Lyons Ferry Hatchery Evaluation
Fall Chinook Salmon
Annual Report: 2007 & 2008

by

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Abstract

This report summarizes activities by the Washington Department of Fish and Wildlife's (WDFW) Lower Snake River Hatchery Evaluation Program for the period 16 April 2007 through 15 April 2009.

For brood year 2007 (BY07), WDFW collected 6,789 fish at Lyons Ferry Hatchery (LFH) and Lower Granite Dam (LGR) for broodstock, monitoring and evaluation of our hatchery releases, and to estimate the run size to LGR. Because of higher than expected run size and pre-spawning survival, 1,424 fish were eventually returned to the river to spawn naturally. For brood year 2008 (BY08), WDFW collected 6,400 adults and jacks for broodstock, but again returned 1,154 fish to the river to spawn naturally. Natural origin fish were once again integrated into our broodstock in both brood years, with natural fish making up 3.3% and 6.4% of broodstock for BY07 and BY08, respectively. Of the total number of fish contributing to production in 2007, 93.3% were Snake River hatchery origin, with small numbers of stray and unknown origin fish also contributing. For 2008, hatchery fish were the majority of spawners, with 68.3% Snake River hatchery origin and 23.1% unknown hatchery origin based on scale analysis and fin clips. Stray fish were 0.04% of the spawners and unclipped and untagged fish without origin assignments were 2.2% of the spawning population in 2008.

A total of 5,143,459 green eggs were taken at Lyons Ferry Hatchery in 2007 and 5,010,224 green eggs in 2008; sufficient to meet the full production goals listed in the *United States v. Oregon Management Agreement*. Egg survival from green to eye-up was nearly 97% for both years.

Hatchery staff released BY06 subyearlings directly from LFH (199,817 fish) on 23 May 2007. The LFH released 459,633 yearling fall Chinook (BY06) into the Snake River on site on 7-10 April 2008. All release groups were represented by a unique coded wire tag (CWT) group and additionally may have received a visual implant elastomer (VIE) or passive integrated transponder (PIT) tag as identified in the US *v.* OR production tables. Historical releases of fish into the Snake Basin from brood years 2002 through 2006 are provided in an appendix G.

We released 200,733 BY07 subyearlings directly from LFH in spring 2008. Four additional groups were released: two groups into the Snake River near Couse Creek (200,513 fish and at 59.1 fpp and an unassociated group of 29,888 fish at 63.0 fpp), and a final group into the Grande Ronde River (194,310 fish at 46.7 fpp tagged with a CWT-only at tagging and an associated group of 108,960 unmarked/untagged fish at 42.2 fpp was released concurrently). Brood year 2007 releases were completed in spring 2009 when 455,152 yearling fall Chinook were released into the Snake River at LFH.

We surveyed the Tucannon River by foot, covering 91% of the historical spawning area of fall Chinook. We estimated that 109 and 254 fall Chinook redds were constructed in the river during 2007 and 2008, respectively, and estimated spawning escapement of 326 Chinook in 2007 and 763 Chinook in 2008. The return to the Tucannon River was estimated to be 93% in-basin hatchery fish in 2007 and 82.2% in-basin hatchery fish in 2008. No natural origin fish were identified during examination of carcasses recovered in 2007 and only 1.3% of recovered carcasses in 2008 were identified as natural origin.

We estimate a minimum of 23.4% of the LSRCP mitigation goal of 91,500 fall Chinook was met in 2007 through combined returns to the Snake River and harvest in freshwater and ocean fisheries. In 2008, we estimate a minimum of 19.0% of the LSRCP mitigation goal was met. During both years, harvest estimates for FCAP released fish were not included.

Smolt-to-adult return estimates to the Snake River and smolt-to-adult survival estimates including estimated harvest for brood years 1994 through 2006 are presented for hatchery fall Chinook released in the Snake River basin. The mean SARs ranged from 0.085%-0.321% for subyearlings and 0.409-1.499% for yearlings for completed brood years 1999 through 2003. Data is summarized for WDFW releases that are part of LSRCP, and additional data from the NPT and IPC programs are included in appendices.

Yearlings continue to provide a survival advantage over subyearlings although it is highly variable year to year. In recent years (brood years 2004 through 2006), yearlings had SARs as high as 1.666% and subyearlings had SARs of 0.940%. We present data showing a survival advantage of LFH on-station subyearlings when compared to direct releases occurring further upstream into the Snake River near Couse Creek and the Grande Ronde River.

We adjusted harvest estimates of CWT tagged fish by fishery, sample detection type, and tag loss to fully reflect total take of non-tagged, non-clipped, as well as adipose clipped, and CWT tagged fall Chinook. Analysis was done solely on recoveries of fall Chinook released by WDFW and does not include recoveries of LSRCP fish from the Nez Perce Tribe (NPT), fish released from NPT Hatchery, or fish released from Idaho Power Company programs.

Acknowledgments

The Lyons Ferry Fall Chinook Salmon Hatchery Evaluation Program is the result of work by many individuals within the Washington Department of Fish and Wildlife Fish Program. We want to thank all those who contributed to this program.

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We thank the personnel at Lyons Ferry Hatchery for their cooperation with sampling and providing information regarding hatchery operations. We appreciate the assistance of Lynn Anderson and crew at the WDFW Tag Recovery Lab. Thanks also to John Sneva (WDFW) who processed our scale samples.

We appreciate the efforts of Jerry Harmon (NOAA Fisheries) and crew at Lower Granite Dam for trapping, tagging, and documenting fall Chinook salmon for transport to Lyons Ferry Hatchery. We also thank Fred Mensik (WDFW) for providing summarized fallback data from the juvenile collection facility at Lower Granite Dam. We also thank Kirk Steinhorst and George Naughton (University of Idaho), and Bill Arnsberg (NPT) for providing information regarding the fall Chinook run reconstruction at Lower Granite Dam for 2007.

We thank Michael Gallinat, Glen Mendel, Andrew Murdoch, Ken Warheit and Steve Yundt for reviewing a draft of this report and providing valuable comments.

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Introduction

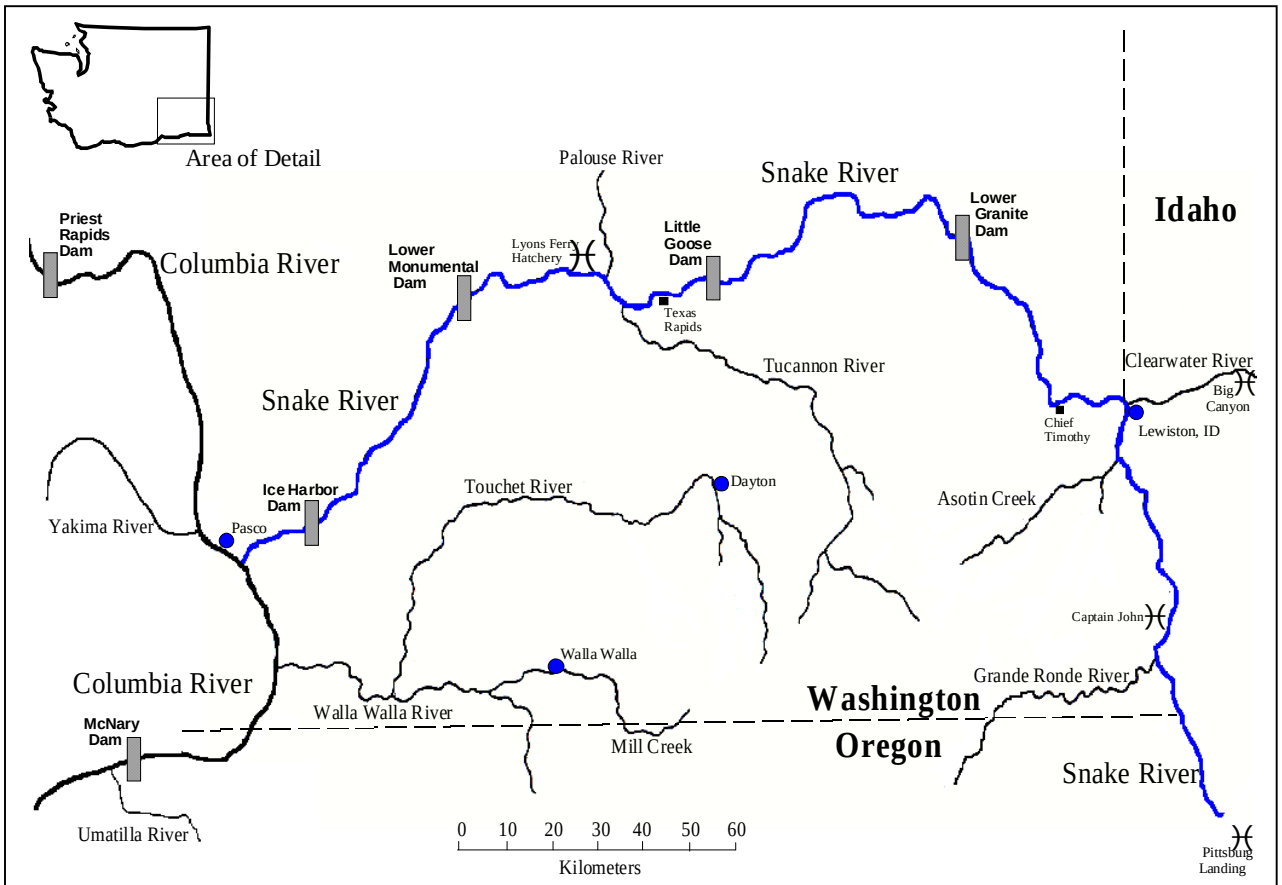
Program Objectives

This report summarizes activities by the Washington Department of Fish and Wildlife's (WDFW) Lower Snake River Hatchery Fall Chinook Evaluation Program from 16 April 2007 to 15 April 2009. WDFW's Snake River Lab (SRL) staff completed this work with Federal fiscal year 2007, 2008, and 2009 funds provided through the U.S. Fish and Wildlife Service (USFWS), under the Lower Snake River Compensation Plan (LSRCP).

Congress authorized the LSRCP in 1976. As a result of that plan, Lyons Ferry Hatchery (LFH) was constructed and has been in operation since 1984 (Figure 1). One objective of the hatchery was to compensate for an annual loss of 18,300 adult (non-juvenile)[1] Snake River stock fall Chinook salmon (U.S. Army Corps of Engineers 1975). In addition, supplying enough fish to support 73,200 fish taken in commercial and sport fisheries was part of the total mitigation goal. An evaluation program was initiated in 1984 to monitor the success of LFH in meeting the LSRCP compensation goals (91,500 fish) and to identify any production adjustments required to accomplish those goals. This mitigation program was modified in the early 1990s by agreement of the *United States v. Oregon* parties to supplement natural fall Chinook production above Lower Granite (LGR) Dam. This action was consistent with the U.S. Endangered Species Act of Washington's Wild Salmonid Policy.

The WDFW has two general goals in its fall Chinook evaluation program: (1) monitor hatchery practices at LFH to ensure quality smolt releases, high downstream migrant survival, and sufficient adult fish contribution to fisheries and escapement to meet the LSRCP compensation goals; and (2) gather genetic information to help maintain the integrity of the Snake River Basin fall Chinook salmon stock (WDF 1994). Our efforts have contributed to evaluating the status of Snake River fall Chinook by monitoring population abundance, spatial distribution, genetics, and life history (sex and age information of returns) as well as by removing strays at LGR Dam on the Snake River to minimize the effects of out-of-basin strays on the population (NMFS 1993). Specific annual program objectives can be obtained from the Snake River Lab Project office.

[1] The LSRCP Special Report has language referring to adult recoveries. That language was intended to differentiate adults from juveniles in the document (Dan Herrig personal communication). The LSCRP mitigation goal was based upon 97,500 fall Chinook counted at McNary Dam in 1958 and expected 14,363 fall Chinook to persist in the Snake River through natural production. At that time adult and jack counts were combined to give a total count. Therefore the mitigation goal consists of jacks and adults, not just adults. Since minijacks (fish < 30 cm total length) are not counted at the dams, they were excluded from the calculations that determined the mitigation goal.



Rkm	Location
Snake River	
16.1	Ice Harbor Dam
66.9	Lower Monumental Dam
95.1	Lyons Ferry Hatchery
95.7	Lyons Ferry Park
105.2	Texas Rapids Boat Launch
113.1	Little Goose Dam
115.0	Bryan's Landing Boat Launch
132.3	Central Ferry Park
173.0	Lower Granite Dam
210.3	Chief Timothy Park
253.7	Couse Creek Boat Launch
263.0	Captain John Acclimation Site
346.0	Pittsburg Landing Acclimation Site
397.4	Hells Canyon Dam (not shown)
Clearwater River	
57.0	Big Canyon Acclimation Site
Grande Ronde River	
49.4	Mouth of Cougar Creek

Figure 1. The Lower Snake River Basin showing location of Lyons Ferry Hatchery and major tributaries in the area.

Broodstock Collection and Management 2007

Fall Chinook are collected at LFH and LGR Dam for broodstock (Appendix A). Each year there is a discrepancy between estimated numbers of fish collected and the numbers of fish processed/killed (Table 1). The in-season estimate of numbers of fish diverted into the hatchery at LFH is a minimum estimate of the run to LFH. Some of the fish that are trapped at LFH are shunted back to the river and never used for broodstock (see LFH Trapping Operations below). The discrepancies between the numbers of fish recorded as collected at LGR trap and the number of fish processed were likely data errors in the numbers of fish trapped at LGR trap.

Table 1. **Number of Chinook initially collected for broodstock from LFH and LGR trapping efforts and how they were accounted for in 2007.**

Year	Trap Location	Number Collected/Hauled for Broodstock	Processed (killed)	Returned to Snake River	Difference from Number Collected/Hauled
2007	LFH	3,994	3,044[a]	950[b]	0
	LGR	2,795	2,337[c]	474	-16[d]

[a] Includes 1 summer Chinook (Wenatchee River) and 2 spring Chinook (Lookingglass Hatchery).
[b] Unique numbers of fish hauled does not include recaptures (68 fish).
[c] Does not include 1 coho accidentally sent from LGR to LFH.
[d] We processed more fish from LGR than were documented as shipped.

Lower Granite Dam Trapping Operations

Trapping protocols are presented in Appendix B. In general, prior to transport, NOAA Fisheries staff anesthetized the salmon, gathered length and sex data, and marked the fish with a hole in the operculum prior to release upstream or transport. WDFW personnel then hauled fish to LFH in a 5,678 L aerated tank truck. A systematic automated trapping of 20% of the run at LGR Dam was conducted 1 September through 21 November. Trapping rates and operation dates of systematic sampling at LGR are presented in Appendix C.

LFH Trapping Operations

The majority of broodstock is collected at LFH. The trap at LFH was in operation daily from 4 September through 26 November. The trapping and sorting protocols are included in Appendix D. Estimates were made each day for fish retained and fish returned to the river. In some prior years the trap was not operated full time or for the length of the run. During those years the numbers of fall Chinook presented in our reports only reflect what was trapped and retained that day, not what the total number of fish would have been if we had trapped daily.

We documented 8,363 trapping events of fall Chinook at the LFH trap in 2007 (Figure 2). Jacks (3,385) and minijacks (1,347) accounted for the majority of trapping events. We were unable to determine the unique (excluding recaptures) number of fish that were trapped because there is

not a marking protocol in place at the hatchery trap. We assume that jacks were recaptured multiple times but we do not know to what extent.

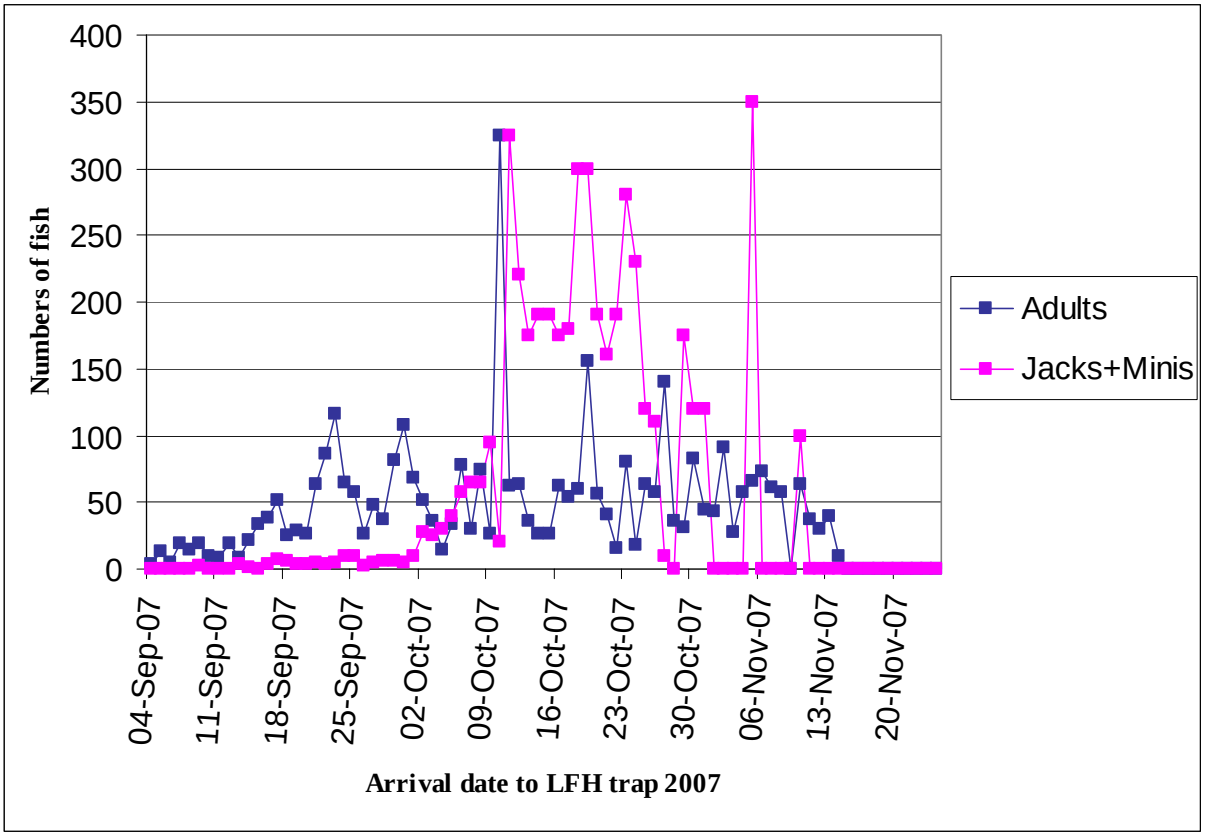


Figure 2. Number of adult and jack fall Chinook arriving at the LFH trap by date, 2007.

Hatchery Operations 2007

Spawning Operations

Spawning and Egg Take

Spawning began the fourth week in October and continued for seven weeks (Table 2). Peak spawn usually occurs during the same week for fish trapped at LFH and LGR Dam, but in 2007 the LGR trapped fish did not ripen as early as usual. On 19 November, staff at LFH realized that lights over the LGR holding pond had been kept on nightly when they should have been turned off. Once the lights were turned off the fish ripened the following week. The LFH fish were not affected because the light did not go that far into the adult ponds.

At spawning, ripe fish were killed and their gametes collected and set aside unmixed. All matings were single male/single female crosses. To determine the origin and brood year of fish spawned, snouts containing wires were removed from tagged fish and scales and DNA were collected from unmarked/untagged fish (no wire or VIE). During spawning, CWTs were decoded to verify origin prior to matings. The origins of untagged fish were not determined until the following week when the results of scale, DNA, and PIT tag analysis were compiled. The total number of fish spawned prior to culling is listed in Table 3.

In order to reduce the genetic impact out-of-basin strays might have on progeny, unknown origin fish (no wire or VIE) were mated with unknown origin fish (Appendix E). In instances where there were not enough unknown origin fish available to mate with unknown origin fish we occasionally used LF origin males in the matings.

Progeny from matings with unmarked/untagged yearlings (LGR and LFH trapped), matings with unmarked/untagged STRAY subyearlings (LFH trapped), and matings with a parent with unreadable scales (LFH trapped) were held separately for possible culling at the end of the season. This protocol is in place to reduce potential strays while still assuring that enough eggs are retained to meet production goals.

Information about processed fish that were not spawned is presented in Table 4. Fish that were killed outright (surpluses) were generally males needed for run composition but not needed for spawning, or strays from other hatcheries (by CWT).

Table 2. Duration and peak of spawning, egg take, and percent egg mortality at LFH, 1984-2008.

Year	Spawn Duration Begin	End	Peak of Spawning	Total Egg take	Egg take fully covered through *US v Oregon* priority number[a]	Egg take partially covered *US v Oregon* priority number	Egg mortality to eye-up (%)[b]
1984	Nov 8	Dec 5	Nov 21	1,567,823	-	-	21.58
1985	Nov 2	Dec 14	Nov 7	1,414,342	-	-	3.99
1986	Oct 22	Dec 17	Nov 19	592,061	-	-	3.98
1987	Oct 20	Dec 14	Nov 17	5,957,976	-	-	3.82
1988	Oct 18	Dec 6	Nov 12	2,926,748	-	-	3.41
1989	Oct 21	Dec 16	Nov 11	3,518,107	-	-	5.75
1990	Oct 20	Dec 8	Nov 6	3,512,571	-	-	8.28
1991	Oct 15	Dec 10	Nov 12	2,994,676[c]	-	-	8.30
1992	Oct 20	Dec 8	Nov 21	2,265,557[c]	-	-	5.96
1993	Oct 19	Dec 7	Nov 2	2,181,879	-	-	6.69
1994	Oct 18	Dec 6	Nov 8	1,532,404	-	-	5.09
1995	Oct 25	Dec 5	Nov 14	1,461,500	-	-	5.64[d]
1996	Oct 22	Dec 3	Nov 5	1,698,309	-	-	4.56
1997	Oct 21	Dec 2	Nov 4	1,451,823[e]	-	-	5.22
1998	Oct 20	Dec 8	Nov 3	2,521,135	-	-	5.08
1999	Oct 19	Dec 14	Nov 9 & 10	4,668,267	-	-	9.42
2000	Oct 24	Dec 5	Nov 7 & 8	4,190,338	-	-	5.92
2001	Oct 23	Nov 27	Nov 13 & 14	4,734,234	-	-	6.42
2002	Oct 22	Nov 25	Nov 12 & 13	4,910,467	-	-	3.57
2003	Oct 21	Dec 2	Nov 10 & 12	2,812,751	8	9	3.09
2004	Oct 19	Nov 22	Nov 9 & 10	4,625,638	16	17	3.26
2005	Oct 18	Nov 29	Nov 15 & 16	4,929,630	16	17	3.50
2006	Oct 24	Dec 5	Nov 7 & 8	2,819,004	8	9	3.18
2007	Oct 23	Dec 3	Nov 13 & 14	5,143,459	17	-	3.29
2008	Oct 21	Nov 25	Nov 4 & 5	5,010,224	17	-	3.73

[a] Priority levels as listed in the *US v Oregon fall agreement* production tables.

[b] Egg mortality includes eggs destroyed due to positive ELISA values.

[c] An additional 9,000 eggs from stray females were given to Washington State University.

[d] Does not include loss from 10,000 stray eggs given to University of Idaho. The egg loss from strays was 8.63% excluding eggs used in fertilization experiments.

[e] Total egg take includes eggs from one coho female crossed with a fall Chinook.

Table 3. Spawn dates, numbers of fall Chinook, and weekly egg take of fish spawned at LFH in 2007. (LFH and LGR trapped fish are combined and jacks are included with males).

Spawn Dates	Male[a]	Female[a]	Non-Viable[b]	Egg take
Oct 23 and 24	17	17	2	57,800
Oct 30 and 31	102	102	1	333,100
Nov 6 and 7	366	366	3	1,203,300
Nov 13 and 14	543	543	4	1,762,800
Nov 19 and 20	289	290	1	937,700
Nov 27	191	191	1	680,559
Dec 3	48	48	0	168,200
Totals	**1,556**	**1,557**	**12**	**5,143,459**

[a] Numbers of fish presented include spawned fish whose progeny were later destroyed.
[b] Non-viable females—not ripe when killed. All were in-basin hatchery origin returns from yearling production.

Table 4. Weekly summary and origins of mortality and surplus Chinook processed at LFH in 2007. (LFH and LGR trapped fish are combined; jacks are included with males).

	Mortality						Killed Outright					
Week	LF/Snake R.[a]		Natural		Other/Unk[b]		LF/Snake R.		Natural		Other/Unk	
Ending	M	F	M	F	M	F	M	F	M	F	M	F
09-Sep	1	1	0	0	0	0	0	0	0	0	0	0
16-Sep	0	1	0	0	0	1	0	0	0	0	0	0
23-Sep	3	1	0	0	2[c]	1	0	0	0	0	0	0
30-Sep	3	2	0	0	1[c]	2	0	0	0	0	0	0
07-Oct	2	2	1	0	1	4	0	0	0	0	0	0
14-Oct	7	1	0	0	3	0	101	0	0	0	7	0
21-Oct	5	0	0	1	2	0	20	0	0	0	0	0
28-Oct	7	10	0	0	1	1	374	0	1	0	6	0
04-Nov	11	9	0	0	1	1	338	1	5	0	10	3
11-Nov	25	9	0	1	0	0	50	0	3	0	13	11
18-Nov	73	15	0	0	6	1	200	1	1	0	29	13
25-Nov	115	13	0	1	8	1	141	0	0	0	10	3
02-Dec	174	10	0	1	17	0	21	0	3	0	13	3
03-Dec	63	1	1	0	4	0	199	22	2	0	19	2
Totals	**489**	**75**	**2**	**4**	**46**	**12**	**1,444**	**24**	**15**	**0**	**107**	**35**

[a] Includes known LFH or NPTH origin (from CWT and/or VIE), and PIT tagged or scale sampled fish of Snake River hatchery origin.
[b] Includes undetermined hatchery yearlings by scales, hatchery strays by scales or wire, regenerated scales, and Lost and No tags.
[c] Does not include one spring Chinook incidentally trapped.

Fish Returned to River

We trapped more fish at LFH than were needed for run composition estimates. To ensure representative sampling we continued trapping throughout the run. Fish not needed for broodstock or run composition analysis were returned to the Snake River (Table 5). Fish trapped at LFH were released either downstream of Little Goose (LGO) Dam at Texas Rapids boat launch (Rkm 105.2) or upstream of LGO Dam at Bryans Landing (Rkm 115.0).

In order to document recaptures, fish were marked with a fin clip on the bottom lobe of the caudal fin prior to transport. Only fish hauled prior to 20 November were used to estimate recovery location. Fish passing LGR Dam after 21 November would not be detected because the trap was closed. Of the 546 fish that were bottom-caudal clipped and released prior to 20 November, 78 fish were recaptured at LFH and killed at processing (14.3% recapture rate) leaving 468 fish for which we could not account. Three fish were recovered in carcass surveys on the Tucannon River which expands to an estimated 36 (6.6% of the released fish). Twenty-eight bottom-caudal clipped fish were collected in the 20% sample at the LGR adult trap. When expanded to account for sample size, an estimated 25.6% of the fish released (140 estimated run to LGR Dam/546 unique fish hauled and released) had reached LGR Dam by 21 November. Of the estimated 140 bottom caudal clipped fish making it to LGR Dam, 25 were hauled to LFH and killed leaving 115 of the fish to continue above LGR Dam. The presumed final locations of the remaining 292 (53.5%) fish were in reservoirs between Lower Monumental (LMO) and LGR dams. The 404 fish released after 20 November are estimated to have remained in the Snake River above LMO Dam, but we do not know if they made it past LGR Dam because the trap was closed at that time.

Excess fish from LGR Dam trapping were transported from LFH and released above LGR Dam at Chief Timothy Park (Rkm 210.3). We estimate the fallback and recapture rate of the LGR fish hauled above the dam at 1.7% (5 unique fish / 291 released) for the period prior to 12 November. One of these fish was recaptured a second time after a second fallback event. The recaptured fish were released at the trap and allowed to continue their upstream journey. The remaining 286 fish and the additional 183 fish released after 2 December are estimated to have remained upstream of LGR Dam.

Table 5. Trapping sites, dates of release, release locations, sex, origin, and total number of Chinook that were hauled back to the Snake River in 2007. Recaptures (in parentheses) are not included in totals.

Trap Site	Release Date	Release Location	Sex	Snake R. Hatchery	Natural	Other/Unk	Unknown[a]	Total
LFH	23-Oct	Texas	Male	-	-	4	192	196
		Rapids	Male<53	5	2	3	258	268
	30-Oct	Bryans	Male	-	-	-	(7)	-
		Landing	Male<53	2	-	1	79 (33)	82
	20-Nov	Texas	Male<53	-	-	-	73 (28)	73
		Rapids	Female	-	-	-	50	50
	27-Nov	Texas	Female	-	-	-	92	92
		Rapids						
	03-Dec	Texas	Male	-	-	-	151	151
		Rapids	Male<53	-	-	-	18	18
			Female	-	-	-	20	20
LGR	09-Oct	Chief	Male	44	32	32	10	118
		Timothy	Male<53	70	1	14	1	86
	24-Oct	Chief	Male	5	1	15	1	22
		Timothy	Male<53	61	-	2	2	65
	03-Dec	Chief	Male	27	27	37	11	102
		Timothy	Male<53	34	-	2	-	36
			Female	14	15	8	8	45
			Totals	**262**	**78**	**118**	**966**	**1,424**

[a] Other/Unknown are most likely Snake River origin fish.

Broodstock Profile

Seventy-two percent of the broodstock contributing to production were collected at the LFH trap. The majority of the unmarked/untagged fish included in our broodstock were trapped at LGR Dam. Although protocol guidelines discourage the multiple uses of individual males, we ultimately used one male twice.

The composition of broodstock used at Lyons Ferry Hatchery is presented in Figure 3. The percentages include fish spawned for the Idaho Power Company (IPC) mitigation agreement as well as the LSRCP program. We estimate 88.8% of the males and 85.9% of the females that contributed gametes for production were returns from hatchery yearling releases.

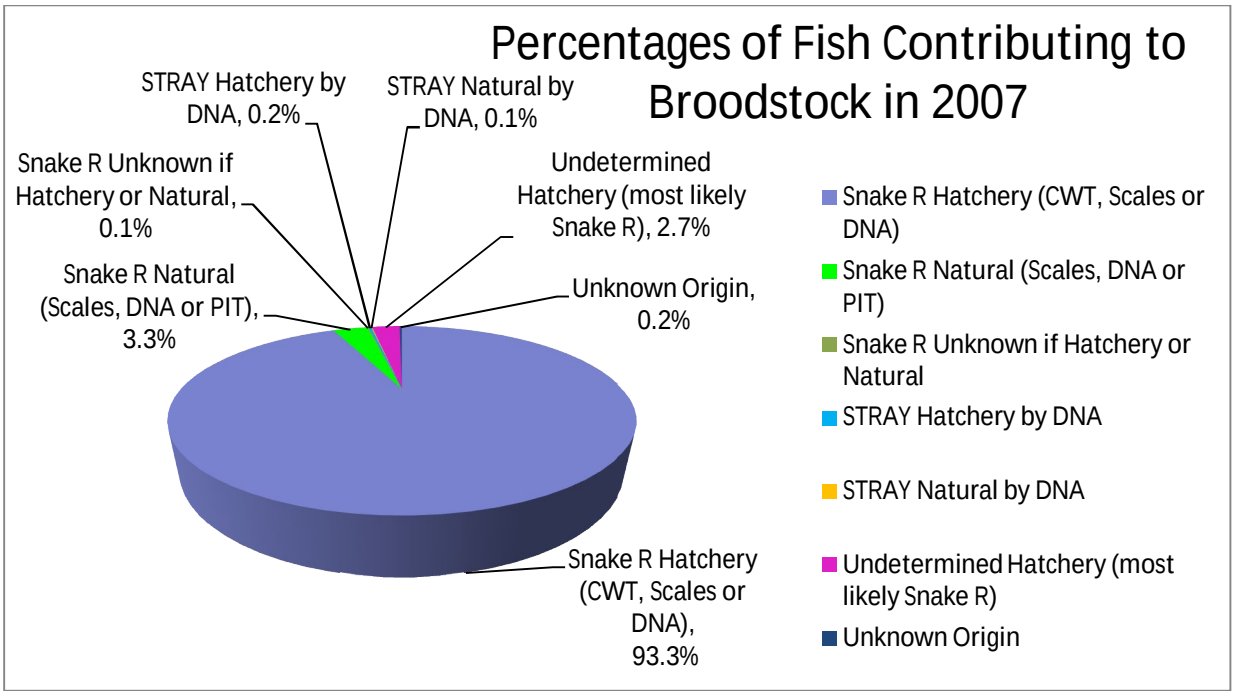


Figure 3. Percentages of fall Chinook contributing to Broodstock by origin, 2007.

DNA as a tool to determine origin

The inclusion of DNA analysis to determine origins made the task of assigning origins more complex. Fish were retained only if their probability of a correct assignment to origin was 0.95 or higher. We culled gametes from untagged fish whose DNA was from out of the basin. For some of the fish we were unable to determine if they were wild or hatchery because the primary and secondary assignments were not independently conclusive. For instance, if the first assignment was 0.50 probability to Snake River Wild with a 0.48 secondary probability to Snake River Hatchery, the combined total probability to the Snake was 0.95, but it could not be definitively assigned to Wild or Hatchery. Because of the large numbers of fish on hand we were able to cull strays down to the 0.93 probability level, resulting in 99 matings being culled.

We categorized fish as unknown origin if there was DNA data that was conflicting. For instance if the primary assignment was 0.64 to Umatilla and the secondary was 0.32 to the Snake River, neither assignment was sufficient to determine if it was an in-basin or out-of-basin fish.

Another complicating factor is that DNA may detect the stray genes in a fish, but it really could be a fish originating from the Snake River. The flow of stray genes into the basin and the practice of spawning untagged fish has allowed this type of integration to occur.

Inclusion of natural origin fish

This was the fifth year that Snake River natural origin fish were included in broodstock (Table 6). Males used multiple times are only counted once in the table below. The goal is to have 30% of the fish used as broodstock come from Snake River natural origin stock.

Table 6. Unique numbers of Snake River natural origin fall Chinook included in broodstock, 2003-2008.

Return Year	Trapping location	Natural Females	Natural Males	Natural Jacks < 53cm	Naturals in Broodstock (%)	Number of fish retained for broodstock after culling	Mating protocol
2003	LGR LFH	0 2	0 0	0 0	0.1	1560	Unknown x LF
2004	LGR LFH	118 9[a]	2 0	1 0	4.9	2645	Unknown x LF
2005	LGR LFH	110 1	122 2	6 0	9.1	2634	Unknown x LF
2006	LGR LFH	115 2	71 3	0 0	12.2	1567	Unknown x unknown and Unknown x LF
2007	LGR LFH	43 1	49 3	0 0	3.3	2915	Unknown x unknown
2008	LGR	110	54	0	6.4	2575	Unknown x unknown

[a] Includes one female that was a true jill (1 salt).

Jacks and jills in broodstock

During spawning, males measuring less than 57 cm were considered jacks. Our spawning protocol indicates that jacks may be included in about 10% of the matings, but are not to exceed 25% of the matings. Post season (BY 2007) data analysis of true age of the fish spawned indicates that 63.8% of the males were true jacks from yearling releases (age 3), 1.8% were true jacks from subyearling releases (age 2), 1.4% were natural reservoir reared true jacks (age 3) and another 1.0% were hatchery reservoir reared true jacks. Of the females spawned, 32.0 % were

true jills from yearling releases (age 3). Fork length data of jacks and jills used in broodstock are presented in Table 7 and Figure 4.

Table 7. Fork lengths of 1- salt jacks and jills used in broodstock at LFH in 2007 originating from H subyearling, H yearling and W reservoir reared releases.

Fork length	H Sub age 2 Jacks	H Res Rear age 3 Jacks	W Res Rear age 3 Jacks	H Yearling age 3 Jacks	H Yearling age 3 Jills
Average	52	66	63	62	63
Median	52	66	62	61	63
Mode	50	63	60	60	64
Range	47-59	59-75	55-73	47-79	50-77
SD	3.4	4.7	4.6	4.1	3.5

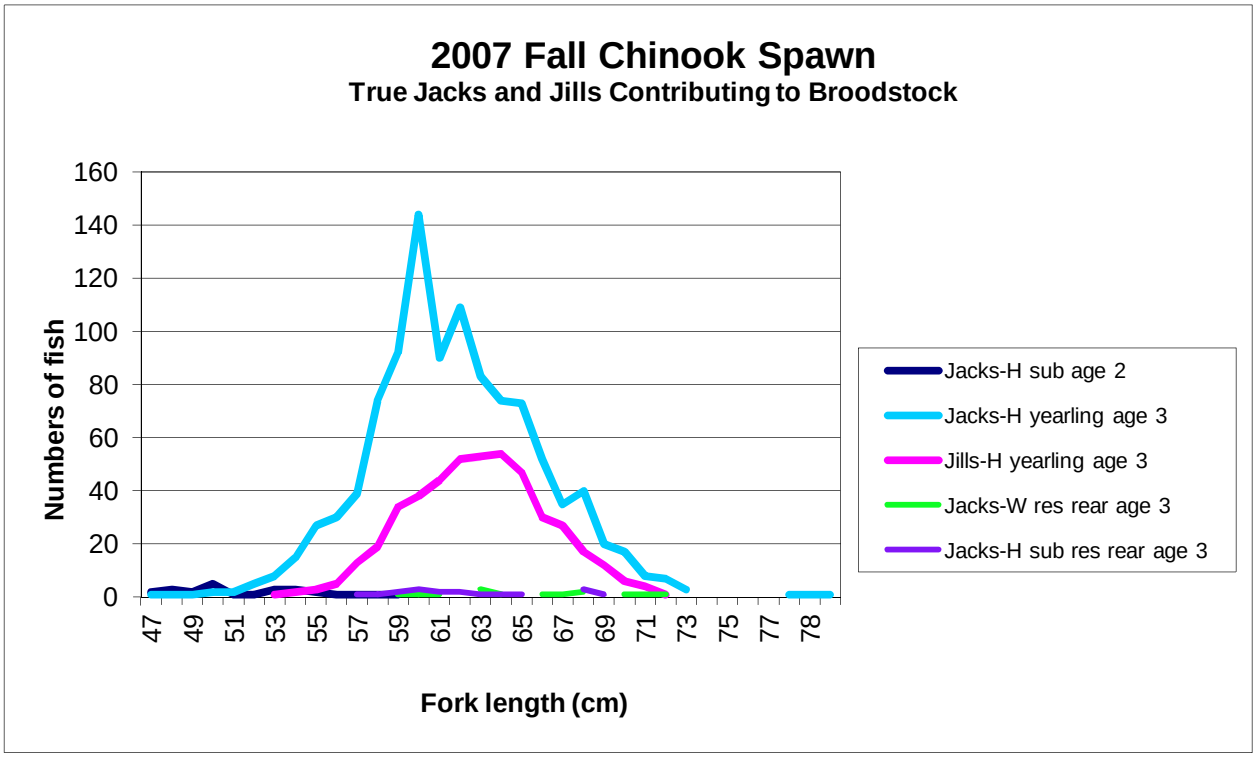


Figure 4. Numbers of true jacks and jills by total age contributing to broodstock in 2007.

Fecundity

In addition to examining the origins of individual fish contributing to LF broodstock, we also looked at the number and percentage of gametes each fish would have contributed (Figure 5). Females with higher fecundities would contribute more genetically by origin than fish with lower fecundities. Each male was assigned a contribution amount based on the fecundity of the female with which he was mated.

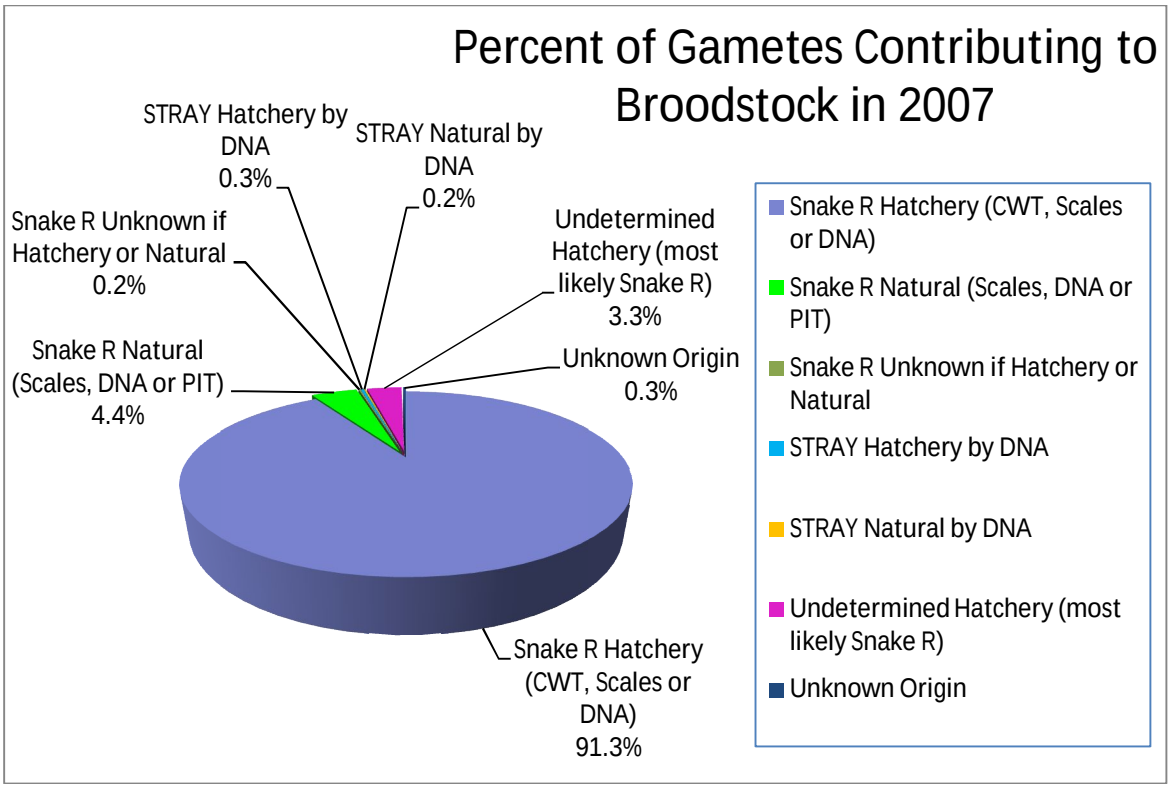


Figure 5. Percent of gametes contributing to broodstock by origin in 2007.

We calculated fecundities for several groups of females using methods previously described by Milks et al. (2006). For un-sampled females we used regression equations from fish of the same origin, age and mark type to estimate fecundity based on fork length. Hatchery origin fish tended to be less fecund (Table 8) than natural origin fish of the same age (Table 9). Overall, natural fish averaged 4,352 eggs/female.

On average, 1-salt jills had a fecundity of 2,497 and ranged from 1,253-4,018 eggs/female. The median fecundity for the group was 2,479 with a mode of 2,412. Jills were primarily from hatchery yearling releases although they were also documented coming from hatchery subyearling releases as well as natural production.

For management purposes the mean fecundity for the fish trapped at LGR and hauled to LFH was 4,002 eggs/female. To assist with trapping protocols three groups of fish are of interest based upon visual and electronic identification: tagged fish (CWT or VIE), unmarked/untagged fish, and AD-clip only (no wire/no VIE) fish. Tagged fall Chinook (known LFH origin) used in broodstock averaged 3,648 eggs/female, while unmarked/untagged fish (hatchery and natural origin) as a whole averaged 4,248 eggs/female. The mean fecundity of the Ad-clip only fish was 3,720 eggs/female.

Table 8. Snake River hatchery origin females used in 2007 broodstock based on origin, salt age, average fecundity and average eggs per fork length (cm).

Origin determination method	Age	Numbers of females	Average Fecundity	Average eggs/cm fork length
Snake R Hatchery by CWT	subyearling 2 salt (age3)	21	3,281	46
	subyearling 3 salt (age4)	17	3,824	49
	subyearling 4 salt (age5)	5	3,872	46
	yearling 1 salt (age3)	464	2,497	40
	yearling 2 salt (age4)	737	3,323	44
	yearling 3 salt (age5)	33	3,729	45
	yearling 4 salt (age6)	2	3,551	43
	yearling unknown age	11	3,138	43
Snake R Hatchery by DNA	reservoir reared 1 salt (age3)	2	2,635	40
	reservoir reared 2 salt (age4)	3	4,175	50
	reservoir reared 3 salt (age5)	1	4,276	50
	subyearling 2 salt (age3)	10	3,080	43
	subyearling 3 salt (age4)	23	4,380	51
	subyearling 4 salt (age5)	5	4,547	52
	unknown age	2	4,878	52
	yearling 1 salt (age3)	1	2,074	36
	yearling 2 salt (age4)	3	3,411	49
Snake R Hatchery by Scales	reservoir reared 1 salt (age3)	1	3,646	50
	reservoir reared 2 salt (age4)	1	3,092	43

Table 9. Snake River natural origin females used in 2007 broodstock based on origin, salt age, average fecundity and average eggs per fork length (cm).

Origin determination method	Age	Numbers of females	Average Fecundity	Average eggs/cm fork length
Snake R Natural by DNA	reservoir reared 1 salt (age3)	1	4,361	61
	reservoir reared 2 salt (age4)	3	3,667	47
	reservoir reared 3 salt (age5)	2	4,888	54
	reservoir reared 4 salt (age6)	1	5,485	61
	subyearling 3 salt (age4)	5	4,243	46
	subyearling 4 salt (age5)	1	4,957	57
	unknown age	1	4,183	57
Snake R Natural by Scales	reservoir reared 1 salt (age3)	1	2,523	36
	reservoir reared 2 salt (age4)	7	3,963	48
	reservoir reared 3 salt (age5)	6	3,894	48
	reservoir reared 4 salt (age6)	1	5,322	60
	subyearling 2 salt (age3)	2	4,237	52
	subyearling 3 salt (age4)	9	4,833	58
	subyearling 4 salt (age5)	4	4,904	53

Rearing, Marking, and Transfer

Historical information regarding egg take, early life stage survival (Table 10), and marking and transfer numbers (Table 11) are provided. Rearing followed standard hatchery procedures that are available upon request. Detailed information regarding type and size of vessels used for rearing can be found in Lyons Ferry Hatchery Annual Reports. Marking was consistent with *United States v. Oregon* recommendations as listed in Appendix F.

Table 10. Egg take and survival numbers by life stage of Lyons Ferry origin fall Chinook spawned at LFH, brood years 1997-2008.

Brood Year	Eggs Taken	ELISA Loss[a]	Eggs Shipped[b]	Eyed Eggs Retained	Fry Ponded	Intended Program
1997	1,184,141	0	0	1,134,641	1,037,221 63,849	Yearling Subyearling
1998	2,085,155	0	0	1,978,704	916,261 1,010,344	Yearling Subyearling
1999	3,980,455	156,352	0	3,605,482	991,613 2,541,759	Yearling Subyearling
2000	3,576,956	53,176	115,891	3,249,377	998,768 2,159,921	Yearling Subyearling
2001	4,734,234	144,530	200,064	4,230,432	1,280,515 2,697,406 125,600	Yearling Subyearling Research
2002	4,910,467	44,900	1,195,067	3,540,000	1,032,205 2,376,251 73,229	Yearling Subyearling Research
2003	2,812,751	0	250,400	2,476,825	985,956 1,455,815 0	Yearling Subyearling Research
2004	4,625,638	0	1,053,278	3,421,751	914,594 2,191,102 184,682	Yearling Subyearling Research
2005	4,929,630	0	1,180,000	3,562,700[c]	980,940 2,078,206 216,417	Yearling Subyearling Research
2006	2,819,004	0	127,564	2,601,679	961,105 1,640,574 2,000	Yearling Subyearling Research
2007	5,143,459	0	1,761,500	3,212,900[d]	960,900 1,894,933 0	Yearling Subyearling Research[e]
2008	5,010,224	0	1,810,800	2,969,200	1,000,000 1,969,200 0	Yearling Subyearling Research[e]

[a] Eggs from ELISA positive females were incorporated into the rest of the brood stock in 1996-1998 and 2003-2004.
[b] The destination of shipped eggs prior to 2003 can be found in previous Annual Reports. In 2005, eyed-eggs were shipped to Oxbow Hatchery (210,000), Umatilla Hatchery (940,000) and NPTH (30,000).
[c] This number includes 154,100 eyed-eggs that were destroyed as ponded fry and 30,000 eyed-eggs that were shipped as fry to NPTH in February 2006.
[d] This number includes 364,983 eyed-eggs that were destroyed as ponded fry in January and February 2007.
[e] 336,500 of the shipped eyed-eggs (included in the shipped egg numbers) were dedicated to research.

Table 11. Snake River fall Chinook juveniles marked by WDFW and/or transferred from LFH, 2006-2007 brood years.

Brood Year	Release Site	Marking				Transfer		
		Date	Type[a]	Number	Fpp	Date	Number	Fpp
2006								
Subyearling	LFH	4/16/07	AD+CWT	200,282	163.0	-	-	-
	CJ	4/10/07	AD+CWT	100,908	200.0	5/08/07	257,936	87.0
	CJ	4/11/07	CWT	101,107	200.0	5/08/07	258,136	87.0
	BC	4/09/07	AD+CWT	100,752	200.0	5/08/07	255,900	76.4
	BC	4/08/07	CWT	102,344	200.0	5/08/07	257,490	76.4
	PL	4/03/07	AD+CWT	100,817	200.0	5/09/07	203,431	85.8
	PL	4/04/07	CWT	101,207	200.0	5/09/07	203,819	85.8
	Research	-	-	-	-	5/10/07	2,000	100.0
Yearling	LFH	10/09/07	AD+CWT+LR	233,955	30.0	-	-	-
	LFH	9/19/07	CWT+LR	226,191	31.0	-	-	-
	CJ	9/21/07	AD+CWT	70,360	30.0	2/04/08	69,916	12.8
	CJ	10/05/07	CWT	84,500	30.0	2/04/08	83,967	12.8
	BC	10/02/07	AD+CWT	70,560	30.0	3/05/08	70,101	14.0
	BC	10/12/07	CWT	80,440	30.0	3/05/08	79,917	14.0
	PL	9/26/07	AD+CWT	70,477	30.0	3/03/08	69,890	13.7
	PL	10/02/07	CWT	84,284	30.0	3/03/08	83,583	13.7
2007								
Subyearling	LFH	3/26/08	AD+CWT	201,033	175.0	-	-	-
	CCD	4/01/08	AD+CWT	201,000	200.0	-	-	-
	CJ	3/28/08	AD+CWT	100,500	200.0	5/05/08	200,364	91.7
	CJ	4/08/08	CWT	100,040	200.0	5/05/08	312,953	95.5
	BC	3/25/08	AD+CWT	100,500	170.0	5/06/08	200,860	72.2
	BC	4/07/08	CWT	100,031	200.0	5/06/08	321,538	96.5
	PL	3/31/08	AD+CWT	100,504	160.0	5/07/08	200,752	92.3
	PL	4/09/08	CWT	100,070	200.0	5/07/08	202,680	112.6

a. In the mark type column, visible implant elastomers (VIE) are designated by side and then color, i.e. LR denotes left red.
b. Unmarked/untagged fish are included in the subyearling transfer groups.

Juvenile Releases and Migration

Fall Chinook produced at LFH and released exclusively by WDFW are included in this section. Historical releases by WDFW, NPT, IDFG, and NOAA are presented in Appendix G.

2006 Brood Year

Subyearling Release

The on-station release of 199,817 subyearlings (BY 2006) from LFH occurred on 23 May 2007. Fish were sampled on 16 May. Mean fork length was 85.6 mm (SD 10.9) and mean weight was 7.5 g (SD 2.8) or 60.2 fish per pound (fpp). The CV for fork length was 12.8 and the condition factor (K) was 1.10. Included in the release were 875 unassociated unmarked/ untagged fish at 103 fpp. These fish were kept separate in IT tank 1 in order to try and increase size. At the time of release, the average daily Snake River flow and spill recorded at LMO Dam was 72.8 kcfs and 23.1 kcfs respectively. The average daily water temperature at LMO Dam was 13.1ºC (USACOE 2007).

Yearling Release

During 7-10 April 2008, 459,633 yearling fall Chinook (BY 2006) were released into the Snake River at LFH. Fish size was estimated using pound counts from 3,239 fish. Two groups of fish were coded-wire-tagged and marked with a red VIE tag behind the left eye. One half of the group (233,955 fish at 10.3 fpp) was adipose fin-clipped (CWT: 63-39-87) and included 14,985 fish that were PIT tagged. The other half (226,191 fish at 10.1 fpp) was not adipose clipped (CWT: 63-40-92) and included 14,959 fish that were PIT tagged. Throughout the release, small groups of fish were removed and held in an adjacent raceway for sampling on 8 April. Mean fork length for all days combined was 161.2 mm (SD 16.6) and mean weight was 44.6 g (SD 12.1) or 10.2 fpp. The CV for fork length was 10.3 and the condition factor (K) was 1.04. More specifically, for the Ad+CWT+VIE group, mean fork length was 160.7 mm (SD 15.6) and CV of length was 9.7. The mean weight was 44.0 g (SD 11.1), and fpp was 10.3. The CWT+VIE group had a mean fork length of 161.5 mm (SD 17.2) with a CV of 10.7. The mean weight was 44.9 g (SD12.7), and the fpp was 10.1. This was the first year small mesh was installed over the lake to prevent avian predation. Predation was estimated at 500. During the release, average daily Snake River flow recorded at LMO Dam ranged from 42.7-44.1 kcfs and the spill ranged from 27.8-29.8 kcfs.

2007 Brood Year

Subyearling Release

Subyearlings were released at LFH and two additional sites upstream of LGR Dam in 2008. Prior to transport and release, juveniles from each release group were sampled at LFH to collect size and condition data as well as to evaluate tag loss for marked groups.

The on-station release of 200,733 subyearlings (BY 2007) from LFH occurred on 2 June 2008. Mean fork length was 92.4 mm (SD 8.4) and mean weight was 8.9 g (SD 2.5) or 50.8 fish per pound (fpp). The CV for fork length was 9.1 and the condition factor (K) was 1.10. At the time of release, the average daily Snake River flow and spill recorded at LMO Dam was 160.8 kcfs and 47.4 kcfs respectively. The average daily water temperature at LMO Dam was 12.2ºC (USACOE 2008).

Snake River near Couse Creek

Two groups of 2007 brood year subyearlings were released into the Snake River near Couse Creek Boat Launch. These groups are discussed separately because of the size differences at release. One group was identified with an adipose fin clip and CWT (200,513 fish at 59.1 fpp). A second group of 29,888 (63.0 fpp) unassociated unmarked/untagged fish were added to the AD+CWT release group when an overage was discovered. Both groups of fish were released on 28 May.

Fish were sampled on 27 May. The sample was weighted according to proportions of fish in the raceways. Essentially each raceway had 100 fish sampled. The overages that were unmarked/untagged were in a separate raceway N16. Although they only represented 13% of the release, we sampled 100 fish then randomly selected 43 to add to the AD/CWT samples. Mean fork length was 85.8 mm (SD 8.5) and mean weight was 7.4g (SD 2.5) or 61.5 fpp. The CV for fork length was 9.88 and K = 1.12.

At the time of the releases average daily Snake River flow and spill recorded at LGR Dam was 131.3 kcfs and 61.4 kcfs. Average daily flow and spill recorded at LMO Dam were 127.3 kcfs and 37.9 kcfs, respectively.

Grande Ronde

Two groups of 2007 brood year subyearlings were released into the Grande Ronde River near the mouth of Cougar Creek on 29 May 2008. One group (194,310 fish at 46.2 fpp) was slated to be marked and tagged with an adipose fin clip and CWT, however, was mismarked by ODFW as CWT-only at tagging on 19-22 May. An associated group of 108,960 unmarked/untagged fish at 42.2 fpp was released concurrently. Pre-liberation sampling was conducted at LFH on 28 May. Mean fork length was 95.8 mm (SD 8.7) and mean weight was 10.3 g (SD 5.3) or 44.2 fpp. The CV for fork length was 9.1 and K = 1.13. During the Grande Ronde release the daily average Snake River flow at LGR Dam was recorded at 144.6 kcfs and daily average spill was recorded at 74.9 kcfs. Daily average flow and spill at LMO Dam was recorded at 142.1 kcfs and 40.7 kcfs, respectively.

Survival Rates to Release

We used the estimated number of eggs and fish present at life stages in the hatchery for 2003-2007 broods to calculate survival rates within the hatchery environment (Table 12). Survivals are based on an estimated number of green eggs, calculated by subtracting green egg equivalents of eggs/fry not retained for LFH rearing (IPC, NPTH, culled strays) from the total egg take. For example in 2006 the hatchery reported 2,819,004 green eggs being taken. An estimated 131,008 green eggs were shipped or destroyed at later stages of development, leaving 2,687,996 green eggs to be used in the actual life stage survival percentage calculations. Survivals for subyearlings and yearlings are the same through ponding because fry are not assigned to yearling or subyearling programs until that time. A historical account of survival rates to release is presented in Appendix H.

Table 12. Estimated survivals (%) between various life stages at LFH for fall Chinook of LFH/Snake River hatchery origin, 2003-2007 brood years.

Brood year	Release stage	Green egg-ponded fry	Ponded fry-release	Green egg-release
2003	Yearling	95.5	75.7	72.3
	Subyearling	95.5	95.1	90.8
2004	Yearling	93.0	96.8	90.1
	Subyearling	93.0	97.6	90.8
2005	Yearling	92.2	99.3	91.5
	Subyearling	92.2	104.9	96.7
2006	Yearling	95.7	95.4	91.3
	Subyearling	95.7	100.2	95.5
2007	Yearling	95.8	95.4	91.4
	Subyearling	95.8	100.3	95.5
Yearling mean:	**%**	**94.4**	**92.5**	**87.3**
	SD	1.7	9.5	8.4
Subyearling mean:	**%**	**94.4**	**98.5**	**93.9**
	SD	1.7	2.1	2.8

Tucannon River Natural Production 2007

Adult Salmon Surveys

Fall Chinook Redd Surveys

WDFW personnel have conducted adult salmon surveys on the lower Tucannon River since 1985 (Appendix I). Survey sections generally covered the river from Rkm 1.1 to Rkm 29.0. The first 1.1 kilometers of the Tucannon River are deep slack water from the Snake River's LMO Dam reservoir and no surveys or estimates are made for that area; the habitat is poor in this area and we presume no spawning occurs there. During 2007, landowner access restrictions prevented the surveying of 1.5 kilometers of river above the Starbuck Bridge within survey sections 5 and 6. River conditions for viewing were good throughout the spawning season except during the week of 3 December when surveys were canceled due to bad weather (Table 13).

Table 13. Date and number of redds and carcasses counted on the Tucannon River in 2007.

	Chinook		coho	
Week beginning	**Redds counted[a]**	**Carcasses sampled**	**Redds counted[a]**	**Carcasses sampled**
22 Oct	3	0	0	1
29 Oct	8	0	4	0
5 Nov	15	1	4	0
12 Nov	15	3	1	1
19 Nov	19	4	1	1
26 Nov	14	6	0	0
3 Dec[b]	NS	NS	NS	NS
10 Dec	6	0	2	0
17 Dec	13	13	0	1
Totals	**93**	**27**	**12**	**4**

[a] Observed redds not expanded for sections with access restrictions.
[b] No survey (NS) was performed that week..

We estimate a total of 109 redds were constructed in the Tucannon River in 2007 (Table 14). We estimated the numbers of redds built in inaccessible sections by calculating redds/km in the surveyed portion of the section and applying it to the non-surveyed area.

Escapement and Composition of Run

The total escapement to the Tucannon River (326 fall Chinook) was estimated using an expansion factor of three fish per redd (Table 14). We believe this expansion factor provides a conservative estimate of fish spawning in the Tucannon River. Other methods have been used to estimate adults per redd upstream of LGR Dam based on estimates of adult salmon above LGR Dam and redd counts from the Clearwater, Snake, Imnaha, Salmon, and Grande Ronde Rivers (Garcia et al. 2005). Garcia estimated 4.7 adults per redd (10 year average). Groves has estimated 3.1 adults per redd since 1993 (Phil Groves, IPC personal communication), using adjustments for over counts of fall Chinook at LGR Dam and pre-spawning mortality estimates as indicated in a radio telemetry study on the Snake River (Mendel et al. 1993).

Table 14. Estimated escapement, and redd construction, and resulting estimates of smolts/redd and total number of migrants from fall Chinook spawning in the Tucannon River, 2002-2008.

			Redd Construction[b]			Success of Spawning	
Year	Estimated escapement[a]	% Strays in carcasses sampled	# Redds observed	# Redds in no access areas (est.)	Total # of Redds (est.)	Estimated smolts/redd[c]	Total Estimated # emigrants[d]
2002	630	35.1	183	27	210	81	17,030
2003[e]	474	65.8	143	15	158	452	71,465
2004	345	29.4	111	4	115	632	72,705
2005	201	60.0	61	6	67	315	21,084
2006	474	9.7	131	27	158	289	44,296
2007	326	7.0	93	16	109	unknown[f]	unknown[f]
2008	763	16.5	209	45	254	23	5,030

[a] This estimate was derived using three fish per redd.
[a] No adjustments were made for super imposition of redds.
[b] This estimate was derived using redds counted above the smolt trap and estimates of emigration the following spring.
[c] This estimate was derived using the smolt per redd estimate above the trap and applying it to the total number of redds in the Tucannon River.
[d] Fish in excess of broodstock needs were returned to the Snake River, possibly affecting the magnitude of the run to the Tucannon River.
[e] No estimate was made because the smolt trap sampling box had a hole in it and fish escaped.

We collect heads and scales from each carcass and used CWT and scale analysis to determine the age and origin of each carcass. The composition of the fall Chinook carcasses is provided in Table 15. Fish with out-of-basin hatchery scale patterns were assigned to the Snake R. hatchery group because CWT recoveries shed doubt on the magnitude of the estimated out-of-basin return using scale determinations.

We estimate that 93% of the run originated from Snake River hatchery releases and 7% of the run originated from out-of-basin hatchery releases (Table 16). Of the females recovered we estimate that 27.6% were true jills (1-salt). Of the males recovered we estimate that 18.5% were minijacks (0-salt) and another 59.3% were true jacks; all from hatchery releases.

Table 15. Composition of carcasses recovered and estimated run composition of fall Chinook on the Tucannon River, 2007.

		Raw recoveries			Expanded to Run			
Origin	CWT	F	M	M <53cm	F	M	M <53cm	Total
Snake River Hatchery (wire)								
LF02YO	63/21/67	1	0	0	12	0	0	12
LF03YO	63/17/69	3	0	0	32	0	0	32
	63/17/70	4	1	0	52	12	0	64
LF04YO	63/32/83	3	1	0	36	12	0	48
	63/32/84	2	1	0	24	12	0	36
LF05SO	63/35/82	0	0	2	0	0	20	20
LF05YO	63/35/97	0	0	2	0	0	20	20
Presumed Snake River Hatchery (no wire)								
Unknown hatchery subyearling age 2 by scales		0	0	2	0	0	20	20
Unknown hatchery subyearling age 4 by scales		4	0	0	48	0	0	48
Out-of-basin hatchery (wire-CWT or BLANK)								
BLANK	BLANK	0	1	0	0	12	0	12
BONN02YUMA	9/39/10	1	0	0	12	0	0	12
Total		**18**	**4**	**5**	**217**	**48**	**60**	**326**

Table 16. Estimated composition of fall Chinook run to Tucannon River by salt water age and origin, 2007.

	0 salt	1 salt		2-5 salt			
Origin	Mini jack	True jack	True jill	Adult F	Adult M	Total	% of return
Snake River Hatchery (wire)	20	44	60	97	12	233	**72%**
Presumed Snake River Hatchery (no wire)	0	20	0	48	0	68	**21%**
Out-of-basin hatchery (wire-CWT or BLANK)	0	0	0	12	12	24	**7%**
Total	20	64	60	157	24	326	
% of return	**6.2%**	**19.8 %**	**18.5%**	**48.1%**	**7.4%**		**100%**

Although the Tucannon River is a small, generally accessible river, carcass recovery is hampered by river topography, and predation. Therefore estimates based on collected carcasses (8% of the estimated run) may not wholly represent the stock composition of fish in the river.

Coho

Twelve redds were suspected of being coho redds (13 when expanded for areas not surveyed). We recovered four coho carcasses; all were adipose clipped hatchery 3-year old fish.

Juvenile Salmon Emigration

Fall Chinook

Juvenile fall Chinook (BY 2006) were observed at the smolt trap (Rkm 3.0) from 21 February through 28 June 2007 when the trap was pulled for the season (Gallinat and Ross, 2008). Median passage date for fall Chinook passing the trap was 2 June. We measured 943 fall Chinook which ranged from 34-110 mm fork length, and averaged 67 mm with a median of 71 mm.

Lengths and weights were taken on 223 fish. For this group, fork lengths ranged from 54-110 mm, with an average of 79 mm and a median of 81 mm. Weights ranged from 1.4 g to 13.8 g, with an average and median of 6.3 g. K-factors ranged from 0.80-1.63, with an average and median of 1.18.

We captured 5,493 fall Chinook, and estimate that 40,250 (95% C.I. = 32,011-53,481) naturally produced fall Chinook smolts passed the Tucannon River smolt trap during 2007. Based on 139 redds estimated above the smolt trap during 2006 we calculated that 289 smolts/redd were produced (Table 14). After including juvenile production from below the smolt trap we estimate that 44,296 naturally produced fall Chinook smolts left the Tucannon during 2007.

Coho

Juvenile coho salmon were incidentally captured at the smolt trap. Mark recapture trap efficiencies were not done for coho in 2007. We trapped 218 coho in the smolt trap, but we were unable to make an estimate of the number of naturally produced coho that passed our smolt trap in 2007 because fish had escaped from a damaged holding box.

Juvenile coho were observed at the smolt trap from 16 March through 12 June; the last day of trapping. Median passage date of coho past the smolt trap was 8 May. Fish ranged from 38-161 mm in length. Coho are generally considered yearling migrants but we have estimated that up to 40% of the coho in the Tucannon emigrate as subyearlings; based on fork lengths.

We measured 86 fish that ranged from 38-103 mm, averaging 79 mm with a median fork length of 80 mm. We suspect these fish are subyearlings from the 2006 spawn. We weighed 23 subyearling coho which ranged from 2.9-11.4 g, and averaged 6.4 g with a median of 6.0 g. K-factors ranged from 1.03-1.36, with an average of 1.19, and a median of 1.20.

The second group of fish (n=127) ranged from 110-161 mm, averaging 130 mm with a median fork length of 129 mm. We estimate those fish were yearlings from the 2005 spawn. We weighed 66 yearling coho which ranged from 13.5-38.6 g with an average of 23.9 g and a median of 23.4 g. K-factors ranged from 0.86-1.27 with an average and median of 1.07.

Fall Chinook Run Size and Composition 2007

Return to LFH

The estimated composition of fall Chinook trapped at LFH that were killed during spawning is listed in Table 17. The raw data prior to estimating composition of fish with lost tags or untagged fish with unreadable scale patterns are listed in Appendix J. Fish that were not needed for broodstock or monitoring and evaluation were released into the Snake River (see Hatchery Operations section). Some of those fish were detected during spawning surveys in the Tucannon or at the LGR Adult trap, or were re-trapped and killed at LFH. The remaining fish are listed in Appendix K and are presumed to have remained in the Snake River; likely between LMO and LGR Dams. None of those fish were reported to the Regional Mark Information System (RMIS) because they were live fish.

Because we do not systematically trap and mark fish trapped at LFH, we can neither estimate the full run size nor the composition of the run to LFH. We can only estimate the composition of fish trapped at LFH that are killed at LFH and then estimate the composition of fish hauled back to the Snake River that were in excess of broodstock needs. Since some of those fish are included in other estimates (run to LGR, run to the Tucannon River, and re-trapped and killed at LFH), they will not be included here. Rather we have estimated the numbers of fish that are not in those estimates that must have remained somewhere in the Snake River (Table 18).

Table 17. Estimated composition of fall Chinook trapped at LFH and killed in 2007 by program and salt water age.

Program	Minijack	True jack	True jill	Adult F	Adult M	Total	% of total
Umatilla/BONN	0	0	0	20	43	63	2.1
Bonneville	0	3	2	1	0	6	0.2
Umatilla	0	0	0	6	0	6	0.2
NPTH	0	4	0	1	3	8	0.3
LSRCP	198	1,353	378	741	284	2, 954	97.1
Natural	0	1	0	1	2	4	0.1
Total	**198**	**1,361**	**380**	**770**	**332**	**3,041**	

Table 18. Estimated composition of fall Chinook that are presumed to have remained in the reservoirs between LMO and LGR dams by program and saltwater age in 2007.

Program	Minijack	True jack	True jill	Adult F	Adult M	Total	% of total
BONN	0	0	0	3	7	10	1.4%
UMATILLA	0	0	0	1	0	1	0.1%
LSRCP	126	350	53	105	45	678	97.4%
NPTH	0	2	0	0	0	2	0.3%
IPC	0	0	0	0	0	0	0.0%
Natural	0	5	0	0	0	5	0.7%
Total	**126**	**357**	**53**	**109**	**51**	**696**	

Returns to LGR Dam and Composition of Fish Hauled to LFH from LGR Dam

Fish hauled from LGR to LFH that were processed (killed) are listed in Appendix J. The run reconstruction to LGR Dam for fish ≥ 30 cm, with bounds around the data, is presented in Appendix L and summarized by program and saltwater age in Table 19. The numbers of 0 salt and 1 salt hatchery fish are likely underestimated because reservoir reared subyearlings were included with non-reservoir reared subyearlings in run reconstruction groupings. Salt water ages of natural origin were calculated taking into account the reservoir reared life history.

Table 19. Estimated 2007 run composition of fall Chinook to LGR Dam by salt water age.

	0 salt		1 salt		2-5 salt			
Program	**Minijacks <30cm[a]**	**Minijacks**	**Jacks**	**Jills**	**Adult F**	**Adult M**	**Total fish ≥ 30**	**% of run**
Bonneville		0	94	0	38	15	147	0.7%
Umatilla		0	21	0	16	5	42	0.2%
Klickitat		0	101	0	0	0	101	0.5%
IPC		0	1,325	0	84	383	1,792	8.5%
NPTH		0	1,764	5	79	164	2,012	9.6%
LSRCP	150	746	8,740	865	2,483	1,708	14,542	69.4%
Natural	11	57	778	36	806	649	2,327	11.1%
Total	**161**	**800**	**12,291**	**906**	**3,509**	**3,457**	**20,963**	

[a] Minijacks <30 cm intercepted during the trapping period and expanded by trapping rate.

Chinook were counted 24 hours per day during August, 16 hours per day September through October, and 10 hours per day from November through 15 December at the counting window (U.S. Army Corps of Engineers, 2007). Window counts estimated 10,197 adults and 9,782 jacks (30 cm-52 cm) reached LGR Dam in 2007 (Figure 6). The Chinook passing LGR Dam after 17 August are designated as falls based on arrival date, which may be inaccurate because of the overlap between the fall and summer Chinook runs. In addition, fish counts do not count fish less than 30 cm long nor do they adjust for fish that crossed the dam and fell back through the juvenile bypass system (fallback event) nor fish that re-crossed the dam after a fallback event (double counting).

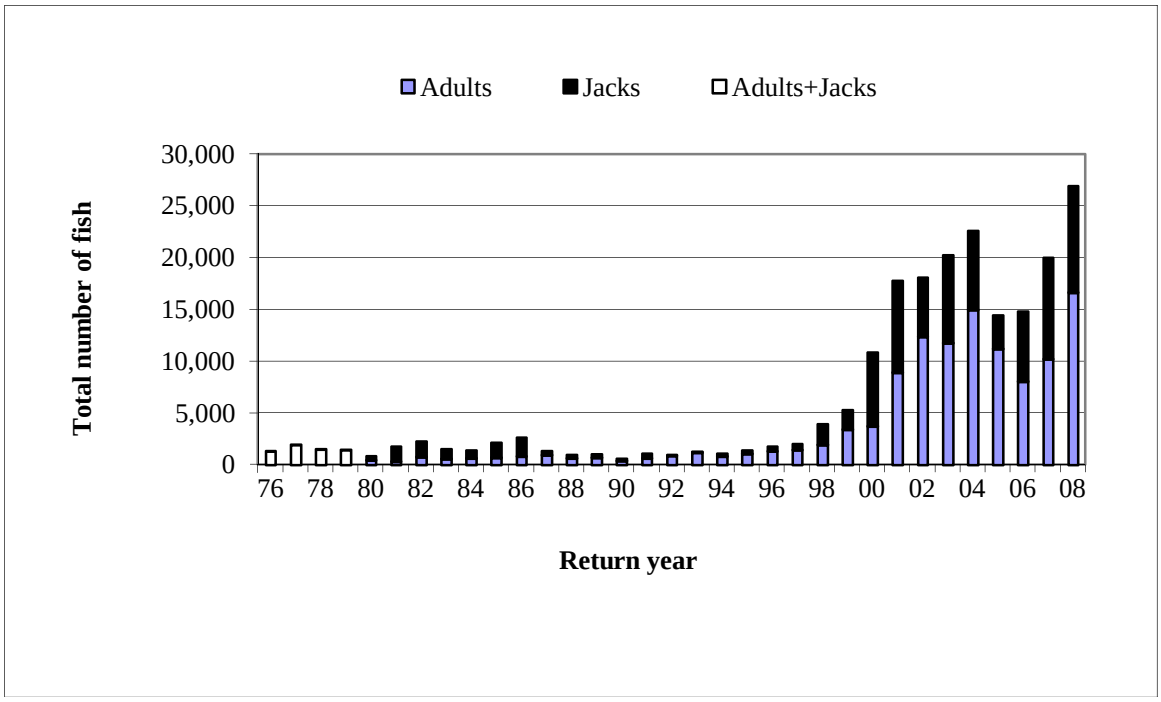


Figure 6. Fall Chinook window counts at LGR Dam, 1976-2008.

Fallbacks

We documented a total of 588 fallback events during the fall Chinook return. These fallback events were not expanded to account for sampling rates at the LGR juvenile bypass facility so the fallback estimate is a minimum. Fallbacks were documented from August-December at the juvenile smolt bypass facility downstream of LGR (Fred Mensik, WDFW, and Mike Halter, COE, personal communications). Fish moving downstream through the LGR Dam forebay that encounter the submersible traveling screens are diverted downstream through the juvenile bypass system and move across a separator. The system separates adults from juveniles to allow adults (generally greater than 50 cm long) to be diverted back to the river. Any fish small enough to fit through the separator grating (pipes) are shunted to the juvenile facility for potential sampling. Fish small enough to fit through the pipes are generally juveniles but fish up to 50 centimeters are occasionally found in the sample.

Of the fish captured during juvenile sampling at LGR Dam, 84.6% of the fish between 30-50 mm and 75.5% of the fish <30 cm were of hatchery origin based on marks and tags documented in Table 20. The majority (60.3%) of the fish between 30-50 cm and 59.1% of the fish <30 cm had a left red elastomer tag indicating they originated from yearling releases downstream of LGR Dam at LFH. Since scales were not taken on the unmarked/untagged group we cannot determine their origin although we suspect they are hatchery fish.

Table 20. Documented fallbacks of Chinook and Coho at the LGR juvenile collection facility, 2007 by fin clip, wire, and VIE.

Run	Fin clip	Wire	VIE	<30cm	30-50cm[a]	No data	Grand Total
Chinook[b]	AD	No wire	NoVIE	1	2		3
		Wire	LR	7	21		28
			NoVIE		10		10
	No clip	No wire	LR		3		3
			NoVIE	1	7		8
		WIRE	LR	6	22		28
			NoVIE	5	4		9
		No data	LR		1		1
			NoVIE	2	8		10
Fall Chinook Total				22	78		100
coho	No clip	No wire	NoVIE			1	1
		(blank)	NoVIE		1		1
coho Total					1	1	2
Grand Total				**22**	**79**	**1**	**102**

[a] Category does not differentiate males from females , although they are likely males.
[b] The run of Chinook is not identified during sampling and may include summers**.**

Fish encountered at the separator were examined for size, fin clips, VIE tags, and operculum punches. We estimate at least 52.8% of the fish larger than 52 cm sampled at the separator were of hatchery origin based solely on adipose clips and VIEs, but expect the rate is actually much greater (Table 21). The use of adipose clips as an indicator of hatchery origin is no longer a reliable method since many hatchery fish are being released into the Snake River basin without an associated fin clip. We estimate at least 65.5% of the fish <53 cm collected at the separator were of hatchery origin but the estimate may be as high as 78.0% if the composition of unclipped fish <53 cm without VIEs was similar to fish in the 30-50 cm category sampled at the juvenile facility.

Table 21. Composition of fallbacks at the LGR Dam separator in 2007 by clip, VIE, and length.

Clip	VIE	<53cm[a]	≥53 cm[a]	No data	Grand Total
Adipose clip	LR	11	25		36
	NE	104	44	1	149
	No data	24	21		45
No clip	LPNK	1			1
	LR	18	22		40
	NE	74	76		150
	No data	14	40	1	55
No data	NE	9			9
	No data		1		1
Grand Total		**255**	**229**	**2**	**486**

[a] Category includes males and females.

Status of Mitigation Requirements

Returns to the Project Area

We estimate at least 95% of the LSRCP mitigation goal of 18,300 fish returning to the Snake River was met in 2007 (Table 22). This estimate does not include in-basin returns from either the IPC or the NPTH programs

This is the first year that we estimated and included numbers of LSRCP fish remaining in the reservoirs between LMO and LGR dams in the total returns to the Snake River. These estimates are described in the returns to LFH section of the report. Combining recoveries at LFH, the estimates of fish remaining in the reservoir, the run to the Tucannon River and LGR Dam provides the best estimate of mitigation returns (tagged and untagged fish).

We estimate that 5,523 adult, 11,863 jack/jills, and 1,240 minijack fall Chinook from the LSRCP program returned to the Snake River in 2007 (Table 22). Only jacks (1-salt) and adults count towards the mitigation goa1 of 18,300 fish to the Snake River.

Table 22. Estimated returns of LSRCP fall Chinook to the Snake River and levels of mitigation goals met in 2007.

	Saltwater age						
	0 salt	1 salt		2-5 salt			
Location	Mini jack[a]	Jack[b]	Jill[c]	Adult F	Adult M	Total (A+J)	% of LSRCP goal
LFH trapped and killed during processing	198	1,353	378	741	284	2,756	15.1
Snake R between LMO and LGR dams[d]	126	350	53	105	45	553	3.0
Run to Tucannon R[e].	20	64	60	145	12	281	1.5
Run to LGR dam[f]	896	8,740	865	2,483	1,708	13,796	75.4
Total	**1,240**	**10,507**	**1,356**	**3,474**	**2,049**	**17,386**	**95.0**

[a] Minijacks are males that did not spend a year in salt water.
[b] Jacks are males that spent 1 year in salt water.
[c] Jills are females that spent 1 year in salt water.
[d] Fall Chinook returned to the Snake River that were not accounted for in other estimates.
[e] Estimated run to the Tucannon River.
[f] Estimated run to LGR Dam (includes fish hauled to LFH and NPTH for processing as well as fish released from the dam).

Recoveries outside of the Snake River Basin

To document where recoveries of LFH/Snake River hatchery fish occurred in 2007, we queried the RMIS database on 6 January 2010 for all tag recoveries (all tag statuses) of LSRCP released fish. Estimates of harvest for fish released by WDFW are listed in Table 23 and do not include recoveries of fish released by the NPT (LSRCP or NPTH programs) nor ODFW or IDFG (IPC program).

We estimate that 5.5% of the harvest goal (commercial and sport fisheries) was met in 2007 by WDFW releases. Estimates of harvest of NPT fish that were part of the LSRCP mitigation were not available at the time of this report, although they will be documented by the NPT in a future report. These estimates include fish that were tagged as well as untagged fish estimated in the following sections.

The majority of harvest occurred in the ocean (65%) off the coast of British Columbia and Washington. Commercial fisheries (Tribal and non-Tribal) consisted of 73% of the total take estimated for fresh and saltwater. LF/Snake River hatchery fall Chinook have a high fidelity to the Snake River. Of the fish recovered in freshwater outside of the Snake River, approximately 0.07% of the fish were recovered at hatcheries, 5.15% during carcass surveys, and 0.07% were recovered in Oregon freshwater sport fisheries.

Table 23. Estimated recoveries of tagged and untagged fall Chinook outside of the Snake River Basin in 2007 for WDFW releases.

Water body	Area	Fishery	RMIS ESTD	Total
Freshwater	COL	Columbia River Gillnet Zone 1-5	137	246
		Columbia River Gillnet Zone 6	504	878
		Columbia River Sport (Below Bonneville)	131	133
		Estuary Sport	45	53
		Freshwater Sport (MCN-Priest Rapids)	6	6
		Mid-Columbia River Sport (John Day)	1	1
		Hatchery (Priest Rapids)	1	1
		Spawning Ground (Hanford Reach/Yakima R)	50	72
	OR	Freshwater Sport (Illinois R/Rogue R)	1	1
Ocean	AK	Experimental Area Troll	3	6
		Marine Sport (DE,DT,MB,MR,MS)	5	7
		Traditional Purse Seine	11	21
		Traditional Troll	61	94
	BC	Gillnet	2	2
		Marine Sport	3	3
		Seine	2	2
		Sport	183	315
		Troll-Freezer Boat	13	13
		Troll-Ice Boat	623	627
	CA	Commercial Troll	19	35
		Sport	12	13
	COL	Marine Sport	47	51
	HS	At-Sea Hake Midwater Trawl Bycatch	123	190
	OR	Ocean Sport	73	137
		Ocean Troll	96	185
	WA	Marine Sport	348	351
		Non-treaty Drift Gillnet	2	4
		Treaty Troll	295	368
		Troll (Non-treaty)	187	214
		Total	2,985	4,030

Harvest Adjustments for Non-Selective Fisheries

Non-selective fisheries retain any fall Chinook captured. Non-selective fisheries include all the commercial and tribal net fisheries. Canada and Alaska sport fisheries are also non-selective. The RMIS database was used to generate estimated (ESTD) harvest data of CWT tagged fish. Fish without CWTs are not reported to RMIS and therefore the harvest estimates must be expanded to reflect total take for mitigation purposes. Adjustments to RMIS harvest data were done differently based upon CWT detection methods listed below.

Visual Detection Method

Visual detection means only adipose fin clipped fish were scanned for wire. Since Canada and Alaska only sample adipose clipped fish but allow take of all fish, we expanded the RMIS estimated recoveries (ESTD) by determining an expansion factor based on release data for each tag code recovered. For example, if the tagcode recovered was from a release of fish that had ADCWT, CWT only, AD only, and unmarked/untagged fish in the release, we used the following formula to expand harvest data of CWT fish to represent the total take:

ESTD CWTs harvested by fisheries from RMIS x (total # released from that tagcode/ # ADCWT in the release) = ESTD total take

Electronic Detection Method

Electronic detection method scans all fish for wire regardless of fin clip. For this detection type we used the following formula to expand the harvest data of CWT fish to estimate the total take:

ESTD CWTs harvested by fisheries from RMIS x (total # released represented by that tagcode/ (# ADCWT in the release + # CWT in the release) = ESTD total take

Discrepancies Between Detection Methods Reported to RMIS

We found discrepancies in the RMIS data when looking at recoveries of two brood years of yearling fall Chinook that were index tagged. The data showed that the Tribal gillnet fishery in the Columbia River was sampled using electronic detection. If that were the case we would reasonably expect the numbers of recoveries from the ADCWT fish to be similar to the numbers of recoveries from the non-clipped CWT fish. In both brood years where there were indexed tagging groups, there were no recoveries from the non-clipped CWT fish. Moreover, at LFH we electronically sample all fish. If the harvest of the AD clipped and no-clip groups occurred differentially, we would expect that recoveries at LFH would reflect those differences; that was not the case. Recoveries from both groups were nearly equal, therefore we presume that the harvest data submitted to RMIS should have indicated visual, not electronic detection type. If electronic detection was used, not only would the expansion rate be less, but also no adjustment would have been made for the lack of recoveries from the non-clipped CWT groups, thus underestimating the LSRCP component.

We adjusted the Columbia River Tribal Gillnet fisheries ESTD harvest of ADCWT groups by applying the formula for visual detections to estimate the total harvest of each tag code. To estimate the total take of non-clipped CWT groups of a different tag code, but from the same brood year, we used the smolt-to-adult recovery rate of the ADCWT group as surrogates and applied that to the total number of fish released.

Harvest Adjustments for Mark Selective Fisheries

To adjust ESTD harvest of ADCWT groups to reflect the total take in AD selective fisheries we had to account for fish released with an AD clip that were not wire tagged. The Columbia River sport fisheries are mark selective and were expanded using the following formula:

ESTD CWTs harvested by fisheries from RMIS x (total # AD + total # non-clipped fish released from that tag code/ # ADCWT) = ESTD total take

Comparison of yearlings and subyearlings recoveries by location

We compared the areas that subyearlings and yearlings were harvested and their differences in age at harvest. Data have not been normalized to account for differing release sizes. The final locations of tagged and untagged fish associated with ADCWT releases of subyearlings and yearlings from WDFW are listed below for the 2007 run year. Yearlings (Table 24) were primarily taken in ocean fisheries whereas subyearlings (Table 25) were taken equally in ocean and freshwater fisheries. Harvest of yearlings occurred mostly in the Columbia River then in BC and WA ocean fisheries. Subyearlings were also harvested mainly in the Columbia River then in BC and High Seas (HS) fisheries; but to a much lesser extent than the yearlings. The tables below are underestimates of total catch because they do not contain information from yearling releases by WDFW that were not adipose clipped. This was done so comparisons between subyearlings and yearlings would be standardized.

Table 24. Final locations of ADCWT yearling fall Chinook released by WDFW to Freshwater and Ocean areas in 2007 by salt water age

Area	0-salt	1-salt	2-salt	3-salt	4-salt	Total	% of total
Freshwater	244	2,262	1,409	157	11	4,083	75%
COL		198	431	102	5	736	14%
OR		1				1	0%
SN	244	2,063	978	54	6	3345	62%
Ocean		414	846	82	5	1,348	25%
AK			49	25	3	77	1%
BC		83	367	41	3	494	9%
CA		4	25			29	1%
COL		19	11			29	1%
HS		65				65	1%
OR		47	107	4		159	3%
WA		197	288	12		496	9%
Grand Total	244	2,676	2,255	239	17	5,431	

Table 25. Final locations of ADCWT subyearling fall Chinook released by WDFW to freshwater and ocean areas in 2007 by salt water age.

Area	1-salt	2-salt	3-salt	4-salt	5-salt	Total	% of total
Freshwater	1,730	151	36			1,918	93%
COL	84	38	13			136	7%
OR							0%
SN	1,646	113	23			1,782	86%
Ocean	61	58	17	3	9	149	7%
AK			2			2	0%
BC	15	21	12	3	9	60	3%
CA		2				2	0%
COL	2	3				5	0%
HS	29	15				44	2%
OR	3		2			5	0%
WA	13	18				31	1%
Grand Total	1,792	210	54	3	9	2,067	

Total Mitigation Level

During 2007, and estimated 23.4% of the total mitigation goal of 91,500 fish was met. Additional harvest of fish released as part of the FCAP releases also occurred but were not included in this report. The FCAP estimates will be presented by the NPT.

Smolt-to-Adult Return Estimates

Appendix M lists smolt-to-adult return (SAR) to the Snake River for all wire tagged in-basin releases grouped by fin clip (BY94-BY06), for return years through 2008. These data were derived from compiled run reconstruction estimates to the Tucannon River, LGR Dam, and LFH. The data presented (Appendix M) includes estimates of SARs for fish released as part of LSRCP, NPTH, and IPC programs, although only WDFW released fish will be discussed in the body of this report.

Yearling releases (Table 26) continue to provide a survival advantage over subyearling releases (Table 27) although it is highly variable among years. We also present data showing a survival advantage of on-station subyearlings when compared to direct releases into the Snake River near Couse Creek (CCD) and the Grande Ronde River (GRR).

Table 26. Average percent smolt-to-adult returns to the Snake River from yearling fall Chinook released by WDFW.

Release site	Brood year	Fin clip	Average % SAR	SD % SAR	Min % SAR	Max % SAR
Completed Returns						
LFH	BY94-98	AD	0.793	0.377	0.382	1.166
	BY99-03	AD	1.032	0.409	0.385	1.499
	BY03	No clip	1.021		0.077	0.940
Incomplete returns through return year 2008						
LFH	BY04-06	AD	1.061	0.571	0.532	1.666
	BY04-06	No clip	1.250	0.545	0.630	1.656

Table 27. Average percent smolt-to-adult returns to the Snake River from subyearling fall Chinook released by WDFW.

Release site	Brood year	Fin clip	Average % SAR	SD % SAR	Min % SAR	Max % SAR
Completed Returns						
LFH	BY98	AD	0.747			
LFH	BY99-03	AD	0.194	0.109	0.085	0.321
Col R below Bonn	BY00	AD	0.072			
CCD	BY02	AD	0.074			
Incomplete returns through return year 2008						
LFH	BY04-06	AD	0.384	0.482	0.077	0.940
CCD	BY04-05	AD	0.278	0.343	0.032	0.670
GRR	BY04-05	AD	0.132	0.104	0.059	0.205

Yearlings continue to return minijacks (0-salt) and jacks (1-salt) at a higher rate (Table 28) than our subyearling production (Table 29). It is also apparent that both programs are returning 1-salt and 2-salt fish at a higher rate than in the past, with a decreased return rate of older aged fish.

Table 28. Average percent smolt-to-adult returns to the Snake River by salt water age at return for yearling fall Chinook released by WDFW.

				Average percent SAR to the Snake River				
Release site	**Brood year**	**Fin clip**		**0-salt**	**1-salt**	**2-salt**	**3-salt**	**4-salt**
Completed Returns								
LFH	BY94-98	AD	average	**0.092**	**0.294**	**0.298**	**0.105**	**0.005**
			SD	0.046	0.192	0.146	0.033	0.005
			min	0.029	0.083	0.139	0.055	0.001
			max	0.167	0.562	0.490	0.140	0.016
	BY99-03	AD	average	**0.151**	**0.438**	**0.385**	**0.056**	**0.006**
			SD	0.113	0.203	0.155	0.045	0.004
			min	0.005	0.156	0.126	0.013	0.001
			max	0.298	0.755	0.576	0.127	0.009
	BY03	No clip	SAR	**0.196**	**0.414**	**0.384**	**0.026**	
Incomplete returns through return year 2008								
LFH	BY04-06	AD	average	**0.489**	**0.671**	**0.375**		
			SD	0.451	0.350			
			min	0.108	0.424			
			max	0.986	0.918			
	BY04-06	No clip	average	**0.662**	**0.684**	**0.397**		
			SD	0.706	0.275			
			min	0.140	0.490			
			max	1.465	0.879			

Table 29. Average percent smolt-to-adult returns to the Snake River by salt water age at return for subyearling fall Chinook released by WDFW.

Release site	Brood year	Fin clip		Average percent SAR to the Snake River 1-salt	2-salt	3-salt	4-salt	5-salt
Completed Returns								
LFH	BY98	AD		**0.208**	**0.347**	**0.173**	**0.018**	
	BY99-03	AD	average	**0.065**	**0.075**	**0.045**	**0.011**	**0.001**
			SD	0.033	0.046	0.035	0.009	
			min	0.034	0.034	0.012	0.001	
			max	0.111	0.126	0.090	0.018	
Col R barged below Bonn	BY00	AD		**0.033**	**0.025**	**0.013**	**0.002**	
CCD	BY02	AD		**0.031**	**0.034**	**0.008**		
Incomplete returns through return year 2008								
LFH	BY04-06	AD	average	**0.187**	**0.293**	**0.006**		
			SD	0.177	0.373			
			min	0.041	0.029			
			max	0.384	0.556			
CCD	BY04-05	AD	average	**0.105**	**0.173**	**0.001**		
			SD	0.110	0.233			
			min	0.023	0.009			
			max	0.230	0.440			
GRR	BY04-05	AD	average	**0.093**	**0.038**	**0.003**		
			SD	0.081	0.024			
			min	0.036	0.020			
			max	0.150	0.055			

Smolt-to-Adult Survival Estimates

Smolt-to-adult survival estimates are presented in Appendix N and include estimated returns to the Snake River as well as recoveries in fisheries in the Columbia River and the ocean.

Broodstock Collection and Management 2008

Fall Chinook are collected at LFH and LGR for broodstock. Each year there is a discrepancy between estimated numbers of fish collected and the numbers of fish processed/killed (Table 30). The in-season estimate of numbers of fish diverted into the hatchery at LFH is a minimum estimate of the run to LFH. Some of the fish that are trapped at LFH are returned to the river and never used for broodstock (see LFH Trapping Operations below). Discrepancies between the numbers of fish recorded as collected at LGR and the number of fish processed likely occurs because of indistinguishable or overlooked operculum punches on fish hauled from LGR Dam. The fish trapped at LGR Dam that are unaccounted for at processing are likely included in the number of LFH fish processed overall.

Table 30. Number of Chinook initially collected for broodstock from LFH and LGR trapping efforts and how they were accounted for in 2008.

Year	Trap Location	Number Collected/Hauled for Broodstock	Processed (killed)	Returned to Snake River	Difference from Number Collected/Hauled
2008	LFH	2,984	2,000	984	0
	LGR	3,416	3,277	170	-31[a]

[a] We processed more fish from LGR than were documented as shipped.

Lower Granite Dam Trapping Operations

Trapping protocols are presented in Appendix B. In general, prior to transport, NOAA Fisheries staff anesthetized the salmon, gathered length and sex data, and marked the fish with a hole in the operculum prior to release upstream or transport. WDFW personnel then hauled fish to LFH in a 5,678 L aerated tank truck. A systematic automated trapping of 20% of the run at LGR Dam was begun on 24 August 2008, but was decreased twice through the trapping period that extended until 21 November. Trapping rates and operation dates of systematic sampling at LGR are presented in Appendix C.

LFH Trapping Operations

The majority of broodstock is collected at LFH. The trap at LFH was in operation daily from 1 September through 25 November. The trapping and sorting protocols are included in Appendix D. In 2008 the approximate number of fish returned to river was not documented, so the numbers of fish trapped is underestimated. Fall Chinook presented in our reports only reflect what was trapped and retained that day, not what the total number of fish would have been if we had trapped daily.

We documented 2,598 trapping events of fall Chinook at the LFH trap during broodstock collection efforts in 2008 (Figure 7). Jacks (359) and minijacks (30) accounted for a proportion

of broodstock trapping events. We were unable to determine the unique (excluding recaptures) number of fish that were trapped because there is not a marking protocol in place at the hatchery trap. We assume that jacks were recaptured multiple times but we do not know to what extent.

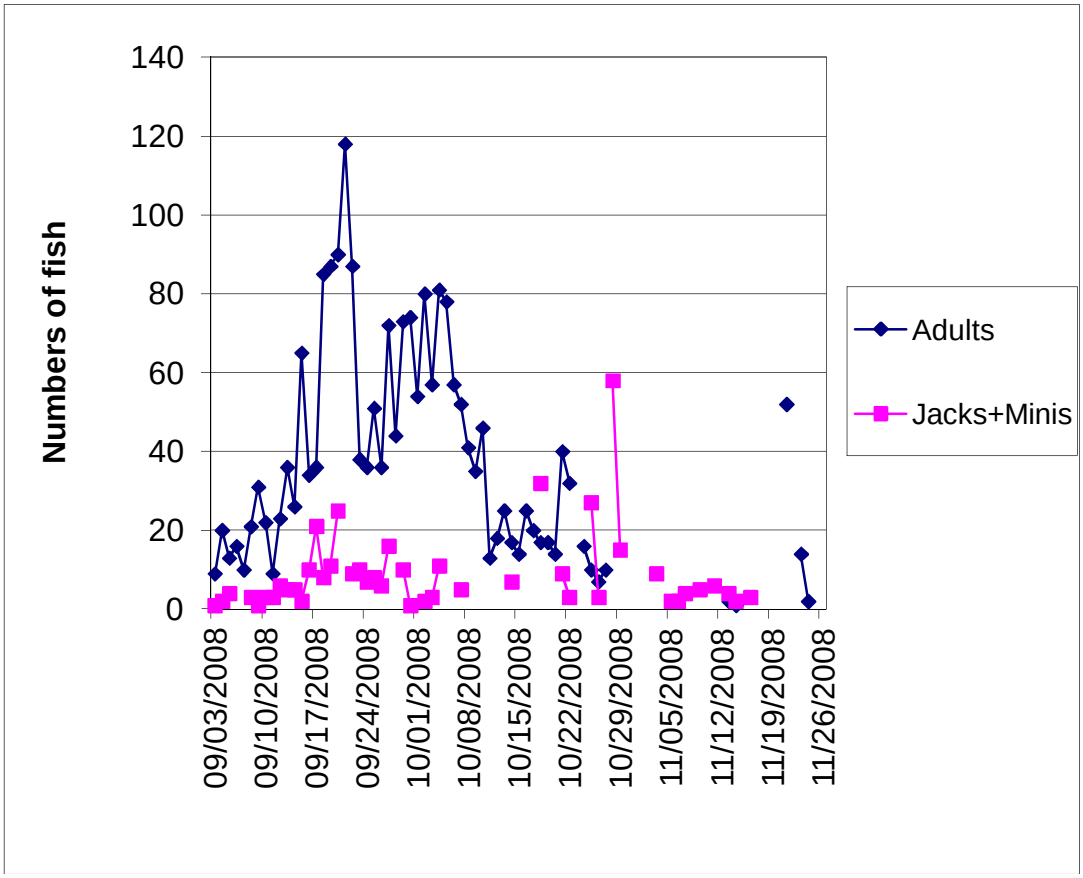


Figure 7. Number of fall Chinook arriving at LFH trap by date, 2008.

Hatchery Operations 2008

Spawning Operations

Spawning and Egg Take

Spawning began the fourth week in October and continued for six weeks. At spawning, ripe fish were killed and their gametes collected and set aside unmixed. All matings were single male/single female crosses. To determine the origin and brood year of fish spawned, snouts containing wires were removed from tagged fish and scales were collected from unmarked/ untagged fish (no coded wire or VIE tag). During spawning, CWTs were decoded to verify origin prior to matings. The origins of untagged fish were not determined until the following week when the results of scale and PIT tag analysis were compiled. The total number of fish spawned prior to culling is listed in Table 31.

In order to reduce the genetic impact out-of-basin strays might have on progeny, unknown origin fish (no wire or VIE) were mated with unknown origin fish (Appendix E). In instances where there were not enough unknown origin fish available to mate with unknown origin fish we occasionally used LF origin males in the matings.

Progeny from matings with unmarked/untagged yearlings (LGR and LFH trapped), matings with unmarked/untagged STRAY subyearlings (LFH trapped), and matings with a parent with unreadable scales (LFH trapped) were held separately for possible culling at the end of the season. This protocol is in place to reduce potential strays while still assuring that enough eggs are retained to meet production goals.

Information about processed fish that were not spawned is presented in Table 32. Fish that were killed outright (surpluses) were generally males needed for run composition but not needed for spawning, or strays from other hatcheries (by CWT).

Table 31. Spawn dates, numbers of fall Chinook, and weekly egg take of fish spawned at LFH in 2008. (LFH and LGR trapped fish are combined and jacks are included with males).

Spawn Dates	Male[a]	Female[a]	Non-Viable[b]	Eggtake
Oct 21 and 22	62	62	2	256,783
Oct 28 and 29	310	310	2	1,141,890
Nov 4 and 5	334	338	1	1,289,355
Nov 12	233	242	2	967,700
Nov 19	253	282	5	1,038563
Nov 25	74	75	3	315,933
Totals	**1,266**	**1,309**	**15**	**5,010,224**

[a] Numbers of fish presented include spawned fish whose progeny were later destroyed.
[b] Non-viable females.

Table 32. Weekly summary and origins of mortality and surplus Chinook processed at LFH in 2008. (LFH and LGR trapped fish are combined, jacks are included with males).

Week Ending	Mortality						Killed Outright					
	LF/Snake R.[a]		Natural		Other/Unk[b]		LF/Snake R.		Natural		Other/Unk	
	M	F	M	F	M	F	M	F	M	F	M	F
07-Sep	0	0	0	0	2	1	0	0	0	0	12	0
14-Sep	1	0	0	0	1	2	0	0	0	0	0	0
21-Sep	4	0	0	0	0	0	0	0	0	0	6	0
28-Sep	9	1	0	0	1	2	11	0	0	0	0	0
05-Oct	13	3	0	0	8	2	217	0	0	0	1	0
12-Oct	6	3	0	0	4	3	550	0	0	0	15	0
19-Oct	20	3	0	0	2	4	20		0	0	0	0
26-Oct	25	3	0	0	0	6	412	0	0	0	30	1
02-Nov	90	2	0	0	2	1	151	1	0	0	19	7
09-Nov	30	4	0	0	1	1	77	1	0	0	31	15
16-Nov	56	16	2	0	16	2	25	0	0	0	16	8
23-Nov	58	21	0	0	36	4	7	2	1	0	24	3
30-Nov	47	2	3	0	51	0	57	0	0	0	13	0
01-Dec	16	0	0	0	25	0	59	6	0	0	3	0
Totals	**375**	**58**	**5**	**0**	**149**	**28**	**1,586**	**10**	**1**	**0**	**170**	**34**

[a] Includes known LFH or NPTH origin (from CWT and/or VIE), and PIT tagged or scale sampled fish of Snake River hatchery origin.

[b] Includes undetermined hatchery yearlings by scales, hatchery strays by scales or wire, regenerated scales, and Lost and No tags.

Fish Returned to River

We trapped more fish at LFH than were needed for return estimates. To ensure representative sampling we continued trapping throughout the run. Fish not needed for broodstock or run composition analysis were returned to the Snake River (Table 33). Fish trapped at LFH were released either downstream of Little Goose (LGO) Dam at Texas Rapids boat launch (Rkm 105.2) or upstream of Little Goose (LGO) Dam at Nisqually John boat landing (Rkm 198.7).

Table 33. Trapping sites, dates of release, release locations, sex, number of naturals handled, and total number of Chinook that were hauled back to the Snake River in 2008.

Trap Site	Release Date	Release Location	Sex	Naturals	Total
LFH	05-Nov	Texas Rapids	Male	0	691
			Female	0	113
			Male <53	0	129
	25-Nov	Texas Rapids	Male	0	49
			Female	0	1
			Male<53	0	1
LGR	01- Dec	Nisqually John	Male	26	150
			Female	9	20
			Male<53	0	0
			Totals	**35**	**1,154**

Broodstock Profile

Thirty-one percent of the broodstock for the fall Chinook program were collected at the LFH trap. The majority of the unmarked/untagged fish included in our broodstock were trapped at LGR Dam. We included 110 females and 54 males of presumed Snake River natural origin (based upon scale readings and DNA) in our broodstock. All of these natural origin fish were hauled from LGR Dam.

Because of adult holding pond constraints (number and size), only fish from one trapping site could be processed each spawn day. Semen was held overnight for use on the following day if needed. Semen can be held overnight and used the following day with only a slight reduction in viability (Mendel and Milks, unreported data). Semen from ripe males was collected and split into two lots. One lot was used the same day it was collected and the other lot was saved for the following day. Semen to be held overnight was stored in individual plastic bags infused with oxygen and placed in a cooler on ice. Burlap bags were positioned between the samples and the ice to prevent freezing of the semen. Although protocol guidelines discourage multiple uses of individual males, we used 1,227 males once, 35 males twice, and 4 males three times in the 1,309 matings from which gametes were retained for production. Following procedures described by Busack (2006) we calculated the effective number of male breeders ($N_{b,\,m}$) at 1220 using the following equations:

A reasonable constant-size assumption is that the number of offspring equals the number of egg lots (N_{egg_lots}). In this case:

$$\mu_t = N_{egg_lots}/N_{tot} = 1309/1266 = 1.034$$

where μ_t is the mean gametic contribution of a randomly chosen individual and N_{tot} is the total number of male breeders used. So the male N_b can be calculated:

$$N_{b,m} \approx (N_{tot} - 1/\mu_t)/((N_1N_2 + N_2N_3 + 4N_1N_3)/((N_1 + 2N_2 + 3N_3)^2) + 1) = 1220$$

where N_1 is the number of males used one time, N_2 is the number of males used two times and N_3 is the number of males used three times.

The effective male breeders is 96.4% of the census number of males, or 93.3% of the male $N_{b,\,m}$ that would have been achieved if enough males had been available to avoid reuse of males.

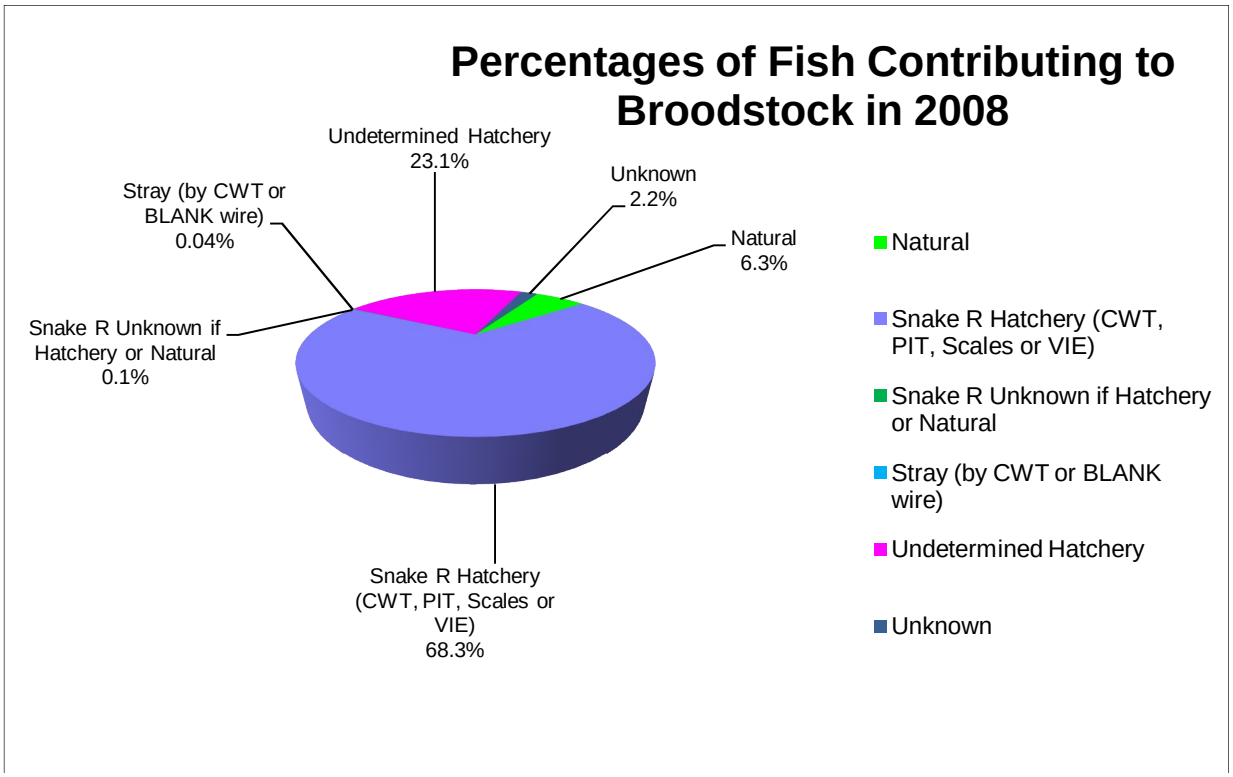


Figure 8. Percentages of fall Chinook contributing to broodstock by origin in 2008.

Inclusion of Natural origin fish

This was the sixth year that Snake River natural origin fish were included in broodstock (Table 6). We estimate 110 females and 54 males were used resulting in 6.4% of broodstock being of natural origin.

Jacks and Jills in Broodstock

During spawning, males measuring less than 57 cm were considered jacks. Our spawning protocol indicates that jacks may be included in about 10% of the matings, but are not to exceed 25% of the matings. Post season data analysis of true age of the fish spawned indicates that 24.0% of the males were true jacks from yearling releases (age 3), 0.5% were true jacks from subyearling releases (age 2), and another 1.0% were natural reservoir reared true jacks. Of the females spawned, 5.6% were true jills from yearling releases (age 3) and another 0.2% were natural reservoir reared true jills. Fork length data of jacks and jills used in broodstock are presented in Table 34.

Table 34. Fork lengths of 1-salt jacks and jills used in broodstock at LFH in 2008, originating from H subyearling, H yearling, and W reservoir reared release.

	H Subs age 2	W Res Rear age 3		H Yearlings age 3	
Fork length	**Jacks**	**Jacks**	**Jills**	**Jacks**	**Jills**
Average	62	64	77	62	65
Median	62	65	77	62	65
Mode	61	66		64	65
Range	57-65	58-70	74-80	54-87	57-80
SD	3.2	3.9	4.2	4.1	3.6

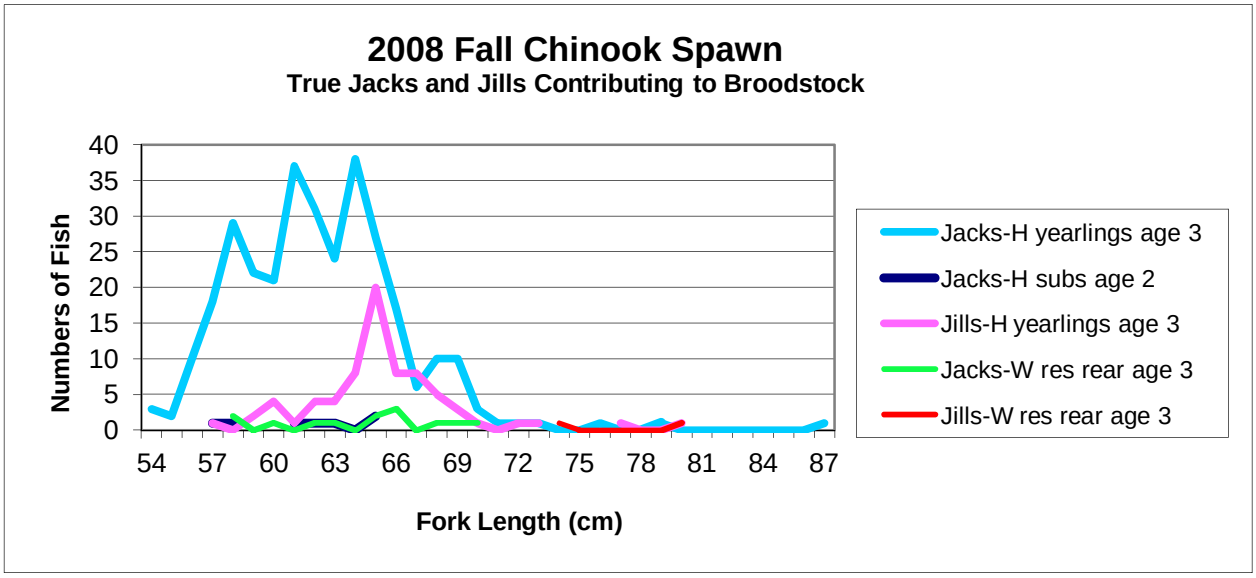


Figure 9. Numbers of true jacks and jills by total age contributing to broodstock in 2008.

Fecundity

We calculated fecundities for several groups of females using methods previously described by Milks et al. (2006). For management purposes the mean fecundity for the fish trapped at LGR and hauled to LFH was 4,002 eggs/female. To assist with trapping protocols three groups of fish are of interest based upon visual and electronic identification: tagged fish (CWT or VIE), unmarked/untagged fish, and AD-clip only (no wire/no VIE) fish. Tagged fall Chinook (known LFH origin) used in broodstock averaged 3,648 eggs/female (Table 35), unmarked/untagged fish (hatchery and natural origin) as a whole averaged 4,248 eggs/female. The mean fecundity of the Ad-clip only fish was 3,720 eggs/female.

Since we are trying to incorporate natural origin gametes into production at 10-25%, it is important that fecundity be estimated for natural origin females also. Natural origin females averaged 4,599 eggs/female.

In addition to examining the origins of individual fish contributing to LF broodstock, we also looked at the number and percentage of gametes each fish would have contributed (Figure 10). Females with higher fecundities would contribute more genetically by origin than fish with lower fecundities. Each male was assigned a contribution amount based on the fecundity of the female he was mated with.

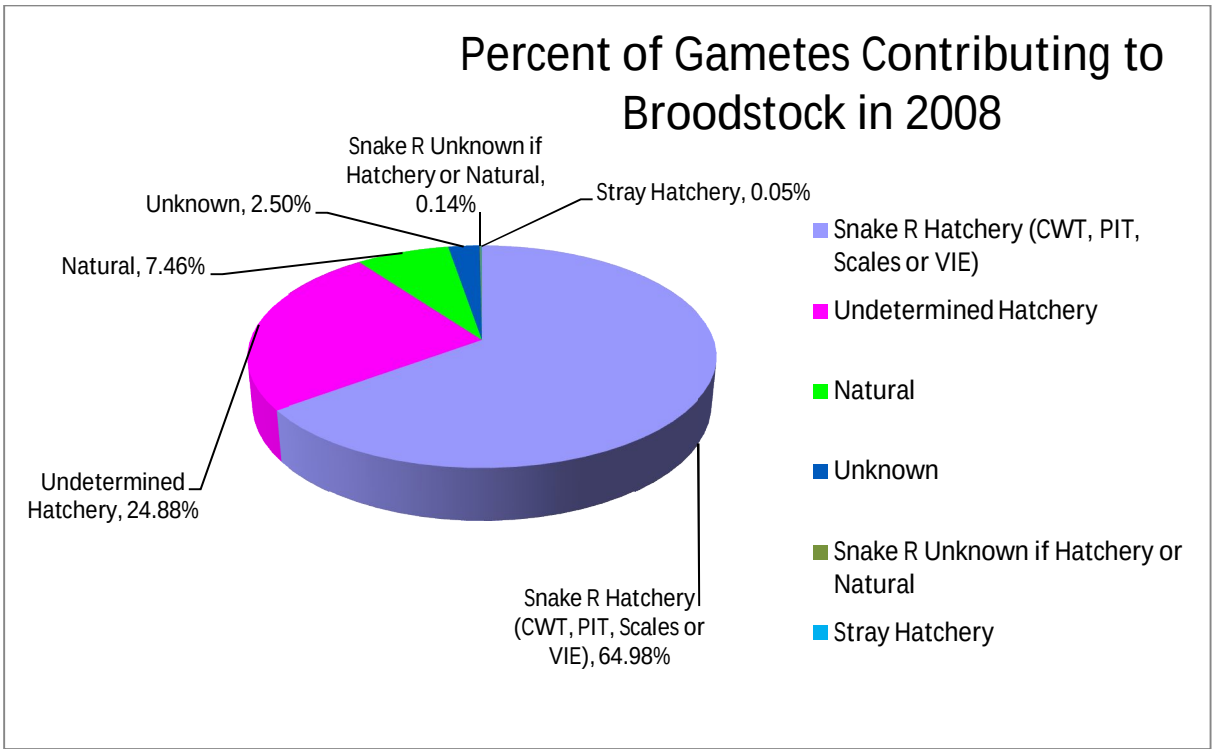


Figure 10. Percent of gametes contributing to broodstock by origin in 2008.

Table 35. Females used in 2008 broodstock based on origin, salt water age, average fecundity, and average eggs per fork length (cm).

Origin determination method	Age	Number of females	Average Fecundity[a]	Average eggs/cm fork length
Snake R Hatchery (CWT, PIT, Scales or VIE)	subyearling 2 salt (age3)	267	3,781	52
	subyearling 3 salt (age4)	20	4,154	53
	subyearling 4 salt (age5)	1	3,841	n/a[b]
	yearling 1 salt (age3)	68	3,158	48
	yearling 2 salt (age4)	467	3,615	46
	yearling 3 salt (age5)	50	3,815	46
	yearling unknown age	7	3,290	43
Natural by Scales	reservoir reared 1 salt (age3)	2	4,257	55
	reservoir reared 2 salt (age4)	39	4,370	52
	reservoir reared 3 salt (age5)	21	4,935	53
	reservoir reared 4 salt (age6)	2	4,298	48
	subyearling 2 salt (age3)	5	3,445	46
	subyearling 3 salt (age4)	36	4,796	56
	subyearling 4 salt (age5)	5	4,976	52
Snake R Unknown if Hatchery or Natural	subyearling 3 salt (age4)	2	4,312	53
	subyearling 4 salt (age5)	1	4,766	54
Undetermined Hatchery	subyearling 2 salt (age3)	139	3,821	51
	subyearling 3 salt (age4)	83	4,485	53
	subyearling 4 salt (age5)	33	4,593	50
	unknown age	15	3,965	51
	yearling 1 salt (age3)	5	3,085	48
	yearling 2 salt (age4)	8	3,661	46
	yearling 3 salt (age5)	1	5,040	49
Unknown	unknown age	32	4,373	52
Grand Total		**1,309**	**3,848**	**49**

[a] Each fish has a counted or estimated fecundity based on fork length
[b] No fork length is associated with this fish

Rearing, Marking, and Transfer

Information regarding marking and transfer numbers are provided in Table 36. Rearing followed standard hatchery procedures that are available upon request. Detailed information regarding type and size of vessels used for rearing can be found in Lyons Ferry Hatchery Annual Reports. Marking was consistent with *United States v. Oregon* recommendations as listed in Appendix F.

Table 36. Snake River fall Chinook juveniles marked by WDFW and/or transferred from LFH, 2007-2008 brood years.

Brood Year	Release Site	Marking				Transfer		
		Date	Type [a]	Number	Fpp	Date	Number	Fpp
2007								
Yearling	LFH	9/10/08	AD+CWT+LR	228,001	35.0	-	-	-
	LFH	9/25/08	CWT+LR	228,156	35.0	-	-	-
	CJ	9/18/08	AD+CWT	72,508	29.0	2/02/09	72,011	12.3
	CJ	10/7/08	CWT	70,905	29.0	2/02/09	70,418	12.3
	BC	9/25/08	AD+CWT	74,844	29.0	3/04/09	74,012	12.5
	BC	9/29/08	CWT	83,588	29.0	3/04/09	82,659	12.5
	PL	9/23/08	AD+CWT	72,506	29.0	3/02/09	71,675	12.3
	PL	10/01/08	CWT	82,630	29.0	3/02/09	81,684	12.3
2008								
Subyearling [b]	LFH	3/24/09	AD+CWT	201,096	150.0	-	-	-
	Couse Cr.	3/30/09	AD+CWT	201,033	140.0	-	-	-
	GRR [c]	4/17/09	AD+CWT	190,684	110.0	-	-	-
	CJ	3/26/09	AD+CWT	100,502	120.0	05/04/09	202,324	75.0
	CJ	4/03/09	CWT	100,039	110.0	05/05/09	323,206	80.6
	BC	3/23/09	AD+CWT	100,500	160.0	05/06/09	202,077	80.0
	BC	4/02/09	CWT	100,137	110.0	05/07/09	274,723	80.0
	PL	3/30/09	AD+CWT	100,522	120.0	05/04/09	201,424	85.0
	PL	4/06/09	CWT	100,900	110.0	05/05/09	215,743	82.0

[a] In the mark type column, visible implant elastomers (VIE) are designated by side and then color, i.e. LR denotes left red.

[b] Unmarked/untagged fish are included in the subyearling transfer groups.

[c] Does not include a second group of fish released at GRR because they were marked by ODFW.

Juvenile Releases and Migration

Fall Chinook produced at LFH and released exclusively by WDFW are included in this section. Historical releases by WDFW, NPT, IDFG, and NOAA are presented in Appendix G.

2007 Brood Year

Yearling Release

In 2009, we released 455,152 yearling fall Chinook (BY 2007) into the Snake River at LFH from 6-8 April at 9.2 fpp. Size (Fpp) was estimated using pound counts of 4,787 fish. Two groups of fish were coded-wire-tagged and marked with a red VIE tag behind the left eye. One half of the group (227,364 fish) was adipose fin-clipped (CWT: 63/46/80) and included 13,390 fish that were PIT tagged. The other half (227,788 fish) was not adipose clipped (CWT: 63/46/81) and included 13,395 fish that were PIT tagged. Throughout the release, small groups of fish were removed and held in an adjacent raceway for sampling. Mean fork length for all days combined was 166 mm (SD 14.6) and mean weight was 50.9 g (SD 12.6) or 8.9 fpp. The CV for fork length was 8.8 and the condition factor (K) was 1.09. More specifically, for the Ad+CWT+VIE group, mean fork length was 165 mm (SD 14.3) and CV of length was 8.7. The mean weight was 49.9 g (SD 12.0), and fpp was 9.1. The CWT+VIE group had a mean fork length of 166 mm (SD 16.1) with a CV of 8.7. The mean weight was 52.0 g (SD 13.2), and the fpp was 8.7. During the release, average daily Snake River flow recorded at LMO Dam ranged from 43.0-44.1 kcfs and spill ranged from 27.7-29.9 kcfs.

2008 Brood Year

Subyearling Release

Subyearlings were released at LFH and two additional sites upstream of LGR Dam in 2009. Prior to transport and release, juveniles from each release group were sampled at LFH to collect size and condition data as well as to evaluate tag loss for marked groups.

The on-station release of 200,695 subyearlings (BY2008) from LFH occurred on 2 June 2009 when the fish were 51.7 to the pound, based on pound counts. Fish were sampled on 2 June. Mean fork length was 91 mm (SD 8.2) and mean weight was 8.6 g (SD 2.4) or 52.9 fpp. The CV for fork length was 9.0 and the condition factor (K) was 1.10. At the time of release, the average daily Snake River flow recorded at LMO Dam ranged from 145.5- 158.5 and the average daily spill ranged from 29.6- 49.1 kcfs respectively. The average daily water temperature at LMO Dam was 12.2ºC (USACOE 2009).

Snake River near Couse Creek

The hatchery released 200,744 subyearlings (46.5 fpp based on pound counts) into the Snake River near Couse Creek Boat Launch on 26 May. The group was identified with an adipose fin clip and CWT. Fish were also sampled by the evaluation team on 26 May. Mean fork length

was 94 mm (SD 7.0) and mean weight was 9.3 g (SD 2.3) or 48.5 fpp. The CV for fork length was 7.42 and K = 1.11. At the time of the release average daily Snake River flow and spill recorded at LGR Dam was 163.9 kcfs and 56.5 kcfs. Average daily flow and spill recorded at LMO Dam was 160.1 kcfs and 43.4 kcfs.

Grande Ronde

Two groups of 2008 brood year subyearlings were released into the Grande Ronde River near the mouth of Cougar Creek. The first group of 441,050 subyearlings was released on 28-29 May. The release was comprised of 201,702 AD+CWT and 239,348 unmarked and untagged fish (associated). Sampling was completed 28 May. Mean fork length was 84 mm (SD 5.9) and mean weight was 6.7 g (SD 1.5) or 67.1 fpp. The CV for fork length was 7.0 and K = 1.10. During the Grande Ronde release, the daily average Snake River flow at LGR Dam was recorded at 144.6 kcfs and daily average spill was recorded at 74.9 kcfs. Daily average flow at LMO Dam was ranged from 113.2 to 115.4 kcfs and the daily average spill ranged from 36.8 to 42.5 kcfs, respectively.

The second group of 181,400 fish was extra production fish released into the Grande Ronde River at RM 30 on 2-3 June. The release was comprised of 165,146 AD+CWT and an additional 1,191 CWT-only, 6,024 AD-only, and 9,039 unmarked/untagged fish that were tagged by ODFW. The release group broke out with a bacterial gill infection on 4/20/09 which resulted in an approximate 9.61% loss between tagging and release. Sampling was completed 2 June. Mean fork length was 93 mm (SD 8.1) and mean weight was 9.1 g (SD 2.4) or 50.0 fpp. The CV for fork length was 8.7 and K = 1.12.

Survival Rates to Release

The five year average of survival rates are estimated in Table 37. Survivals are based on an estimated number of green eggs, calculated by subtracting green egg equivalents of eggs/fry not retained for LFH rearing (IPC, NPTH, culled strays) from the total egg take. For example, in 2008 the hatchery reported 5,010,224 green eggs being taken. An estimated 1,939,734 green eggs were shipped or destroyed at later stages of development, leaving 3,070,490 green eggs to be used in the actual life stage survival percentage calculations. Survivals for subyearlings and yearlings are the same through ponding because fry are not assigned to yearling or subyearling programs until that time.

Table 37. Estimated survivals (%) between various life stages at LFH for fall Chinook of LFH/Snake River hatchery origin, 2004-2008 brood years.

Brood year	Release stage	Green egg-ponded fry	Ponded fry-release[a]	Green egg-release
2004	Yearling	93.0	96.8	90.1
	Subyearling	93.0	97.6	90.8
2005	Yearling	92.2	99.3	91.5
	Subyearling	92.2	104.9	96.7
2006	Yearling	95.7	95.4	91.3
	Subyearling	95.7	100.2	95.5
2007	Yearling	95.8	95.4	91.4
	Subyearling	95.8	100.3	95.5
2008	Yearling	95.8	94.1	90.1
	Subyearling	95.8	105.9	90.4
Yearling mean:	**%**	**94.5**	**96.2**	**90.9**
	SD	1.8	2.0	0.7
Subyearling mean:	**%**	**94.5**	**101.8**	**93.8**
	SD	1.8	3.5	2.9

[a] Estimation methods used to determine numbers of fish ponded often lead to survival estimates that exceed 100%.

Tucannon River Natural Production 2008

Adult Salmon Surveys

Fall Chinook Redd Surveys

Survey sections generally covered the river from Rkm 1.1 to Rkm 29.0. The first 1.1 kilometers of the Tucannon River are deep slack water from the Snake River's LMO Dam reservoir and no surveys or estimates are made for that area. The habitat is poor in this area and we presume no spawning occurs there. During 2008, landowner access restrictions prevented the surveying of 1.5 kilometers of river above the Starbuck Bridge within survey sections 5 and 6. River conditions for viewing were good throughout the spawning season with low flows and clear water. Surveys were not completed during the week of 9 November due to weather.

We estimate a total of 254 redds were constructed on the Tucannon River in 2008. We counted 209 fall Chinook redds (Table 33) and estimate an additional 45 redds were built in sections that were not surveyed due to restricted landowner access. The methodologies used in 2008 for estimating redd construction were the same as those used in 2007.

Table 38. Date and number of redds counted and carcasses sampled on the Tucannon River in 2008.

	Chinook		Coho	
Week beginning	Redds counted	Carcasses sampled	Redds counted	Carcasses sampled
19 Oct	4	0	5	0
26 Oct	10	1	3	3
2 Nov	27	9	4	2
9 Nov	0	0	0	0
16 Nov	125	55	4	7
23 Nov	3	16	3	0
30 Nov	36	6	2	1
07 Dec	0	0	0	0
Totals	**209**	**91**	**21**	**14**

Escapement and Composition of Run

The total escapement to the Tucannon River (763 fall Chinook) was estimated using an expansion factor of three fish per redd (Table 39). We collected heads and scales from each carcass and used CWT and scale analysis to determine the age and origin of each carcass. The composition of the fall Chinook carcasses by salt water age are listed in Table 40. Fish with out-of-basin hatchery scale patterns were assigned to the Snake R. hatchery group because CWT recoveries shed doubt on the magnitude of the estimated out-of-basin return using scale determinations. There were not any fish with reservoir rearing scale patterns in the carcasses that were sampled.

We estimate that 82.2% of the run originated from Snake River hatchery releases, 16.5% originated from out-of-basin hatchery releases, and 1.3% were Snake River natural origin (Table 40). All of the 0 and 1 salt fish recovered were of hatchery origin. Of the females recovered, we estimate that 6.2% were true jills (1 salt). Of the males recovered, we estimate that 46.7% were minijacks (0 salt) and another 23.1% were true jacks, all from hatchery releases.

Table 39. Composition of carcasses recovered and estimated run composition of fall Chinook on the Tucannon River, 2008.

Origin	CWT	Raw Recoveries F	M	M < 53cm	Expanded to Run F	M	M < 53cm	Total
Snake River Hatchery (wire)								
LF03SO	631786	1			8	0	0	8
LF03YO	631769	1			8	0	0	8
LF04YO	633283	9	2		75	17	0	92
	633284	8			63	0	0	63
LF05SBCA	610174	1			8	0	0	8
LF05SO	633582	3	4		25	30	0	55
LF05YO	633597	2	6	1	17	50	8	75
	633598	1	2		8	17	0	25
LF06YBCA	612513	0		1	0	0	8	8
LF06YO	633987	0		6	0	0	50	50
	634092	0		11	0	0	92	92
Snake River Hatchery (AD/LR)								
Snake R. hatchery Adclip/LRVIE yearling age 4 by scales		1			8	0	0	8
Presumed Snake River Natural								
Presumed Snake River Natural origin sub age 4 by scales		1			10	0	0	10
Presumed Snake River Hatchery (no wire)								
Unknown hatchery unm/ noVIE yearling age 5 by scales		1			8	0	0	8
Unknown hatchery unm/ noVIE yearling age 3 by scales		0	1		0	8	0	8
Unknown hatchery unm/ noVIE yearling age 4 by scales		3		2	26	0	17	42
Unknown hatchery unm/ noVIE sub age 4 by scales		1	1		10	8	0	19
Unknown hatchery Adclip only sub age 5 by scales		1			8	0	0	8
Unknown hatchery Adclip only sub age 3 by scales		0	2		0	20	0	20
Unknown hatchery Adclip only sub age 4 by scales		2			17	0	0	17
Unknown hatchery unm/ noVIE sub age 3 by scales		1			8	0	0	8
Out-of-basin hatchery (BLANK or 09BLANK)								
09BLANK	09BLANK	0		2	0	0	17	17
BLANK	BLANK	11	2		92	17	0	109
Total		**48**	**20**	**23**	**402**	**168**	**193**	**763**

Table 40. Estimated composition of fall Chinook run to Tucannon River by salt water age and origin, 2008.

	0 salt	1 salt		2-5 salt			
Origin	**Mini jack**	**True jack**	**True jill**	**Adult F**	**Adult M**	**Total**	**% of return**
Snake River Hatchery (wire or LR)	151	76	25	197	47	496	**65.0%**
Snake River Natural				10		10	**1.3%**
Presumed Snake River Hatchery (no wire)		8		78	45	131	**17.2%**
Out-of-basin hatchery (wire-CWT or BLANK)	17			92	17	126	**16.5%**
Total	168	84	25	377	109	763	
% of return	**22.0%**	**11.0%**	**3.3%**	**49.4%**	**14.3%**		**100%**

Coho

There were 21 redds suspected of being coho redds (28 redds when expanded for areas not surveyed). We recovered 14 coho carcasses. Scale readings indicated 12 were hatchery 3-year-old fish, one was a hatchery 4-year-old and two were of an undetermined origin. Two of the 3-year olds had a CWT verifying a Clearwater River release.

Juvenile Salmon Emigration

Fall Chinook

We estimate a minimum of 264 juvenile fall Chinook passed the trap in 2008, but we could not expand the trapping data because the holding box was damaged which allowed trapped fish to escape. We counted juvenile fall Chinook (BY07) at the smolt trap (Rkm 3.0) from 29 February through 26 June 2008, when the trap was pulled for the season (Gallinat and Ross, 2009). The median passage date of fall Chinook passing the trap was 7 May. We measured 248 fall Chinook. These fish ranged 27-100 mm in length. The average length was 67 mm with a median fork length of 39 mm. Forty-eight fish were both measured and weighed. The average length of this group was 69 mm with an average weight of 4.0 g and an average K-factor of 1.25. The median fork length, weight, and K-factors were 69 mm, 4.1 g, and 1.24, respectively.

Coho

Juvenile coho salmon were incidentally captured at the smolt trap. No mark-recapture trap efficiency estimates were done for coho in 2008. We estimate a minimum of 61 coho passed the smolt trap in 2008.

Juvenile coho were observed at the smolt trap from 6 March through 20 June. The median passage date of coho passing the smolt trap was 26 April. Fish ranged from 34-142 mm in length. Two age classes were observed with the majority (76.7%) of the fish being subyearlings (BY07). Subyearlings (n=46 fish) averaged 58 mm with a median fork length of 55 mm and yearlings (n=14) averaged 130 mm with a median fork length of 131 mm. We observed no fish exhibiting the morphology of a Chinook x coho hybrid.

Fall Chinook Run Size and Composition 2008

Returns to LFH

The estimated composition of fall Chinook trapped at LFH that were killed during spawning are listed in Table 41. The raw data prior to estimating composition of fish with lost tags or untagged fish with unreadable scale patterns are listed in Appendix J. Fish that were not needed for broodstock or monitoring and evaluation were released into the Snake River (see Hatchery Operations section). Some of those fish were detected during spawning surveys in the Tucannon, or at the LGR Adult trap, or were re-trapped and killed at LFH. The remaining fish are listed in Table 42 and are presumed to have remained in the Snake River, likely between LMO and LGR dams. None of those fish were reported to the Regional Mark Information System (RMIS) because they were live fish.

Because we do not systematically trap and mark fish trapped at LFH, we can neither estimate the full run size nor the composition of the run to LFH. So, we can only estimate the composition of fish trapped at LFH that are killed at LFH and then estimate the composition of fish hauled back to the Snake River that were in excess of broodstock needs. Since some of those fish are included in other estimates (run to LGR, run to the Tucannon River, and re-trapped and killed at LFH), they will not be included here. Rather we have estimated the numbers of fish that are not in those estimates that must have remained somewhere in the Snake River.

Table 41. Estimated composition of fall Chinook trapped at LFH and killed in 2008 by program and saltwater age.

Location	Minijacks[a]	True Jacks	True Jills	Adult F	Adult M	% of Total
Bonneville	0	1	0	21	11	1.7%
Umatilla	0	0	0	0	4	0.2%
LSRCP	698	617	75	405	166	98.1%
IPC	0	0	0	0	0	0%
NPTH	0	0	0	0	0	0%
Natural	0	0	0	0	0	0%
Total	**698**	**618**	**75**	**426**	**181**	**100%**

[a]Age determined by salt water age

Table 42. Estimated composition of fall Chinook trapped at LFH and released into the Snake River that are presumed to have remained in the reservoirs between LMO and LGR dams by program and saltwater age.

Program	Minijack	True Jack	True Jill	Adult F	Adult M	Total	% of total
LSRCP	85	444	15	81	181	806	97.1%
Bonneville				0	3	3	0.4%
Umatilla				0	4	4	0.5%
Umatilla/BONN				4	13	17	2.0%
Total	**85**	**444**	**15**	**85**	**201**	**830**	**100.0%**

[a] These fish are not accounted for in documented killed fish, the estimated Tucannon run or the estimated LGR run.

Returns to LGR Dam and Composition of Fish Hauled to LFH from LGR Dam

Fish hauled from LGR to LFH that were processed (killed) are listed in Appendix J. The run reconstruction to LGR Dam was not finalized at the time this report was printed so only CWT recoveries expanded for trapping rate and lost tags are presented in Appendix L and summarized by program and saltwater age in Table 43. Minijacks were subsampled (19% of total trapped) and all were identified as spring (10 fish) or summer Chinook (6 fish). Although one minijack with a VIE was noted as being sent to LFH, we were unable to identify the fish at spawning. Three fall Chinook minijacks (based on VIE presence) were trapped which expands to 23 fish.

Table 43. Estimated 2008 run composition of wire tagged fall Chinook to LGR Dam by salt water age.

	0 Salt	1 Salt		2-5 Salt				
Program	**Minijacks[a]**	**Jacks**	**Jills**	**Adult F**	**Adult M**	**Unknown Age M**	**Total**	**% of run**
Trinity River[b]	0.0	0.0	0	10.5	0.0	0.0	10.5	.04
Hanford Natural	0.0	0.0	0	0.0	8.8	0.0	8.8	.04
Bonneville	33.2	41.2	0	282.0	141.5	0.0	497.9	2.04
Umatilla	0.0	0.0	0	41.0	25.3	0.0	66.3	.27
Bonneville/Umatilla[c]	0.0	0.0	0	0.0	0.0	174.5	174.5	.71
Klickitat	0.0	0.0	0	14.6	0.0	0.0	14.6	.06
IPC	0.0	106.3.	8.4	174.1	368.6	0.0	657.3	2.69
NPTH	0.0	426.8	0	500.7	855.9	0.0	1,783.4	7.30
LSRCP	12,285.8	2,504.5	89.0	3,375.5	2,949.1	0.0	21,204.0	86.84
Total	**12,319.1**	**3,078.8**	**97.4**	**4,398.4**	**4,349.3**	**174.5**	**24,417.5**	**100%**

[a] There were no fall Chinook minijacks < 30cm trapped at LGR Dam in 2008

[b] Trinity River, California

[c] These were 09BLANK agency coded wire.

.

Chinook were counted visually 16 hours per day from April through October 31. Visual counts ended October 31. From November 1 through December 31 counts were from video tape recorded for 10 hours per day. Official Fall Chinook run ended December 15 (U.S. Army Corps of Engineers, 2008). Window counts estimated 16,628 adults and 10,228 jacks reached LGR Dam in 2008 (Figure 4). The Chinook passing LGR Dam after 17 August are designated as falls based on arrival date, which may be inaccurate because of the overlap between the fall and summer Chinook runs. In addition, fish counts do not adjust for fish less than 30 cm long nor do they adjust for fish that crossed the dam and fell back through the juvenile bypass system (fallback event) nor fish that re-crossed the dam after a fallback event (double counting).

Fallbacks

We documented a total of 2,843 fallback events during the fall Chinook. These fallback events were not expanded to account for sampling rates at the LGR juvenile bypass facility so the fallback estimate is a minimum. Fallbacks were documented from August-December at the juvenile smolt bypass facility, downstream of LGR (Fred Mensik, WDFW, and Mike Halter,

COE, personal communication). A description of the juvenile collection facility operation is provided in the 2007 section of this report. Of the fish captured and scanned for wire during juvenile sampling at LGR Dam, 99.0% of the males 30-50 cm were of hatchery origin (Table 44). The majority (82.8%) of the males between 30-50 cm and 38.6% of the males < 30 sampled had a left red elastomer tag indicating they originated from yearling releases downstream of LGR Dam at LFH. Since scales were not taken on the unmarked/untagged group we cannot determine their origin although we suspect that most are hatchery fish.

Table 44. Documented fallbacks of Chinook at the LGR juvenile collection facility in 2008 by clip, wire, and VIE.

Fin clip	Wire	VIE	Males < 30cm	Males 30-50cm	Grand Total
AD clip	No wire	LR		5	5
	Wire	LR	9	366	375
	No wire	No VIE	14	4	18
	Wire	No VIE	8	57	65
	NO DATA	NO DATA	1	76	77
No clip	No wire	LR		6	6
	Wire	LR	8	473	481
	No wire	No VIE	1	11	12
	Wire	No VIE	3	92	95
	NO DATA	NO DATA		99	99
NO DATA	NO DATA	NO DATA		297	297
Grand Total			**44**	**1,486**	**1,530**

Fish encountered at the separator were examined for size, fin clips, VIE tags, and operculum punches. We estimate at least 59.3% of the fish $\geq$ 53 cm sampled at the separator were of hatchery origin based solely on adipose clips and VIEs, but expect the rate is actually much greater (Table 45). The use of adipose clips as an indicator of hatchery origin is no longer a reliable method since many hatchery fish are being released into the Snake River basin without an associated fin clip. We estimate at least 83.0% of the males < 53 cm collected at the separator were of hatchery origin but the estimate may be as high as 98.2% if the composition of unclipped jacks without VIEs was similar to jacks sampled at the juvenile facility.

Table 45. Composition of fallbacks at the LGR Dam separator in 2008 by clip, VIE, and length.

Fin clip	VIE	< 53cm	$\geq$53Adults	No Data	Grand Total
AD clip	LPNK	18	6		24
	RPNK				
	LR	120	34		154
	No VIE	94	151		245
	No Data	165	133		298
No Clip	LPNK	19	3		22
	RPNK	1			1
	LR	106	15		121
	No VIE	78	150		228
	No Data	117	103		220
Grand Total		**718**	**595**		**1,313**

Status of Mitigation Requirements

Returns to the Project area

We estimate a minimum of 81.9% of the LSRCP mitigation goal (18,300 fish returning to the Snake River) was met in 2008 (Table 46). The preliminary estimate includes CWTs and associated untagged fish, PIT tagged fish, and untagged hatchery yearlings based on scales. Untagged hatchery subyearlings (based on scale analysis) that were left over after assigning untagged fish to CWT release groups were not included (2,700 fish), although some proportion should be assigned to LSRCP returns from untagged fish released from sites that were not associated with CWT groups. These estimates do not include in-basin returns from the IPC nor the NPTH programs. Updated mitigation estimates will be provided in a future annual report when the run reconstruction is finalized.

Table 46. Estimated number of LF/Snake River hatchery origin fall Chinook to the Snake River in 2008 contributing to LSRCP goals.

	Saltwater age						
	0 salt	1 salt		2-5 salt			
Location	Minijack[a]	True Jack[b]	True Jill[c]	Adult F	Adult M	Total (A+J)	% of LSRCP goal
LFH trapped and killed during processing	698	617	75	405	166	1,263	6.9%
Snake R between LMO and LGR dams[d]	85	445	15	81	181	722	3.9%
Run to Tucannon R[e]	151	84	25	277	92	478	2.6%
Run to LGR dam[f]	13,412	2,724	97	4,450	5,256	12,527	68.5%
Total	**14,346**	**3,870**	**212**	**5,213**	**5,695**	**14,990**	**81.9%**

[a] Minijacks are males that did not spend a year in salt water.

[b] Jacks are males that spent 1 year in salt water.

[c] Jills are females that spent 1 year in salt water.

[d] Fall Chinook returned to the Snake River that were not accounted for in other estimates.

[e] Estimated run to the Tucannon River.

[f] Estimated preliminary run to LGR Dam (includes wire tagged fish, untagged fish associated with wires, PIT tagged fish, and untagged yearlings based on scales, from fish hauled to LFH and NPTH for processing as well as fish released from the dam).

Recoveries outside of the Snake River Basin

To document where recoveries of LFH/Snake River hatchery fish occurred in 2008, we queried the RMIS database on 6 January 2010 for all tag recoveries (all tag statuses) of LSRCP released fish. Estimates of harvest for fish released by WDFW are listed in Table 47. Not included are recoveries of fish released by the NPT (LSRCP or NPTH programs), or ODFW and IDFG (IPC program).

We estimate that 3.3% of the harvest goal (commercial and sport fisheries) was met in 2008 by WDFW releases. Estimates of harvest of NPT fish that were part of the LSRCP mitigation were not available at the time of this report, although they will be documented by the NPT in a future report. These estimates include fish that were tagged as well as untagged fish estimated in the following sections.

The majority of harvest occurred in the ocean (73%) off the coast of British Columbia and Washington. Commercial fisheries (Tribal and non-Tribal) consisted of 68% of the total take estimated for fresh and saltwater. LF/Snake River hatchery fall Chinook have a high fidelity to the Snake River. Of the fish recovered in freshwater outside of the Snake River, approximately 2.1% of the fish were recovered at hatcheries, 0.7% during carcass surveys, and 0.2% were recovered in Oregon freshwater sport fisheries.

Table 47. Estimated recoveries of tagged and untagged fall Chinook outside of the Snake River Basin in 2008 for WDFW releases.

Water body	Area	Fishery	RMIS ESTD	Total
Freshwater	COL	Columbia River Gillnet Zone1-5	145	229
		Columbia River Gillnet Zone6	171	262
		Columbia River Sport (below BONN)	61	61
		Estuary Sport	80	81
		Hatchery (Priest Rapids)	1	1
		Other Oregon Hatcheries (CTUIR brood ponds)	8	12
		Spawning Ground (Hanford Reach)	4	4
	OR	Freshwater Sport (Illinois R/Rogue R)	1	1
Ocean	AK	Traditional Troll	30	43
	BC	Sport	258	351
		Troll-Freezer Boat	112	123
		Troll-Ice Boat	407	429
	COL	Marine Sport	38	38
	HS	At-Sea Hake Midwater Trawl Bycatch	13	13
	OR	Ocean Sport	9	13
		Ocean Troll	103	178
	WA	Marine Sport	209	220
		Treaty Drift Gillnet	1	1
		Treaty Troll	233	246
		Troll (Non-treaty)	97	101
		Total	1,982	2,409

Total Mitigation Level

During 2008, and estimated 19.0% of the total mitigation goal of 91,500 fish was met. Additional harvest of fish released as part of the FCAP releases also occurred but were not included in this report. The harvest estimate of fish released from FCAP sites will be presented by the NPT.

Conclusions and Recommendations

The fall Chinook program at LFH requires substantial coordination. The program is currently being managed to meet the requests of Tribal, state, and federal co-managers. Conclusions and recommendations listed below are not prioritized.

1. Estimating harvest of LSRCP produced fish using RMIS has proven challenging. Reported catch is being incorrectly estimated for some fisheries based on differing catch accounting of clipped and unclipped fish, and often underestimates total harvest.

   Recommendation: Continue double index tag releases of yearlings. This allows us to proof the reporting of catch to RMIS by using CSV downloads to compare detection methods and reported take of adipose fin clipped and non-clipped fall Chinook with CWTs.

   Recommendation: Adjust any recoveries according to sampling method, detection method, and fishery to fully expand the catch to include untagged fish.

   Recommendation: Adjust harvest estimates for years prior to 2006 to fully estimate the mitigation levels attained.

2. The release of unmarked/untagged fish into the Snake River may be causing us to underestimate escapement of fish associated with LSRCP mitigation. The absence of CWTs in these fish forces us to depend upon scale analysis to differentiate in-basin (LSRCP or IPC) from out-of-basin fish. CWT expansions do not fully explain all of the fish determined to be hatchery by scale analysis. Possible explanations for these discrepancies are; scale determinations are incorrect for hatchery and wild fish, there is a high degree of shedding of CWTs post release, we are not sampling a large enough part of the run, or the subsample of the run taken at LGR Dam is not truly random for the numbers of wire tagged fish passing the dam.

   Recommendation: Tag or mark 100% of the LSRCP releases so returns can be accurately estimated.

   Recommendation: Continue to collect scales on untagged fish to determine the age at return.

   Recommendation: If tagging cannot occur at 100%, continue to have each release site tagged for M & E purposes and also otolith mark 100% of the groups to determine if there is additional CWT loss occurring in the release groups. Otolith marks can be applied with unique marks for the hatchery and release year. Compare the total number of CWTs of a single aged return to the % CWTs in the releases for that brood year. If the ratio of tagged to untagged returns by age decreases then we will be able to determine the percent of CWTs that were shed in that brood year.

Literature Cited

Bugert, R., G. Mendel, and P. Seidel. 1996. Lower Snake River Compensation Plan, Survival of Subyearling and Yearling Fall Chinook Salmon Released at Lyons Ferry Hatchery or Barged Downstream. Washington Department of Fish and Wildlife Hatcheries Report # H96-08 to U.S. Fish and Wildlife Service, Boise, ID.

Busack, C. The impact of repeat spawning of males on effective number of breeders in hatchery operations. Aquaculture (2007), doi:10.1016/j.aquaculture.2007.03.027

Connor, W. P., H. L. Burge, R. Waitt, and T. C. Bjornn. 2002. Juvenile life history of wild fall Chinook salmon in the Snake and Clearwater Rivers. North American Journal of Fisheries Management 22: 703-712.

Connor, W. P., J. G. Sneva, K.F. Tiffan, R. K. Steinhorst, and D. Ross. 2005. Two alternative juvenile life history types for fall Chinook salmon in the Snake River basin. Transactions of the American Fisheries Society 134:291-304.

Gallinat, M. P., and L.A. Ross. 2006. Tucannon River Spring Chinook Salmon Hatchery Evaluation Program, 2005 Annual Report. Washington Department of Fish and Wildlife Fish Program Report # FPA06-09 to U. S. Fish and Wildlife Service, Boise, ID.

Gallinat, M. P., and L.A. Ross. 2007. Tucannon River Spring Chinook Salmon Hatchery Evaluation Program, 2006 Annual Report, Draft. Washington Department of Fish and Wildlife Fish Program Report to U. S. Fish and Wildlife Service, Boise, ID.

Gallinat, M. P., and L.A. Ross. 2009. Tucannon River Spring Chinook Salmon Hatchery Evaluation Program, 2008 Annual Report, Draft. Washington Department of Fish and Wildlife Fish Program Report to U. S. Fish and Wildlife Service, Boise, ID.

Garcia, A. P., S. Bradbury, B. D. Arnsberg, S. J. Rocklage, and P. A. Groves. 2005. Fall Chinook salmon spawning ground surveys in the Snake River basin upriver of Lower Granite Dam, 2004. 2004 Annual Report to Bonneville Power Administration. Project number 1998-010-03. Contract 98-AI-37776, Portland, Oregon.

Mendel, G., D. Milks, M. Clizer, and R. Bugert. 1993. Upstream passage and spawning of fall Chinook salmon in the Snake River. In Blankenship and Mendel, editors. Upstream passage, spawning, and stock identification in the Snake River, 1992. Project 92-046. Annual report to Bonneville Power Administration, Portland, OR.

Mendel, G., K. Petersen, R. Bugert, D. Milks, L. Ross, J. Dedloff, and J. Bumgarner. 1994. Lower Snake River Compensation Plan, Lyons Ferry Hatchery Evaluation Program, fall Chinook salmon, 1992 annual report. Report # AFF1/LSR-93-09 to U.S. Fish and Wildlife Service, Boise, ID.

Milks, D., M. Varney, J. Jording, and M. Schuck. 2006. Lyons Ferry Hatchery Evaluation Fall Chinook Salmon Annual Report: 2003 and 2004. Washington Department of Fish and Wildlife, Olympia, WA. Report #FPA 06-07.

Milks, D., M. Varney, J. Jording, and M. Schuck. 2007. Lyons Ferry Hatchery Evaluation Fall Chinook Salmon Annual Report: 2005. Washington Department of Fish and Wildlife, Olympia, WA. Report #FPA 07-04.

NMFS. 1993. Biological Opinion for 1993 Hatchery Operations in the Columbia River Basin.

U.S. Army Corps of Engineers. 1975. Special report: Lower Snake River Fish and Wildlife Compensation Plan. Walla Walla, WA.

U.S. Army Corps of Engineers. 2005. Annual fish passage report, 2005. Columbia River and Snake River projects for salmon, steelhead, and shad, Draft. North Pacific Division, Walla Walla, WA.

WDF (Washington Department of Fisheries). 1994. Lower Snake River Compensation Plan, Snake River Hatchery Evaluation Program five-year plan 1994-1998. Washington Department of Fisheries, Olympia, WA.

Appendix A: Fall Chinook Run to LFH, IHR, LMO, and LGR Dams: 2004-2008

(Numbers of fall Chinook observed at Snake River Dams and numbers of fall Chinook trapped and processed at LFH. LGR trapped fish that were processed at LFH are listed under LGR Dam data with COE window counts).

Appendix A Table 1. Numbers of Chinook processed at LFH, estimated escapement to the Tucannon River and window counts at Ice Harbor, Lower Monumental, and Lower Granite dams, 2004-2008.

		Daytime Counts				Night Video[a]				Totals[b]	
		Through October		Nov and Dec		Through Oct		Nov and Dec			
Year	Location	Adults	Jacks	Adults	Jacks	Adults	Jacks	Adults	Jacks	Adults	Jacks
2004	IHR Dam	21,109	11,167	nc[c]	nc	nc	nc	nc	nc	21,109	11,167
	LOMO Dam	19,812	5,921	114	30	nc	nc	nc	nc	19,926	5,951
	LFH									2,863	506
	Tucannon R.									345	0
	LGR Dam	14,560	7,478	400	122	nc	nc	nc	nc	14,960	7,600
2005	IHR Dam	14,677	4,561	nc	nc	nc	nc	nc	nc	14,677	4,561
	LOMO Dam	13,137	3,051	nc	nc	nc	nc	nc	nc	13,137	3,051
	LFH									2,240	473
	Tucannon R.									181	20
	LGR Dam	11,137	3,183	57	53	nc	nc	nc	nc	11,194	3,236
2006	IHR Dam	10,272	6,835	nc	nc	nc	nc	nc	nc	10,272	6,835
	LOMO Dam	11,127	8,769	nc	nc	nc	nc	nc	nc	11,127	8,769
	LFH									1,534	427
	Tucannon R.									386	88
	LGR Dam	7,974	6,551	74	170	nc	nc	nc	nc	8,048	6,721
2007	IHR Dam	13,408	9,743	nc	nc	nc	nc	nc	nc	13,408	9,743
	LOMO Dam	16,073	8,834	nc	nc	nc	nc	nc	nc	16,073	8,834
	LFH									2,697	347
	Tucannon R.									263	63
	LGR Dam	10,050	9,710	147	72	4[c]	2[c]	nc	nc	10,201	9,784
2008	IHR Dam	21,907	11,544	nc	nc	nc	nc	nc	nc	21,907	11,544
	LOMO Dam	20,923	10,465	nc	nc	nc	nc	nc	nc	20,923	10,465
	LFH									1,208	792
	Tucannon R.									486	277
	LGR Dam	16,443	10,076	185	152	nc	nc	nc	nc	16,628	10,228

[a] Night counts occurred during 18-31 August.
[b] Total from LFH consist of killed fish that were identified at processing as LFH trapped.
[c] No counts (nc) were completed at the dam during that time of year.

Appendix B: *Trapping and Sampling Protocols at LGR Adult Trap for 2007 & 2008*

2007 Fall Chinook Trapping/Sampling Protocol
17 Aug 2007

Executive summary:

The tagging/sampling protocol for broodstock shipped to LFH and NPTH will be the same.

Basics: Scan all FCH for wire and PIT tags. Any fish hauled to LFH or NPTH must be given 1-ROP punch. If you release a fish give it 1-LOP and take scales. Scales should also be taken on 67% of the unmarked/untagged fish hauled to LFH or NPTH.

Note: NO WIRE TAGGED FISH SHOULD BE PASSED UPSTREAM.

Data collected from spring/summer Chinook should be put on the same form that is used for FCH. Please note Spring or Summer under comments.

Protocol:

1) COLLECT & HAUL: All wire tagged FCH adults and jacks (31-52cm). Please give 1-ROP punch.

2) COLLECT & HAUL: All unmarked/untagged adult FCH. Please give 1-ROP punch and take scales from two out of every three of these fish.

3) PASS: All unmarked/untagged FCH jacks, give 1-LOP punch, and take scales.

4) COLLECT & HAUL: All AD Only (no wire) adult FCH, give 1-ROP punch.

5) PASS: All AD Only (no wire) jack FCH, give 1-LOP punch, and take scales.

6) PASS: All mini-jacks (30cm or less), give 1-LOP punch, and take scales.

More detailed information regarding trapping/sampling:

1) Trapping at LGR Dam
    a. Trapping/Sampling Protocol based upon water temperature in the ladder at the beginning of the day.
        i. Begin trapping August 18 if temperatures allow
        ii. Water temps at or below 70^{o} F
            1. Set automatic trapping gates to sample 20% (still waiting for authorization from NOAA and COE) of the entire run, 24 hours a day
                a. Any fish that are retained for broodstock must receive 1-ROP. If a fish to be retained is accidentally punched on the left side, give 1-ROP also and make a note in the comments column.

b. Any fish released must receive 1-LOP and be scale sampled. Place scales in an envelope for age and origin determinations. If these fish are caught again DO NOT scale sample, but enter in data as recapture.

b. Data and Verification
   i. Please note the times you check the trap and when the trap is empty (you are caught up).
   ii. Please write hauling destination (LFH or NPTH) on top of each data form)
   iii. Circle sampling or data recording errors and briefly note in comments column (examples: released with 1-ROP, forgot to scale sample, both sides punched, forgot to record or missing digit in PIT Tag, sample envelope numbers either out of numerical order or skipped for some reason).
   iv. Briefly check over data forms prior to faxing, sometimes erasures and cross-outs are not transmitted clearly through the fax machine.

c. Hauling of broodstock
   i. Injections at LGR Adult Trap
      1. All fish collected for broodstock (both LFH and NPTH) will be injected as directed by hatchery staff.
   ii. WDFW and NPT will haul fish from LGR Dam (70% go to LFH and 30% go to NPTH).
      1. Fish will be divided weekly unless otherwise agreed to.
      2. It was agreed that trucks would be at LGR at 10am when the 70 degree protocol was in effect.

d. Research
      1. U of I radio tagged fish. Haul all radio tagged fish to LFH or NPT. DO NOT PULL RADIO!!! (we are still waiting to hear about what the UofI is doing for 2007)
         a. These fish will be used as broodstock at LFH or NPTH.
      2. NOAA sort-by-code fish.
         a. These fish will be used as broodstock at LFH and NPTH.
         b. Doug Marsh will run a program to indicate which fish were trapped during the 20% and which fish were outside of the trapping period (sort-by-code)

e. Coordination of trapping data and CWT decoding of hauled fish
   i. Fax paper copy of data to LFH, NPT, and SRL daily or whenever fish are hauled.
   ii. Data entry, verification, and finalization by January 14.
      1. WDFW will enter, verify, and finalize the LGR Adult Trap trapping data.
   iii. All database files at season's end must be sent to NPT (Bill Arnsberg), WDFW (Debbie Milks), and TAC (Stuart Ellis and Henry Yuen).

f. Video monitoring of sort-by-code fish

g.

i. All sort-by-code fish will be video-taped and summarized by Ken McIntyre
ii. A copy of the video and summary will be sent to Debbie Milks so a copy is available for TACs estimating the run comp at LGR

2007 Fall Chinook Trapping/Sampling Protocol
14 Sept 2007

Executive summary:

The tagging/sampling protocol for broodstock shipped to LFH and NPTH will be the same.

Basics: Scan all FCH for wire and PIT tags. Any fish hauled to LFH or NPTH must be given 1-ROP punch. If you release a fish give it 1-LOP and take scales. Scales should also be taken on 67% of the unmarked/untagged fish hauled to LFH or NPTH.

Note: NO WIRE TAGGED FISH SHOULD BE PASSED UPSTREAM.

Data collected from spring/summer Chinook should be put on the same form that is used for FCH. Please note Spring or Summer under comments.

Protocol:

1) COLLECT & HAUL: All wire tagged FCH adults and jacks (31-52cm). Please give 1-ROP punch.

2) COLLECT & HAUL: All unmarked/untagged adult FCH. Please give 1-ROP punch and take scales from two out of every three of these fish.

3) PASS: All unmarked/untagged FCH jacks, give 1-LOP punch, and take scales.

4) COLLECT & HAUL: All AD Only (no wire) adult FCH, give 1-ROP punch.

5) PASS: All AD Only (no wire) jack FCH, give 1-LOP punch, and take scales.

6) PASS: All mini-jacks (30cm or less), give 1-LOP punch, and take scales.

More detailed information regarding trapping/sampling:

1) Trapping at LGR Dam
    h. Trapping/Sampling Protocol based upon water temperature in the ladder at the beginning of the day.
        i. Begin trapping August 18 if temperatures allow
        ii. Water temps at or below 70^{o} F
            1. Set automatic trapping gates to sample 20% of the entire run, 24 hours a day
                a. Any fish that are retained for broodstock must receive 1-ROP. If a fish to be retained is accidentally punched on the left side, give 1-ROP also and make a note in the comments column.
                b. Any fish released must receive 1-LOP and be scale sampled. Place scales in an envelope for age and origin

determinations. If these fish are caught again DO NOT scale sample, but enter in data as recapture.

i. Data and Verification
    i. Please note the times you check the trap and when the trap is empty (you are caught up).
    ii. Please write hauling destination (LFH or NPTH) on top of each data form)
    iii. Circle sampling or data recording errors and briefly note in comments column (examples: released with 1-ROP, forgot to scale sample, both sides punched, forgot to record or missing digit in PIT Tag, sample envelope numbers either out of numerical order or skipped for some reason).
    iv. Briefly check over data forms prior to faxing, sometimes erasures and cross-outs are not transmitted clearly through the fax machine.

j. Hauling of broodstock
    i. Injections at LGR Adult Trap
        1. All fish collected for broodstock (both LFH and NPTH) will be injected as directed by hatchery staff.
    ii. WDFW and NPT will haul fish from LGR Dam (70% go to LFH and 30% go to NPTH).
        1. Fish will be divided weekly unless otherwise agreed to.
        2. It was agreed that trucks would be at LGR at 10am when the 70 degree protocol was in effect.

k. Research
        1. U of I radio tagged fish. Haul all radio tagged fish to LFH or NPT. DO NOT PULL RADIO!!! (we are still waiting to hear about what the UofI is doing for 2007)
            a. These fish will be used as broodstock at LFH or NPTH.
        2. NOAA sort-by-code fish.
            a. These fish will be used as broodstock at LFH and NPTH.
            b. Doug Marsh will run a program to indicate which fish were trapped during the 20% and which fish were outside of the trapping period (sort-by-code)

l. Coordination of trapping data and CWT decoding of hauled fish
    i. Fax paper copy of data to LFH, NPT, and SRL daily or whenever fish are hauled.
    ii. Data entry, verification, and finalization by January 14.
        1. WDFW will enter, verify, and finalize the LGR Adult Trap trapping data.
    iii. All database files at season's end must be sent to NPT (Bill Arnsberg), WDFW (Debbie Milks), and TAC (Stuart Ellis and Henry Yuen).

m. Video monitoring of sort-by-code fish
    i. All sort-by-code fish will be video-taped and summarized by Ken McIntyre

ii. A copy of the video and summary will be sent to Debbie Milks so a copy is available for TACs estimating the run comp at LGR

2007 Fall Chinook Trapping/Sampling Protocol
3 Oct 2007

Executive summary:

The tagging/sampling protocol for broodstock shipped to LFH and NPTH will be the same.

Basics: Scan all FCH for wire and PIT tags. Any fish hauled to LFH or NPTH must be given 1-ROP punch. If you release a fish give it 1-LOP and take scales. Scales should also be taken on 67% of the unmarked/untagged fish hauled to LFH or NPTH.

Note: NO WIRE TAGGED FISH SHOULD BE PASSED UPSTREAM.

Data collected from spring/summer Chinook should be put on the same form that is used for FCH. Please note Spring or Summer under comments.

Protocol:

1) COLLECT & HAUL: All wire tagged FCH adults and jacks (31-52cm). Please give 1-ROP punch.

2) COLLECT & HAUL: All unmarked/untagged adult FCH. Please give 1-ROP punch and take scales from two out of every three of these fish.

3) PASS: All unmarked/untagged FCH jacks, give 1-LOP punch, and take scales.

4) COLLECT & HAUL: All AD Only (no wire) adult FCH, give 1-ROP punch.

5) PASS: All AD Only (no wire) jack FCH, give 1-LOP punch, and take scales.

6) PASS: All mini-jacks (30cm or less), give 1-LOP punch, and take scales.

More detailed information regarding trapping/sampling:

1) Trapping at LGR Dam
    n. Trapping/Sampling Protocol based upon water temperature in the ladder at the beginning of the day.
        i. Begin trapping August 18 if temperatures allow
        ii. Water temps at or below 70^{o} F
            1. Set automatic trapping gates to sample 20% of the entire run, 24 hours a day
                a. Any fish that are retained for broodstock must receive 1-ROP. If a fish to be retained is accidentally punched on the left side, give 1-ROP also and make a note in the comments column.
                b. Any fish released must receive 1-LOP and be scale sampled. Place scales in an envelope for age and origin

determinations. If these fish are caught again DO NOT scale sample, but enter in data as recapture.

o. Data and Verification
    i. Please note the times you check the trap and when the trap is empty (you are caught up).
    ii. Please write hauling destination (LFH or NPTH) on top of each data form)
    iii. Circle sampling or data recording errors and briefly note in comments column (examples: released with 1-ROP, forgot to scale sample, both sides punched, forgot to record or missing digit in PIT Tag, sample envelope numbers either out of numerical order or skipped for some reason).
    iv. Briefly check over data forms prior to faxing, sometimes erasures and cross-outs are not transmitted clearly through the fax machine.

p. Hauling of broodstock
    i. Injections at LGR Adult Trap
        1. All fish collected for broodstock (both LFH and NPTH) will be injected as directed by hatchery staff.
    ii. WDFW and NPT will haul fish from LGR Dam (70% go to LFH and 30% go to NPTH).
        1. Fish will be divided weekly unless otherwise agreed to.
        2. It was agreed that trucks would be at LGR at 10am when the 70 degree protocol was in effect.

q. Research
        1. There will not be any U of I radio tagged fish this season.
        2. NOAA sort-by-code fish.
            a. These fish will be used as broodstock at LFH and NPTH.
            b. Doug Marsh will run a program to indicate which fish were trapped during the 20% and which fish were outside of the trapping period (sort-by-code)

r. Coordination of trapping data and CWT decoding of hauled fish
    i. Fax paper copy of data to LFH, NPT, and SRL daily or whenever fish are hauled.
    ii. Data entry, verification, and finalization by January 14.
        1. WDFW will enter, verify, and finalize the LGR Adult Trap trapping data.
    iii. All database files at season's end must be sent to NPT (Bill Arnsberg), WDFW (Debbie Milks), and TAC (Stuart Ellis and Henry Yuen).

s. Video monitoring of sort-by-code fish
    i. All sort-by-code fish will be video-taped and summarized by Ken McIntyre
    ii. A copy of the video and summary will be sent to Debbie Milks so a copy is available for TACs estimating the run comp at LGR

2007 Fall Chinook Trapping/Sampling Protocol
4 Oct 2007

Executive summary:

The tagging/sampling protocol for broodstock shipped to LFH and NPTH will be the same.

Basics: Scan all FCH for wire and PIT tags. Any fish hauled to LFH or NPTH must be given 1-ROP punch. If you release a fish give it 1-LOP and take scales. Scales should also be taken on 67% of the unmarked/untagged fish hauled to LFH or NPTH.

Note: NO WIRE TAGGED FISH SHOULD BE PASSED UPSTREAM.

Data collected from spring/summer Chinook should be put on the same form that is used for FCH. Please note Spring or Summer under comments.

Protocol:
ON THE DATA FORM, PLEASE NOTE WHEN YOU BEGAN USING THIS MODIFIED PROTOCOL!!!!

REVISION: JACKS ARE NOW 56-31 cm!!!! ADULTS are AT LEAST 57 cm!!!

1) COLLECT & HAUL: All wire tagged FCH adults and jacks (31-56 cm). Please give 1-ROP punch.

2) COLLECT & HAUL: REVISION: RETAIN ALL unmarked/untagged FEMALES and EVERY THIRD unmarked/untagged MALE. Take scales on every other unmarked/untagged fish hauled to LFH.

3) PASS: All unmarked/untagged FCH jacks (31-56 cm), give 1-LOP punch, and take scales. REVISION: Also PASS two out of three unmarked/untagged Males. Give 1-LOP punch and take scales.

4) COLLECT & HAUL: All AD Only (no wire) adult FCH, give 1-ROP punch.

5) PASS: All AD Only (no wire) jack (31-56 cm) FCH, give 1-LOP punch, and take scales.

6) PASS: All mini-jacks (30cm or less), give 1-LOP punch, and take scales.

More detailed information regarding trapping/sampling:

1) Trapping at LGR Dam
    t. Trapping/Sampling Protocol based upon water temperature in the ladder at the beginning of the day.
        i. Begin trapping August 18 if temperatures allow
        ii. Water temps at or below 70^{o} F

1. Set automatic trapping gates to sample 20% of the entire run, 24 hours a day
    a. Any fish that are retained for broodstock must receive 1-ROP. If a fish to be retained is accidentally punched on the left side, give 1-ROP also and make a note in the comments column.
    b. Any fish released must receive 1-LOP and be scale sampled. Place scales in an envelope for age and origin determinations. If these fish are caught again DO NOT scale sample, but enter in data as recapture.

u. Data and Verification
    i. Please note the times you check the trap and when the trap is empty (you are caught up).
    ii. Please write hauling destination (LFH or NPTH) on top of each data form)
    iii. Circle sampling or data recording errors and briefly note in comments column (examples: released with 1-ROP, forgot to scale sample, both sides punched, forgot to record or missing digit in PIT Tag, sample envelope numbers either out of numerical order or skipped for some reason).
    iv. Briefly check over data forms prior to faxing, sometimes erasures and cross-outs are not transmitted clearly through the fax machine.

v. Hauling of broodstock
    i. Injections at LGR Adult Trap
        1. All fish collected for broodstock (both LFH and NPTH) will be injected as directed by hatchery staff.
    ii. WDFW and NPT will haul fish from LGR Dam (70% go to LFH and 30% go to NPTH).
        1. Fish will be divided weekly unless otherwise agreed to.
        2. It was agreed that trucks would be at LGR at 10am when the 70 degree protocol was in effect.

w. Research
        1. There will not be any U of I radio tagged fish this season.
        2. NOAA sort-by-code fish.
            a. These fish will be used as broodstock at LFH and NPTH.
            b. Doug Marsh will run a program to indicate which fish were trapped during the 20% and which fish were outside of the trapping period (sort-by-code)

x. Coordination of trapping data and CWT decoding of hauled fish
    i. Fax paper copy of data to LFH, NPT, and SRL daily or whenever fish are hauled.
    ii. Data entry, verification, and finalization by January 14.
        1. WDFW will enter, verify, and finalize the LGR Adult Trap trapping data.

iii. All database files at season's end must be sent to NPT (Bill Arnsberg), WDFW (Debbie Milks), and TAC (Stuart Ellis and Henry Yuen).

y. Video monitoring of sort-by-code fish
   i. All sort-by-code fish will be video-taped and summarized by Ken McIntyre
   ii. A copy of the video and summary will be sent to Debbie Milks so a copy is available for TACs estimating the run comp at LGR

2008 Fall Chinook Trapping/Sampling Protocol
15 Aug 2008

Executive summary:

The tagging/sampling protocol for broodstock shipped to LFH and NPTH will be the same.

Basics: Scan all FCH for wire and PIT tags. Any fish hauled to LFH or NPTH must be given 1-ROP punch. If you release a fish give it 1-LOP and take scales. Scales should also be taken on 67% (2 out of 3) of the unmarked/untagged fish hauled to LFH or NPTH.

Note: ALL WIRE TAGGED FISH > 31 cm SHOULD BE HAULED TO LFH or NPTH.

Data collected from spring/summer Chinook should be put on the same form that is used for FCH. Please note Spring or Summer under comments.

Protocol:

Jack and Male criteria: JACKS ARE 56-31 cm, MALES are AT LEAST 57 cm fork length
Females: We have verified females as small as 49 cm during processing.
ALL FEMALES ARE TO BE HAULED REGARDLESS OF SIZE!

1) COLLECT & HAUL: All wire tagged FCH adults and jacks. Please give 1-ROP punch.

2) COLLECT & HAUL: ALL unmarked/untagged FEMALES and unmarked/untagged MALES >56 cm. Take scales on two out of three unmarked/untagged fish hauled to LFH.

3) PASS: All unmarked/untagged FCH jacks, give 1-LOP punch, and take scales.

4) COLLECT & HAUL: All AD Only (no wire) adult FCH, give 1-ROP punch.

5) PASS: All AD Only (no wire) jack FCH, give 1-LOP punch, and take scales.

6) PASS: All mini-jacks (30cm or less), give 1-LOP punch, and take scales.

More detailed information regarding trapping/sampling:

2) Trapping at LGR Dam
    a. Trapping/Sampling Protocol based upon water temperature in the ladder at the beginning of the day.
        i. Begin trapping August 18 if temperatures allow
        ii. Water temps at or below 70^{o} F
            1. Set automatic trapping gates to sample 20% of the entire run, 24 hours a day

a. Any fish that are retained for broodstock must receive 1-ROP. If a fish to be retained is accidentally punched on the left side, give 1-ROP also and make a note in the comments column.
b. Any fish released must receive 1-LOP and be scale sampled. Place scales in an envelope for age and origin determinations. If these fish are caught again DO NOT scale sample, but enter in data as recapture.

b. Data and Verification
   i. Please note the times you check the trap and when the trap is empty (you are caught up).
   ii. Please write hauling destination (LFH or NPTH) on top of each data form)
   iii. Circle sampling or data recording errors and briefly note in comments column (examples: released with 1-ROP, forgot to scale sample, both sides punched, forgot to record or missing digit in PIT Tag, sample envelope numbers either out of numerical order or skipped for some reason).
   iv. Briefly check over data forms prior to faxing, sometimes erasures and cross-outs are not transmitted clearly through the fax machine.

c. Hauling of broodstock
   i. Injections at LGR Adult Trap
      1. All fish collected for broodstock (both LFH and NPTH) will be injected as directed by hatchery staff.
   ii. WDFW and NPT will haul fish from LGR Dam (70% go to LFH and 30% go to NPTH).
      1. Fish will be divided weekly unless otherwise agreed to.
      2. It was agreed that trucks would be at LGR at 10am when the 70 degree protocol was in effect.

d. Research
   1. The U of I radio tagged fish trapped during the 20% will be hauled or released based on criteria in the above protocol. Keep the radio in the fish even if it is hauled.
      a. Radio tagged fish did not have wires or PIT tags prior to Radio tagging the fish. As a secondary mark the UofI is also PIT tagging each radio tagged fish.
   2. NOAA sort-by-code fish.
      a. These fish will be used as broodstock at LFH and NPTH.
      b. Doug Marsh will run a program to indicate which fish were trapped during the 20% and which fish were outside of the trapping period (sort-by-code)

e. Coordination of trapping data and CWT decoding of hauled fish
   i. Fax paper copy of data to LFH, NPT, and SRL daily or whenever fish are hauled.
   ii. Data entry, verification, and finalization by January 14.

1. WDFW will enter, verify, and finalize the LGR Adult Trap trapping data.

iii. All database files at season's end must be sent to NPT (Bill Arnsberg), WDFW (Debbie Milks), and TAC (Stuart Ellis and Henry Yuen).

f. Video monitoring of sort-by-code fish
   i. No video monitoring in 2008
   ii. At season's end Doug Marsh will let us know what the realized trap rate was for the season (set at 20% then adjusted for time gates left open for s-by-c fish)

2008 Fall Chinook Trapping/Sampling Protocol
12 Sept 2008

Executive summary:

The tagging/sampling protocol for broodstock shipped to LFH and NPTH will be the same.

TRAPPING RATE WILL BE CHANGED TO 12% AT THE END OF THE DAY

Basics: Scan all FCH for wire and PIT tags. Any fish hauled to LFH or NPTH must be given 2-ROP punches. If you release a fish give it 1-LOP and take scales. Scales should also be taken on 100% of the unmarked/untagged fish hauled to LFH or NPTH.

Note: ALL WIRE TAGGED FISH > 31 cm SHOULD BE HAULED TO LFH or NPTH.

Data collected from spring/summer Chinook should be put on the same form that is used for FCH. Please note Spring or Summer under comments.

Protocol:

Jack and Male criteria: JACKS ARE 56-31 cm, MALES are AT LEAST 57 cm fork length
Females: We have verified females as small as 49 cm during processing.
ALL FEMALES ARE TO BE HAULED REGARDLESS OF SIZE!

7) COLLECT & HAUL: All wire tagged FCH adults and jacks. Please give 2-ROP punches.

8) COLLECT & HAUL: ALL unmarked/untagged FEMALES and unmarked/untagged MALES >56 cm. Take scales on 100% of the unmarked/untagged fish hauled to LFH.

9) PASS: All unmarked/untagged FCH jacks, give 1-LOP punch, and take scales.

10) COLLECT & HAUL: All AD Only (no wire) adult FCH, give 2-ROP punches.

11) PASS: All AD Only (no wire) jack FCH, give 1-LOP punch, and take scales.

12) PASS: All mini-jacks (30cm or less), give 1-LOP punch, and take scales.

13) RECAPTURES: Give an additional left operculum punch to each fish recaptured (will result in 2-LOP)

More detailed information regarding trapping/sampling:

3) Trapping at LGR Dam
    a. Trapping/Sampling Protocol based upon water temperature in the ladder at the beginning of the day.

i. Begin trapping August 18 if temperatures allow
ii. Water temps at or below 70^{o} F
    1. Set automatic trapping gates to sample 20% of the entire run, 24 hours a day
        a. Any fish that are retained for broodstock must receive 1-ROP. If a fish to be retained is accidentally punched on the left side, give 1-ROP also and make a note in the comments column.
        b. Any fish released must receive 1-LOP and be scale sampled. Place scales in an envelope for age and origin determinations. If these fish are caught again DO NOT scale sample, but enter in data as recapture.

b. Data and Verification
    i. Please note the times you check the trap and when the trap is empty (you are caught up).
    ii. Please write hauling destination (LFH or NPTH) on top of each data form)
    iii. Circle sampling or data recording errors and briefly note in comments column (examples: released with 1-ROP, forgot to scale sample, both sides punched, forgot to record or missing digit in PIT Tag, sample envelope numbers either out of numerical order or skipped for some reason).
    iv. Briefly check over data forms prior to faxing, sometimes erasures and cross-outs are not transmitted clearly through the fax machine.

c. Hauling of broodstock
    i. Injections at LGR Adult Trap
        1. All fish collected for broodstock (both LFH and NPTH) will be injected as directed by hatchery staff.
    ii. WDFW and NPT will haul fish from LGR Dam (70% go to LFH and 30% go to NPTH).
        1. Fish will be divided weekly unless otherwise agreed to.
        2. It was agreed that trucks would be at LGR at 10am when the 70 degree protocol was in effect.

d. Research
        1. The U of I radio tagged fish trapped during the 20% will be hauled or released based on criteria in the above protocol. Keep the radio in the fish even if it is hauled.
            a. Radio tagged fish did not have wires or PIT tags prior to Radio tagging the fish. As a secondary mark the UofI is also PIT tagging each radio tagged fish.
        2. NOAA sort-by-code fish.
            a. These fish will be used as broodstock at LFH and NPTH.
            b. Doug Marsh will run a program to indicate which fish were trapped during the 20% and which fish were outside of the trapping period (sort-by-code)

e. Coordination of trapping data and CWT decoding of hauled fish
    i. Fax paper copy of data to LFH, NPT, and SRL daily or whenever fish are hauled.
    ii. Data entry, verification, and finalization by January 14.
        1. WDFW will enter, verify, and finalize the LGR Adult Trap trapping data.
    iii. All database files at season's end must be sent to NPT (Bill Arnsberg), WDFW (Debbie Milks), and TAC (Stuart Ellis and Henry Yuen).
f. Video monitoring of sort-by-code fish
    i. No video monitoring in 2008
    ii. At season's end Doug Marsh will let us know what the realized trap rate was for the season (set at 20% then adjusted for time gates left open for s-by-c fish)

2008 Fall Chinook Trapping/Sampling Protocol
26 Sept 2008

Executive summary:

The tagging/sampling protocol for broodstock shipped to LFH and NPTH will be the same.

1)TRAPPING RATE WILL BE CHANGED TO 10% AT THE END OF THE DAY
2) Subsample CWT jack fall Chinook, keep 1 pass 2, or keep 1 and pass 1
3) If still swamped shut down trap for an hour or so but clearly identify in the data when the trap was shut down and when it was started up again. Do not shut down and stay shut down for the rest of the day because we need to have a pre and post shut down sample so we can average them to estimate what passed during the shutdown. (7/16/09 DM the trap was not shut down during the year, only if they needed to flush the trap)

Basics: Scan all FCH for wire and PIT tags. Any fish hauled to LFH or NPTH must be given 3-ROP punches. If you release a fish give it 1-LOP and take scales. Scales should also be taken on 100% of the unmarked/untagged fish hauled to LFH or NPTH.

Note: ALL WIRE TAGGED FISH > 31 cm SHOULD BE HAULED TO LFH or NPTH.

Data collected from spring/summer Chinook should be put on the same form that is used for FCH. Please note Spring or Summer under comments.

Protocol:

Jack and Male criteria: JACKS ARE 56-31 cm, MALES are AT LEAST 57 cm fork length
Females: We have verified females as small as 49 cm during processing.
ALL FEMALES ARE TO BE HAULED REGARDLESS OF SIZE!

1) COLLECT & HAUL: All <u>wire tagged</u> FCH adults and 1 out of 3 <u>wire tagged</u> jacks. Please give 3-ROP punches. For the <u>wire tagged</u> jacks you PASS give 1-LOP, and take scales if you have time.

2) COLLECT & HAUL: ALL unmarked/untagged FEMALES and unmarked/untagged MALES >56 cm. Take scales on 100% of the unmarked/untagged fish hauled to LFH.

3) PASS: All <u>unmarked/untagged</u> FCH <u>jacks</u>, give 1-LOP punch, and take scales.

4) COLLECT & HAUL: All <u>AD Only (no wire)</u> adult FCH, give 3-ROP punches.

5) PASS: All AD Only (no wire) jack FCH, give 1-LOP punch, and take scales.

6) PASS: All mini-jacks (30cm or less), give 1-LOP punch, and take scales.

7) RECAPTURES: Give an additional left operculum punch to each fish recaptured (will result in 2-LOP)

More detailed information regarding initial trapping/sampling protocols:

4) Trapping at LGR Dam
    a. Trapping/Sampling Protocol based upon water temperature in the ladder at the beginning of the day.
        i. Begin trapping August 18 if temperatures allow
        ii. Water temps at or below 70^{o} F
            1. Set automatic trapping gates to sample 20% of the entire run, 24 hours a day
                a. Any fish that are retained for broodstock must receive 1-ROP. If a fish to be retained is accidentally punched on the left side, give 1-ROP also and make a note in the comments column.
                b. Any fish released must receive 1-LOP and be scale sampled. Place scales in an envelope for age and origin determinations. If these fish are caught again DO NOT scale sample, but enter in data as recapture.

    b. Data and Verification
        i. Please note the times you check the trap and when the trap is empty (you are caught up).
        ii. Please write hauling destination (LFH or NPTH) on top of each data form)
        iii. Circle sampling or data recording errors and briefly note in comments column (examples: released with 1-ROP, forgot to scale sample, both sides punched, forgot to record or missing digit in PIT Tag, sample envelope numbers either out of numerical order or skipped for some reason).
        iv. Briefly check over data forms prior to faxing, sometimes erasures and cross-outs are not transmitted clearly through the fax machine.

    c. Hauling of broodstock
        i. Injections at LGR Adult Trap
            1. All fish collected for broodstock (both LFH and NPTH) will be injected as directed by hatchery staff.
        ii. WDFW and NPT will haul fish from LGR Dam (70% go to LFH and 30% go to NPTH).
            1. Fish will be divided weekly unless otherwise agreed to.
            2. It was agreed that trucks would be at LGR at 10am when the 70 degree protocol was in effect.
    d. Research
            1. The U of I radio tagged fish trapped during the 20% will be hauled or released based on criteria in the above protocol. Keep the radio in the fish even if it is hauled.

a. Radio tagged fish did not have wires or PIT tags prior to Radio tagging the fish. As a secondary mark the UofI is also PIT tagging each radio tagged fish.

2. NOAA sort-by-code fish.
    a. These fish will be used as broodstock at LFH and NPTH.
    b. Doug Marsh will run a program to indicate which fish were trapped during the 20% and which fish were outside of the trapping period (sort-by-code)

e. Coordination of trapping data and CWT decoding of hauled fish
    i. Fax paper copy of data to LFH, NPT, and SRL daily or whenever fish are hauled.
    ii. Data entry, verification, and finalization by January 14.
        1. WDFW will enter, verify, and finalize the LGR Adult Trap trapping data.
    iii. All database files at season's end must be sent to NPT (Bill Arnsberg), WDFW (Debbie Milks), and TAC (Stuart Ellis and Henry Yuen).

f. Video monitoring of sort-by-code fish
    i. No video monitoring in 2008
    ii. At season's end Doug Marsh will let us know what the realized trap rate was for the season (set at 20% then adjusted for time gates left open for s-by-c fish)

Appendix C: Systematic Sampling Rates at Lower Granite Dam 2003-2008

Appendix C.: Dates, times, and trapping rates of fall Chinook at Lower Granite Adult trap, 2003-2008.

Year	Date opened trap	Trapping rate (%)	Date trap closed	Date/time trapping rate changed	Modified trapping rate (%)	Date trapping rate changed	Modified trapping rate (%)	Date Trap Closed
2003	9 Sept	11	-		nc[a]		nc	19 Nov
2004	2 Sept	15	3&5 Sept[b]	10 Sept	13		nc	22 Nov
2005	6 Sept	13			nc		nc	20 Nov
2006	1 Sept	13			nc		nc	21 Nov
2007	1 Sept	20			nc		nc	20 Nov
2008	24 Aug 8:00am[c]	20		12 Sept 2:52pm	12	26 Sept 3:00pm	10	21 Nov

[a] No change (nc) was made to the trapping rate.Trap was closed down for two hours each day.
[b] Trap was closed down for two hours each day.
[c] Trap was operated between 8am-8:30, then 12:30-12:55, then 2:20-3:02 on 24 Aug due to water temperature restrictions. Full operation began 25 August.

Appendix D: Trapping and Sorting Protocol at Lyons Ferry Hatchery 2007 and 2008

2007 Trapping Protocol at LFH

Begin trapping the first week of September.

Adults:
->56 cm
-Trap and retain all adults
Jacks:
-31-56 cm
-As of 10/5/07 trap 20 jacks/week
(target ~300 total)
Mini-Jacks:
-less than 31 cm
-Trap 20 fish weekly (~200 total).
-Kill outright since facility cannot retain fish of this small of size.

2007 Sorting Plan

10/9/07 work the LGR Pond first
-2 truckloads of unmarked/untagged Males and jacks to Chief Timothy (above LGR)
Load 75 unmarked/untagged males (57 cm or greater)
Load 105 unmarked/untagged jacks (less than 57 cm)
(Total load is 90 fish/ truck)
Sampling:
Scan for PIT tags
-if PIT tagged
-DO NOT scale sample (unless the fish is on our list)
-Measure and give a TC clip
-if NOT PIT tagged
scale sample, measure, give a TC clip
Kill wire tagged jacks <46cm long
-Take all data (ln, clip, vi, PIT tag)
scale sample 1 in 3 NOVIE wire tagged fish

We will use LGR trapping data to estimate # of females so we won't need a tally by sex

10/10/07 Count females, males (> 56 cm), jacks (45-56 cm), and small jacks (<45cm)
-We are dividing jacks by fork length because spawning protocol says we will not use jacks less than 45 cm in matings. We are also trying to figure out the % of small jacks in the jack estimate of what was trapped.

2008 Trapping Protocol at LFH

Begin trapping the first week of September.

Adults:
->56 cm
-Trap and retain all adults
Jacks:
-31-56 cm
-As of 10/5/07 trap 20 jacks/week
(target ~300 total)
Mini-Jacks:
-less than 31 cm
-Trap 20 fish weekly (~200 total).
-Kill outright since facility cannot retain fish of this small of size.

2008 Sorting Plan

LGR pond: work the LGR Pond first

We will use LGR trapping data to estimate # of females so we won't need a tally by sex

(Note: we should have counted females b/c we ended up with many more females during spawning than was estimated using trap data)

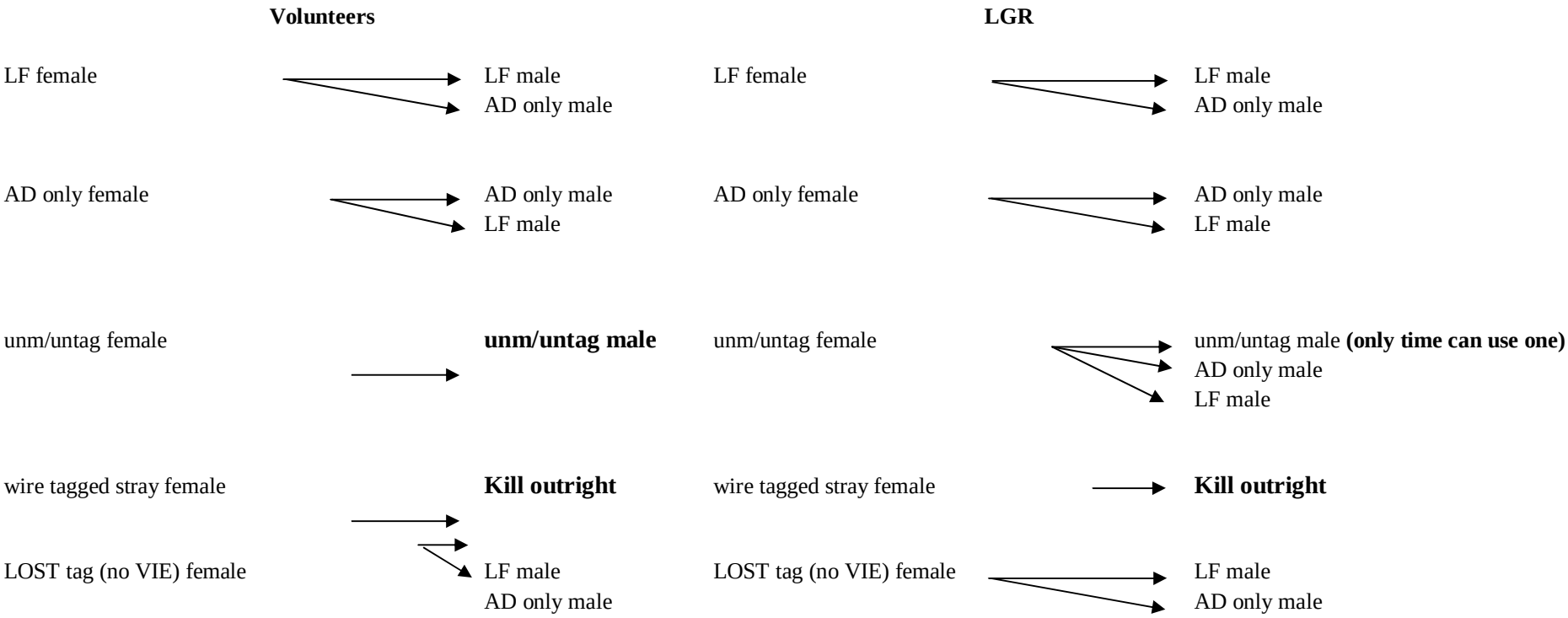
LFH pond: Count females, males (> 56 cm), jacks (45-56 cm), and small jacks (<45 cm)
-We are dividing jacks by fork length because spawning protocol says we will not use jacks less than 45cm in matings. We are also trying to figure out the % of small jacks in the jack estimate of what was trapped.

Appendix E: *2007 and 2008 Spawning Protocol for Mixing of Gametes*

Appendix E. 2007 and 2008 Spawning Protocol for mixing of gametes.

2007 and 2008

Mixing of gametes at spawning



Incorporate jacks in broodstock up to 15%.
Split each LF male (not jacks) and hold to use for LGR day.

Incorporate jacks in broodstock up to 15%
Reuse LF origin males as last resort.
Use wild origin males based on PIT tag data.

Appendix F: *United States v. Oregon* Production and Marking Table

Appendix F. Table B4 in Interim Management Agreement for Upriver Chinook, Sockeye, Steelhead, Coho, and White Sturgeon. Snake River fall Chinook production for Brood Years 2005-2007 for the Lower Snake River Compensation Program (LSRCP) at Lyons Ferry Hatchery, the Fall Chinook Acclimation Program (FCAP), the Idaho Power Program (IPC) and the Nez Perce Tribal Hatchery (NPTH).[1]

Production Priority	Rearing Facility [2]	Release Number	Release Location	Life stage	Mark
Tier One assumes rearing of 2.2 million subyearlings at Lyons Ferry Hatchery and 1.0 million eggs for IPC program.[7]					
1	Lyons Ferry	450,000	On-station	yearling	225K CWT, AD, VIE 225K CWT, VIE
2	Lyons Ferry	450,000	Pittsburg Landing Captain John Rapids Big Canyon	yearling	Each Group: 70K CWT, AD 80K CWT
3	Lyons Ferry	200,000	On-station	subyearling	200K CWT, AD
4	Lyons Ferry	1,000,000	Big Canyon Captain John Rapids	subyearling	Each Group: 100K CWT, AD 100K CWT
5	IPC [2] (Oxbow)	200,000	Pittsburg Landing Hells Canyon Dam if Priority # 13 is in effect	subyearling	200K CWT, AD
6	IPC (Umatilla)	200,000	Hells Canyon Dam	subyearling	200K CWT, AD
7	IPC (Umatilla)	200,000	Pittsburg Landing Hells Canyon Dam if Priority # 13 is in effect	subyearling	200K CWT, AD if released at Pittsburg and #5 reared at Oxbow 200K AD only if released at Hells Canyon Dam, combine with # 6 if reared at Umatilla
8	Lyons Ferry	400,000 [5]	Direct release @ Captain John Rapids	subyearling	200K CWT, AD
9	Lyons Ferry	200,000	Grande Ronde	subyearling	200K CWT, AD
10	IPC (Umatilla)	400,000	Hells Canyon Dam	subyearling	400K AD
11	Lyons Ferry	100,000	Grande Ronde	subyearling	None, combine with # 9
12	Lyons Ferry	300,000	Grande Ronde And/or Captain John Rapids	subyearling	None if released at Grande Ronde, combine with # 9&11 200K CWT, AD if released at Captain John Rapids
Tier Two assumes rearing of up to 2.6 million subyearlings at Lyons Ferry Hatchery[6,7]					
13	Lyons Ferry	400,000 [3]	Pittsburg Landing	subyearling	100K CWT, AD 100K CWT Combine with # 4
NPTH tier [7]					
1	NPTH	1,000,000	On-station North Lapwai Valley	subyearling	Each Group: 100K CWT, AD 200K CWT
2	NPTH	400,000 [4]	Cedar Flats Luke's Gulch	subyearling	Each Group: 100K CWT, AD 100K CWT
Subtotal Snake Basin		**5,900,000**			

Footnotes for Table B4:

1. Bonneville Power Administration directly or indirectly funds all programs except the IPC program.
2. IPC program may be implemented at IPC Oxbow Hatchery and/or other hatcheries, such as Umatilla Hatchery. Priority 5 production may be implemented at Oxbow Hatchery and, priorities 6, 7 and 10 production may be implemented at Umatilla Hatchery if broodstock shortage limits full implementation of Tier 1.
3. These would replace subyearlings released by IPC under priorities 5 and 7, and all IPC releases would occur at Hells Canyon Dam. These will be combined with the Priority # 4 Big Canyon and Captain John marking groups for harvest evaluation.
4. Early spawning component of NPTH program.
5. Split into two release groups at two locations of 200K each depending on final study design. If so, they will have appropriate tags and AD clips for evaluation of the study.
6. The parties acknowledge that facilities improvements will be required to achieve all the releases in Tier 2.
7. For Broodstock collected at Lower Granite Dam, the parties will determine annually the broodstock collection protocol.

Appendix G: LFH/Snake River Origin Fall Chinook Releases Brood Years: 2002-2006

Appendix G. LFH/Snake River hatchery origin fall Chinook releases with number marked, tagged, and unmarked by release year and type.

Release Year	S/Y[b]	Brood Year	Release Location-Type	Release Date	CWT Code	Number of Fish Released[a]				FPP	VIE Mark	% VIE	PIT Tagged[c]
						AD+CWT	CWT Only	Ad Clip Only	No AD or CWT				
2003	S	2002	BC1-direct	03 Jun	610122	-	193,255	-	313,233	94.5			
2003	S	2002	CJ1-volitional	28 May	610121	-	196,068	-	316,617	81.3			
2003	S	2002	CJ1-volitional	12 Jun	612654	-	186,937	-	104,465	74.4			
2003	S	2002	LFH-direct	06 Jun	631545	193,848	4,517	1,727	-	50.0			
2003	S	2002	NLV1-volitional	28-31 May	610109	-	77,855	-	9,862	61.3			
2003	S	2002	NLV1-volitional	28-31 May	612657	-	72,009	-	9,146	61.3			
2003	S	2002	NLV1-volitional	28-31 May	612648	-	9,303	-	1,178	61.3			
2003	S	2002	NLV1-volitional	28-31 May	612649	-	9,259	-	1,172	61.3			
2003	S	2002	NPTH1-volitional	02-04 Jun	610107	-	193,643	-	5,989	38.2			
2003	S	2002	NPTH2-volitional	19-20 Jun	610110	-	97,932	-	17,032	81.4			
2003	S	2002	PL1-direct	04 Jun	610123	-	189,782	-	200,401	129.6			
2003	S	2002	Snake R. at Roosters Landing-direct	04 Mar	no CWT	-	-	-	33,500	1200			
2003	S	2002	Snake R. at Couse Cr. boat launch-direct	09 Jun	631391	96,073	2,631	1,315	-	40.4			
2003	S	2002	Snake R. below HC Dam-Oxbow hatchery- IPC direct	22 May	no CWT	-	-	199,246	-	46.6			10,000
2003	S	2002	Snake R. below HC Dam-Umatilla hatchery-–IPC direct	15-16 May	no CWT	-	-	332,226	-	41.4			3,000
2003	S	2002	Research – near Couse Creek - direct	28 Mar-05 Jun	no CWT	-	-	53,583	-				53,583
2004	Y	2002	LFH-direct	12-14 Apr	632167	425,316	2,397	18,376	266	9.9	LR	90.4	
2004	Y	2002	PL1-direct	12-13 Apr	612502	143,257	1,488	186	186	9.9	RG	81.9	
2004	Y	2002	CJ1-volitional	02-07 Apr	612503	150,569	192	-	-	9.1	LB	86.0	
2004	Y	2002	BC1-direct	14-15 Apr	612659	106,657	270	-	-	9.4	LG	91.3	
2004	S	2003	LFH-direct in evening	21 Jun	631786	195,046	2,209	4,279	-	51.1			
2004	S	2003	BC1-direct	03 Jun	612500	-	198,190	-	275,366	79.6			
2004	S	2003	CJ1-volitional	29 May-01 Jun	612600	-	192,649	-	308,090	55.3			
2004	S	2003	PL2-direct	31 May	no CWT	-	-	-	197,687	48.2			2,496
2004	S	2003	PL1-Oxbow hatchery-IPC-direct	24 May	106973	35,760	-	1,106	-	54.3			
2004	S	2003	PL1-Oxbow hatchery-IPC-direct	24 May	107976	63,711	-	1,971	-	54.3			
2004	S	2003	PL1-Oxbow hatchery-IPC-direct	24 May	108076	61,004	-	1,886	-	54.3			
2004	S	2003	Snake R. below HC Dam-Oxbow hatchery-IPC direct	28 May	no CWT	-	-	9,957	-	48.0			9,957

Appendix G. LFH/Snake River hatchery origin fall Chinook releases with number marked, tagged, and unmarked by release year and type.

Release Year	S/Y[b]	Brood Year	Release Location-Type	Release Date	CWT Code	Number of Fish Released[a]				FPP	VIE Mark	% VIE	PIT Tagged[c]
						AD+CWT	CWT Only	Ad Clip Only	No AD or CWT				
2004	S	2003	NPTH1-direct	04-11 Jun	612675	-	163,830	-	5,766	55.2			
2005	Y	2003	PL1-direct	13-14 Apr	610146	-	79,281	-	1,126	9.9			
2005	Y	2003	PL1-direct	13-14 Apr	610149	69,598	420	279	2	9.9			
2005	Y	2003	BC1-direct	04-05 Apr	610145	-	72,589	-	1,938	10.4			
2005	Y	2003	BC1-direct	04-05 Apr	610147	63,039	253	1,683	7	10.4			
2005	Y	2003	LFH-direct	28-30 Mar	631769	213,142	4,565	240	-	9.4	LR	83.4	
2005	Y	2003	LFH-direct	28-30 Mar	631770	-	218,150	-	623	9.4	LR	84.1	
2005	Y	2003	LFH-direct	28-30 Mar	632368	16,365	33	82	-	9.4	LR	86.7	
2005	S	2004	BC1-direct	30-31 May	612504	96,630	98,657	1,377	313,562	55.3			
2005	S	2004	CJ1 Acclimated [vs. CC]-volitional	28-31 May	610154	94,164	87,888	9,015	314,020	46.8			
2005	S	2004	Snake R. below HC Dam-Oxbow hatchery-IPC-direct	28 April	106676	53,548		4,726		61.5			3,098
2005	S	2004	Snake R. below HC Dam-Oxbow hatchery-IPC-direct	28 April	109370	21,094		1,861		61.5			1,209
2005	S	2004	Snake R. below HC Dam-Oxbow hatchery-IPC-direct	28 April	100471	20,578		1,816		61.5			1,180
2005	S	2004	Snake R. below HC Dam-Oxbow hatchery-IPC-direct	28 April	106776	54,047		4,769		61.5			3,098
2005	S	2004	Snake R. below HC Dam-Oxbow hatchery-IPC-direct	28 April	107176	24,709		2,180		61.5			1,416
2005	S	2004	PL1-Umatilla hatchery-IPC-direct	25-26 May	073336	211,302	-	186,402	-	50.4			2,492
2005	S	2004	Snake R. below HC Dam-Umatilla hatchery-IPC-direct	8-12 May	no CWT	-	-	394,055	-	63.0			
2005	S	2004	NPTH1-volitional	17 May	612669 612672	106,079	140,171	-	115,326	120.8			
2005	S	2004	NPTH1-volitional	17 May	610108 612670	101,580	194,334	-	154,046	115.3			
2005	S	2004	NPTH1-volitional	17 May	no CWT	-	-	-	57,764	110.0			
2005	S	2004	Research Transport Study (NOAA)-direct			-	-	-	-	-			
2005	S	2004	Couse Creek Direct [vs. CJ1 Accl.]-direct	26 May	610155	183,401	1,937	14,853	-	49.2			1,550

Appendix G. LFH/Snake River hatchery origin fall Chinook releases with number marked, tagged, and unmarked by release year and type.

Release Year	S/Y[b]	Brood Year	Release Location-Type	Release Date	CWT Code	Number of Fish Released[a]				FPP	VIE Mark	% VIE	PIT Tagged[c]
						AD+CWT	CWT Only	Ad Clip Only	No AD or CWT				
2005	S	2004	Snake R. at Couse Creek boat launch-direct	23 May	no CWT	-	-	-	234,030	59.0			
2005	S	2004	Grande Ronde R. -direct	25 May	632782	191,868	610	8,050	244	56.0			
2005	S	2004	Grande Ronde R. unmarked-direct	24 May	no CWT	-	-	-	281,688	66.0			
2005	S	2004	LFH-direct	27 May	632787	195,367	934	3,870	-	51.0			1,498
2006	Y	2004	LFH-direct	5-10 April	633283	223,151	1,489	213	-	9.8	LR	92.5	
2006	Y	2004	LFH-direct	5-10 April	633284	-	220,952	-	4,195	10.3	LR	89.6	
2006	Y	2004	PL1-direct	05 April	610150	66,987	-	2,516	-	10.3			2,320
2006	Y	2004	PL1-direct	05 April	610153	-	77,644	-	2,410	10.3			2,673
2006	Y	2004	BC1-direct	12-13 April	610148	66,732	-	1,965	-	9.3			2,642
2006	Y	2004	BC1-direct	12-13 April	610144	-	59,465	-	1,636	9.3			2,394
2006	Y	2004	CJ1-volitional	11-14 April	610151	70,185	-	490	-	8.9			2,284
2006	Y	2004	CJ1-volitional	11-14 April	610152	-	78,156	-	2,291	8.9			2,600
2006	S	2005	Snake R. below HC Dam-Oxbow hatchery-IPC-direct	02 May	109477	66,879	-	1,091	-	80.3			12,084
2006	S	2005	Snake R. below HC Dam-Oxbow hatchery-IPC-direct	02 May	109577	68,040	-	1,110	-	80.3			
2006	S	2005	Snake R. below HC Dam-Oxbow hatchery-IPC-direct	02 May	108977	41,257	-	673	-	80.3			
2006	S	2005	Snake R. below HC Dam-Umatilla hatchery-IPC-direct	09-10 May	none	-	-	330,172	1,993	80.3			23,969
2006	S	2005	PL1-Umatilla hatchery-IPC-direct	22-24 May	094419	185,413	-	211,654	-	52.5			24,162
2006	S	2005	CJ1-volitional	25-29 May	610177	-	99,366	-	306,594	45.6			2,792
2006	S	2005	CJ1-volitional	25-29 May	610176	98,699	-	2,313	-	45.6			695
2006	S	2005	BC1-direct	25-26 May	610175	-	98,994	-	304,613	56.7			46,698
2006	S	2005	BC1-direct	25-26 May	610174	97,763	-	3,336	-	56.7			11,697
2006	S	2005	Couse Creek Direct [vs. CJ1 Accl. Study]	30-31 May	633583	195,701	262	4,463	394	55.6			11,995
2006	S	2005	Couse Creek Direct (late release)	22 June	610178	207,606	1,076	2,153	673	50.0			10,872
2006	S	2005	LFH-direct (accidental release)	04 April	none	-	-	-	71,000	181.0			
2006	S	2005	LFH-direct	01 June	633582	200,369	789	789	263	52.3			12,095
2006	S	2005	GRR Direct	19-21 June	633584	196,630	335	3,467	208,733	50.6			25,357
2006	S	2005	Research Transport Study (NOAA)-Snake River Release-direct	10 May-03 Jun		-	-	-	229,097	115.0			229,063

Appendix G. LFH/Snake River hatchery origin fall Chinook releases with number marked, tagged, and unmarked by release year and type.

Release Year	S/Y[b]	Brood Year	Release Location-Type	Release Date	CWT Code	Number of Fish Released[a]				FPP	VIE Mark	% VIE	PIT Tagged[c]
						AD+CWT	CWT Only	Ad Clip Only	No AD or CWT				
2006	S	2005	Research Transport Study (NOAA) BC1-direct	19 Jun-09 July		-	-	-	150,374	83.0			109,506
2006	S	2005	NPTH-North Lapwai Valley Accl.	17 May	612707	-	98,670	-	1,148	72.3			
2006	S	2005	NPTH-North Lapwai Valley Accl.	17 May	612671	99,438	-	490	-	72.3			
2006	S	2005	NPTH-Site 1705	6-15 June	612709	-	197,659	-	134,787	59.0			2,314
2006	S	2005	NPTH-Site 1705	6-15 June	612698	99,163	-	488	-	59.0	-		693
2006	S	2005	NPTH-Cedar Flats Accl.	13 June	612653		16,077	-	187	32.9			3,145
2006	S	2005	NPTH-Cedar Flats Accl.	13 June	612660	-	9,401	-	109	32.9			1,839
2006	S	2005	NPTH-Lukes Gulch Accl.	13 June	612655	-	25,099	-	292	36.6			4,971
2007	Y	2005	LFH-direct	2-6 April	633598	226,442	-	1,805	24,143	11.0	LR	87.8	
2007	Y	2005	LFH-direct	2-6 April	633597	-	220,825	5,489	24,457	10.1	LR	85.5	
2007	Y	2005	PL1-direct	16-17 April	612505	64,106	-	128	2,291	10.0			2,252
2007	Y	2005	PL1-direct	16-17 April	612510		72,805	-	476	10.0			2,481
2007	Y	2005	PL1-direct	16-17 April	612661	6,863	-	-	14	10.0			233
2007	Y	2005	BC1-direct	18-19 April	612507	67,891	-	-	-	10.0			2,128
2007	Y	2005	BC1-direct	18-19 April	612508	-	77,220	-	10,369	10.0			2,746
2007	Y	2005	CJ1-volitional	13 April	612506	69,180	-	112	9,911	10.0			1,996
2007	Y	2005	CJ1-volitional	13 April	612509	-	78,588	-	708	10.0			1,999
2007	S	2006	LFH-direct	23 May	633986	191,436	1,810	6,000	571	61.3			
2007	S	2006	LFH-Unassociated	23 May	633986				875	103.0			
2007	S	2006	PL1-	26 May	612732	97,668		1,117		50.0			712
2007	S	2006	PL1-	26 May	612731	98,046			1,122	50.0			714
2007	S	2006	PL1-Unassociated	26 May	none				202,971	56.3			1,463
2007	S	2006	CJ1	29 May	612727	99,017		1,456		50.0			565
2007	S	2006	CJ1	29 May	612728		99,212		1,459	50.0			566
2007	S	2006	CJ1-Unassociated	29 May	none				313,339	50.0			1,761
2007	S	2006	BC1	28-29 May	612729	98,546		789		50.0			567
2007	S	2006	BC1	28-29 May	612730		100,103		2,013	50.0			583
2007	S	2006	BC1-Unassociated	28-29 May	none				305,255	50.0			1,741
2007	S	2006	Snake R. below HC Dam-Oxbow hatchery-IPC-direct	08 May	101273	114,584		9,955		55.0			9,954
2007	S	2006	Snake R. below HC Dam-Oxbow hatchery-IPC-direct	08 May	104480	114,584		9,955		55.0			9,954
2007	S	2006	Snake R. below HC Dam-Oxbow hatchery-IPC-direct	08 May	103880	114,584		9,955		55.0			9,954

Appendix G. LFH/Snake River hatchery origin fall Chinook releases with number marked, tagged, and unmarked by release year and type.

Release Year	S/Y[b]	Brood Year	Release Location-Type	Release Date	CWT Code	Number of Fish Released[a]				FPP	VIE Mark	% VIE	PIT Tagged[c]
						AD+CWT	CWT Only	Ad Clip Only	No AD or CWT				
2007	S	2006	NPTH-Site 1705	11-15 June	612699	98,947		665		37.9			627
2007	S	2006	NPTH-Site 1705	11-15 June	612696		194,988		196,824	37.9			2,468
2007	S	2006	NPTH-North Lapwai Valley Accl.	22-23 May	612710	100,303	194,988	674	17,916	50.9			3,090
2007	S	2006	NPTH-Lukes Gulch Accl.	4 June	612733		24,906		49	37.2			3,093
2007	S	2006	NPTH-Cedar Flats Accl.	11 June	612734		24,890		98	47.3			3,100
2008	Y	2006	LFH	7-10 April	633987	231,534	456	1,673		10.3	LR	93.4	14,972
2008	Y	2006	LFH	7-10 April	634092		220,350		5621	10.1	LR	89.5	14,972
2008	Y	2006	CJ1	14 April	612511	69,056		768		8.4			8,597
2008	Y	2006	CJ2	14 April	612514		82,934		922	8.4			10,324
2008	Y	2006	BC1	15 April	612513	68,199		880		9.3			8,794
2008	Y	2006	BC1	15 April	612516		77,749		1,004	9.3			10,324
2008	Y	2006	PL1	14 April	612512	68,129		343		9.8			8,426
2008	Y	2006	PL1	14 April	612515		81,476		409	9.8			10,076
2008	S	2007	LFH	02 June	634672	194,723	2,270	3,606	134	48.7			
2008	S	2007	Couse Creek Direct [vs. CJ1 Accl. Study]	28 May	634671	195,058	2,794	2,129	30,420	59.1			16,054
2008	S	2007	CJ1	28 May	612518	98,282		1,647		65.0			7,630
2008	S	2007	CJ1	28 May	612521		98,734		314,082	65.0			31,522
2008	S	2007	BC1	26 May	612517	98,903		676		55.0			7,517
2008	S	2007	BC1	26 May	612520		99,367		321,089	55.0			31,740
2008	S	2007	PL1	27 May	612519	99,371		395		60.0			7,896
2008	S	2007	PL1	27 May	612522		99,802		202,639	60.0			23,938
2008	S	2007	GRR Direct	29 May	634670		190,424		112,846	46.2			25,745
2008	S	2007	NPTH-Cedar Flats Accl.	12 June	612736		99,641		653	59.3			8,275
2008	S	2007	NPTH-Lukes Gulch Accl.	11 June	612737		99,456		912	46.0			8,332
2008	S	2007	NPTH-North Lapwai Valley Accl.	15 May	612694	98,251	69,725	378	269	73.4			3,059
2008	S	2007	NPTH-Site 1705-Irrigon	10-15 June	612695		149,162		1,368	50.7			928
2008	S	2007	NPTH-Site 1705	10-15 June	612716	100,665		388	244,354	50.7			2,131
2008	S	2007	Snake R. below HC Dam-Oxbow hatchery-IPC-direct	06 May	107171	23,141		2,023	388	51.4			2,022
2008	S	2007	Snake R. below HC Dam-Oxbow hatchery-IPC-direct	06 May	103680	56,662		4,953	951	51.4			4,952
2008	S	2007	Snake R. below HC Dam-Oxbow hatchery-IPC-direct	06 May	107502	55,837		4,881	937	51.4			4,880

Appendix G. LFH/Snake River hatchery origin fall Chinook releases with number marked, tagged, and unmarked by release year and type.

Release Year	S/Y[b]	Brood Year	Release Location-Type	Release Date	CWT Code	Number of Fish Released[a]				FPP	VIE Mark	% VIE	PIT Tagged[c]
						AD+CWT	CWT Only	Ad Clip Only	No AD or CWT				
2008	S	2007	Snake R. below HC Dam-Oxbow hatchery-IPC-direct	06 May	107271	23,442		2,049	393	51.4			2,048
2008	S	2007	Snake R. below HC Dam-Oxbow hatchery-IPC-direct	06 May	104381	17,917		1,566	301	51.4			1,566
2008	S	2007	Snake R. below HC Dam-Umatilla hatchery-IPC-direct	22 May	090136	223,250		547,100		44.0			64,533
2009	Y	2007	LFH	06-08 April	634680	220,723	424	5,935	283	9.2	LR	92.2	13,390
2009	Y	2007	LFH	06-08 April	634681		221,493		1,757	9.2	LR	91.8	13,395
2009	Y	2007	CJ1	03 April	612752	70,325		854		9.1			9,467
2009	Y	2007	CJ2	03 April	612755		66,821		2,784	9.1			9,257
2009	Y	2007	BC1	15 April	612750	72,770		146		10.6			8,769
2009	Y	2007	BC1	15 April	612753		80,783		651	10.6			9,793
2009	Y	2007	PL1	14 April	612751	71,169				9.5			8,846
2009	Y	2007	PL1	14 April	612754		78,673		2,433	9.5			10,082
2009	S	2008	LFH	02 June	634995	191,407	823	8,230	235	51.7			1,509
2009	S	2008	Couse Creek Direct [vs. CJ1 Accl. Study]	26 May	634996	187,434	488	11,967	855	46.5			13,740
2009	S	2008	GRR Direct-Extras	02-03 June	612676	165,146	1,191	6,024	9,039	50.0			
2009	S	2008	CJ1	26 May	610180	100,383				57.0			2,645
2009	S	2008	CJ1	26 May	610183	99,521			325,006	57.0			11,186
2009	S	2008	BC1	26 May	610179	100,093				62.5			2,901
2009	S	2008	BC1	26 May	610182		99,332		275,443	62.5			10,862
2009	S	2008	PL1	24 May	610181	95,227		5,012		59.3			3,320
2009	S	2008	PL1	24 May	610184		99,727		216,025	59.3			10,457
2009	S	2008	GRR Direct	28-29 May	634997	193,275	535	7,892	239,348	67.1			27,764
2009	S	2008	NPTH-Cedar Flats Accl.	09 June	612760		100,760		1,202	59.7			7,104
2009	S	2008	NPTH-Cedar Flats Accl.	09 June	612761	95,840		2,296		59.7			6,838
2009	S	2008	NPTH-Lukes Gulch Accl.	10 June	612762		98,025		11,008	51.6			7,276
2009	S	2008	NPTH-Lukes Gulch Accl.	10 June	612763	98,486		2,359		51.6			6,730
2009	S	2008	NPTH-Lapwai Valley Accl.	15 May	612766		182,328		213,149	85.3			2,381
2009	S	2008	NPTH-Lapwai Valley Accl.	15 May	612738	97,751		2,341		85.3			602
2009	S	2008	NPTH-Site 1705	08 June	612739	90,953		27,725		51.5			559
2009	S	2008	NPTH-Site 1705	08 June	612697		181,522		328,615	51.5			2,404

Appendix G. LFH/Snake River hatchery origin fall Chinook releases with number marked, tagged, and unmarked by release year and type.

Release Year	S/Y[b]	Brood Year	Release Location-Type	Release Date	CWT Code	Number of Fish Released[a]				FPP	VIE Mark	% VIE	PIT Tagged[c]
						AD+CWT	CWT Only	Ad Clip Only	No AD or CWT				
2009	S	2008	Snake R. below HC Dam-Oxbow hatchery-IPC-direct	08 May	107582	53,095		16,465		54.7			5,090
2009	S	2008	Snake R. below HC Dam-Oxbow hatchery-IPC-direct	08May	107682	66,322				54.7			4,854
2009	S	2008	Snake R. below HC Dam-Oxbow hatchery-IPC-direct	08 May	107482	66,957				54.7			4,900
2009	S	2008	Snake R. below HC Dam-Umatilla hatchery-IPC-direct	12 May	090228	232,772		570,713		60.2			55,488

a Numbers presented do not necessarily match hatchery records for fish per pound because of reporting constraints for the hatchery. Release information for some NPT release sites that had multiple CWT codes was estimated by WDFW based upon proportions of fish at tagging since those data were not available at the time this report was printed.

[b] S/Y indicates subyearling or yearling rearing strategy.

[c] Numbers of fish PIT tagged are included in the Number of Fish Released categories.

Appendix H: Estimated Survivals (%) Between Various Life Stages at LFH for Fall Chinook of LFH/Snake River Hatchery Origin Brood Years: 1984-2002

Appendix H: Estimated percent survival between various life stages of LFH/Snake River hatchery fall Chinook for brood years 1984-2002 at LFH.

Brood year	Release stage	Green egg-ponded fry	Ponded fry-release	Green egg-release
1984	Yearling	N/A	N/A	83.5
	Subyearling	N/A	N/A	86.2
1985	Yearling	N/A	N/A	86.2
	Subyearling	N/A	N/A	87.4
1986	Yearling	N/A	N/A	84.7
	Subyearling	N/A	N/A	89.1
1987	Yearling	N/A	N/A	88.6
	Subyearling	N/A	N/A	90.9
1988	Yearling	N/A	N/A	88.8
	Subyearling	N/A	N/A	93.6
1989	Subyearling	N/A	N/A	86.3
1990	Yearling	86.8[a]	94.5	82.1
	Subyearling	86.8[a]	98.0	85.1
1991	Yearling	89.1[a]	94.1	83.8
1992	Yearling	92.7	96.5	89.5
	Subyearling	92.7	98.4	91.2
1993	Yearling	88.0[a]	99.0	87.1
1994	Yearling	92.7	99.3	92.1
1995[b]	Yearling	90.8	94.8	86.1
	Subyearling	90.8	99.0	89.9
1996	Yearling	95.0	76.6	72.8
	Subyearling	95.0	89.5	85.0
1997	Yearling	93.0	92.5	86.0
	Subyearling	93.0	97.6	90.8
1998	Yearling	92.4	94.8	87.6
	Subyearling	92.4	95.1	87.9
1999	Yearling	92.4	66.3[c]	61.3[c]
	Subyearling	92.4	95.2	87.9
2000	Yearling	92.8	91.3	84.8
	Subyearling	92.8	94.9	88.1
2001	Yearling	93.6	79.5	74.5
	Subyearling	93.6	97.7	95.8
2002	Yearling	95.3	86.8	82.8
	Subyearling	95.3	94.8	90.3
Yearling mean:	**%**	**93.1**	**91.6**	**84.8**
	SD	1.3	7.2	4.9
Subyearling mean:	**%**	**93.1**	**96.0**	**89.1**
	SD	1.4	4.0	3.0

[a] Based on back calculation to estimate green eggs taken.

[b] Estimated after partitioning loss in that raceway for subyearlings (33,459 eggs), yearlings and escaped fry (83,183). Survivals for accidentally released fry are not included.

[c] Avian predation of yearlings released at LFH was estimated at 25%. This loss occurred between tagging and release, while fish were in the rearing lake.

Appendix I: Tucannon River Survey Sections and Historical Escapement

Appendix I. Table 1. Description and length of sections, survey length, percent of reach surveyed, and estimated total number of fall Chinook redds in the Tucannon River, 2007.

Section	Description	Length of section (Rkm)[a]	Length surveyed (Rkm)	% of productive reach surveyed[b]	Estimated total # of Redds[c]
1	Mouth of Tucannon R to highway 261 Bridge	2.8	1.7	100	26
2	Highway 261 Bridge to Smolt trap	0.2	0.2	100	0
3	Smolt trap to Powers Bridge	0.5	0.5	100	13
4	Powers Bridge to upper hog barns	1.2	1.2	100	13
5	Hog barns to Starbuck Br.	2.5	2.4	96	14
6	Starbuck Br. To Fletchers Dam	2.7	1.3	48	29
7	Fletcher's Dam to Smith Hollow	2.9	2.9	100	5
8	Smith Hollow to Ducharme's Sheep Ranch Br.	4.4	4.4	100	7
9	Ducharme's Bridge to Highway 12	5.5	5.5	100	2
10	Highway 12 to Brines Bridge	6.2	6.2	100	0
	Total	28.9	26.3	95	**109**

[a] Section lengths measured using Maptech, Terrain Navigator Pro version 6.0 software.
[b] Percentage is based upon length of stream that is presumed to successfully produce fry.
[c] Counted redds were expanded based on percent of reach surveyed to estimate total number of redds.

Appendix I. Table 2. Description and length of sections, survey length, percent of reach surveyed, and estimated total number of fall Chinook redds in the Tucannon River, 2008

Section	Description	Length of section (Rkm)	Length surveyed (Rkm)	% of productive reach surveyed	Estimated total # of Redds
1	Mouth of Tucannon R to highway 261 Bridge	2.8	1.7	100	38
2	Highway 261 Bridge to Smolt trap	0.2	0.2	100	1
3	Smolt trap to Powers Bridge	0.5	0.5	100	32
4	Powers Bridge to upper hog barns	1.2	1.2	100	25
5	Hog barns to Starbuck Br.	2.5	2.4	96	53
6	Starbuck Br. To Fletchers Dam	2.7	1.3	48	83
7	Fletcher's Dam to Smith Hollow	2.9	2.9	100	9
8	Smith Hollow to Ducharme's Sheep Ranch Br.	4.4	4.4	100	7
9	Ducharme's Bridge to Highway 12	5.5	5.5	100	5
10	Highway 12 to Brines Bridge	6.2	6.2	100	1
	Total	28.9	26.3	95	**254**

Appendix I, Table 3. Estimated escapement, % stray component of the run, and number of redds, and resulting estimates of smolts/redd and total number of migrants from fall Chinook spawning in the Tucannon River, 1985-2001.

	Escapement		Redd Construction			Success of Spawning	
Year	Estimated escapement [a]	% Strays in escapement estimate	# Redds observed	# Redds in no access areas (estim)	Total # of Redds (estim)	Estimated smolts/redd[b]	Total Estimated # emigrants[c]
1985[d]	0	unknown	0	No estim	0	unknown	unknown
1986[e]	2[f]	unknown	0	No estim	0	unknown	unknown
1987	48	0	16	0	16	unknown	unknown
1988	78	0	26	0	26	unknown	unknown
1989	150	27.9	48	2	50	unknown	unknown
1990	186	30.8	62[g]	0	62	unknown	unknown
1991	150	20.0	50	0	50	unknown	unknown
1992	69	0	23	0	23	unknown	unknown
1993	84	6.3	28	0	28	unknown	unknown
1994	75	28.0	25	0	25	unknown	unknown
1995	87	33.3	29	0	29	unknown	unknown
1996	144	95.5	43	5	48	0.6[h]	29
1997	93	5.3	27	4	31	712	22,076
1998	132	7.1	40	4	44	15	666
1999	87	9.1	21	8	29	441	12,799
2000	60	27.8	19	1	20	468	9,352
2001	219	14.9	65	8	73	336	24,545

[a] This estimate was derived using three fish per redd.
[b] This estimate was derived using redds counted above the smolt trap and estimates of emigration the following spring. Estimates began in 1997 when the smolt trap was moved to its current position at Rkm 3.0, at an area low enough in the system to trap fall Chinook.
[c] This estimate was derived using the smolt per redd estimate above the trap and applying it to the total number of redds in the Tucannon River.
[d] Based on one survey completed 12/17/85.
[e] Based on one survey completed 11/18/86.
[f] Two carcasses counted but not sampled.
[g] Correction of number of redds observed that was presented in the 1990 Annual Report.
[h] Flood event occurred January of 1997, nearly eliminating all the progeny from the 1996 spawn.

Appendix J: Salmon Processed and killed at LFH in 2007/2008

(LFH=voluntary return to Lyons Ferry Hatchery, LGR=fish trapped at Lower Granite Dam. Age/Rearing states origin, brood year, age at release, and release site (LF03SO is a LFH hatchery origin fish from the 2003 brood year, released as a subyearling, on-station at LFH).

Appendix J. Table 1. Estimated composition of <u>non-wire</u> tagged fall Chinook trapped and killed at LFH during 2007.

Program	Origin/age determinations by method	Male <53cm	Female	Male	Grand Total
Umatilla	Out-of-basin Yakima Bright DNA, hatchery unm/untag/noVI res rear age 4 by scales	0	1	0	1
Snake River Natural	Presumed Snake R., Wild sub age 2 by scales	0	0	1	1
Snake River Natural	Presumed Snake R., WILD sub age 3 by scales	0	0	2	2
Snake River Natural	Presumed Snake R., Wild sub age 4 by scales	0	1	0	1
LSRCP	Snake R. basin DNA, hatchery unm/untag/noVI res rear age 3 by scales	0	0	1	1
LSRCP	Snake R. basin DNA, hatchery unm/untag/noVI sub age 2 by scales	1	0	3	4
NPTH	Snake R. basin DNA, hatchery unm/untag/noVI sub age 2 by scales, assigned to NPTH release	1	0	0	1
LSRCP	Snake R. basin DNA, hatchery unm/untag/noVI sub age 2 by scales PIT tag DWOR surrogates	1	0	0	1
LSRCP	Snake R. basin DNA, hatchery unm/untag/noVI sub age 3 by scales	0	4	0	4
NPTH	Snake R. basin DNA, hatchery unm/untag/noVI sub age 3 by scales, assigned to NPTH release	0	0	1	1
LSRCP	Snake R. basin DNA, Snake R. hatchery ADLR yearling age 3	0	1	0	1
LSRCP	Snake R. basin DNA, Snake R. hatchery LR only yearling age 4	0	0	1	1
LSRCP	Snake R. hatchery ADLR yearling age 2	2	0	0	2
LSRCP	Snake R. hatchery ADLR yearling age 3	0	2	8	10
LSRCP	Snake R. hatchery ADLR yearling age 4	0	6	0	6
LSRCP	Snake R. hatchery DNA, hatchery unm/untag/noVI res rear age 5 by scales	0	1	0	1
LSRCP	Snake R. hatchery DNA, hatchery unm/untag/noVI sub age 2 by scales	1	0	0	1
LSRCP	Snake R. hatchery DNA, hatchery unm/untag/noVI sub age 3 by scales	0	1	0	1
LSRCP	Snake R. hatchery LR only yearling age 2	2	0	0	2
LSRCP	Snake R. hatchery LR only yearling age 3	1	0	9	10
LSRCP	Snake R. hatchery LR only yearling age 4	0	0	1	1
LSRCP	Snake R. hatchery LR unknown if AD yearling age 2	2	0	0	2
LSRCP	Snake R. hatchery LR unknown if AD yearling age 3	1	0	0	1
LSRCP	Unknown hatchery AD only yearling age 3	0	0	5	5
LSRCP	Unknown hatchery AD only yearling age 4	0	3	1	4
LSRCP	Unknown hatchery AD only yearling age 5	0	0	1	1
LSRCP	Unknown hatchery unm/untag/noVI res rear age 3 by scales	0	0	1	1
LSRCP	Unknown hatchery unm/untag/noVI sub age 2 by scales	4	0	5	9

Appendix J. Table 1. (continued)

Program	Origin/age determinations by method	Male <53cm	Female	Male	Grand Total
LSRCP	Unknown hatchery unm/untag/noVI sub age 3 by scales	0	2	0	2
LSRCP	Unknown hatchery unm/untag/noVI sub age 4 by scales	0	1	1	2
LSRCP	Unknown hatchery unm/untag/noVI yearling age 2 by scales	13	0	0	13
LSRCP	Unknown hatchery unm/untag/noVI yearling age 3 by scales	0	0	5	5
LSRCP	Unknown hatchery unm/untag/noVI yearling age 4 by scales	0	3	2	5
LSRCP	Unknown hatchery unm/untag/noVI yearling age 5 by scales	0	1	0	1
	Total	29	27	48	104

Appendix J. Table 2. Estimated composition of wire tagged fall Chinook trapped and killed at LFH during 2007.

Program	Origin CWT	CWT	Male <53 cm	Female	Male	Grand Total
Bonneville/Umatilla	BLANK	BLANK	0	20	43	63
Bonneville	BONN03YUMA	094053	0	1	0	1
Bonneville	BONN04YUMA	092038	0	1	1	2
Bonneville		094054	0	1	2	3
Umatilla	UMA03S	094027	0	1	0	1
Umatilla		094028	0	3	0	3
Umatilla		094030	0	1	0	1
LSRCP	LF01YO	631585	0	1	0	1
LSRCP	LF02SBCA	610122	0	1	0	1
LSRCP	LF02YBCA	612659	0	0	1	1
LSRCP	LF02YCJA	612503	0	1	0	1
LSRCP	LF02YO	632167	0	33	2	35
LSRCP	LF03SO	631786	0	6	1	7
LSRCP	LF03YBCA	610145	0	8	3	11
LSRCP		610147	0	2	1	3
LSRCP	LF03YO	631769	0	308	123	431
LSRCP		631770	0	323	118	441
LSRCP		632368	0	27	14	42
LSRCP	LF03YPLA	610146	0	2	1	3

Appendix J. Table 2 (continued)

Program	Origin CWT	CWT	Male <53 cm	Female	Male	Grand Total
LSRCP	LF03YPLA	610149	0	2	0	2
LSRCP	LF04SBCA	612504	0	0	1	1
LSRCP	LF04SCJA	610154	0	0	2	2
LSRCP	LF04SGRRD	632782	0	1	0	1
LSRCP	LF04SO	632787	0	4	10	14
LSRCP	LF04YBCA	610144	0	3	6	9
LSRCP		610148	0	0	6	6
LSRCP	LF04YCJA	610151	1	3	7	11
LSRCP		610152	2	2	6	10
LSRCP	LF04YO	633283	30	196	565	791
LSRCP		633284	38	169	565	772
LSRCP	LF04YPA	610150	0	0	1	1
LSRCP		610153	0	1	2	3
LSRCP	LF05SBCA	610174	2	0	2	4
LSRCP		610175	1	0	0	1
LSRCP	LF05SCCD1	633583	4	1	0	5
LSRCP	LF05SCJA	610176	1	0	0	1
LSRCP		610177	3	0	0	3
LSRCP	LF05SGRRD	633584	1	0	0	1
LSRCP	LF05SO	633582	53	0	11	64
LSRCP	LF05YO	633597	99	0	0	99
LSRCP		633598	79	0	1	80
NPTH	NPTH02SO2	610110	0	1	0	1
NPTH	NPTH04SA	612672	0	0	2	2
NPTH	NPTH05SNLVA	612707	1	0	0	1
NPTH	NPTH05SO	612698	1	0	0	1
NPTH		612709	1	0	0	1
		Total	317	1,123	1,497	2,937

Appendix J. Table 3. Estimated composition of non-wire tagged fall Chinook that were trapped during the 20% sample at LGR, hauled to LFH, and killed during 2007.

Origin/age by determination method	Male < 53 cm	Female	Male	Grand Total
Nowire and No PIT tag (in 20% sample) n=441				
Out-of-basin DNA most like Coweeman R, hatchery unm/untag/noVI SUB age 3 by scales		1		1
Out-of-basin DNA most like Hanford Reach, hatchery unm/untag/noVI sub age 4 by scales		4		4
Out-of-basin DNA most like Hanford Reach, hatchery unm/untag/noVI sub age 5 by scales			1	1
Out-of-basin DNA most like Klickitat Summer, hatchery unm/untag/noVI sub age 4 by scales			1	1
Out-of-basin DNA most like L Yakima, hatchery unm/untag/noVI sub age 4 by scales		2		2
Out-of-basin DNA most like L Yakima, hatchery unm/untag/noVI sub age 5 by scales		1		1
Out-of-basin DNA most like Methow, hatchery unm/untag/noVI sub age 3 by scales			1	1
Out-of-basin DNA most like Yakima bright, hatchery unm/untag/noVI sub age 4 by scales		1		1
Out-of-basin Hanford reach WILD DNA, unm/untag/noVI unknown age		1		1
Out-of-basin L Yakima WILD DNA, unm/untag/noVI unknown age		1		1
Out-of-basin Methow R WILD DNA, unm/untag/noVI unknown age		1		1
Out-of-basin Umatilla Hatchery DNA, hatchery unm/untag/noVI sub age 5 by scales			1	1
Out-of-basin Yakima Bright DNA, WILD unm/untag/noVI res rear age 4 by scales		1		1
Out-of-basin Yakima Bright DNA, WILD unm/untag/noVI res rear age 5 by scales		1		1
Presumed Snake R. WILD res rear age 3 by scales		1	28	29
Presumed Snake R. WILD res rear age 4 by scales		15	11	26
Presumed Snake R. WILD res rear age 5 by scales		12	4	16
Presumed Snake R. WILD sub age 3 by scales		3	13	16
Presumed Snake R. WILD sub age 4 by scales		16	4	20
Presumed Snake R. WILD sub age 5 by scales		7	3	10
Presumed Snake R. WILD sub age 6 by scales			1	1
Snake R. Basin DNA, hatchery AD only sub age 3 by scales		3	3	6
Snake R. Basin DNA, hatchery AD only yearling age 3 by scales			1	1
Snake R. basin DNA, hatchery unm/untag/noVI res rear age 3 by scales		2		2
Snake R. Basin DNA, hatchery unm/untag/noVI res rear age 4 by scales		3		3
Snake R. basin DNA, hatchery unm/untag/noVI sub age 2 by scale			1	1
Snake R. basin DNA, hatchery unm/untag/noVI sub age 3 by scales		5	12	17
Snake R. basin DNA, hatchery unm/untag/noVI sub age 4 by scales		25	7	32
Snake R. Basin DNA, hatchery unm/untag/noVI sub age 5 by scales		5		5
Snake R. basin DNA, hatchery unm/untag/noVI yearling age 3 by scales			1	1
Snake R. basin DNA, hatchery unm/untag/noVI yearling age 4 by scales		1		1

Appendix J. Table 3 (continued)

Origin/age by determination method	Male < 53 cm	Female	Male	Grand Total
Snake R. basin DNA, presumed WILD res rear age 3 by scales		1	4	5
Snake R. Basin DNA, presumed WILD res rear age 4 by scales		3	3	6
Snake R. Basin DNA, presumed WILD res rear age 5 by scales		2		2
Snake R. Basin DNA, presumed WILD res rear age 6 by scales		1		1
Snake R. Basin DNA, presumed WILD Sub age 3 by scales			4	4
Snake R. Basin DNA, presumed WILD sub age 4 by scales		5	1	6
Snake R. Basin DNA, presumed Wild sub age 5 by scales		2	1	3
Snake R. Basin DNA, unknown (H or W) unm/untag/noVI unk age		3		3
Snake R. hatchery ADLR yearling age 4 by scales			1	1
Snake R. Hatchery DNA, hatchery AD only yearling age 4 by scales		1		1
Snake R. hatchery DNA, hatchery unm/untag/noVI sub age 3 by scales			4	4
Snake R. hatchery DNA, hatchery unm/untag/noVI sub age 4 by scales		3		3
Snake R. Hatchery DNA, hatchery unm/untag/noVI sub age 5 by scales		1		1
Snake R. Hatchery DNA, hatchery unm/untag/noVI yearling age 4 by scales		1		1
Snake R. Hatchery DNA, unm/untag/noVI unknown age		2		2
Snake R. hatchery LR only yearling age 3 by scales			1	1
Snake R. hatchery LR only yearling age 4 by scales		1		1
Snake R. WILD DNA, unknown age		1	1	2
Snake R. WILD DNA, wild res rear age 3 by scales			1	1
Snake R. WILD DNA, wild res rear age 4 by scales		1		1
Snake R. WILD DNA, wild sub age 3 by scales			1	1
Snake R. WILD DNA, wild sub age 4 by scales		1		1
Unknown hatchery AD only and unknown age			1	1
Unknown hatchery AD only res rear age 3 by scales			1	1
Unknown hatchery AD only res rear age 4 by scales		1		1
Unknown hatchery AD only sub age 2 by scales			5	5
Unknown hatchery AD only sub age 3 by scales		1	2	3
Unknown hatchery AD only unknown age		1	1	2
Unknown hatchery AD only yearling age 3 by scales			1	1
Unknown hatchery AD only yearling age 4 by scales		1		1
Unknown hatchery unm/untag/noVI res rear age 3 by scales			10	10
Unknown hatchery unm/untag/noVI res rear age 4 by scales		10	1	11
Unknown hatchery unm/untag/noVI res rear age 5 by scales		7		7

Appendix J. Table 3 (continued)

Origin/age by determination method	Male < 53 cm	Female	Male	Grand Total
Unknown hatchery unm/untag/noVI sub age 2 by scales	1		3	4
Unknown hatchery unm/untag/noVI sub age 3 by scales		14	16	30
Unknown hatchery unm/untag/noVI sub age 4 by scales		45	20	65
Unknown hatchery unm/untag/noVI sub age 5 by scales		16	2	18
Unknown hatchery unm/untag/noVI yearling age 2 by scales	1			1
Unknown hatchery unm/untag/noVI yearling age 3 by scales	1	1	2	4
Unknown hatchery unm/untag/noVI yearling age 4 by scales			1	1
Unknown origin (H or W) unm/untag/noVI and unknown age	3	4	12	19
No wire but have PIT tag (in 20% sample) n=12				
Snake R. hatchery PIT tag (CLW surrogates), hatchery sub age 3 scales			1	1
Snake R. hatchery PIT tag (Snake R. surrogates), hatchery sub age 3 by scales			4	4
Snake R. WILD PIT tag, WILD res rear age 3 by scales			1	1
Snake R. WILD PIT tag, WILD sub age 3 by scales			1	1
Snake R. basin PIT tag, Presumed Snake R. WILD res rear age 3 by scales			2	2
Snake R. hatchery PIT tag (IPC-Hells Canyon), hatchery sub age 2 by scales	1			1
Snake R. basin PIT tag, hatchery res rear age 3 by scales		1		1
Snake R. hatchery PIT tag (CLW surrogates), hatchery res rear age 3 by scales			1	1
Total	7	243	203	453

Appendix J. Table 4. Estimated composition of <u>wire</u> tagged fall Chinook trapped at LGR Dam <u>during the 20% sample</u> that were hauled to LFH and killed during 2007.

Origin/age	CWT	Male < 53 cm	Female	Male	Grand Total
Wire tagged fish trapped (in 20% sample) n=1716					
BONN04YUMA	092039			1	1
KLICK05S	633377	1			1
KLICK05S	633578	1			1
LF01YO	631585		1		1
LF02SBCA	610122		1		1
LF02SPLA	610123		1		1
LF02YBCA	612659			1	1

Appendix J. Table 4 (continued)

Origin/age	CWT	Male < 53 cm	Female	Male	Grand Total
LF02YO	632167		2	1	3
LF03SBCA	612500		5		5
LF03SCJA	612600		3		3
LF03SIPCPA	107976		1		1
LF03SO	631786		1	1	2
LF03YBCA	610145		6		6
LF03YBCA	610147		6	1	7
LF03YO	631769	1	48	11	60
LF03YO	631770		37	9	46
LF03YO	632368		3	3	6
LF03YPLA	610146	0	9	4	13
LF03YPLA	610149		7	1	8
LF04SBCA	612504		4	6	10
LF04SCCD	610155			2	2
LF04SCJA	610154	0	4	3	7
LF04SGRRD	632782		1	4	5
LF04SIPCHC	106676		1	3	4
LF04SIPCHC	106776		2		2
LF04SIPCHC	107176			1	1
LF04SIPCHC	109370		1		1
LF04SO	632787		2	3	5
LF04YBCA	610144	1	4	28	33
LF04YBCA	610148	5	7	19	31
LF04YCJA	610151	5	8	46	59
LF04YCJA	610152	6	13	50	69
LF04YO	633283	15	51	148	214
LF04YO	633284	12	32	131	175
LF04YPA	610150	7	11	37	55
LF04YPA	610153	3	17	40	60
LF05SBCA	610174	29	0	4	33
LF05SBCA	610175	27	0	7	34
LF05SCCD1	633583	64	0	6	70
LF05SCCD2	610178	22	0	0	22
LF05SCJA	610176	44		5	49

Appendix J. Table 4 (continued)

Origin/age	CWT	Male < 53 cm	Female	Male	Grand Total
LF05SCJA	610177	32		3	35
LF05SGRRD	633584	18	0	2	20
LF05SIPCPA	108977	10		2	12
LF05SIPCPA	109477	19	0	4	23
LF05SIPCPA	109577	13		4	17
LF05SO	633582	102	0	15	117
LF05SPL1-IPCIPCPA	094419	30	0	2	32
LF05YBC	612507	3			3
LF05YBC	612508	5			5
LF05YCJA	612506	6			6
LF05YCJA	612509	9			9
LF05YO	633597	38			38
LF05YO	633598	28	0	0	28
LF05YPA	612505	7			7
LF05YPA	612510	8			8
LF05YPA	612661	1			1
NPTH02SO2	610110		1		1
NPTH03SA	612675		2		2
NPTH04SA	610108			1	1
NPTH04SA	612669			1	1
NPTH04SA	612670			1	1
NPTH04SA	612672		1		1
NPTH05SCFA	612653	14	0	3	17
NPTH05SCFA	612660	3			3
NPTH05SLGA	612655	12	0	1	13
NPTH05SNLVA	612671	20			20
NPTH05SNLVA	612707	21	0	5	26
NPTH05SO	612698	15		3	18
NPTH05SO	612709	81	1	13	95

Appendix J. Table 4

Origin/age	CWT	Male < 53 cm	Female	Male	Grand Total
stray	63BLANK		1		1
stray	BLANK	1	5	16	22
UMA03SUMA	094028		1		1
UMA05SUMA	094418	1			1
UMA05UMA	094415	1			1
UMA05UMA	094417	1			1
LOST TAG	LOST tag	9	4	8	21
Total		751	305	660	1,716

Appendix J. Table 5. Estimated composition of PIT tagged fall Chinook trapped outside of the 20% sample (part of sort-by-code sampling) at LGR Dam that were hauled to LFH and killed during 2007.

Origin/age by determination method	CWT	Male < 53 cm	Female	Male	Grand Total
PIT tagged fish part of sort-by-code (trapped outside of 20% sampling period) n=168					
LF03SCJA	612600		1		1
LF05SBCA	610174	14		2	16
	610175	13		3	16
LF05SCCD1	633583	10		2	12
LF05SCCD2	610178	3			3
LF05SGRRD	633584	3			3
LF05SO	633582	11		2	13
LF05SPL1-IPCIPCPA	094419	18			18
NPTH05SCFA	612653	6			6
	612660	2			2
NPTH05SLGA	612655	4			4
NPTH05SO	612698	2			2
	612709	3		1	4
Snake R. hatchery age 2 surrogate by PIT tag		1			1
Snake R. hatchery age 2 surrogate by PIT tag, Hstray age 2 by scales		5			5
Snake R. hatchery age 2 surrogate CLW by PIT tag, age 2 yrl by scales		1			1
Snake R. hatchery age 3 surrogate by PIT tag, age 3 res rear by scales				1	1

Appendix J Table 5 (continued)

Origin/age by determination method	CWT	Male< 53 cm	Female	Male	Total
Snake R. hatchery age 3 surrogate by PIT tag, age 3 sub by scales			1		1
Snake R. hatchery age 3 surrogate by PIT tag, Hstray age 3 by scales				2	2
Snake R. hatchery age 3 surrogate by PIT tag, wild by scales age 3				1	1
Snake R. hatchery age 3 surrogate CLW by PIT tag, hatchery sub age 3 by scales , DNA most like Snake R			1		1
Snake R. hatchery res rear age 3 by scales, Snake basin return to river by PIT tag				2	2
Snake R. hatchery res rear age 4 by scales, Snake basin return to river by PIT tag			2		2
Snake R. hatchery sub age 2 by PIT tag	LOST tag	1			1
Snake R. hatchery sub age 2 HC by PIT tag, age 2 sub by scales		1			1
Snake R. hatchery sub age 2 HC by PIT tag, Hstray age 2 by scales		1			1
Snake R. hatchery sub age 2 PL by PIT tag, Hstray age 2 by scales		1		1	2
Snake R. hatchery sub age 4 by scales, Snake basin LGR run of river by PIT tag			2		2
Snake R. hatchery sub BC age 2 by PIT tag		1			1
Snake R. hatchery sub BC age 2 by PIT tag	LOST tag	1			1
Snake R. hatchery sub BC age 2 by PIT tag, age 2 sub by scales		1			1
Snake R. hatchery sub BC age 2 by PIT tag, Hstray age 2 by scales		3		3	6
Snake R. hatchery sub BC age 2 by PIT tag, Hstray age 3 by scales		1			1
Snake R. hatchery sub surrogate CLW by PIT tag, Hstray sub age 3 by scales				1	1
Wild age 3 by PIT tag, Hstray age 3 by scales				1	1
wild age 3 res rear by scales, Snake basin LGR run of river by PIT tag			1	3	4
wild age 4 by scales, Snake basin LGR run of river by PIT tag			2	1	3
wild age 4 by scales, Snake basin LGR run of river by PIT tag, DNA like Snake R basin				1	1
wild age 4 res rear by scales, Snake basin LGR run of river by PIT tag			1	1	2
Wild age 5 by PIT tag, wild age 5 res rear by scales			1		1
wild age 5 by scales, Snake basin LGR run of river by PIT tag			1		1
wild age 6 res rear by scales, Snake basin LGR run of river by PIT tag			1		1
Wild seined CLW by PIT tag, age 3 res rear by scales				1	1
Wild seined CLW by PIT tag, age 4 res rear by scales (DNA most like Hanford reach)			1		1
Snake R. basin age 4 by PIT tag LGR run of river			1		1
Snake R. basin age 4 by PIT tag LGR run of river, age 4 sub hstray by scales, DNA most like Snake R. hatchery			1		1
Snake R. hatchery age 3 surrogate CLW by PIT tag, age 3 res rear by scales			3	11	14
Snake R. hatchery age 3 surrogate CLW by PIT tag, age 3 res rear by scales, DNA like Snake R basin			1		1
Total		107	21	40	168

Appendix J. Table 6. Estimated composition of wire tagged fall Chinook trapped and killed at LFH during 2008.

Origin and Age	CWT	MALES < 53cm	FEMALES	MALES	GRAND TOTAL
Yearling Age 3	09BLANK			1	1
No Scales Taken	BLANK		10	6	16
Regenerated Scales			1		1
Yearling Age 3				2	2
Yearling Age 4			7	2	9
Yearling Age 5			2		2
BONN03YUMA	094053			1	1
BONN04YUMA	092039			1	1
	094054		1		1
UMA05SUMA	094415			1	1
	094418			2	2
LF03SO	631786		1		1
LF03YBCA	610147		1		1
LF03YO	631769		23	3	26
	631770		21	2	23
	632368		3		3
LF04SCCD	610155		1		1
LF04SO	632787		1	1	2
LF04YBCA	610148		2		2
LF04YCJA	610151		1	1	2
	610152		2	1	3
LF04YO	633283	1	132	39	172
	633284	1	160	40	201
LF04YPA	610150		3		3
LF05SBCA	610174		1	1	2
	610175	1	2	2	5
LF05SCCD1	633583			2	2
LF05SCCD2	610178		1		1
LF05SCJA	610176			1	1
LF05SO	633582	3	33	49	85
LF05YBC	612508	2			2
LF05YO	633597	71	44	168	283
	633598	136	18	148	302
LF05YPLA	612505	1			1

Appendix J, Table 6 (continued)

Origin and Age	CWT	MALES < 53cm	FEMALES	MALES	GRAND TOTAL
LF05YPLA	612510	1			1
LF06SBCA	612730	1			1
LF06SO	633986	19			19
LF06YBCA	612513	3			3
	612516	7			7
LF06YCJA	612511	2			2
	612514	10			10
LF06YO	633987	301			301
	634092	343			343
LF06YPLA	612512	3			3
	612515	3			3
Inbasin hatchery YRL LR age 2 by length	LOST HEAD	3			3
Inbasin hatchery YRL LR 58cm (presume age 3)				1	1
Unknown hatchery age/origin		1			1
LOST TAG	LOST	15	9	19	43
MCCALL04YSUMMERSALMONR	108375		1		1
Grand Total		**928**	**481**	**494**	**1,903**

Appendix J. Table 7. Estimated composition of <u>non-wire</u> tagged fall Chinook that were trapped and killed at LFH during 2008.

Origin	Final Origin and Age	Male < 53cm	Female	Male	GRAND TOTAL
Inbasin hatchery	inbasin hatchery SUB TRANS BCCAP age 3 by PIT tag			1	1
	inbasin hatchery YRL LR 58 cm			1	1
	inbasin hatchery YRL LR 68 cm		1		1
	inbasin hatchery YRL LR 69 cm			1	1
	inbasin hatchery YRL LR 75 cm			1	1
	inbasin hatchery YRL LR 82cm		1		1
	inbasin hatchery YRL LR age 2 by length	5			5
	inbasin hatchery YRL LR age 2 by scale	1			1
	inbasin hatchery YRL LR age 3 by scale	2	1	5	8
	inbasin hatchery YRL LR age 4 by scale			3	3
Unknown hatchery	unknown hatchery SUB age 2 by scales		5	11	16
	unknown hatchery SUB age 4 by scales		1		1
	unknown hatchery YRL age 2 by scales	3			3
	unknown hatchery YRL age 3 by scales	4	5	29	38
	unknown hatchery YRL age 4 by scales		7	2	9
	unknown hatchery YRL age 5 by scales			1	1
	unknown hatchery age/origin			1	1
unknown age/origin	unknown age/origin (presume hatchery)			4	4
	unknown hatchery age/origin			1	1
Grand Total		**15**	**21**	**61**	**97**

Appendix J. Table 8. Estimated composition of wire tagged fall Chinook trapped at LGR Dam that were hauled to LFH and killed during 2008.

Origin	CWT	MALES < 53cm	FEMALES	MALES	GRAND TOTAL
Unreadable Scales	09BLANK	15		3	18
Regenerated Scales				1	1
Yearling Age 3				1	1
Unreadable Scales	BLANK	1	9	5	15
Regenerated Scales			1	4	5
Yearling Age 3				1	1
Yearling Age 4			9	7	16
Yearling Age 5			5		5
BONN04YUMA	092039		1	1	2
BONN06YUMA	094505	1			1
	094506	3			3
CRFC05HANFORD REACHWILD	610412			1	1
KLICK03S	632381		1		1
KLICK04S	632968		1		1
LF03SCJA	612600			1	1
LF03YBCA	610145		1		1
	610147		1		1
LF03YO	631769		1		1
	631770		3		3
	632368		1		1
LF03YPLA	610149		1		1
LF04SCJA	610154		1		1
LF04SGRRD	632782		1		1
LF04SIPCHC	106676		3		3
	106776		2		2
LF04SO	632787		1		1
LF04YBCA	610144		10	3	13
	610148		12	2	14
LF04YCJA	610151		19	3	22
	610152		18	3	21
LF04YO	633283		43	13	56
	633284		59	9	68

Appendix J, Table 8 (continued)

Origin	CWT	MALES < 53cm	FEMALES	MALES	GRAND TOTAL
LF04YPA	610150		18	1	19
	610153		13	3	16
LF05SBCA	610174		12	23	35
	610175	2	14	30	46
LF05SCCD1	633583		30	47	77
LF05SCCD2	610178	4	1	14	19
LF05SCJA	610176		15	26	41
	610177		17	27	44
LF05SGRRD	633584	2	4	6	12
LF05SIPCHC	108977		4	9	13
	109477		3	12	15
	109577		2	8	10
LF05SIPCPLA	094419	1	4	10	15
LF05SO	633582		30	68	98
LF05YBC	612507	7	1	11	19
	612508	6		5	11
LF05YCJA	612506	3		3	6
	612509	2		6	8
LF05YO	633597	12	2	54	68
	633598	20	4	32	56
LF05YPLA	612505	3		6	9
	612510	4		4	8
	612661			1	1
LF06SBCA	612729	7			7
	612730	8			8
LF06SCJA	612727	3			3
	612728	5			5
LF06SIPCHC	101273	2			2
	103880	4			4
	104480	7			7
LF06SO	633986	17		1	18
LF06SPLA	612731	4			4

Appendix J, Table 8 (continued)

Origin	CWT	MALES < 53cm	FEMALES	MALES	GRAND TOTAL
LF06SPLA	612732	6			6
LF06YBCA	612513	28			28
	612516	47			47
LF06YCJA	612511	104			104
	612514	107			107
LF06YO	633987	118			118
	634092	148			148
LF06YPLA	612512	40			40
	612515	37			37
LOST HEAD	LOST HEAD			1	1
Unknown Age	LOST TAG	8	5	24	37
Yearling Age 4			1		1
NPTH03SA	612675		1		1
NPTH04SA	612672		1		1
NPTH05SCFA	612653		2	6	8
	612660			4	4
NPTH05SLGA	612655		2	7	9
NPTH05SNLVA	612671	1	8	11	20
	612707		11	9	20
NPTH05SO	612698		5	5	10
	612709	2	21	45	68
NPTH06CFA	612734	3			3
NPTH06SLGA	612733	1			1
NPTH06SNLVA	612710	6			6
NPTH06SO	612696	15		2	17
	612699	12			12
TRINITYRIVER04STRINITYRIVER	065322		1		1
UMA05SUMA	094415		2		2
	094416		1	3	4
	094417		1		1
LOST TAG-634092 by PIT tag	LOST	1			1
Grand Total		**827**	**440**	**582**	**1,849**

Appendix J. Table 9. Estimated composition of <u>non-wire</u> tagged fall Chinook that were trapped at LGR, hauled to LFH, and killed during 2008.

Final Origin	MALES < 53cm	FEMALES	MALES	GRAND TOTAL
inbasin hat DWOR SUB BCA TRAN age 3 by PIT			18	18
inbasin hat DWOR SUB BCA TRAN age 4 by PIT			1	1
inbasin hat DWOR SUB BCA TRAN age 5 by PIT			1	1
inbasin hat DWOR SUB SNAKE3 TRAN age 3 by PIT		1	14	15
inbasin hat DWOR SUB SNAKE3 TRAN age 4 by PIT		1	1	2
inbasin hat LF SUB BCA age 3 by PIT			2	2
inbasin hat LF SUB BCA TRAN age 3 by PIT		3	8	11
inbasin hat LF YRL LR age 3 by scale			2	2
inbasin hat LF YRL LR age 4 by scale			1	1
inbasin hat NPTH SUB CJRAP age 3 by PIT			1	1
inbasin hat OXBO SUB SNAKE4 age 3 by PIT			1	1
inbasin hat UMAH SUB HCD age 3 by PIT		2	2	4
inbasin unknown origin SUB age 3 by PIT			1	1
inbasin unknown origin SUB age 4 by PIT		1	2	3
inbasin unknown origin SUB age 5 by PIT			2	2
unknown age/origin	1	30	38	69
unknown hatchery age/origin		5	5	10
unknown hatchery SUB age 2 by scale	3		4	7
unknown hatchery SUB age 3 by scale		132	288	420
unknown hatchery SUB age 4 by scale		78	34	112
unknown hatchery SUB age 5 by scale		31	11	42
wild RR age 3 by scale		4	14	18
wild RR age 4 by scale		35	15	50
wild RR age 5 by scale		20	3	23
wild RR age 6 by scale		2		2
wild SUB age 2 by scale			1	1
wild SUB age 3 by scale		4	16	20
wild SUB age 4 by scale		34	10	44
wild SUB age 5 by scale		5	3	8
unknown hatchery unknown age (64cm)			1	1
unknown hatchery unknown age (67cm)			1	1
unknown origin/age (64cm)			1	1
unknown origin/age (83cm)		1		1
GRAND TOTAL	**4**	**389**	**502**	**895**

Appendix K: Estimated composition of fall Chinook remaining in the reservoirs between LMO and LGR dams in 2007 and 2008

(These fish were hauled to the Snake River, released, and were not accounted for at other locations (re-trapped at LFH and killed, the run composition at LGR Dam, or the run composition to the Tucannon River).

Appendix K. Table 1. Estimated composition of fall Chinook remaining in the reservoirs between LMO and LGR dams in 2007.

Program	Origin CWT	CWT	F	M+J	Total
BONN	BLANK	BLANK	3	7	10
Umatilla	UMA03SUMA	094028	1	0	1
LSRCP	LF02YO	632167	5	4	9
LSRCP	LF03SO	631786	1	0	1
LSRCP	LF03YBCA	610145	1	0	1
LSRCP	LF03YO	631769	44	19	63
LSRCP		631770	46	15	61
LSRCP		632368	4	5	9
LSRCP	LF04SO	632787	1	1	2
LSRCP	LF04YBCA	610144	0	4	4
LSRCP		610152	0	3	3
LSRCP	LF04YO	633283	28	130	158
LSRCP		633284	25	134	159
LSRCP	LF05SBCA	610174	0	2	2
LSRCP		610177	0	5	5
LSRCP	LF05SO	633582	0	39	39
LSRCP	LF05YO	633597	0	63	63
LSRCP		633598	0	48	48
NPTH	NPTH05SO	612698	0	1	1
Snake River Natural	Presumed Snake R., Wild sub age 2 by scales		0	5	5
LSRCP	Snake R. basin DNA, hatchery unm/untag/noVI sub age 2 by scales		0	1	1
NPTH	Snake R. basin DNA, hatchery unm/untag/noVI sub age 2 by scales, assigned to NPTH release		0	1	1
LSRCP	Snake R. basin DNA, hatchery unm/untag/noVI sub age 2 by scales PIT tag DWOR surrogates		0	1	1
LSRCP	Snake R. basin DNA, hatchery unm/untag/noVI sub age 3 by scales		1	0	1
LSRCP	Snake R. hatchery ADLR yearling age 4		1	0	1
LSRCP	Snake R. hatchery DNA, hatchery unm/untag/noVI sub age 2 by scales		0	1	1
LSRCP	Snake R. hatchery LR only yearling age 3		0	7	7
LSRCP	Unknown hatchery unm/untag/noVI res rear age 3 by scales		0	2	2
LSRCP	Unknown hatchery unm/untag/noVI sub age 2 by scales		0	19	19
LSRCP	Unknown hatchery unm/untag/noVI yearling age 2 by scales		0	15	15
LSRCP	Unknown hatchery unm/untag/noVI yearling age 4 by scales		1	0	1
LSRCP	Unknown hatchery AD only sub age 2 by scales		0	2	2
	Totals		162	534	696

Appendix K. Table 2. Estimated composition of fall Chinook remaining in the reservoirs between LMO and LGR dams in 2008.

Origin	CWT	Females	Males	Fish < 53cm
09BLANK	09BLANK	0	1	0
BLANK	BLANK	4	12	0
BONN03YUMA	094053	0	1	0
BONN04YUMA	092039	0	2	0
UMA05SUMA	094415	0	1	0
	094418	0	3	0
LF03YO	631769	5	3	0
	631770	4	3	0
	632368	1	0	0
LF04SO	632787	0	1	0
LF04YCJA	610151	0	1	0
	610152	1	1	0
LF04YO	633283	27	48	0
	633284	32	49	0
LF04YPA	610150	1	0	0
LF05SBCA	610174	0	1	0
	610175	1	3	0
LF05SCCD1	633583	0	3	0
LF05SCJA	610176	0	1	0
LF05SO	633582	7	61	0
LF05YO	633597	9	208	9
	633598	3	180	16
LF06SO	633986	0	0	2
LF06YBCA	612516	0	0	1
LF06YCJA	612514	0	0	1
LF06YO	633987	0	0	37
	634092	0	0	42
LF06YPA	612512	0	0	1
inbasin hatchery YRL LR age 2 by scales/FL		0	0	3
inbasin hatchery YRL LR age 3 by scales/FL		0	3	1
inbasin hatchery YRL LR age 4 by scales/FL		0	3	0
unknown hatchery SUB age 2 by scales		1	6	0
unknown hatchery YRL age 2 by scales		0	0	1
unknown hatchery YRL age 3 by scales/FL		1	17	2
unknown hatchery YRL age 4 by scales/FL		2	2	0
unknown hatchery YRL age 5 by scales/FL		0	1	0
Grand Total		**100**	**615**	**115**

Appendix L: Run Reconstruction of fall Chinook to LGR Dam during 2007 and 2008

(Salmon less < 30 cm are not included in the run reconstruction. Data for 2008 only contain estimates of wires in run to LGR Dam because the run reconstruction is not finalized).

Appendix L, Table 1. Run Reconstruction estimates of fall Chinook to LGR Dam in 2007 with statistical bounds around the estimates.

Origin	CWT	L	Females	U	L	Males	U	L	<53cm	U
Wire tags and associated nowire fish										
63BLANK (subyearlings age 3 by scales, presumed from UMA)	63BLANK	5	11	16	2	5	9	0	0	0
BLANK (yearlings age 4 by scales, presumed from BONN)	BLANK	27	37	47	5	10	16	0	0	0
LF04SPL1-IPCPA	073336	0	0	0	6	11	16	0	0	0
BONN04YUMA	092039	0	0	2	73	88	105	2	5	9
UMA03SUMA	094028	2	6	10	0	0	1	0	0	0
BONN03YUMA	094053	0	0	0	2	5	9	0	0	0
UMA05UMA	094415	0	0	0	2	5	10	2	5	9
UMA05UMA	094417	0	0	0	0	0	0	2	5	9
UMA05SUMA	094418	0	0	0	0	0	0	2	5	9
LF05SPL1-IPCIPCPA	094419	0	0	0	20	28	37	355	391	423
LF04SIPCHC	106676	2	6	10	11	17	24	0	0	0
LF04SIPCHC	106776	11	17	24	0	0	1	0	0	0
LF03SIPCPLA	106973	2	6	10	0	0	1	0	0	0
LF04SIPCHC	107176	0	0	2	2	6	10	0	0	0
LF03SIPCPA	107976	2	6	10	0	0	1	0	0	0
LF05SIPCPA	108977	0	0	0	6	11	16	49	61	74
LF04SIPCHC	109370	2	6	10	0	0	1	0	0	0
LF05SIPCPA	109477	0	0	0	19	27	36	113	133	150
LF05SIPCPA	109577	0	0	0	19	27	35	81	97	113
NPTH04SA	610108	5	10	16	5	11	16	0	0	0
NPTH02SO2	610110	2	6	10	0	0	1	0	0	0
LF02SBCA	610122	10	16	22	0	0	1	0	0	0
LF02SPLA	610123	6	11	17	0	0	1	0	0	0
LF04YBCA	610144	23	32	41	190	214	240	14	21	29
LF03YBCA	610145	38	50	61	10	16	22	0	0	0

Appendix L, Table 1 (continued)

Origin	CWT	L	Females	U	L	Males	U	L	<53cm	U
LF03YPLA	610146	52	65	76	26	36	46	0	0	0
LF03YBCA	610147	33	43	54	9	16	23	0	0	0
LF04YBCA	610148	40	52	63	120	138	157	30	40	51
LF03YPLA	610149	36	47	60	10	16	23	0	0	0
LF04YPA	610150	53	67	81	197	223	247	39	51	63
LF04YCJA	610151	31	41	53	257	286	313	39	50	62
LF04YCJA	610152	70	85	101	321	355	385	41	53	65
LF04YPA	610153	90	107	124	248	278	305	17	25	33
LF04SCJA	610154	69	85	101	36	47	59	1	3	6
LF04SCCD	610155	2	6	10	6	11	17	0	0	0
LF05SBCA	610174	0	0	0	34	44	55	177	202	226
LF05SBCA	610175	0	0	0	173	197	218	629	677	719
LF05SCJA	610176	0	0	0	32	43	54	251	278	304
LF05SCJA	610177	0	0	0	75	91	106	737	787	831
LF05SCCD2	610178	0	0	0	0	0	1	109	128	147
LF02YPLA	612502	2	5	9	0	0	1	0	0	0
LF03SBCA	612500	50	64	78	0	0	0	0	0	0
LF04SBCA	612504	127	146	167	131	152	170	0	0	0
LF05YPA	612505	0	0	2	0	0	1	27	37	47
LF05YCJA	612506	0	0	2	0	0	1	26	36	45
LF05YBC	612507	0	0	2	0	0	1	9	15	22
LF05YBC	612508	0	0	0	0	0	0	21	30	40
LF05YCJA	612509	0	0	0	0	0	0	36	46	57
LF05YPA	612510	0	0	0	0	0	0	30	41	51
LF03SCJA	612600	45	58	71	9	16	23	0	0	0
NPTH05SCFA	612653	0	0	0	10	16	23	114	134	151
NPTH05SLGA	612655	0	0	0	2	6	9	60	75	89
LF02YBCA	612659	2	5	9	2	5	9	0	0	0

Appendix L, Table 1 (continued)

Origin	CWT	L	Females	U	L	Males	U	L	<53cm	U
NPTH05SCFA	612660	0	0	0	0	0	1	21	29	38
LF05YPA	612661	0	0	2	0	0	1	2	5	9
NPTH04SA	612669	0	0	0	6	11	16	0	0	0
NPTH04SA	612670	0	0	2	4	8	13	0	0	0
NPTH05SNLVA	612671	0	0	0	0	0	1	141	163	184
NPTH04SA	612672	9	16	23	0	0	1	0	0	0
NPTH03SA	612675	5	11	16	2	5	9	0	0	0
NPTH05SO	612698	0	0	0	10	16	23	107	126	143
NPTH05SNLVA	612707	0	0	0	24	32	42	118	138	157
NPTH05SO	612709	2	5	9	117	137	157	832	886	934
LF01YO	631585	2	5	9	0	0	0	0	0	0
LF03YO	631769	301	334	365	97	114	133	2	5	9
LF03YO	631770	303	334	365	50	63	75	0	0	0
LF03SO	631786	6	11	17	2	5	9	0	0	0
LF02YO	632167	5	10	16	5	10	16	0	0	0
LF03YO	632368	23	32	42	13	21	29	0	0	0
LF04SGRRD	632782	10	16	23	15	22	29	0	0	0
LF04SO	632787	14	21	29	14	22	30	0	0	0
LF04YO	633283	250	278	305	813	868	915	107	125	144
LF04YO	633284	172	197	218	827	884	932	74	89	104
KLICK05S	633377	0	0	0	0	0	0	43	56	68
KLICK05S	633578	0	0	0	0	0	0	35	46	57
LF05SO	633582	0	0	0	78	95	110	568	613	651
LF05SCCD1	633583	0	0	0	32	43	55	367	402	435
LF05SGRRD	633584	0	0	0	24	33	42	235	262	288
LF05YO	633597	0	0	0	0	0	0	187	211	235
LF05YO	633598	0	0	2	0	0	1	144	164	186

Appendix L, Table 1 (continued)

Origin CWT	L	Females	U	L	Males	U	L	<53cm	U
Untagged fish (No wire)									
Snake R hatchery SUB TRANS EVAL age 2 by PIT	0	0	0	0	0	0	17	25	33
Snake R LYFE SUB age 2 by PIT	0	0	0	5	10	15	13	20	28
Snake R hatchery SUB NPT cedar flats age 2 by PIT	0	0	0	2	5	9	0	0	0
Snake R hatchery SUB SNAKE4 age 2 by PIT	0	0	0	0	0	0	2	5	9
Snake R hatchery SUB IPC trans eval HCD age 2 by PIT	0	0	0	0	0	0	5	10	16
Snake R hatchery SUB surrogate COE SNAKE3 age 3 by PIT	2	5	8	2	5	9	0	0	0
Snake R hatchery SUB surrogate COE BCCAP age 3 by PIT	0	0	0	13	20	27	0	0	0
Snake R hatchery SUB-NPTH program NLV age 3 by PIT (detected pre-trap period)	0	0	0	0	1	3	0	0	0
assigned to unassociated release HC05S-umatilla subyearlings AD only age 2	0	0	0	213	239	264	272	301	329
assigned to unassociated release LF05Sonstation (est) subyearlings unm/untag age 2	0	0	0	79	94	111	706	755	800
assigned to unassociated release HC04SIPC-umatilla subyearlings AD only age 3	0	2	5	317	349	377	0	0	0
assigned to unassociated release GR04SDirect (est) subyearlings unm/untag age 3	19	27	36	131	151	171	7	13	19
assigned to unassociated release CCD04SDirect (est) subyearlings unm/untag age 3	4	9	15	40	52	65	1	4	8
assigned to unassociated release NPTH04S (est) subyearlings unm/untag age 3	0	2	4	5	10	15	0	1	2
assigned to unassociated release PL03S1 (non IPC) (est) subyearlings unm/untag age 4	8	14	20	4	8	13	0	0	0
assigned to unassociated release HC02SIPC1-umatilla subyearlings AD only age 5	0	3	6	0	0	0	0	0	0
assigned to unassociated release HC02SIPC2-oxbow subyearlings AD only age 5	0	3	5	0	0	0	0	0	0
unknown hatchery SUB age 3 by scale unm/untag (NPTH program)	12	18	26	85	102	118	4	9	13
unknown hatchery SUB age 3 by scale unm/untag (LSRCP program)	50	63	76	326	356	385	22	30	39
unknown hatchery SUB age 4 by scale AD only (LSRCP program)	22	31	40	0	0	0	0	0	0
unknown hatchery SUB age 4 by scale AD only (IPC program)	26	36	46	0	0	0	0	0	0
unknown hatchery SUB age 4 by scale unm/untag (NPTH program)	1	5	8	0	3	6	0	0	0
unknown hatchery SUB age 4 by scale unm/untag (LSRCP program)	650	698	742	363	398	429	0	0	0
unknown hatchery SUB age 5 by scale unm/untag (NPTH program)	6	11	17	1	3	6	0	0	0
unknown hatchery SUB age 5 by scale unm/untag (LSRCP program)	204	228	255	49	62	75	0	0	0
unknown hatchery yearling age 2 by scale AD only	0	0	0	0	0	0	56	70	85
unknown hatchery yearling age 3 by scale AD only	2	5	8	9	15	22	0	0	0

Appendix L, Table1 (continued)

Origin	CWT	L	Females	U	L	Males	U	L	<53cm	U
unknown hatchery yearling age 4 by scale AD only		6	11	16	2	5	9	0	0	0
unknown hatchery yearling age 2 by scale unm/untag		0	0	0	0	0	0	72	87	103
unknown hatchery yearling age 3 by scale unm/untag		0	0	0	120	138	157	64	80	94
unknown hatchery yearling age 4 by scale unm/untag		17	26	34	14	22	29	0	0	0
unknown hatchery yearling age 5 by scale unm/untag		2	6	10	0	0	0	0	0	0
Presumed Snake R. wild SUB age 2 by scale Jack		0	0	0	0	0	0	156	181	204
Presumed Snake R. WILD res rear age 2 by scales		0	0	0	0	0	0	45	57	70
Presumed Snake R. WILD res rear age 3 by scales		21	30	39	505	545	582	0	0	0
Presumed Snake R. WILD sub age 3 by scales		69	84	100	268	300	327	0	0	0
Snake R. basin DNA, presumed WILD res rear age 3 by scales		3	6	11	15	24	32	0	0	0
Snake R. Basin DNA, presumed WILD Sub age 3 by scales		0	0	0	16	24	32	0	0	0
Snake R. WILD DNA, wild res rear age 3 by scales		0	0	0	2	6	10	0	0	0
Snake R. WILD DNA, wild sub age 3 by scales		0	0	0	2	6	10	0	0	0
Snake R. WILD PIT tag, WILD res rear age 3 by scales		0	0	0	2	5	10	0	0	0
Snake R. WILD PIT tag, WILD sub age 3 by scales		0	0	0	2	5	9	0	0	0
Snake R wild RR age 3 LGR by PIT		0	0	0	2	5	10	0	0	0
Snake R. Basin PIT tag, Presumed Snake R. WILD res rear age 3 by scales		0	0	0	6	11	17	0	0	0
Presumed Snake R. WILD res rear age 4 by scales		158	181	203	131	152	172	0	0	0
Presumed Snake R. WILD sub age 4 by scales		153	174	198	37	49	60	0	0	0
Snake R. Basin DNA, presumed WILD res rear age 4 by scales		12	19	26	10	16	23	0	0	0
Snake R. Basin DNA, presumed WILD sub age 4 by scales		22	31	40	2	5	9	0	0	0
Snake R. WILD DNA, wild res rear age 4 by scales		3	6	11	0	0	0	0	0	0
Snake R. WILD DNA, wild sub age 4 by scales		2	6	11	0	0	0	0	0	0
Snake R wild SUB transport in river age 4 by PIT		0	0	0	2	5	9	0	0	0
Snake R. WILD PIT tag, age 4 by PIT tag (detected pre-trapping)		0	1	3	0	0	0	0	0	0
Presumed Snake R. WILD res rear age 5 by scales		125	145	166	32	43	54	0	0	0
Presumed Snake R. WILD sub age 5 by scales		111	130	149	22	31	40	0	0	0

Appendix L, Table 1 (continued)

Origin	CWT	L	Females	U	L	Males	U	L	<53cm	U
Snake R. Basin DNA, presumed WILD res rear age 5 by scales		6	11	17	0	0	0	0	0	0
Snake R. Basin DNA, presumed Wild sub age 5 by scales		6	11	17	2	5	9	0	0	0
Presumed Snake R. WILD sub age 6 by scales		0	0	0	2	6	10	0	0	0
Snake R. Basin DNA, presumed WILD res rear age 6 by scales		2	6	10	0	0	0	0	0	0

Appendix L. Table 2. Run Reconstruction estimates of fall Chinook run to LGR Dam during the trapping period, before the trap was opened, and after the trap was closed during 2007.

		Run during trapping			Run Pre-trapping			Run post-trapping			Total Run to LGR			
Groupings in Run Composition		F	M	<53	F	M	<53	F	M	<53	F	M	<53	Grand total
Wires and associated no wire groups														
63BLANK (subyearlings age 3 by scales, presumed from UMA)		10	5	0	0	0	0	0	0	0	11	5	0	16
BLANK (yearlings age 4 by scales, presumed from BONN)		36	10	0	1	0	0	0	0	0	37	10	0	47
LF04SPL1-IPCPA	073336	0	10	0	0	0	0	0	0	0	0	11	0	11
BONN04YUMA	092039	0	85	5	0	3	0	0	0	0	0	88	5	94
UMA03SUMA	094028	5	0	0	0	0	0	0	0	0	6	0	0	6
BONN03YUMA	094053	0	5	0	0	0	0	0	0	0	0	5	0	5
UMA05UMA	094415	0	5	5	0	0	0	0	0	0	0	5	5	11
UMA05UMA	094417	0	0	5	0	0	0	0	0	0	0	0	5	5
UMA05SUMA	094418	0	0	5	0	0	0	0	0	0	0	0	5	5
LF05SPL1-IPCIPCPA	094419	0	27	387	0	1	4	0	0	0	0	28	391	419
LF04SIPCHC	106676	6	16	0	0	1	0	0	0	0	6	17	0	23
LF04SIPCHC	106776	16	0	0	1	0	0	0	0	0	17	0	0	17
LF03SIPCPLA	106973	6	0	0	0	0	0	0	0	0	6	0	0	6
LF04SIPCHC	107176	0	6	0	0	0	0	0	0	0	0	6	0	6
LF03SIPCPA	107976	6	0	0	0	0	0	0	0	0	6	0	0	6
LF05SIPCPA	108977	0	11	61	0	0	1	0	0	0	0	11	61	72
LF04SIPCHC	109370	6	0	0	0	0	0	0	0	0	6	0	0	6
LF05SIPCPA	109477	0	26	131	0	1	1	0	0	0	0	27	133	160

Appendix L, Table 2 (continued)

Groupings in Run Composition		Run during trapping			Run Pre-trapping			Run post-trapping			Total Run to LGR			Grand total
		F	M	<53	F	M	<53	F	M	<53	F	M	<53	
LF05SIPCPA	109577	0	26	96	0	1	1	0	0	0	0	27	97	124
NPTH04SA	610108	10	10	0	0	0	0	0	0	0	10	11	0	21
NPTH02SO2	610110	6	0	0	0	0	0	0	0	0	6	0	0	7
LF02SBCA	610122	15	0	0	1	0	0	0	0	0	16	0	0	16
LF02SPLA	610123	11	0	0	0	0	0	0	0	0	11	0	0	11
LF04YBCA	610144	31	206	21	1	8	0	0	0	0	32	214	21	268
LF03YBCA	610145	48	15	0	2	1	0	0	0	0	50	16	0	65
LF03YPLA	610146	62	35	0	2	1	0	0	0	0	65	36	0	101
LF03YBCA	610147	41	15	0	2	1	0	0	0	0	43	16	0	59
LF04YBCA	610148	50	132	40	2	5	0	0	0	0	52	138	40	230
LF03YPLA	610149	46	15	0	2	1	0	0	0	0	47	16	0	63
LF04YPA	610150	65	214	51	3	8	1	0	0	0	67	223	51	341
LF04YCJA	610151	40	275	49	2	11	1	0	1	0	41	286	50	378
LF04YCJA	610152	82	341	53	3	13	1	0	1	0	85	355	53	493
LF04YPA	610153	102	267	25	4	10	0	0	1	0	107	278	25	410
LF04SCJA	610154	81	45	3	3	2	0	0	0	0	85	47	3	135
LF04SCCD	610155	5	11	0	0	0	0	0	0	0	6	11	0	17
LF05SBCA	610174	0	42	200	0	2	2	0	0	0	0	44	202	246
LF05SBCA	610175	0	189	669	0	7	7	0	0	0	0	197	677	874
LF05SCJA	610176	0	42	275	0	2	3	0	0	0	0	43	279	322
LF05SCJA	610177	0	87	778	0	3	9	0	0	0	0	91	787	878
LF05SCCD2	610178	0	0	127	0	0	1	0	0	0	0	0	128	128
LF02YPLA	612502	5	0	0	0	0	0	0	0	0	5	0	0	5
LF03SBCA	612500	62	0	0	2	0	0	0	0	0	64	0	0	64
LF04SBCA	612504	141	146	0	6	6	0	0	0	0	146	152	0	298
LF05YPA	612505	0	0	37	0	0	0	0	0	0	0	0	37	38
LF05YCJA	612506	0	0	35	0	0	0	0	0	0	0	0	36	36
LF05YBC	612507	0	0	15	0	0	0	0	0	0	0	0	15	16
LF05YBC	612508	0	0	30	0	0	0	0	0	0	0	0	30	30
LF05YCJA	612509	0	0	46	0	0	1	0	0	0	0	0	46	46
LF05YPA	612510	0	0	40	0	0	0	0	0	0	0	0	41	41

Appendix L, Table 2 (continued)

		Run during trapping			Run Pre-trapping			Run post-trapping			Total Run to LGR			
Groupings in Run Composition		**F**	**M**	**<53**	**F**	**M**	**<53**	**F**	**M**	**<53**	**F**	**M**	**<53**	**Grand total**
LF03SCJA	612600	56	15	0	2	1	0	0	0	0	58	16	0	74
NPTH05SCFA	612653	0	15	132	0	1	1	0	0	0	0	16	134	150
NPTH05SLGA	612655	0	5	75	0	0	1	0	0	0	0	6	75	81
LF02YBCA	612659	5	5	0	0	0	0	0	0	0	5	5	0	10
NPTH05SCFA	612660	0	0	29	0	0	0	0	0	0	0	0	29	29
LF05YPA	612661	0	0	5	0	0	0	0	0	0	0	0	5	6
NPTH04SA	612669	0	10	0	0	0	0	0	0	0	0	11	0	11
NPTH04SA	612670	0	8	0	0	0	0	0	0	0	0	8	0	9
NPTH05SNLVA	612671	0	0	161	0	0	2	0	0	0	0	0	163	164
NPTH04SA	612672	15	0	0	1	0	0	0	0	0	16	0	0	16
NPTH03SA	612675	11	5	0	0	0	0	0	0	0	11	5	0	17
NPTH05SO	612698	0	15	124	0	1	1	0	0	0	0	16	126	142
NPTH05SNLVA	612707	0	31	136	0	1	2	0	0	0	0	32	138	170
NPTH05SO	612709	5	131	876	0	5	10	0	0	0	5	137	886	1029
LF01YO	631585	5	0	0	0	0	0	0	0	0	5	0	0	5
LF03YO	631769	321	110	5	13	4	0	1	0	0	334	114	5	453
LF03YO	631770	321	60	0	13	2	0	1	0	0	334	63	0	397
LF03SO	631786	11	5	0	0	0	0	0	0	0	11	5	0	17
LF02YO	632167	10	10	0	0	0	0	0	0	0	10	10	0	21
LF03YO	632368	31	20	0	1	1	0	0	0	0	32	21	0	53
LF04SGRRD	632782	15	21	0	1	1	0	0	0	0	16	22	0	38
LF04SO	632787	20	21	0	1	1	0	0	0	0	21	22	0	43
LF04YO	633283	267	834	124	10	33	1	1	2	0	278	869	125	1272
LF04YO	633284	189	849	88	7	33	1	0	2	0	197	884	89	1169
KLICK05S	633377	0	0	55	0	0	1	0	0	0	0	0	56	56
KLICK05S	633578	0	0	45	0	0	1	0	0	0	0	0	46	46
LF05SO	633582	0	91	606	0	4	7	0	0	0	0	95	613	708
LF05SCCD1	633583	0	41	398	0	2	4	0	0	0	0	43	402	445
LF05SGRRD	633584	0	32	260	0	1	3	0	0	0	0	33	262	295
LF05YO	633597	0	0	209	0	0	2	0	0	0	0	0	211	211

Appendix L, Table 2 (continued)

	Run during trapping			Run Pre-trapping			Run post-trapping			Total Run to LGR			
Groupings in Run Composition	**F**	**M**	**< 53**	**F**	**M**	**<53**	**F**	**M**	**<53**	**F**	**M**	**<53**	**Grand total**
LF05YO 633598	0	0	162	0	0	2	0	0	0	0	0	164	165
PIT tagged fish													
Snake R hatchery SUB TRANS EVAL age 2 by PIT	0	0	25							0	0	25	25
Snake R LYFE SUB age 2 by PIT	0	10	20							0	10	20	30
Snake R hatchery SUB NPT cedar flats age 2 by PIT	0	5	0							0	5	0	5
Snake R hatchery SUB SNAKE4 age 2 by PIT	0	0	5							0	0	5	5
Snake R hatchery SUB IPC trans eval HCD age 2 by PIT	0	0	10							0	0	10	10
Snake R hatchery SUB surrogate COE SNAKE3 age 3 by PIT	5	5	0							5	5	0	10
Snake R hatchery SUB surrogate COE BCCAP age 3 by PIT	0	20	0							0	20	0	20
Snake R hatchery SUB-NPTH program NLV age 3 by PIT (detected pre-trap period)	0	0	0		1					0	1	0	1
													0
Inbasin untagged hatchery fish assigned to unassociated releases:													
assigned to unassociated release HC05S-umatilla subyearlings AD only age 2	0	229	298	0	9	3	0	0	0	0	239	301	540
assigned to unassociated release LF05Sonstation (est) subyearlings unm/untag age 2	0	91	747	0	4	8	0	0	0	0	94	755	850
assigned to unassociated release HC04SIPC-umatilla subyearlings AD only age 3	2	335	0	0	13	0	0	1	0	2	349	0	351
assigned to unassociated release GR04SDirect (est) subyearlings unm/untag age 3	26	145	13	1	6	0	0	0	0	27	151	13	191
assigned to unassociated release CCD04SDirect (est) subyearlings unm/untag age 3	9	50	4	0	2	0	0	0	0	9	52	4	66
assigned to unassociated release NPTH04S (est) subyearlings unm/untag age 3	2	9	1	0	0	0	0	0	0	2	10	1	12
assigned to unassociated release PL03S1 (non IPC) (est) subyearlings unm/untag age 4	14	8	0				0	0	0	14	8	0	21
assigned to unassociated release HC02SIPC1-umatilla subyearlings AD only age 5	3	0	0	0	0	0	0	0	0	3	0	0	3
assigned to unassociated release HC02SIPC2-oxbow subyearlings AD only age 5	3	0	0	0	0	0	0	0	0	3	0	0	3
													0
Unknown hatchery origin (inbasin or out-of-basin) left over after assignments-Presume inbasin													
unknown hatchery SUB age 3 by scale unm/untag	78	440	38	3	17	0	0	1	0	81	458	39	578
unknown hatchery SUB age 4 by scale AD only	64	0	0	3	0	0	0	0	0	66	0	0	66
unknown hatchery SUB age 4 by scale unm/untag	675	385	0	26	15	0	1	1	0	703	401	0	1104
unknown hatchery SUB age 5 by scale unm/untag	229	62	0	9	2	0	0	0	0	239	65	0	304
													0

Appendix L, Table 2 (continued)

Groupings in Run Composition	Run during trapping			Run Pre-trapping			Run post-trapping			Total Run to LGR			Grand total
	F	M	<53	F	M	<53	F	M	<53	F	M	<53	
Unknown hatchery origin yearling AD only (inbasin or out-of-basin) left over after assignments-Presume inbasin													
unknown hatchery yearling age 2 by scale AD only	0	0	70	0	0	1	0	0	0	0	0	70	70
unknown hatchery yearling age 3 by scale AD only	5	15	0	0	1	0	0	0	0	5	15	0	20
unknown hatchery yearling age 4 by scale AD only	10	5	0	0	0	0	0	0	0	11	5	0	16
													0
Unknown hatchery yearling unm/untag (inbasin or out-of-basin) left over after assignments-Presume inbasin													
unknown hatchery yearling age 2 by scale unm/untag	0	0	86	0	0	1	0	0	0	0	0	87	87
unknown hatchery yearling age 3 by scale unm/untag	0	133	79	0	5	1	0	0	0	0	138	80	218
unknown hatchery yearling age 4 by scale unm/untag	25	21	0	1	1	0	0	0	0	26	22	0	48
unknown hatchery yearling age 5 by scale unm/untag	6	0	0	0	0	0	0	0	0	6	0	0	6
Wild Snake River fall Chinook													
Presumed Snake R. wild SUB age 2 by scale Jack	0	0	178	0	0	4	0	0	0	0	0	182	182
Presumed Snake R. WILD res rear age 2 by scales	0	0	56	0	0	1	0	0	0	0	0	57	57
Presumed Snake R. WILD res rear age 3 by scales	28	500	0	2	45	0	0	0	0	30	545	0	575
Presumed Snake R. WILD sub age 3 by scales	77	276	0	7	25	0	0	0	0	84	300	0	384
Snake R. basin DNA, presumed WILD res rear age 3 by scales	6	22	0	1	2	0	0	0	0	6	24	0	30
Snake R. Basin DNA, presumed WILD Sub age 3 by scales	0	22	0	0	2	0	0	0	0	0	24	0	24
Snake R. WILD DNA, wild res rear age 3 by scales	0	5	0	0	0	0	0	0	0	0	6	0	6
Snake R. WILD DNA, wild sub age 3 by scales	0	5	0	0	0	0	0	0	0	0	6	0	6
Snake R. WILD PIT tag, WILD res rear age 3 by scales	0	5	0	0	0	0	0	0	0	0	5	0	5
Snake R. WILD PIT tag, WILD sub age 3 by scales	0	5	0	0	0	0	0	0	0	0	5	0	5
Snake R wild RR age 3 LGR by PIT	0	5	0	0	0	0	0	0	0	0	5	0	5
Snake R. Basin PIT tag, Presumed Snake R. WILD res rear age 3 by scales	0	10	0	0	1	0	0	0	0	0	11	0	11
Presumed Snake R. WILD res rear age 4 by scales	167	140	0	15	12	0	0	0	0	181	152	0	334
Presumed Snake R. WILD sub age 4 by scales	160	45	0	14	4	0	0	0	0	174	49	0	223
Snake R. Basin DNA, presumed WILD res rear age 4 by scales	17	15	0	2	1	0	0	0	0	19	16	0	35
Snake R. Basin DNA, presumed WILD sub age 4 by scales	28	5	0	3	0	0	0	0	0	31	5	0	36
Snake R. WILD DNA, wild res rear age 4 by scales	6	0	0	1	0	0	0	0	0	6	0	0	6

Appendix L, Table 2 (continued)

Groupings in Run Composition	Run during trapping			Run Pre-trapping			Run post-trapping			Total Run to LGR			
	F	M	M<53	F	M	M<53	F	M	M<53	F	M	M<53	
Snake R. WILD DNA, wild sub age 4 by scales	6	0	0	1	0	0	0	0	0	6	0	0	6
Snake R wild SUB transport in river age 4 by PIT	0	5	0	0	0	0	0	0	0	0	5	0	5
Snake R. WILD PIT tag, age 4 by PIT tag (detected pre-trapping)				1						1	0	0	1
Presumed Snake R. WILD res rear age 5 by scales	134	40	0	12	4	0	0	0	0	145	43	0	189
Presumed Snake R. WILD sub age 5 by scales	119	28	0	11	3	0	0	0	0	130	31	0	161
Snake R. Basin DNA, presumed WILD res rear age 5 by scales	10	0	0	1	0	0	0	0	0	11	0	0	11
Snake R. Basin DNA, presumed Wild sub age 5 by scales	10	5	0	1	0	0	0	0	0	11	5	0	17
Presumed Snake R. WILD sub age 6 by scales	0	5	0	0	0	0	0	0	0	0	6	0	6
Snake R. Basin DNA, presumed WILD res rear age 6 by scales	5	0	0	0	0	0	0	0	0	6	0	0	6
Grand Total	**4,204**	**7,771**	**8,307**	**203**	**361**	**94**	**7**	**14**	**2**	**4,415**	**8,145**	**8,403**	20,963

Appendix L, Table 3. Estimated number of wire tagged fall Chinook in run to LGR Dam during 2008.

		TOTAL RUN DURING TRAPPING			TOTAL EXPANDED FOR PRE-TRAPPING			TOTAL EXPANDED FOR POST-TRAPPING			TOTAL RUN TO LGR			
Origin code	CWT	Females	Males	Males < 53cm	Females	Males	Males < 53cm	Females	Males	Males < 53cm	Females	Males	Males < 53cm	Grand Total
LF06SIPCHC	101273	0.0	0.0	10.0	0.0	0.0	0.0				0.0	0.0	10.0	10.0
LF06SIPCHC	100471	8.3	0.0	0.0	0.1	0.0	0.0				8.4	0.0	0.0	8.4
LF06SIPCHC	103880	0.0	5.0	31.5	0.0	0.1	0.1				0.0	5.0	31.6	36.6
LF06SIPCHC	104480	0.0	0.0	59.6	0.0	0.0	0.1				0.0	0.0	59.7	59.7
LF04SIPCHC	106676	33.2	0.0	0.0	0.4	0.0	0.0				33.6	0.0	0.0	33.6
LF04SIPCHC	106776	10.1	0.0	0.0	0.1	0.0	0.0				10.2	0.0	0.0	10.2
LF05SIPCHC	108977	44.2	59.4	0.0	0.5	0.7	0.0				44.7	60.1	0.0	104.8
LF05SIPCHC	109477	39.9	126.0	0.0	0.5	1.5	0.0				40.4	127.5	0.0	167.9
LF05SIPCHC	109577	20.0	88.0	0.0	0.2	1.0	0.0				20.3	89.0	0.0	109.3
LF04YBCA	610144	126.0	15.3	0.0	1.5	0.2	0.0				127.5	15.4	0.0	142.9
LF03YBCA	610145	9.4	0.0	0.0	0.1	0.0	0.0				9.5	0.0	0.0	9.5
LF03YBCA	610147	9.4	0.0	0.0	0.1	0.0	0.0				9.5	0.0	0.0	9.5
LF04YBCA	610148	113.9	20.5	0.0	1.3	0.2	0.0				115.2	20.7	0.0	135.9
LF03YPLA	610149	9.4	0.0	0.0	0.1	0.0	0.0				9.5	0.0	0.0	9.5
LF04YPA	610150	159.9	18.9	0.0	1.9	0.2	0.0				161.8	19.1	0.0	180.9
LF04YCJA	610151	223.5	44.4	0.0	2.6	0.5	0.0				226.1	44.9	0.0	271.0
LF04YCJA	610152	226.4	43.9	0.0	2.6	0.5	0.0				229.1	44.4	0.0	273.5
LF04YPA	610153	97.5	25.2	0.0	1.1	0.3	0.0				98.7	25.5	0.0	124.2
LF04SCJA	610154	15.1	73.1	0.0	0.2	0.9	0.0				15.3	74.0	0.0	89.2
LF05SBCA	610174	93.0	183.0	0.0	1.1	2.1	0.0				94.1	185.1	0.0	279.2
LF05SBCA	610175	132.0	283.0	15.2	1.5	3.3	0.0				133.5	286.3	15.3	435.1
LF05SCJA	610176	151.0	270.0	0.0	1.8	3.1	0.0				152.8	273.1	0.0	425.9
LF05SCJA	610177	146.0	230.0	0.0	1.7	2.7	0.0				147.7	232.7	0.0	380.4
LF05SCCD2	610178	5.0	120.0	19.9	0.1	1.4	0.0				5.1	121.4	20.0	146.5
Hanford05WILD	610412	0.0	8.7	0.0	0.0	0.1	0.0				0.0	8.8	0.0	8.8

Appendix L, Table 3 (continued)

		TOTAL RUN DURING TRAPPING			TOTAL EXPANDED FOR PRE-TRAPPING			TOTAL EXPANDED FOR POST-TRAPPING			TOTAL RUN TO LGR			
Origin code	CWT	Females	Males	Males < 53cm	Females	Males	Males < 53cm	Females	Males	Males < 53cm	Females	Males	Males < 53cm	Grand Total
LF05YPLA	612505	0.0	67.7	23.5	0.0	0.8	0.0				0.0	68.5	23.6	92.0
LF05YCJA	612506	0.0	28.1	18.3	0.0	0.3	0.0				0.0	28.4	18.3	46.7
LF05YBC	612507	9.4	104.1	51.5	0.1	1.2	0.1				9.5	105.3	51.5	166.3
LF05YBC	612508	0.0	56.1	46.0	0.0	0.7	0.1				0.0	56.7	46.1	102.8
LF05YCJA	612509	0.0	64.9	10.0	0.0	0.8	0.0				0.0	65.7	10.0	75.6
LF05YPLA	612510	8.3	51.0	33.4	0.1	0.6	0.1				8.4	51.6	33.5	93.4
LF06YCJA	612511	0.0	0.0	2,243.7	0.0	0.0	3.7			1.0	0.0	0.0	2,248.4	2,248.4
LF06YPLA	612512	0.0	0.0	927.5	0.0	0.0	1.5				0.0	0.0	929.1	929.1
LF06YBCA	612513	0.0	0.0	473.7	0.0	0.0	0.8				0.0	0.0	474.5	474.5
LF06YCJA	612514	0.0	0.0	1,989.5	0.0	0.0	3.3				0.0	0.0	1,992.8	1,992.8
LF06YPLA	612515	0.0	0.0	746.5	0.0	0.0	1.2				0.0	0.0	747.8	747.8
LF06YBCA	612516	0.0	0.0	1,036.7	0.0	0.0	1.7				0.0	0.0	1,038.4	1,038.4
LF03SCJA	612600	0.0	5.1	0.0	0.0	0.1	0.0				0.0	5.1	0.0	5.1
NPTH05SCFA	612653	22.8	41.5	0.0	0.3	0.5	0.0				23.1	42.0	0.0	65.0
NPTH05SLGA	612655	32.1	46.6	0.0	0.4	0.5	0.0				32.5	47.1	0.0	79.6
NPTH05SCFA	612660	0.0	39.6	0.0	0.0	0.5	0.0				0.0	40.1	0.0	40.1
LF05YPLA	612661	0.0	8.9	0.0	0.0	0.1	0.0				0.0	9.0	0.0	9.0
NPTH05SNLVA	612671	68.0	108.0	8.3	0.8	1.3	0.0				68.8	109.3	8.3	186.4
NPTH04SA	612672	13.4	0.0	0.0	0.2	0.0	0.0				13.5	0.0	0.0	13.5
NPTH03SA	612675	5.1	0.0	0.0	0.1	0.0	0.0				5.2	0.0	0.0	5.2
NPTH06SO	612696	0.0	33.5	165.0	0.0	0.4	0.3				0.0	33.9	165.3	199.2
NPTH05SO	612698	43.9	41.9	0.0	0.5	0.5	0.0				44.4	42.4	0.0	86.8
NPTH06SO	612699	0.0	0.0	133.0	0.0	0.0	0.2				0.0	0.0	133.2	133.2
NPTH05SNLVA	612707	95.7	103.3	0.0	1.1	1.2	0.0				96.8	104.5	0.0	201.2
NPTH05SO	612709	214.0	444.0	13.2	2.5	5.2	0.0				216.5	449.2	13.2	678.9
NPTH06SNLVA	612710	0.0	0.0	52.3	0.0	0.0	0.1				0.0	0.0	52.4	52.4

Appendix L, Table 3 (continued)

Origin code	CWT	TOTAL RUN DURING TRAPPING			TOTAL EXPANDED FOR PRE-TRAPPING			TOTAL EXPANDED FOR POST-TRAPPING			TOTAL RUN TO LGR			Grand Total
		Females	Males	Males < 53cm	Females	Males	Males < 53cm	Females	Males	Males < 53cm	Females	Males	Males < 53cm	
LF06SCJA	612727	0.0	0.0	39.7	0.0	0.0	0.1				0.0	0.0	39.8	39.8
LF06SCJA	612728	0.0	0.0	46.6	0.0	0.0	0.1				0.0	0.0	46.7	46.7
LF06SBCA	612729	0.0	0.0	70.0	0.0	0.0	0.1				0.0	0.0	70.1	70.1
LF06SBCA	612730	0.0	0.0	77.7	0.0	0.0	0.1				0.0	0.0	77.9	77.9
LF06SPLA	612731	0.0	0.0	34.4	0.0	0.0	0.1				0.0	0.0	34.4	34.4
LF06SPLA	612732	0.0	0.0	53.5	0.0	0.0	0.1				0.0	0.0	53.6	53.6
NPTH06SLGA	612733	0.0	0.0	12.3	0.0	0.0	0.0				0.0	0.0	12.4	12.4
NPTH06CFA	612734	0.0	0.0	29.6	0.0	0.0	0.0				0.0	0.0	29.6	29.6
LF03YO	631769	15.0	0.0	0.0	0.2	0.0	0.0				15.1	0.0	0.0	15.1
LF03YO	631770	33.8	0.0	0.0	0.4	0.0	0.0				34.2	0.0	0.0	34.2
LF03YO	632368	5.0	0.0	0.0	0.1	0.0	0.0				5.0	0.0	0.0	5.0
KLICK03S	632381	5.0	0.0	0.0	0.1	0.0	0.0				5.1	0.0	0.0	5.1
LF04SGRRD	632782	5.0	0.0	0.0	0.1	0.0	0.0				5.1	0.0	0.0	5.1
LF04SO	632787	10.4	0.0	0.0	0.1	0.0	0.0				10.5	0.0	0.0	10.5
KLICK04S	632968	9.4	0.0	0.0	0.1	0.0	0.0				9.5	0.0	0.0	9.5
LF04YO	633283	495.3	160.2	0.0	5.8	1.9	0.0				501.0	162.1	0.0	663.1
LF04YO	633284	568.5	97.2	0.0	6.6	1.1	0.0				575.1	98.3	0.0	673.4
LF05SO	633582	332.0	686.0	0.0	3.9	8.0	0.0		1.0		335.9	695.0	0.0	1,030.9
LF05SCCD1	633583	315.0	536.0	0.0	3.7	6.2	0.0				318.7	542.2	0.0	860.9
LF05SGRRD	633584	39.2	54.5	13.3	0.5	0.6	0.0				39.7	55.1	13.3	108.1
LF05YO	633597	23.8	658.9	96.3	0.3	7.7	0.2		1.0		24.1	667.6	96.4	788.1
LF05YO	633598	46.5	441.8	158.0	0.5	5.1	0.3				47.0	447.0	158.3	652.3
LF06SO	633986	0.0	5.2	239.0	0.0	0.1	0.4				0.0	5.3	239.4	244.7
LF06YO	633987	0.0	0.0	1,972.7	0.0	0.0	3.3				0.0	0.0	1,975.9	1,975.9
LF06YO	634092	0.0	0.0	2,872.3	0.0	0.0	4.7			2.0	0.0	0.0	2,879.0	2,879.0
BONN04YUMA	092039	18.7	8.9	0.0	0.2	0.1	0.0				18.9	9.0	0.0	27.9

Appendix L, Table 3 (continued)

		TOTAL RUN DURING TRAPPING			TOTAL EXPANDED FOR PRE-TRAPPING			TOTAL EXPANDED FOR POST-TRAPPING			TOTAL RUN TO LGR			
Origin code	CWT	Females	Males	Males < 53cm	Females	Males	Males < 53cm	Females	Males	Males < 53cm	Females	Males	Males < 53cm	Grand Total
LF05SIPCPLA	094419	24.5	86.0	5.0	0.3	1.0	0.0				24.8	87.0	5.0	116.8
09BLANK	09BLANK	0.0	42.8	131.0	0.0	0.5	0.2				0.0	43.3	131.2	174.5
BLANK-yrl age 3	BLANK		35.8	5.0	0.0	0.4	0.0				0.0	36.2	5.0	41.2
BLANK-yrl age 4	BLANK	184.0	130.9		2.1	1.5	0.0				186.2	132.5	0.0	318.6
BLANK-yrl age 5	BLANK	76.0	0.0		0.9	0.0	0.0				76.9	0.0	0.0	76.9
TRINITYRIV04S	065322	10.4	0.0	0.0	0.1	0.0	0.0				10.5	0.0	0.0	10.5
UMA05SUMA	094415	20.8	0.0	0.0	0.2	0.0	0.0				21.0	0.0	0.0	21.0
UMA05SUMA	094416	10.4	25.0	0.0	0.1	0.3	0.0				10.5	25.3	0.0	35.8
UMA05SUMA	094417	9.4	0.0	0.0	0.1	0.0	0.0				9.5	0.0	0.0	9.5
BONN06YUMA	094505	0.0	0.0	8.3	0.0	0.0	0.0				0.0	0.0	8.3	8.3
BONN06YUMA	094506	0.0	0.0	24.9	0.0	0.0	0.0				0.0	0.0	24.9	24.9
	Total wires	4,444.0	5,827.8	13,997.9	51.8	67.9	23.1	0.0	2.0	3.0	4,495.8	5,897.7	14,024.0	24,417.5

Appendix M: Estimated Numbers and Percent Smolt-to-Adult Returns to the Snake River for BY1994-BY2006

(Estimates are based upon Snake River escapement estimates through run year 2008. All estimates are based on CWTs and do not include untagged fish. Data includes SARs for fish released as part of the LSRCP, IPC, and NPTH programs).

Appendix M. Table 1. Estimated number and percent smolt-to-adult returns for yearling fall Chinook with ADCWTs that were released in the Snake River basin: BY94-BY06.

Brood Year	Site	CWT	Release date	fpp	0-salt	1-salt	2-salt	3-salt	4-salt	5-salt	Total
Completed Returns											
1994	LFH	635844	9-Apr	11	0.096	0.114	0.156	0.065	0.002		0.433
					190	226	310	128	4		858
		635845	9-Apr	11	0.102	0.083	0.139	0.055	0.003	0.001	0.382
					213	172	289	114	7	2	797
	PL	635712	12-Apr	10	0.011	0.008	0.029	0.004	0.003		0.055
					13	9	33	5	3		63
1995	BC	635959	14-Apr	10	0.022	0.040	0.045	0.124	0.014		0.245
					16	29	32	89	10		176
		635960	14-Apr	10	0.016	0.056	0.040	0.071			0.183
					12	41	29	52			134
	BC	635953	14-May	12		0.007	0.014	0.072			0.092
						2	4	21			27
		636025	14-May	12	0.007	0.021	0.014	0.139	0.007		0.187
					1	3	2	20	1		27
	LFH	636320	4-Apr	9	0.079	0.440	0.444	0.136	0.009		1.109
					173	958	967	297	20		2415
		636321	4-Apr	9	0.097	0.469	0.458	0.140	0.002		1.166
					212	1021	998	304	5		2540
	PL	635957	14-Apr	11	0.021	0.071	0.052	0.103	0.009		0.256
					14	48	35	69	6		172
		635958	14-Apr	11	0.021	0.080	0.064	0.108	0.004		0.277
					14	54	43	73	3		187
1996	BC	630110	13-Apr	30		0.008					0.008
						1					1
		636126	13-Apr	10				0.130			0.130
								20			20
		636343	13-Apr	10			0.702				0.702
							56				56
		636347	13-Apr	10		0.034	0.493				0.527
						8	117				125
	CJ	630363	13-Apr	11	0.015	0.015	0.015	0.103			0.147
					1	1	1	7			10
		630401	13-Apr	11		0.070					0.070
						1					1
		636345	13-Apr	11	0.015	0.021	0.327	0.030			0.393
					9	13	198	18			238
		636346	13-Apr	11	0.016	0.023	0.179	0.061			0.279
					10	14	111	38			173
	LFH	630163	3-Apr	10	0.032	0.147	0.219	0.105	0.016		0.520
					64	294	439	211	33		1041
		636318	3-Apr	10	0.029	0.137	0.180	0.087	0.001		0.435
					60	286	376	182	2		906

Appendix M, Table 1 (continued)

Brood Year	Site	CWT	Release date	fpp	0-salt	1-salt	2-salt	3-salt	4-salt	5-salt	Total
1996	PL	630446	13-Apr	10	0.016	0.009	0.137	0.081			0.244
					11	6	93	55			165
		630448	13-Apr	10	0.015	0.026	0.138	0.293	0.004		0.477
					10	18	94	200	3		325
1997	BC	630454	12-Apr	10	0.005	0.151	0.149	0.028			0.333
					8	229	227	42			506
	BC	630938	26-Apr	11	0.001	0.067	0.303	0.001			0.373
					1	51	230	1			283
	CJ	630453	12-Apr	12	0.022	0.574	0.220	0.020	0.006		0.843
					34	896	344	32	10		1316
	LFH	630860	1-Apr	8	0.130	0.398	0.490	0.115	0.003		1.136
					560	1710	2109	494	12		4885
	PL	630451	12-Apr	10	0.017	0.238	0.150	0.067			0.472
					24	332	209	93			658
1998	BC	631012	11-Apr	11	0.060	0.214	0.247	0.040			0.561
					78	280	322	52			732
	CJ	631013	1-Apr	8	0.159	0.544	0.204	0.080	0.006		0.992
					208	714	267	105	8		1302
	LFH	631213	24-Mar	9	0.167	0.562	0.295	0.135	0.005		1.164
					756	2548	1339	612	22		5277
	PL	631212	11-Apr	10	0.058	0.146	0.101	0.025			0.331
					77	195	135	34			441
1999	BC	630477	9-Apr	10	0.042	0.219	0.042	0.002			0.305
					48	248	47	2			345
	CJ	630478	4-Apr	10	0.061	0.256	0.124	0.016			0.457
					62	260	126	16			464
	LFH	630476	1-Apr	9	0.005	0.314	0.310	0.093	0.007		0.729
					18	1057	1046	312	23		2456
	PL	630479	10-Apr	10	0.021	0.134	0.049	0.008			0.212
					22	139	51	8			220
2000	BC	630677	10-Apr	13	0.145	0.130	0.107	0.022			0.403
					226	203	167	34			630
	CJ	630183	16-Apr	17	0.107	0.178	0.143	0.017			0.446
					172	285	229	28			714
	LFH	631273	1-Apr	9	0.187	0.525	0.481	0.127	0.009		1.329
					801	2247	2059	545	38		5690
	PL	630678	15-Apr	13	0.327	0.189	0.214	0.045			0.775
					520	301	341	71			1233
2001	BC	610119	14-Apr	11	0.057	0.123	0.055	0.011			0.246
					82	177	79	16			354
	CJ	610118	30-Mar	10	0.189	0.299	0.157	0.012			0.657
					285	450	236	18			989
	LFH	631585	1-Apr	10	0.298	0.755	0.412	0.033	0.001		1.499
					1530	3881	2117	169	6		7703
	PL	610120	13-Apr	9	0.068	0.182	0.043	0.001			0.295
					94	253	60	2			409

Appendix M, Table 1 (continued)

Brood Year	Site	CWT	Release date	fpp	0-salt	1-salt	2-salt	3-salt	4-salt	5-salt	Total
2002	BC	612659	14-Apr	9		0.054	0.043	0.010			0.108
						58	46	11			115
	CJ	612503	2-Apr	9		0.091	0.042	0.001			0.134
						137	64	1			202
	LFH	632167	12-Apr	10	0.090	0.156	0.126	0.013			0.385
					387	666	538	54			1645
	PL	612502	12-Apr	10		0.079	0.028	0.003			0.110
						114	40	5			159
2003	BC	610147	4-Apr	10	0.145	0.194	0.098	0.017			0.454
					92	123	62	11			288
	LFH	631769	28-Mar	9	0.251	0.473	0.406	0.019			1.149
					546	1030	883	42			2501
		632368	28-Mar	9	0.073	0.402	0.576	0.050			1.102
					12	66	95	8			181
	PL	610149	13-Apr	10	0.077	0.257	0.093	0.014			0.441
					54	180	65	10			309
Incomplete Returns through return year 2008											
2004	BC	610148	12-Apr	9	0.496	0.354	0.207				1.057
					331	236	138				705
	CJ	610151	11-Apr	9	1.191	0.553	0.389				2.133
					836	388	273				1497
	LFH	633283	5-Apr	10	0.373	0.918	0.375				1.666
					837	2063	842				3742
	PL	610150	5-Apr	10	0.312	0.511	0.275				1.097
					209	342	184				735
2005	BC	612507	18-Apr	10	0.022	0.245					0.267
					15	166					181
	CJ	612506	13-Apr	10	0.052	0.068					0.120
					36	47					83
	LFH	633598	2-Apr	11	0.108	0.424					0.532
					244	960					1204
	PL	612505	16-Apr	10	0.058	0.145					0.203
					37	93					130
		612661	16-Apr	10	0.073	0.132					0.205
					5	9					14
2006	BC	612513	15-Apr	9	0.700						0.700
					478						478
	CJ	612511	14-Apr	8	3.259						3.259
					2250						2250
	LFH	633987	7-Apr	10	0.986						0.986
					2288						2288
	PL	612512	14-Apr	10	1.368						1.368
					932						932

Appendix M. Table 2. Estimated numbers and percent smolt-to-adult returns for non-adipose clipped yearling fall Chinook with CWTs that were released in the Snake River basin for BY94-BY06

Brood Year	Site	CWT	Release date	fpp	0-salt	1-salt	2-salt	3-salt	4-salt	5-salt	Total
Completed Returns											
2003	BC	610145	4-Apr	10	0.167	0.171	0.106	0.013			0.457
					121	124	77	10			332
	LFH	631770	28-Mar	9	0.196	0.414	0.384	0.026			1.021
					428	904	838	57			2227
	PL	610146	13-Apr	10	0.057	0.173	0.131				0.361
					45	137	104				286
Incomplete Returns through return year 2008											
2004	BC	610144	12-Apr	9	0.394	0.464	0.240				1.098
					234	276	143				653
	CJ	610152	11-Apr	9	1.224	0.642	0.354				2.221
					957	502	277				1736
	LFH	633284	5-Apr	10	0.380	0.879	0.397				1.656
					840	1942	876				3658
	PL	610153	5-Apr	10	0.403	0.532	0.160				1.095
					313	413	124				850
2005	BC	612508	18-Apr	10	0.039	0.136					0.175
					30	105					135
	CJ	612509	13-Apr	10	0.059	0.096					0.155
					46	76					122
	LFH	633597	2-Apr	10	0.140	0.490					0.630
					310	1082					1392
	PL	612510	16-Apr	10	0.056	0.130					0.186
					41	94					135
2006	BC	612516	15-Apr	9	1.345						1.345
					1045						1045
	CJ	612514	14-Apr	8	2.415						2.415
					2003						2003
	LFH	634092	7-Apr	10	1.465						1.465
					3228						3228
	PL	612515	14-Apr	10	0.921						0.921
					751						751

Appendix M. Table 3. Estimated numbers and smolt-to-adult returns for subyearling fall Chinook with ADCWTs that were released in the Snake River basin for BY94-BY06.

Brood Year	Release site	CWT	Release date	fpp	1-salt	2-salt	3-salt	4-salt	5-salt	Total
Completed Returns										
1996	BC	635120	10-Jun	64	0.033	0.081	0.078	0.020		0.212
					39	97	94	24		254
		635316	10-Jun	64	0.028	0.090	0.067	0.018		0.202
					32	102	76	20		230
1998	LFH	631026	15-Jun	50	0.208	0.347	0.173	0.018		0.747
					423	704	352	37		1516
1999	LFH	630167	26-May	46	0.111	0.102	0.090	0.018	0.001	0.321
					216	198	174	35	1	624
2000	Col. R.-below BONN Dam	630270	1-Jun	46	0.033	0.025	0.013	0.002		0.072
					65	49	26	3		143
2001	LFH	630890	24-Jun	52	0.051	0.126	0.057	0.013		0.247
					98	243	109	25		475
2002	LFH	631545	6-Jun	50	0.066	0.034	0.024			0.124
					130	68	47			245
	CCD	631391	9-Jun	40	0.031	0.034	0.008			0.074
					31	34	8			73
2003	LFH	631786	21-Jun	51	0.034	0.039	0.012	0.001		0.085
					67	76	23	1		167
	PL-IPC	106973	24-May	54		0.048	0.017			0.064
						17	6			23
		107976	24-May	54	0.031	0.013	0.009			0.053
					20	8	6			34
		108076	24-May	54	0.033					0.033
					20					20
Incomplete Returns through return year 2008										
2004	CCD [vs. CJ]	610155	26-May	49	0.023	0.009	0.001			0.032
					42	17	1			60
	GRR Direct	632782	25-May	56	0.036	0.020	0.003			0.059
					69	39	5			113
	HC Dam-IPC	100471	28-Apr	62	0.039		0.041			0.080
					8		8			16
		106676	28-Apr	62	0.032	0.043	0.063			0.137
					17	23	34			74
		106776	28-Apr	62	0.048	0.031	0.019			0.098
					26	17	10			53
		107176	28-Apr	62	0.101	0.024				0.125
					25	6				31
		109370	28-Apr	62	0.038	0.028				0.066
					8	6				14
	LFH	632787	27-May	51	0.041	0.029	0.006			0.077
					81	57	13			151
	NPTH	612670	17-May	115		0.011				0.011
						11				11

Appendix M, Table 3 (continued)

Brood Year	Release site	CWT	Release date	fpp	1-salt	2-salt	3-salt	4-salt	5-salt	Total
2004	NPTH	612672	17-May	121	0.018	0.013	0.010			0.040
					25	18	14			57
	PL-IPC	073336	25-May	50	0.004	0.005				0.009
					9	11				20
2005	BC	610174	25-May	57	0.256	0.288				0.544
					250	281				531
	CJ [vs. CCD]	610176	25-May	46	0.327	0.433				0.760
					323	427				750
	CCD [vs. CJ]	633583	30-May	56	0.230	0.440				0.670
					450	863				1313
	CCD	610178	22-Jun	50	0.061	0.071				0.132
					128	147				275
	GRR Direct	633584	19-Jun	51	0.150	0.055				0.205
					296	108				404
	HC Dam	108977	2-May	80	0.175	0.254				0.429
					72	105				177
		109477	2-May	80	0.239	0.251				0.490
					160	168				328
		109577	2-May	80	0.182	0.161				0.343
					124	109				233
	LFH	633582	1-Jun	52	0.384	0.556				0.940
					772	1119				1891
	NPT-North Lapwai Valley	612671	17-May	72	0.164	0.187				0.351
					163	186				349
	NPTH	612698	8-Jun	59	0.144	0.088				0.232
					143	87				230
	PL1-IPC	094419	22-May	53	0.226	0.063				0.289
					419	117				536
2006	BC	612729	28-May	50	0.071					0.071
					70					70
	CJ	612727	29-May	50	0.040					0.040
					40					40
	HC Dam-IPC	101273	8-May	55	0.009					0.009
					10					10
		103880	8-May	55	0.032					0.032
					37					37
		104480	8-May	55	0.052					0.052
					60					60
	LFH	633986	23-May	62	0.136					0.136
					264					264
	NPTH	612699	11-Jun	38	0.135					0.135
					133					133
	PL	612732	26-May	50	0.055					0.055
					54					54

Appendix M. Table 4. Estimated number and percent smolt-to-adult returns for non-adipose clipped subyearling fall Chinook with CWTs that were released in the Snake River basin for BY94-BY06.

Brood Year	Release site	CWT	Release date	fpp	1-salt	2-salt	3-salt	4-salt	5-salt	Total
Completed Returns										
1998	BC	631025	2-Jun	84	0.493	0.437	0.244	0.031	0.003	1.209
					963	854	477	60	6	2360
1999	CJ	630168	20-May	45	0.110	0.102	0.109	0.006	0.005	0.331
					213	198	210	11	9	641
	CJ	630169	15-Jun	52	0.268	0.198	0.193	0.008		0.666
					521	385	375	16		1297
2000	BC	630271	29-May	53	0.112	0.082	0.040	0.010	0.004	0.248
					221	162	78	19	8	488
	PL	630272	28-May	84	0.054	0.026	0.012		0.004	0.096
					106	52	24		8	190
2001	BC	612639	27-May	193	0.107	0.178	0.097	0.014		0.396
					212	352	192	27		783
	CJ	610106	28-May	215	0.078	0.077	0.084	0.010		0.249
					144	142	156	19		461
	CJ	610105	20-Jun	152	0.254	0.265	0.162	0.009		0.691
					464	484	296	17		1261
	PL	612501	27-May	166	0.058	0.057	0.045	0.004		0.163
					115	114	89	8		326
2002	BC	610122	3-Jun	95	0.053	0.042	0.010	0.009		0.113
					102	81	19	17		219
	CJ	610121	28-May	81	0.023	0.037				0.060
					46	72				118
	CJ	612654	12-Jun	74	0.034	0.048	0.010			0.091
					64	89	18			171
	NPT-North Lapwai Valley	610109	28-May	61	0.030	0.012	0.010			0.052
					23	9	8			40
		612648	28-May	61	0.086					0.086
					8					8
		612657	28-May	61			0.011			0.011
							8			8
	NPTH	610107	2-Jun	38	0.015	0.004	0.004			0.024
					30	8	8			46
	NPTH	610110	19-Jun	81	0.120	0.092	0.053	0.007		0.273
					118	90	52	7		267
	PL	610123	4-Jun	130	0.005	0.027	0.004	0.006		0.042
					9	52	8	11		80
2003	BC	612500	3-Jun	80	0.038	0.050	0.032			0.121
					76	99	64			239
	CJ	612600	29-May	55	0.034	0.048	0.038	0.003		0.123
					66	92	74	5		237
	NPTH	612675	4-Jun	55	0.024	0.021	0.010	0.003		0.058
					40	34	16	5		95

Appendix M, Table 4 (continued)

Brood Year	Release site	CWT	Release date	fpp	1-salt	2-salt	3-salt	4-salt	5-salt	Total
Incomplete Returns through return year 2008										
2004	NPTH	610108	17-May	115	0.004	0.011				0.015
					8	21				29
		612669	17-May	121	0.018	0.010				0.028
					19	11				30
2005	BC	610175	25-May	57	0.884	0.445				1.329
					875	440				1315
	CJ	610177	25-May	46	0.887	0.383				1.270
					881	380				1261
	NPT-Cedar Flats	612653	13-Jun	33	0.933	0.404				1.337
					150	65				215
		612660	13-Jun	33	0.308	0.426				0.735
					29	40				69
	NPT-Lukes Gulch	612655	13-Jun	37	0.323	0.317				0.640
					81	80				161
	NPT-North Lapwai Valley	612707	17-May	72	0.173	0.204				0.377
					171	201				372
	NPTH	612709	8-Jun	59	0.521	0.343				0.864
					1029	679				1708
2006	BC	612730	28-May	50	0.079					0.079
					79					79
	CJ	612728	29-May	50	0.047					0.047
					47					47
	NPT-Cedar Flats	612734	11-Jun	47	0.119					0.119
					30					30
	NPT-Lukes Gulch	612733	4-Jun	37	0.050					0.050
					12					12
	NPTH	612696	11-Jun	38	0.102					0.102
					199					199
	PL	612731	26-May	50	0.035					0.035
					34					34

Appendix M. Table 5. Estimated numbers and percent smolt-to-adult returns for <u>subyearling</u> fall Chinook with CWTs that have both non-adipose clipped and adipose clipped fish in the same release that were released in the Snake River basin for BY94-BY06.

Brood Year	Release site	CWT	Release date	fpp	1-salt	2-salt	3-salt	4-salt	5-salt	Total
Incomplete Returns through return year 2008										
2004	BC	612504	30-May	55	0.060	0.153				0.214
					118	299				417
	CJ [vs. CCD]	610154	28-May	47	0.025	0.075	0.049			0.149
					45	137	89			271
2006	NPT-North Lapwai Valley	612710	22-May	51	0.036					0.036
					52					52

Appendix N: Estimated Numbers and Percent Smolt-to-Adult Survivals for BY1994-BY2006

(Estimates are based upon RMIS download on 01/06/10 for ocean and freshwater recoveries and Snake River escapement estimates through run year 2008. All estimates are based on CWTs and do not include untagged fish. Data includes SARs for fish released as part of the LSRCP, IPC, and NPTH programs).

Appendix N. Table 1. Estimated numbers and percent smolt-to-adult survivals for yearling fall Chinook with ADCWTs that were released in the Snake River basin for BY94-BY06.

Brood Year	Site	CWT	Release date	fpp	0-salt	1-salt	2-salt	3-salt	4-salt	5-salt	Total
Completed Returns											
1994	LFH	635844	9-Apr	11	0.100	0.138	0.257	0.132	0.003		0.631
					198	274	510	261	7		1250
		635845	9-Apr	11	0.106	0.104	0.229	0.107	0.004	0.001	0.551
					221	216	478	222	9	2	1148
	PL	635712	12-Apr	10	0.022	0.024	0.084	0.029	0.003		0.162
					25	27	96	33	3		185
1995	BC	635959	14-Apr	10	0.022	0.105	0.261	0.162	0.023		0.574
					16	75	187	116	17		412
		635960	14-Apr	10	0.018	0.096	0.287	0.122	0.003		0.526
					13	70	210	89	2		384
	BC	635953	14-May	12		0.007	0.025	0.072			0.103
						2	7	21			30
		636024	14-May	12			0.438				0.438
							3				3
		636025	14-May	12	0.014	0.032	0.096	0.219	0.007		0.368
					2	5	14	32	1		53
	LFH	636320	4-Apr	9	0.080	0.524	0.916	0.233	0.017		1.770
					175	1140	1995	508	37		3856
		636321	4-Apr	9	0.098	0.561	0.936	0.260	0.010		1.865
					213	1221	2040	567	21		4061
	PL	635957	14-Apr	11	0.026	0.133	0.279	0.260	0.020	0.010	0.727
					17	89	188	175	13	7	489
		635958	14-Apr	11	0.021	0.134	0.293	0.172	0.011		0.631
					14	91	197	116	7		425
1996	BC	630110	13-Apr	30		0.008		0.019			0.027
						1		2			3
		636126	13-Apr	10			0.100	0.197			0.297
							15	30			46
		636343	13-Apr	10			0.880				0.880
							70				70
		636347	13-Apr	10	0.004	0.057	0.581	0.030			0.673
					1	14	138	7			160
	CJ	630363	13-Apr	11	0.015	0.015	0.104	0.193			0.327
					1	1	7	13			22
		630401	13-Apr	11		0.070	0.253				0.323
						1	4				5
		636345	13-Apr	11	0.020	0.060	0.435	0.080	0.011		0.607
					12	36	263	49	7		367
		636346	13-Apr	11	0.016	0.042	0.336	0.134			0.528
					10	26	209	83			327
	LFH	630163	3-Apr	10	0.032	0.192	0.400	0.189	0.021		0.834
					64	385	800	378	42		1670

Appendix N, Table 1 (continued)

Brood Year	Site	CWT	Release date	fpp	0-salt	1-salt	2-salt	3-salt	4-salt	5-salt	Total
1996	LFH	636318	3-Apr	10	0.030	0.168	0.348	0.152	0.003		0.700
					62	350	725	317	5		1460
	PL	630446	13-Apr	10	0.028	0.072	0.280	0.178	0.007		0.565
					19	49	189	121	4		382
		630448	13-Apr	10	0.021	0.067	0.276	0.333	0.004		0.701
					14	46	188	227	3		478
1997	BC	630454	12-Apr	10	0.005	0.211	0.320	0.043			0.580
					8	321	486	65			881
	BC	630938	26-Apr	11	0.005	0.123	0.442	0.015			0.584
					3	93	335	12			443
	CJ	630453	12-Apr	12	0.037	0.694	0.626	0.055	0.006		1.418
					58	1084	978	86	10		2215
	LFH	630860	1-Apr	8	0.151	0.669	1.343	0.192	0.006		2.361
					649	2879	5779	824	26		10157
	PL	630451	12-Apr	10	0.024	0.321	0.398	0.077	0.002		0.822
					34	448	555	107	2		1147
1998	BC	631012	11-Apr	11	0.078	0.290	0.541	0.095	0.001		1.005
					102	378	706	125	2		1313
	CJ	631013	1-Apr	8	0.216	0.729	0.849	0.169	0.013		1.977
					283	957	1114	221	17		2593
	LFH	631213	24-Mar	9	0.176	0.752	0.948	0.240	0.008		2.124
					798	3409	4296	1090	38		9631
	PL	631212	11-Apr	10	0.080	0.274	0.470	0.073	0.004		0.900
					106	366	627	97	5		1201
1999	BC	630477	9-Apr	10	0.050	0.237	0.082	0.024	0.003		0.395
					57	268	93	27	3		447
	CJ	630478	4-Apr	10	0.085	0.318	0.247	0.059	0.002		0.710
					86	323	251	59	2		721
	LFH	630476	1-Apr	9	0.014	0.453	0.852	0.241	0.012		1.571
					47	1525	2872	812	41		5297
	PL	630479	10-Apr	10	0.026	0.158	0.158	0.027			0.369
					27	164	164	28			383
2000	BC	630677	10-Apr	13	0.151	0.185	0.227	0.077	0.001		0.641
					236	289	355	121	1		1002
	CJ	630183	16-Apr	17	0.112	0.253	0.304	0.074			0.743
					179	405	487	119			1191
	LFH	631273	1-Apr	9	0.193	0.657	0.923	0.273	0.011		2.057
					824	2813	3949	1169	48		8804
	PL	630678	15-Apr	13	0.334	0.279	0.464	0.135	0.001		1.214
					531	444	739	215	2		1931
2001	BC	610119	14-Apr	11	0.057	0.159	0.142	0.020			0.378
					82	228	204	28			542
	CJ	610118	30-Mar	10	0.197	0.414	0.408	0.066			1.085
					297	623	614	99			1632

Appendix N. Table 2. Estimated numbers and percent smolt-to-adult survivals for non-adipose clipped yearling fall Chinook with CWTs that were released in the Snake River basin for BY94-BY06

Brood Year	Site	CWT	Release date	fpp	0-salt	1-salt	2-salt	3-salt	4-salt	5-salt	Total
Completed Returns											
2003	BC	610145	4-Apr	10	0.167	0.196	0.172	0.020			0.556
					121	143	125	15			404
	LFH	631770	28-Mar	9	0.202	0.484	0.575	0.032			1.293
					441	1056	1254	69			2820
	PL	610146	13-Apr	10	0.057	0.182	0.204				0.443
					45	145	162				351
Incomplete Returns											
2004	BC	610144	12-Apr	9	0.394	0.531	0.332				1.257
					234	316	198				747
	CJ	610152	11-Apr	9	1.224	0.763	0.434				2.422
					957	596	340				1893
	LFH	633284	5-Apr	10	0.380	0.968	0.488				1.835
					840	2138	1077				4055
	PL	610153	5-Apr	10	0.403	0.642	0.215				1.260
					313	498	167				978
2005	BC	612508	18-Apr	10	0.039	0.136					0.175
					30	105					135
	CJ	612509	13-Apr	10	0.059	0.096					0.155
					46	76					122
	LFH	633597	2-Apr	10	0.140	0.490					0.630
					310	1082					1392
	PL	612510	16-Apr	10	0.056	0.130					0.186
					41	94					135
2006	BC	612516	15-Apr	9	1.345						1.345
					1045						1045
	CJ	612514	14-Apr	8	2.415						2.415
					2003						2003
	LFH	634092	7-Apr	10	1.465						1.465
					3228						3228
	PL	612515	14-Apr	10	0.921						0.921
					751						751

Appendix N. Table 3. Estimated number and percent smolt-to-adult survivals for subyearling fall Chinook with ADCWTs that were released in the Snake River basin for BY94-BY06.

Brood Year	Site	CWT	Release date	fpp	1-salt	2-salt	3-salt	4-salt	5-salt	Total
Completed Returns										
1996	BC	635120	10-Jun	64	0.061	0.193	0.205	0.042	0.003	0.503
					73	231	246	50	3	602
		635316	10-Jun	64	0.054	0.214	0.190	0.036		0.493
					62	244	216	41		562
1998	LFH	631026	15-Jun	50	0.239	0.544	0.374	0.041		1.198
					484	1104	759	84		2431
1999	LFH	630167	26-May	46	0.120	0.172	0.159	0.032	0.001	0.483
					234	334	308	62	1	939
2000	Col. R.-below BONN Dam	630270	1-Jun	46	0.040	0.060	0.083	0.006		0.189
					80	119	166	11		375
2001	LFH	630890	24-Jun	52	0.053	0.152	0.098	0.029	0.005	0.337
					101	292	189	55	9	647
2002	LFH	631545	6-Jun	50	0.067	0.057	0.032	0.001		0.158
					134	113	63	3		313
	CCD	631391	9-Jun	40	0.031	0.052	0.016	0.002		0.102
					31	51	16	2		100
2003	LFH	631786	21-Jun	51	0.039	0.068	0.027	0.001		0.136
					78	135	54	3		269
	PL-IPC	106973	24-May	54		0.075	0.025			0.100
						27	9			36
		107976	24-May	54	0.031	0.026	0.019			0.077
					20	16	12			49
		108076	24-May	54	0.033	0.027	0.003			0.063
					20	17	2			39
Incomplete Returns										
2004	CCD [vs. CJ]	610155	26-May	49	0.025	0.034	0.010			0.069
					47	62	18			128
	GRR Direct	632782	25-May	56	0.036	0.040	0.009			0.085
					69	77	18			163
	HC Dam-IPC	100471	28-Apr	62	0.039	0.067	0.041			0.146
					8	14	8			30
		106676	28-Apr	62	0.039	0.064	0.063			0.166
					21	34	34			89
		106776	28-Apr	62	0.055	0.031	0.029			0.116
					30	17	16			62
		107176	28-Apr	62	0.105	0.038				0.143
					26	9				35
		109370	28-Apr	62	0.038	0.042				0.080
					8	9				17
	LFH	632787	27-May	51	0.042	0.036	0.009			0.087
					83	71	17			171
	NPTH	612670	17-May	115		0.015	0.002			0.017
						15	2			17

Appendix N, Table 3 (continued)

Brood Year	Site	CWT	Release date	fpp	1-salt	2-salt	3-salt	4-salt	5-salt	Total
2004	NPTH	612672	17-May	121	0.018	0.014	0.010			0.042
					25	20	14			58
	PL-IPC	073336	25-May	50	0.004	0.008				0.012
					9	16				25
2005	BC	610174	25-May	57	0.261	0.353				0.614
					255	345				601
	CJ [vs. CCD]	610176	25-May	46	0.369	0.618				0.987
					364	610				974
	CCD [vs. CJ]	633583	30-May	56	0.259	0.643				0.902
					508	1260				1768
	CCD	610178	22-Jun	50	0.068	0.112				0.180
					142	234				376
	GRR Direct	633584	19-Jun	51	0.155	0.099				0.254
					304	196				500
	HC Dam	108977	2-May	80	0.181	0.486				0.667
					75	200				275
		109477	2-May	80	0.265	0.331				0.596
					177	221				398
		109577	2-May	80	0.232	0.304				0.537
					158	207				365
	LFH	633582	1-Jun	52	0.416	0.815				1.231
					837	1640				2476
	NPT-North Lapwai Valley	612671	17-May	72	0.167	0.219				0.386
					166	218				384
	NPTH	612698	8-Jun	59	0.149	0.149				0.297
					148	147				295
	PL1-IPC	094419	22-May	53	0.243	0.120				0.363
					451	223				673
2006	BC	612729	28-May	50	0.071					0.071
					70					70
	CJ	612727	29-May	50	0.040					0.040
					40					40
	HC Dam-IPC	101273	8-May	55	0.009					0.009
					10					10
		103880	8-May	55	0.032					0.032
					37					37
		104480	8-May	55	0.052					0.052
					60					60
	LFH	633986	23-May	62	0.136					0.136
					264					264
	NPTH	612699	11-Jun	38	0.135					0.135
					133					133
	PL	612732	26-May	50	0.055					0.055
					54					54

Appendix N. Table 4. Estimated number and percent smolt-to-adult survivals for non-adipose clipped subyearling fall Chinook with CWTs that were released in the Snake River basin for BY94-BY06.

Brood Year	Site	CWT	Release date	fpp	1-salt	2-salt	3-salt	4-salt	5-salt	Total
Completed Returns										
1998	BC	631025	2-Jun	84	0.494	0.506	0.344	0.036	0.003	1.383
					965	987	671	71	6	2700
1999	CJ	630168	20-May	45	0.111	0.133	0.126	0.007	0.005	0.382
					214	258	245	14	9	739
	CJ	630169	15-Jun	52	0.269	0.253	0.232	0.012		0.766
					523	492	452	23		1491
2000	BC	630271	29-May	53	0.112	0.094	0.053	0.011	0.004	0.275
					221	186	105	21	8	540
	PL	630272	28-May	84	0.054	0.026	0.020	0.001	0.004	0.105
					106	52	39	2	8	207
2001	BC	612639	27-May	193	0.107	0.214	0.121	0.024		0.467
					212	424	240	47		923
	CJ	610106	28-May	215	0.078	0.093	0.099	0.014	0.001	0.285
					144	173	183	26	3	528
	CJ	610105	20-Jun	152	0.254	0.289	0.191	0.027		0.761
					464	526	348	50		1388
	PL	612501	27-May	166	0.058	0.060	0.058	0.009		0.185
					115	119	117	18		369
2002	BC	610122	3-Jun	95	0.053	0.049	0.030	0.009		0.141
					102	94	59	17		272
	CJ	610121	28-May	81	0.025	0.043	0.005			0.073
					49	85	9			142
	CJ	612654	12-Jun	74	0.035	0.057	0.018			0.109
					65	106	33			204
	NPT-North Lapwai Valley	610109	28-May	61	0.030	0.022	0.018	0.003		0.072
					23	17	14	2		56
		612648	28-May	61	0.086					0.086
					8					8
		612657	28-May	61			0.015			0.015
							11			11
	NPTH	610107	2-Jun	38	0.015	0.007	0.005			0.028
					30	14	10			54
	NPTH	610110	19-Jun	81	0.122	0.115	0.083	0.007		0.328
					119	113	82	7		321
	PL	610123	4-Jun	130	0.005	0.027	0.011	0.006		0.049
					9	52	21	11		93
2003	BC	612500	3-Jun	80	0.038	0.054	0.045			0.137
					76	106	89			271
	CJ	612600	29-May	55	0.034	0.055	0.051	0.003		0.142
					66	105	98	5		274
	NPTH	612675	4-Jun	55	0.024	0.024	0.011	0.003		0.062
					40	39	18	5		102

Appendix N, Table 4 (continued)

Brood Year	Site	CWT	Release date	fpp	1-salt	2-salt	3-salt	4-salt	5-salt	Total
Incomplete Returns										
2004	NPTH	610108	17-May	115	0.004	0.011	0.001			0.016
					8	21	2			31
		612669	17-May	121	0.018	0.010	0.001			0.029
					19	11	1			31
2005	BC	610175	25-May	57	0.884	0.508				1.392
					875	503				1378
	CJ	610177	25-May	46	0.891	0.469				1.361
					886	466				1352
	NPT-Cedar Flats	612653	13-Jun	33	0.933	0.536				1.469
					150	86				236
		612660	13-Jun	33	0.308	0.485				0.794
					29	46				75
	NPT-Lukes Gulch	612655	13-Jun	37	0.327	0.353				0.680
					82	89				171
	NPT-North Lapwai Valley	612707	17-May	72	0.173	0.234				0.408
					171	231				402
	NPTH	612709	8-Jun	59	0.523	0.422				0.945
					1034	834				1868
2006	BC	612730	28-May	50	0.079					0.079
					79					79
	CJ	612728	29-May	50	0.047					0.047
					47					47
	NPT-Cedar Flats	612734	11-Jun	47	0.119					0.119
					30					30
	NPT-Lukes Gulch	612733	4-Jun	37	0.050					0.050
					12					12
	NPTH	612696	11-Jun	38	0.102					0.102
					199					199
	PL	612731	26-May	50	0.035					0.035
					34					34

Appendix N. Table 5. Estimated number and percent smolt-to-adult survivals for <u>subyearling</u> fall Chinook with CWTs that have both non-adipose clipped and adipose clipped fish in the same release that were released in the Snake River basin for BY94-BY06.

Brood Year	Site	CWT	Release date	fpp	1-salt	2-salt	3-salt	4-salt	5-salt	Total
Incomplete Returns										
2004	BC	612504	30-May	55	0.060	0.180	0.004			0.244
					118	351	7			476
	CJ [vs. CCD]	610154	28-May	47	0.027	0.082	0.050			0.159
					50	149	90			289
2006	NPT-North Lapwai Valley	612710	22-May	51	0.036					0.036
					52					52

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