

Explanation of Compass analysis of TDG alternatives.

NOAA Fisheries received a request from the Adaptive Management Team to use the COMPASS downstream survival model to analyze two alternatives: 1) 2008 FCRPS Biological Opinion (BiOp) operations under current TDG management and 2) 2008 FCRPS BiOp operations with elimination of forebay TDG monitors. Estimated river flows and spill levels for the analysis were provided by Hydsim flow model (Bonneville Power Administration) based on information on spill caps under the two alternatives from the Systeg total dissolved gas model (Corps of Engineers).

COMPASS is a daily time step model that estimates downstream passage survival of juvenile salmonids under specific FCRPS operations. Analyses are typically done in the form of comparisons between two or more alternative FCRPS operation scenarios. In a model run, groups of fish pass sequentially through the dams and reservoirs of the FCRPS. Mathematical algorithms simulate fish passage and survival through reservoirs and available routes of dam passage. Survival and other values used in the algorithms are derived from empirical studies of fish passage survival.

Survival estimates were generated for Upper Snake River Spring/Summer Chinook, Upper Snake River Steelhead, Upper Columbia Steelhead, Upper Columbia Chinook, and Middle Columbia Steelhead. Survival estimates included results for both survival to the Bonneville tailrace and estimates of post-Bonneville effects of passage through the FCRPS in the form of estimated Smolt to Adult returns (SAR).

From the Systeg and Hysim modeling it was apparent that the major effect of eliminating the forebay monitors would be a slight increase in spill at some of the dams in the FCRPS. In the COMPASS model, survival generally increases with increasing spill, though the relationship is relatively weak in some cases. The survival estimates produced in this analysis generally stayed true to this observed pattern with small increases in estimated survival for most of the species examined.

Interpretation of Compass results can be somewhat confusing. There are two aspects to the analysis, the first is a basic comparison of two alternatives to determine which provides the higher estimated survival. Additionally, the model provides an estimate of the magnitude of difference between the alternatives. In the case of the AMT analyses the magnitude of most estimated survival differences were small, many so small that when the absolute and relative differences were rounded to the same level of precision reported in the FCRPS BiOp the result was zero. However, when carried out to the maximum number of decimal places used in the model there was a difference between alternatives. The significance of such small differences is somewhat debatable, however we would interpret them as very small positive (in most cases) or negative effects.

The exception to the general positive survival trend associated with elimination of the forebay meters was Snake River Steelhead. There was a drop in estimated FCRPS survival and SAR. This decrease was due to increased spill, resulting in decreased collection for transport. This negative effect could potentially be reduced by limiting

spill at transport collector dams, with Lower Granite Dam being the most important collection site. Snake River Chinook showed a decrease in FCRPS survival, but an increase in estimated SAR. This was also due to reduced collection for transport. In the case of Snake River Chinook, until mid-May fish that migrate in-river rather than being transported return as adults at a higher rate. Thus, while FCRPS survival decreased because fish were switched to a route of passage with a lower survival rate, more of the fish which survived returned.

The rest of the species in the analysis showed extremely small increases in survival from elimination of the forebay monitors (most of which rounded to 0). The only exception to this was Mid-Columbia Steelhead stocks which originated in the Bonneville pool which experienced an extremely small decrease in survival.

To summarize the analysis, we conclude that our analysis indicates that elimination of the forebay monitors, with resulting increasing spill rates would provide a small, but positive effect on survival and adult returns of listed stocks. The negative effects estimated for Snake River Steelhead could be reduced through management actions, such as limiting spill, to increase collection for transportation at Lower Granite Dam.