



# FISH PASSAGE CENTER

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## MEMORANDUM

TO: Charles Morrill, WDFW

*Michele DeHart*

FROM: Michele DeHart, FPC

DATE: January 8, 2013

RE: Review Comments on, "Effects of Release History, Migration History, and Adult Detection Location on Smolt to Adult Return Rates for Snake River Sockeye Salmon", October 22, 2012

In response to your request the Fish Passage Center staff reviewed the subject report and has developed the following comments for your consideration. The subject report summarizes the objectives, methods, analyses and results of the U.S. Army Corps of Engineers Sockeye Pilot Study evaluating the smolt to adult return rates of Snake River Sockeye salmon relative to route of passage. The report includes analyses of PIT tagged sockeye salmon juveniles from the Redfish Lake Trap and the Sawtooth Trap in the 2009 downstream migration, returning in 2010 and 2011. Our summary conclusions are listed below followed by specific discussion.

- This document is the result of a pilot study and is too limited to support any fish passage management actions. In fact, the study conclusions only address future study design issues. SAR estimates and TIR estimates for the Redfish Lake PIT tag group should be considered with caution because, due to their larger size at release, they may not be representative of the sockeye hatchery population at large.
- The primary recommendation from this pilot study is that additional large PIT tag mark groups are required to evaluate Sockeye SAR by route of passage.
- Through a collaborative effort with the Idaho Department of Fish and Game, the Comparative Survival Study (CSS) will include a Sawtooth Sockeye PIT tag mark group to begin to build a time series of Sockeye SAR by route of passage which should provide a basis for fish passage management decisions in the future.

- The CSS Annual Report for 2012 includes SARs by route of passage for Snake River Sockeye Salmon for 2009 and sockeye juvenile passage characteristics relative to environmental variables. This limited early data does not indicate a benefit of transportation of sockeye smolts. We do not expect the pilot study group from the 2010 outmigration to generate a robust comparison of route of passage SARs because very few fish were transported in 2010. Future CSS reports will continue to update the sockeye time series as data is developed.

### **Comparative Survival Study Results Sockeye PIT tag groups**

Chapter 3, “Effects of the in-river environment on juvenile travel time, instantaneous mortality rates and survival”, of the 2012 CSS Annual Report summarizes juvenile passage characteristics relative to environmental variables such as river flow and spill. Steelhead, sockeye and yearling Chinook in the RIS-MCN reach all had faster fish travel time (*FTT*) when water travel time (*WTT*) was reduced. For sockeye, steelhead, and wild yearling Chinook in the LGR-MCN reach, the number of dams with spillway surface passage structures appears to have reduced instantaneous mortality rates (*Z*). Increases in water temperature were associated with increases in *Z* for sockeye in the LGR-MCN and RIS-MCN reaches, as well as steelhead in the MCN-BON reach. Steelhead, sockeye and yearling Chinook in the RIS-MCN reach all had faster *FTT* when *WTT* was reduced. The model-averaged predictions that were developed captured a very high degree of the variation in mean *FTT* of all species and reaches. These analyses of the sockeye pilot study groups begin to indicate that sockeye juveniles respond to flow and spill levels in a similar fashion to Chinook and steelhead juveniles.

Chapter 4, “Overall SARs, of the CSS Annual Report includes calculation of overall SARs for the Sockeye Pilot Study mark groups. The first juvenile migration year with sufficient numbers of PIT-tagged smolts to estimate SARs for Snake River hatchery sockeye is 2009. The hatchery sockeye SAR (LGR-GRA) for migration year 2009 was 1.15% for Sawtooth hatchery-reared sockeye and 2.03% for Oxbow hatchery-reared sockeye (Table 4.21). The estimated SAR LGR-to-BOA for Sawtooth sockeye in 2010 was 1.34% compared to 1.81% in 2009 (Table 4.21). In 2010 all PIT-tagged sockeye were routed in-river. There were very few incidentally transported PIT-tagged fish in 2010, therefore, an estimate of overall SAR LGR-to-GRA was not possible for the Sawtooth hatchery group. Sample size was limited for the Oxbow hatchery sockeye group both years, and estimation of SAR to either GRA or BOA was not possible for the Oxbow in 2010.

#### **Redfish Lake (Oxbow) PIT tag mark group vs Sawtooth PIT tag mark group.**

The report concludes that Transport to in-river ratio was larger than 1.0 for both mark groups but adds that the transport and in-river groups for the Sawtooth mark group (reared at Sawtooth Hatchery) were not significantly different resulting in a limited indication that there was no apparent benefit of smolt transportation for that group.

However, the Redfish Lake mark group (reared at Oxbow Hatchery) showed a statistical difference between the transported and in-river groups resulting in a limited preliminary indication that there is a potential benefit of transportation for that mark group. These results

must be considered with caution. The mark group in the Redfish Lake release was raised at Oxbow Hatchery and their size at release was 10.2 fish per pound. By comparison, the Sawtooth PIT tag mark group release size was 30.6 fish per pound. If there is a relation between juvenile size and survival to adulthood, then the difference in size at release between these two groups must be taken into consideration.

In addition, the summary of current PIT tag data shows that Oxbow hatchery sockeye adult returns include a much higher component of age-3 (1-salt) adults and therefore a lower age at maturity than their Sawtooth hatchery counterparts. Both sockeye stocks appear to consist mostly of age-4 adults. Results from the Redfish Lake Group discussed in this report are unlikely to represent the Snake River Sockeye populations at large and therefore these results should be considered cautiously.

In summary, this study is an evaluation of limited data. It is far too limited to use to apply the results from the first year of study to any management action.



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**DATA REQUEST FORM**

Request Taken By: Michele Date: 10-26-2012

Data Requested By:  
Name: Charles Monvill Phone: \_\_\_\_\_  
Address: WDFW Fax: \_\_\_\_\_  
Email: \_\_\_\_\_

Data Requested:  
see attached - review sockeye  
pilot study 10/2012

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

Comments:  
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\_\_\_\_\_

Data Compiled By: Michele/Margaret Date: 1-8-2013

Request # 1