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MEMORANDUM

TO: Russ Kiefer, IDFG

FROM: FPC Staff

DATE: April 21, 2008

RE: Seasonal Timing of CSS groups

At the March 18, 2008 FPAC meeting NOAA Fisheries Staff came to discuss the transportation data. At the meeting a question was raised by NOAA Fisheries as to whether the aggregate PIT tag groups of wild Chinook and wild steelhead originating above Lower Granite Dam are truly representative of the wild populations outmigrating each year. Specifically, NOAA stated that the CSS wild spring Chinook TIR estimates were heavily weighted to early migrating Imnaha stocks. NOAA stated that earlier migrating stocks had higher in-river survival and therefore it is unlikely that the CSS groups were representative of the run at large. You requested that we explore this comment.

Wild Chinook

An investigation of the CSS PIT tagged wild Chinook aggregate and the contribution and migration timing of the various drainages above Lower Granite Dam in that aggregate will help address the NOAA comments.

In Appendix F of the CSS 10-Year Retrospective Summary Report, a series of timing plots show when PIT-tagged wild Chinook from each of the key drainages above Lower Granite Dam passing that facility. The PIT-tag detections in these plots were adjusted by the passage index expansion, which adjusts for differences in daily proportion of flow through the powerhouse (assuming a conservative 1:1 ratio of fish per unit water through the powerhouse and spillways).

These plots show that the earliest arriving wild Chinook were from the Imnaha River basin and the latest arriving wild Chinook were from the Clearwater River basin. For migration years 1997 to 2004, the 8-yr median date of 50% passage (Table 1) tended to be approximately 1-week earlier for the Imnaha River (IMN) basin wild Chinook compared to Grande Ronde (GRN) and Salmon River (SAL) basin wild Chinook, while the Clearwater River (CLW) basin wild Chinook tended to be approximately 2-weeks later than the Grande Ronde and Salmon River basin fish.

Table 1. Dates of median passage of timing distribution of PIT-tagged wild Chinook at Lower Granite Dam, where timing distribution consists of the daily PIT-tag detections adjusted by passage index expansion.

year	CLW	GRN	IMN	SAL
1997	5/8	4/30	4/18	4/28
1998	5/7	4/30	4/24	5/2
1999	5/24	5/1	4/27	5/2
2000	5/12	5/4	4/22	5/1
2001	5/15	5/6	4/28	5/11
2002	5/20	5/4	5/3	5/3
2003	5/26	4/29	4/24	5/3
2004	5/18	5/6	4/29	5/4
8-yr median date	5/17	5/3	4/26	5/3

NOAA Fisheries has remarked that the CSS aggregate wild Chinook tag group is impacted by having too high a percentage of PIT tags originating from the Imnaha River basin, which tends to be the earliest group to arrive Lower Granite Dam. Table 2 shows the percentage composition of the PIT-tags from each basin in the aggregate. With the exception of a much higher than average IMN tag proportion in 2001 and GRN tag proportion in 1997, the percentage contribution from each basin remained relatively stable across the years.

Table 2. Percentage of PIT-tagged wild Chinook at Lower Granite Dam from each major upstream tributary in the CSS PIT-tag wild Chinook aggregate, 1997 to 2004.

year	CLW	GRN	IMN	SAL
1997	6.3%	42.1%	23.1%	28.5%
1998	12.9%	21.2%	33.3%	32.6%
1999	13.2%	13.0%	19.1%	54.7%
2000	10.7%	13.1%	23.2%	53.1%
2001	7.2%	10.2%	42.6%	40.0%
2002	21.0%	14.8%	13.1%	51.0%
2003	12.1%	14.1%	18.5%	55.2%
2004	14.3%	15.4%	23.0%	47.4%
8-yr average	12.2%	18.0%	24.5%	45.3%

In Figure 1, a comparison of the cumulative passage distribution of the CSS aggregate PIT-tagged wild Chinook group is made with the overall wild Chinook run-at-large (RAL), which consists of the unclipped (no CWT) yearling Chinook in the subsamples of the total run collected at Lower Granite Dam by the Smolt Monitoring Program. The PIT-tag detections and run-at-large counts are both adjusted by the passage index expansion. The timing distribution of the CSS aggregate at Lower Granite Dam and the overall wild Chinook run-at-large timing distribution were very similar for migration years 1998, 1999, and 2000, and differed in the later half of the distribution in 1997, 2002, 2003, and 2004 by being later for the CSS aggregate, and not earlier as inferred by NOAA fisheries. In 2001 the middle of the CSS aggregate wild Chinook passage distribution was earlier than that of the run-at-large wild Chinook, and the higher contribution of IMN tagged fish (which arrived earlier than other basin fish) in the detections at Lower Granite Dam very likely contributed to that earlier CSS aggregate group's timing distribution. But the timing data of the other seven years do not support the NOAA claim that IMN tagged fish are unduly influencing the CSS analysis results.

Wild Steelhead

Similarly, we conducted an investigation of the CSS PIT tagged wild steelhead aggregate and the contribution and migration timing of the various drainages above Lower Granite Dam in that aggregate.

In Appendix F of the CSS 10-Year Retrospective Summary Report, a series of timing plots at Lower Granite Dam are also present for the PIT-tagged wild steelhead from each of the key drainages above Lower Granite Dam passing that facility. The PIT-tag detections in these plots were adjusted by the passage index expansion. These plots show that the earliest arriving wild steelhead were from the Clearwater River basin and the latest arriving wild steelhead were most often from the Imnaha River basin. This is the opposite trend to what is observed with wild Chinook. For migration years 1997 to 2004, the 8-yr median date of 50% passage (Table 3) for the Clearwater River (CLW) basin wild steelhead tended to be approximately 1-week earlier than the Salmon River (SAL) basin wild steelhead and approximately 2-weeks earlier than the wild steelhead from the Grande Ronde (GRN) and Imnaha River (IMN) basins.

Table 3. Dates of median passage of timing distribution of PIT-tagged wild steelhead at Lower Granite Dam, where timing distribution consists of the daily PIT-tag detections adjusted by passage index expansion.

Year	CLW	GRN	IMN	SAL
1997	4/22	5/10	5/8	5/22
1998	4/27	5/9	5/4	5/2
1999	4/28	5/1	5/19	5/3
2000	4/20	5/1	5/11	4/28
2001	5/1	5/7	5/14	5/5
2002	4/20	5/22	5/17	4/28
2003	4/29	5/26	5/14	5/7
2004	5/3	5/10	5/8	5/8
8-yr median date	4/28	5/10	5/13	5/4

The CSS aggregate wild steelhead tag group consists of a higher proportion of PIT tags that originated from the Clearwater River basin (Table 4), which tends to be the earliest group to arrive Lower Granite Dam (Table 3). The second highest proportion of PIT tags originated from the Imnaha River basin, which tends to be the latest group to arrive Lower Granite Dam. With the exception of a much higher than average CLW tag proportion in 1997, the percentage contribution from each basin in other years remained relatively stable across the years.

Table 4. Percentage of PIT-tagged wild steelhead at Lower Granite Dam from each major upstream tributary in the CSS PIT-tag wild steelhead aggregate, 1997 to 2004.

Year	CLW	GRN	IMN	SAL
1997	70.2%	4.0%	17.3%	8.5%
1998	44.9%	12.5%	35.9%	6.7%
1999	37.2%	18.0%	24.8%	20.0%
2000	40.2%	16.1%	27.9%	15.8%
2001	40.6%	14.1%	24.4%	20.9%
2002	52.6%	16.0%	17.5%	13.9%
2003	27.1%	19.3%	38.1%	15.4%
2004	30.6%	15.1%	41.2%	13.1%
8-yr average	42.9%	14.4%	28.4%	14.3%

In Figure 2, a comparison of the cumulative passage distribution of the CSS aggregate PIT-tagged wild steelhead group is made with the overall wild steelhead run-at-large (RAL), which consists of the unclipped steelhead in the subsamples of the total run collected at Lower Granite Dam by the Smolt Monitoring Program. The PIT-tag detections and run-at-large counts are both adjusted by the passage index expansion. The timing distribution of the CSS aggregate at Lower Granite Dam and the overall wild steelhead run-at-large timing distribution were virtually identical for migration year 2004, and in 1997, 1998, 2001, and 2003, the distribution for the CSS aggregate was only slightly earlier than the overall wild steelhead run-at-large timing distribution during most of the season. Migration year 1999 saw a later migration timing of the CSS aggregate (through the 75% percentile of that year's timing distribution). Only in migration years 2000 and 2002 is there a fairly substantial shift earlier in the timing distribution of the CSS aggregate at Lower Granite Dam. In both 2000 and 2002, the CLW tag group had their earliest date of median passage (April 20) at Lower Granite Dam, and were present in the aggregate in a high percentage, so the Clearwater River basin wild steelhead may have had a sizeable influence on the CSS analysis results of wild steelhead for those two migration years. Although the 1997 timing the CSS aggregate and run-at-large wild steelhead were fairly similar, the fact that 70% of the CSS wild steelhead aggregate arriving Lower Granite Dam that year were from the Clearwater River basin, so undoubtedly that drainage had a sizeable influence on the CSS analysis results for 1997.

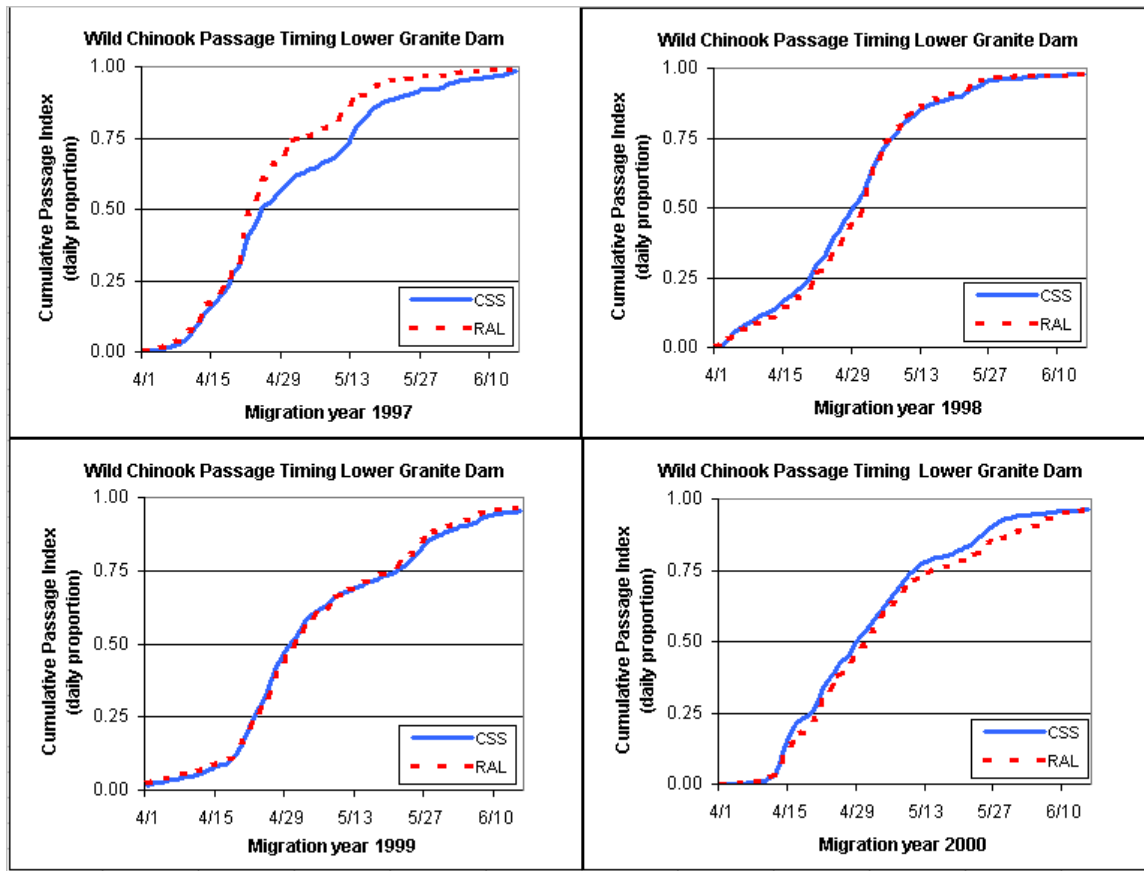


Figure 1. Cumulative wild Chinook passage timing distributions at Lower Granite Dam for the CSS PIT-tagged wild Chinook aggregate compared to the run-at-large (RAL), which consists of untagged and tagged fish numbers expanded from the facility sampling of the Smolt Monitoring Program.

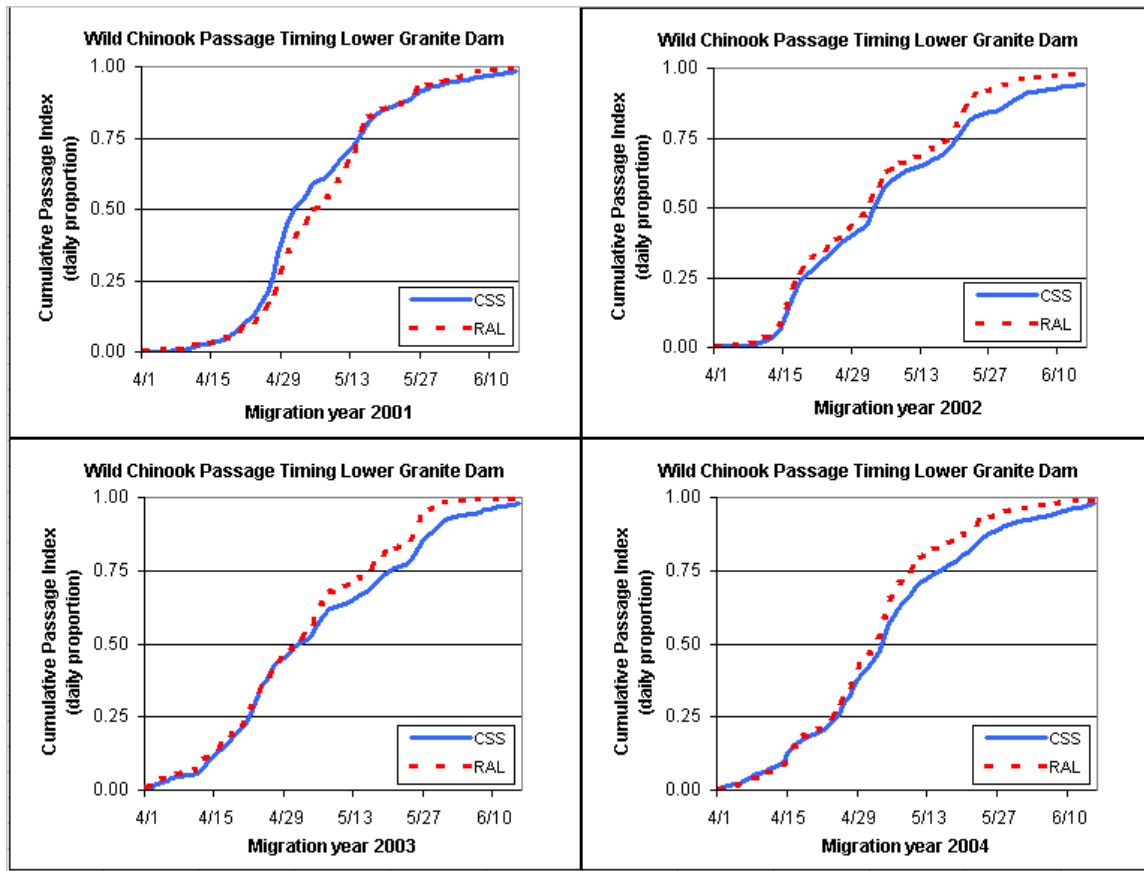


Figure 1. Continued.

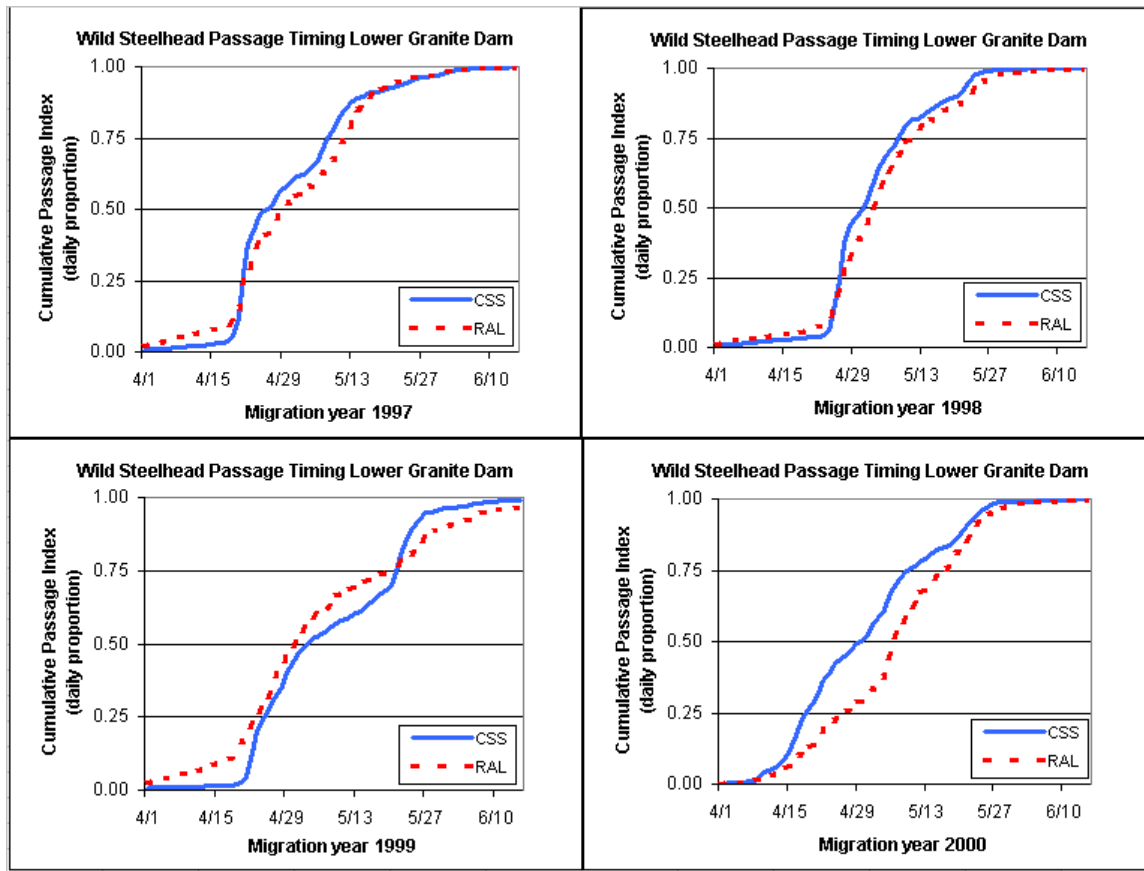


Figure 2. Cumulative wild steelhead passage timing distributions at Lower Granite Dam for the CSS PIT-tagged wild steelhead aggregate compared to the run-at-large (RAL), which consists of untagged and tagged fish numbers expanded from the facility sampling of the Smolt Monitoring Program.

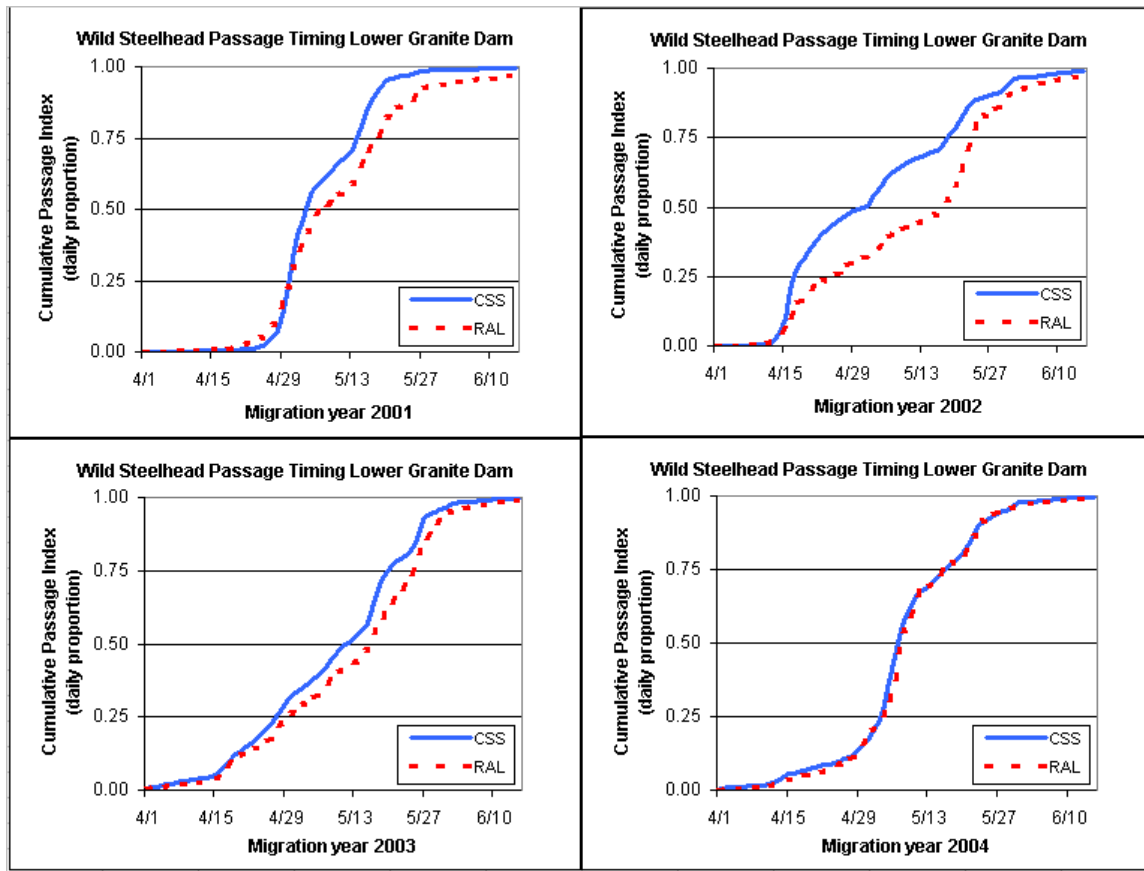


Figure 2. Continued.