

INDEPENDENT SCIENTIFIC ADVISORY BOARD

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Letter Report, ISAB 99-1

TO: Mr. William Stelle, Regional Administrator
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Mr. John Etchart, Chair
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Ref.: ISAB Review of "1998 Draft Annual Report to the Oregon Department of Environmental Quality" (December 1, 1998)

The Independent Scientific Advisory Board (ISAB) appreciates the opportunity to review the draft submission by the National Marine Fisheries Service, Hydropower Program (Portland office) to the Oregon Department of Environmental Quality (ODEQ) regarding dissolved gas studies in 1998. The National Marine Fisheries Service requested this review by the ISAB with a copy of its transmittal letter from Dr. Mark J. Schneider to Langdon Marsh of ODEQ (December 1, 1998) and discussions with Chip McConnaha of the Northwest Power Planning Council staff. The ISAB received the draft report for review at its December 2, 1998 meeting in Portland.f

The draft provides a technically sound and reasonably useful summary of monitoring and research in 1998. We make recommendations for improvements that address technical concerns and the utility of the document. In so doing, we recognize that the originally planned research program was limited by the availability of funds while priority attention was directed to physical measures for gas abatement at dams in accordance with recommendations of the Independent Scientific Review Panel.

We have some general comments, particularly on the structure of the section on Gas Bubble Research in relation to Appendix 1, "Outline for NMFS Annual Report to EQC." More detailed comments follow.

1. It would be useful early in the introduction to state that this annual report follows the outline (Appendix 1) developed jointly by NMFS and the ODEQ. Some readers of this series of annual reports may not understand that the type of information and its organization were carefully considered and accepted by consensus for a continuing series of annual reports. Further, the outline in the appendix is not, itself, being reviewed now by the ISAB. There are typographical errors and instances of strange wording that need attention, particularly in the introduction where bits of text may be missing. The missing parts may include the reference to the standard outline.

2. The sections on Physical Monitoring, Factors Causing Spill, and Biological Monitoring for Real-Time Spill Management are reasonably thorough, informative, and well supported by graphs and appendix data. The information content of some graphs is difficult to decipher, however, and might be improved before final release (e.g., overlapping data and confidence limits). Exclusion of lower Snake River Total Dissolved Gas Saturation (TDGS)

data from Appendix 3 seems inconsistent with inclusion of other Snake River data in the appendices and elsewhere in the report. We believe the report still leaves reasonable doubt that the TDGS data collection points are representative of conditions experienced by fish in the Columbia and Snake rivers. More spatial detail, probably via special studies (or reference to earlier ones), would be helpful. Identification of a normal “ambient” condition without spill remains elusive (see section on “Other Research” in Appendix 1). We have questions about how the distinction is made between voluntary and involuntary spill. It would be useful to have the method laid out more clearly.

3. The biological monitoring supports the hypothesis that the physical and biological circumstances during migration prevent the expression of much gas bubble trauma in migrating salmonids as long as the surface-based TDGS values do not exceed the ODEQ's water-quality-standard waiver values of 115% in the forebay and 120% in the tailrace of each dam.

4. We found the Update on Gas Bubble Research difficult to follow. We eventually realized that this was because of conflicts between a logical presentation of 1998 work in the text and attempts to adhere to the outline in Appendix 1 without adequate explanation. For example, there were only objectives 1 and 3 given in the text, and there was an element B without an element A. We suggest that the section introduction explain its relationship to the appendix outline and use either of two options for the text: (1) describe just what was done in 1998 with parenthetical notes keying each item to the elements in the general outline in Appendix 1; or (2) organize the section explicitly according to the outline in the appendix, with entries for all elements of the outline, including explanations for elements not researched in 1998.

5. We found the research summaries themselves to be informative and also supportive of the waiver levels for TDGS.

Specific comments:

1. Question on Table 3, p. 26. Error? Zero fish with Severe GBT should be 0%, not 0.01%; 0.01% would correspond to about 5 fish.

2. Bottom of p. 27, last paragraph in Section 3. Incomplete sentence where Table 5 was inserted. Last sentence of the section should probably be 1997 not 1998.

3. Page 30, G-tests. Significance in a test of a null hypothesis is a function of sample size. Any observed difference will be “statistically significant” with a large enough sample size and the G-test is particularly sensitive to this problem. As with most statistical analyses, this section would be better presented using confidence intervals on the difference between percent occurrence of GBT in-river and bypass samples. Effect of sample size is reflected in the width of the confidence interval and the magnitude of the difference is easier to judge than when using tests of hypothesis.

4. Page 32, Table 9. Again, confidence intervals on the difference of percentages with GBT or confidence intervals on the individual percentages could be computed to quantify precision of the comparisons.

5. Page 33. Word “affects” is used incorrectly in conclusions (should be effects).

6. Page 35. Box and whisker plots (which include the median) of the depths of juvenile steelhead and chinook salmon would provide a valuable graphical figure to include in the report.

7. Page 35. If probability of detection is inversely proportional to depth, then correction factors (weighting factors) should be developed during the research period if possible.

Unweighted data will underestimate the median depth because the “deeper” values are not present in the data set. We do not have specific advice for estimation of the correction factors, except to point out that the problem is similar to estimation of net selectivity in fisheries and estimation of resource selection functions in food and habitat selection studies. In the simplest case, a group of fish with known depth would be sampled and logistic regression conducted to estimate the probability of detection as a function of depth. Use of ultrasonic tags, for which detection is not very depth-sensitive, rather than radio frequency tags would eliminate this problem.

In conclusion, the ISAB considers the weight of technical evidence from 1998 monitoring and research to support ongoing waivers at the prescribed limits. Based on these results, it appears technically justified to continue such waivers in 1999 for the managed spill program. Lower TDGS levels are necessary for meeting the EPA water quality criterion and the state standard, but improvements to fish health by the additional reduction appear to be minimal. We couple this conclusion with support for continued physical modifications of dam spillways to reduce TDGS levels to as low as practicable, which will be important for healthy fish populations under both managed and involuntary spill (support is tempered by realization that some modifications have the potential to reduce survival of juvenile salmon and that such effects need to be considered carefully in design, implementation, and monitoring).

We look forward to receiving a copy of the final report from the NMFS Portland office.

Sincerely,

Richard Williams, Chair

CC: Dr. Michael Schiewe, NMFS
Dr. Mark J. Schneider, NMFS
Willis E. “Chip” McConnaha, NWPPC