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Dear Agnes and Andrew,

We would like to thank the Oregon Department of Environmental Quality (ODEQ) and the Washington Department of Ecology for establishing the Adaptive Management Team (AMT) under the TMDL Process for consideration of the use of forebay monitors for compliance with water quality standards or waivers for total dissolved gas (TDG). We appreciate the considerable time and effort that you have put into this process. This AMT has been a valuable forum for all interested parties to provide input to the use of forebay monitors and has served as a valuable venue for the exchange of information. This input should prove valuable to you in your assessment of the question at hand.

The Oregon Department of Fish and Wildlife (ODFW) has long been concerned regarding the use of forebay monitors for compliance. In the initial establishment of the points of compliance, forebay monitors were to be used to represent a mixed water column downstream of the input of TDG from controlled voluntary spill for fish passage. Forebay monitors typically are located on the pier noses and other portions of hydroprojects near turbine intakes or spillways, or slightly upstream of the immediate hydroproject on the navigation lock guidewall. Investigations have demonstrated the influence of certain environmental factors on the measurements of TDG as was formally described in the salmon managers joint letter to ODEQ (January 31, 2007 http://www.fpc.org/documents/joint_technical/FINAL%20ODEQ%20COMMENTS.pdf). Those environmental factors include water temperature, wind, barometric pressure, solar input, and biological activity (photosynthesis). The challenge of the Adaptive

Management Team is to determine if the technical information supports the continued need and location of the 115% forebay TDG monitoring requirement.

There were presentations given by the US Army Corps of Engineers (COE), Fish Passage Center (FPC) and Bonneville Power Administration (BPA) describing the amount of additional spill that would be expected if the forebay monitoring requirement was removed. There are differences in the volumes predicted by the three entities based on the assumptions and tools used to predict the spill levels that would occur. The COE modeling approach was based on using model derived spill caps implementing the 2008 Biological Opinion scenario for spill and operations. The FPC approach used empirical data from past years to generate relations for spill and TDG, and spill volumes were based on the range of possible spill programs that could be implemented. The BPA (May 13, 2008) approach implemented the 2008 Biological Opinion (BiOp) spill program, and used the present market capacity to remove excess generation from the volume calculations. It is not surprising that the highest volume difference in spill with and without the 115% forebay monitoring was predicted by the FPC analysis, since they did not adopt the restrictions on spill contained in the 2008 BiOp and did not remove excess generation spill. ODFW has concern regarding the BPA inclusion of excess generation spill in their calculations. According to Mr. Schiewe (BPA), the excess generation spill was calculated based on the existing power market and existing transmission system. There is no way of knowing whether the power market will remain stable in the future, or will increase. Consequently, excess generation spill would not be available in all situations and cannot be planned for fish protection. Additionally, when excess generation spill is included in the calculations and the 2008 spill assumed in the BiOp is used, the additional volume of spill that would result from operating without the 115% forebay requirement is small. This smaller volume was then used by the COE and NOAA Fisheries for input to the COMPASS model.

The Federal Agencies (COE, BPA and NOAA Fisheries) presented no empirical information showing detriment to aquatic biota from removal of the 115% forebay monitoring requirement. The Federal Agencies presented information on system configuration and operations that may affect overall salmonid survival and model simulation results to suggest that implementation of spill to the 120% tailrace would decrease the survival of steelhead. We do not agree with their assessment based on simulation modeling and dam specific survival estimates. We would like to point out that the system operations that are developed to benefit fish are developed in other arena outside of the mission of the AMT. We assure the Washington DOE and Oregon DEQ that the ODFW will not be recommending operations that achieve the 120% tailrace TDG levels if we do not believe that they are beneficial to fish.

Oregon and other salmon managers have repeatedly documented the technical deficiencies with using COMPASS as a tool to estimate the outcome of alternative hydropower system operations (posted on the Fish Passage Center website www.fpc.org under Joint Technical Memorandums). Some of the concerns that ODFW has with the application of the COMPASS model were included in our comments on the DRAFT Biological Opinion: These comments are as follows:

- The ability of COMPASS to reliably predict future survival benefits of hydropower system operational changes based on a combination of retrospective annual models seems quite suspect. Also, the model underestimates survival experienced by non-bypassed in-river fish, as well as that experienced by in-river fish under optimized flow conditions, particularly in the latter part of spring. Because of this, the model produces inflated transportation benefits estimates and underestimates the benefits of spill and improved in-river migration conditions. Finally, the model is based on data from a limited number of years for which Smolt-to-Adult Ratios (SARs) are available and for only two ESUs (Snake River spring/summer Chinook and steelhead).
- The COMPASS analyses of survival of in-river migrants are inherently biased because the model primarily includes survival data from bypassed fish (instead of non-bypassed in-river migrants), including fish that have been bypassed multiple times. Evidence indicates that, for Chinook and steelhead, bypassing juvenile fish significantly decreases SARs. Bypassed fish were used in the analysis as that was the only way to produce weekly estimates of SARs for in-river and transported juvenile fish. However, in management practice, fish collected after early May are transported, not bypassed to the river, because of the known impacts to survival (Schaller et al. 2007)¹. Thus, in-river SAR estimates based on tagged, bypassed fish are very likely lower than the SARs of in-river fish that are not bypassed and not handled and tagged, and estimated benefits of management actions to improve in-river passage survival are likely to be over-optimistic since they are calculated from a lower survival base estimate than is the case for typical in-river fish.

¹ Schaller H., P. Wilson, and S. Haesecker, C. Petrosky, E. Tinus, T. Dalton, R. Woodin, E. Weber, N. Bouwes, T. Berggren, J. McCann, S. Rassk, H. Franzoni, and Pete McHugh. 2007. Comparative Survival Study (CSS) of PIT Tagged Spring/Summer Chinook and Steelhead in the Columbia River Basin: Ten-Year Retrospective Report. BPA Projects # 1996-02-00 and 1994-033-00. 675 p.

- Even though the model includes in-river survival data for the recent Court-Ordered spill beginning in 2005, it underestimates in-river fish survival, and the benefits of actions aimed at enhancing in-river passage conditions, and produces deflated estimates of the benefits of in-river migration and inflated estimates of the benefits of transportation. The Court-Ordered spill regime has provided some of the highest in-river survival estimates observed, especially for steelhead (Schaller et al. 2007).
- COMPASS model estimates for steelhead are especially biased because the model includes SAR data from only four years (1999, 2000, 2002, and 2003) when overall in-river survival was low. Again, this has the effect of inflating the benefits of transportation of steelhead and underestimating the adverse impacts of spill reductions in May and June, as proposed in the Biological Opinion. In addition, the effects of multiple bypass of juvenile fish on SARs are not nearly as well understood and quantified for steelhead as for Chinook. As a result there is great uncertainty in the use of bypassed fish in COMPASS to estimate SARs for steelhead that migrate in river and are never bypassed.

The COMPASS model has been reviewed by the ISAB. In general the ISAB views the model as a welcome addition to the available analytical tools, but caution about the model's application to management choices. Specifically they say:

“(b) allow for the simulation of the effects of management actions – COMPASS will permit evaluation of a reasonable range of management options, though the passage data are still insufficient to fine-tune the management choices. Full-blown management simulation is (mostly) a future challenge for COMPASS, but the possibilities are promising.” (p. 1)

On the other hand, there were presentations of studies given by the FPC on both juvenile and adult salmonid survival, and the US Fish and Wildlife Service (USFWS) on the Comparative Survival Study results. These studies show the overall importance of spill where higher spill levels increased juvenile salmonid survival and subsequent SARs.. The spill levels observed were from years where the system operated with both controlled spill programs and uncontrolled spill where TDG's exceed those allowed under the waivers. The FPC also presented the GBT Monitoring Program results from several years of data (1996 to present) showing that signs of GBT are rarely observed when tailrace levels of surface TDG are 120% or less.

There were literature compilations developed and/or presented by Washington DOE, as well as by Mark Schneider (retired NOAA Fisheries) on resident fish, and Don Weitkamp (Parametrix) on salmonids, non salmonids and invertebrates. These literature reviews strongly suggest that spill to 120% TDG is likely safe for salmonids and resident species.

We thank you for this opportunity to provide our comments.

Sincerely,

Ron Boyce
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