



FISH PASSAGE CENTER

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MEMORANDUM

TO: Rhett Lawrence, Save Our Wild Salmon

FROM: FPC Staff

DATE: September 13, 2011

RE: The biological seriousness of Rank 1 or Rank 2 GBT signs

The following is the FPC staff response to your questions regarding the occurrence of GBT during the 2011 outmigration and your question regarding the biological basis of GBT rank criteria.

2011 Outmigration

The spill section of our annual report addresses each year's GBT results and includes a table of previous years. You can download the 2010 report at: http://www.fpc.org/documents/FPC_Annual_Reports.html.

GBT Rank Criteria

The ranks of GBT occurrence summarized in the FPC Annual Reports were developed from research undertaken at USGS-BRD laboratory to address the question of how to monitor gas bubble trauma (GBT) using signs in fish. The gas bubble trauma (GBT) monitoring program began in 1994 under the direction of the National Marine Fisheries Service Gas Bubble Disease Technical Work Group (GBDTWG). The GBDTWG reviewed and recommended research necessary to support the development of the GBT monitoring program. Over several years the USGS conducted research on the progression of GBT signs and the onset of mortality in the test groups. That effort resulted in the development of the ranking system for measuring the portion of fin area affected by bubbles. Ranks 1 and 2 indicate that fish have less than 5% fin signs or between 5 and 25% fins signs (respectively) under the current program. Those ranks were used to quantify the area of fins occluded with bubbles. Ranks higher than two are considered severe.

At the early stages of the GBT monitoring program the GBDTWG developed action criteria based on the research findings from USGS. The GBDTWG set 15% incidence of signs of any rank in the sample of fish being monitored or 5% incidence of severe rankings as triggers to indicate actions should be taken to reduce TDGS levels in the river. Those action levels were conservative according to a review by Dr. Mark Schneider (2008) for the Adaptive Management Team (AMT). Incidence of mortality did not occur until 60% of juvenile fish showed signs of GBT or 30% showed severe signs (Schneider 2008). However, it is likely that conservative ranks are appropriate given the difficulty in translating results of laboratory tests to monitoring in the field.

The NOAA 2000 Biological Opinion, Appendix E, a risk assessment of spill in the hydro-system (NOAA 2000), addressed the question of the utility of interpreting the incidence of signs of GBT and the severity of signs as found in the monitoring program. In their review of the monitoring program NOAA (2000) stated:

“The results from these early studies indicate that it is necessary to monitor migrants for signs of GBT as the biological threshold indicator of TDG supersaturation stress. However, there is no clear set of signs, or a clear time correlation between TDG level and exposure duration, that allows impending fatality to be predicted.”

In the concluding section of the BiOp risk assessment, NOAA (2000) concluded their review of the GBT monitoring program with respect to gas bubble signs as follows:

GBT in juvenile salmonids is observed at all gas levels. Even at a relatively low gas supersaturation level of 110%, signs can develop if the exposure is long and the water is shallow. However, based on 5 years of data from the biological monitoring program, the average incidence of GBT signs has been low. The accumulated data on GBT in Chinook and steelhead show few GBT signs below 120% TDG. When fish with signs are exposed to gas levels above 120%, the incidence and severity of GBT signs increase. A similar pattern is observed in fish with the more severe ranks 3 and 4 signs. Only few fish with severe GBT signs are detected until TDG approaches 130%, and the prevalence of signs does not begin to increase until TDG is between 121% and 125%. The overall number of fish affected with GBT signs proved to be less than originally assumed in the 1995 report.



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DATA REQUEST FORM

Request Taken By: Brandon Chockley Date: 9-Sept-2011

Data Requested By:

Name: Rhett Lawrence Phone: _____
Address: _____ Fax: _____
_____ Email: _____

Data Requested:

Questions about 2011 GBT data compared to
historic years and biological significance of rank
1 and 2 GBT.

Data Format: Hardcopy Text Excel

Delivery: Mail Email Fax Phone

Comments:

Memo attached

Data Compiled By: Brent R Chockley Date: 15-Sept-11
Jerry McCann

Request # 71