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MEMORANDUM

TO: Fish Passage Advisory Committee

Michele DeHart

FROM: Michele DeHart

DATE: May 10, 2005

RE: Fall Chinook Overwintering

Overview

At the April 26, 2005 FPAC conference call, the committee asked the Fish Passage Center to begin to summarize juvenile fall Chinook migration data as part of an FPAC summary of fall Chinook passage data. The following memorandum addresses a review of PIT tag data regarding the overwintering or holdover of fall Chinook. Although there have been discussions of the holdover phenomenon and various statements that have been made about smolt-to-adult return of holdover fall Chinook, there has not been an attempt to discuss the holdover phenomenon in the context of the entire fall Chinook out-migrating population. The magnitude of the overwintering phenomenon, as well as the specific components of the population that over-winter are important considerations. Some have suggested that a relatively large rate of overwintering would mean that less emphasis is needed on improving the downstream migration conditions for summer migrating juvenile fall Chinook, since the fish that survive through the summer and over-winter could take advantage of migration under spring higher flow and spill conditions. However the data collected to date do not support this conclusion. Data from scale sampling of adults suggests that under the recent management of the hydrosystem, some portion of the returning adults apparently outmigrated as yearlings. These scale data do not indicate where fish holdover in the river system, how many smolts that began their outmigration as subyearlings actually complete it as yearlings or the effect that transporting most fall chinook may have on the relative proportion that appear as adults if juveniles do not survive transportation.

Information on these uncertainties, as well as the overall magnitude of the overwintering phenomenon and possible effects of the hydrosystem on the proportion of overwintering, is necessary prior to consideration of alternative passage management scenarios for fall Chinook. We began to examine these uncertainties by summarizing the available PIT tag data on fall

Chinook. PIT tag detection data can be used to summarize the number of fish that were detected at various projects as subyearlings or yearlings. While these summaries do not conclusively estimate the absolute magnitude of the overwintering phenomenon, they may help establish the scope and general magnitude of overwintering.

This summary concentrates on the PIT-tag detections at the dams and summarizes trends in the proportion of subyearling Chinook detected in the year they were released as subyearlings and in the subsequent spring as yearlings, as well as marked fish detected only as yearlings the spring following their release.

PIT-tagged wild fall Chinook

From migration year 1994 to 2003 (excluding 1999), there have been 465 to 4,740 subyearling wild fall Chinook PIT-tagged at various locations of the mainstem Snake River between Asotin and Hells Canyon Dam by USFWS researchers. The year 1999 is excluded because the shift to new ISO PIT tags in 2000 precluded detection capabilities for tags from 1999 in year 2000 at the dams. The percentage of detections for these fish that migrated in-river (non-transported) through the hydrosystem and were detected in the following year as holdovers was 6% or less in five of these nine years examined (Figure 1), three of the nine years showed holdover rates of 10 to 15% and in one of the nine years (1994), the holdover rate was 34%. In years where the holdover rate was higher it was noted that the overall tag detection rate decreased, suggesting a **fairly substantial overwintering mortality is occurring and that this overwintering mortality must be factored in when one compares adult return of subyearling out-migrants versus adult returns of the yearling survivors detected the following year.**

In the Clearwater River, at least 350 wild subyearling Chinook were PIT tagged in seven years between 1993 and 2003. Of the fish that were detected the holdover percent for in-river migrants was 87 to 94% in three years, 21 to 51% in three years and 11% in one year (Figure 1). It is apparent that there are major differences between the migration characteristics of wild fall Chinook from the Clearwater River and mainstem Snake River.

PIT-tagged hatchery fall Chinook

Over the years from 1995 to 2003 there were large numbers of hatchery fall Chinook subyearlings PIT tagged in the mainstem Snake River near or within the acclimation ponds at Captain Johns Rapids (Rk 263) and Pittsburg Landing (Rk 346) and in the lower Clearwater River near or within the acclimation pond at Big Canyon Creek (Rk 57). The releases of the PIT-tag subyearling Chinook in the vicinity of the acclimation ponds were typically made weekly over a series of 6 weeks in most years, 1995-2003. Releases of PIT-tag fish within production are available since 2000 and have been increased in 2004 to cover additional hatchery production from the Nez Perce Hatchery on the Clearwater River. In years when the acclimation ponds made a second (back-fill) release, there was the trend toward higher percent holdovers in the later releases compared to the primary production releases (Figure 2) of PIT-tagged fish available in both releases.

The temporal release schedule for the hatchery fall Chinook subyearlings provided evidence of increased holdovers in later releases. For migration years 1995 to 2003 (1999

unavailable as stated earlier in this document), the in-river migrating (non-transported) PIT-tagged fish released early in the season through June 8 in most years (two years stratified at June 2 due to early migration timing) had less than 5% of their detections from holdover fish (Figure 3). The PIT-tagged fish released in the next 2-week interval tended to have about double the number of detections of holdover fish compared to the earlier interval. And by the last temporal interval, starting after June 17 (or June 23 in some years), there was again about a doubling or greater increase in number of detections of holdover fish. In the years through 1998, the latest temporal strata had fish groups with 7-20% of their detections as holdovers, while in the later years from 2000 to 2002 these percentages rose to 12-44% (Figure 3). There has been an overall trend toward more holdover fish detected from the later temporal releases of PIT-tagged fish over the years.

The size at release of the subyearling fall chinook may also be influencing the holdover rate. In 2003, the PIT-tagged fish released with the NPT Hatchery production fish in the later (back-fill) release were smaller (median length 83 mm) compared to the earlier main production release (median length 105 mm). Likewise, the NOAA transportation study subyearling hatchery fall Chinook were specifically reared to be smaller, since NOAA believed this would mimic wild fall Chinook. Although these NOAA study fish had very few holdovers from the 2003 outmigration, the occurrence of holdovers from in-river migrating NOAA study fish in 2001 (overall few numbers since most were transported) and 2002 was much higher (at 29 and 20%, respectively) than occurred for other hatchery fish being released at a similar time period (mostly less than 5%).

Unlike their wild fall Chinook counterparts, the hatchery fall Chinook subyearlings from the releases in the Clearwater River had percentages of detected fish seen as yearlings that were similar to that of the hatchery fall Chinook subyearlings from the mainstem Snake River. This result was unexpected since the migration timing observed at Lower Granite Dam of the Clearwater River releases tend to extend later into the summer season than does the timing of the mainstem Snake River releases.

Summary

In summary, this review revealed patterns in the PIT-tag detection data that begin to address some of the uncertainties surrounding the holdover phenomenon for fall chinook. There are indications that this phenomenon may largely be the result of human activities, the hatchery program and hydrosystem operations. In addition, it became apparent that recent broad statements regarding the “advantages” of the holdover migration may be inaccurate. Our review indicates that:

- **The smolt-to-adult returns that have been discussed for holdover fish are inaccurate because they are not based on the number of subyearlings that remain in the hydrosystem after August 31. They are based upon passage the following spring of survivors and do not account for the summer and overwintering mortality which are likely substantial.**
- **Wild fall Chinook from the Clearwater River tend to have higher percentages of holdovers in their detections at the dams than do Snake River wild fall Chinook.**
- **Hatchery fall Chinook that are smaller fish tend to have higher percentages of holdovers in their detections at the dams.**
- **Later released (backfill) hatchery fall Chinook likewise have higher percentages of holdovers in their detections at the dams.**

Figure 1: Percent of total detections occurring as yearlings for inriver migrating PIT-tagged wild subyearling fall Chinook of Snake and Clearwater River origin

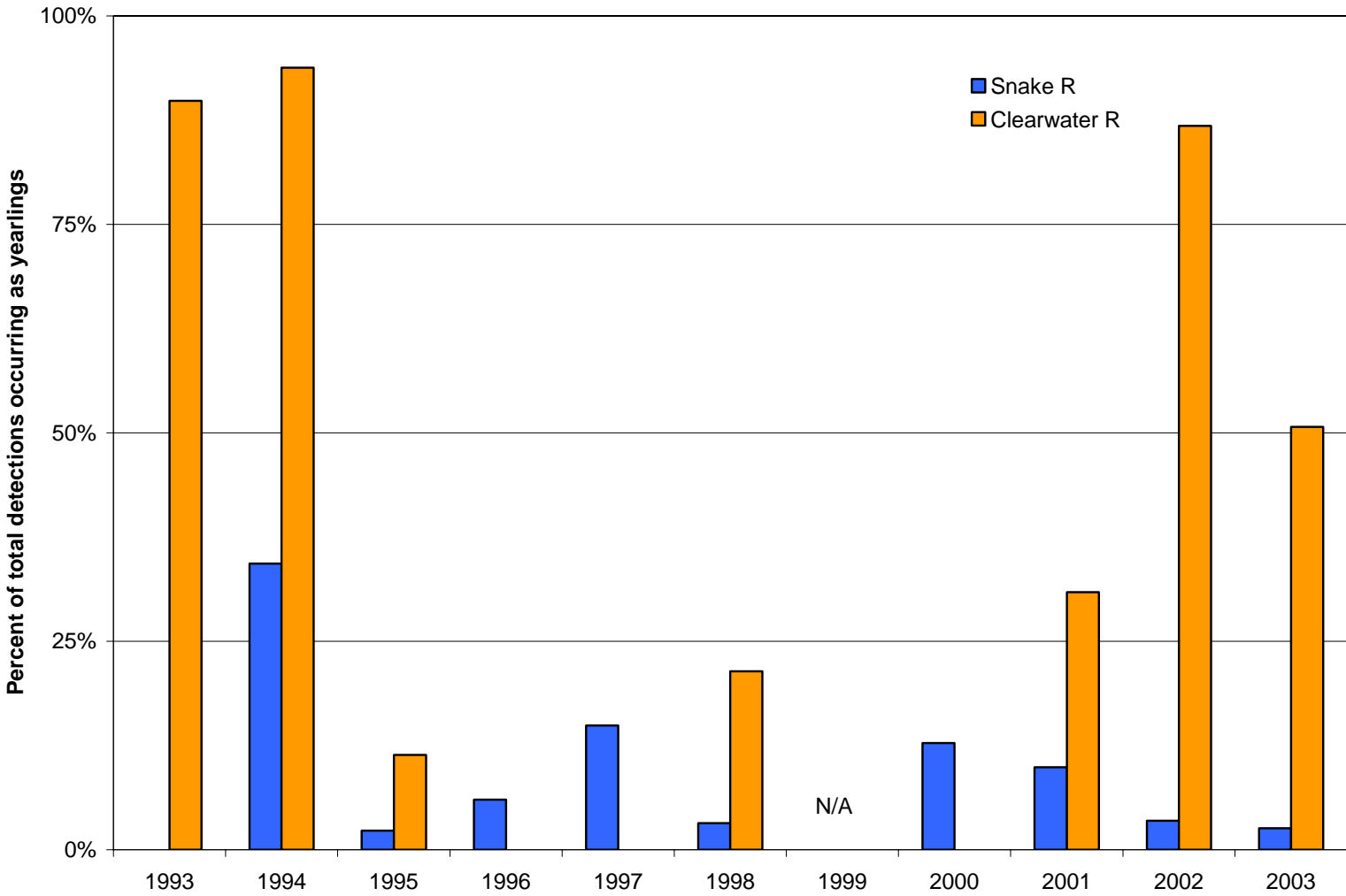


Figure 2: Percent of total detections occurring as yearlings for inriver migrating PIT-tagged hatchery subyearling fall Chinook from primary and back-fill releases at Big Canyon, Pittsburg Landing, and Captain John Rapids acclimation ponds

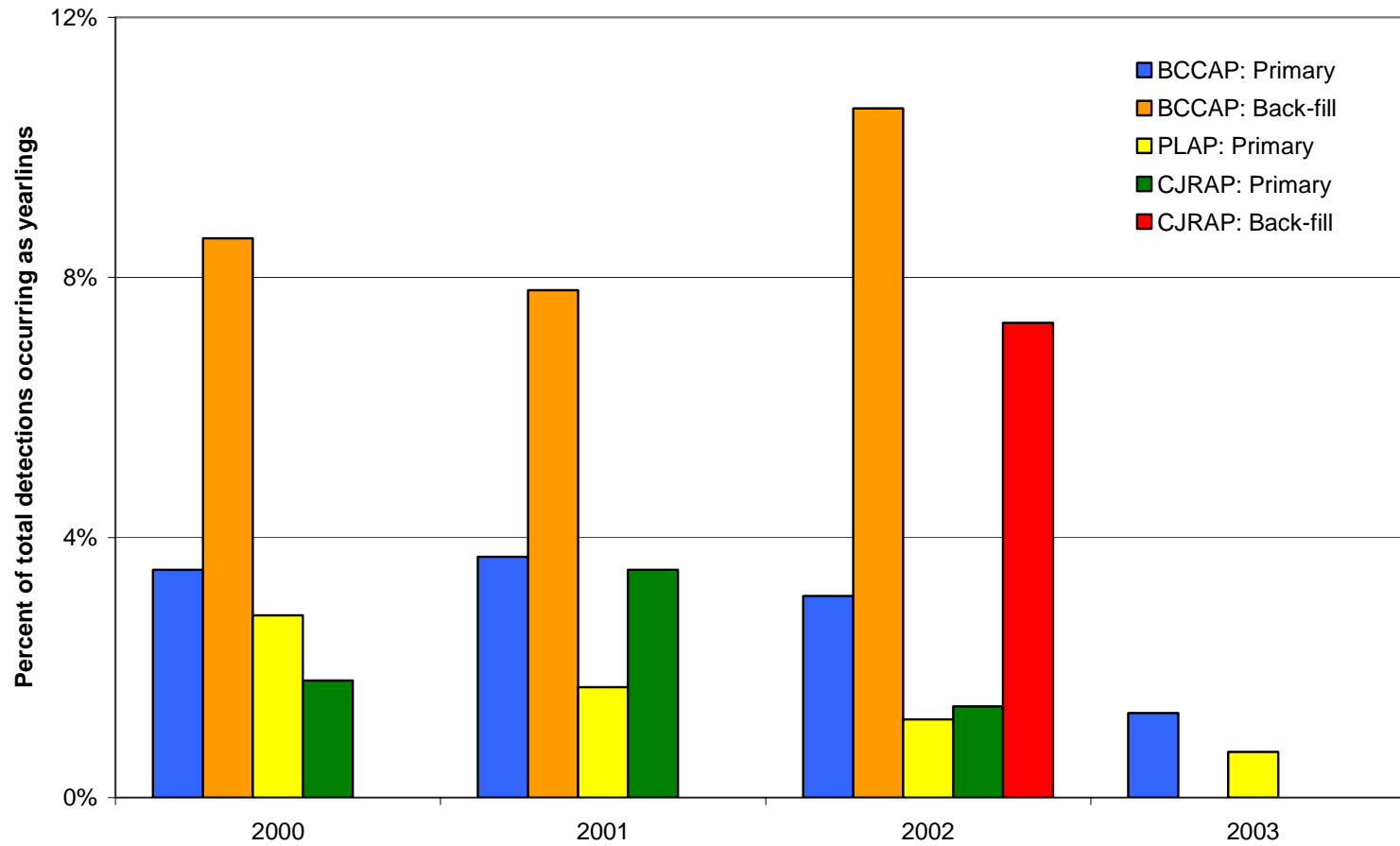
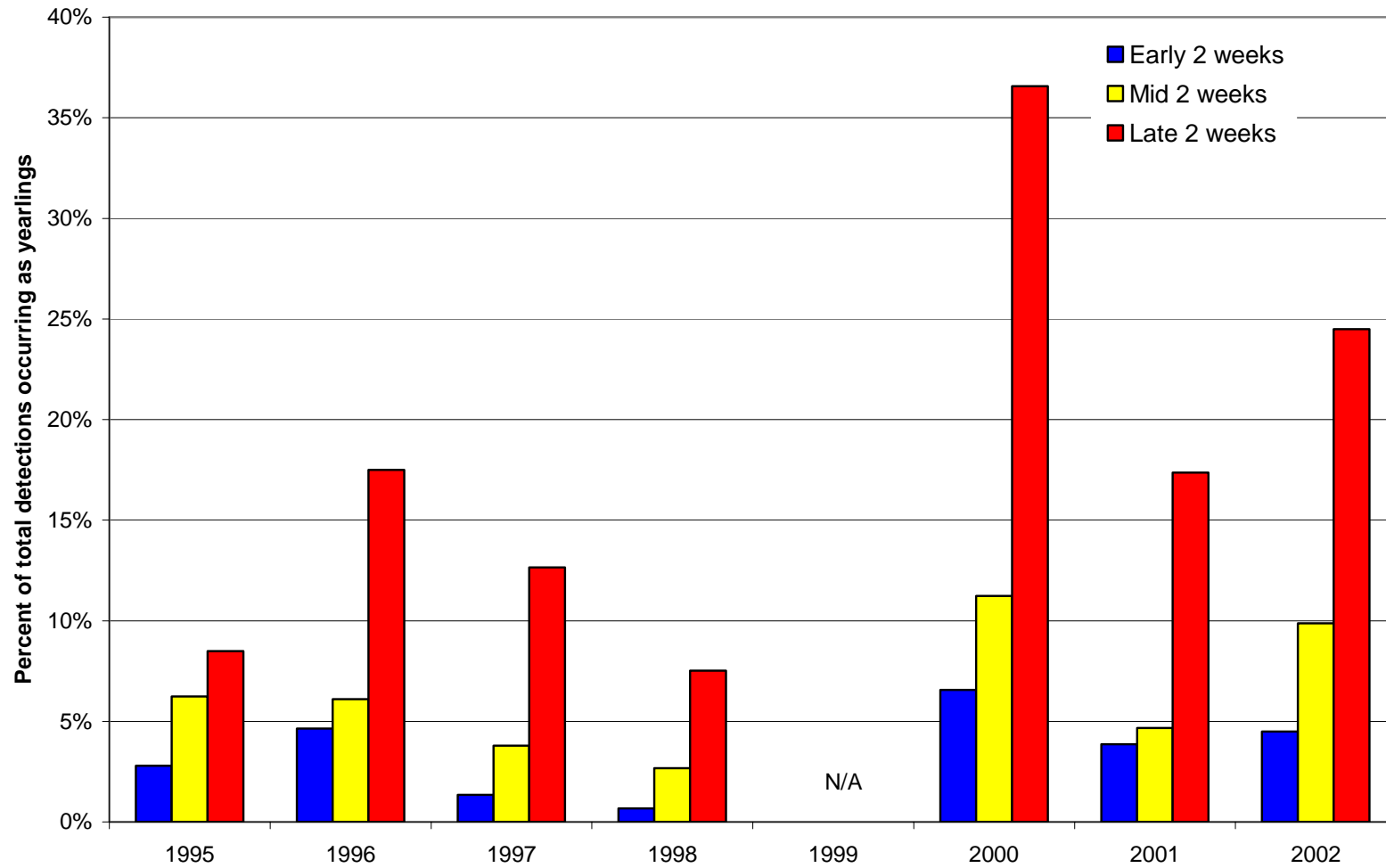


Figure 3: Average percent of total detections occurring as yearlings for PIT-tagged hatchery subyearling fall Chinook released temporally near acclimation ponds (Mid spans a 2-week interval starting 6/3-9 and ending 6/16-23)



APPENDIX

Tables for Memorandum on Overwintering of Subyearling Fall Chinook from Snake and Clearwater Rivers

Percent of PIT tagged fall chinok detected from total release, detected outmigrating in migration year (MY) vs holding over to the following year (H0), and percent of hold-over fall chinook with prior upstream dam detection as subyearlings (partial)

CRITERIA: rel_num ≥ 350 fish

Snake River wild fall chinook

Clearwater River wild fall chinook

Snake River wild fall chinook					Clearwater River wild fall chinook				
mig_yr	rel_num	data	in-river	transport	mig_yr	rel_num	data	in-river	transport
					1993	366	%det/rel	13.4%	6.6%
							%det_MY	10.2%	87.5%
							%det_HO	89.8%	12.5%
							%partial/HO	0.0%	0.0%
1994	2,343	%det/rel	9.2%	5.2%	1994	696	%det/rel	2.3%	1.1%
		%det_MY	65.7%	88.6%			%det_MY	6.3%	12.5%
		%det_HO	34.3%	11.4%			%det_HO	93.8%	87.5%
		%partial/HO	5.4%	0.0%			%partial/HO	0.0%	0.0%
1995	1,374	%det/rel	43.8%	6.6%	1995	499	%det/rel	8.8%	2.4%
		%det_MY	97.7%	97.8%			%det_MY	88.6%	100.0%
		%det_HO	2.3%	2.2%			%det_HO	11.4%	0.0%
		%partial/HO	28.6%	0.0%			%partial/HO	0.0%	-----
1996	465	%det/rel	39.7%	3.7%					
		%det_MY	94.0%	100.0%					
		%det_HO	6.0%	0.0%					
		%partial/HO	18.2%	-----					
1997	640	%det/rel	30.5%	4.1%					
		%det_MY	85.1%	88.5%					
		%det_HO	14.9%	11.5%					
		%partial/HO	20.7%	0.0%					
1998	2,060	%det/rel	45.4%	4.0%	1998	395	%det/rel	42.5%	1.8%
		%det_MY	96.8%	97.6%			%det_MY	78.6%	57.1%
		%det_HO	3.2%	2.4%			%det_HO	21.4%	42.9%
		%partial/HO	20.0%	0.0%			%partial/HO	11.1%	0.0%
2000	1,213	%det/rel	36.2%	5.5%					
		%det_MY	87.2%	97.0%					
		%det_HO	12.8%	3.0%					
		%partial/HO	55.4%	100.0%					
2001	1,392	%det/rel	15.9%	2.3%	2001	492	%det/rel	11.2%	2.2%
		%det_MY	90.1%	100.0%			%det_MY	69.1%	100.0%
		%det_HO	9.9%	0.0%			%det_HO	30.9%	0.0%
		%partial/HO	59.1%	-----			%partial/HO	5.9%	-----
2002	2,405	%det/rel	31.1%	2.7%	2002	478	%det/rel	7.9%	0.6%
		%det_MY	96.5%	97.0%			%det_MY	13.2%	66.7%
		%det_HO	3.5%	3.0%			%det_HO	86.8%	33.3%
		%partial/HO	38.5%	100.0%			%partial/HO	6.1%	0.0%
2003	4,740	%det/rel	39.1%	3.1%	2003	663	%det/rel	10.7%	2.3%
		%det_MY	97.4%	99.3%			%det_MY	49.3%	100.0%
		%det_HO	2.6%	0.7%			%det_HO	50.7%	0.0%
		%partial/HO	45.8%	100.0%			%partial/HO	16.7%	-----

Tables for Memorandum on Overwintering of Subyearling Fall Chinook from Snake and Clearwater Rivers

Hatchery fall chinook released in 1995 as subyearlings and number residualizing to 1996

mig_yr	data	coord	RELEASED 5/31 -- 6/08			RELEASED 6/09 -- 6/23			RELEASED 6/23 -- 7/05		
			rel_site	in-river	transport	rel_site	in-river	transport	rel_site	in-river	transport
Clearwater River direct stream releases near Big Canyon Ck AP											
1995	%det/rel	WPC	SNK-BC1	41.8%	8.5%	SNK-BC2	37.9%	9.3%			
	%det_MY			97.1%	98.1%		93.0%	99.0%			
	%det_HO			2.9%	1.9%		7.0%	1.0%			
	%partial/HO			40.0%	0.0%		20.7%	0.0%			
1995	%det/rel	RNI				SNK-CJ2	30.8%	8.3%	SNK-CJ3	21.1%	6.8%
	%det_MY						92.7%	95.6%		91.5%	94.3%
	%det_HO						7.3%	4.4%		8.5%	5.7%
	%partial/HO						22.6%	30.0%		20.8%	13.0%
Snake River direct stream releases near Pittsburg Landing AP											
1995	%det/rel	WPC	SNK-PL1	44.3%	8.4%	SNK-PL2	36.6%	9.4%			
	%det_MY			97.3%	95.5%		95.6%	92.6%			
	%det_HO			2.7%	4.5%		4.4%	7.4%			
	%partial/HO			35.5%	10.0%		19.0%	33.3%			

Hatchery fall chinook released in 1996 as subyearlings and number residualizing to 1997

mig_yr	data	coord	RELEASED 6/06 -- 6/08			RELEASED 6/09 -- 6/23			RELEASED 6/23 -- 7/10		
			rel_site	in-river	transport	rel_site	in-river	transport	rel_site	in-river	transport
Clearwater River direct stream releases near Big Canyon Ck AP											
1996	%det/rel	RNI	CLWR-1	42.8%	3.7%	CLWR-2	37.6%	5.2%	CLWR-3	11.7%	1.4%
	%det_MY			95.0%	100.0%		94.0%	93.4%		81.4%	66.0%
	%det_HO			5.0%	0.0%		6.0%	6.6%		18.6%	34.0%
	%partial/HO			28.0%	-----		43.5%	42.9%		14.9%	0.0%
Snake River direct stream releases near Pittsburg Landing AP											
1996	%det/rel	RNI	SNK-PL1	41.1%	5.9%	SNK-PL2	41.4%	5.5%	SNK-PL3	10.9%	1.6%
	%det_MY			95.7%	95.7%		93.8%	93.5%		83.6%	82.4%
	%det_HO			4.3%	4.3%		6.2%	6.5%		16.4%	17.6%
	%partial/HO			23.8%	33.3%		40.3%	31.9%		23.2%	22.2%

Tables for Memorandum on Overwintering of Subyearling Fall Chinook from Snake and Clearwater River

Hatchery fall chinook released in 1997 as subyearling and number residualizing to 1998

mig_yr	data	coord	RELEASED 5/15 -- 6/08			RELEASED 6/09 -- 6/18			RELEASED 6/19 -- 7/08		
			rel_site	in-river	transport	rel_site	in-river	transport	rel_site	in-river	transport
Clearwater River direct stream releases near Big Canyon Ck AP											
1997	%det/rel	BDA	CLWR-1	35.1%	3.2%	CLWR-2	34.6%	2.7%	CLWR-3	10.1%	0.7%
	%det_MY			97.5%	98.1%		97.5%	96.9%		92.5%	86.8%
	%det_HO			2.5%	1.9%		2.5%	3.1%		7.5%	13.2%
	%partial/HO			48.8%	33.3%		43.5%	26.7%		35.4%	30.0%
1997	%det/rel	RNI	CLWR-1	27.7%	3.1%	CLWR-2	20.5%	1.4%	CLWR-3	10.1%	0.8%
	%det_MY			99.7%	100.0%		99.6%	100.0%		92.2%	86.2%
	%det_HO			0.3%	0.0%		0.4%	0.0%		7.8%	13.8%
	%partial/HO			0.0%	-----		0.0%	-----		33.3%	50.0%
1997	%det/rel	WPC				CLWR-2	22.7%	2.3%			
	%det_MY						95.0%	93.1%			
	%det_HO						5.0%	6.9%			
	%partial/HO						57.1%	50.0%			
Snake River direct stream releases at Billy Ck near Captain John Rapids AP											
1997	%det/rel	WPC	SNK-BC1	31.4%	2.8%	SNK-BC2	31.3%	2.8%	SNK-BC3	13.6%	1.2%
	%det_MY			99.0%	100.0%		99.0%	100.0%		77.6%	82.8%
	%det_HO			1.0%	0.0%		1.0%	0.0%		22.4%	17.2%
	%partial/HO			25.0%	-----		50.0%	-----		33.3%	0.0%
1997	%det/rel	RNI				SNK-BC2	38.1%	2.9%	SNK-BC3	34.4%	3.4%
	%det_MY						91.2%	94.4%		87.2%	83.3%
	%det_HO						8.8%	5.6%		12.8%	16.7%
	%partial/HO						31.7%	50.0%		31.5%	42.9%
Snake River direct stream releases near Pittsburg Landing AP											
1997	%det/rel	RNI	SNK-PL1	45.9%	3.9%	SNK-PL2	35.3%	3.4%	SNK-PL3	18.6%	1.4%
	%det_MY			98.4%	99.1%		97.1%	94.0%		87.2%	88.5%
	%det_HO			1.6%	0.9%		2.9%	6.0%		12.8%	11.5%
	%partial/HO			44.4%	40.0%		40.0%	20.0%		33.7%	16.7%
1997	%det/rel	WPC				SNK-PL2	33.8%	3.2%			
	%det_MY						94.0%	92.9%			
	%det_HO						6.0%	7.1%			
	%partial/HO						37.5%	32.6%			

Tables for Memorandum on Overwintering of Subyearling Fall Chinook from Snake and Clearwater River

Hatchery fall chinook released in 1998 as subyearlings and number residualizing to 1999

mig_yr	data	coord	RELEASED 5/15 -- 6/02			RELEASED 6/03 -- 6/16			RELEASED 6/17 -- 7/07		
			rel_site	in-river	transport	rel_site	in-river	transport	rel_site	in-river	transport
Clearwater River direct stream releases near Big Canyon Ck AP											
1998	%det/rel	BDA	CLWR-1	54.6%	2.8%	CLWR-2	54.7%	2.4%	CLWR-3	43.8%	2.3%
	%det_MY			99.4%	100.0%		98.4%	97.9%		92.4%	93.6%
	%det_HO			0.6%	0.0%		1.6%	2.1%		7.6%	6.4%
	%partial/HO			53.8%	-----		37.3%	50.0%		36.6%	27.8%
1998	%det/rel	WDM	CLWR-1	39.1%	2.0%	CLWR-2	42.8%	2.2%	CLWR-3	25.1%	1.1%
	%det_MY			99.6%	100.0%		96.8%	98.2%		89.3%	93.0%
	%det_HO			0.4%	0.0%		3.2%	1.8%		10.7%	7.0%
	%partial/HO			100.0%	-----		28.6%	0.0%		27.5%	0.0%
Snake River direct stream releases at Billy Ck and Heller Bar near Captain John Rapids AP											
1998	%det/rel	WDM	SNK-BC1	44.1%	2.4%	SNK-BC2	39.7%	1.5%	SNK-BC3	18.6%	1.3%
	%det_MY			99.5%	100.0%		97.3%	100.0%		91.9%	93.8%
	%det_HO			0.5%	0.0%		2.7%	0.0%		8.1%	6.3%
	%partial/HO			33.3%	-----		37.0%	-----		40.4%	33.3%
1998	%det/rel	WDM				SNK-HE2	56.9%	2.3%			
	%det_MY						98.7%	98.1%			
	%det_HO						1.3%	1.9%			
	%partial/HO						43.0%	16.7%			
Snake River direct stream releases near Pittsburg Landing AP											
1998	%det/rel	WDM	SNK-PL1	40.6%	1.3%	SNK-PL2	40.6%	1.7%	SNK-PL3	14.3%	0.9%
	%det_MY			98.1%	100.0%		95.4%	97.7%		92.9%	83.3%
	%det_HO			1.9%	0.0%		4.6%	2.3%		7.1%	16.7%
	%partial/HO			20.0%	-----		29.8%	0.0%		30.8%	25.0%
1998	%det/rel	WPC	SNK-PL1	57.1%	3.1%				SNK-PL3	45.0%	2.2%
	%det_MY			100.0%	100.0%					95.9%	96.1%
	%det_HO			0.0%	0.0%					4.1%	3.9%
	%partial/HO			-----	-----					40.2%	23.5%

Tables for Memorandum on Overwintering of Subyearling Fall Chinook from Snake and Clearwater River

Hatchery fall chinook released in 2000 as subyearlings and number residualizing to 2001

mig_yr	data	coord	RELEASED 5/25 -- 6/08			RELEASED 6/09 -- 6/23			RELEASED 6/24 -- 7/13		
			rel_site	in-river	transport	rel_site	in-river	transport	rel_site	in-river	transport
Clearwater River -- Two Big Canyon Ck AP production releases and nearby direct stream releases											
2000	%det/rel	BDA	BCCAP-P1	48.3%	8.0%	BCCAP-P2	39.7%	7.7%	BCCAP-3	13.3%	1.5%
	%det_MY			96.5%	98.8%		91.4%	97.0%		53.0%	68.8%
	%det_HO			3.5%	1.2%		8.6%	3.0%		47.0%	31.2%
	%partial/HO			47.1%	0.0%		48.9%	22.2%		15.3%	12.5%
Snake River -- Pittsburg Landing AP production release and nearby direct stream releases											
2000	%det/rel	BDA	PLAP-P1	38.8%	4.3%						
	%det_MY			97.2%	97.7%						
	%det_HO			2.8%	2.3%						
	%partial/HO			72.7%	100.0%						
2000	%det/rel	WDM	SNK-PL1	6.8%	1.5%	SNK-PL2	3.7%	0.6%	SNK-PL3	1.9%	0.1%
	%det_MY			92.9%	100.0%		89.1%	100.0%		73.9%	50.0%
	%det_HO			7.1%	0.0%		10.9%	0.0%		26.1%	50.0%
	%partial/HO			66.7%	-----		20.0%	-----		0.0%	100.0%
Snake River -- Captain John Rapids AP production release and nearby direct stream releases at Billy Ck											
2000	%det/rel	BDA	CJRAP-P1	48.8%	6.4%						
	%det_MY			98.2%	98.4%						
	%det_HO			1.8%	1.6%						
	%partial/HO			66.7%	100.0%						
2000	%det/rel	WDM	SNK-BC1	20.4%	4.1%	SNK-BC2	8.6%	2.3%	SNK-BC3	2.9%	1.2%
	%det_MY			90.9%	98.0%		85.8%	94.6%		63.4%	90.0%
	%det_HO			9.1%	2.0%		14.2%	5.4%		36.6%	10.0%
	%partial/HO			34.8%	0.0%		43.3%	0.0%		23.1%	0.0%

Tables for Memorandum on Overwintering of Subyearling Fall Chinook from Snake and Clearwater River

Hatchery fall chinook released in 2001 as subyearlings and number residualizing to 2002

mig_yr	data	coord	RELEASED 5/18 -- 6/02			RELEASED 6/03 -- 6/16			RELEASED 6/17 -- 7/04		
			rel_site	in-river	transport	rel_site	in-river	transport	rel_site	in-river	transport
Clearwater River -- released with Big Canyon Ck AP production and nearby stream releases											
2001	%det/rel	BDA	BCCAP-P1	49.3%	6.1%	BCCAP-P2	29.2%	4.0%			
	%det_MY			96.3%	100.0%		92.2%	97.0%			
	%det_HO			3.7%	0.0%		7.8%	3.0%			
	%partial/HO			54.1%	-----		42.1%	66.7%			
2001	%det/rel	BDA	BCCAP-1	39.4%	4.4%	BCCAP-2	26.5%	3.2%	BCCAP-3	14.5%	2.3%
	%det_MY			96.2%	99.4%		94.0%	97.5%		83.5%	95.6%
	%det_HO			3.8%	0.6%		6.0%	2.5%		16.5%	4.4%
	%partial/HO			50.8%	0.0%		34.0%	42.9%		19.9%	9.1%
Mainstem Snake River -- released with Pittsburg Landing AP production and nearby stream releases											
2001	%det/rel	BDA	PLAP-P1	20.7%	3.1%						
	%det_MY			98.3%	100.0%						
	%det_HO			1.7%	0.0%						
	%partial/HO			71.4%	-----						
2001	%det/rel	WDM	PLAP-1	6.5%	0.5%	PLAP-2	0.9%	0.1%	PLAP-3	0.3%	0.0%
	%det_MY			95.0%	100.0%		95.5%	100.0%		87.5%	100.0%
	%det_HO			5.0%	0.0%		4.5%	0.0%		12.5%	0.0%
	%partial/HO			25.0%	-----		100.0%	-----		0.0%	-----
Snake River -- released with Captain John Rapids AP production and nearby stream release at Billy Ck											
2001	%det/rel	BDA	CJRAP-P1	54.5%	7.2%						
	%det_MY			96.5%	100.0%						
	%det_HO			3.5%	0.0%						
	%partial/HO			55.3%	-----						
2001	%det/rel	WDM	SNK-BC1	28.9%	3.2%	SNK-BC2	5.8%	0.5%	SNK-BC3	1.0%	0.1%
	%det_MY			97.2%	100.0%		96.5%	100.0%		76.9%	100.0%
	%det_HO			2.8%	0.0%		3.5%	0.0%		23.1%	0.0%
	%partial/HO			40.0%	-----		60.0%	-----		16.7%	-----
Snake River -- transportation study release near Captain John Rapids AP											
2001	%det/rel	DMM	SNAKER	2.9%	35.9%						
	%det_MY			71.4%	99.9%						
	%det_HO			28.6%	0.1%						
	%partial/HO			3.0%	11.1%						

Tables for Memorandum on Overwintering of Subyearling Fall Chinook from Snake and Clearwater River

Hatchery fall chinook released in 2002 as subyearlings and number residualizing to 2003

mig_yr	data	coord	RELEASED 5/24 -- 6/08			RELEASED 6/09 -- 6/18			RELEASED 6/19 -- 7/02		
			rel_site	in-river	transport	rel_site	in-river	transport	rel_site	in-river	transport
Clearwater River -- released with Big Canyon Ck Ap production and nearby stream releases											
2002	%det/rel	SJR	BCCAP-P1	37.3%	2.3%	BCCAP-P2	25.5%	2.5%			
	%det_MY			96.9%	100.0%		89.4%	91.9%			
	%det_HO			3.1%	0.0%		10.6%	8.1%			
	%partial/HO			34.5%	-----		19.4%	40.0%			
Snake River -- released with Pittsburg Landing AP production and nearby stream releases plus below Hells Canyon Dam											
2002	%det/rel	SJR	PLAP-P1	29.7%	2.1%						
	%det_MY			98.8%	100.0%						
	%det_HO			1.2%	0.0%						
	%partial/HO			44.4%	-----						
2002	%det/rel	WDM	SNK-PL1	7.7%	0.4%	SNK-PL2	2.7%	0.3%	SNK-PL3	1.4%	0.3%
	%det_MY			96.3%	100.0%		92.3%	100.0%		84.0%	100.0%
	%det_HO			3.7%	0.0%		7.7%	0.0%		16.0%	0.0%
	%partial/HO			66.7%	-----		60.0%	-----		50.0%	-----
2002	%det/rel	DTV	HCD-1	48.3%	3.3%						
	%det_MY			100.0%	100.0%						
	%det_HO			0.0%	0.0%						
	%partial/HO			-----	-----						
Snake River -- released with Captain John Rapids AP production and nearby stream releases including Billy Ck											
2002	%det/rel	SJR	CJRAP-P1	43.7%	3.9%	CJRAP-P2	33.2%	3.3%			
	%det_MY			98.6%	100.0%		92.7%	93.9%			
	%det_HO			1.4%	0.0%		7.3%	6.1%			
	%partial/HO			53.3%	-----		33.3%	20.0%			
2002	%det/rel	WDM	SNK-BC1	25.3%	1.2%	SNK-BC2	12.4%	1.0%	SNK-BC3	4.0%	0.3%
	%det_MY			93.3%	100.0%		88.7%	92.3%		67.0%	85.7%
	%det_HO			6.7%	0.0%		11.3%	7.7%		33.0%	14.3%
	%partial/HO			35.7%	-----		22.9%	50.0%		15.2%	100.0%
2002	%det/rel	HLB	SNK-RIV1	54.0%	4.8%	SNK-RIV2	44.6%	0.0%			
	%det_MY			99.0%	100.0%		100.0%	-----			
	%det_HO			1.0%	0.0%		0.0%	-----			
	%partial/HO			100.0%	-----		-----	-----			
Snake River -- transportation study release near Captain John Rapids AP											
2002	%det/rel	DMM	SNAKER1	5.5%	22.8%	SNAKER2	3.8%	13.2%			
	%det_MY			79.8%	99.8%		65.2%	99.6%			
	%det_HO			20.2%	0.2%		34.8%	0.4%			
	%partial/HO			12.3%	0.0%		8.5%	4.5%			
Snake River -- released in reservoir near Asotin and Lewiston											
2002	%det/rel	HLB	SNK-RES1	47.2%	7.8%	SNK-RES2	61.4%	5.3%			
	%det_MY			97.8%	100.0%		100.0%	100.0%			
	%det_HO			2.2%	0.0%		0.0%	0.0%			
	%partial/HO			50.0%	-----		-----	-----			

Tables for Memorandum on Overwintering of Subyearling Fall Chinook from Snake and Clearwater River

Hatchery fall chinook released in 2003 as subyearling and number residualizing to 2004

mig_yr	data	coord	RELEASED 5/22 -- 6/08			RELEASED 6/09 -- 6/18		
			rel_site	in-river	transport	rel_site	in-river	transport

Clearwater River -- released with Big Canyon Ck, Lapwai AP, Nez Perce Hatchery production

2003	%det/rel	SJR	BCCAP-P1	56.9%	3.1%			
	%det_MY			98.7%	100.0%			
	%det_HO			1.3%	0.0%			
	%partial/HO			50.0%	-----			
2003	%det/rel	BDA	NLVP	58.8%	2.8%			
	%det_MY			99.3%	100.0%			
	%det_HO			0.7%	0.0%			
	%partial/HO			9.1%	-----			
2003	%det/rel	BDA	NPTH-P1	70.2%	3.3%	NPTH-P2	21.9%	3.6%
	%det_MY			99.6%	100.0%		89.3%	96.5%
	%det_HO			0.4%	0.0%		10.7%	3.5%
	%partial/HO			62.5%	-----		21.4%	33.3%

Snake River -- release with Pittsburg Landing AP production and nearby stream releases including below Hells Canyon Dam

2003	%det/rel	SJR	PLAP-P1	53.3%	2.6%			
	%det_MY			99.3%	100.0%			
	%det_HO			0.7%	0.0%			
	%partial/HO			44.4%	-----			
2003	%det/rel	WDM	SNK-PL1	13.7%	47.9%			
	%det_MY			99.3%	100.0%			
	%det_HO			0.7%	0.0%			
	%partial/HO			7.1%	-----			
2003	%det/rel	DTV	HCD	43.1%	1.5%			
	%det_MY			100.0%	100.0%			
	%det_HO			0.0%	0.0%			
	%partial/HO			-----	-----			

Snake River -- released with Captain John Rapids AP production and nearby stream releases including transport study fish

2003	%det/rel	SJR	CJRAP-P1	68.5%	2.7%			
	%det_MY			100.0%	100.0%			
	%det_HO			0.0%	0.0%			
	%partial/HO			-----	-----			
2003	%det/rel	DMM	SNKDMM-1	12.9%	56.6%			
	%det_MY			99.2%	100.0%			
	%det_HO			0.8%	0.0%			
	%partial/HO			13.2%	0.0%			
2003	%det/rel	MLS				SNKMLS-2	65.8%	5.2%
	%det_MY						99.8%	100.0%
	%det_HO						0.2%	0.0%
	%partial/HO						50.0%	-----