



FISH PASSAGE CENTER

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MEMORANDUM

TO: Fish Passage Advisory Committee

Michele DeHart

FROM: Michele DeHart

DATE: May 21, 2001

RE: Status of the 2001 Migration

The Columbia River Inter Tribal Fish Commission has requested the Fish Passage Center to develop an update describing the status 2001 juvenile migration to-date. All of the fishery data reviewed suggests that the hydrosystem operations have significantly impacted both the spring/summer chinook, steelhead and fall chinook migrations thus far in 2001. In particular, decisions made regarding hydrosystem operations in Upper and Mid Columbia Rivers have had specific and quantifiable deleterious effects.

- Passage indices of yearling chinook and steelhead at Rock Island Dam are significantly lower than previous years' relative to upstream hatchery releases
- Comparable Mid Columbia hatchery releases from Winthrop and Leavenworth hatcheries are not arriving at McNary Dam in expected numbers.
- Wild and hatchery fish from the Snake, Mid Columbia and lower Columbia tributaries continue to pass Bonneville Dam.
- A significant mortality has been sustained by Hanford Reach fall chinook due to stranding from project operations and flow fluctuations.

Snake River Passage

At Lower Granite Dam both the yearling chinook and steelhead cumulative totals are within the 95% confidence interval based on pre-season estimates developed by NMFS for ESA estimation purposes. There are several factors to take into consideration:

1. The 2001 juvenile chinook migration is considerably smaller than past years'. Consequently small variations have a larger impact this year.
2. The 2001 pre-season estimates used FGE estimates that appear to be considerably less than actually experienced in 2001 (based on the passage indices at Little

Goose Dam it appears few fish are getting past Lower Granite Dam). Consequently the pre-season prediction may be less than the total collection should be, which would cause the migration to-date to appear overly optimistic.

3. The migration primarily arrived in two bursts that coincided with increased flow from rain/snow melt events. The second peak in the bimodal distribution showed a significant increase in the passage indices of fish at the project. It is impossible to determine the impact that the delay may have caused these fish.

Snake River PIT tagged fish have been passing McNary into the lower Columbia since the middle of April based on PIT tag recapture at McNary Dam, and have comprised most of the PIT tag recaptures at McNary Dam to-date.

Mid Columbia Passage

Spring Chinook and Steelhead

The McNary passage indices for yearling chinook and steelhead are far below what was anticipated pre-season. The removal of most fish by the transportation program in the Snake River was taken into consideration in the pre-season estimation of abundance at McNary. Most fish comprising the pre-season estimates were to come from the Mid Columbia River. We looked at the passage indices at Rock Island Dam and compared them to the passage distribution for past years'. Passage indices are often related to the size of the hatchery release and, therefore, we also compared the annual releases to the size of the hatchery release that year. The results are presented in the following table:

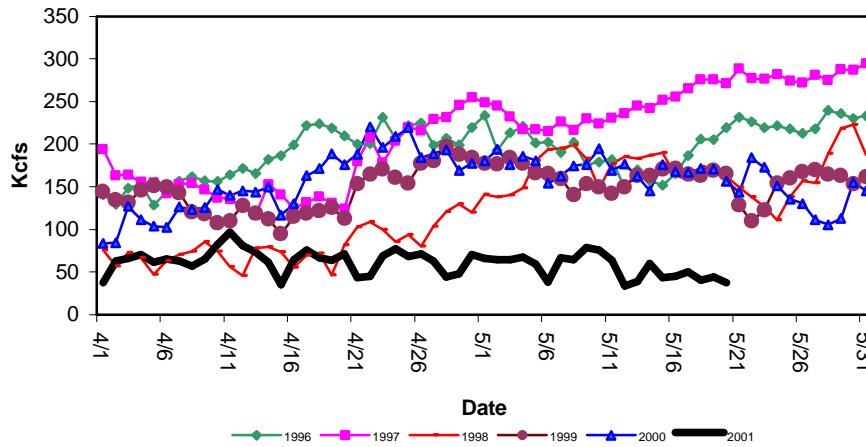
Rock Island Passage Indices						
	Yearling Chinook			Steelhead		
Year	Passage Index to 5/21	Hatchery release	Proportion PI/HR	Passage Index to 5/21	Hatchery release	Proportion PI/HR
1996	23713	3,243,054	0.007	15993	1,411,096	0.011
1997	27887	1,328,576	0.021	20337	1,420,394	0.014
1998	16029	3,328,869	0.005	18330	1,472,296	0.012
1999	34198	4,956,745	0.007	15755	1,726,741	0.009
2000	20196	3,939,920	0.005	14770	1,396,898	0.011
2001	4489	3,249,761	0.001	3638	1,338,847	0.003

As can be seen from the table, the passage indices are an order of magnitude less than what would be expected to be collected at Rock Island Dam by this date in the data observed since 1996 (While only 1996-2001 are presented here, the same observation can be made for data going back to 1985, see the cumulative passage plots for Rock Island dam at www.fpc.org.) We also looked at the passage indices at Rock Island relative to the annual size of the hatchery release, since a large part of the annual variation can be explained by this factor. In this situation, the proportion of the migration observed to-date is 5 to 21 times less for chinook and 3

to 4 times less for steelhead than observed since 1996. This, together with the extremely low collection of fish at McNary Dam suggests that the juvenile migration is impeded this year.

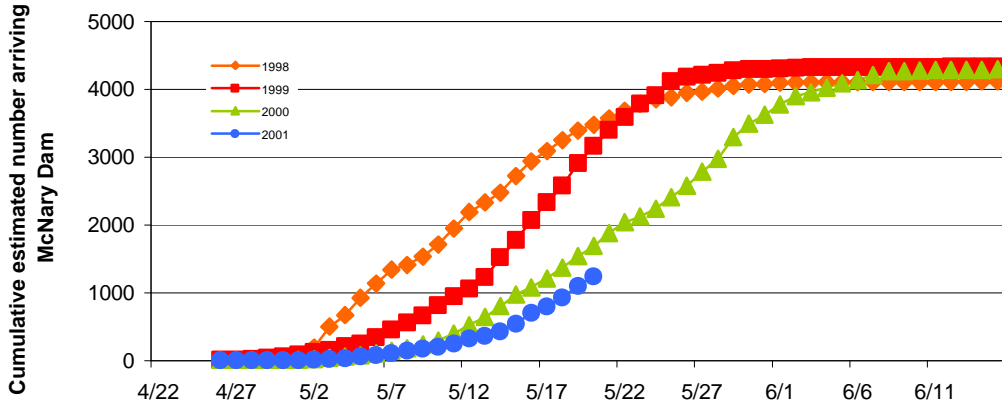
We plotted the Mid Columbia flows for 2001 and compared them to the flows at Rock Island for the five previous years (see below). The 2001 Mid Columbia flows differed from past years' flows in that after the end of fall chinook emergence in the Hanford Reach area, flows were reduced to near project minimums. In addition, there has been significant daily variations in hourly flows for load following. It is strongly suggested from the data collected thus far that the Mid-Columbia migration has been stalled by the low flows that are occurring at this time.

Rock Island Flows

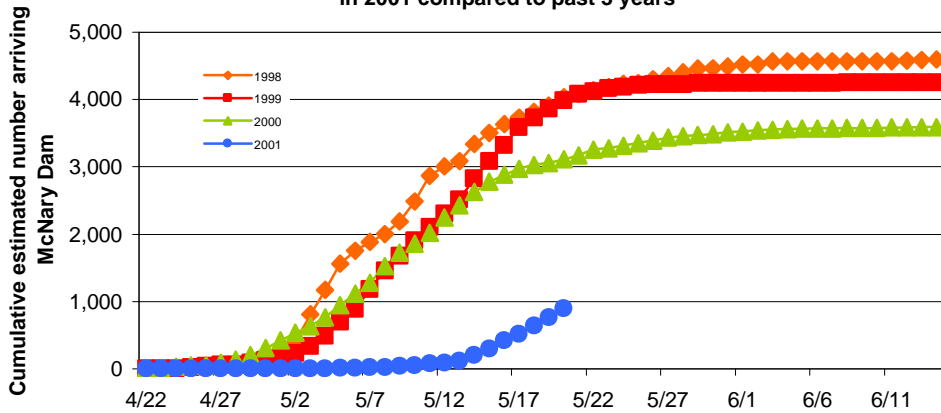


To address possible discrepancies at Rock Island Dam due to sampling efficiency we investigated the passage timing and recapture rates of both the Winthrop Hatchery spring chinook and Leavenworth Hatchery spring chinook at McNary Dam. These PIT tagged fish have been released with a sample size of approximately 7500 fish per hatchery since 1998. The numbers of tags recaptured annually (1998 – 2000) at McNary was adjusted for spill and FGE using the collection efficiency generated using the Seber-Jolly Model. No spill has occurred in 2001 and the PIT tag recaptures were simply expanded using the estimate of FGE adopted by NMFS for ESA estimation. The use of the FGE estimate employed by NMFS at McNary Dam (0.65) produces a very optimistic recovery of those tags to-date. In spite of this the recovery of both hatchery groups is far below what was recovered in past years. Again, this strongly suggests that present flow conditions in the Mid Columbia are seriously affecting the migration of both listed and non-listed species.

**PIT tagged Leavenworth H spring chinook (7,500 released):
 passage timing and estimated magnitude at McNary Dam
 in 2001 compared to past 3 years**



**PIT tagged Winthrop H spring chinook (7,500 released):
 passage timing and estimated magnitude at McNary Dam
 in 2001 compared to past 3 years**



Fall Chinook

The present flow conditions and flow fluctuations in the Mid Columbia River are taking a toll on the Hanford Reach fall chinook as well as on spring chinook and steelhead. The WDFW Hanford Stranding Report #6 presents the following information for fall chinook through April 29, 2001.

	Year	Mean, per plot	Total
At risk	1999-2000	1.4	105,004
	2001	32.8	696,031
Mortalities	1999-2000	0.8	59,599
	2001	31.7	672,985

This information (see Appendix B of Report #6) was developed to determine the range of flow fluctuations to be allowed during the subsequent weeks of the protection program. As seen from the table nearly 700,000 fall chinook mortalities can be attributed to stranding this year through April 29th. These data illustrate the significant impacts of the hydrosystem operations on the survival of fall chinook juveniles.

Lower Columbia River

The overall passage indices at Bonneville Dam appear within the bounds of what was expected, but it important to recognize that the passage indices and timing at Bonneville Dam are always dominated by the Bonneville Pool hatchery releases. However, PIT tagged Snake River and some Mid Columbia River fish have been detected at McNary Dam beginning in mid April. In addition, PIT tag recaptures at Bonneville Dam also show that wild fish from the Yakama, John Day, Deschutes, Umatilla and Umpqua rivers are all passing through the lower River at this time. The following graph shows the timing of some PIT tagged groups at Bonneville Dam.

Timing distribution of wild chinook from John Day, Umatilla, and Yakima rivers at Bonneville Dam through May 21, 2001

