



United States Department of the Interior

FISH AND WILDLIFE SERVICE

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MEMORANDUM

TO: Rod Sando, CBFWA

FROM: David Wills, Chairperson
Fish Passage Advisory Committee *David Wills*

DATE: January 21, 2004

RE: Review of the Beeman/Skalski proposal, entitled, Bonneville Dam Summer Spill Evaluation

In response to your request the Fish Passage Advisory Committee has developed the following technical comments on the study designed by John Beeman (USGS) and John Skalski (UW) on behalf of the Bonneville Power Administration. The proposed study was reviewed within the context of:

- Other planned studies for 2004 at Bonneville, The Dalles and John Day dams.
- The results of the John Day Dam project studies, since this proposal essentially repeats the John Day that study.
- The decisions of the System Configuration Team (SCT) of the Regional Biological Opinion process, that plans, prioritizes and implements a course of study to resolve critical passage uncertainties at Bonneville Dam as well as other FCRPS projects according to the Biological Opinion measures.
- Knowledge gained from prior scientific studies and the need to address scientific uncertainties with respect to passage studies from a holistic perspective.

Our overall conclusions are:

- Several critical design issues limit the feasibility and applicability of the study as proposed that would likely lead to controversy over study results
- The study is proposed without establishing a testable hypothesis.
- The study fails to incorporate a delayed or indirect mortality evaluation.
- The study fails to evaluate the impacts on adult salmon that fallback through the dam.
- The study fails to incorporate findings of past juvenile passage studies at Bonneville and other dams.
- The only outcome of implementing the study appears to be reducing the 2000 FCRPS Biological Opinion (BIOP) summer spill at Bonneville Dam.

- The inclusion of the no spill period in the test protocol would negatively impact juvenile summer and fall chinook migrants from all upstream reaches and tributaries both in Bonneville Pool and at Bonneville Dam. The no spill treatment proposed in the study would negatively impact adult salmon and steelhead emigrating over the dam. All available data indicate that the study will have a negative impact on the listed and unlisted populations passing the project during the no-spill periods. The spill treatment of 50 kcfs will also negatively impact juvenile and adult salmon compared to the higher levels of spill required under the BIOP. The scientific value and applicability of the data resulting from this study does not justify the negative impact of the proposed study dam operating conditions on the run-at-large.
- Significant uncertainties and questions remain regarding the appropriate management application of the John Day juvenile survival study results. The issues surrounding the study results remain unresolved, and can only be expected to be present in the proposed Bonneville study.
- There are no data that justify the conduct of a no spill test at Bonneville Dam. The most comprehensive passage study that compared the relative survival of subyearling juvenile fall chinook thorough the Bonneville Dam spillway, turbines, screen system and a tailrace release clearly demonstrated that spill provided the best survival from both a direct and delayed mortality perspective (Gilbreath et al. 1993; Dawley et al. 1996).
- The only possible valid scientific rationale for conducting a no-spill test at the Bonneville project would be if tests of the new corner collector showed that it was as efficient and safe as spill at the Bonneville project. The best information at hand from hydraulic studies indicates that a minimum of 50 kcfs of spill is necessary to maximize corner collector effectiveness. The Bonneville corner collector has not been tested and, therefore, such a scientific basis for a no-spill condition has not been established.
- While uncertainty exists on the exact magnitude of the negative impact of the no-spill condition, knowingly imposing a harmful management action upon both ESA-listed and non-listed fish would be completely counter to the precautionary approach to endangered species management.
- There is no benefit to fish, or protection of mitigation measures either in this proposed management option or in the study design.

Several critical design issues limit the feasibility and applicability of the study as proposed. First, radio-tagged (RT) age-0 chinook would not be representative of the population at large. While there have been improvements in tag size, it remains true that only the largest individuals in the population could be tagged, severely limiting the applicability of the study results. Second, the proposed study does not account for the life-cycle effects of the no-spill condition. It has been established that changes in BIOP measures need to be evaluated in terms of life-cycle survival, and this proposed study does not. By conducting the proposed project-specific study, the harmful delayed effects of the no-spill condition, as well as the effects of reduced spill at multiple projects, will be ignored. Third, the efficiency of the corner collector and the survival rates of fish passing this route, in addition to all survival and efficiency parameters on age-0 chinook at Bonneville, are unknown, making the sample size calculations little more than conjecture. Furthermore, the study design calculations assume that 89% of the fish released at The Dalles will survive to Bonneville Dam and would be test subjects for the proposed Bonneville study. Mortality in Bonneville Pool, especially during periods of no-spill,

high temperatures and low flows, would significantly increase the number of tags required to obtain adequate precision. Other study proposals have suggested that at least 5,250 radio-tagged fish would be required per treatment, substantially greater than the 4,000 fish per treatment set forth in the proposal. As discussed in the spill committee, the feasibility of handling and radio-tagging this many subyearling fall chinook in the summer under periods with warm water temperatures could compromise the integrity of the proposed study and may make it difficult to conduct a study of this magnitude. Fourth, there is no discussion in the study on how to adequately block test periods so that fish experiencing test conditions, both within Bonneville Pool and at Bonneville Dam, do not overlap.

Baseline survival and migration rates under the existing spill program have not been determined for age-0 chinook at Bonneville Dam. In addition, a new route of passage has been installed, the corner-collector, with completely unknown impacts in terms of efficiency and fish survival. Before an adequate study can be developed on an alternative operation, baseline survival rates, migration rates, and passage efficiencies need to be determined for all existing routes of passage for age-0 chinook. Until a baseline study has been done under existing BIOP reasonable and prudent measures, it is impossible to determine whether an in-season blocked design can be utilized. An annual experimental approach may be necessary.

The proposed study fails to address the key scientific uncertainty as to whether project-specific studies can be used to make valid inferences on reach survival.

There is a risk that ESA-listed populations will not recover even under full implementation of the BIOP spill measures. This risk likely increases should the BIOP spill program be reduced under a scientific study. Non-listed stocks are likely to be impacted to a much greater extent. It is generally accepted that reductions in the BIOP spill program will result in increased mortality of listed and non-listed populations. These risks need to be fully quantified, along with the risks associated with potential mitigation measures, before a study such as this one can proceed. The proposed study does not adequately quantify the risks to the populations that will be impacted. Such a risk analysis is impossible because of the paucity of passage data on age-0 chinook at Bonneville Dam and through all passage routes including the new route of passage (the corner collector) under the baseline BIOP conditions.

Specific technical concerns regarding the study design include:

- The critical assumption of the single project survival methodology is that latent or indirect effects are not significant outside the zone of measured survival. However, the single project test proposed for the Bonneville Dam summer spill evaluation does not attempt to address this shortcoming. For example, passage through multiple bypasses or turbines could well have greater effects on long-term survival than single turbine passage. The effects of multiple stressors, (multiple bypasses or turbine passage at multiple dams), and delay associated with multiple powerhouse passage, could synergistically combine to compromise survival outside the short reach being tested by the proposed radio tag (RT) test. (Refer to the results of 2001 reach survivals.) The study reach is limited due to limited battery life of radio-tags (especially those available for subyearling chinook). The basic assumption of no latent effects of increasing turbine passage needs to be addressed.

- RT studies of subyearling chinook may be biased in regard to estimating true population effects because; 1) tags affecting buoyancy compensation may in turn affect average depth of smolts and in this could affect guidance efficiency and spill effectiveness of test animal differently than migrant population and, 2) tag size minimum may bias results for overall population. The combination of size selectivity and effects of tags on buoyancy might add significant bias to the study results especially in relation to comparing on operation to another where proportion of fish using each route are critical to assessing the impacts on survival (via SIMPAS modeling) of each operation. These effects should be explored via carefully designed comparisons of RT and PIT-tag reach survival studies. For example release PIT-tagged and RT fish above LGR Dam and calculate reach survival to McNary Dam. To improve tag life for subyearlings decrease ping-rate, increase antenna arrays at projects. There should be a comparison of survival estimates as well as collection efficiency of PIT versus bypass routing of RT fish at each project.
- The study proposal fails to compare test conditions against baseline condition specified by the BIOP. Neither 24 hour zero spill nor 50 kcfs spill conditions have previously been evaluated. It would seem prudent to determine the effectiveness of the corner collector under the baseline conditions before evaluating other options. Further, the corner collector was designed to operate with a minimum of 50 kcfs flow from the spillway to generate adequate tailrace egress conditions. Without this flow, migrants using this route will be placed at significant risk to predation.
- The 2004 adult migration season is scheduled to be the last year of large-scale marking of adults to evaluate fall back at Bonneville and general migration through the system. Adult telemetry may continue later, but at more site-specific locations. It would be prudent to utilize this opportunity to test adult fallback and migration at Bonneville with current BIOP operations since adult attraction to the spillway entrances has been identified as an area of concern. This is an identified study objective for the current study. Without providing a minimum of BIOP spill this concern will be left unknown and will be expensive to test later.
- The SCT has prioritized the current corner collector study at a high level. This proposed study has not been considered, reviewed or prioritized by SCT to-date. Without coordination with the SCT the whole regional process comes into question with regard to its ability to meet the needs to the regional managers.

The fishery managers and tribes previously expressed considerable concern regarding the radio tag studies that have been conducted at John Day Dam. These comments apply to the proposed Bonneville Dam study in that the protocol is very similar. These concerns have not been resolved and clearly effect the valid management application of the study results:

- Significant concern has been raised regarding the use of the radio tagged fish to represent the overall behavior and physiological condition of the migrating population. The average length of tagged fish used in 2003 studies at John Day was 10 or more mm larger than average size of fish collected in the bypass. This limitation could potentially bias results.
- The project operations that occurred at the John Day Project in 2003 likely added variability to the results, diminishing the power to detect differences in survival, and made conclusions regarding spill level alone difficult. The study was designed to measure

the differences in survival and proportion of fish passing among all routes between 0/45% and 0/60% spill operations. The expectation would be that spill volume would be significantly higher during 60% spill than 45% spill and that average total discharge between treatments should be similar. However, within treatment variability in total spillway discharge varied more than difference between treatments in some adjacent treatment blocks (i.e. 45% spill vs. 60%). Further, total discharge was lower for 60% spill treatments overall. Using average total discharge per spill treatment block we subtracted the average Q of the 45% block from the adjacent preceding 60% or subsequent block to create a difference score for adjacent test block pairs. The expectation would be overall zero effect with a value near zero. However, the average difference was a -10 kcfs suggesting that the 45% treatments were on average carried out at higher average discharge than 60% tests, so that comparisons of survival would be confounded.

The most recent studies conducted of spill and no spill conditions were implemented at Ice Harbor Dam. The agencies and tribes provided two separate correspondences to NOAA fisheries regarding the results and application of the data from those studies (attached correspondence dated July 21, 2003 and November 1, 2003). These studies clearly show that spillway passage at Ice Harbor is the safest passage route. Based on these and previous studies there is no valid basis to assume that turbine passage at Bonneville second powerhouse is more safe than spillway passage. The remaining question at Bonneville II powerhouse is the efficiency of the corner collector. Since that has not yet been tested there is no basis to include a no spill test in the study. The Biological Opinion measure implementation should be tested to first establish the efficiency of the corner collector. All of the available passage and survival data indicate that a no spill test will impact juvenile fall chinook passage at Bonneville Dam. (FPC memos to Bill Tweit and Larry Cassidy)

In a December 10, 2003 letter to Judi Danielson, Chairperson of the Northwest Power and Conservation Council the CBFWA proposed a multi-year approach designed to meet the stated requirements of the Fish and Wildlife Program's mainstem amendments for evaluation of spill for fish passage and of the BIOP for evaluation of transportation. The approach was designed to utilize and build upon the fall chinook studies that are currently in place and generating results; compliments on- going research and monitoring efforts; generates data that has multiple applications to long and short-term management questions; is consistent with the present approach to evaluating the fall chinook transportation program and the baseline benefits of the BIOP spill measures. The proposed research reviewed here does not address the components of the study design supported by the CBFWA agencies and tribes.