



FISH PASSAGE CENTER

1827 NE 44th Avenue, Suite 240, Portland, OR 97213

Phone: (503) 230-4099 Fax: (503) 230-7559

<http://www.fpc.org/>

e-mail us at fpcestaff@fpc.org

MEMORANDUM

TO: Ed Bowles, ODFW
Rob Lothrop, CRITFC
Guy Norman, WDFW
Sharon Kiefer, IDFG
FPAC

Michele DeHart

FROM: Michele DeHart

DATE: February 21, 2006

RE: Predicting 95% passage for sub-yearling Chinook to manage spill

In response to your request FPC staff reviewed the BPA document entitled, "Alternative Methods to Assess In-season Migration Timing of Snake River Fall Chinook, for Collaborative Discussion, February 15, 2006". In addition Tom Lorz, CRITFC distributed a document prepared by William Connor, for estimating the passage of daily numbers of wild or hatchery surrogate sub yearling Chinook that pass Lower Granite, Little Goose and Lower Monumental or Ice Harbor dams to the Fish Passage Advisory Committee. We have also included a review of that document. The FPAC discussed this issue briefly and there was not agreement, although NOAA indicated some agreement with the idea of predicting 95%.

The issue of predicting 95% passage for the purpose of ending spill for fish passage has been discussed repeatedly in the region for the past several years. There are several documents addressing this subject over the years and they are included here by reference. The same methods discussed in the BPA draft were discussed in past years. In each of those discussions the limitations of accurately predicting percent passage were identified. The same limitations exist at the present time and are identified in the BPA proposal. The following points summarize our conclusions. There are many ways of developing a prediction of 95% passage of fall Chinook sub-yearlings however all of the proposed methods have limitations, which BPA identified, that make them unreliable for managing spill, particularly since spill is being utilized as a tool to "spread-the-risk" for transportation for the migration-at-large which requires adult return data.

- The addition of summer spill at collector projects is a major change in project operations which is likely to affect passage timing and distribution of fall Chinook, making predictions based on historic non-spill conditions tenuous.

- The Connor et al method and the McCann/FPC method for **estimating** passage distribution after the fact are similar and only differ in the type of distribution used to redistribute fish only detected at Little Goose Dam back to Lower Granite Dam. Where the FPC assumed a gamma distribution for estimating travel time destination and the Connor/NOAA method assumed a directly proportional distribution based on numbers of fish detected at both dams. Both methods have similar limitations as described later in this document. The Connor/NOAA method used Snake river natural/wild and Snake River surrogate fish together which raises additional questions. The degree to which the mark groups used represents the total wild/natural population is questionable.
- The most prudent approach for managing summer spill for the immediate future is to utilize the NOAA Biological Opinion planning date of August 31, while collecting a data time series on juvenile fish passage under the summer spill operation. This requires an adequate marking program. This will in turn establish a data base that reflects the new summer spill operation, and which would form a basis for future spill management decisions. It is likely that spill will affect passage distribution and timing, maintaining a consistent operation for several years will provide passage timing and allow for consideration of adult return data, consistent with evaluation of the transportation program.
- At the present time PIT tag mark groups are not designed to provide a basis for managing spill or predicting passage of the population through the system. If this is the objective a consistent marking program designed for the purpose of managing passage should be developed to provide a basis for adaptive management decisions. One possible method would require all hatchery fish to be marked (by a regionally agreed upon method such as coded wire tag, fin-clip, or other), which would allow all wild fish to be identified. This would allow direct estimation of timing via passage index, but would still require some method of expansion that utilizes PIT-tags to address in-season changes in spill efficiency and guidance due to changes in operations, changing river conditions, or changes in the fish through time either physiological (e.g. smoltification or behavioral change with season) or physical (smaller or larger fish migrating later for example). As it is now, we have no method of positively distinguishing wild from unmarked hatchery fish.

BPA Alternative Methods for predicting 95% passage

The prediction of the 95% point of passage for sub-yearling Chinook in the Snake River is discussed every year. Specifically in 2003 the federal parties made a similar proposal to manage spill, which only occurred at Ice Harbor, according to prediction of 95% passage based upon historical passage indices and Snake River PIT tag groups. At that time the limitations and requirements of managing to a percent passage date were discussed in the NOAA Regional Process and agreement was not reached on a method to determine 95% passage nor was there agreement on extending spill past the NOAA planning date if a predicted 95% passage occurred after the planning date. The BPA draft methodology document identifies the same methods that have been discussed in the regional forum in past years and the same limitations which are still relevant. The limitations identified in the BPA document do not allow the 95% point of passage to be predicted accurately in season. In addition the historical data which is the basis of each of these methods reflect completely different passage conditions than those anticipated for the

summer of 2006 and different population characteristics that existed prior to the fall Chinook supplementation program. Some of the limitations to accurately predicting 95% passage are:

- Present marking programs do not mark a known proportion of the population or components of the population or the entire passage distribution of the population and therefore do not provide a sound basis for predicting passage. This has been discussed each year. In years prior to large scale supplementation, PIT tag passage distribution of wild subyearling Chinook differed significantly from passage at large.
- The implementation of summer spill represents a major change in operations which will likely affect fish passage distribution and timing. Historic data does not reflect spill, particularly in August. There is no historic data that incorporates spill in late summer and so no adequate historic data base to support a prediction method for in-season management.
- The BPA methods of predicting 95% passage and the Connor method of estimating passage distribution after-the-fact are based on Snake River PIT tags only without consideration of the Clearwater River component of the ESU which have an extended migration pattern. This represents a management decision that spill will not be provided for the majority of Clearwater wild/natural fall Chinook. A methodology should not substitute for a management decision. If the decision is made to manage Clearwater fall Chinook migrations in a different manner or with different objectives, that decision should be made consciously with clear and open discussion rather than inadvertently or ad-hoc through adoption of a methodology for managing spill.
- Surrogate fish are utilized as part of a research program and may or may not reflect wild or natural fish, or hatchery fish passage. In fact year to year the surrogate fish are not a consistent group.
- The 95% point of passage is affected by project operations and environmental variables. Past data has shown that the 95% point of passage can occur earlier in low flow years when survival is low, because of a high mortality rate at the later part of the migration. Low detection probabilities of PIT tags when spill occurs can affect an estimated point of 95% passage if PIT tags are the basis of the estimation. High survival throughout the passage period can result in a later 95% passage date.

Connor/NOAA estimation of after the fact passage distribution

FPC estimation of after the fact passage distribution

- The Connor/NOAA method mixes “surrogate” fish with Snake River marked fish in order to have enough tags to provide estimation in July and August. These fish are part of the NOAA transportation research study and are a special group that are neither reared as part of the normal hatchery production nor are they wild/natural. Making inferences to the run-at-large on the basis of this group or treating them as if they were part of the Snake River natural/wild marks raises questions.
- Both the FPC and Connor/NOAA methods utilize only PIT tags and therefore are making inferences about the after-the-fact passage distribution of the PIT tag groups. Again because the PIT tag groups represent an unknown proportion of the population and because PIT tags are not applied throughout the passage distribution inferences to the entire population should be conditioned on these points.