ISAB

Independent Scientific Advisory Board
for the Northwest Power Planning Council
and the National Marine Fisheries Service
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Mr. Frank L. Cassidy Jr., Chair
Northwest Power Planning Council
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Portland, Oregon 97204-1348

Ms. Donna Darm
Acting Regional Administrator
National Marine Fisheries Service
7600 Sandpoint Way NE
Seattle, WA 98115

Ref.: Emergency Surface Spill in 2001

Dear Chairman Cassidy and Ms. Darm,

Because it is unlikely that the normal spill program for passing out-migrating juvenile salmonids will be implemented in 2001 due to expected low runoff, the ISAB encourages the judicious use of surface spill at dams in the Columbia-Snake River system. Spill, in whatever form, facilitates in-river passage, which spreads the risk (or benefit) of different routes of passage among members of populations of smolts to help maintain biological diversity, and also retains fish in the river for important monitoring. Relative to normal spill, most studies have shown that surface spill can be effective in passing large numbers of downstream migrants in small amounts of water. Surface spill can be implemented fairly quickly by using existing surface spillways at some dams and by installation of stop logs in conventional spillways at dams to create surface spill where there are no existing surface spillways. We justify our recommendation with the information that follows.

Several articles in the Columbia Basin Bulletin of Friday, March 16, 2001, (for example) described the angst over low river flows anticipated in the Columbia River basin this year and, to meet energy needs, the likely elimination of the normal spill program. At its February 21 meeting, the ISAB heard John Fazio of the Council staff describe the potential costs of maintaining the normal spill program in 2001; several ISAB members also heard an update of the situation at the ISRP briefing on March 14. We recognize that the cost of spill this spring and summer, if it were to go ahead normally, is now estimated to be $1.6 billion for purchase of replacement power. Nonetheless, CRITFC and others are still recommending some spill for fish, and many others, ourselves included, lament the inevitable loss of fish if spill is eliminated completely.

Previous work of the ISAB (and predecessor groups) and its members offers an alternative to complete cessation of spill, in the form of "skim spill" or surface spill (ISG 1996; Whitney et al. 1997; Coutant and Whitney 2000). We have previously made the following points:

1. Spill is a route of passage at the Columbia River dams that provides high survival for juvenile salmonids (nearly 100%).

2. Effectiveness in passing fish is greater with surface spill than deep spill. Spill gates normally open from the bottom at a depth of around 50 feet. Some projects, such as Wanapum and Priest Rapids dams, however, are equipped with one gate that opens from the top to serve as an exit for ice and trash. Effectiveness of these gates in passing fish has been measured since the mid 1980's. A summary of data collected since 1990 (Whitney et al. 1997 and personal communication with Stuart Hammond of Grant County P.U.D.) shows that the ratio of percentage fish passing the project to the percentage of water passed in spill at those surface gates was 5 to 1 in the spring months and 3.5 to 1 in the summer months. At deep spill gates the ratio was 1 to 1 in the spring and 1.5 to 1 in the summer. Therefore, surface spill is expected to require much less water (1/3rd to 1/5th as much) to pass a given percentage of fish at a project than would standard deep spill.

3. It is feasible at some projects to make a temporary modification of the standard gates by inserting stop logs in the spill bay, as was done by Raymond and Sims (1980) at John Day Dam. Such modification might be done rather quickly, as a temporary measure to reduce the amount of water required in spill to achieve the survival goals set by the Council or NMFS. A modification of a standard spill bay that involved constructing a baffle at the upstream end of the spill bay was evaluated by Grant County P.U.D. in the 1990's. This modification left the spill gate in place to regulate the volume of water passed. Unfortunately, this particular configuration led to some injury of fish that were passed, and further development of the concept there was abandoned. The Raymond and Sims (1980) approach may be more appropriate.

4. In previous reviews of transportation and other juvenile passage strategies, the ISAB and predecessors have supported a "spread-the-risk approach" in which some in-river passage has been maintained. We also have noted that it is not possible to collect all of the fish in existing bypass systems (for transportation). Furthermore, because the bypasses are selective as to size, species, and stock of smolts, they could lead to adverse selection. Because we do not accurately know the composition of species or stocks in spill, we ought to provide as many bypass routes as possible until we have enough information to make a proper decision about abandoning a given route.

Before the Council, NMFS, or hydrosystem managers make a decision on the spill levels that might be required this year, we suggest that the Council and NMFS encourage among the affected parties an open discussion of the use of existing surface spillways and the possibility of temporary modifications of one or a few spill bays at some (or all) projects. Such modifications are already conceived for the future. In the 2000 Biological Opinion, NMFS recommends study of removable spillway weir (RSW) prototypes at John Day in 2002, and McNary, Ice Harbor, Lower Monumental, Little Goose, and Lower Granite at indefinite times thereafter (Section 9.6.1.4.2) and specific defined actions for RSWs at John Day (Action 72), McNary (Action 75), Lower Monumental (Action 77), and Lower Granite (Action 80). As the BiOp requests, several years of prototype testing of weirs might be best, but the urgent need is occurring this year. With sufficient monitoring we could gain much practical information for later use.

A blanket, basin-wide prescription for a specific level of surface spill would be inappropriate. For example, according to a Memorandum of Agreement reached among the affected parties

(NMFS, WDFW, ODFW, the Tribes, and Grant P.U.D.) in 2000, spill levels required at Wanapum and Priest Rapids dams will be determined from now on by the amounts required to accomplish 95% survival past each project. Volume of surface spill will be an element in the calculation of whether this criterion is met. Our recommendation to use surface spill throughout the hydropower system in 2001 ought to be viewed in this project-by-project context.

The regulation of spill volume with stop logs or baffles in place requires some further thought. Stop logs placed in the gate slot would let the volume of spill vary with elevation of the pool, unless there was further restriction of flow volume by the gate. If this procedure were followed it would put the affected spill gates out of normal flood-water service (although there is little likelihood of flood flows this year). Lack of control of a gate could lead to some operational restrictions in the event of load rejection. With flows expected to be so low this year, however, the ISAB expects that each dam ought to be able to spare a spillbay or two.

In conclusion, we encourage the Council and NMFS to facilitate discussion of the options of using existing surface spillways and of modifying some spillways with stop logs to create surface spill as water-efficient approaches to passing downstream migrants in the river in this dry year.

Sincerely,

Jim Lichatowich

Jim Lichatowich, Chair
Independent Scientific Advisory Board

References

Coutant, C. C., and R. R. Whitney. 2000. Fish behavior in relation to passage through hydropower turbines: A review. Transactions of the American Fisheries Society 129:351-380.

ISG (Independent Scientific Group). 1996. Return to the River. Northwest Power Planning Council, Portland, Oregon.

Raymond, H. L., and C. W. Sims. 1980. Assessment of smolt migration and passage enhancement studies for 1979. National Marine Fisheries Service, Northwest and Alaska Fisheries Center, Seattle, Washington.

Whitney, R. R., L. D. Calvin, M. W. Erho, Jr., and C. C. Coutant. 1997. Downstream passage for salmon at hydroelectric projects in the Columbia River basin: Development, installation, and evaluation. Report 97-15, Northwest Power Planning Council, Portland, Oregon.

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