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MEMORANDUM

REVISED

Salmon Managers

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Travel time from traps to Lower Granite Dam in 2001

The Fish Passage Center staff reviewed the PIT tag travel time data from the Smolt Monitoring Program under the current low flows occurring in 2001 in order to assess the status of this year's migration.

There are certain inherent difficulties in assessing in-season travel times that must be taken into consideration. The primary complication is the fact that travel time can only be determined on the fish that survive to a given dam. In extremely bad migration years such as 2001, the chance of survival of smolts may decrease over time so that fewer of the slower migrating smolts arrive at the dam compared to the faster migrating smolts. This causes the average travel time (as well as median travel time) of a group of fish to appear shorter than what would occur if all fish had an equal chance of survival. Low survivals or truncated passage distributions, which occur in bad migration conditions, affect the average travel time making it appear faster. We have addressed this problem in the travel time estimates from the traps to Lower Granite Dam by estimating average weekly travel times and estimating minimum travel times. For these groups, in addition to average travel times, we have compared the 2001 travel times of the fastest fish with the 2000 travel times of the fastest fish. Travel time was also estimated for PIT tagged yearling chinook and steelhead in the lower Columbia River between McNary and Bonneville dams.

Our summary assessment of the present travel time status of the juvenile migration to date is:

- Travel time of PIT tagged yearling chinook and steelhead through the lower Columbia River from McNary Dam to Bonneville Dam in 2001 is about two times longer than it was in 2000
- The fastest fish travel times in 2001 from trap sites to Lower Granite Dam are 20% to 231% longer than fastest fish travel times in 2000,
- Weekly average travel times from trap sites to Lower Granite Dam are 6% to 175% longer in 2001 when compared with 2000.
- Travel time and passage index data indicate that the present hydrosystem operations, load following, elimination of spill for fish passage at most projects, and low flows are

having a significant detrimental impact on the juvenile spring migration of yearling chinook salmon and steelhead.

Trap Sites to Lower Granite Dam

PIT tag detections at Lower Granite Dam were reviewed. Tag detections through 06:00 May 23 of yearling chinook and steelhead PIT tagged and released from the traps between March 19 and May 5 were utilized. Fish tagged prior to March 19 in each year had very long travel times (40-50 days), indicative of non-active migrating fish. Fish tagged after May 5 in each year were not included in this analysis in order to provide at least a 17-day window of opportunity to pass Lower Granite Dam, thus reducing the impact from fish of these releases that have not yet arrived at the dam as of May 23.

The fact that the migration is not finished is a complication of the in-season assessment of smolt travel time. In order to address this problem, we also looked at the fish with the shortest (minimum) travel time in each group. PIT tagged yearling chinook and steelhead were grouped by week of release for each of the three traps (located on lower Salmon, Imnaha, and Grande Ronde rivers). Tables 1 and 2 show weekly average and minimum travel time, respectively, from trap site to Lower Granite Dam in 2001 compared to 2000. In order to make the data as comparable as possible between the two years 2000 and 2001 prior to completion of the current season, both years were limited to releases made between March 19 and May 5.

Table 1 showed the greatest change in weekly average travel times between 2000 and 2001 for yearling chinook released through mid-April and again in early May. These were the periods of lowest flows at Lower Granite Dam in 2001 and longer travel times during these periods were observed. This same general pattern is developing with steelhead travel times.

The minimum travel time from traps to Lower Granite Dam in Table 2 shows yearling chinook released between April 2 and 15 in 2001 had substantially longer minimum travel times (81-231% higher) than in 2000. Likewise, steelhead released between April 2 and 22 in 2001 had substantially longer minimum travel times (89-147% higher) than in 2000. For the last two weeks beginning April 23, the trend has lessened to 10-90% higher minimum travel times in 2001. The use of minimum travel time has helped collaborate the trend of longer travel times in the weekly average travel times under the lower flows conditions of 2001.

Lower Columbia River Travel Time

Weekly minimum and average travel time from McNary Dam to Bonneville Dam is substantially longer in 2001 compared to 2000 for both yearling chinook and steelhead. Yearling chinook weekly minimum travel times for fish passing McNary Dam between April 21 and May 11 have been 44 to 85% higher in 2001 than 2000, and weekly average travel times have been 57 to 120% higher (Table 3). The weekly average travel times will become even higher later as more slow moving fish reach Bonneville Dam after the 06:00 May 23 cut-off for this analysis. Steelhead passage at McNary Dam has been delayed in 2001 to the extent that only a few fish have been detected at both McNary Dam and Bonneville Dam as of the date of this report. The travel times for 2001 steelhead reported in Table 4 are based on only the 13 fish available at this time, while the chinook results were based on sample sizes over the 50 fish threshold set for these analyses. In spite of low numbers, the results for steelhead collaborate what was seen for yearling chinook. The weekly average and minimum travel times for 2001 were 98 to 128% higher than those in 2000.

Table 1. Weekly average travel time for PIT tagged chinook and steelhead (n>50 fish) from Snake River basin traps to Lower Granite Dam in years 2000 and 2001, with percent increase in travel time in year 2001.

Salmon River trap average travel time to Lower Granite Dam

Yearling Chinook				Steelhead			
Week	2000	2001	%increase	Week	2000	2001	%increase
1	34.9	37.0	6.0%	1			
2	29.6	32.3	9.1%	2			
3	19.9	27.6	38.7%	3			
4	18.1	20.7	14.4%	4		17.1	
5	13.5	15.6	15.6%	5	5.7	11.4	100.0%
6	13.6	13.1	-3.7%	6	6.8	7.6	11.8%
7	10.6	13.0	22.6%	7	5.2	10.4	100.0%

Imnaha River trap average travel time to Lower Granite Dam

Yearling Chinook				Steelhead			
week	2000	2001	%increase	week	2000	2001	%increase
1	28.6	32.1	12.2%	1			
2	22.0	28.2	28.2%	2		35.6	
3	21.2	24.6	16.0%	3	9.7		
4	18.7	17.4	-7.0%	4	13.3	20.5	54.1%
5	17.1	12.8	-25.1%	5	11.4	11.1	-2.6%
6	9.7	11.3	16.5%	6	11.0	8.2	-25.5%
7	8.6	11.4	32.6%	7	5.5	11.2	103.6%

Grande Ronde River trap average travel time to Lower Granite Dam

Yearling Chinook				Steelhead			
week	2000	2001	%increase	week	2000	2001	%increase
1				1			
2	17.7	23.5	32.6%	2			
3	16.7	27.9	67.1%	3	6.5		
4	15.1	22.8	51.0%	4	5.9	14.5	145.8%
5	11.8	12.5	5.9%	5	6.5		
6	10.7	11.2	4.7%	6	4.3	7.1	65.1%
7	7.6	11.5	51.3%	7	2.9	8.0	175.9%

Week legend : dates of release

- 1 March 19–March 25
- 2 March 26 - April 1
- 3 April 2 - April 8
- 4 April 9 - April 15
- 5 April 16 - April 22
- 6 April 23 - April 29
- 7 April 30 - May 5

Table 2. Weekly minimum travel time for PIT tagged chinook and steelhead (n>50 fish) from Snake River basin traps to Lower Granite Dam in years 2000 and 2001, with percent increase in travel time in 2001.

Salmon River trap minimum travel time to Lower Granite Dam

Yearling Chinook				Steelhead			
week	2000	2001	%increase	week	2000	2001	%increase
1	20.3	15.7	-22.7%	1			
2	8.6	10.4	20.4%	2			
3	6.9	14.6	113.0%	3			
4	4.6	12.3	168.5%	4		7.0	
5	4.3	8.0	86.6%	5	2.4	4.6	88.9%
6	4.9	5.5	12.5%	6	2.8	3.5	24.9%
7	3.5	5.4	54.3%	7	2.4	3.8	58.3%

Imnaha River trap minimum travel time to Lower Granite Dam

Yearling Chinook				Steelhead			
week	2000	2001	%increase	week	2000	2001	%increase
1	12.4	6.1	-50.9%	1			
2	5.7	9.0	58.6%	2		6.4	
3	5.9	10.7	80.7%	3	3.0		
4	2.9	8.3	183.8%	4	2.2	5.5	147.3%
5	4.0	5.1	26.5%	5	1.8	4.4	143.3%
6	4.4	3.5	-21.5%	6	2.6	2.9	10.3%
7	4.0	5.0	25.0%	7	2.0	3.8	90.0%

Grande Ronde River trap minimum travel time to Lower Granite Dam

Yearling Chinook				Steelhead			
week	2000	2001	%increase	week	2000	2001	%increase
1				1			
2	7.5	12.4	64.8%	2			
3	5.6	10.7	92.4%	3	2.5		
4	2.6	8.5	231.4%	4	1.6	3.6	118.0%
5	3.4	5.5	64.4%	5	1.4		
6	3.4	3.7	10.0%	6	1.6	2.4	54.5%
7	2.4	6.1	154.2%	7	1.5	1.8	20.0%

Week legend : dates of release

- 1 March 19 – March 25
- 2 March 26 – April 1
- 3 April 2 – April 8
- 4 April 9 – April 15
- 5 April 16 – April 22
- 6 April 23 – April 29
- 7 April 30 – May 5

Table 3. Weekly minimum and average travel time for PIT tagged yearling chinook from McNary Dam to Bonneville Dam in 2001 compared to 2000.

Passage at MCN	Minimum 2001	Minimum 2000	Change	Average 2001	Average 2000	Change
4/14 – 4/20	12.2			18.9		
4/21 – 4/27	7.2	3.9	84.6%	16.7	7.6	120.0%
4/28 – 5/4	5.5	3.8	44.7%	13.5	7.0	92.9%
5/5 – 5/11	5.6	3.9	43.6%	9.9	6.3	57.1%

Table 4. Weekly minimum and average travel time for PIT tagged steelhead from McNary Dam to Bonneville Dam in 2001 compared to 2000.

Passage at MCN	Minimum 2001	Minimum 2000	Change	Average 2001	Average 2000	Change
4/14 – 4/20		3.4			5.2	
4/21 – 4/27		3.6			5.5	
4/28 – 5/4		3.2			5.5	
5/5 – 5/11	8.2	3.6	127.8%	10.5	5.3	98.1%