



# FISH PASSAGE CENTER

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## MEMORANDUM

TO: Rick Kruger

FROM: Michele DeHart

DATE: September 10, 2012

RE: Comments on Bypass Selectivity Proposals to SRWG

In response to your request, the FPC staff has reviewed the two proposals submitted to SRWG on the evaluation of selectivity of juvenile bypass systems (Marsh and Smith; Ham and Skalski). Both studies have significant problems in that they propose to use fish collected in bypass units to test the selectivity of other bypass units, which will potentially bias results. In addition, no assessment of biologically significant differences are defined in either study. Below are our additional comments.

- Neither study defines the level of significance that will be used to define a difference. Consequently, it is impossible to determine how the study results would be applied to management decisions.
- Both studies propose to use smolts collected in bypass systems for at least part of their analyses. Most components of the Marsh and Smith proposal require collection at Lower Granite Dam. If bypass systems are selective, the study fish will not represent the population and, therefore, will not be able to measure the true impact on the smolt population. This potential for bias associated with collecting study fish at Lower Granite Dam is why studies such as the CSS use fish tagged above Lower Granite Dam.

- If tagged fish are collected in traps far upstream from Lower Granite, their size at tagging may not correlate to their size at encountering a project given the variability in growth rate.
- Neither study indicates how multiple dam bypass events will be incorporated into the models. If there is a cumulative effect of juvenile bypass as indicated in other studies (Buchanan et al. 2010, Tuomikoski et al. 2010), the fact that these models require multiple detections may bias results.
- Observed delayed mortality could be caused by conditions acquired when passing through the bypass system (injury, disease, etc.), through the size selectivity of bypass systems, or an additive or synergistic combination of these two factors. However, both of these proposals are designed to generate a yes-or-no answer as to whether or not higher mortality in bypassed smolts is a measure of bypass selectivity due to size.
- The Ham and Skalski proposal includes using PIT-tag and CSS data, and data from JSATS tagging previously used for past performance standards testing for a retrospective analysis.
  - The PIT-tag data will be used in the Manly-Parr model to calculate detection probability. This utilizes downstream detections and therefore requires the assumption that downstream dams are not size-selective. This assumption is not valid for a study designed to test the size-selectivity of bypass systems.
  - Smolts used in performance testing are collected by the Smolt Monitoring Program at different projects and exclude previously PIT-tagged fish. Therefore, their passage history for all upstream projects is unknown. The initial sample may be significantly biased due to experiencing multiple selective bypass events.
  - Limitations on tagging size with JSATS tagging means that the smallest smolts collected were not used in performance standards. Given that this proposal is to test the size selectivity of bypass systems, this tagging limitation will very seriously limit the applicability of the results. In 2010, 3% of smolts were rejected from JSATS tagging due to size. However, this number is significantly higher than average in subyearling Chinook, for which 27% of rejections were due to size.
  - This is especially true for runs that are on average smaller, such as subyearling Chinook.
  - JSATS tags cause a significant tag burden when compared to PIT-tagging. Acoustic tags used in 2010 performance standards were 12.02 mm in length, 12.7% of the body length of the smallest tagged fish. If this tag burden causes a change in swimming ability or behavior in smaller tagged fish, it may significantly bias results.

- The Marsh and Smith proposal contains numerous components, including several retrospective analyses as well as experimental manipulations.
  - This proposal states that “bypass systems are an unavoidable component of the transportation program”, then goes on to say, “if... bypass systems are selective... [it] result[s] in biased estimates (underestimates) of transportation benefits”. This statement makes little sense because if bypass systems are an unavoidable part of transportation, you cannot estimate transportation benefits without bypass systems. Consequently, the questions this proposal is trying to answer are unclear.
  - The fish to be included in the retrospective analysis of Hostetter et al. (2011), fish condition on detection probability, prevalence of parasites, and swimming ability will all be collected at Lower Granite, on the assumption that there is no bypass selectivity. As stated previously, this introduces an additional potential level of bias to the experiments.
  - The power and effect size of the test are not included for any component of this proposal. It is unclear what will be considered to be a biologically significant difference in the size or condition of bypassed fish.
  - To vary swimming ability in smolts, this proposal will require artificially reducing the swimming ability of 10,000 – 30,000 yearling Chinook by cutting the caudal fin. To replicate the study with Steelhead, equal numbers of Steelhead smolts will be intentionally damaged. It is not indicated in the proposal how this inflicted injury relates to or represents the swimming ability of the run at large. The results from this study will have limited applicability.
  - To generate smaller hatchery fish, a single raceway in the Dworshak hatchery will be fed less than other fish in the same hatchery. We are not aware of any studies that convincingly compare smaller fish that are fed less in a hatchery setting with fish that are naturally smaller in a wild environment. If these hatchery fish are weaker than smaller, wild fish, the results will be biased when compared to the run at large.

In conclusion, it is unclear what management questions these proposals intend to answer, or how these data will be used. No distinction is made in either proposal between statistical and biological significance with regards to the size selectivity of bypass systems. The power and effect size are not included for the various tests between treatments. The basis for using the assumption that one or more dams have no selectivity in the bypass is not appropriate for either design study. It does not appear that either study will significantly contribute to studies already conducted.

## References

Buchanan RA, Skalski JR, Townsend RL, Ham KD. 2011 The effects of bypass passage on adult returns of salmon and Steelhead: An analysis of PIT tag data using the program ROSTER. Final Report to the US Army Corps of Engineers, Walla Walla District, Contract # W912EF-08-D-0004 DO4.

Tuomikoski J, McCann J, Berggren T, Schaller H, Wilson P, Haeseker S, Fryer J, Petrosky C, Tinus E, Dalton T, Ehlke R. 2010. Comparative Survival Study (CSS) of PIT-tagged Spring/Summer Chinook and Summer Steelhead, 2010 Annual Report, Project No. 1996-020-00.



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### DATA REQUEST FORM

Request Taken By: Erin Cooper Date: Sept August 29 2012

Data Requested By:

Name: Rick Kruger Phone: \_\_\_\_\_  
Address: ODFW Fax: \_\_\_\_\_  
Email: rick.kruger@state.or.us

Data Requested:

Review of AFEP proposals regarding  
bypass selectivity for P413. Is one study preferable to the  
other, should both or neither be funded?

Data Format: Hardcopy  Text  Excel   
Delivery: Mail  Email  Fax  Phone

Comments:

Sent to FPAC

Data Compiled By: h s g Date: Sept 10 2012

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