



# FISH PASSAGE CENTER

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## MEMORANDUM

TO: Larry Cassidy, NWPCC

*Michele DeHart*

FROM: Michele DeHart, FPC

DATE: December 5, 2003

RE: Historical Fish Passage Data

In response to your request the Fish Passage Center staff summarized the following juvenile fish passage data in the Lower Columbia River for August. This historical passage data was presented to the Regional Forum Implementation Team in October 2003. The following historical data includes several caveats and limitations.

- The following PIT tag mark group data presents a conservative representation of fish presence in the lower Columbia River because the majority of the available PIT tag mark groups are not designed to represent the entire passage distribution of the marked population with the exception of the Smolt Monitoring Program group marked at Rock Island Dam. Nor do the mark groups represent a specific proportion of the population so they can not be used as an indicator of the magnitude of the population passing a particular project.
- The Smolt Monitoring Program historical passage index data is a conservative representation of the migrating population. The passage index is not expanded to a population estimate to account for fish guidance efficiency.
- The presence of fish in the Lower Columbia River is greatly affected by passage conditions and operations at upstream sites. Specifically, the transportation of juvenile fall chinook at the Snake River projects affects the number of fish observed downriver.
- Transportation of fall chinook juveniles is being evaluated. Evaluation of fall chinook transportation is an identified Action (46 page 9-78) in the present Biological Opinion. The effectiveness of transportation of fall chinook will determine how many juveniles are present in the Lower Columbia River. If a spread the risk policy is implemented as the result of the transportation evaluation, the number of fall chinook in the lower Snake and Columbia rivers will greatly increase.

- There is a flow and juvenile survival relationship for fall chinook in the Lower Columbia River and there is a flow/travel time relationship for juvenile fall chinook in the lower Columbia River. This results in a broad range of percent of the population present in August, depending on the flow passage conditions. In higher flows fish move faster through the lower Columbia.
- There are only two mitigation operations provided for summer migrants in the lower Columbia River, flow targets and spill at John Day and The Dalles Dams. The August flow target has only been met in two out of the past 12 years. Spill for fish passage has been provided in eleven of the past twelve years. Spill is the only mitigation measure consistently provided in August for in river migrants in the lower Columbia and lower Snake Rivers.

**Percentage of Annual PIT tag detections occurring in August at McNary Dam for subyearling chinook originating in the Snake River and the Mid Columbia River Basins**

Table 1

Year	Snake River Basin			Mid-Columbia River Basin			
	Clearwater River Basin (%)	SNAKE River (%)	Tucannon River (%)	Yakima River (%)	Hanford** Reach (%)	Rock* Island Dam (%)	Wells Hatchery (%)
1998	28.6	18.7	1.2	3.3	0.0	53.1	1.8
1999	(0 tags)	42.3	No tags	30.7	2.4	64.9	14.1
2000	(0 tags)	8.8	6.9	2.9	16.3	64.0	20.3
2001	(0 tags)	33.4	33.3	0.0	17.2	71.7	37.7
2002	(0 tags)	12.7	2.0	No tags	No tags	57.2	5.1
2003	3 tags	12.5	No tags	0.0	0.0	28.6	1.0

\* Of the PIT tag mark groups included in this table only the Rock Island group is designed to cover the entire passage distribution. None of these mark groups is designed to mark a specific proportion of the specific population.

\*\* This mark group only represents the early portion of the migration. There is no tag data for the middle and late portion of this population

**Percentage of annual PIT tag detections occurring during the first and last two weeks of August at McNary Dam for subyearling chinook originating in the Snake River and Mid-Columbia River basins.**

Table 2

Year	August Period	Snake River Basin			Mid-Columbia River Basin			
		Clearwater River (%)	Mainstem Snake R. (%)	Tucannon River (%)	Yakima River (%)	Hanford Reach (%)**	Rock Island Dam (%) *	Wells Hatchery (%)
1998	8/1-15	14.3	15.2	1.2	3.0	0.0	41.9	1.7
	8/16-31	14.3	3.5	0.0	0.3	0.0	11.2	0.1
1999	8/1-15	(0 fish)	32.2	No tags	21.1	2.2	45.4	12.8
	8/16-31		10.1		9.6	0.2	19.5	1.3
2000	8/1-15	(0 fish)	5.6	6.2	2.4	15.3	41.8	19.3
	8/16-31		3.2	0.7	0.5	1.0	22.2	1.0
2001	8/1-15	(0 fish)	27.8	17.9	0.0	14.1	41.8	25.7
	8/16-31		5.6	15.4	0.0	3.1	29.9	12.0
2002	8/1-15	(0 fish)	11.4	1.5	No tags	No tags	35.1	4.6
	8/16-31		1.3	0.5			22.1	0.5
2003	8/1-15	(3 fish)	8.0	No tags	No tags	0.0	28.6	1.0
	8/16-31		4.5			0.0	0.0	0.0

Of the PIT tag mark groups included in this table only the Rock Island group is designed to cover the entire passage distribution. None of these mark groups is designed to mark a specific proportion of the specific population.

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**Percentage of Subyearling Wild Chinook Migrants at John Day Dam During August**

Table 3

Year	Yakima River (%)	Hanford Reach (%)
1998	19.6	2.3
1999	20.0	9.2
2000	20.8	44.7
2001	4.5	66.7

**Passage Index\*\* for sub-yearling fall chinook at McNary and John Day Dams in the first and last two weeks of August, 1992-2003**

Table 4

**MCN and JDA Passage Index for Fall Chinook  
for the month of August 1992 to 2003**

Year	Dates	MCN Passage Index	JDA Passage Index
1992	08/01 - 08/15	85,650	134,317
	08/16 - 08/31	29,160	38,761
1993	08/01 - 08/15	396,676	129,234
	08/16 - 08/31	89,719	127,940
1994	08/01 - 08/15	47,754	58,769
	08/16 - 08/31	26,981	36,605
1995	08/01 - 08/15	121,050	38,164
	08/16 - 08/31	97,564	24,518
1996	08/01 - 08/15	740,107	118,069
	08/16 - 08/31	250,774	113,603
1997*	08/01 - 08/15	1,227,691	60,074
	08/16 - 08/31	404,604	39,213
1998	08/01 - 08/15	324,636	137,129
	08/16 - 08/31	107,089	21,753
1999	08/01 - 08/15	461,696	154,966
	08/16 - 08/31	292,700	91,785
2000	08/01 - 08/15	724,574	178,725
	08/16 - 08/31	188,500	32,090
2001	08/01 - 08/15	489,174	808,950
	08/16 - 08/31	224,016	317,575
2002	08/01 - 08/15	478,291	87,228
	08/16 - 08/31	341,070	93,452
2003	08/01 - 08/15	588,965	195,302
	08/16 - 08/31	86,479	29,395

\*Through 1997 sampling at John Day utilized an airlift collector in unit 3. Beginning in 1998 the bypass sampler at John Day was operational

\*\* The passage index is a conservative index of passage, it does not account for fish guidance efficiency (FGE) the efficiency of the screen guidance systems. FGE for fall chinook is estimated at approximately 32%. The actual population passing the project is larger than the passage index.

**Expected impact of eliminating spill for fish passage in August**

Several research projects are being conducted on the passage and migration characteristics of fall chinook. The research questions being pursued include the effectiveness of the present smolt transportation program for fall chinook. Research to date shows that there is a significant flow and juvenile survival and flow travel time relationship for fall chinook in the lower Columbia River. Available data indicate that there will be direct and indirect impacts of eliminating summer spill. The direct impact is that a large proportion (over 40%) of fish

approaching each project will pass through turbine units increasing the project mortality. FGE estimates vary by project, the NMFS BIOP lists estimates at McNary of .62, John Day .32, and Bonneville .28. Recent turbine survival estimates for McNary and Ice Harbor Dam are .77 and .90 respectively.

Potential Indirect impacts of decreasing spill include, increase migration delay in the forebay, which increases stress, exposure to high water temperatures, and exposure to predators. Tailrace mortality may increase in reduced spill conditions and bypass outfall mortality may increase as predators are not dispersed by spill. Research conducted in the Snake River indicates that in low summer flow conditions such as occurs in August, considerable forebay delay can occur. Elimination of spill for fish passage in the Columbia and Snake River can reasonably be expected to exacerbate forebay delay of migrating fall chinook. Water temperature standards are often violated in the month of August. Prolonged exposure to higher water temperatures can increase the incidence of disease.

### **Conclusions – Passage Data**

- **The historic passage data indicates that significant proportion of the summer migration is present in the lower Columbia River in August.**
- **The same data shows that the proportion of passage present in August varies from year to year.**
- **The data indicates that mid-Columbia stocks in particular Hanford Reach fall chinook will be impacted by decrease in summer spill. The average 95% passage date at McNary Dam (1997-2003) of unclipped sub yearling fall chinook marked at Rock Island Dam is September 16 (at McNary). Travel time through the John Day pool at low flows places these fish in the lower Columbia through September. The present August 31 end date of summer spill does not provide protection to 95% of the mid-Columbia fall chinook passage distribution. This shows a substantial portion of the migration is present in the lower Columbia River in August.**
- **The expected fish benefits of the Mid-Columbia HCP will probably be decreased if Lower Columbia River spill for fish passage in August is decreased or eliminated.**
- **The smolt transportation program upstream largely affects the presence of juvenile fall chinook in the lower Columbia and lower Snake Rivers. The effectiveness of transportation of fall chinook juveniles is presently being evaluated. If a “spread-the-risk” policy for transportation of fall chinook is implemented in the future, the proportion of fall chinook present in the lower Columbia River and the lower Snake River will increase.**
- **Any consideration of modification of spill for fish passage for summer migrants is premature prior to the actual determination of the benefits of the fall chinook transportation program.**

### **Conclusions-Offsets**

- **The question of offsets to mitigate for the adverse impact on fall chinook survival of the Bonneville Power Administration proposal to reduce or eliminate spill in August is problematic. All viable offsets have already been included in the Biological Opinion. The Opinion was defined as the “aggressive non-breach “ approach. The**

**data indicates that migration time decreases in years of higher flow resulting in smaller proportions of the migration present in the lower Columbia in August. Higher water flows and higher water velocities would be an effective offset, which is not already included in the Biological Opinion.**