



FISH PASSAGE CENTER

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MEMORANDUM

TO: Paul Kline, IDFG
Russ Kiefer, IDFG

Michele DeHart

FROM: Michele DeHart

DATE: March 20, 2012

RE: Comparison of juvenile spring Chinook and steelhead survival estimates, Faulkner et al. (2010) and the Comparative Survival Study (CSS) (2011).

In response to your request the Fish Passage Center (FPC) staff reviewed the annual in-river survival estimates presented in the Comparative Survival Study (2011) and the survival estimates presented in “Survival Estimates for the Passage of Spring-Migrating Juvenile Salmonids through Snake and Columbia River Dams and Reservoirs, 2010” (Faulkner et al. NOAA). The purpose of the review was to investigate why survival estimates for wild spring Chinook and steelhead in the Lower Granite to Bonneville reach, differed in the two reports. It was noted that the CSS survival point estimates were higher in some years when compared to the NOAA estimates.

We compared estimates in Tables 27 and 28 “Hydrosystem survivals” from Faulkner et al. (2010) with Tables 2.2 and 2.4, pages 42-44 in the CSS 2011 annual report. In general, as you observed, the survival estimates from Lower Granite to Bonneville for wild yearling Chinook and wild steelhead are somewhat lower in the Faulkner et al. (2010) report when compared to the survival estimates for the same river reach and the same years in the CSS 2011 report. The two reports utilize the same analytical methodology to estimate juvenile survival but there are some differences in implementation and study design which affect the resulting estimates. The survival estimates differ in the two reports because:

- The CSS study was designed to mark fish upstream from the FCRPS, specifically, avoiding marking at the hydroelectric projects because past data indicated that marking at the projects resulted in a downward bias in juvenile survival. The CSS analysis and survival estimation does not include fish that are sampled and PIT tagged at the

hydroelectric projects, or included in the delayed mortality studies conducted by NOAA at Lower Monumental. The FPC summarized these points in two separate memorandums which are posted on the FPC website at, <http://www.fpc.org/documents/memos/50-08.pdf> <http://www.fpc.org/documents/memos/33-08.pdf>.

- The majority of wild Chinook and steelhead mark groups analyzed by NOAA are collected from the juvenile sampling system and marked at the Lower Granite Dam. The following table (Table 1) shows percentage composition of wild fish marked at Lower Granite for 2006-2010 (years where you noted large differences in the estimates). The wild yearling Chinook and steelhead utilized in CSS groups are marked at traps and weirs throughout Idaho and Oregon, and the mark group analyzed is formed by an aggregate population of those tags at Lower Granite Dam.

CSS Percentage of NOAA survival estimates

Table 1. Smolts used in NOAA analyses and CSS smolts available to be included in NOAA analyses total.

Tagged fish used in NOAA Analyses

Migration Year	Tagged		Total Analyzed		source
	Wild St.	Wild Ch.	Wild St.	Wild Ch.	
2006	14,144	9,717	NA*	NA*	Faulkner et al. 2006
2007	11,286	14,576	NA*	NA*	Faulkner et al. 2007
2008	15,991	9,714	18,265	16,450	Faulkner et al. 2008
2009	15,250	13,304	19,501	23,027	Faulkner et al. 2009
2010	12,917	17,076	14,500	24,076	Faulkner et al. 2010

*Data not available

CSS fish detected at LGR and available to be included in NOAA Analyses

Migration Year	Detected at LGR		Percent of Analyzed	
	Wild St.	Wild Ch.	Wild St.	Wild Ch.
2006	1417	3321	10% (of tagged)	34% (of tagged)
2007	1199	4705	11% (of tagged)	32% (of tagged)
2008	1704	5301	9%	32%
2009	3033	8513	16%	37%
2010	1373	3575	9%	15%

- The NOAA survival estimates include re-grouping of PIT tag groups at McNary Dam to estimate survival from McNary to Bonneville. These groups include PIT tags utilized in delayed mortality study treatment groups. The re-grouping of marks at McNary is effective in increasing sample size for the estimation of survival from McNary to Bonneville. The CSS study design does not utilize the same mark groups and does not utilize fish that are included in the delayed mortality study. In some cases this results in an inadequate sample size for a CSS estimate below John Day Dam. In those cases the CSS estimates are expanded per mile to Bonneville from John Day.

- Wild steelhead smolts marked as part of the CSS program typically were 16% or less of those included in the NOAA survival estimates presented in Faulkner et al. 2010. Wild Chinook marked in the CSS often composed about one third of the sample size of those smolts used in NOAA estimation (table above). While the point estimates of survival from LGR to BON may have looked different they were never statistically different in the CSS and Faulkner et al. 2010 (figure 1 below).

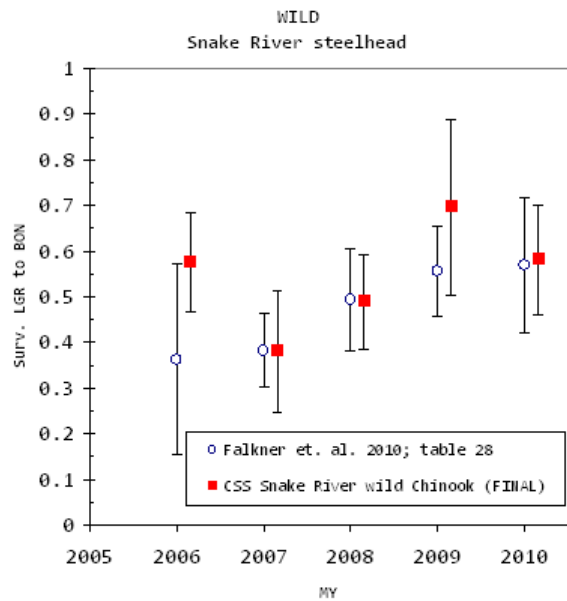
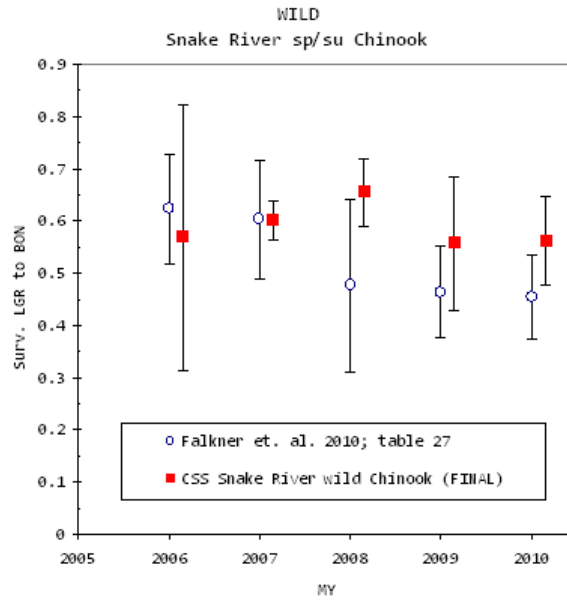


Figure 1. Survival from LGR to BON as estimated in the CSS (red squares) and Faulkner et al. 2010 (blue circles); both shown with 90% CI's. Wild Chinook are shown in the top panel and wild steelhead are shown in the bottom panel.