on management recommendations, rather than just information would also have been regionally useful.

Our focal technical concern is with the Memo's descriptions of extra mortality hypotheses, and resolution. Review and comment on this issue are described more completely in comments to the NOAA Fisheries (NOAAF) companion Memo by Williams et al. Specific comments to this Memo follow.

Specific comments:

<u>P. 88; Description of direct survival study at Ice Harbor Dam in 2003</u>. "At Ice Harbor Dam in 2003 NOAAF released PIT tagged run-of-river hatchery yearling chinook salmon into the bypass collection channel, spillway, turbine unit slots 1A and 3A, and a control site 1 km downstream." The Memo should also identify some of the known limitations of these types of direct survival studies. To get high precision with this type of direct survival study, tagged fish are released directly into migration routes of concern, a procedure which introduces biases that favor some routes. The bypass route in this study design has several biases that will cause the estimated survival to be higher than survival exhibited by nonstudy fish. For run-of-river fish that are bypassed, this study design does not address the following causes of stress and resulting mortality: 1) radio tag studies have shown that smolts swim against the currents pulling them deep into the turbine entrances, a phenomenon which does not occur with the study fish; 2) the study fish do not encounter the stress of the collection screens; 3) the study fish do not go through the dramatic pressure changes in the collection system; and 4) the study fish do not go through the piping and de-watering system to get to the bypass channel. We believe that the studies overestimate true bypass survival by not adequately representing the collection and bypass stresses that normal bypass fish experience. The full experience of bypass or any other route of hydrosystem migration should be adequately represented or biases that may influence survival results should be acknowledged.

<u>P. 92, Operation of existing turbines</u>. The Memo also should reference the review of juvenile passage and turbine operating efficiency criteria conducted by the salmon managers technical staff (SFTAJTS 2003). SFTAJTS (2003) found support for the 1% peak efficiency limits in the Biological Opinion from historic and recent studies. The range of literature and technical analyses available to the region should be reflected by NOAAF to provide adequate representation of the state of knowledge about this issue.

Pp. 100-101, Key uncertainties associated with juvenile passage, extra mortality. The description of spawner and recruit analyses should also include references to Deriso et al. (2001), and the Schaller et al. (2000) response to comments by Zabel and Williams (2000) for the same reasons offered above. The cited paper by Hinrichsen (2001) does not actually question the conclusion that the FCRPS accounted for differences in productivity and survival between upriver and downriver spring/summer chinook populations, as stated in the Memo. Rather, Hinrichsen found that the effect of eliminating certain influential observations altered the relative strengths of conclusions about differential mortality and climate change on recruit/spawner patterns. He argued that these influential observations must be looked at carefully. In addition, the Hinrichsen (2001) reference was not included in the Memo references.

The Memo states that the NOAAF study will experimentally test the hypotheses that extra mortality is related to the hydrosystem by 2010. Extra mortality, by definition, is the delayed mortality shared by transported and in-river migrants around and through the hydrosystem. The initial study (200304100) proposed to collect and tag smolts at Lower Granite Dam, to truck the groups to two locations (Lower Granite tailrace and Ice Harbor tailrace), and to compare smolt-to-adult returns (SARS) as a measure of effects of multiple dam passage. IDFG suggests that this proposal will not isolate extra mortality, since it relies on reference groups with no true control (even the reference groups do not represent any actual management scenario that is currently contemplated). It is not possible to measure truly a control (SARs of in-river migrants with no dam passage through turbines, bypass or spillway, and no delay in reservoirs or at dams) with a treatment (in-river migrants through the existing hydrosystem) simultaneously. Thus, we believe that evaluation of extra mortality will require a collaborative analytical framework and a weight of evidence approach to evaluate objectively and systematically support for the alternative hypotheses.

P. 101, “”Mechanisms that could potentially result in post-hydropower-system-passage delayed or extra mortality were postulated by Budy et al. (2002), but none have been confirmed with empirically-derived data to actually cause extra mortality.” We believe there are significant data indicating extra mortality that have not been considered. We detail this in the IDFG comments on the Williams et al. Memo concerning SARs with and without the recent better ocean conditions from the Yakima River, and the recent SAR estimates from the John Day River. Empirical evidence for extra mortality is found in the consistently lower SARs from multiple bypass PIT-tagged smolts, lower SARs from smolts PIT-tagged at Lower Granite Dam, and the consistently lower SARs from both transported and bypassed smolts at Lower Monumental and McNary dams.

P. 101, The Memo lists two alternative extra mortality hypotheses to explain the lower productivity of Snake River anadromous fish; ocean regime shift and stock viability degradation. The State of Idaho previously elaborated on the lack of evidence for these alternative hypotheses in comments about the NMFS draft 2000 FCRPS BiOp (State of Idaho 2000). State of Idaho (2000) stated (p. 59) that “[t]o characterize the extra issue as

basically an 'all or none' effect is inconsistent with formal decision analysis methods for addressing uncertainty (Marmorek et al. 1998)."

The recent upturn in survival of most Columbia Basin stocks would seem to support a common year effect, not an ocean regime shift that had selected specifically against Snake River anadromous species and populations (spring/summer chinook, fall chinook, sockeye, and A-run and B-run steelhead). IDFG believes the logic is similarly weak to suggest that all Snake River anadromous species and populations simultaneously suffered a debilitating loss of stock viability, unrelated to the hydrosystem, prior to the recent upturn in survival of all Columbia Basin stocks. It is very questionable whether the NMFS experimental extra mortality investigations alluded to in the Memo will be able to isolate the extent to which the hydrosystem causes extra mortality. As detailed in IDFG comments on the Williams et al. (2003) Memo, extra mortality hypotheses about ocean and smolt migration influences on survival through the smolt-to-adult life stage would be best addressed through a collaborative, analytical framework.

P. 111, Adult passage, survival. IDFG cannot verify the Bjornn et al. (1998c) pre-spawning survival estimate of 55% from adults at Ice Harbor Dam to the spawning grounds during 1962-1968, when only one dam was present. The original source of this estimate was a workshop paper (Bjornn 1990), which did not document methods, expansion rate assumptions, or results of the accounting. Redd count programs were generally established not as a total spawner count but to provide a relative index of escapement to determine annual trends within the Snake River tributaries. This may not have been a problem in the original workshop paper (Bjornn 1990) since the comparison presumably used the same method over years, i.e., the same expansion rate was used throughout and any errors would be relative. However, the comparison is questionable between Bjornn's (1990) pre-spawning survival estimates using index redd expansions and those derived from recent radio-tag studies.

P. 117, "Bjornn et al. (1995) found … chinook salmon that were noted as having head scrapes or injuries, 38% did not migrate to known spawning areas and were classified as possible pre-spawning mortalities. More recent information regarding survival of PIT tagged hatchery and natural fish may, or may not corroborate past radio tag conversion information, but it has not been assessed in a basin-wide framework, and specifically not for fish with headburn. An analytical focus to assess all pertinent information and determine whether there is a significant population survival effect would be useful to direct management resources.

Literature Cited

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Deriso, R.B., D.R. Marmorek, and I.J. Parnell. 2001. Retrospective patterns of differential mortality and common year effects experienced by spring and summer chinook salmon (Oncorhynchus tshawytscha) of the Columbia River. Can. J. Fish. Aquat. Sci. 58:2419-2430.

Marmorek, D.R., C.N. Peters and I. Parnell. 1998. Plan for Analyzing and Testing Hypotheses (PATH): Final Report for Fiscal Year 1998. ESSA Technologies Ltd. 1765 West 8th Avenue, Suite 300. Vancouver, BC, V6J 5C6, 263 pp.

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