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MEMORANDUM

TO: FPAC

Michele DeHart

FROM: Michele DeHart

DATE: August 18, 2003

RE: Update status of sub-yearling chinook passage and the determination of a 95% passage date.

We are providing the following brief points updating subyearling chinook downstream passage on the basis of monitoring information and a discussion of the probability of accurately predicting a 95% passage date.

- The concept of protecting 95% of the juvenile fish run is difficult to quantify. Fish pass through the hydrosystem year round, however, passage increases during the time noted as “in-season”. Any 95% passage date based on migration in-season already excludes those fish that don’t pass during “prime-time” passage.
- In the 1980’s and early 1990’s mitigation for the hydrosystem development was often based on protecting the middle 80% of the run. This middle 80% was dominated by large numbers of fish released from hatcheries that all migrated around the same time period causing a peaked or “bell” shaped curve. Fish managers argued that managing in this fashion afforded little, or no, protection to the tails of the migration (either early or late). Individual stocks of wild fish could display either an early or late migration that occurred completely outside of the middle 80% passage dates and consequently not be afforded any protection measures.
- To address this issue the region began looking at the migration in more detail to include migrating fish in the tails under the umbrella of protection. Reference and planning based on the 95% date of passage became more common. While it seems intuitive that 95% dates would include the tails of the run, the actual management based on available data may in fact mislead managers into thinking a majority of fish are being protected. For example, the Mid Columbia projects are operating on the basis of spilling until the 95% passage date. Based on an in-season methodology for predicting the 95% passage

date, the 2003 spill program has ended at Rocky Reach, Rock Island and Wanapum dams and will end soon at Priest Rapids Dam. However, spill is scheduled to continue at Wells Dam until August 26 based on the historic passage 95% date (21 years of hydroacoustic data). Since this project is above all the other projects it is apparent that 95% passage of the upper Mid Columbia stocks will not be protected by spill at the lower Mid Columbia projects. The point here is that the intent of the 95% passage date was to protect the genetic integrity of the tails of the migration. However, by managing on a project-by-project basis and using the 95% passage of the run-at-large we may be managing against the part of the population that initially caused managers to extend protection to the 95% passage date.

Snake River

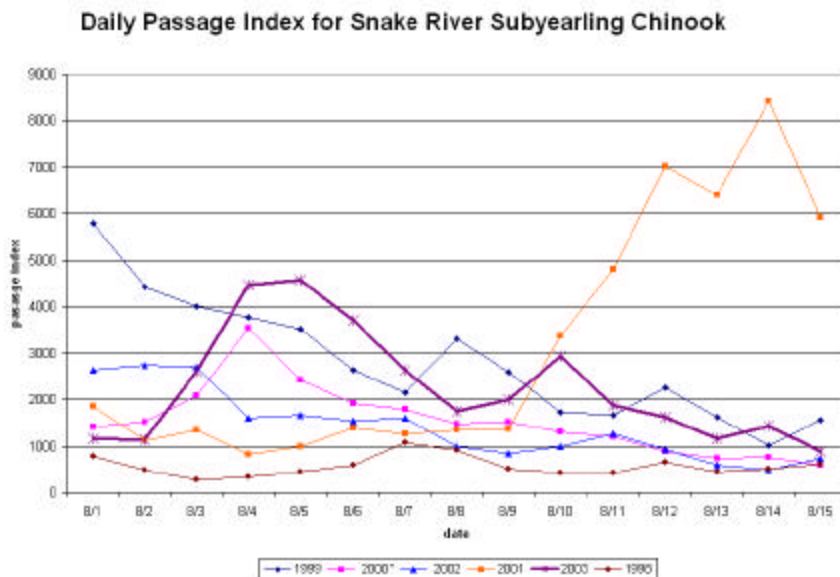
- The dates in the Biological Opinion were not based on an actual 95% passage date, but were negotiated based on the impact to the hydropower system. Historic data shows the actual 95% passage dates extend into the fall. By choosing August 31 as the end of protection a factor of compromise is already incorporated into the protection period.
- Present in-season passage distributions of subyearling migrants at Lower Granite Dam are difficult to interpret. Predictions based on the run-at-large have been heavily influenced by the addition of hatchery supplementation fish. These fish are relatively large at time of release and pass through the river relatively quickly. The numbers (over a million in past years) dwarf the wild population, which numbers in the thousands. The faster and therefore earlier migration of the supplementation fish causes the passage distribution to skew earlier and is likely completed earlier than the wild fish migration.
- In addition, the run-at-large 95% passage date appears to be getting earlier as the years progress. This is an artifact of the large numbers of supplementation fish that are being added to the system. (Passage indices at Lower Granite Dam ranged from a low of 18,500 in 1996 to over 1.1 million predicted for 2003). These supplementation fish are migrating earlier and in large numbers, which skews the distribution to look like it is now occurring earlier.

Table 1. The 95% passage date at Lower Granite Dam for the run at large (hatchery and wild combined) and the wild PIT tagged fish

YEAR	95% Passage Date Run at Large	95% Passage Date Wild PIT Tagged Fish
1995	Oct 11	Sept 14*
1996	Sept 20	Aug 27
1997	Sept 23	Sept 14
1998	Sept 26	Aug 15
1999	Sept 22	Aug 15
2000	Sept 08	Sept 14*
2001	Aug 16	Aug 18
2002	Aug 31	July 28

*Last date category actual date may be later

- Reliance on passage timing as determined on the basis of wild PIT tag recoveries also has limitations. Marking of these designated wild fall chinook is limited by two factors, the first is size at time of marking and the second is availability of fish to mark. As fish grow and mature they move from near shore areas and decrease in availability to beach seining techniques used for collection. Consequently, it is difficult to determine the portion of the run that is represented by the wild PIT tagged fall chinook. Likely, because of the accessibility of early fish the PIT tagged distribution is skewed early. This is consistent with what is observed when the PIT tagged subpopulation is compared to the run-at-large timing at Lower Granite Dam (Table 1). (Also, this discrepancy is recognized and documented on the DART in season forecast metadata. Historical data shows that on average the 95% point of passage for the run-at-large is on average 27 days later than the wild Snake River PIT tagged group.)
- The sub-yearling chinook passage index at Lower Granite Dam is averaging 2,261 fish per day, for the past 15 days. For the past three days the passage index at Lower Granite has maintained near 2,000 fish per day. This is a substantial number of migrants and represents about 2.5% of the migration to-date. With an average estimated travel time of 17 days (based on the wild subyearling travel time estimates observed thus far in 2003) the fish have begun arriving and will continue to pass Ice Harbor Dam throughout the next several weeks.
- The 2003 migration appeared to initially migrate earlier than it has in the last several years. However, the environmental conditions in 2003 (flow that are, and have been, much below the Biological Opinion flow targets) have likely caused the migration to tail for a longer period of time. The daily passage index at Lower Granite Dam for subyearling chinook is not any different than observed in past years' for passage during this time period.



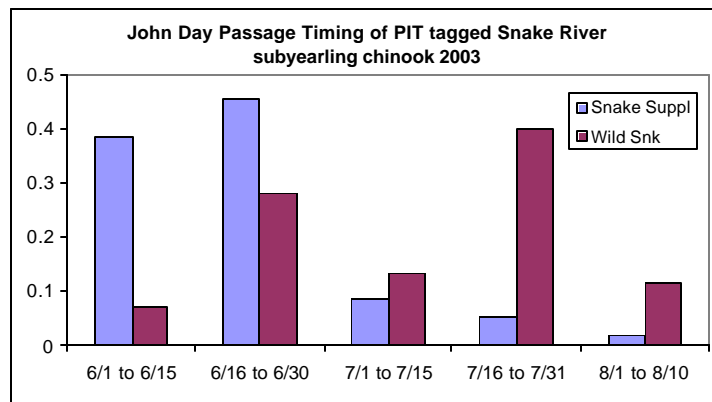
- Based upon historical travel time data, at the present flows in the Snake River, wild fall chinook passing Lower Granite Dam are expected to have a 19-day travel time to McNary Dam and an additional 5-day travel time to below Bonneville.
- Small numbers of PIT tagged wild and hatchery chinook continue to be detected at Lower Granite Dam, from the Nez Perce hatchery, Pittsburgh Landing, and release groups from Lyons Ferry.
- Based on PIT-tags of wild subyearlings in the Clearwater River, a large portion of that population is still rearing above Lower Granite Dam. A total of 663 subyearling chinook were marked in the Clearwater River in 2003. Of those fish only 15 have been detected at Lower Granite or Little Goose dams.
- Much effort has been made this year to protect small numbers of late migrating fall chinook from the Clearwater drainage. Flow augmentation protection for fall chinook migrants passing during the month of August was decreased in order to protect these fish. It is inconsistent to hold water in reserve for these fish in September, while at the same time terminating spill mitigation in the lower Snake River.

Lower Columbia River

- The daily passage index at McNary Dam during the first two weeks of August has averaged approximately 41,000 subyearling chinook smolts per day. With no spill and assuming around 50% FGE at this time of the season, the population of smolts (PIT tagged and non-tagged) is projected to be approximately 82,000 wild and hatchery smolts per day. The estimated number of hatchery subyearling chinook arriving at McNary Dam during this time period (also assuming a 50% FGE) is projected to be approximately 1,713 smolts per day (based on expanding production fish PIT tag detections at McNary Dam by the proportion of PIT tags released with production). During the first two weeks of August the hatchery subyearling chinook appear to be accounting for only 2% of the subyearling chinook arriving at McNary Dam, leaving approximately 98% of the subyearling chinook smolts arriving at McNary Dam after August 1 to be of wild origin.
- The wild subyearling chinook arriving at McNary Dam in August are most likely of Hanford reach origin. Of the 2,975 Hanford reach wild chinook PIT tagged on May 27, 2003, a total of 525 have been detected at McNary Dam with 99% detected by mid-July, and none detected in August. However, given such limited PIT tagging in 2003 on a single day, it may be premature to assume that the entire Hanford reach population arrived at McNary Dam before August this year. PIT tag data in prior years had shown Hanford reach subyearling chinook continuing to migrate past McNary Dam in August. The 90% passage date at McNary Dam for PIT tagged wild Hanford reach fall chinook was at the end of the first week of August in 1991, within the third week of July in 1992, and near the end of July in 1993 (Figure 7 in the 1993 McNary Dam and Lower Monumental Dam Smolt Monitoring Program annual report by Paul Wagner, WDFW, prepared for BPA Project No. 87-127). In two of these three years, at least 10% of the

PIT tagged smolts from the Hanford reach run were arriving McNary Dam after August 1st.

- The breakdown of the daily rate of arrival of hatchery subyearling chinook at McNary Dam during the first two weeks of August is as follows (assuming a 50% FGE): approximately 609/d Big Canyon Creek AP (Clearwater R); 403/d Pittsburg Landing AP (Snake R); 355/d Nez Perce Tribal Hatchery (Clearwater R); 158/d Wells Hatchery (mid-Columbia R); 89/d Lapwai AP (Clearwater R); 52/d Captain Johns Rapids AP (Snake R); 38/d Lyons Ferry Hatchery (Snake R); and 9/d Oxbow Hatchery's Hells Canyon release (Snake R). No additional smolts from Priest Rapids Hatchery (mid-Columbia R) and Prosser AP (Yakima R) appear to be passing McNary Dam in August, although it is unknown if any subyearling chinook from mid-Columbia River releases at Turtle Rock, Ringold Hatchery, or the Little White Salmon River Hatchery release at Prosser AP in 2003 because no PIT tags were released with these production releases.
- The Plot below shows passage timing at John Day Dam, of Snake River wild subyearling chinook along with timing for pit-tagged supplementation fish. The data confirms that a significant portion of the wild run is still in-migration, since 11% of the run-to-date is passing in August. Also, it shows the earlier timing of the supplementation fish.



- Most subyearlings passing through the lower river are of mid-Columbia origin. Historical travel time data indicates that at the present flows these fall chinook can be expected to travel quite slowly through the reach from McNary to John Day Dam. Our analysis shows that median travel time from McNary to John Day was 21.3 days for Hanford Reach subyearling chinook when flows were between 100 and 130 Kcfs.
- Based upon historical travel time data, at the present flows in the Snake River, wild fall chinook are expected to have an additional 5 day travel time to below Bonneville.

Summary

- Managing subyearling migrants for a 95% passage date is misleading for management purposes. There is a high risk of making a mistake based on a per project prediction of a 95% passage date.
- Management actions must be consistent. If modifications have been made to the Biological Opinion to provide protection to late migrating Clearwater fall chinook then it is not appropriate to terminate spill protection early.
- From all the information reviewed to-date for the 2003 migration, it appears that the planning dates contained in the 2000 Biological Opinion are conservative and should be used when managing for the end of spill this year.
- Managing spill and flow on the basis of 95% passage is a departure from the management contemplated in the Biological Opinion. Historical data shows that the 95% passage often occurs after the August 31 planning date. The management precedent being considered establishes the possibility that in some circumstances spill will continue beyond the August 31 planning date.
- Managing to the 95% passage date requires adequate tagging of specific groups of fish. Modifications to the smolt monitoring program may be necessary to meet the spill management requirements.