Lyons Ferry Hatchery Evaluation
Fall Chinook Salmon
Annual Report: 2011

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 2011 through 15 April 2012.

During 2011, WDFW collected 3,101 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 composition at LGR. At the end of the season, no fish were returned to the river to spawn naturally. Accuracy of identification of origins (hatchery/wild) occurred at three levels: highly accurate, moderately accurate, and relatively unknown. Fish with CWT, VIE or PIT tags contributed to a highly accurate count of hatchery or natural fish in broodstock. Fish with Adipose clips were highly accurate for determination that they were hatchery origin but not accurate about the release location. Fish PIT tagged as juveniles during outmigration past LGR Dam were accurate at determining basin of origin but not hatchery/wild designation. Unmarked/untagged fish were the least accurate group because scale analysis is unable to determine origins. Highly accurate assignments occurred with 66.4% of the broodstock being identified as Snake River hatchery fish based on CWT, VIE, and PIT tags, 0.5% of the broodstock were identified as Snake River natural origin based on PIT tags from seined juveniles in the Snake River, and 0.2% of the broodstock were identified as strays based on CWTs or PIT tags. Moderate accuracy was determined for 2.6% of the broodstock that were AD clipped or had lost/unreadable CWT hatchery fish, and 2.8% of the broodstock that were PIT tagged as Snake River outmigrants (hatchery or natural). Low level accuracy was determined for 27.5% of the broodstock that were unmarked and untagged which could be hatchery or wild. This high rate of uncertainty is not considered acceptable for run reconstruction, stock status monitoring, or for ESA recovery purposes.

Of the 410 males spawned, 379 fish were used multiple times to minimize the use of jacks. Overall, minijacks (zero salt) contributed to 0% of the matings, one salt jacks contributed to 1.8% of the matings, and jills contributed to 2.9% of the matings.

PIT tagged fish (males and females) trapped at LGR Dam were evaluated to determine if there was a relationship between trapping date and spawning date. Run timing was not a predictor of spawn timing.

A total of 4,723,501 green eggs were taken at Lyons Ferry Hatchery in 2011; numerically less than full production goals listed in the *United States v. Oregon Management Agreement*, but well within precision levels expected from large production hatcheries. Egg survival from green to eye-up was 96.4%. Based on hatchery records, overall average fecundity of LGR and LFH trapped females combined was 3,776 eggs/female.

Hatchery staff released BY10 subyearlings into the Snake River on site on 1 June 2011 (202,200 fish at 50.0 fpp). Two additional groups were released: one group into the Snake River near Couse Creek (202,300 fish at 49.0 fpp), and a second group into the Grande Ronde River near Cougar Creek (397,428 fish at 79.5 fpp).

Hatchery staff released BY10 yearlings into the Snake River on site from 10-13 April 2012 (490,000 fish) with peak emigration occurring prior to 9am on 12 April. All release groups were represented by a unique coded wire tag (CWT) group and additionally may have received a passive integrated transponder (PIT) tag as identified in the US *v.* OR production tables. Approximately 51% of the release was AD+CWT tagged and 49% were CWT tagged at release. Visual examinations showed slender bodies and was verified by low K-factors of 1.08 and 1.09. There were no signs of precocity during visual examinations of the salmon at release. PIT tags in 29,990 of the released onstation yearlings (BY10) will be used to monitor returns in-season. Migration timing of PIT tagged fish was calculated from release site to detection facility and juvenile salmon averaged 3.1 km/day to LMO Dam, 5.6 km/day to IHR dam, 8.2 km/day to MCN Dam, 14.2 km/day to John Day Dam, and 16.6 km/day to Bonneville Dam.

Upon return, fish from yearling production were consistently larger than subyearlings at the same salt water age. Yearling females returned at larger sizes than yearling males of the same salt water age until age 3-salt when males were larger than the females. Subyearling females consistently returned at larger sizes than subyearling males of the same salt water age. Minijacks (0-salt) returned from yearling releases but not from subyearling releases. Yearlings returned 1-salt jacks and jills, whereas subyearlings returned one jill. Fork lengths were highly variable and there was overlap between each of the salt water ages.

The Tucannon River was surveyed by foot, covering 92.3% of the historical spawning area of fall Chinook. After expanding for areas not surveyed, an estimated 302 fall Chinook redds were constructed in the river during fall 2011. Carcasses sampled consisted of 64.1% in-basin hatchery fish based on wire (CWT) or VIE tags, 6.1% stray salmon based on wire (CWT or Agency wire tag) recoveries. Presumed to be from inbasin releases, non-tagged AD clipped hatchery fish represented 6.9% and adult returns from hatchery yearling releases by scale pattern analysis represented 5.3%. The remaining 17.6% of the run was unclipped and untagged, therefore are of unknown origin. Currently we are investigating alternate methods of estimating run size based on returns to other areas in the basin, therefore no estimates were made for 2011.

Juvenile production in the Tucannon River was estimated at 24,315 naturally produced fall Chinook from the 2010 spawners. Juvenile fall Chinook were observed at the Tucannon smolt trap from 24 January through 21 July 2011. Median passage date for fall Chinook passing the trap was 22 June 2011. We calculated 76 smolts/redd were produced from the 2010 spawn. Juvenile coho salmon were trapped from 26 January through 22 July with a median passage date of 11 May. Scales were not collected on coho so we were unable to determine brood year of the emigrants, therefore no estimate of total coho emigrants was made.

Characteristics of fall Chinook reaching LGR Dam showed that females tended to arrive earlier than males. The return consisted of 66% males, including jacks. The sex ratio of the return was calculated at 1.9 males+jacks/female. After removal of broodstock and adjustments for fish passing the dam, falling back, and remaining below the dam, the fish estimated passing LGR Dam was 68% males resulting in a sex ratio of 2.1 males+jacks/female. The majority of the run consisted of small males 54 cm or less. The median fork length of males was 51 cm and the median fork length of females was 78 cm.

We calculated that a minimum of 35.7% of the total LSRCP mitigation goal (91,500 fish) was met in 2011. Mitigation numbers presented in this report should be considered minimum estimates. A total of 28,216 LSRCP adult fall Chinook were estimated to have returned to the Columbia basin, including; returns to the Snake River (WDFW and FCAP), fully expanded (CWT tagged and untagged) harvest recoveries of WDFW releases outside of the Snake River, and unexpanded harvest recoveries of FCAP releases with CWTs outside of the Snake River. Returns to the Snake include 500 fish harvested in sport fisheries (from WDFW releases), and an unreported number of fish harvested in tribal fisheries. Harvest reported by IDFG was not included because only observed, non-expanded, harvest was reported to RMIS.

The escapement goal (18,300 hatchery fish) to the Snake River Basin was exceeded in 2011 (WDFW and FCAP). An estimated 11,009 true jacks and jills (1-salt) and 9,316 adults (2-5 salt) contributed. An additional 2,151 minijacks (0-salt) were also estimated to have returned to the Snake River, but do not count toward the mitigation goal. Mitigation fisheries may not be maintained if the naturally produced portion of the population is not maintained at a yet to be determined minimum abundance threshold (critical threshold under ESA permitting) that would be able to sustain the incidental catch and release mortality from tribal and non-tribal fisheries. It is possible that the hatchery return component could be exceeded and fisheries may not be granted because natural origin Chinook abundance is insufficient to sustain incidental fishery impacts.

The preliminary run size of natural origin fish estimated to reach LGR Dam was 8,618 fish $\geq$ 53 cm fork length and 4,017 fish <53 cm fork length. The remaining run consisted of 19,087 fish $\geq$ 53 cm fork length and 11,421 fish < 53 cm fork length, all likely hatchery origin. The stray rate was estimated at 1.4% for fish $\geq$ 53 cm fork length and 0.4% for fish <53 cm fork length. Run reconstruction methods are currently being revised and will have more refinements to improve accuracy and precision of estimates. Finalized run reconstruction estimates back to 2005 in time for a symposium in August of 2013.

Fall Chinook WDFW released into the Snake River at LFH, the Snake River near Couse Creek, and into the Grande Ronde River, resulted in harvest of 2,734 fish in sport fisheries and 6,420 in commercial fisheries, representing 29.9 and 70.1 % of the total harvest recoveries in 2011. WDFW released fish were also recovered at hatcheries (7 salmon recovered at Priest Rapids an Umatilla hatcheries, < 0.1% of all out of basin recoveries) and on spawning grounds (59 salmon on the Hanford reach, 0.2% of all out of basin recoveries) outside of the Snake River basin.

The majority (51 %) of recoveries of LSRCP fish released by WDFW reported to RMIS occurred at saltwater locations and 49% occurred at freshwater locations. Of the total number of fish recovered, 73.2% came from commercial fisheries, and 26.1 % were from sport fisheries, 0.7% were from spawning ground surveys on the Hanford reach, and 0.1% were from hatcheries (Priest Rapids and Umatilla). Harvest occurred in the ocean off the coasts of Washington and British Columbia, but the single largest fishery contributor to harvest was the Zone 6 Gillnet fishery which consisted of 31.2 % of all the fish recovered outside the Snake R. Basin.

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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 2011 to 15 April 2012. WDFW's Snake River Lab (SRL) staff completed this work with Federal fiscal year 2011/2012 funds provided through the U.S. Fish and Wildlife Service (USFWS), under the Lower Snake River Compensation Plan (LSRCP).

This hatchery program began in 1984 after construction of Lyons Ferry Hatchery (LFH, Figure 1) and is part of the LSRCP program authorized by Congress in 1976. The purpose of the LSRCP is to replace adult salmon and steelhead trout lost by construction and operation of four hydroelectric dams on the Lower Snake River in Washington. Specifically, the stated purpose of the plan was:

> *"…[to]….. provide the number of salmon and steelhead trout needed in the Snake River system to help maintain commercial and sport fisheries for anadromous species on a sustaining basis in the Columbia River system and Pacific Ocean" (NMFS & USFWS 1972 pg 14.)*

Subsequently in 1994, additional authorization was provided to construct juvenile acclimation facilities for fall Chinook salmon that would

> " … protect, maintain or enhance biological diversity of existing wild stocks."

Numeric mitigation goals for the LSRCP were established in a three step process (COE 1974). First, the adult escapement that occurred prior to construction of the four dams was estimated. Second, an estimate was made of the reduction in adult escapement (loss) caused by construction and operation of the dams (e.g. direct mortality of smolts resulting in reduced adult abundance and loss to mainstem spawning habitat). Last, a catch to escapement ratio was used to estimate the future production that was forgone in commercial and recreational fisheries as result of the reduced spawning escapement and natural production. Assuming that the fisheries below the project area would continue to be prosecuted into the future as they had in the past, LSRCP adult return goals were expressed in terms of the adult escapement back to, or above the project area.

For fall Chinook salmon, the escapement to the Snake River below Hells Canyon Dam prior to construction of four lower Snake River dams was estimated to be 34,400. Construction and operation of the dams was expected to cause a reduction in the spawning escapement in two ways: 1) the slack water reservoirs created behind the dams was expected to eliminate spawning grounds for 5,000 adults, and 2) 15% of the smolts migrating past each dam were expected to die (48% cumulative mortality).

These factors were expected to reduce the adult escapement by 18,300[1]. This number established the LSRCP escapement mitigation goal back to the project area (Snake River). This reduction in natural spawning escapement was estimated to result in a reduction in the coast-wide commercial/tribal harvest of 54,900 adults, and a reduction in the recreational fishery harvest of 18,300 adults below the project area. In summary the expected total number of adults (excludes minijacks but includes jacks) that would be produced as part of the LSRCP mitigation program was 91,500 (Table 1).

Table 1. Fall Chinook goals as stated in the LSRCP Mitigation document.

Component	Number of Adults
Escapement to Project Area	18,300
Commercial Harvest	54,900
Recreational Harvest	18,300
Total hatchery fish	91,500
Maintain Natural origin population	14,363

Since 1976 when the LSRCP was authorized, many of the parameters and assumptions used to size the hatchery program and estimate the magnitude of benefits have changed.

- The survival rate required to deliver a 4:1 catch to escapement ratio has been less than expected and this has resulted in fewer adults being produced.

- The listing of Snake River fall Chinook and Snake River Steelhead under the Endangered Species Act has resulted in significant curtailment of commercial, recreational and tribal fisheries throughout the ocean and mainstem Columbia River. This has resulted in a higher percentage of the annual hatchery run returning to the project area than was expected.

  Three hatchery programs artificially propagate endemic Snake River fall Chinook. Two of the programs (LSRCP [includes LFH and Fall Chinook Acclimation Project – FCAP)]), and Nez Perce Tribal Hatchery [NPTH]) are integrated programs aimed at increasing harvest and natural-origin abundance via supplementation and harvest mitigation releases. Information about the NPTH is presented in NPT annual reports and is not presented here. The third program (Idaho Power Company [IPC]) is primarily mitigation for lost production due to construction of the Hells Canyon Complex (HCC). Fish are released at two different life stages (sub-yearling and yearling smolts) throughout the basin. Releases occur at 10 release locations. The three programs are highly coordinated in their operations, including broodstock collection at Lower Granite Dam and fish transfers among facilities. Several out of basin hatchery facilities are

[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, USFWS, 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.

utilized (Irrigon and Umatilla) in addition to the in basin facilities and acclimation sites. Marking of hatchery-origin fish was proposed by a Snake River Basin Fall Chinook Salmon Production Program Marking Justification white paper (Rocklage 2004). Mark types and quantities have been adopted under the 2008 - 2017 *United States v. Oregon* Management Agreement (*United States v. Oregon* 2008). At full production levels, 76% of the hatchery-produced fish are marked in some manner, 47% are marked with an adipose fin clip.

In summary, the LSRCP (LFH and FCAP) and IPC overall program purposes are as follows:

1. The goal of the LSRCP program is to mitigate for decreased numbers of fall Chinook harvested and returning to the Snake River due to the construction of the lower Snake River Dams with the presumption that the natural population will remain at 14,363. The first order of business for the LSRCP fall Chinook mitigation program was the egg bank effort to keep this population from becoming extirpated. The conservation of this stock including both demographics and genetic integrity is paramount under the LSRCP. The Snake River fall Chinook program has been a conservation effort from the beginning. Production goals of LSRCP are consistent with *United States v. Oregon* Agreements.

2. The goal of the IPC program is to replace adult fall Chinook salmon lost to the construction and ongoing operation of the HCC by releasing 1,000,000 smolts annually.

3. The immediate goal of the FCAP is a concerted effort to ensure that the Snake River fall Chinook salmon above Lower Granite Dam are not extirpated. FCAP is part of the LSRCP mentioned in item 1 above, but accounting for adults is done separately by NPT. Long-term goals of the project are

- 3.1 Increase the natural population of Snake River fall Chinook spawning above Lower Granite Dam.
- 3.2 Sustain long-term preservation and genetic integrity of this population.
- 3.3 Keep the ecological and genetic impacts of non-target fish populations within acceptable limits.
- 3.4 Assist with the recovery of Snake River fall Chinook.
- 3.5 Provide harvest opportunities for both tribal and non-tribal anglers.

4. There has been substantial effort made to maintain the population's genetic structure and diversity as well as rebuild adult returns of both hatchery and natural origin salmon through supplementation efforts by WDFW. The LSRCP program at LFH has been guided by the following objectives:

- 4.1 Maintain and enhance natural populations of native salmonids
- 4.2 Establish broodstock(s) capable of meeting eggtake needs,
- 4.3 Return adults to the LSRCP area which meet designated goals
- 4.4 Improve or re-establish sport and tribal fisheries.

While recognizing the overarching purpose and goals established for the LSRCP and realities regarding changes since the program was authorized, the following objectives for the beneficial uses of adult returns have been established for the period through 2017 (United States v. Oregon 2008):

1. Contribute to coast-wide ocean fisheries in accordance with the Pacific Salmon Treaty.

2. Contribute to the recreational, commercial and/or tribal fisheries in the mainstem Columbia River consistent with agreed to abundance-based harvest rate schedules established in the 2008 – 2017 *US vs. Oregon* Management Agreement.

3. Spawn enough fish to retain 4.75 million eggs (Lyons Ferry AOP 2009-2010) to assure that production goals as stated in *US vs. Oregon* are met. Fecundities vary depending upon return age classes and run composition, but generally 1,400-2,000 females would need to be spawned to make production goals. In order to produce enough fish to meet the original LSRCP harvest goals, many more fish would need to be trapped, spawned, and reared, or smolt to adult survivals would need to be increased dramatically. Major infrastructure additions would need to occur at LFH for additional production, and changes to the *United States v. Oregon* production tables would need to occur in order to meet the original LSRCP harvest mitigation goals.

4. Estimate the numbers of returns of LSRCP, FCAP, NPTH and IPC program hatchery fish to the Snake River basin (below and above LGR Dam), and estimate the numbers of natural origin fish escaping to spawn above Lower Granite Dam. For these tasks, an additional 1,300-2,000 fish must be recovered so coded wire tag information can be decoded.

5. To provide tribal and non-tribal fisheries in the Snake River consistent with co-manager goals, ESA constraints and permits, and the Columbia River Management Plan.

6. To contribute to hatchery and natural-origin return goals identified in the draft Snake River Fall Chinook Management Plan.

Hatchery-Origin Return Goals

- Interim total return target based on current production levels and survival is 15,484 hatchery-origin fish above Lower Monumental Dam, which is comprised of 9,988 from LSRCP, 3,206 from Nez Perce Tribal Hatchery (NPTH), and 2,290 from IPC. Returns are estimated in-season to Lower Monumental Dam and not to Ice Harbor Dam (located closer to the mouth of the Snake River) because Columbia River salmon dip into the Snake River, cross the dam, then fall back below the dam causing an overestimate of fall Chinook to the Snake River.

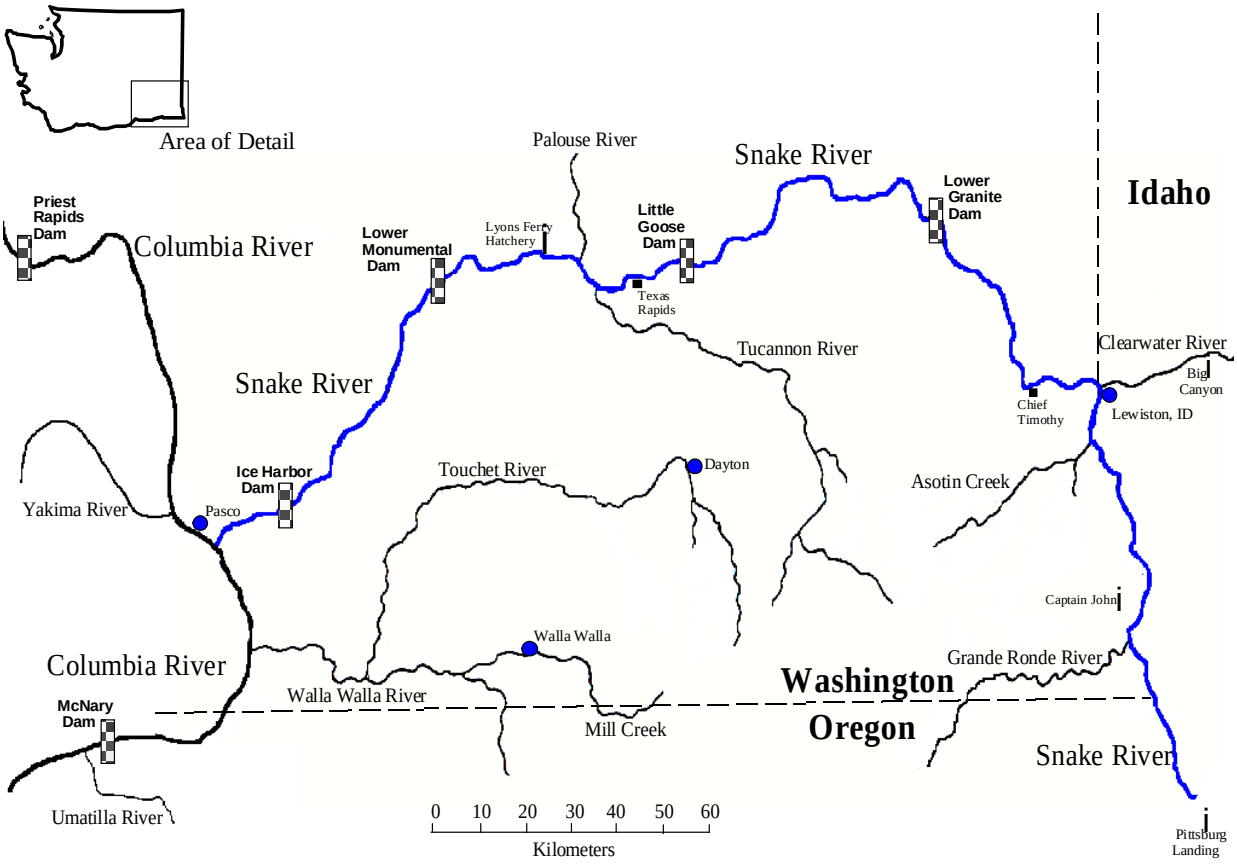
- The long-term goal is for a total return 24,750 hatchery-origin fish above Lower Monumental Dam, which is comprised of 18,300 from LSRCP, 3,750 from NPTH, and 2,700 for IPC.

Natural-Origin Return Goals

- Achieve ESA delisting by attaining interim population abundance in the Snake River ESU of at least 3,000 natural-origin spawners, with no fewer than 2,500 distributed in the mainstem Snake River (as recommended by the Interior Columbia Technical Recovery Team).

- Interim goal is to achieve a population of 7,500 natural-origin fall Chinook (adults and jacks) above Lower Monumental Dam.

- Long term goal is to achieve a population of 14,363 natural-origin fall Chinook (adults and jacks) above Lower Monumental Dam.



Rkm	Location
0.0	Snake River mouth
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)
0.0	Clearwater River mouth
57.0	Big Canyon Acclimation Site
0.0	Grande Ronde River mouth
49.4	Cougar Creek

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

Broodstock Collection and Management 2011

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 2). 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. The trap is closed much of the fall and opened for limited periods during which times fish recycle through the trap if they are not diverted into the brood ponds (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 2. Numbers of Chinook initially collected at LFH and LGR for broodstock, evaluation, and run construction needs in 2011.

Year	Trap Location	Number Collected/Hauled for Broodstock	Processed (killed)	Returned to Snake River	Difference from Number Collected/Hauled
2011	LFH	820	820	0	0
	LGR	2,303	2,281	0	22

Lower Granite Dam Trapping Operations

Fall Chinook were trapped by systematically opening the trap 10% of each hour from 18 August through 20 November. Fish were trapped and hauled to LFH across the run (Figure 2). Trapping protocols are presented in Appendix B. Historical trapping rates and operation dates of systematic sampling at LGR are presented in Appendix C. In general, NOAA Fisheries staff anesthetized the salmon, gathered length and sex data, and indicated if the fish had a fin clip, wire tag or a PIT tag. The fish were then marked with a hole in the operculum prior to release upstream or transport. Approximately 80% of the salmon collected for broodstock were shipped to LFH and 20% were hauled to NPTH. Fish slated for LFH were hauled in a 5,678 L aerated tank truck by WDFW personnel.

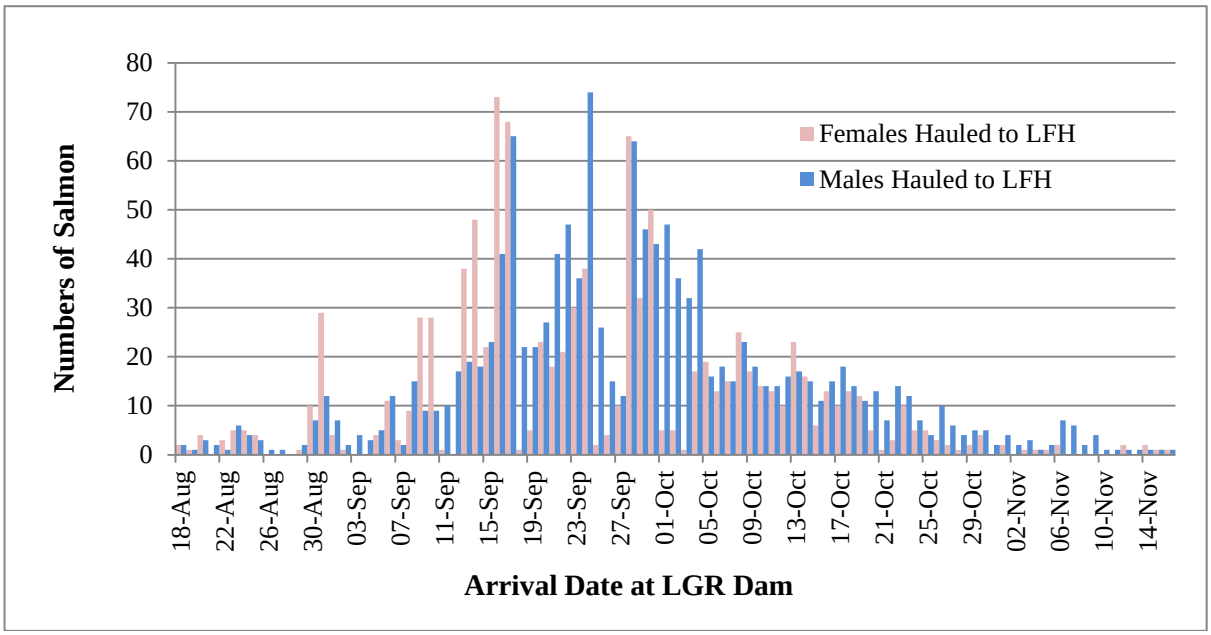


Figure 2. Arrival timing of fall Chinook at LGR Dam that were hauled to LFH in 2011.

LFH Trapping Operations

Broodstock are collected at LFH to fulfill needs not met by trapping at LGR Dam. The trap at LFH was operated periodically from 1 September through 18 October as noted in trapping and sorting protocols provided in Appendix D.

Hatchery Operations 2011

Spawning Operations

Spawning and Egg Take

Sorting of broodstock prior to spawning is an essential task for determining the sex composition and lengths of fish on hand. Both of these enumerations are used to modify trapping and spawning protocols in-season. The LGR pond had approximately a 0.25:1 sex ratio (males/females) in the adults (75 cm or greater), and 4.0:1 sex ratio (males/females) for fish less than 75 cm. A random sample of males <75 cm was taken to determine the age composition of males from LGR for spawning protocol development. Mate selection and spawning protocols changed weekly to allow for maximum use of unmarked/untagged fish from LGR, older aged males ($\geq$ 2-salt), and subyearlings.

The duration, peak of spawning, eggtake, and percent egg mortality (Table 3), numbers of fish spawned (Table 4), and the number killed outright and that died in the pond (Table 5) are provided. Natural origin fish were identified based on PIT tags recovered from fish seined and tagged as juveniles and likely underestimate the numbers of natural origin fish processed. Semen from some males was held overnight for use on the LFH trapped fish. Semen from untagged males held overnight was used in matings first thing the following morning. The goal is to maximize the use of untagged fish during spawning as a way to maximize the proportion of natural origin fish in matings. In 2011 eggtake was within 1% of the 4.75 million goal and therefore was considered attained.

Table 3. Duration and peak of spawning, egg take, and percent egg mortality at LFH, 1984-2011.

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	8 Nov	5 Dec	21 Nov	1,567,823	-	-	21.6
1985	2 Nov	14 Dec	7 Nov	1,414,342	-	-	4.0
1986	22 Oct	17 Dec	19 Nov	592,061	-	-	4.0
1987	20 Oct	14 Dec	17 Nov	5,957,976	-	-	3.8
1988	18 Oct	6 Dec	12 Nov	2,926,748	-	-	3.4
1989	21 Oct	16 Dec	11 Nov	3,518,107	-	-	5.8
1990	20 Oct	8 Dec	6 Nov	3,512,571	-	-	8.3
1991	15 Oct	10 Dec	12 Nov	2,994,676[c]	-	-	8.3
1992	20 Oct	8 Dec	21 Nov	2,265,557[c]	-	-	6.0
1993	19 Oct	7 Dec	2 Nov	2,181,879	-	-	6.7
1994	18 Oct	6 Dec	8 Nov	1,532,404	-	-	5.1
1995	25 Oct	5 Dec	14 Nov	1,461,500	-	-	5.6[d]
1996	22 Oct	3 Dec	5 Nov	1,698,309	-	-	4.6
1997	21 Oct	2 Dec	4 Nov	1,451,823[e]	-	-	5.2
1998	20 Oct	8 Dec	3 Nov	2,521,135	-	-	5.1
1999	19 Oct	14 Dec	9 & 10 Nov	4,668,267	-	-	9.4
2000	24 Oct	5 Dec	7 & 8 Nov	4,190,338	-	-	5.9
2001	23 Oct	27 Nov	13 & 14 Nov	4,734,234	-	-	6.4
2002	22 Oct	25 Nov	12 & 13 Nov	4,910,467	-	-	3.6
2003	21 Oct	2 Dec	10 & 12 Nov	2,812,751	8	9	3.1
2004	19 Oct	22 Nov	9 & 10 Nov	4,625,638	16	17	3.3
2005	18 Oct	29 Nov	15 & 16 Nov	4,929,630	16	17	3.5
2006	24 Oct	5 Dec	7 & 8 Nov	2,819,004	8	9	3.2
2007	23 Oct	3 Dec	13 & 14 Nov	5,143,459	17	-	3.3
2008	21 Oct	25 Nov	4 & 5 Nov	5,010,224	17	-	3.7
2009	20 Oct	18 Nov	9 & 10 Nov	4,574,182	17	12,14 [f]	4.7
2010	19 Oct	30 Nov	16 Nov	4,619,533	16	17	2.7
2011	18 Oct	21 Nov	7 & 8 Nov	4,723,501	10&15&,17[g]	11-14,16	3.5

[a] Priority levels as listed in the *US v. Oregon fall agreement* production tables (Appendix E).
[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.
[f] Priority levels 12 and 14 did not meet production goal. However, overall production in the subyearling group was more than required.
[g] Fully covered through priority 10 and priorities 15 and 17 were also fully covered.

Table 4. Spawn dates, numbers of fall Chinook, and weekly egg take of fish spawned at LFH in 2011. (LFH and LGR trapped fish are combined and jacks are included with males).

Spawn Dates	Hatchery and Unk Origin Males[a]	Natural Origin Males	Hatchery and Unk Origin Females[a]	Natural Origin Females	Non-Viable [b]	Egg Take
18 Oct	10	0	29	0	0	115,476
25 Oct	37	0	104	0	1	387,196
1 & 2 Nov	100	0	305	3	3	1,192,815
7 & 8 Nov	114	2	360	0	0	1,316,284
15 Nov	80	1	273	0	0	1,052,414
21 Nov	66	0	177	0	0	659,316
Totals	**407**	**3**	**1,248**	**3**	**4**	**4,723,501**

[a] Numbers of fish presented include spawned fish whose progeny were later destroyed.
[b] Non-viable females—not ripe when killed.

Table 5. Weekly summary and origins of mortality and surplus fall Chinook processed at LFH in 2011. (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
04-Sep	0	0	0	0	0	2	0	0	0	0	0	0
11-Sep	0	0	0	0	0	0	28	0	0	0	0	0
18-Sep	0	0	0	1	0	0	49	0	0	0	0	0
25-Sep	1	1	0	0	0	1	118	0	0	0	2	0
02-Oct	0	0	0	0	0	3	316	0	0	0	7	0
09-Oct	1	0	0	1	0	2	171	1	0	0	0	0
16-Oct	0	2	0	0	2	3	73	0	0	0	1	0
23-Oct	2	5	0	1	1	5	56	0	0	0	2	0
30-Oct	2	6	0	0	1	1	7	0	0	0	1	1
06-Nov	0	2	0	0	0	0	12	0	0	0	4	11
13-Nov	15	9	0	0	0	3	5	1	0	0	9	10
20-Nov	44	21	0	0	1	4	9	0	0	0	1	6
27-Nov	62	56	0	0	4	3	9	7	0	0	2	4
04-Dec	12	18	0	0	2	0	40	119	0	0	20	33
Totals	**139**	**120**	**0**	**3**	**11**	**27**	**893**	**128**	**0**	**0**	**49**	**65**

[a] Includes known LFH or NPTH origin (from CWT and/or VIE), and PIT tagged 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

Fish in excess of broodstock needs that had been inoculated were not returned to the river in 2011, rather they were sacrificed to prevent the release of antibiotics into the Snake River environment. This action was done upon advisement from Fish Health staff.

Broodstock Profile

This was the first year we intended to take fin tissues from all fish contributing to broodstock, including those that were spawned but not used (Appendix F) as part of an effort to genetically identify the hatchery offspring from the brood through Parentage Based tagging (PBT). Although, one female (fish ID number 3314) was missed and did not have fin tissue samples taken. Scales were taken on all untagged fish including fish with left red (LR) visual implant elastomer tags, ADLR, AD clip only, and unmarked/untagged fish to determine age and rearing type. Otoliths were taken from all unmarked/untagged fish (spawned as well as unspawned) from LGR by staff from the University of Idaho. The otoliths were used in a microchemistry study to determine where fall Chinook are rearing in the Snake River basin based on strontium levels found in the otoliths (Hegg 2012). These otoliths will be archived at the University of Idaho.

The composition and length frequencies of broodstock at Lyons Ferry Hatchery are presented in Figure 3 and Figure 4, respectively. Males used multiple times are counted multiple times in both figures. Unknown origin fish could be either hatchery or natural origin. An estimated 34.3% of the males and 43.6% of the females that contributed gametes for production were returns from yearling releases. Of the broodstock contributing to production, 33.2% were collected at the LFH trap.

A paramyxovirus was detected in samples of fish spawned on 15 November. The virus is not known to cause any disease or mortality in salmonids so no management actions were employed.

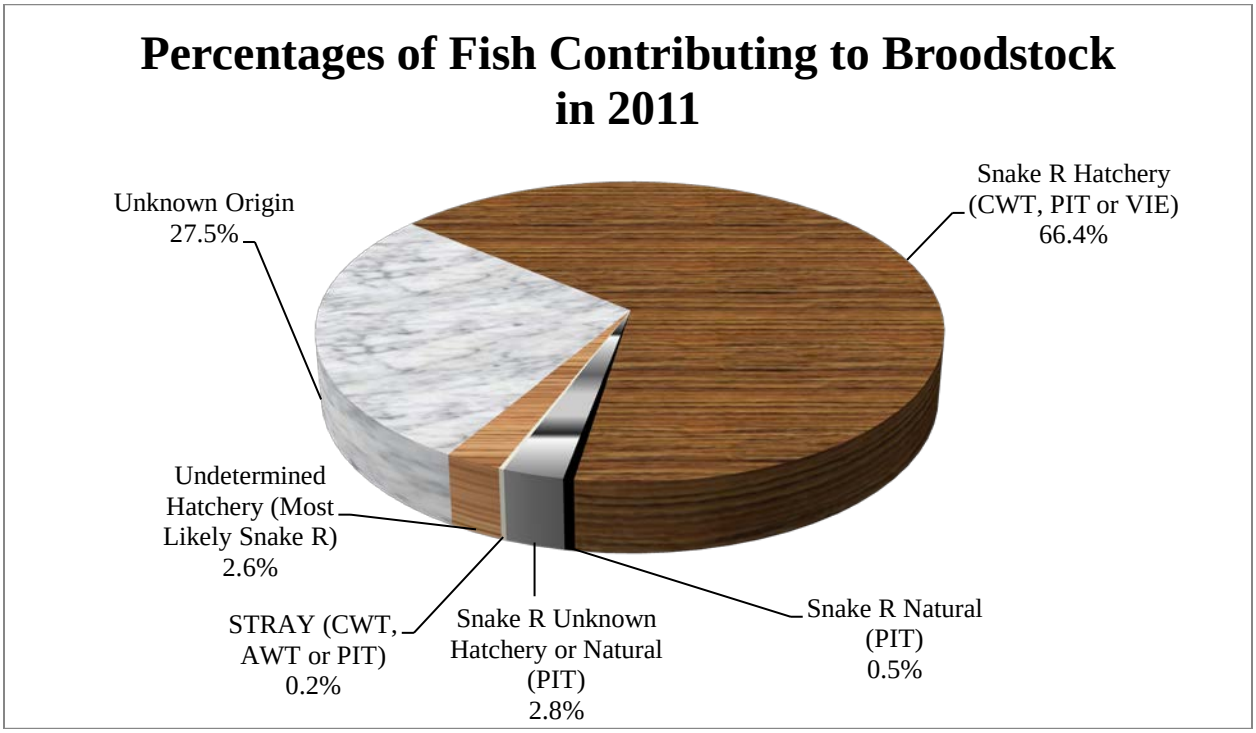


Figure 3. Percentages of fish contributing to broodstock at LFH during 2011.

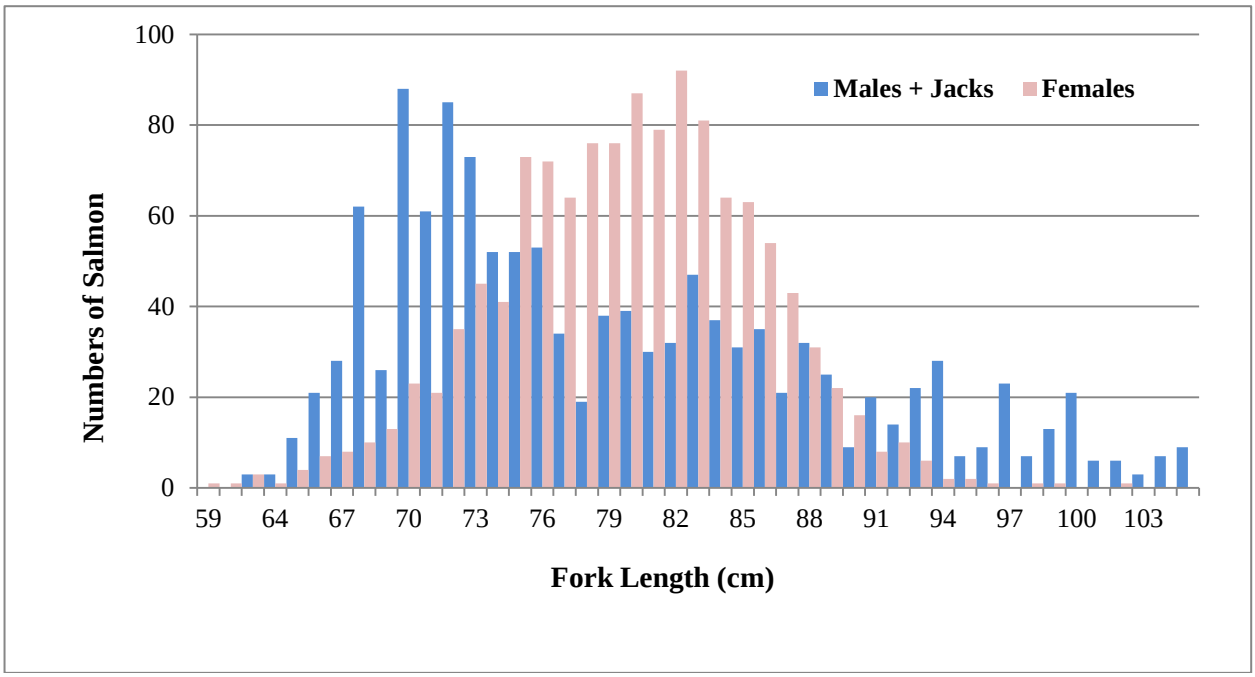


Figure 4. Fork lengths of salmon used as broodstock at LFH in 2011.[a]

[a] Fish with unknown fork lengths are not represented.

Spawn timing

PIT tagged fish (males and females) trapped at LGR Dam, prior to the first spawn day at LFH, were evaluated to determine if there was a relationship between trapping date and spawning date (Figure 5). We were unable to determine if run timing was a predictor of spawn timing for fish trapped during that time.

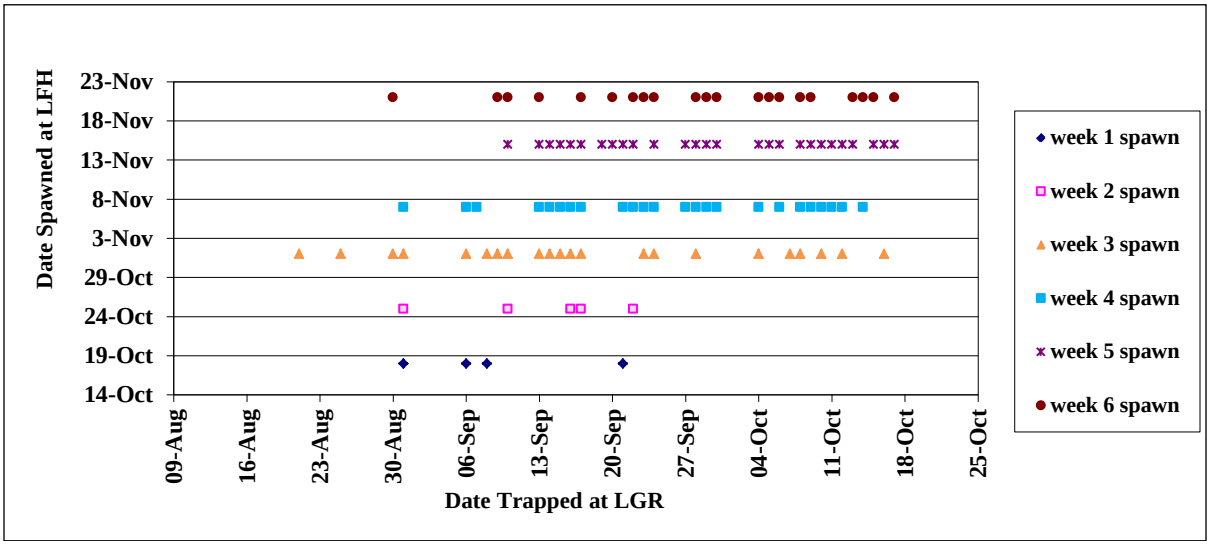


Figure 5. Spawn timing of PIT tagged fish trapped at LGR in 2011.

Males used in broodstock

Fish collected at LGR for broodstock, run reconstruction, and monitoring and evaluation purposes were hauled to LFH and NPTH with a goal of an 80:20 split. Males hauled to LFH were trapped across the run at LGR Dam (Figure 6). Older aged males were used on multiple females, mimicking nature (Hankin 2009). Of the 410 males spawned, 379 fish were used multiple times (Table 6) to reduce the usage of jacks in the broodstock and to maximize the numbers of adults from subyearlings used. The calculated effective number of male breeders was 362 (N_b) using procedures described by Busack (2006). The effective male breeders are 88.2% of the census number of males, but only 28.9% of the male N_b that would have been achieved if enough males had been available to avoid reuse of males.

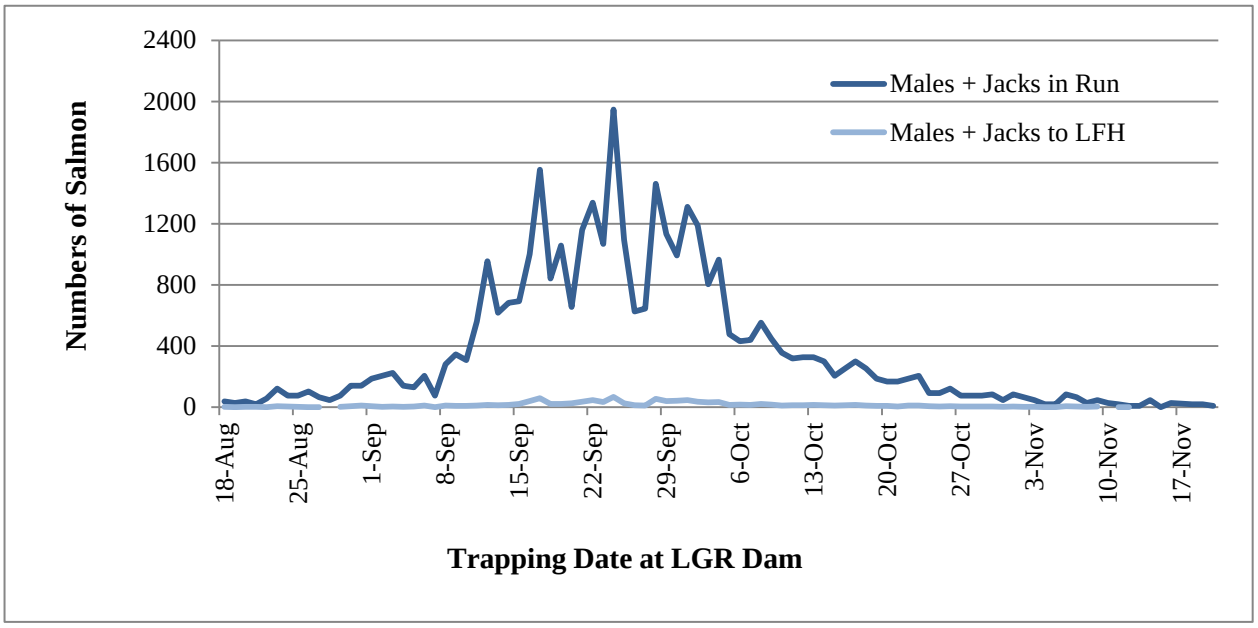


Figure 6. Arrival timing of the run of male fall Chinook at LGR Dam and the proportion hauled to LFH during 2011.

Origin including release site information was determined for 68.0% of the males spawned based on CWT, VI, or PIT tag data. An additional 2.0% of the males were identified as hatchery origin based either on an AD clip or lost/unreadable tags. Males that were neither tagged nor clipped (hatchery and natural origin) represent 30.0% of the males spawned.

Table 6. Origin and age of males used multiple times during spawning at LFH, 2011.

	Times Each Male was Used for Mating						
Origin Determination Method / Age	**1**	**2**	**3**	**4**	**5**	**6**	**Total Unique**
Snake R Hatchery by CWT or VIE							
subyearling 2-salt (age3)		6	21	3	1	1	**32**
subyearling 3-salt (age4)		4	16	7	2	1	**30**
yearling 1-salt (age3)	5	4					**9**
yearling 2-salt (age4)	12	23	70	20	2	5	**132**
yearling 3-salt (age5)		1	5		1	1	**8**
Snake R Hatchery by PIT							
subyearling 2-salt (age3)	4	7	9	3			**23**
subyearling 3-salt (age4)		4	13	6	1	2	**26**
Snake R Natural by PIT							
subyearling 2-salt (age3)			1				**1**
subyearling 3-salt (age4)			2				**2**
Snake R Unknown by PIT							
subyearling 2-salt (age3)	1		2	1			**4**
subyearling 3-salt (age4)		1	3			2	**6**
unknown age			5	1			**6**
Unknown Hatchery by Clip or WIRE							
subyearling 2-salt (age3)		1	1				**2**
subyearling 3-salt (age4)			2	1	1	1	**5**
unknown age			1				**1**
Unknown Origin							
subyearling reservoir reared 1-salt (age3)			1				**1**
reservoir reared 1-salt (age3)			2				**2**
reservoir reared 2-salt (age4)	1	1	4	1		1	**8**
reservoir reared 3-salt (age5)			1				**1**
subyearling 1-salt (age2)	1						**1**
subyearling 2-salt (age3)	2	3	12				**17**
subyearling 3-salt (age4)	4	10	43	12			**69**
subyearling 4-salt (age5)	1			1	1	9	**12**
unknown age		2	7	1		2	**12**
Total Unique Males	**31**	**67**	**221**	**57**	**9**	**25**	**410**

[a] Saltwater age for wire tagged fish was estimated by subtracting 1 from the total age of

Females used in broodstock

Females hauled to LFH from LGR Dam were trapped throughout the run (Figure 7). Origin including release site information was determined for 73.0 % the females spawned based on CWT, VI, or PIT tag data. An additional 3.0 % of the females were identified as hatchery origin based either on an AD clip, AWT or lost/unreadable tags. Females that were not tagged or clipped represent 24.0 % of the females spawned. The estimated age composition and origins of females contributing to broodstock at LFH are listed in Table 7.

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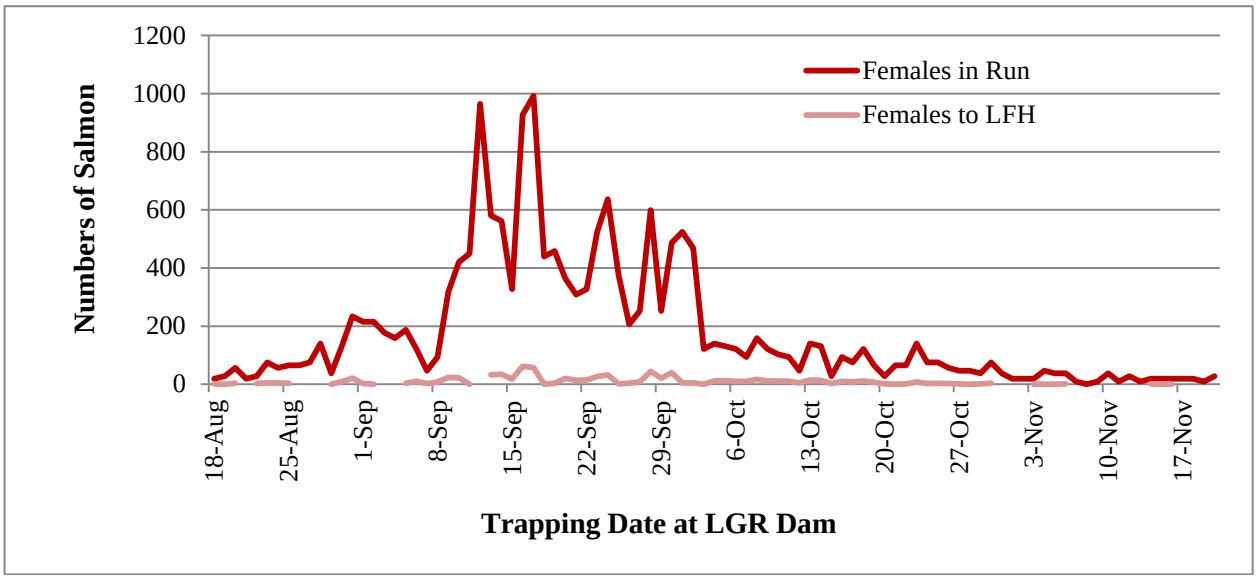

Figure 7. Arrival timing of the run of female fall Chinook at LGR Dam and the proportion of females hauled to LFH during 2011.

Table 7. Origins of females contributing to LFH broodstock during 2011.

Origin Determination Method	Age	Number of Females
Snake R Hatchery		
Snake R Hatchery by CWT or VIE	subyearling 2-salt (age3)	**48**
	subyearling 3-salt (age4)	**178**
	yearling 1-salt (age3)	**35**
	yearling 2-salt (age4)	**454**
	yearling 3-salt (age5)	**52**
	yearling 4-salt (age6)	**2**
Snake R Hatchery by PIT	subyearling 2-salt (age3)	**7**
	subyearling 3-salt (age4)	**113**
Out of Basin Hatchery		
STRAY Hatchery by CWT or AWT	subyearling 3-salt (age4)	**4**
	yearling 2-salt (age4)	**1**
	unknown age	**1**
Natural Origin		
Snake R Natural by PIT	subyearling 3-salt (age4)	**3**
Unknown Origin		
Snake R Unknown by PIT	reservoir reared 3-salt (age5)	**4**
	subyearling 3-salt (age4)	**6**
	subyearling 4-salt (age5)	**2**
	unknown age	**4**
Undetermined Hatchery by Clip	subyearling 2-salt (age3)	**5**
or WIRE or yearling scales with	subyearling 3-salt (age4)	**26**
a hatchery check	yearling 2-salt (age4)	**2**
	unknown age	**4**
Unknown Origin	subyearling reservoir reared 3-salt (age5)	**2**
	reservoir reared 1-salt (age3)	**1**
	reservoir reared 2-salt (age4)	**6**
	reservoir reared 3-salt (age5)	**5**
	subyearling 2-salt (age3)	**12**
	subyearling 3-salt (age4)	**239**
	subyearling 4-salt (age5)	**4**
	unknown age	**31**
Total		**1,251**

Fecundity

Based on hatchery records, average fecundity was 3,910 eggs/female for fish trapped at LGR and 3,544 eggs/female for fish trapped at LFH. These estimates were derived after egg picking when the estimated number of green eggs taken (prior to egg picking) was corrected based on actual counts and weights of eggs collected. These fecundities do not reflect the run at large because jills were minimized in broodstock, and larger sized females were selected during trapping at LFH.

Inclusion of natural origin fish

This was the ninth year that Snake River natural origin fish were included in broodstock (Table 8). Males used multiple times are only counted once in the table below to describe take for ESA reporting purposes. The goal is to have 30% of the fish used as broodstock come from Snake River natural origin stock. In previous years, scales were analyzed to determine natural versus hatchery origin on unmarked, untagged fish. Recent information has shown that scale results are not as reliable in that determination as once thought and are not included in this year's natural origin totals.

Table 8. Unique numbers of Snake River natural origin fall Chinook included in broodstock, 2003-2011.

Return Year	Trapping location	Natural Females	Natural Males	Natural Jacks < 53cm	Total % of Naturals in Broodstock	Total number of fish spawned	Mating protocol
2003	LGR LFH	0 2	0 0	0 0	0.1	1,560	Unknown x LF
2004	LGR LFH	118 9[a]	2 0	1 0	4.9	2,645	Unknown x LF
2005	LGR LFH	110 1	122 2	6 0	9.1	2,634	Unknown x LF
2006	LGR LFH	115 2	71 3	0 0	12.2	1,567	Unknown x Unknown and Unknown x LF
2007	LGR LFH	43 1	49 3	0 0	3.3	2,915	Unknown x Unknown
2008	LGR	110	54	0	6.4	2,575	Unknown x Unknown
2009	LGR	36	30	0	3.1	2,126	Unknown x Unknown
2010[b]	LGR	1	2	0	0.1	2,234	Unknown x Unknown
2011	LGR	3	3	0	0.5	1,661	Unknown x Unknown

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

[b] Natural origin fish were no longer identified using scale analysis. Fish PIT tagged during juvenile seining efforts were identified as naturals

Jacks and Jills in Broodstock

To document the extent that jacks and jills were used as broodstock, jacks used multiple times were included multiple times in the estimates in Table 9. Minijack is defined as 0-salt fish and jacks/jills are defined as 1-salt fish. Saltwater age for wire tagged fish was estimated by subtracting 1 from the total age of subyearlings and 2 from the total age of yearlings. This method overestimates saltwater ages for subyearlings since reservoir rearing is not taken into consideration. Untagged fish are scale sampled and reservoir rearing is used to estimate salt water age. Fork length data of jacks and jills used in broodstock are presented in Table 10. Fork lengths of jacks and jills are biased towards larger sizes due to mating protocols employed at the hatchery. Historical uses of jacks and jills in broodstock are presented in Table 11 and should be considered minimum estimates. Intensive monitoring of jacks and jills began in 2010 in order to minimize the contribution of 1-salts in broodstock (Table 12). This monitoring has reduced the total matings with 0 and/or 1-salt parentage by over 59% within the last two years.

Table 9. Numbers and percentages of matings with 1-salt jacks and jills that contributed to production at LFH during 2011.

			Jacks	Jills
Age/rearing	**Brood year**	**saltwater age**	**Number of matings**	**Number of matings**
H yearling	2008	1	13	35
Unk sub res rear	2008	1	3	0
Unk res rear	2008	1	6	1
Unk sub	2009	1	1	0
Totals			**23**	**36**
% of Matings			**1.8**	**2.9**

Table 10. Fork lengths of 1-salt jacks and jills used in broodstock at LFH during 2011.

	Number of matings	Average fork length (cm)[a]	Median fork length (cm)	SD of fork length (cm)	Minimum fork length (cm)	Maximum fork length (cm)
Jacks 1-salt-						
H yearling	13	69	70	2.6	65	72
Unk sub reservoir reared	3	73	73	0	73	73
Unk reservoir reared	6	72	71.5	2.7	69	74
Unk subyearling	1	72	72	-	-	-
Jills 1-salt-						
H yearling	33	67	67	3.2	59	74
Unk reservoir reared	1	70	70	-	-	-

[a] unknown fork lengths of two jills are not included.

Table 11. Historical number of matings of minijacks, jacks, and jills contributing to broodstock at LFH, 2000-2009, before mating protocols limited jack and jill usage.

Year	0-salt	1-salt jack	1-salt jill	Number of matings containing jack x jill mating	% of total matings with 0 and/or 1-salt parentage
2000	195	609	157	127	80.4
2001	9	875	67	47	67.6
2002	5	348	6	4	31.8
2003	3	527	78	63	74.5
2004	34	941	254	204	77.6
2005	13	610	58	26	45.3
2006	1	525	123	94	70.6
2007	0	1136	477	405	82.9
2008	0	348	78	31	30.2
2009	1	547	513	152	70.3
Average	**26**	**647**	**181**	**115**	**63.1**

Table 12. Number of matings of minijacks, jacks, and jills contributing to broodstock at LFH, 2010-2011, after mating protocols began limiting jack and jill usage.

Year	0-salt	1-salt jack	1-salt jill	Number of matings containing jack x jill mating	% of total matings with 0 and/or 1-salt parentage
2010	0	38	2	0	3.2
2011	0	23	36	2	4.6
Average	**0**	**31**	**19**	**1**	**3.9**

Rearing and Marking

Information regarding numbers of fish ponded are included in Table 13. Historical ponding information is listed in Appendix G. Rearing followed standard hatchery procedures as described in the Snake River fall Chinook HGMP available at http://www.fws.gov/lsnakecomplan/Reports/HGMPreports.htm. Detailed information regarding type and size of vessels used for rearing can be found in Lyons Ferry Hatchery Annual Reports available at http://www.fws.gov/lsnakecomplan/Reports/WDFWreports.html.

Table 13. Egg take and survival numbers by life stage of Lyons Ferry origin fall Chinook spawned at LFH, brood years 2007-2011.

Brood Year	Eggs Taken	ELISA Loss	Eggs Shipped[a]	Eyed Eggs Retained	Fry Ponded	Intended Program
2007	5,143,459	0	1,761,500	3,212,900[b]	960,900 1,894,933 0	Yearling Subyearling Research
2008	5,010,224	0	1,810,800	2,969,200	1,000,000 1,969,200 0	Yearling Subyearling Research
2009	4,574,182	0	1,507,300	2,853,020	977,667 1,875,353 0	Yearling Subyearling Research
2010	4,619,533	0	1,630,000	2,865,100	980,000 1,885,100 0	Yearling Subyearling Research
2011	4,723,501	0	1,785,600	2,772,900	960,000 1,812,900 0	Yearling Subyearling Research

[a] Includes eyed eggs shipped for research.
[b] This number includes 364,983 eyed-eggs that were destroyed as ponded fry in January and February 2007.

Marking was consistent with the *United States v. Oregon 2008-2017 Management Agreement* recommendations. Fish were ADCWT tagged and marked from 19 July – 28 July and CWT only fish were tagged 28 July – 1 August. After CWT tagging and marking, all but 34,000 fish were diverted to the rearing lake. Approximately 17,000 ADCWT fish were diverted into one raceway and 17,000 CWT only fish were diverted into a second raceway. Staff performed tag and clip quality control checks from of a sample of fish from both raceway held groups on 15 August; 14-16 days post tagging (Table 14).

Table 14. Numbers of fall Chinook sampled by WDFW for marking and tagging quality control checks.

	Release site	Mark Type	CWT	Number sampled	AD+CWT	AD ONLY	CWT ONLY	Unmarked/ Untagged
2010 Yearling	LFH	AD+CWT	636080	1,510	1,497 (99.1%)	3 (0.2%)	4 (0.3%)	6 (0.4%)
	LFH	CWT ONLY	636079	1,530	0 -	0 -	1,499 (98.0%)	31 (2.0%)
2010 Subyearling	LFH	AD+CWT	635998	1,437	1,422 (99.0%)	10 (0.7%)	2 (0.1%)	3 (0.2%)
	CCD	AD+CWT	635997	1,043	1,036 (99.3%)	2 (0.2%)	5 (0.5%)	0 -
	GRR	AD+CWT	635999	1,500	1,488 (99.2%)	9 (0.6%)	1 (0.1%)	2 (0.1%)

Staff PIT tagged 30,000 onstation yearlings between 15 August – 18 August from the raceways for the purpose of monitoring returns in-season and to compare two methods of estimating SARs (using CWTs and PIT tags). After PIT tagging, the fish were returned to the raceways to allow healing of the incisions before initial tag loss was estimated. Initial tag loss was < 1 % and the recovered PIT tags were reused on fish at release to increase the sample size. After tagging, all mortalities were collected and scanned for PIT tags (Table 15). The tag list was submitted to PTAGIS and fish were assigned to monitor mode to allow them to be treated like non-PIT tagged fish when intercepted at dams. After release, a total of 10 shed tags were recovered (0.03%) from the outlet structure, leaving an estimated 29,990 PIT tags to represent the yearling release. A PIT tag array consisting of three antennas in the outlet structure only detected 40.9% of the PIT tags released due to system malfunctions and fish leaving the structure in masses that overwhelmed the antennas.

An additional 20,000 onstation subyearlings from BY11 were PIT tagged by Biomark during the week of 9 April. Initial tag loss was < 0.3%, leaving 19,943 PIT tags to represent the subyearling release. This was the first year both subyearling and yearlings onstation releases were PIT tagged at large enough levels to monitor future returns.

Table 15. PIT tagging mortality of BY10 onstation yearlings.

Day	Mortalities	Number tagged/day	Mortality (%)
15-Aug	4	9,500	0.01
16-Aug	69	8,500	0.23
17-Aug	1	8,000	0.00
18-Aug	10	4,000	0.03
19-Aug	5	0	0.02
20-Aug	0	0	0.00
21-Aug	0	0	0.00
22-Aug	0	0	0.00
Total	**89**	**30,000**	**0.30%**

Juvenile Releases

Brood year 2010

Subyearling

Subyearling fall Chinook at LFH were released 1 June 2011. A subsample of fish was measured and weighed and visually appeared in good condition, with no external signs of BKD, pop-eye, or injuries from birds. Fish were also visually examined for sexual precocity; none were noted. An estimated 202,200 fish were released as an AD+CWT group. Hatchery staff counted 14.8 pounds of fish and calculated the size at release to be 50.0 fpp. Fish used in the pound counts were set aside for SRL staff to subsample for individual lengths and weights (Table 16). Snake River flows on 1 June at the LMO Dam were 154.1 kcfs with 40.8 kcfs spill and total dissolved gases at the LMO tailrace was 119.2%. Columbia River flows at MCN Dam were 476.1 kcfs with 328.0 kcfs spill on 1 June and total dissolved gases were at 129.0%.

Subyearling fall Chinook slated for the Snake River near Couse Creek were released 2-3 June 2011. Fish were measured, weighed, and visually appeared in good condition, with no external signs of BKD, pop-eye, descaling or sexual precocity. An estimated 202,300 fish were released as an AD+CWT group. LFH staff counted 13.3 pounds of fish and calculated the size at release to be 49.0 fpp. One 3 June, the average daily Snake River flow and spill recorded at LMO Dam tailrace was 168.7 kcfs and 55.5 kcfs respectively with total dissolved gasses at 121.1%. Columbia River flows at MCN Dam on 3 June were 476.7 kcfs with 332.6 kcfs spill with total dissolved gases at 129.6%.

Subyearling fall Chinook reared at Irrigon FH were released into the Grande Ronde River on 24 May. An estimated 200,800 fish were released as an AD+CWT group and 196,628 were released as unmarked/untagged. Fish were measured and weighed and visually appeared in good condition, with no external signs of BKD, pop-eye, descaling or sexual precocity. ODFW staff provided pound counts and the release was calculated at 79.5 fpp.

Table 16. Length and weight data from subyearling fall Chinook (BY10) sampled by Snake River Lab staff and released into the Snake and Grande Ronde rivers during 2011.

	Snake R at LFH	Snake R at Couse Creek	Grande Ronde R at Cougar Creek
	Sample Date	Sample date	Sample date
Length/weight data	**24 May 2010**	**23 May 2010**	**23 May 2011**
Number sampled	206	205	166
Avg. fork length (mm)	91	92	78
Median	92	91	79
Range	68-109	62-116	51-101
STDS	7.6	8.4	10.5
CV	8.3	9.1	13.5
Avg. weight (g)	9.0	9.2	6.0
STDS	2.4	2.7	2.3
CV	26.0	28.7	38.9
Avg. K:factor	1.16	1.17	1.19
FPP	50.2	49.1	76.2

Yearling

Yearling fall Chinook at LFH were released from 10 April to 13 April 2012, with peak emigration occurring on 10 and 11 April. Fish were measured and weighed and visually appeared in good condition, with no external signs of BKD, pop-eye, or injuries from birds. None of the yearlings observed were precocious {precocious fish expel semen when handled and are dark colored (non-smolted)} based on that visual examination. Fish were well smolted, slender and uniform in size. An estimated 249,062 fish were released from the AD+CWT group, and 240,938 were released from the CWT ONLY group. Hatchery staff counted 150 pounds of fish and calculated the release at 10.4 fpp. Fish used in the pound counts were set aside for SRL staff to subsample for individual lengths and weights (Table 17). Most emigration occurred prior to 12 April. The Lake was fully drained 13 April with the last few fish leaving that day (only 10 observed). From 10 - 13 April, Snake River flows at LMO Dam ranged from 92.1 – 113.1 kcfs with 26.4 – 30.0 kcfs spill and Columbia River flows at MCN Dam ranged from 281.4 – 301.5 kcfs with 135.8- 156.7 kcfs spill. The release occurred during an increasing hydrograph in each basin. Historical releases by WDFW, NPT, IDFG, and NOAA are provided in Appendix H.

Table 17. Length and weight data from yearling fall Chinook (BY10) released at LFH in 2012.

	Yearlings	
Length/weight data	**ADCWT**	**CWT only**
CWT code	636079	636080
Number sampled	212	218
Avg. fork length (mm)	160	161
Median	160	160
Range	130-205	130-185
STDS	12.2	11.4
CV	7.6	7.1
Avg. weight (g)	45.7	45.4
STDS	11.4	10.1
CV	24.8	22.2
Avg. K:factor	1.09	1.08
FPP	9.9	10

Survival Rates to Release

The estimated number of eggs and fish present at life stages in the hatchery were used for brood years 2006-2010 to calculate survival rates within the hatchery environment (Table 18). Historical survivals between various life stages at LFH are presented in Appendix I.

Table 18. Estimated survivals (%) between various life stages at LFH for fall Chinook of LFH/Snake River hatchery origin, 2006-2010 brood years.

Brood year	Release stage	Green egg-ponded fry	Ponded fry-release[a]	Green egg-release
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	95.3	91.3
	Subyearling	95.8	105.9	90.4
2009	Yearling	94.1	97.9	92.1
	Subyearling	94.1	100.3	93.8
2010	Yearling	96.4	101.9	98.2
	Subyearling	96.4	101.1	95.4
Yearling mean:	**%**	**95.6**	**97.3**	**92.9**
	SD	**0.9**	**2.9**	**3.0**
Subyearling mean:	**%**	**95.6**	**101.8**	**94.0**
	SD	**0.9**	**3.0**	**2.6**

[a] Survival estimates exceed 100% due to inventory tracking methodologies used at LFH.

Migration timing and survival

An interrogation summary from the PTAGIS website (www.ptagis.org) downloaded on 14 March was used to populate Tables 19 and 20. PIT tagged subyearlings released into the Snake River near Couse Creek and into the Grande Ronde River are used only to represent migration timing in this report. From the Couse Creek release site to detection facility, juvenile salmon averaged 6.5 km/day to LGR Dam, 9.1 km/day to LGO Dam, 11.3 km/day to LMO Dam, 12.9 km/day to IHR Dam, 14.1 km/day to MCN Dam, 17.6 km/day to John Day Dam, and 19.2 km/day to Bonneville Dam.

From the Grande Ronde release site near Cougar Creek to detection facility, juvenile salmon averaged 13.0 km/day to LGR Dam, 10.7 km/day to LGO Dam, 12.3 km/day to LMO Dam, 14.0 km/day to IHR Dam, 13.6 km/day to MCN Dam, 16.3 km/day to John Day Dam, and 15.9 km/day to Bonneville Dam.

An interrogation summary from the PTAGIS website downloaded on 12 December was used to populate Table 21. Migration timing of PIT tagged yearlings released onstation from LFH are presumed to represent the non-PIT tagged release because they were designated as monitor mode

fish at the dams. From release site to detection facility, juvenile salmon averaged 3.1 km/day to LMO Dam, 5.6 km/day to IHR dam, 8.2 km/day to MCN Dam, 14.2 km/day to John Day Dam, and 16.6 km/day to Bonneville Dam. Minimum survival to Bonneville Dam was estimated at 3.2% based on 394 PIT tag detections at Bonneville Dam from fish also detected at the PIT tag array at LFH. We cannot estimate total downstream survival using the SURPH model because the salmon were put in monitor mode. Overall, 47.0% of the fish detected at the array at LFH were also detected at downstream detection sites. Low survival rates to Bonneville dam may be attributed to high dissolved nitrogen levels due to spill from the dams.

Table 19. Migration timing of BY10 PIT tagged subyearlings released into the Snake River near Couse Creek in 2011.

	Detection Facilities						
	LGR	**LGO**	**LMO**	**ICH**	**MCN**	**JDD**	**BONN[a]**
Number Detected	**2,298**	**3,307**	**2,069**	**1,362**	**1,030**	**901**	**448**
Median Travel Days from CCD[b]	12.4	15.4	16.5	18.4	21.6	24.4	28.6
Median Passage Date	14 Jun	17 Jun	19 Jun	20 Jun	24 Jun	26 Jun	1 Jul
First Detection Date	3 Jun	6 Jun	8 Jun	8 Jun	11 Jun	12 Jun	15 Jun
Last Detection Date	27 Jul	29 Jul	27 Jul	13 Jul	12 Aug	9 Aug	2 Aug
10% of Run Passage Date	7 Jun	11 Jun	12 Jun	13 Jun	16 Jun	18 Jun	21 Jun
90% of Run Passage Date	26 Jun	26 Jun	27 Jun	28 Jun	7 Jul	7 Jul	11 Jul
TDG on Median Date (%)[c]	126.3	124.8	117.7	121.2	129.9	122.4	122.7
Outflow on Median Date (kcfs)[c]	188.9	166.2	150.2	165.1	493.6	439.7	426.2
Spill on Median Date (kcfs)[c]	77.9	75.8	37.6	82.4	327.8	175.3	211.2

[a] TDG, outflow and spill for BONN are detected six miles downstream at Warrendale.
[b] Travel days are calculated from 2 June.
[c] Detections are from the tailrace of each dam.

Table 20. Migration timing of BY10 PIT tagged subyearlings released into the Grande Ronde River near Cougar Creek in 2011.

	Detection Facilities						
	LGR	**LGO**	**LMO**	**ICH**	**MCN**	**JDD**	**BONN[a]**
Number Detected	**3,143**	**3,969**	**2,126**	**1,308**	**1,160**	**1,030**	**313**
Median Travel Days from GRR[b]	11.4	19.4	20.6	21.8	27.4	30.5	38.3
Median Passage Date	4 Jun	12 Jun	14 Jun	15 Jun	20 Jun	24 Jun	1 Jul
First Detection Date	26 May	31 May	29 May	1 Jun	4 Jun	6 Jun	10 Jun
Last Detection Date	29 July	21 Sept	7 Sept	29 Jul	17 Aug	3 Aug	2 Aug
10% of Run Passage Date	30 May	4 Jun	7 Jun	9 Jun	12 Jun	15 Jun	17 Jun
90% of Run Passage Date	20 Jun	25 Jun	26 Jun	26 Jun	22 Jul	5 Jul	19 Jul
TDG on Median Date (%)[c]	119.2	125.5	124.2	126.1	126.2	128.2	122.7
Outflow on Median Date (kcfs)[c]	160.5	169.0	188.7	196.6	437.2	497.0	426.2
Spill on Median Date (kcfs)[c]	51.0	78.8	71.6	113.6	271.8	240.6	211.2

[a] TDG, outflow and spill for BONN are detected six miles downstream at Warrendale.
[b] Travel days are from the date of release.
[c] Detections are from the tailrace of each dam.

Table 21. Migration timing of BY10 PIT tagged yearlings released at LFH in 2012.

	Detection Facilities				
	LMO	**ICH**	**MCN**	**JDD**	**BONN[a]**
Number Detected	5,887	2,682	3,852	4,682	937
Median Travel Days from LFH[b]	9	14	18	19	23
Median Passage Date	19 Apr	24 Apr	28 Apr	29 Apr	3 May
First Detection Date	11 Apr	13 Apr	14 Apr	17 Apr	19 Apr
Last Detection Date	5 Jun	2 Jun	10 Jun	23 Jul	5 Jun
10% of Run Passage Date	13 Apr	15 Apr	18 Apr	23 Apr	24 Apr
90% of Run Passage Date	27 Apr	1 May	9 May	4 May	17 May
TDG on Median Date (%)[c]	118.4	122.2	121.5	120.2	122.7
Outflow on Median Date (kcfs)[c]	106.6	144.7	394.9	389.2	404.0
Spill on Median Date (kcfs)[c]	25.9	99.8	221.7	147.7	176.5

[a] TDG, outflow and spill for BONN are detected six miles downstream at Warrendale.
[b] Travel days are from the date of release.
[c] Detections are from the tailrace of each dam.

Adult progeny to parent ratio

We are unable to estimate the adult progeny to parent ratio because we are unable to identify untagged hatchery returns. This was the first year parentage based tagging (PBT) of broodstock was used at LFH. Combining data from PBT of broodstock at NPTH and LFH will result in the ability to identify all inbasin hatchery releases at return. In 2017, the whole return of inbasin hatchery fish will be identifiable through PBT analysis which will enable the estimation of adult progeny to parent ratios for both hatchery and natural origin fish.

Hatchery Stock Profile Evaluation

Size at age of return was calculated for wire tagged yearling (Table 22) and subyearling (Table 23) LSRCP releases (including FCAP) and out-of-basin strays processed by WDFW. Recoveries of fish that are part of IPC and NPTH programs are not included below. These data provide the reader a general idea of the size of the fish at return, not the extent of the return by age because of selective (non-random) trapping protocols. In addition, the reader must be aware that age 3 subyearlings include some jacks that reservoir reared.

In general, fish trapped at LFH are primarily from yearling releases while fish trapped at LGR consist of a higher proportion of adults from subyearling releases. The sizes at age of return of LSRCP fish were not different than the sizes of out-of-basin strays processed. Historical sizes at age of returning LSRCP program fish are provided in Appendix J.

Table 22. Comparisons of size at age of return by sex for CWT tagged fish from LSRCP and out-of-basin yearling releases processed by WDFW in 2011.

			Total age at Return to Snake River				
Sex	**Origin**	**Fork length**	**2 (Minijack)**	**3 (Jack)**	**4**	**5**	**6**
Male	LFH	N=	165	457	155	7	-
		Median (cm)	**35**	**57**	**72**	**85**	**-**
		Range (cm)	32-45	41-72	60-89	78-102	-
	Stray	N=	3	2	1	-	-
		Median (cm)	**38**	**55**	**69**	**-**	**-**
		Range (cm)	34-38	49-61	69	-	-
Female	LFH	N=	-	142	526	2	-
		Median (cm)	**-**	**64**	**76**	**84**	**-**
		Range (cm)	-	55-79	63-90	80-87	-
	Stray	N=	-	-	1	2	-
		Median (cm)	**-**	**-**	**74**	**90**	**-**
		Range (cm)	-	-	74	90-90	-

Table 23. Comparisons of size at age of return by sex for CWT tagged fish from LSRCP and out-of-basin subyearling releases that were processed by WDFW in 2011.

			Total Age at Return to Snake River				
Sex	**Origin**	**Fork length**	**1 (Minijack)**	**2 (Jack)**	**3**	**4**	**5**
Male	LFH	N=	-	204	40	17	-
		Median (cm)	**-**	**47**	**68**	**80**	**-**
		Range (cm)	-	34-60	53-81	61-86	-
	Stray	N=	-	-	2	10	-
		Median (cm)	**-**	**-**	**71**	**80**	**-**
		Range (cm)	-	-	68-74	73-86	-
Female	LFH	N=	-	1	48	122	-
		Median (cm)	**-**	**45**	**72**	**82**	**-**
		Range (cm)	-	45	61-86	63-99	-
	Stray	N=	-	-	-	22	-
		Median (cm)	**-**	**-**	**-**	**81**	**-**
		Range (cm)	-	-	-	73-86	-

Tucannon River Natural Production 2011

Adult Salmon Surveys

Fall Chinook Redd Surveys

WDFW personnel have conducted adult salmon surveys on the lower Tucannon River since 1985 (Appendix K). Survey sections generally covered the river from Rkm 1.1 to Rkm 33.6. 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 it is presumed no spawning occurs there. During 2011, landowner access restrictions prevented the surveying of 1.5 kilometers of river above the Starbuck Bridge within survey sections 5 and 6. Surveys began the week of 16 October (Table 24) and continued through the week of 18 December. River conditions for viewing were good for most sections throughout the spawning season.

An estimated 302 fall Chinook and 39 coho redds were constructed in the Tucannon during 2011. A total of 311 redds (from all species) were counted in the Tucannon River (Table 25) and we estimate an additional 30 redds occurred in sections of river not accessed due to landowner restrictions. We estimated the numbers of redds built in inaccessible sections by calculating redds/Rkm in an adjacent surveyed section and applying it to the non-surveyed area. The size, locations, and timing of redd building for coho is similar to that for fall Chinook. Two methods were compared to estimate the numbers of coho redds on the Tucannon. The first method was visual estimation which could only be verified if fish were during the survey. The second method applies the proportion of coho found during carcass surveys to the total redd count (fall Chinook + coho) to estimate the total number of redds built by coho. This year, the number of redds estimated based on carcasses was the same as the visual estimation of redds.

Table 24. Date and number of redds and carcasses counted on the Tucannon River in 2011.

	Total Redds [a]	Carcasses Sampled	
Week beginning	Chinook & Coho [b]	Chinook	Coho
16 Oct	6	0	1
23 Oct	16	2	0
30 Oct	23	5	4
6 Nov	26	9	5
13 Nov	40	13	3
20 Nov	35	14	3
27 Nov	103	51	1
4 Dec	20	25	0
11 Dec	9	11	0
18 Dec	0	1	0
Totals	**278**	**131**	**17**

[a] Observed redds not expanded for sections with access restrictions.
[b] Chinook & coho redd data are combined.

Table 25. Estimated escapement, redd construction, and resulting estimates of smolts/redd and total number of migrants from fall Chinook spawning in the Tucannon River, 2002-2011.[a]

Brood Year	Estimated escapement [b]	% Strays in carcasses sampled	Redd Construction[a] # Redds observed	# Redds in no access areas (est.)	Total # of Redds (est.)	Success of Spawning Estimated smolts/redd [c]	Total # Estimated emigrants [d]	Adult progeny to Parent ratio
2002	pending	35.1	183	27	210	81	17,030	-
2003	pending	65.8	143	15	158	460	72,656	-
2004	pending	29.4	111	4	115	631	72,655	-
2005	pending	60.0	61	5	66	320	21,170	-
2006 [e]	pending	9.7	127	26	153	289	44,296	-
2007	pending	7.0	93	16	109	unknown[f]	unknown[f]	-
2008	pending	16.5	209	45	254	20	5,030	-
2009[g]	pending	10.7	217	35	252	147	36,991	-
2010	pending	27.0	281	43	324	76	24,315	-
2011	pending	6.1	278	24	302	67	20,261	-

[a] Numbers presented in this table may be different from prior reports and represent the most accurate estimates of escapement and production in the Tucannon to date.
[b] Estimates are currently under review and will be updated once methodologies are finalized.
[c] This estimate was derived using redds counted above the smolt trap and estimates of emigration the following spring.
[d] 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.
[e] Includes approximately 2.3% summer Chinook in escapement that contributed to production estimate.
[f] No estimate was made because the smolt trap sampling box had a hole in it and fish escaped.
[g] First year of using new methodology to estimate proportion of fall Chinook redds based upon proportions of fall Chinook in carcass recoveries. Excludes one summer Chinook redd located below the smolt trap.

Escapement and Composition of Run

Methodologies are currently being developed to more accurately estimate the size and composition of the run to the Tucannon River and related adult progeny to parent ratios. Rather than present estimates that will change, we will only present raw data for 2011 in this section of the report. Revised estimates will be presented in an upcoming annual report.

Compositions of recovered carcasses are presented in Table 26 and Table 27. Key to age and origin is presented in Appendix L. Females represented 60% of the recoveries; primarily adult 2-3-salt fish. DNA was collected and archived from 115 fall Chinook (DNA sample numbers 11IP001, 11IP003 11IP005, 11IP007 – 17, 11IP021-24, 11IP026-32, 11IP034-039,11IP041-11IP113.). CWT and scale analysis were used to determine the origin and age of each carcass.

Table 26. Composition of carcasses recovered and estimated run composition of fall Chinook on the Tucannon River, 2011.

				RAW Totals		
	Age and Origin	CWT Origin	CWT	F	M ≥53 cm	M <53 cm
In Basin Wire Fish	HLF06YLCWT5	LF06YO	633987	1		
	HLF07SSCWT4	LF07SO	634672	5	1	
	HLF07YLCWT4	LF07YO	634680	4	2	
		LF07YO	634681	12	1	
	HLF08SSCWT3	LF08SO	634995		2	
	HLF08YLCWT3	LF08YO	635165	11	15	2
		LF08YO	635166	13	9	
	HLF09SSCWT2	LF09SO	635180	1	1	2
	HLF09YLCWT2	LF09Y0	635510			1
	HCL08YLCWT3	LF08YBCA	220303		1	
Out of Basin Wire Fish	HHS07SSCWT4	UMA07SUMA	090133	1		
		UMA07SUMA	090134	1		
		UMA07SUMA	090135	2	1	
	HHS08SSCWT3	UMA08SUMA	090330	1		
	HHS07YLAWT4	09BLANK	09BLANK	1		
	HHS55XXAWTX	09BLANK	09BLANK	1		
No Wire Fish	HXX07SSCLP4				1	
	HXX08YLCLP3			2	1	
	HXX55XXCLPX			1		
	UXX07SSSCA4			13	4	
	UXX08SSSCA3			1	1	
	UXX55XXSCAX				1	
	UXX55XXXXXX			1		
Unknown if Fish had Wire[a]	HXX07SSCLP4			1		
	HXX07YLSCA4			2	2	
	HXX08YLCLP3			1	1	
	HXX08YLSCA3			1	2	
	HXX55XXCLPX			1		
	UXX55XXSCAX			1	1	
			Grand Total	**79**	**47**	**5**

[a] These were partial carcasses and had no head when recovered.

Table 27. Estimated composition of fall Chinook recovered on the Tucannon River by salt water age and origin, 2011.

Origin	0-salt	1-salt		2+ salt		Total	% of Return
	minijack	True jack	True jill	Adult F	Adult M		
Snake River Hatchery (wire, VIE)	1	30	25	22	6	84	64.1%
Presumed Snake River Hatchery (ADclip or yearling scales)	0	4	4	5	3	16	12.2%
Out-of-basin hatchery (wire-CWT or BLANK)	0	0	0	7	1	8	6.1%
Unknown Origin	0	1	1	15	6	23	17.6%
Total	**1**	**35**	**30**	**49**	**16**	**131**	**100.0%**
% of return	**0.8%**	**26.7%**	**22.9%**	**37.4%**	**12.2%**		

Coho

Coho produced an estimated 39 redds when expanded for areas not surveyed. Of the Seventeen coho carcasses recovered, 64.7% were females and the majority (82.4%) were untagged fish of unknown origin (Table 28). DNA was collected from 12 coho (DNA sample numbers 11NQ0001-11NQ0012) for archiving.

Table 28. Composition of coho carcasses recovered on the Tucannon River in 2011.

Origin		Females			Males			Totals
		AD clip	No clip	Unknown	AD clip	No clip	Unknown	
Wire Tagged coho								
Clearwater (CWTs)	612757	0	1	0	0	0	0	1
	612759	2	0	0	0	0	0	2
No Wire								
Unknown origin		3	5	0	0	5	1	14
Total		**5**	**6**	**0**	**0**	**5**	**1**	**17**

Juvenile Salmon Emigration

Fall Chinook

Juvenile fall Chinook (BY10) were observed at the smolt trap (Rkm 3.0) from 24 January through 21 July 2011, 16 days before the trap was pulled for the season (Gallinat and Ross, 2011). Trapping efficiency for fall Chinook ranged from 3.2% to 29.6 % (Table 29). Median passage date at the smolt trap for fall Chinook was 22 June. Staff captured 2,632 fall Chinook, and estimated that 19,851 (95% C.I. = 16,087-26,962) naturally produced fall Chinook smolts passed the smolt trap during 2011. Based on 261 redds estimated above the smolt trap during 2010, a calculated 76 smolts/redd were produced. After including juvenile production from below the smolt trap, an estimated 24,315 naturally produced fall Chinook smolts left the Tucannon during 2011.

Staff selected fish by size in the same proportions as trapped, with the goal of measuring 20 fish per day. A total of 1,087 fall Chinook were measured and ranged from 30-110 mm fork length and averaged 71 mm with a median of 75 mm. Lengths and weights were taken on 422 fish. For this group, fork lengths ranged from 50-110 mm, with a mean and median of 77 mm. Weights ranged from 1.1 g to 18.0 g, with a mean of 5.9 g and median of 5.6 g. K-factors ranged from 0.66-2.54, with a mean of 1.23 and median of 1.21. The regression line in Figure 8 shows a correlation between size and trapping date indicating that the fish sampled were from the same brood year. Scales would verify this finding but unfortunately scales were not collected on fall Chinook in 2011. PIT tags originally planned for use in fall Chinook on the Tucannon were re-directed to another study this year.

Table 29. Trapping efficiency estimates for fall Chinook and coho at a smolt trap on the Tucannon River in 2011.

	Fall Chinook	Coho
Week Ending	Recapture efficiency	Recapture efficiency
17 April	unknown	0.0%
24 April	unknown	13.0%
01 May	unknown	20.6%
08 May	unknown	100.0%[a]
08 May	unknown	17.5%
15 May	unknown	7.7%
22 May	3.2%	10.0%
29 May	6.8%	25.0%
05 June	9.5%	0.0%
12 June	11.3%	20.0%
19 June	17.0%	6.7%
26 June	18.9%	44.4%
03 July	19.1%	66.7%
11 July	27.1%	17.7%
18 July	29.6%	28.6%

[a] One fish was marked as a wild spring Chinook and was PIT tagged.

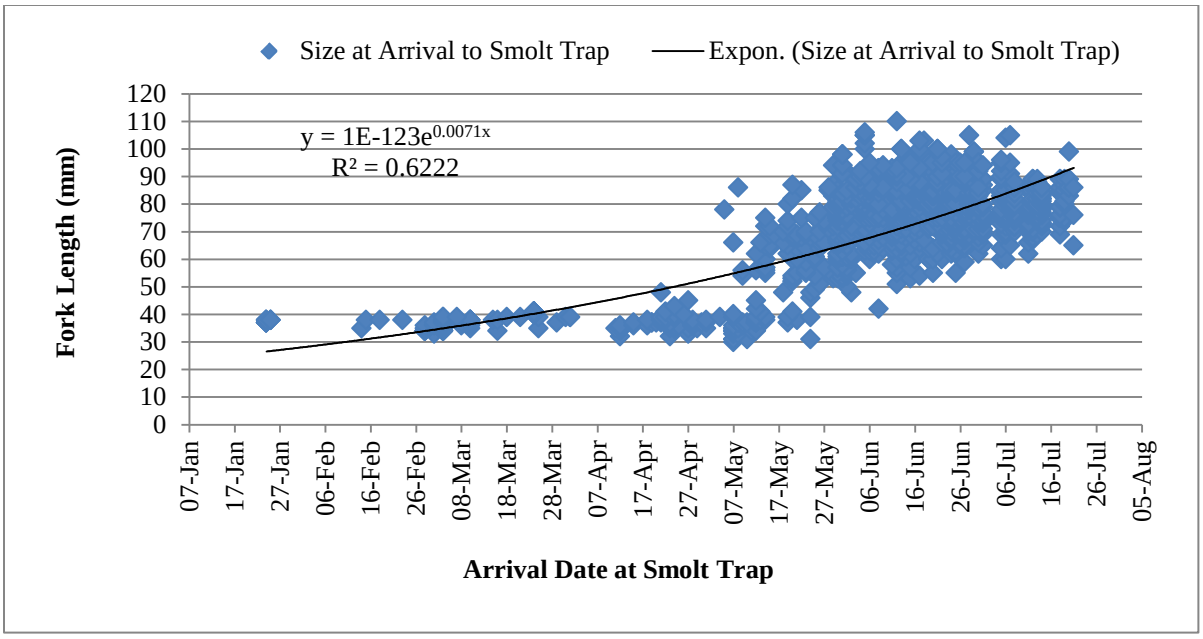

Figure 8. Arrival dates and sizes of juvenile natural origin fall Chinook trapped on the Tucannon River in 2011.

Coho

Juvenile coho salmon were incidentally captured at the smolt trap. Mark-recapture trap efficiencies were calculated and were highly variable and averaged 25% during the trapping period (Table 29). Staff captured 368 coho and estimate that 2,076 (95% C.I. = 1,480-3,090) naturally produced coho parr and smolts passed the Tucannon River smolt trap during 2011. Scales were not collected on coho so we were unable to determine brood year of the emigrants although we suspect two age classes are present based upon fork lengths and arrival dates shown in Figure 9. There is a strong correlation between size and arrival date for suspected subyearlings and a slight correlation for suspected yearlings. Determining age classes would enable us to estimate productivity and to compare it with fall Chinook productivity.

Juvenile coho were observed at the smolt trap from 26 January through 22 July. Median passage date was 11 May. Staff took fork lengths on 362 fish which ranged from 24-149 mm in length, with a mean of 107 mm and median of 110 mm. Weights ranged from 1.3-38.3 g, with a mean of 16.7 g and a median of 16.1 g. K-factors ranged from 0.25-2.39, with a mean of 1.15 and median of 1.12.

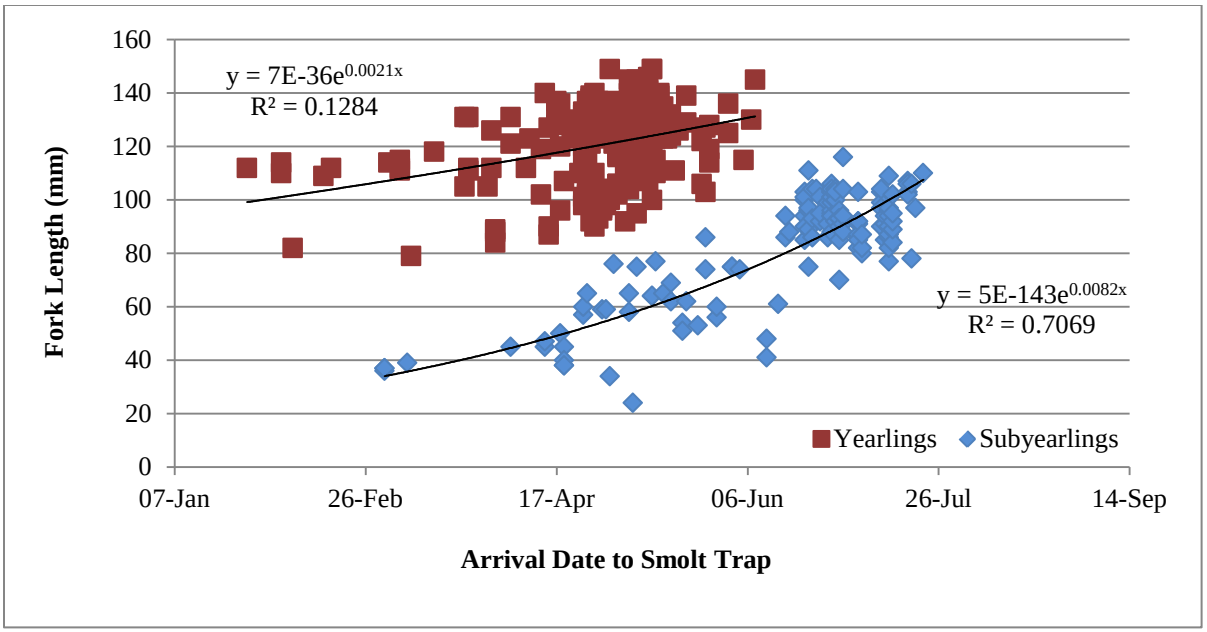

Figure 9. Arrival dates and sizes of natural origin coho trapped on the Tucannon River in 2011 by suspected age classes.

Fall Chinook Run Size and Composition 2011

Return to LFH

Fish trapped at LFH are not systematically trapped and marked; therefore, neither the full run size nor the true composition of the run to LFH can be estimated. The estimated composition of fall Chinook trapped at LFH that were killed during spawning is shown in Table 30.

Table 30. Estimated composition of fall Chinook trapped at LFH and killed in 2011 by program and saltwater age.

	0-salt	1-salt		2+ salt			
Program	**Minijack**	**True jack**	**True jill**	**Adult F**	**Adult M**	**Total**	**% of total**
Umatilla/BONN	0	0	0	2	5	7	1.7
Bonneville	0	0	0	0	0	0	0.0
Umatilla	0	0	0	2	2	4	1.0
NPTH	0	0	0	0	0	0	0.0
LSRCP	17	50	8	205	123	403	97.3
Natural	0	0	0	0	0	0	0.0
Total	**17**	**50**	**8**	**209**	**130**	**414**	

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 M. At the time of printing this report, a finalized run reconstruction was not completed for 2011. Run reconstruction methods are currently being revised to reduce bias and improve the accuracy of estimates. The preliminary estimated composition of the run to LGR for fish $\geq$ 53 cm fork length was 8,618 natural origin and 19,087 hatchery fish, with an overall stray rate of 1.6%. The preliminary estimated composition of fish < 53 cm fork length was 4,017 natural origin and 11,421 hatchery fish with an overall stray rate of 0.4%.

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 at LGR Dam (U.S. Army Corps of Engineers, 2011). Window counts estimated 46,098 adults and jacks reached LGR Dam in 2011 (Figure 10). 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 include fish less than 30 cm long, and neither adjust for fish that crossed the dam and fell back through the juvenile bypass system (fallback event) nor are they adjusted for fish that re-crossed the dam after a fallback event (double counting).

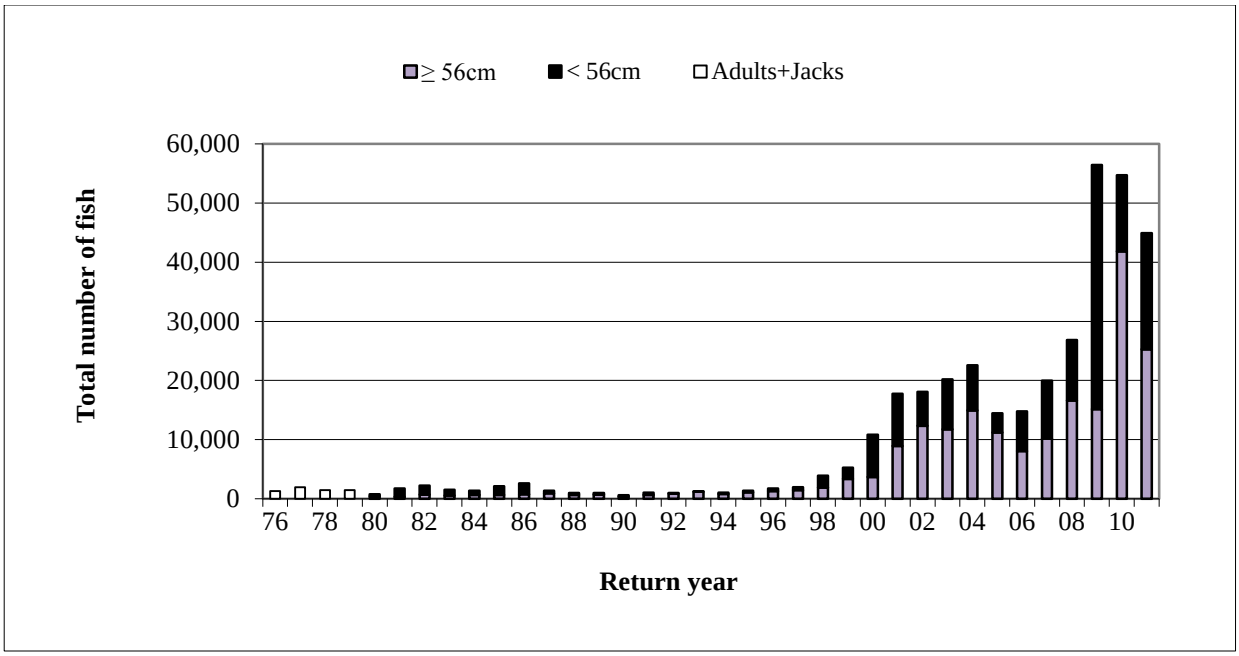

Figure 10. Fall Chinook window counts at LGR Dam, 1976-2011.

Fallbacks

A total of 3,010 fallback events were counted at the juvenile collection facility (Table 31) and the separator (Table 32) located below LGR Dam. These fallback events occur when fish encounter the traveling screens that bypass fish away from the turbines and shunt them to the juvenile collection facility. Fish can also fallback over the spillway, go through the turbines, or the navigation lock, but we did not estimate fallback for those routes.

Table 31. Documented fallbacks of Chinook at the LGR juvenile collection facility during 2011 by clip and wire.

Run	Fin clip	Wire	<30cm	30-50cm[a]	Grand Total
Chinook[b]	AD	No wire	0	0	0
		Wire	0	6	6
		Unk	1	48	49
	No clip	No wire	0	4	4
		Wire	0	5	5
		Unk	0	24	24
Fall Chinook Total			**1**	**87**	**88**
% Hatchery Origin			**100.0%**	**67.8%**	**68.2%**

[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 juvenile collection facility and separator were examined for size, fin clips, VIE tags, and operculum punches. More than half of the fish less than 50 cm fork length were hatchery fish. No VIE tags were detected in 2011. An estimate of at least 57.4% of the fish ≥ 53 cm sampled at the separator were of hatchery origin based solely on adipose clips, but we expect the rate is actually much greater since some of the hatchery fish released inbasin are unclipped.

Table 32. Composition of fallbacks at the LGR Dam separator in 2011 by clip and fork length.

Clip	<53cm[a]	≥53 cm[a]	Grand Total
AD Clip	787	910	1,697
No Clip	522	703	1,225
Grand Total	**1,309**	**1,613**	**2,922**

[a] Category includes males and females.

Characteristics of fall Chinook reaching LGR Dam

The following figures were built using data collected at the LGR adult trap. These analyses include hatchery and natural origin fall Chinook.

Arrival timing

The actual numbers of fish trapped were expanded to estimate the magnitude of the run arriving at LGR each day (Figure 11) the trap was operated.

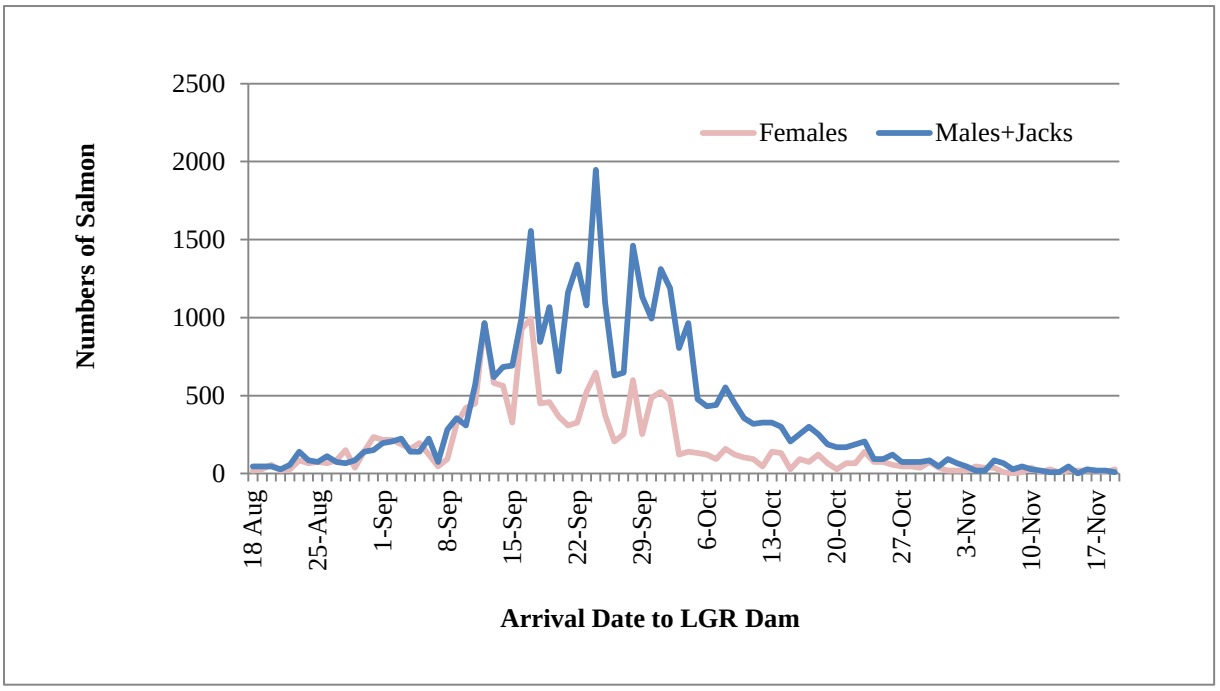

Figure 11. Run timing of fall Chinook to LGR Dam by sex in 2011.

Sex Ratio

The 2011 return consisted of 66% males, including jacks. The sex ratio of the return was calculated at 1.9 males+jacks/female. After removal of fish for broodstock, the fish calculated passing LGR Dam were 68% males resulting in 2.1 males+jacks/female.

Length frequencies

Fish trapped at LGR were measured and numbers of fish at each length were expanded to account for trapping rate (Figure 12). Median fork length for males and females was 51 cm and 78 cm, respectively. Figure 13 shows the length frequencies of fish passing LGR Dam after broodstock was removed. Updated length frequency figures from the 2010 annual report are presented in Appendix N.

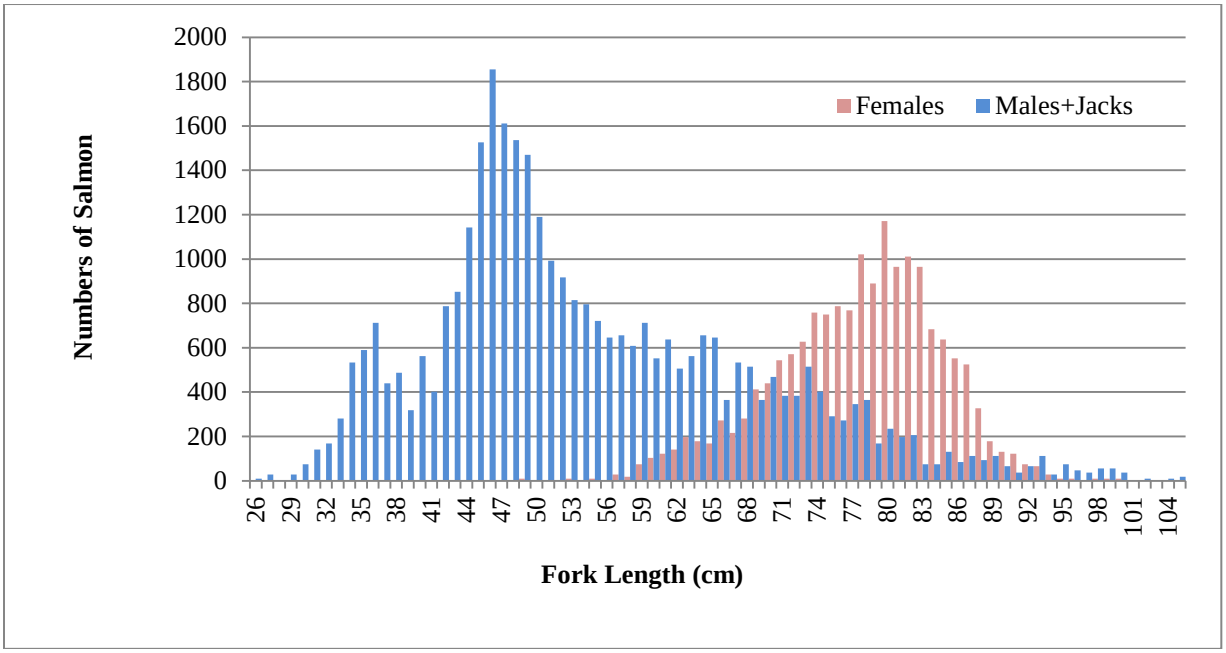

Figure 12. Estimated length frequencies of the fall Chinook run to LGR Dam by sex in 2011.

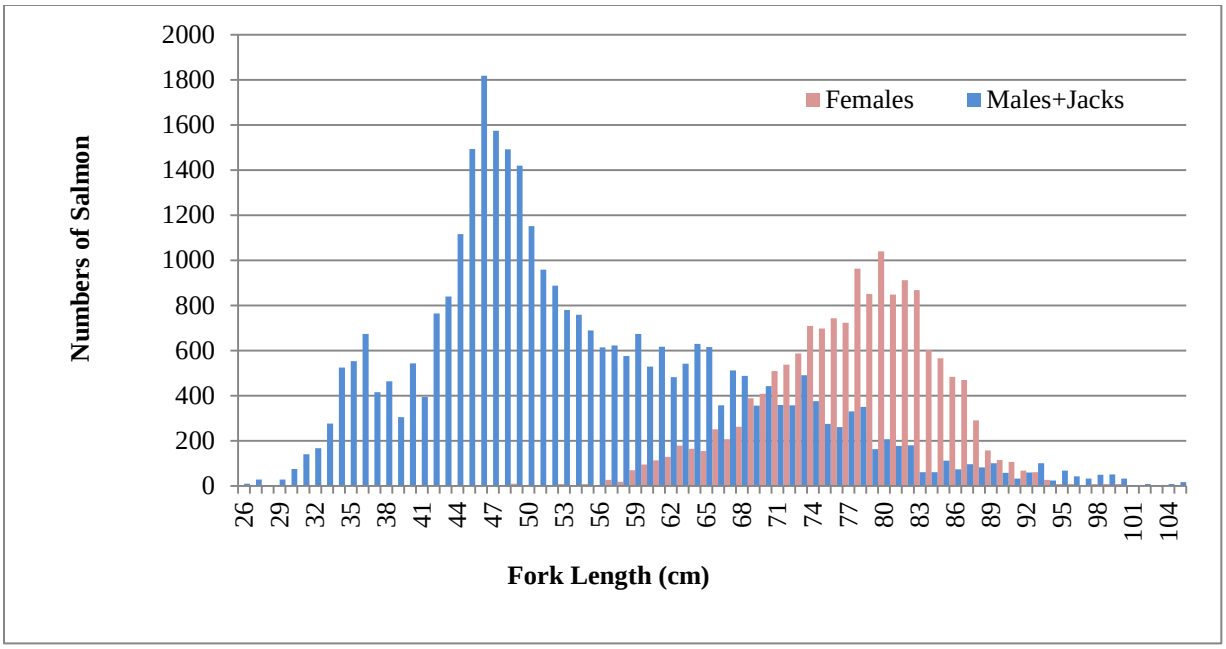

Figure 13. Estimated length frequencies of fall Chinook passing LGR Dam by sex in 2011.

Status of Mitigation Requirements

Overall Mitigation Level

A minimum estimated 35.7% of the total LSRCP mitigation goal of 91,500 fish was achieved in 2011. An estimated minimum of 20,326 fall Chinook (adults+jacks) returned from WDFW and FCAP releases into the Snake River, and at least an additional 12,320 fall Chinook were recovered outside of the Snake River basin, totaling 32,646 fish contributing to LSRCP mitigation in 2011. Age was estimated by subtracting 1 from the total age of subyearlings and subtracting 2 from the total age of yearlings. These estimates underestimate jacks because they do not take into account reservoir rearing of the subyearling component. Estimated recoveries of WDFW releases outside of the Snake River are fully expanded, but the FCAP recoveries only include CWT recoveries and are not expanded to account for untagged fish associated with those groups or adjusted for detection method. Mitigation numbers presented in this report are therefore considered minimum estimates. The RMIS website was queried on 25 Feb 2013 for the 2011 returns of CWT tagged fish associated with the LSRCP (FCAP and WDFW releases).

Returns to the Project Area

The LSRCP mitigation goal of 18,300 fish returning to the Snake River was exceeded in 2011 (Table 34). Combining recoveries of fish harvested below LGR Dam, killed at LFH, the carcasses recovered on Tucannon River and the preliminary run to LGR Dam provides the best estimate of mitigation returns (tagged and untagged fish). These estimates include neither in-basin hatchery returns from the IPC and the NPTH programs, nor a fully expanded estimate for the Tucannon River due to methodology changes in review.

In 2011, anglers in Washington were allowed a daily harvest of three adult fall Chinook and three jacks, all of which must be adipose clipped. In Oregon, anglers were allowed a daily limit of six adipose-clipped adults. There was no limit for jack retention.

On the Snake, 171 observed recoveries were reported to RMIS which expands to 500 harvested fish (Table 33). IDFG submitted an additional 67 observed recoveries but estimated catch was not reported. IDFG reported 8 jacks and 5 adults harvested in the Clearwater River up to the Orofino bridge, but no expanded estimates were submitted for those fish. There were also 2 minijacks, 30 jacks and 4 jills, and 18 adults harvested in the Snake River below the Salmon River that had no expansions. Tribal catch was not reported.

Table 33. Estimated Snake River basin recoveries in 2011 of fall Chinook released by WDFW releases as reported to RMIS.

		Saltwater age					
		0-salt	1-salt		2-5 salt		
Freshwater sport location		**Minijack**	**Jack**	**Jill**	**F**	**M**	**Total**
BELOW LGR	Snake R Ice Harbor-LMO	0	2	4	0	0	6
	Snake LMO –LGO	16	60	70	0	0	130
ABOVE LGR	Snake R above LGR	36	215	17	65	15	312
Totals		**52**	**277**	**91**	**65**	**15**	**448**

The preliminary run reconstruction estimates of LSRCP and FCAP returns to LGR Dam are presented in Table 34. The ages presented were estimated by subtracting broodyear from return year to get the total age of the fish then estimating 1 year in freshwater for subyearlings and 2 years in freshwater for yearlings. Reservoir rearing was not taken into account for the run reconstruction.

Table 34. Preliminary estimated returns of LSRCP (WDFW and FCAP)fall Chinook to the Snake River and levels of mitigation goals met in 2011.

	Saltwater age						
	0-salt	1-salt		2-5 salt			% of LSRCP goal to the Snake River
Location	**Mini jack[a]**	**Jack[b]**	**Jill[c]**	**Adult F**	**Adult M**	**Total (A+J)**	
Harvested FCH below LGR[d]	16	62	74	0	0	136	0.7
LFH trapped and killed during processing	12	83	56	483	115	737	4.0
Carcasses recovered in the Tucannon R[e].	1	30	25	22	6	83	0.5
Run to LGR dam (prelim LSRCP est. CWT+nowire)	2,122	9,371	1,038	6,049	2,078	18,536	101.3
Run to LGR dam (prelim Run Recon- surrogates)[f]	0	270	0	156	407	834	4.6
Total	**2,151**	**9,816**	**1,193**	**6,710**	**2,606**	**20,326**	**111.1**

[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] Harvest only includes recoveries of fish released by WDFW (FCAP is excluded).
[e] Estimates have not been expanded to the run to the Tucannon due to methodology changes currently under consideration.
[f] Estimated run to LGR Dam for LSRCP and FCAP releases and includes fish hauled to LFH and NPTH for processing as well as fish released from the dam.

Recoveries outside of the Snake River Basin

At a minimum, 17 % of the 73,200 fish harvest goal was met through returns from LSRCP releases in 2011. An estimated 8,773 salmon were harvested from WDFW releases after expanding for sampling methodologies reported and including associated untagged fish estimated in catches (fully expanded estimates). An additional 3,547 CWT tagged fish from FCAP releases were reported by RMIS (not fully expanded for untagged fish harvested or adjusted for detection method), although we do not include them further in this report.

To document where recoveries of LFH/Snake River hatchery fish occurred in 2011, the RMIS database was queried on 25 February 2013 for LSRCP released fish. Estimates of harvest for fish released by WDFW are listed in Tables 35 and 36 and do not include recoveries of fish released by the NPT (LSRCP or NPTH programs) or ODFW or IDFG (IPC program).

In 2011, an estimated 12% of the 73,200 fish harvest goal was met by WDFW releases. The sport harvest estimate is a minimum, and includes harvest in the Snake River (0.2% of total harvest goal). Expanded estimates of harvest of NPT fish (FCAP) that were part of the LSRCP mitigation are not presented in this report and will be documented in a future NPT report.

The majority (51 %) of recoveries reported to RMIS occurred in saltwater locations and 49% occurred in freshwater locations. Of the total number of fish recovered, 73.2% came from commercial fisheries, 26.1 % were from sport fisheries, 0.7% were from spawning ground surveys on the Hanford reach, and 0.1% were from hatcheries. Harvest occurred in the ocean off the coasts of Washington and British Columbia, but the single largest fishery contributor to harvest was the Zone 6 Tribal Gillnet fishery which accounted for 31.2 % of all the fish harvested in 2011.

Harvest Adjustments for Non-Selective Fisheries

Non-selective fisheries retain any fall Chinook captured. Non-selective fisheries include all the current commercial and tribal net fisheries. The WA and OR sport fisheries in the Columbia River, and Canadian and Alaskan 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 CWT harvest estimates must be expanded to reflect total harvest for mitigation purposes. Adjustments to RMIS harvest data were calculated differently based upon CWT detection methods listed below.

Visual Detection Method

Visual detection means only adipose fin clipped fish were scanned for CWTs. Since Oregon, 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 that were associated with a tagcode/# ADCWT in the release) = Revised ESTD total take

Electronic Detection Method

Electronic detection method means all fish were scanned 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 that were associated with a tagcode/(# ADCWT in the release + # CWT in the release) = Revised ESTD total take

Table 35. Fully expanded recovery estimates of tagged and untagged fall Chinook in freshwater areas outside of the Snake River basin in 2011 for WDFW releases.

			Yearlings			Subyearlings							Total recoveries	
			LFH			LFH		CCD		GRR				
Region	Recovery area	Fishery/Hatchery/River	EST CWT	EST CWT adj for detect method	Total EST wire + no wire	EST CWT	EST wire + no wire	EST CWT	EST wire + no wire	EST CWT	EST wire + no wire	Total EST wire + no wire	Grand Total EST CWT	Grand Total EST wire + no wire
CA	Freshwater Sport	ABOVE RED BLUFF DAM	25	25	25							0	25	25
COL	COL R Gillnet Zone 6	ABOVE BNVILLE NET	1,033	2,016	2,064	224	232	235	267	109	174	673	1,601	2,737
	COL R Gillnet Zone 1-5		279	531	544	84	87	75	85	29	48	220	467	764
	COL R Sport		225	422	429	57	59	47	54	20	28	141	349	570
	Estuary Sport	COL R ESTUARY	93	93	95	9	9	9	10	6	7	26	117	121
	Mid-COL R Sport	JOHN DAY POOL LWR/ HANFORD REACH	1	1	1					5	10	10	6	11
	Spawning Ground	COL R @ HANFORD REACH(36)	18	18	19					18	41	41	36	59
	Hatchery	PRIEST RAPIDS						1	1	3	5	6	4	6
	Oregon Hatchery	CTUIR UM R BROOD PDS								1	1	1	1	1
OR	Estuary Sport	UMPQUA ESTUARY	2	2	2							-	2	2
Total Freshwater recoveries			1,676	3,108	3,179	374	387	367	416	191	314	1,118	2,608	4,297

Table 36. Fully expanded recovery estimates of tagged and untagged fall Chinook in saltwater areas in 2011 for WDFW releases.

		Yearlings			Subyearlings							Total recoveries	
		LFH			LFH		CCD		GRR				
Region	Fishery	EST CWT	EST CWT adj for detect method	Total EST wire + no wire	EST CWT	EST wire + no wire	EST CWT	EST wire + no wire	EST CWT	EST wire + no wire	Total EST wire + no wire	Grand Total EST CWT	Grand Total EST wire + no wire
AK	Ocean Sport				2	2					2	2	2
	Ocean Gillnet (non-treaty)	1	2	2							-	1	2
	Ocean Troll - Day Boat	3	6	6	2	2	6	7			9	11	15
	Ocean Troll (non-treaty)	25	49	51	10	10	24	28	3	3	42	62	92
BC	Ocean Sport	187	316	324	50	52	47	54	16	31	137	300	460
	Ocean Troll (non-treaty)	484	484	497	82	84	88	99	28	42	225	682	723
	Sport (private)	6	6	6	2	2					2	8	8
CA	Ocean Sport	19	29	29	5	5	9	11			16	33	45
	Ocean Troll (non-treaty)	13	17	17	4	4	12	14			18	29	35
COL	Sport (private)	26	26	27					12	20	20	38	46
HS	Hake Trawl Fishery (CA/OR/WA)	600	747	758	75	76	75	76	75	147	299	825	1,057
OR	Ocean Sport	93	93	95	7	7	2	2			9	102	104
	Ocean Troll (non-treaty)	151	151	155	20	21	14	16	15	26	63	200	218
WA	Coastal Gillnet	2	2	2							-	2	2
	Estuary Sport	38	38	39	13	13	3	3			17	54	56
	Ocean Troll (non-treaty)	249	249	256	28	29	22	25	19	24	78	318	334
	Sport (charter)	306	306	312	8	8	10	11	6	10	29	330	341
	Sport (private)	420	420	429	24	25	21	24	13	18	66	478	495
	Treaty Troll	332	332	341	32	33	28	31	23	36	100	415	440
Total ocean recoveries		2,955	3,273	3,343	364	374	361	401	210	358	1,132	3,890	4,476
Grand Total recoveries (Freshwater+Saltwater)		**4,631**	**6,381**	**6,523**	**738**	**761**	**728**	**817**	**401**	**672**	**2,250**	**6,498**	**8,773**

Total ages of yearling and subyearlings recovered outside of the Snake River basin

Recoveries in 2011 from yearling (Table 37) and subyearling released fish (Tables 38-40) were primarily from age 4 fish (2-salt yearlings and 3-salt subyearlings). Data were summarized only for ADCWT marked releases in the tables below. Adjustments were not made to the original data presented by RMIS as ESTD in the tables below.

Table 37. Final locations of ADCWT yearling fall Chinook released onstation at LFH to freshwater and ocean areas outside of the Snake River basin in 2011 by total age.

Brood year:	**2009**	**2008**	**2007**	**2006**	
Total age:	**2**	**3**	**4**	**5**	
Tag code:	**635564**	**635166**	**634680**	**633987**	
ADCWT at release:	**226,621**	**250,814**	**220,723**	**231,534**	
Total released (wires+nowire):	**227,391**	**254,203**	**227,364**	**233,663**	**Totals**
Freshwater	63	502	951	76	1,592
CA		25			25
COL	62	477	951	76	1,566
OR	1				1
Ocean		671	911	96	1,678
AK		0	14	15	29
BC		61	294	34	389
CA		11	17	4	32
COL		12	8		20
HS		300	75		375
OR		44	83	10	137
WA		243	420	33	696
Grand Total	63	1,173	1,862	172	3,270
Percent of release recovered	**0.03%**	**0.46%**	**0.82%**	**0.07%**	

Table 38. Final locations of ADCWT subyearling fall Chinook released onstation at LFH to freshwater and ocean areas outside of the Snake River basin in 2011 by total age.

Brood year:	**2009**	**2008**	**2007**	
Total age:	**2**	**3**	**4**	
Tag code:	**635180**	**634995**	**634672**	
ADCWT at release:	**198,457**	**191,407**	**194,723**	
Total released (wires+nowire):	**202,328**	**200,695**	**200,733**	**Totals**
Freshwater	15	116	243	374
COL	15	116	243	374
Ocean	75	87	202	364
AK		2	12	14
BC		33	101	134
CA		2	7	9
HS	75			75
OR		12	15	27
WA		38	67	105
Grand Total	90	203	445	738
Percent of release recovered	**0.04%**	**0.10%**	**0.22%**	

Table 39. Final locations of ADCWT subyearling fall Chinook released into the Snake River near Couse Creek to freshwater and ocean areas outside of the Snake River basin in 2011 by total age.

Brood year:	**2009**	**2008**	**2007**	
Total age:	**635181**	**634996**	**634671**	
Tag code:	**2**	**3**	**4**	
ADCWT at release:	**199,326**	**187,434**	**195,058**	
Total released (wires+nowire):	**203,162**	**200,744**	**230,401**	**Total**
Freshwater	37	101	229	367
COL	37	101	229	367
ocean	75	98	188	361
AK			30	30
BC		50	85	135
CA		4	17	21
HS	75			75
OR		6	10	16
WA		38	46	84
Grand Total	112	199	417	728
Percent of release recovered	**0.06%**	**0.10%**	**0.18%**	

Table 40. Final locations of ADCWT subyearling fall Chinook released into the Grande Ronde to freshwater and ocean areas outside of the Snake River basin in 2011 by total age.

Brood year:	**2009**	**2008**	**2008**	
Total age:	**635182**	**612676**	**634997**	
Tag code:	**2**	**3**	**3**	
ADCWT at release:	**197,252**	**165,146**	**193,275**	
Total released (wires+nowire):	**386,840**	**181,400**	**441,050**	**Totals**
Freshwater	33	93	65	191
COL	33	93	65	191
Ocean	80	63	37	180
AK		3		3
BC	5	19	16	40
COL		4	4	8
HS	75			75
OR		1	4	5
WA		36	13	49
Grand Total	113	156	102	371
Percent of release recovered	**0.03%**	**0.09%**	**0.02%**	

Returns estimated using PIT tags and CWTs

The trap at LGR Dam is not designed to hold small (zero-salt) fish. Small fish can slip between the bars of the grail and are thought to be able to fit between the bars in the ladder, thus allowing them to avoid being diverted into the trap. The trap at LFH can hold small fish but a similar problem occurs when the fish are shunted into the fallback channel and crowded. The bars on the crowder are not designed to keep small fish from escaping so although they may be trapped, they are not accounted for at spawning because they never make it into the spawning building for processing.

To address this issue, we compared two methods of estimating returns to the Snake River: 1) PIT tag detections at return and 2) estimated returns of CWT fish. Data presented is preliminary since return information by brood year is incomplete. PIT tag detections were downloaded 5 March 2013. PIT tags used for estimating returns to the Snake River consisted of fish detected at arrays in the Snake River (Table 41). Data presented in Table 42 include returns of CWT fish in 2011.

By using PIT tagged returns of yearling fall Chinook released at LFH, we were able to detect an average 3.1 times greater return estimates of 0-salt fish compared to estimates using conventional CWT estimates based on trapping rates and detections. As fish returned at older ages the differences between estimation methods decreased, and CWT estimates resulted in 1.5 times greater return estimates for 1-salt and 2-salt fish than from PIT tag estimates. However, 3-salt fish with PIT tags resulted in 1.5 times greater SAR than when using CWT estimates. We currently have no explanation for these differences, but will continue to utilize both procedures and evaluate sources of error and bias in the sampling that might account for the difference.

Table 41. Return estimates to the Snake River for yearling fall Chinook released at LFH estimated using PIT tag detections in the Snake River through 2011.

Brood year	0-salt	1-salt	2-salt	3-salt	4-salt	Total Return to Date	Total PIT tagged at Release
2006	4.0% 1,183	1.7% 500	0.8% 233	0.04% 13	-	6.5% 1,929	29,806
2007	0.4% 106	0.7% 195	0.3% 83	-	-	1.4% 384	26,757
2008	0.6% 157	0.9% 250	-	-	-	1.5% 407	26,975
2009	0.4% 130	-	-	-	-	0.4% 130	29,890

Table 42. Return estimates to the Snake River for yearling fall Chinook released at LFH estimated using CWT recoveries and return estimates of live fish through 2011.

Brood year	0-salt	1-salt	2-salt	3-salt	4-salt	Total Return to Date	Total Tagged at Release	Tag codes
2006	1.3% 5,737	3.3% 14,856	1.0% 4,541	0.03% 151	-	5.6% 25,285	452,340	634092 633987
2007	0.1% 522	1.1% 4,987	0.6% 2,502	-	-	1.8% 8,011	442,640	634680 634681
2008	0.1% 324	0.6% 2,783	-	-	-	0.7% 3,107	472,359	635165 635166
2009	0.2% 1,102					0.2% 1,102	463,729	635510 635564

Total survival estimated using CWT and PIT tags

Total survival estimates include recoveries or detections in the Snake River as well as harvest recoveries and detections at downstream locations (Tables 43 and 44). PIT tag detections result in an average 3.4 times greater 0-salt survival estimate than occurred by using CWT estimation methods. However, as fish returned at older ages the differences between methods reversed and the CWT estimation method resulted in 1.6 and 1.7 times greater survival estimate of 1-salt and 2-salt fish than estimated by using PIT tags. Both methods estimated 3-salt returns equally. Although returns are not complete for the brood years evaluated, it appears that CWT estimation methods result in accounting for more jack and adults than PIT tag detections, but PIT tags are useful for estimating the abundance of minijacks. We do not presently know the cause of the difference in estimated returns between PIT tags and CWTs for older fish.

Table 43. Total survival estimates of yearling fall Chinook released at LFH estimated using PIT tag detections in the Snake and Columbia rivers during 2011.

Brood year	0-salt	1-salt	2-salt	3-salt	4-salt	Total Return to Date	Total PIT tagged at Release
2006	4.8% 1,418	2.1% 635	1.4% 405	0.1% 26	-	8.3% 2,484	29,806
2007	0.5% 142	0.8% 225	0.6% 161	-	-	2.0% 528	26,757
2008	0.7% 198	1.1% 292	-	-	-	1.8% 490	26,975
2009	0.6% 181	-	-	-	-	0.6% 181	29,890

Table 44. Total survival estimates of yearling fall Chinook released at LFH estimated using ocean and freshwater CWT recoveries and return estimates of live fish through 2011.

Brood year	0-salt	1-salt	2-salt	3-salt	4-salt	Total Return to Date	Total Tagged at Release	Tag codes
2006	1.3% 5,800	3.9% 17,749	2.0% 9,000	0.1% 490	-	7.3% 33,039	452,340	634092 633987
2007	0.1% 572	1.4% 6,034	1.4% 6,202	-	-	2.9% 12,808	442,640	634680 634681
2008	0.1% 324	1.0% 4,851	-	-	-	1.1% 5,175	472,359	635165 635166
2009	0.3% 1,377					0.3% 1,377	463,729	635510 635564

Reference Population

Deschutes River fall Chinook

The search for another reference population beyond the Deschutes River fall Chinook has been tabled until summer of 2013. At that time the search will continue in preparation for the fall Chinook symposium.

Conclusions and Recommendations

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

1. Run Reconstruction methodologies have changed and currently estimates are being revised through 2005. Prior to 2005, sub-sampling of VIE tagged fish with CWTs occurred at LFH which will require adjustments to the method employed for 2012-2005.

Recommendation: Finalize the 2012-2005 dataset and update appropriate historical return tables.

Recommendation: Assist the Run Reconstruction group in developing methodologies to address sampling changes that occurred prior to 2005.

Recommendation: Continue to assist with documentation of historical methodologies used to develop run estimates.

2. In prior reports the run to the Tucannon was estimated based on a multiplier of 3 fish per redd each year. Carcass surveys over the years have resulted in a higher proportion of females in the sample than males or jacks when compared to the run estimates at LGR Dam. Currently we are investigating alternate methods of estimating run size and composition that would change yearly depending upon run compositions.

Recommendation: Derive a methodology for calculating a multiplier to apply to the number of redds counted on the Tucannon to more accurately estimate run size.

Recommendation: Compile sex ratios of fish reaching LGR Dam over the years.

3. Concerns have been raised about onstation released fall Chinook passing LGR Dam, which could be considered straying away from the release site.

Recommendation: Calculate the percent of the onstation releases that are crossing LGR Dam and the estimated final location of these fish.

4. Two ages of coho are intercepted at the smolt rap each year but we are unable to determine age due to overlaps in fish size. The ages of coho need to be identified in order to estimate productivity of coho in the Tucannon River and to compare them with fall Chinook productivity.

Recommendation: Take scales on larger sized coho to determine true age of outmigrants. Continue sampling until three years of data are compiled (through 2014 outmigration).

5. Ages of fish presented in this report under estimate jacks. Scales are primarily taken on untagged fish so salt water ages are accurate and take into account reservoir rearing. Salt water ages of wire tagged fish are calculated by subtracting 1 year from the total age of subyearling and 2 years from the total age of yearlings. This method does not take into account reservoir rearing of subyearlings and therefore over estimates the saltwater age.

Recommendation: Continue to take scale samples from all fish used as broodstock to document true jacks and jills possibly included in the broodstock.

Recommendation: Take stratified samples of wire tagged fish during processing at LFH based on sex and fork length to profile reservoir rearing.

6. Estimates of returns using PIT tags and CWTs vary by age at return. Tagging constitutes a significant program cost annually for fall Chinook and methods for monitoring and evaluating program performance need to be cost efficient.

Recommendation: Continue to evaluate the use of both types of tagging to determine if some optimum proportion of PIT and CWT could be used to accurately portray fish performance and reduce tagging costs.

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Appendix A: Fall Chinook Run to LFH, IHR, LMO, and LGR Dams: 2006-2011

(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 fall Chinook processed at LFH and window counts at Ice Harbor, Lower Monumental, and Lower Granite dams, 2007-2011.

		Daytime Counts Through October		Nov and Dec		Night Video[a] Through Oct		Nov and Dec		Totals[b]	
Year	Location	Adults	Jacks	Adults	Jacks	Adults	Jacks	Adults	Jacks	≥ 52 cm FL	< 53 cm FL
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
	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									1208	792
	LGR Dam	16,443	10,076	185	152	nc	nc	nc	nc	16,628	10,228
2009	IHR Dam	24,824	38,611	nc	nc	nc	nc	nc	nc	24,824	38,611
	LOMO Dam	22,184	39,241	nc	nc	nc	nc	nc	nc	22,184	39,241
	LFH									542	742
	LGR Dam	15,058	40,973	109	312	nc	nc	nc	nc	15,167	41,285
2010	IHR Dam	46,541	12,230	nc	nc	nc	nc	nc	nc	46,541	12,230
	LOMO Dam	42,718	15,408	nc	nc	nc	nc	nc	nc	42,718	15,408
	LFH									339	75
	LGR Dam	41,311	12,730	504	165	nc	nc	nc	nc	41,815	12,895
2011	IHR Dam	31,405	19,578	nc	nc	nc	nc	nc	nc	31,405	19,578
	LOMO Dam	27,594	17,855	nc	nc	nc	nc	nc	nc	27,594	17,855
	LFH									666	154
	LGR Dam	24,819	19,516	430	139	nc	nc	nc	nc	25,249	19,655

[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 2011

2011 Fall Chinook Trapping/Sampling Protocol

by

Debbie Milks, WDFW
Bill Arnsberg, NPT
Stuart Rosenberger, IPC
Stuart Ellis, CRITFC
August 1, 2011

Executive summary:

The sample rate at LGR Trap will be set at 10% and kept at that level throughout the season. If the trap is swamped with fish: 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.

WDFW is providing 2 staff for helping with the broodstock collection activities at LGR. Scales sampled at the LGR Trap for run reconstruction needs will be mounted by WDFW staff at LGR and sent to Olympia every two weeks.

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. If you are getting jacks suspected of being summers we will need to subsample those fish for wires as well.

Males, jacks and minijacks will all be entered on the data forms as males.

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

In an effort to reduce the numbers of jills and jacks hauled to the hatcheries and to reduce the numbers of fish sacrificed with wire for run reconstruction purposes the following protocol was approved by co-managers in the basin on 8/01/2011. The sub-sampling of wire tagged fish should allow for ample recoveries for evaluation purposes.

Protocol:

1) COLLECT & HAUL: Please give 1-ROP punch. Fish ≥ 65 cm slated for hauling will be put together in tanks while fish < 65cm will be put together in another tank. Regardless of whose day it is to haul, any fish <65cm slated to be hauled will go to LFH. NPTH will not be taking any fish < 65cm, they will be hauled to LFH for processing
    a. Wire tagged fish: haul every 2 out of 3 wire tagged fish regardless of size
    b. All Untagged fish > 80 cm
2) PASS: Please give 1-LOP punch and take scales on every third fish that is not wire tagged/PIT tagged
    a. 1 out of 3 wire tagged fish
    All untagged fish <80 cm

2011 Fall Chinook Trapping/Sampling Protocol

by

Debbie Milks, WDFW
Bill Arnsberg, NPT
Stuart Rosenberger, IPC
Stuart Ellis, CRITFC
Revised September 27, 2011

Executive summary:

Due to a lower than estimated return, the protocol was modified to increase the numbers of fish hauled to LFH and NPTH to assure eggtake goals will be met. The size criteria for untagged (no wire) fish hauled to the hatcheries will be relaxed so more fish are hauled to the hatcheries.

Protocol:

1) COLLECT & HAUL: Please give 1-ROP punch. Fish ≥ 65 cm slated for hauling will be put together in tanks while fish < 65cm will be put together in another tank. Regardless of whose day it is to haul, any fish <65cm slated to be hauled will go to LFH. NPTH will not be taking any fish < 65cm, they will be hauled to LFH for processing
    a. Wire tagged fish: haul every 2 out of 3 wire tagged fish regardless of size
    b. All Untagged fish ≥ 70 cm
2) PASS: Please give 1-LOP punch and take scales on every third fish that is not wire tagged/PIT tagged
    a. 1 out of 3 wire tagged fish
    b. All untagged fish <70 cm

2011 Fall Chinook Trapping/Sampling Protocol

by

FCH Coordination Team
Revised October 5, 2011

Executive summary:

Due to a lower than estimated return, the protocol was modified to increase the numbers of fish hauled to LFH and NPTH to assure eggtake goals will be met. Wire tagged fish 70 cm and larger will no longer be sub-sampled, they will now be 100% collected and hauled to the hatcheries to increase the numbers of fish hauled to the hatcheries.

Protocol:

1) COLLECT & HAUL: Please give 1-ROP punch. Fish ≥ 65 cm slated for hauling will be put together in tanks while fish < 65cm will be put together in another tank. Regardless of whose day it is to haul, any fish <65cm slated to be hauled will go to LFH. NPTH will not be taking any fish < 65cm, they will be hauled to LFH for processing

- **a.** Wire tagged fish: haul every 2 out of 3 wire tagged fish <70 cm, and haul ALL fish ≥70 cm
- **b.** All Untagged fish ≥ 70 cm

2) PASS: Please give 1-LOP punch and take scales on every third fish that is not wire tagged/PIT tagged

- a. 1 out of 3 wire tagged fish
- b. All untagged fish <70 cm

2011 Fall Chinook Trapping/Sampling Protocol

by

FCH Coordination Team
Revised October 7, 2011

Executive summary:

Due to a lower than estimated return, the protocol was modified to increase the numbers of fish hauled to LFH and NPTH to assure eggtake goals will be met. All females (tagged and untagged) regardless of size will be hauled to the hatcheries.

Protocol:

1) COLLECT & HAUL: Please give 1-ROP punch. Fish ≥ 65 cm slated for hauling will be put together in tanks while fish < 65cm will be put together in another tank. Regardless of whose day it is to haul, any fish <65cm slated to be hauled will go to LFH. NPTH will not be taking any fish < 65cm, they will be hauled to LFH for processing

- **a.** Wire tagged FEMALES: haul all regardless of size
- **b.** Wire tagged MALES: haul every 2 out of 3 wire tagged MALES <70 cm, and haul ALL MALES ≥70 cm
- **c.** Untagged FEMALES: haul all regardless of size
- **d.** Untagged MALES ≥ 70 cm

2) PASS: Please give 1-LOP punch and take scales on every third fish that is not wire tagged/PIT tagged

- a. 1 out of 3 wire tagged fish (DO NOT pass any females)
- b. All untagged males <70 cm (DO NOT pass any females)

2011 Fall Chinook Trapping/Sampling Protocol

by

FCH Coordination Team
Revised October 20, 2011

Executive summary:

Now that broodstock goals have been met at LFH and NPTH, the protocol was modified to decrease the numbers of females hauled to LFH to assure the minimum numbers of females sacrificed for run reconstruction needs. In addition, to increase the numbers of adult males available to spawn, the protocol was changed and untagged males ≥ 65 cm will be hauled to LFH. Inoculations will cease at LGR dam. All fish (larges and smalls) slated for hauling will be mixed in the same tanks. Fish that are < 65 cm will no longer be held separately.

Protocol:

1) COLLECT & HAUL: Please give 1-ROP punch. The NPT ceased hauling fish to NPTH since their broodstock needs have been met. DO NOT inoculate fish slated for hauling. All sizes of fish will be mixed together in the holding tanks.

- **a.** Wire tagged FEMALES: haul every 2 out of 3 regardless of size
- **b.** Wire tagged MALES: haul 2 out of 3 wire tagged MALES <70 cm, and haul ALL MALES ≥70 cm
- **c.** Untagged MALES, ≥ 65 cm

2) PASS: Please give 1-LOP punch and take scales on every third fish that is not wire tagged/PIT tagged

a. 1 out of 3 wire tagged females, regardless of size
b. 1 out of 3 wire tagged males <70 cm
c. All untagged females, regardless of size
d. Untagged males <65

Appendix C: Systematic Sampling Rates at Lower Granite Dam 2003-2011

Appendix C 1. Dates, times, and trapping rates of fall Chinook at Lower Granite Adult trap, 2003-2011.

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
2009	18 Aug 7:37am	12	-	9 Sept 7:25am	9	-	nc	15 Nov
2010	22 Aug 11:05 am	12	10 Sept-10:50 am [d] 18 Sept-10:50am [b]	18 Sept 3:00pm	10	-	nc	18 Nov
2011	18 Aug 10:30 am	10	-	-	nc	-	nc	21 Nov

[a] No change (nc) was made to the trapping rate.
[b] Trap was closed down for two hours each day.
[c] Trap was operated between 8-8:30 am, then 12:30-12:55 pm, then 2:20-3:02 pm on 24 Aug due to water temperature restrictions. Full operation began 25 August
[d] Trap was closed down at 10:50 am for three hours due to large numbers of fall Chinook.

Appendix D: Trapping and Sorting Protocols at Lyons Ferry Hatchery 2011

2011 Fall Chinook Trapping/Sampling Protocol at LFH

Begin trapping 9/20/2011. Tally fish diverted into the hatchery. A PIT tag array will be in place to estimate numbers trapped and recapture events based on PIT tag detections.

Collect fish approximately 90 cm FL or larger
-600 fish goal (200 females)
-Should have 25% of the females by 6 October

Revised 27 September
Collect fish approximately 80 cm FL or larger

2011 Sorting Plan

LGR pond:

Work the LGR Pond containing fish <65 cm "smalls"

Kill males and move females to the "bigs" pond
Sacrifice 30 males with wire to determine age at return by fork length
Double check number and side of operculum punches
For females that do not have 1-ROP:
Give 1-ROP punch and make note of presence/absence of adipose clip and wire.

Work the LGR Pond containing fish ≥65cm "bigs"

Count females >75cm FL, and males < 75 cm FL
Double check number and side of operculum punches
For fish that do not have 1-ROP:
Give 1-ROP punch and make note of sex, clips, wire of that fish, and what operculum punches they had.

LFH pond:

Count males and females and return them to the pond.

Appendix E: United States v. Oregon Production and Marking Table

Appendix E Table B4B. Revised production table listing Snake River fall Chinook salmon production priorities for LFH per the *Us v. OR* Management Agreement, Table *B4B,* and agreed upon by members of the SRFMP for Brood Years 2008-2017.

Priority	Production Program				
	Rearing Facility	**Number**	**Age**	**Release Location(s)**	**Marking**
1	Lyons Ferry	450,000	1+	Onstation	225KAdCWT 225K CWT
2	Lyons Ferry	150,000	1+	Pittsburg Landing	70K AdCWT 80K CWT only
3	Lyons Ferry	150,000	1+	Big Canyon	70K AdCWT 80K CWT only
4	Lyons Ferry	150,000	1+	Captain John Rapids	70K AdCWT 80K CWT only
5	Lyons Ferry	200,000	0+	Onstation	200K AdCWT
6	Lyons Ferry	500,000	0+	Captain John Rapids	100K AdCWT 100K CWT only 300K Unmarked
7	Lyons Ferry	500,000	0+	Big Canyon	100K AdCWT 100K CWT only 300K Unmarked
8	Lyons Ferry	200,000	0+	Pittsburg Landing	100K AdCWT 100K CWT only
9	Oxbow	200,000	0+	Hells Canyon Dam	200K AdCWT
10	Lyons Ferry	200,000	0+	Pittsburg Landing	200K Unmarked
11	Lyons Ferry	200,000	0+	Direct stream evaluation Near Captain John Rapids	200K AdCWT
12	DNFH/Umatilla	250,000	0+	Transportation Study[a]	250K PIT Tag only
13	Irrigon[b]	200,000	0+	Grande Ronde River	200K AdCWT
14	DNFH/Umatilla	78,000	0+	Transportation Study[a]	78K PIT tag only
15	Umatilla	200,000	0+	Hells Canyon Dam	200K AdCWT
16	Irrigon[b]	200,000	0+	Grande Ronde River	200K Unmarked
17	Umatilla	600,000	0+	Hells Canyon Dam	600K Ad only
TOTAL	**Yearlings**	**900,000**			
	Subyearlings	**3,528,000 (of which 328,000 are for Transportation Study)**			

Footnotes for Table B4B:

a/ The Parties expect that fisheries conducted in accordance with the harvest provisions of this Agreement will not compromise broodstock acquisition. If broodstock acquisition is nevertheless compromised by the current mark strategy and as a result of implementation of mark selective fisheries for fall Chinook in the ocean or Columbia/Snake River mainstem, the Parties will revisit the marking strategy during the course of this Agreement.

b/ Production of transportation study surrogates is in effect for five brood years. After this group of fish has been provided for five years the transportation study group will be removed from the table and the groups of fish below will move up one step in priority. If eggs available for subyearling production are 1.2M or less, production of the transportation study surrogate group will be reduced to 250K or be deferred for that year. The PAC will review broodstock collected and projected egg take and make a recommendation to the policy group on whether to provide 250,000 fish or defer by November 1.

c/ USACOE Transportation Study natural-origin surrogate groups direct stream released into the Clearwater and mainstem Snake River.

d/ For logistical purposes, fish may be reared at Irrigon (LSRCP).

Appendix F: LFH 2011 Broodstock PBT Tissue Samples

Appendix F: LFH 2011 Broodstock PBT Tissue Samples

DNA ID	FISH ID	DNA ID	FISH ID	DNA ID	FISH ID	DNA ID	FISH ID
1601	1008	2148	3180	2650	4186	3098	5170
1602	1001	2149	3173	2651	4187	3099	5155
1603	1003	2150	3182	2652	4188	3100	5180 OR 5188
1604	1006	2151	3186	2653	4189	3101	5151
1605	1007	2152	3184	2654	4185	3102	5180 OR 5188
1606	1010	2153	3187	2655	4165	3103	5183
1607	1004	2154	3189	2656	4167	3104	5185
1608	1002	2155	3178	2657	4183	3105	5186
1609	1009	2156	3176	2658	4169	3106	5181
1610	M2304	2158	3177	2659	M2544	3107	5187
1611	M2308	2159	3172	2660	M2551	3108	5182
1612	M2306	2160	3181	2661	M2550	3109	M2655
1613	1005	2161	3175	2662	M2552	3110	M2653
1614	M2301	2162	3167	2663	M2553	3111	M2658
1615	M2307	2163	3183	2664	M2546	3112	M2659
1616	M2305	2164	3188	2665	M2554	3113	M2654
1617	M2303	2165	M2442	2666	M2543	3114	M2656
1618	M2302	2166	M2440	2667	4128	3115	M2652
1619	1011	2167	M2439	2668	4194	3116	M2661
1620	M2309	2168	M2441	2669	4201	3117	M2650
1621	M2310	2169	3185	2670	4192	3118	LIKELY M2644
1622	M2311	2170	3179	2671	4205	3119	M2649
1623	1012	2171	3171	2672	4207	3120	M2645
1624	1014	2172	3174	2673	4202	3121	5100
1625	1013	2173	3168	2674	4208	3122	5105
1626	M2312	2174	3195	2675	4203	3123	5135
1627	1015	2175	3193	2676	4209	3124	5110
1628	1017	2176	3190	2677	4197	3125	5136
1629	1016	2177	3191	2678	4190	3126	M2648
1630	1020	2178	3194	2679	4191	3127	5134
1631	1019	2179	3192	2680	4210	3128	5129
1632	M2313	2180	3197	2681	4206	3129	5119
1633	1018	2181	M2443	2682	4204	3130	5122
1634	M2314	2182	3196	2683	M2555	3131	5113
1635	1022	2183	M2445	2684	M2559	3132	M2641
1636	1021	2184	3198	2685	M2558	3133	M2663
1638	M2315	2185	3199	2686	M2557	3134	M2662
1640	1024	2186	3201	2687	M2556	3135	M2665
1641	1025	2187	3200	2688	4196	3136	5203
1642	1023	2188	3205	2689	4198	3137	5201

Appendix F: LFH 2011 Broodstock PBT Tissue Samples

DNA ID	FISH ID	DNA ID	FISH ID	DNA ID	FISH ID	DNA ID	FISH ID
1643	1026	2189	3209	2690	4193	3138	LIKELY M2664
1648	1027	2190	3203	2691	4199	3139	M2666
1649	1028	2191	M2448	2692	4195	3140	5199
1650	1029	2192	3213	2693	4200	3141	5198
1701	M2316	2193	3210	2694	M2561	3142	5200
1702	M2317	2194	3215	2695	M2563	3143	5195
1703	2004	2195	3212	2696	M2562	3144	5189
1704	2003	2196	3217	2697	4220	3145	5194
1705	2005	2197	3218	2698	4223	3146	5202
1706	2007	2198	3211	2699	M2560	3147	5191
1707	2006	2199	3207	2700	4225	3148	5192
1708	2012	2200	M2447	2701	4229	3149	5197
1709	2014	2201	3208	2702	4231	3150	5190
1710	2013	2202	3206	2703	4233	3151	M2667
1711	2008	2203	M2449	2704	4234	3152	M2670
1712	2002	2204	M2446	2705	4230	3153	M2669
1713	2015	2205	3216	2706	4222	3154	M2671
1714	2011	2206	3214	2707	4235	3155	M2668
1715	2010	2207	M2450	2708	4224	3156	M2674
1716	M2325	2208	3204	2709	4232	3157	5193
1717	M2323	2209	3202	2710	4228	3158	5196
1718	M2329	2210	3219	2711	4227	3159	M2673
1719	M2324	2211	M2444	2712	4219	3160	M2676
1720	M2322	2212	3226	2713	4218	3161	M2675
1721	M2332	2213	3224	2714	4215	3162	5218
1722	M2330	2214	3228	2715	4217	3163	5214
1723	M2318	2215	3227	2716	4214	3164	5221
1724	2023	2216	M2455	2717	4213	3165	M2672
1725	2022	2217	3222	2718	4211	3166	5220
1726	2027	2218	3225	2719	4212	3167	5219
1727	2024	2219	3223	2720	4216	3168	5222
1728	2020	2220	3220	2721	4221	3169	5217
1729	M2334	2221	M2451	2722	4226	3170	5212
1730	2026	2222	3221	2723	M2568	3171	5224
1731	2021	2223	M2452	2724	M2567	3172	5215
1732	M2331	2224	M2453	2725	M2566	3173	5216
1733	M2328	2225	M2456	2726	M2564	3174	5225
1734	M2320	2226	M2454	2727	4253	3175	5227
1735	M2326	2227	M2458	2728	M2565	3176	5207
1736	2030	2228	M2462	2729	M2569	3177	5208
1737	2029	2229	M2460	2730	4254	3178	5226

Appendix F: LFH 2011 Broodstock PBT Tissue Samples

DNA ID	FISH ID	DNA ID	FISH ID	DNA ID	FISH ID	DNA ID	FISH ID
1738	2034	2230	M2461	2731	4245	3179	5205
1739	2032	2231	M2457	2732	4257	3180	5206
1740	2016	2232	M2459	2733	4247	3181	5210
1741	2033	2233	3241	2734	4258	3182	5213
1742	M2333	2234	3238	2735	4250	3183	5209
1743	2018	2235	3239	2736	4242	3184	5204
1744	2031	2236	3240	2737	4259	3185	5223
1745	2017	2237	3235	2738	4237	3186	5211
1746	2019	2238	3236	2739	4246	3187	5231
1747	M2327	2239	3237	2740	4256	3188	5236
1748	2025	2240	3229	2741	4239	3189	5241
1749	2028	2241	3231	2742	4251	3190	5243
1750	M2319	2242	3233	2743	4248	3191	5245
1751	M2340	2243	3242	2744	4249	3192	5246
1752	2001	2244	3232	2745	4252	3193	5247
1753	M2321	2245	3246	2746	M2573	3194	M2680
1754	M2338	2246	3243	2747	M2574	3195	M2678
1755	2039	2247	3248	2748	4243	3196	5250
1756	M2341	2248	3252	2749	4241	3197	M2682
1757	2036	2249	3253	2750	M2577	3198	5254
1758	M2339	2250	3250	2751	M2572	3199	5258
1759	2035	2251	3247	2752	M2579	3200	5249
1760	2037	2252	3257	2753	M2576	3201	5179
1761	2038	2253	M2464	2754	M2575	3202	5184
1762	2049	2254	3258	2755	4236	3203	5178
1763	2046	2255	3254	2756	4267	3204	5177
1764	2045	2256	3261	2757	4272	3205	M2657
1765	2048	2257	3260	2758	4266	3206	5160
1766	2050	2258	3264	2759	4263	3207	5146
1767	2051	2259	3263	2760	4271	3208	5162
1768	M2342	2260	3251	2761	M2578	3209	5152
1769	2040	2261	3265	2762	4269	3210	5154
1770	M2335	2262	M2469	2763	4280	3211	5164
1771	M2337	2263	M2468	2764	4273	3212	5098
1772	M2336	2264	3268	2765	4262	3213	5137
1773	2054	2265	3249	2766	4260	3214	5101
1774	2052	2266	M2466	2767	4279	3215	5138
1775	2057	2267	M2467	2768	4276	3216	M2647
1776	2053	2268	M2463	2769	4277	3217	5103
1777	2055	2269	M2465	2770	4265	3218	5125
1778	2042	2270	3245	2771	4275	3219	5112

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DNA ID	FISH ID	DNA ID	FISH ID	DNA ID	FISH ID	DNA ID	FISH ID
1779	2056	2271	3234	2772	4274	3301	5242
1780	2041	2272	3244	2773	M2581	3302	5252
1781	2043	2273	3230	2774	M2580	3303	5251
1782	2044	2274	3267	2775	M2584	3304	5256
1783	2047	2275	3269	2776	M2586	3305	5248
1784	2059	2276	3266	2777	M2588	3306	5244
1785	2060	2277	3256	2778	4278	3307	M2685
1786	2058	2278	3262	2779	4264	3308	5233
1787	M2347	2279	3259	2780	4268	3309	5238
1788	M2346	2280	3255	2781	4270	3310	5229
1789	M2349	2281	M2470	2782	4261	3311	5234
1790	2065	2282	3275	2783	M2589	3312	M2679
1791	2067	2283	3278	2784	M2590	3313	5232
1792	2064	2284	3277	2785	M2587	3314	5257
1793	M2348	2285	3270	2786	M2592	3315	5235
1794	M2350	2286	3274	2787	M2591	3316	5237
1795	2066	2287	3281	2788	M2582	3317	5253
1796	M2343	2288	3285	2789	4293	3318	M2681
1797	2070	2289	3282	2790	M2585	3319	5240
1798	2069	2290	3286	2791	4292	3320	M2683
1799	2073	2291	3280	2792	4290	3321	M2687
1800	2072	2292	3287	2793	4296	3322	M2688
1801	M2352	2293	3289	2794	4287	3323	M2684
1802	M2344	2294	3276	2795	4297	3324	5259
1803	M2351	2295	3283	2796	4301	3325	5262
1804	M2345	2296	3290	2797	4298	3326	5266
1805	2068	2297	3272	2798	4288	3327	5268
1806	2079	2298	3291	2799	4294	3328	5267
1807	2081	2299	3292	2800	4284	3329	5255
1808	2076	2300	3293	2801	4289	3330	5269
1809	2080	2301	M2472	2802	4285	3331	5275
1810	2077	2302	M2473	2803	4286	3332	5276
1811	2082	2303	M2471	2804	4281	3333	5274
1812	2083	2304	3294	2805	4283	3334	M2691
1813	2075	2305	3288	2806	4282	3335	5271
1814	2084	2306	3271	2807	4299	3336	5270
1815	2078	2307	3284	2808	M2601	3337	5272
1816	M2353	2308	3279	2809	M2598	3338	5273
1817	2085	2309	M2474	2810	M2595	3339	5261
1818	2090	2310	3273	2811	M2596	3340	M2694
1819	M2354	2311	M2476	2812	M2593	3341	M2693

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DNA ID	FISH ID	DNA ID	FISH ID	DNA ID	FISH ID	DNA ID	FISH ID
1820	2089	2312	M2475	2813	M2594	3342	M2692
1821	2088	2313	3302	2814	4300	3343	5265
1822	2074	2314	3303	2815	M2597	3344	M2690
1823	2071	2315	3304	2816	4291	3345	5264
1824	2086	2316	3305	2817	4295	3346	5263
1825	2061	2317	3300	2818	4302	3347	5277
1826	2087	2318	3306	2819	4238	3348	5260
1827	2063	2319	3301	2820	M2570	3349	5278
1828	2091	2320	3310	2821	M2583	3350	M2686
1829	2093	2321	3295	2822	4255	3351	M2689
1830	2092	2322	3311	2823	4240	3352	M2677
1831	2062	2323	3312	2824	M2571	3353	5228
1832	2094	2324	3307	2825	4244	3354	M2695
1833	2096	2325	3308	2826	M2599	3355	M2696
1834	M2355	2326	3296	2827	4323	3356	5230
1835	2097	2327	3315	2828	4327	3357	5239
1836	M2356	2329	3313	2829	4329	3401	M2705
1837	2098	2330	3319	2830	4330	3402	M2706
1838	M2358	2331	3316	2831	4325	3403	M2703
1839	M2357	2332	3320	2832	4338	3404	M2704
1840	2095	2333	3321	2833	4331	3405	M2702
1841	2101	2334	3298	2834	4333	3406	M2701
1842	2100	2335	3299	2835	4319	3407	M2700
1843	2099	2336	3297	2836	4337	3408	M2698
1844	M2359	2337	3318	2837	4340	3409	M2699
1845	M2360	2338	3322	2838	4324	3410	6010
1846	2102	2339	3309	2839	4342	3411	M2710
1847	2103	2340	3317	2840	4322	3412	M2707
1848	2104	2401	4005	2841	4321	3413	M2711
1849	2105	2402	4004	2842	4314	3414	M2708
1850	2106	2403	4010	2843	4313	3415	6016
1901	M2361	2404	4012	2844	4326	3416	6018
1902	M2362	2405	4011	2845	4312	3417	M2709
1903	M2363	2406	4013	2846	4310	3418	6009
1904	M2364	2407	4009	2847	4309	3419	M2713
1905	3004	2408	4014	2848	4328	3420	6032
1906	3005	2409	4008	2849	4305	3421	6019
1907	3003	2410	M2481	2850	4334	3422	M2718
1908	3006	2411	M2482	2851	4304	3423	M2719
1909	3007	2412	M2483	2852	4311	3424	6030
1910	3002	2413	M2484	2853	4347	3425	M2720

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DNA ID	FISH ID	DNA ID	FISH ID	DNA ID	FISH ID	DNA ID	FISH ID
1911	3001	2414	4019	2854	4307	3426	6004
1912	M2366	2415	4016	2855	4308	3427	M2714
1913	M2365	2416	4021	2856	M2603	3428	6023
1914	M2367	2417	M2487	2857	M2602	3429	M2722
1915	M2368	2418	4022	2858	M2600	3430	M2723
1916	M2369	2419	M2491	2859	4345	3431	M2724
1917	3008	2420	M2490	2860	4359	3432	6037
1918	3010	2421	4020	2861	4361	3433	6025
1919	M2370	2422	4025	2862	4316	3434	M2725
1920	3009	2423	4026	2863	4356	3435	M2726
1921	M2372	2424	4024	2864	4346	3436	M2727
1922	M2371	2425	M2489	2865	4315	3437	6036
1923	3012	2426	M2486	2866	4317	3438	6039
1924	3011	2427	4002	2867	4320	3439	6007
1925	3015	2428	M2488	2868	4362	3440	6042
1926	3016	2429	4018	2869	4354	3441	6001
1927	3013	2430	4003	2870	4357	3442	M2730
1928	3014	2431	4027	2871	4360	3443	M2728
1929	3017	2432	4030	2872	4318	3444	M2717
1930	3018	2433	4015	2873	M2604	3445	M2712
1931	3019	2434	4028	2874	4339	3446	M2729
1932	M2373	2435	4029	2875	4341	3447	M2731
1933	M2374	2436	M2493	2876	M2605	3448	M2721
1934	M2375	2437	M2494	2877	4336	3449	M2716
1935	M2376	2438	M2496	2878	4369	3450	M2732
1936	M2377	2439	4033	2879	4358	3451	M2733
1937	M2378	2440	4034	2880	4370	3452	M2734
1938	M2379	2441	4031	2881	4364	3453	6057
1939	M2380	2442	4032	2882	4353	3454	6061
1940	M2383	2443	M2492	2883	4368	3455	6064
1941	3021	2444	M2497	2884	4352	3456	6013
1942	3024	2445	M2495	2885	4366	3457	M2715
1943	3028	2446	4023	2886	4350	3458	6058
1944	M2382	2447	M2485	2887	4355	3459	6060
1945	3030	2448	4017	2888	4306	3460	6040
1946	3023	2449	4001	2889	4351	3461	6070
1947	3027	2450	M2479	2890	4349	3462	6066
1948	3029	2451	M2480	2891	4343	3463	6071
1949	3031	2452	M2499	2892	4344	3464	6063
1950	3032	2453	M2498	2893	4348	3465	6067
1951	3022	2454	M2501	2894	4367	3466	6069

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DNA ID	FISH ID	DNA ID	FISH ID	DNA ID	FISH ID	DNA ID	FISH ID
1952	3026	2455	M2500	2895	4363	3467	6074
1953	M2381	2456	M2502	2896	4365	3468	6072
1954	3025	2457	M2477	2897	4332	3469	6053
1955	3020	2458	4007	2898	4335	3470	6075
1956	M2384	2459	M2478	2899	4303	3471	6068
1957	M2385	2460	4038	2901	M2609	3472	6062
1958	M2386	2461	4042	2902	M2608	3473	M2697
1959	M2387	2462	4039	2903	5013	3474	6055
1960	M2388	2463	4044	2904	5007	3475	6076
1961	3037	2464	4040	2905	5018	3476	6065
1962	3039	2465	4037	2906	5019	3477	6073
1963	3038	2466	4036	2907	5017	3478	6059
1964	3040	2467	4041	2908	5020	3479	6038
1965	3034	2468	4046	2909	5014	3480	6056
1966	3042	2469	4049	2910	5016	3481	6041
1967	3044	2470	4043	2911	5005	3482	6005
1968	3033	2471	4047	2912	5008	3483	6035
1969	3043	2472	4048	2913	M2614	3484	6033
1970	3041	2473	4035	2914	M2611	3485	6034
1971	3048	2474	4045	2915	5025	3486	6003
1972	3047	2475	4006	2916	M2612	3487	6027
1973	3049	2476	4051	2917	M2615	3488	6045
1974	3046	2477	4055	2918	5024	3489	6046
1975	3045	2478	4056	2921	5029	3490	6044
1976	M2392	2479	4054	2922	5035	3491	6043
1977	M2391	2480	4050	2923	5004	3492	6047
1978	3051	2481	4057	2924	5028	3493	M2735
1979	3052	2482	M2504	2925	5038	3494	6049
1980	3050	2483	M2505	2926	5021	3495	6050
1981	3055	2484	M2503	2927	5027	3496	6048
1982	M2393	2485	4053	2928	5032	3497	6079
1983	3061	2486	4052	2931	5015	3498	M2739
1984	3060	2487	M2509	2932	5030	3499	M2741
1985	3053	2488	M2510	2933	5009	3500	M2740
1986	3057	2489	M2508	2934	5011	3501	M2743
1987	3063	2490	M2506	2935	5010	3502	6080
1988	3065	2491	4066	2936	5003	3503	6077
1989	3069	2492	4061	2937	5040	3504	6029
1990	3068	2493	4067	2938	5022	3505	6084
1991	3066	2494	M2513	2939	5001	3506	6087
1992	3064	2495	M2514	2940	5002	3507	6078

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DNA ID	FISH ID	DNA ID	FISH ID	DNA ID	FISH ID	DNA ID	FISH ID
1993	M2395	2496	4058	2941	5031	3508	6082
1994	3067	2497	4069	2942	5037	3509	6002
1995	3058	2498	4068	2943	5036	3510	6031
1996	3036	2499	4070	2944	5006	3511	6026
1997	3062	2500	4059	2945	5033	3512	6099
1998	M2390	2501	4064	2946	5039	3513	6095
1999	M2394	2502	4065	2947	5023	3514	6097
2000	3035	2503	4060	2948	5034	3515	6006
2001	3059	2504	M2512	2949	5026	3516	6092
2002	3056	2505	4071	2950	M2610	3517	6089
2003	M2396	2506	4072	2951	M2617	3518	6011
2004	3073	2507	4074	2952	M2616	3519	6093
2005	3072	2508	4073	2953	5012	3520	6028
2006	3074	2509	4062	2954	M2606	3521	6022
2007	M2397	2510	4063	2955	M2607	3522	6021
2008	3076	2511	M2507	2956	M2613	3523	6020
2009	3071	2512	M2511	2957	M2618	3524	6008
2010	3075	2513	M2521	2958	5053	3525	6024
2011	3082	2514	M2520	2959	5049	3526	6014
2012	3081	2515	M2519	2960	5051	3527	6081
2013	3084	2516	4089	2961	5048	3528	6015
2014	3086	2517	4088	2962	5052	3529	6017
2015	3079	2518	M2518	2963	5061	3530	6012
2016	3080	2519	4087	2964	5050	3531	6088
2017	3078	2520	4086	2965	5066	3532	6090
2018	3085	2521	4090	2966	5043	3533	6098
2019	3070	2522	4092	2967	5062	3534	6096
2020	3083	2523	4093	2968	5054	3535	6094
2021	3077	2524	4085	2969	5045	3536	6091
2022	M2399	2525	4095	2970	5044	3537	6086
2023	M2400	2526	4096	2971	5058	3538	6083
2024	M2389	2527	4094	2972	5074	3539	6085
2025	M2398	2528	4098	2973	5069	3540	M2742
2026	3054	2529	4100	2974	5070	3541	M2736
2027	3087	2530	4101	2975	5064	3542	M2737
2028	3089	2531	4097	2976	5056	3543	6052
2029	3090	2532	4103	2977	5057	3544	6051
2030	3092	2533	4102	2978	5055	3545	M2744
2031	3088	2534	4084	2979	M2626	3546	6054
2032	3091	2535	4099	2980	M2623	3547	M2752
2033	3093	2536	4091	2981	M2627	3548	M2751

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DNA ID	FISH ID	DNA ID	FISH ID	DNA ID	FISH ID	DNA ID	FISH ID
2034	M2405	2537	4079	2982	M2621	3549	M2749
2035	M2407	2538	4083	2983	M2620	3550	M2750
2036	M2406	2539	4081	2984	5059	3551	M2747
2037	M2402	2540	4082	2985	M2629	3552	M2748
2038	M2404	2541	4075	2986	M2630	3553	M2746
2039	M2403	2542	4080	2987	M2624	3554	M2738
2040	3103	2543	4076	2988	5072	3555	M2745
2041	3100	2544	4077	2989	M2622	3556	M2765
2042	3095	2545	4078	2990	5084	3557	6108
2043	3097	2546	M2515	2991	M2628	3558	6106
2044	M2409	2547	M2517	2992	5046	3559	6114
2045	3104	2548	M2516	2993	5042	3560	6115
2046	3102	2549	4108	2994	5095	3561	6116
2047	3107	2550	4104	2995	5089	3562	6111
2048	3098	2551	4107	2996	5087	3563	6104
2049	3108	2552	4109	2997	5075	3564	6109
2050	3096	2553	4112	2998	5065	3565	6112
2051	3111	2554	4110	2999	5090	3566	6101
2052	M2408	2555	4106	3000	5041	3567	6119
2053	3106	2556	4114	3001	M2625	3568	6117
2054	3105	2557	4113	3002	5067	3569	6121
2055	M2412	2558	4115	3003	5068	3570	6126
2056	3114	2559	4111	3004	5076	3571	6123
2058	3117	2560	4120	3005	5071	3572	6118
2059	3094	2561	4119	3006	5093	3573	6122
2060	3115	2562	4121	3007	5092	3574	6124
2061	3116	2563	4118	3008	5088	3575	6120
2062	3119	2564	4123	3009	5079	3576	6102
2063	3118	2565	4124	3010	5080	3577	6105
2064	3120	2566	4105	3011	5096	3578	6100
2065	3125	2567	4125	3012	5082	3579	6125
2066	3123	2568	4122	3013	5091	3580	6103
2067	3122	2569	4117	3017	5094	3581	6113
2068	3124	2570	4116	3018	5078	3582	6110
2069	3121	2571	M2525	3019	5085	3583	6107
2070	3126	2572	M2526	3020	5081	3584	M2770
2071	3113	2573	M2524	3021	5086	3585	M2771
2072	M2413	2574	M2522	3022	5083	3586	M2755
2073	M2411	2575	M2523	3023	5077	3587	M2769
2074	3127	2576	M2527	3024	5073	3588	M2766
2075	3101	2577	M2529	3025	5063	3589	M2768

Appendix F: LFH 2011 Broodstock PBT Tissue Samples

DNA ID	FISH ID	DNA ID	FISH ID	DNA ID	FISH ID	DNA ID	FISH ID
2076	3109	2578	M2530	3026	5060	3590	M2756
2077	M2414	2579	M2531	3027	5047	3591	M2767
2078	M2416	2580	M2528	3028	M2619	3592	M2762
2079	M2401	2581	M2532	3029	M2632	3593	M2764
2080	M2417	2582	4126	3030	M2635	3594	M2757
2081	M2415	2583	4132	3031	M2634	3595	M2758
2082	3110	2584	4134	3032	M2631	3596	M2760
2083	M2410	2585	4140	3033	M2633	3597	M2763
2084	M2418	2586	4137	3034	M2640	3598	M2753
2085	M2419	2587	4138	3035	M2637	3599	M2759
2086	3128	2588	4130	3036	M2638	3600	M2754
2087	3137	2589	4129	3037	M2642	3601	M2761
2088	3133	2590	4136	3038	M2643	3602	6139
2089	3099	2591	4135	3039	M2636	3603	6143
2090	3135	2592	4139	3040	M2639	3604	M2772
2091	3131	2593	4133	3041	5117	3605	6150
2092	3139	2594	4146	3042	5109	3606	6144
2093	3136	2595	4145	3043	5118	3607	6152
2094	3132	2596	M2536	3044	5115	3608	6149
2095	3138	2597	4141	3045	5114	3609	6154
2096	3134	2598	4142	3046	5127	3610	6156
2097	3141	2599	4143	3047	5120	3611	6158
2098	3112	2600	4144	3048	5124	3612	6160
2099	3140	2601	4149	3049	5132	3613	6155
2100	3130	2602	4150	3050	5131	3614	6147
2101	M2421	2603	4147	3051	5123	3615	6159
2102	M2422	2604	4153	3052	5121	3616	6165
2103	M2420	2605	4154	3053	5130	3617	6166
2104	3129	2606	4152	3054	5128	3618	6164
2105	M2424	2607	4151	3055	5126	3619	6153
2106	M2423	2608	4155	3056	5116	3620	6169
2107	M2425	2609	4156	3057	5142	3621	6170
2108	M2426	2610	M2541	3058	5141	3622	6161
2109	M2427	2611	M2540	3059	5143	3623	6172
2110	3150	2612	M2538	3060	5139	3624	6141
2111	3151	2613	M2542	3061	5099	3625	6174
2112	3153	2614	M2537	3062	5097	3626	6178
2113	3148	2615	M2534	3063	5107	3627	6181
2114	3147	2616	M2535	3064	5111	3628	6182
2115	3144	2617	4148	3065	5104	3629	6186
2116	3152	2618	M2539	3066	5140	3630	6185

Appendix F: LFH 2011 Broodstock PBT Tissue Samples

DNA ID	FISH ID	DNA ID	FISH ID	DNA ID	FISH ID	DNA ID	FISH ID
2117	3149	2619	M2533	3067	5133	3631	6167
2118	3143	2620	4131	3068	5106	3632	6184
2119	3146	2621	4127	3069	5108	3633	6183
2120	3142	2622	4161	3070	5102	3634	6168
2121	3145	2623	4157	3071	M2651	3635	6151
2122	3154	2624	4164	3072	M2646	3636	6179
2123	3162	2625	4166	3073	5156	3637	6177
2124	3158	2626	4168	3074	5144	3638	6180
2125	3159	2627	4159	3075	5147	3639	6176
2126	3165	2628	4170	3076	5145	3640	6162
2127	3164	2629	4174	3077	5148	3641	6173
2128	3161	2630	4175	3078	5163	3642	6171
2129	3166	2631	4176	3079	5153	3643	6157
2130	3155	2632	4177	3080	5167	3644	6148
2131	3160	2633	4180	3081	5150	3645	6163
2132	3157	2634	4160	3082	5158	3646	6145
2133	3156	2635	4179	3083	5166	3647	6175
2134	3163	2636	M2545	3084	5159	3648	6146
2135	M2430	2637	4178	3085	5169	3649	6142
2136	M2436	2638	4172	3086	5161	3650	6138
2137	M2433	2639	4162	3087	5168	3651	6136
2138	M2432	2640	4173	3088	5175	3652	6134
2139	M2428	2641	4158	3089	5157	3653	6137
2140	M2431	2642	M2549	3090	5174	3654	6135
2141	M2437	2643	4163	3091	5171	3655	6133
2142	M2434	2644	4171	3092	5172	3656	6132
2143	M2438	2645	M2548	3093	5165	3657	6131
2144	M2429	2646	4181	3094	M2660	3658	6140
2145	M2435	2647	4182	3095	5176	3659	6129
2146	3170	2648	M2547	3096	5173	3660	6128
2147	3169	2649	4184	3097	5149	3661	6127
						3662	6130

Appendix G: Egg Take and Early Life Stage Survival Brood Years: 1990-2011

Appendix G. Egg take and survival numbers by life stage of Lyons Ferry origin fall Chinook spawned at LFH, brood years 1990-2011.

Brood Year	Eggs Taken	ELISA Loss [a]	Eggs Shipped [b]	Eyed Eggs Retained	Fry Ponded	Intended Program
1990	1,103,745	0	0	1,011,998	729,311	Yearling
					228,930	Subyearling
1991	906,411	0	0	828,514	807,685	Yearling
					0	Subyearling
1992	901,232	0	0	855,577	624,961	Yearling
					210,210	Subyearling
1993	400,490	0	0	363,129	352,461	Yearling
					0	Subyearling
1994	583,871	0	0	553,189	542,461	Yearling
					0	Subyearling
1995[c]	1,056,700	0	0	1,022,700	847,241	Yearling
					112,532	Subyearling
1996	1,433,862	0	0	1,377,202	941,900	Yearling
					419,677	Subyearling
1997	1,184,141	0	0	1,134,641	1,037,221	Yearling
					63,849	Subyearling
1998	2,085,155	0	0	1,978,704	916,261	Yearling
					1,010,344	Subyearling
1999	3,980,455	156,352	0	3,605,482	991,613	Yearling
					2,541,759	Subyearling
2000	3,576,956	53,176	115,891	3,249,377	998,768	Yearling
					2,159,921	Subyearling
2001	4,734,234	144,530	200,064	4,230,432	1,280,515	Yearling
					2,697,406	Subyearling
					125,600	Research
2002	4,910,467	44,900	1,195,067	3,540,000	1,032,205	Yearling
					2,376,251	Subyearling
					73,229	Research
2003	2,812,751	0	250,400	2,476,825	985,956	Yearling
					1,455,815	Subyearling
					0	Research
2004	4,625,638	0	1,053,278	3,421,751	914,594	Yearling
					2,191,102	Subyearling
					184,682	Research
2005	4,929,630	0	1,180,000	3,562,700[d]	980,940	Yearling
					2,078,206	Subyearling
					216,417	Research

Appendix G. Egg take and survival numbers by life stage of Lyons Ferry origin fall Chinook spawned at LFH, brood years 1990-2011.

Brood Year	Eggs Taken	ELISA Loss [a]	Eggs Shipped [b]	Eyed Eggs Retained	Fry Ponded	Intended Program
2006	2,819,004	0	127,564	2,601,679	961,105	Yearling
					1,640,574	Subyearling
					2,000	Research
2007	5,143,459	0	1,761,500	3,212,900[e]	960,900	Yearling
					1,894,933	Subyearling
					0	Research
2008	5,010,224	0	1,810,800	2,969,200	1,000,000	Yearling
					1,969,200	Subyearling
					0	Research
2009	4,574,182	0	1,507,300	2,853,020	977,667	Yearling
					1,875,353	Subyearling
					0	Research
2010	4,619,533	0	1,630,000	2,864,400	980,000	Yearling
					1,884,400	Subyearling
					0	Research
2011	4,723,501	0	1,785,600	2,772,900	960,000	Yearling
					1,812,900	Subyearling
					0	Research

[a] Eggs from ELISA positive females were incorporated into the rest of the broodstock in 1997-1998 and 2003-2004.

[b] Includes eyed eggs shipped for research.

[c] An overage of 58,500 fish was found during marking. This number was added (unexpanded) to total green and eyed eggs and fry ponded. Also includes 83,183 fry up to ponding that were accidentally released as strays. Back calculated to estimate 32,088 eggs for subyearlings and 91,808 eggs for escaped fry (resulting in 847,241 ponded for yearling release).

[d] 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.

[e] This number includes 364,983 eyed-eggs that were destroyed as ponded fry in January and February 2007.

Appendix H: LFH/Snake River Origin Fall Chinook Releases Brood Years: 2004-2010

Appendix H. 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] AD Clip +CWT	CWT Only	AD Clip Only	No Clip or CWT	FPP	VIE Mark	% VIE	PIT Tagged[c]
2005	S	2004	BC1-direct	30-31 May	612504	96,630	98,657	1,377	313,562	55.3			2,498
2005	S	2004	CJ1 Acclimated [vs. CC]-volitional	28-31 May	610154	94,164	87,888	9,015	314,020	46.8			3,494
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	none	-	-	394,055	-	63.0			0
2005	S	2004	NPTH1-volitional	17 May	612669	-	106,079	-	74,575	120.8			Unk
					612672	140,171	-	365	98,176	120.8			Unk
2005	S	2004	NPTH1-volitional	17 May	610108	-	194,334	-	100,753	115.3			Unk
					612670	101,580	-	408	52,876	115.3			
2005	S	2004	NPTH1-volitional	17 May	none	-	-	-	57,764	110.0			
2005	S	2004	Couse Creek Direct [vs. CJ1 Accl.]	26 May	610155	183,401	1,937	14,853	-	49.2			3,465
2005	S	2004	Snake R. at Couse Creek-direct	23 May	none	-	-	-	234,030	59.0			0
2005	S	2004	Grande Ronde R. -direct	25 May	632782	191,868	610	8,050	241	56.0			0
2005	S	2004	Grande Ronde R. unmarked-direct	24 May	none	-	-	-	281,688	66.0			0
2005	S	2004	LFH-direct	27 May	632787	195,367	934	3,870	-	51.0			1,498
2005	S	2004	Snake R at Couse Creek-Surrogates	16-27 May	none				124,783	113			124,447
2005	S	2004	Clearwater R at BC-Surrogates	21 June-08 July	none				47,790	110.6			45,790
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

Appendix H. 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 Clip +CWT	CWT Only	AD Clip Only	No Clip or CWT				
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			0
2006	S	2005	Snake R. below HC Dam-Oxbow hatchery-IPC-direct	02 May	109577	68,040	-	1,110	-	80.3			0
2006	S	2005	Snake R. below HC Dam-Oxbow hatchery-IPC-direct	02 May	108977	41,257	-	673	-	80.3			0
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			0
2006	S	2005	LFH-direct	01 June	633582	200,369	789	790	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	Snake R at Couse Creek-Surrogates (NOAA)	15 May-03 Jun	none	-	-	-	229,097	115.0			229,063
2006	S	2005	Clearwater R at BC-Surrogates (NOAA)	19 Jun-09 July	none	-	-	-	150,054	83.0			109,186
2006	S	2005	NPTH-North Lapwai Valley Accl.	17 May	612707	-	98,670	-	1,148	72.3			unk
2006	S	2005	NPTH-North Lapwai Valley Accl.	17 May	612671	99,438	-	490	-	72.3			unk
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

Appendix H. 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] AD Clip +CWT	CWT Only	AD Clip Only	No Clip or CWT	FPP	VIE Mark	% VIE	PIT Tagged[c]
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	0
2007	Y	2005	LFH-direct	2-6 April	633597	-	220,825	5,489	24,457	10.1	LR	85.5	0
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			0
2007	S	2006	LFH-Unassociated	23 May	none	-	-	-	875	103.0			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	11,247	-	1,419	-	55.0			1,067
2007	S	2006	Snake R. below HC Dam-Oxbow hatchery-IPC-direct	08 May	104480	48,621	-	6,135	-	55.0			4,613
2007	S	2006	Snake R. below HC Dam-Oxbow hatchery-IPC-direct	08 May	103880	44,638	-	5,633	-	55.0			4,235
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	44,538	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

Appendix H. 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] AD Clip +CWT	CWT Only	AD Clip Only	No Clip or CWT	FPP	VIE Mark	% VIE	PIT Tagged[c]
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-Direct	2 June	634672	194,723	2,270	3,606	134	48.7			0
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[b]	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.	12 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	10-15 June	612716	100,665	-	388	244,354	50.7			2,131
2008	S	2007	NPTH-Site 1705	10-15 June	612695	-	149,162	-	1,368	50.7			928
2008	S	2007	Snake R. below HC Dam-Oxbow hatchery-IPC-direct	6 May	107171	22,795	-	2,369	-	51.4			2,022
2008	S	2007	Snake R. below HC Dam-Oxbow hatchery-IPC-direct	6 May	103680	55,816	-	5,799	-	51.4			4,952
2008	S	2007	Snake R. below HC Dam-Oxbow hatchery-IPC-direct	6 May	107502	55,004	-	5,714	-	51.4			4,880
2008	S	2007	Snake R. below HC Dam-Oxbow hatchery-IPC-direct	6 May	107271	23,092	-	2,399	-	51.4			2,048
2008	S	2007	Snake R. below HC Dam-Oxbow hatchery-IPC-direct	6 May	104381	17,650	-	1,833	-	51.4			1,566
2008	S	2007	Snake R. below HC Dam-Oxbow hatchery-IPC-direct	20-22 May	090136	142,500	-	627,850	-	44.0			64,436

Appendix H. 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] AD Clip +CWT	CWT Only	AD Clip Only	No Clip or CWT	FPP	VIE Mark	% VIE	PIT Tagged[c]
2008	S	2007	Snake R at Couse Creek-Surrogates	19 May- 5 June	none	-	-	-	203,185	Unk			201,845
2008	S	2007	Clearwater R at BC-Surrogates	23 June-11 July	none	-	-	-	111,719	unk			105,444
2009	Y	2007	LFH	6-10 April	634680	220,723	424	5,935	282	9.1	LR	92.2	13,390
2009	Y	2007	LFH	6-10 April	634681	-	221,493	-	6,295	8.7	LR	91.8	13,395
2009	Y	2007	CJ1	3 April	612752	70,325	-	854	-	9.1			9,467
2009	Y	2007	CJ2	3 April	612755	-	66,821	-	2,784	9.1			9,257
2009	Y	2007	BC1	4-6 Mar	612750	72,770	-	146	-	10.6			8,769
2009	Y	2007	BC1	4-6 Mar	612753	-	80,783	-	651	10.6			9,793
2009	Y	2007	PL1	2-3 Mar	612751	71,169	-	-	-	9.5			8,846
2009	Y	2007	PL1	2-3 Mar	612754	-	78,673	-	2,433	9.5			10,082
2009	S	2008	LFH	2 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-extras	2-3 June	612676	165,146	1,191	6,024	9,039	50.0			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.	9 June	612760	-	100,760	-	1,202	59.7			7,104
2009	S	2008	NPTH-Cedar Flats Accl.	9 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-North Lapwai Valley Accl.	15 May	612766	-	182,328	-	213,149	85.3			2,381
2009	S	2008	NPTH-North Lapwai Valley Accl.	15 May	612738	97,751	-	2,341	-	85.3			602
2009	S	2008	NPTH-Site 1705	8-12 June	612739	90,953	-	27,725	-	51.5			559
2009	S	2008	NPTH-Site 1705	8-12 June	612697	-	181,522	-	328,615	51.5			2,404
2009	S	2008	Snake R. below HC Dam-Oxbow hatchery-IPC-direct	8 May	107582	64,892	-	7,289	-	54.7			5,090
2009	S	2008	Snake R. below HC Dam-Oxbow hatchery-IPC-direct	8 May	107682	65,514	-	7,359	-	54.7			4,854
2009	S	2008	Snake R. below HC Dam-Oxbow	8 May	107482	51,950	-	5,836	-	54.7			4,900

Appendix H. 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] AD Clip +CWT	CWT Only	AD Clip Only	No Clip or CWT	FPP	VIE Mark	% VIE	PIT Tagged[c]
			hatchery-IPC-direct										
2009	S	2008	Snake R. below HC Dam-Umatilla hatchery-IPC-direct	12-14 May	090228	233,692	-	569,793	-	60.2			55,488
2009	S	2008	Snake R at Couse Creek-Surrogates	18 May-5 June	none	-	-	-	237,829	Unk			237,741
2009	S	2008	Clearwater R at BC-Surrogates	29 June-17 July	none	-	-	-	90,912	unk			90,039
2010	Y	2008	LFH	12-15 April	635166	250,814	169	2,542	678	9.8			13,488
2010	Y	2008	LFH	12-15 April	635165	-	221,376	-	3,273	9.8			13,487
2010	Y	2008	CJ1	5 April	220305	70,925	-	1,284	-	8.0			8,922
2010	Y	2008	CJ1	5 April	220300	-	81,467	-	961	8.0			10,184
2010	Y	2008	BC1	14 April	220303	70,043	-	1,993	-	9.0			8,925
2010	Y	2008	BC1	14 April	220302	-	79,756	-	1,907	9.0			10,117
2010	Y	2008	PL1	13 April	220304	70,834	-	984	-	9.3			8,902
2010	Y	2008	PL1	13 April	220301	-	80,417	-	1,244	9.3			10,123
2010	S	2009	LFH	25 May	635180	198,457	1,068	2,803	-	52.4			0
2010	S	2009	CJ1	24 May	220309	100,778	-	392	-	47.0			7,376
2010	S	2009	CJ1	24 May	220308	-	102,167	-	325,440	47.0			31,174
2010	S	2009	BC1	25 May	220307	100,461	-	441	-	52.3			7,587
2010	S	2009	BC1	25 May	220306	-	101,207	-	309,127	52.3			30,855
2010	S	2009	PL1	24 May	220311	100,537	-	765	-	50.5			7,725
2010	S	2009	PL1	24 May	220310	-	100,619	-	203,120	50.5			23,162
2010	S	2009	Couse Creek Direct [vs. CJ1 Accl. Study]	24 May	635181	199,326	926	2,381	529	58.0			15,445
2010	S	2009	GRR Direct	24 May	635182	197,252	-	2,868	186,720	42.0			30,488
2010	S	2009	Snake R. below HC Dam-Oxbow hatchery-IPC-direct	6 May	104383	50,433	-	4,609	-	47.0			4,208
2010	S	2009	Snake R. below HC Dam-Oxbow hatchery-IPC-direct	6 May	100142	64,144	-	5,862	-	47.0			5,352
2010	S	2009	Snake R. below HC Dam-Oxbow hatchery-IPC-direct	6 May	106482	61,977	-	5,664	-	47.0			5,171
2010	S	2009	Snake R. below HC Dam-Umatilla hatchery-IPC-direct	25-27 May	090331	208,330	1,242	476,055	-	46.3			50,036
2010	S	2009	NPTH-Cedar Flats Accl.	14 June	612764	-	74,939	-	14,328	48.3			6,737
2010	S	2009	NPTH-Cedar Flats Accl.	14 June	612765	97,930	-	1,214	-	48.3			7,482
2010	S	2009	NPTH-Lukes Gulch Accl.	9 June	612747	-	99,116	-	415	44.4			8,208

Appendix H. 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] AD Clip +CWT	CWT Only	AD Clip Only	No Clip or CWT	FPP	VIE Mark	% VIE	PIT Tagged[c]
2010	S	2009	NPTH-Lukes Gulch Accl.	9 June	612748	98,220	-	1,218	-	44.4			8,201
2010	S	2009	NPTH-North Lapwai Valley Accl.	14 May	220201	-	164,981	-	200,716	81.2			2,424
2010	S	2009	NPTH-North Lapwai Valley Accl.	14 May	220202	99,024	-	1,228	-	81.2			665
2010	S	2009	NPTH-Site 1705	7 June	220200	99,100	-	1,229	-	54.2			577
2010	S	2009	NPTH-Site 1705	7 June	612772	-	199,710	-	236,960	54.2			2509
2010	S	2009	Snake R at Couse Creek-Surrogates	17 May- 4 June	none				195,534				195,493
2010	S	2009	Clearwater R at BC-Surrogates	21 June- 9 July	none				113,162				112,577
2011	Y	2009	LFH	12-15 April	635564	226,621	462	308		9.9			14,657
2011	Y	2009	LFH	12-15 April	635510	-	236,175	-	163	9.9			15,233
2011	Y	2009	CJ1	1 April	220315	71,407	-	867	-	10.3			8,862
2011	Y	2009	CJ1	1 April	220314	-	80,830	-	1,482	10.3			10,092
2011	Y	2009	BC1	14 April	220317	71,096	-	286	-	9.9			8,300
2011	Y	2009	BC1	14 April	220312	-	89,325	-	1,637	9.9			10,577
2011	Y	2009	PL1	12 April	220316	69,415	-	2,766	-	9.5			8,218
2011	Y	2009	PL1	12 April	220313	-	93,103	-	1,126	9.5			10,729
2011	S	2010	LFH	1 June	635998	200,502	283	1,415		50.0			0
2011	S	2010	CJ1	22 May	220119	100,967		200		45.3			8,037
2011	S	2010	CJ1	22 May	220120		100,986		314,327	45.3			32,992
2011	S	2010	BC1	25 May	220117	100,622		200		51.0			8,111
2011	S	2010	BC1	25 May	220115		100,748		307,576	51.0			32,847
2011	S	2010	PL1	23 May	220121	100,987		201		49.0			8,044
2011	S	2010	PL1	23 May	220122		100,999		211,097	49.0			24,811
2011	S	2010	Couse Creek Direct [vs. CJ1 Accl. Study]	2-3 June	635997	200,945	971	384		49.0			16,459
2011	S	2010	GRR Direct	24 May	635999	199,460	134	1,206	196,628	79.5			32,441
2011	S	2010	Snake R. below HC Dam-Oxbow hatchery-IPC-direct	5 May	100153	167,137		15,769	11,903	48.2			14,927
2011	S	2010	Snake R. below HC Dam-Irrigon hatchery-IPC-direct	24-26 May	090447	195,414	397	435,100	7,989	81.0			36,925
2011	S	2010	NPTH-Cedar Flats Accl.	15 June	220205		103,007		323	54.5			8,244
2011	S	2010	NPTH-Cedar Flats Accl.	15 June	220206	96,604		5,622		54.5			8,155
2011	S	2010	NPTH-Lukes Gulch Accl.	14 June	220207		99,115		5,364	50.2			8,283
2011	S	2010	NPTH-Lukes Gulch Accl.	14 June	220208	101,688		1,315		50.2			8,166
2011	S	2010	NPTH-North Lapwai Valley Accl.	14 May	220203		202,265		206,799	75.0			2,392

Appendix H. 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 Clip +CWT	CWT Only	AD Clip Only	No Clip or CWT				
2011	S	2010	NPTH-North Lapwai Valley Accl.	14 May	220204	99,174		1,282		75.0			588
2011	S	2010	NPTH-Site 1705	7-15 June	220210		201,980		224,365	52.5			2,412
2011	S	2010	NPTH-Site 1705	7 June	220209	94,893		5,523		52.5			568
2011	S	2010	NPTH late release-Site 1705	6-11 July	220211		99,907		313	93.0			1,038
2011	S	2010	NPTH late release-Site 1705	6-11 July	220212		94,673		91,694	93.0			1,931
2011	S	2010	Snake R at Couse Creek-Surrogates	23 May-10 June	none				202,462				201,608
2011	S	2010	Clearwater R at BC-Surrogates	20 June-8 July	none				116,668				114,127
2012	Y	2010	LFH	10-13 Apr	636080	246,918	660	495	989	10.4			15,244
2012	Y	2010	LFH	10-13 Apr	636079		236,056		4,882	10.4			14,746
2012	Y	2010	CJ1	28 Mar	220321	72,233		432		10.3			8,881
2012	Y	2010	CJ1	28 Mar	220320		81,042		1,427	10.3			10,080
2012	Y	2010	BC1	12 Apr	220323	74,973		903		9.7			8,441
2012	Y	2010	BC1	12 Apr	220318		86,184		1,555	9.7			9,760
2012	Y	2010	PL1	11 Apr	220322	79,519		316		9.4			8,777
2012	Y	2010	PL1	11 Apr	220319		90,110		1,177	9.4			10,036

[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 I: Historical Estimated Survivals (%) Between Various Life Stages at LFH Brood Years: 1990-2010

Appendix I. Estimated survivals (%) between various life stages at LFH for fall Chinook of LFH/Snake River hatchery origin.

Brood year	Release stage	Green egg-ponded fry	Ponded fry-release	Green egg-release
1990	Yearling	86.8	94.5	82.1
	Subyearling	86.8	98.0	85.1
1991	Yearling	89.1	94.1	83.8
1992	Yearling	92.7	96.5	89.5
	Subyearling	92.7	98.4	91.2
1993	Yearling	88.0	99.0	87.1
1994	Yearling	92.7	99.3	92.1
1995	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	61.3
	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
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
2008	Yearling	95.8	95.3	91.3
	Subyearling	95.8	107.1	89.4
2009	Yearling	94.1	98.3	92.5
	Subyearling	94.1	100.2	94.0
2010	Yearling	96.4	101.9	98.2
	Subyearling	96.4	101.1	95.4
Yearling mean:	**%**	**93.0**	**91.6**	**85.2**
	SD	**2.6**	**9.3**	**8.7**
Subyearling mean:	**%**	**93.5**	**98.2**	**91.1**
	SD	**2.3**	**4.0**	**3.7**

Appendix J: Historical Size at Age of Return of CWT LSRCP Origin Fish Processed by WDFW: 1985-2010

(Size at return of fish processed may not represent the full run depending upon trapping and sampling protocols. WDFW and LSRCP releases are included. Historical recoveries (1985-1987) of subyearling fall Chinook released from Hagerman National Fish hatchery are not included. Caution must be taken when comparing historical data because of changes in the program including addition of releases upstream of LGR Dam. Another item for consideration is the BY89 which was progeny from broodstock consisting of a large proportion of strays. Although the BY89 is presented in Appendix I, they were never used as broodstock when they returned.)

Appendix J Table 1. Size at age of return in 1985-1990 by sex for CWT LSRCP fish processed by WDFW that were part of yearling production.

Return Year	Sex		Total Age at Return					
			2(Minijack)	3(Jack)	4	5	6	7
1985	Male	N=	1870	-	-	-	-	-
		Median (cm)	**35**	**-**	**-**	**-**	**-**	**-**
		Range (cm)	29-53	-	-	-	-	-
	Female	N=	15	-	-	-	-	-
		Median (cm)	**35**	**-**	**-**	**-**	**-**	**-**
		Range (cm)	30-40	-	-	-	-	-
1986	Male	N=	48	636	-	-	-	-
		Median (cm)	**36**	**57**	**-**	**-**	**-**	**-**
		Range (cm)	31-40	37-70	-	-	-	-
	Female	N=	-	15	-	-	-	-
		Median (cm)	**-**	**63**	**-**	**-**	**-**	**-**
		Range (cm)	-	50-73	-	-	-	-
1987	Male	N=	240	88	553	-	-	-
		Median (cm)	**36**	**54**	**79**	**-**	**-**	**-**
		Range (cm)	29-45	40-64	41-100	-	-	-
	Female	N=	1	1	867	-	-	-
		Median (cm)	**-**	**-**	**78**	**-**	**-**	**-**
		Range (cm)	35	66	46-98	-	-	-
1988	Male	N=	225	239	55	110	-	-
		Median (cm)	**35**	**55**	**68**	**97**	**-**	**-**
		Range (cm)	26-43	35-66	55-93	55-111	-	-
	Female	N=	-	2	42	165	-	-
		Median (cm)	**-**	**-**	**74**	**88**	**-**	**-**
		Range (cm)	-	64-67	58-90	54-106	-	-
1989	Male	N=	81	226	203	21	3	-
		Median (cm)	**34**	**54**	**70**	**85**	**92**	**-**
		Range (cm)	30-46	33-66	44-93	63-105	84-94	-
	Female	N=	-	4	202	38	4	-
		Median (cm)	**-**	**64**	**75**	**82**	**93**	**-**
		Range (cm)	-	58-66	54-89	60-93	76-104	-
1990	Male	N=	293	75	71	57	2	-
		Median (cm)	**34**	**54**	**73**	**93**	**-**	**-**
		Range (cm)	28-40	43-62	58-93	62-102	103-109	-
	Female	N=	-	2	120	94	1	1
		Median (cm)	**-**	**-**	**75**	**83**	**-**	**-**
		Range (cm)	-	54-61	56-86	68-94	84	89

Appendix J Table 2. Size at age of return in 1991-1996 by sex for CWT LSRCP fish processed by WDFW that were part of yearling production.

Return			Total Age at Return					
Year	Sex		2(Minijack)	3(Jack)	4	5	6	7
1991	Male	N=	-	197	71	44	8	-
		Median (cm)	**-**	**52**	**73**	**94**	**89**	**-**
		Range (cm)	-	31-65	45-88	61-109	86-101	-
	Female	N=	-	2	123	89	9	-
		Median (cm)	**-**	**-**	**73**	**81**	**92**	**-**
		Range (cm)	-	57-74	60-86	56-95	79-103	-
1992	Male	N=	129	-	160	18	-	4
		Median (cm)	**34**	**-**	**73**	**89**	**-**	**88**
		Range (cm)	29-39	-	46-110	60-102	-	70-97
	Female	N=	-	-	241	31	1	3
		Median (cm)	**-**	**-**	**71**	**80**	**-**	**88**
		Range (cm)	-	-	55-90	68-88	85	79-94
1993	Male	N=	102	58	-	60	1	-
		Median (cm)	**33**	**51**	**-**	**85**	**-**	**-**
		Range (cm)	28-41	40-68	-	51-99	77	-
	Female	N=	-	2	-	102	-	-
		Median (cm)	**-**	**-**	**-**	**80**	**-**	**-**
		Range (cm)	-	53-75	-	67-94	-	-
1994	Male	N=	241	283	54	-	4	-
		Median (cm)	**35**	**53**	**75**	**-**	**83**	**-**
		Range (cm)	29-51	36-82	42-91	-	76-98	-
	Female	N=	-	4	86	-	10	-
		Median (cm)	**-**	**58**	**73**	**-**	**79**	**-**
		Range (cm)	-	57-63	58-86	-	67-92	-
1995	Male	N=	1781	230	26	122	-	-
		Median (cm)	**35**	**55**	**78**	**78**	**-**	**-**
		Range (cm)	22-47	41-72	51-90	57-105	-	-
	Female	N=	-	14	53	175	-	1
		Median (cm)	**-**	**61**	**75**	**75**	**-**	**-**
		Range (cm)	-	56-68	60-90	55-95	-	80
1996	Male	N=	380	374	238	18	2	-
		Median (cm)	**33**	**51**	**72**	**90**	**-**	**-**
		Range (cm)	27-47	37-66	54-98	77-105	77-83	-
	Female	N=	-	20	314	32	1	-
		Median (cm)	**-**	**60**	**74**	**83**	**-**	**-**
		Range (cm)	-	54-80	56-92	70-92	95	-

Appendix J Table 3. Size at age of return in 1997-2002 by sex for CWT LSRCP fish processed by WDFW that were part of yearling production.

Return			Total Age at Return					
Year	Sex		2(Minijack)	3(Jack)	4	5	6	7
1997	Male	N=	434	401	224	55	-	-
		Median (cm)	**34**	**50**	**70**	**90**	**-**	-
		Range (cm)	28-40	37-68	48-93	57-104	-	-
	Female	N=	-	-	347	116	2	-
		Median (cm)	**-**	**-**	**73**	**82**	**-**	-
		Range (cm)	-	-	55-89	57-97	77-102	-
1998	Male	N=	136	1770	289	136	2	-
		Median (cm)	**35**	**52**	**70**	**88**	**-**	-
		Range (cm)	22-43	33-73	45-97	56-121	96-98	-
	Female	N=	1	142	301	351	3	-
		Median (cm)	**-**	**57**	**73**	**84**	**77**	-
		Range (cm)	34	49-78	49-91	61-106	77-82	-
1999	Male	N=	358	394	570	42	10	-
		Median (cm)	**36**	**53**	**69**	**88**	**96**	-
		Range (cm)	30-49	37-70	45-95	63-104	76-108	-
	Female	N=	-	14	741	96	27	-
		Median (cm)	**-**	**61**	**72**	**85**	**89**	-
		Range (cm)	-	49-70	53-86	64-96	74-99	-
2000	Male	N=	410	1066	188	97	1	-
		Median (cm)	**36**	**59**	**70**	**88**	**-**	**-**
		Range (cm)	28-44	34-72	55-95	59-110	86	-
	Female	N=	-	110	292	249	4	-
		Median (cm)	**-**	**64**	**77**	**82**	**92**	**-**
		Range (cm)	-	54-74	54-89	58-94	91-92	-
2001	Male	N=	14	858	221	29	3	1
		Median (cm)	**34**	**57**	**75**	**91**	**97**	**78**
		Range (cm)	32-40	39-74	57-98	69-103	84-103	78
	Female	N=	-	60	614	111	13	-
		Median (cm)	**-**	**63**	**77**	**84**	**92**	-
		Range (cm)	-	52-76	55-95	65-98	79-100	-
2002	Male	N=	219	471	241	35	2	-
		Median (cm)	**35**	**55**	**74**	**98**	**85**	**-**
		Range (cm)	27-51	40-67	51-96	71-112	73-97	-
	Female	N=	-	6	505	94	3	-
		Median (cm)	**-**	**64**	**77**	**86**	**86**	**-**
		Range (cm)	-	60-80	51-93	73-97	84-87	-

Appendix J Table 4. Size at age of return in 2003-2008 by sex for CWT LSRCP fish processed by WDFW that were part of yearling production.

Return			Total Age at Return					
Year	Sex		2(Minijack)	3(Jack)	4	5	6	7
2003	Male	N=	690	846	232	24	-	-
		Median (cm)	**35**	**54**	**72**	**88**	-	-
		Range (cm)	27-53	31-78	47-90	62-105	-	-
	Female	N=	-	63	269	158	3	-
		Median (cm)	**-**	**62**	**76**	**83**	**90**	-
		Range (cm)	-	45-68	52-88	68-101	85-96	-
2004	Male	N=	329	1444	259	21	3	-
		Median (cm)	**36**	**59**	**69**	**95**	**99**	-
		Range (cm)	30-43	40-74	54-97	60-113	86-101	-
	Female	N=	-	249	513	104	4	-
		Median (cm)	**-**	**64**	**74**	**84**	**88**	-
		Range (cm)	-	44-84	57-91	65-98	70-95	-
2005	Male	N=	438	472	346	69	1	-
		Median (cm)	**36**	**58**	**71**	**84**	**-**	-
		Range (cm)	29-47	43-71	50-96	60-106	84	-
	Female	N=	-	55	917	192	7	-
		Median (cm)	**-**	**64**	**77**	**86**	**83**	-
		Range (cm)	-	50-82	52-90	61-95	74-90	-
2006	Male	N=	660	964	109	8	-	-
		Median (cm)	**35**	**59**	**71**	**75**	-	-
		Range (cm)	28-45	41-80	56-86	67-95	-	-
	Female	N=	-	125	266	88	8	-
		Median (cm)	**-**	**65**	**76**	**84**	**85**	-
		Range (cm)	-	49-74	60-88	70-99	74-96	-
2007	Male	N=	281	1759	285	5	-	-
		Median (cm)	**33**	**60**	**73**	**83**	**-**	-
		Range (cm)	27-56	42-79	52-98	76-92	-	-
	Female	N=	-	513	780	35	2	-
		Median (cm)	**-**	**63**	**76**	**83**	-	-
		Range (cm)	-	50-83	58-96	75-93	80-84	-
2008	Male	N=	1244	723	120	6	-	-
		Median (cm)	**35**	**57**	**75**	**82**	**-**	-
		Range (cm)	28-54	32-79	59-99	75-100	-	-
	Female	N=	-	75	494	58	-	-
		Median (cm)	**-**	**65**	**78**	**83**	**-**	-
		Range (cm)	-	57-80	60-97	62-92	-	-

Appendix J Table 5. Size at age of return in 2009-2010 by sex for CWT LSRCP fish processed by WDFW that were part of yearling production.

Return			Total Age at Return					
Year	**Sex**		**2(Minijack)**	**3(Jack)**	**4**	**5**	**6**	**7**
2009	Male	N=	43	1293	130	5	-	-
		Median (cm)	**34**	**59**	**74**	**89**	-	-
		Range (cm)	29-42	39-75	56-92	76-96	-	-
	Female	N=	-	546	388	11	1	-
		Median (cm)	**-**	**65**	**77**	**85**	**80**	-
		Range (cm)	-	53-88	61-90	80-92	80	-
2010	Male	N=	137	201	161	4	1	-
		Median	35	59	77	93	89	-
		Range	30-56	48-77	50-105	84-100	89	-
	Female	N=	-	20	504	20	-	-
		Median	-	67	79	86	-	-
		Range	-	53-74	55-98	72-92	-	-

Appendix J Table 6: Size at age of return in 1985-1990 by sex for CWT LSRCP fish processed by WDFW that were part of subyearling production.

Return			Total Age at Return						
Year	Sex		1(Minijack)	2(Jack)	3	4	5	6	7
1985	Male	N=	-	-	-	-	-	-	-
		Median (cm)	-	-	-	-	-	-	-
		Range (cm)	-	-	-	-	-	-	-
	Female	N=	-	-	-	-	-	-	-
		Median (cm)	-	-	-	-	-	-	-
		Range (cm)	-	-	-	-	-	-	-
1986	Male	N=	-	34	-	-	-	-	-
		Median (cm)	-	**45**	-	-	-	-	-
		Range (cm)	-	32-55	-	-	-	-	-
	Female	N=	-	-	-	-	-	-	-
		Median (cm)	-	-	-	-	-	-	-
		Range (cm)	-	-	-	-	-	-	-
1987	Male	N=	-	24	80	-	-	-	-
		Median (cm)	-	**44**	**65**	-	-	-	-
		Range (cm)	-	37-51	49-76	-	-	-	-
	Female	N=	-	-	37	-	-	-	-
		Median (cm)	-	-	**72**	-	-	-	-
		Range (cm)	-	-	58-81	-	-	-	-
1988	Male	N=	-	153	29	27	-	-	-
		Median (cm)	-	**45**	**61**	**88**	-	-	-
		Range (cm)	-	32-57	48-74	**62-100**	-	-	-
	Female	N=	-	-	2	32	-	-	-
		Median (cm)	-	-	**75**	**81**	-	-	-
		Range (cm)	-	-	74-76	66-99	-	-	-
1989	Male	N=	-	6	113	19	5	-	-
		Median (cm)	-	**44**	**63**	**81**	**100**	-	-
		Range (cm)	-	43-50	41-76	57-95	96-105	-	-
	Female	N=	-	-	42	48	5	-	-
		Median (cm)	-	-	**72**	**81**	**85**	-	-
		Range (cm)	-	-	59-79	58-92	74-93	-	-
1990	Male	N=	-	6	8	50	17	-	-
		Median (cm)	-	**49**	**63**	**92**	**101**	-	-
		Range (cm)	-	45-55	50-70	57-101	83-110	-	-
	Female	N=	-	-	3	105	16	-	-
		Median (cm)	-	-	**63**	**84**	**92**	-	-
		Range (cm)	-	-	59-69	62-99	65-103	-	-

Appendix J Table 7: Size at age of return in 1991-1996 by sex for CWT LSRCP fish processed by WDFW that were part of subyearling production. (Fish highlighted in red were returns of BY89 subyearlings, progeny of broodstock with a high stray component)

Return			Total Age at Return						
Year	Sex		1(Minijack)	2(Jack)	3	4	5	6	7
1991	Male	N=	-	45	10	4	19	1	-
		Median (cm)	**-**	**46**	**63**	**77**	**101**	**-**	**-**
		Range (cm)	-	40-56	49-95	72-88	84-109	98	-
	Female	N=	-	-	3	11	31	1	-
		Median (cm)	**-**	**-**	**70**	**80**	**90**	**-**	**-**
		Range (cm)	-	-	68-73	68-89	73-98	92	-
1992	Male	N=	-	24	59	3	-	-	-
		Median (cm)	**-**	**68**	**67**	**80**	**-**	**-**	**-**
		Range (cm)	-	40-54	48-79	70-83	-	-	-
	Female	N=	-	-	21	14	-	2	1
		Median (cm)	**-**	**-**	**71**	**76**	**-**	**-**	**-**
		Range (cm)	-	-	61-84	61-88	-	79-99	92
1993	Male	N=	-	-	42	23	-	-	-
		Median (cm)	**-**	**-**	**69**	**84**	**-**	**-**	**-**
		Range (cm)	-	-	58-85	68-99	-	-	-
	Female	N=	-	-	20	44	2	-	-
		Median (cm)	**-**	**-**	**71**	**80**	**-**	**-**	**-**
		Range (cm)	-	-	62-79	72-89	66-87	-	-
1994	Male	N=	-	134	-	27	4	-	-
		Median (cm)	**-**	**45**	**-**	**86**	**89**	**-**	**-**
		Range (cm)	-	36-54	-	69-101	83-103	-	-
	Female	N=	-	-	-	67	7	-	-
		Median (cm)	**-**	**-**	**-**	**81**	**88**	**-**	**-**
		Range (cm)	-	-	-	71-90	82-92	-	-
1995	Male	N=	-	-	180	-	8	1	-
		Median (cm)	**-**	**-**	**64**	**-**	**103**	**-**	**-**
		Range (cm)	-	-	46-87	-	88-107	104	-
	Female	N=	-	-	79	-	19	-	-
		Median (cm)	**-**	**-**	**69**	**-**	**89**	**-**	**-**
		Range (cm)	-	-	54-78	-	82-102	-	-
1996	Male	N=	-	-	-	68	-	1	-
		Median (cm)	**-**	**-**	**-**	**82**	**-**	**-**	**-**
		Range (cm)	-	-	-	54-102	-	103	-
	Female	N=	-	-	-	126	-	-	-
		Median (cm)	**-**	**-**	**-**	**79**	**-**	**-**	**-**
		Range (cm)	-	-	-	62-90	-	-	-

Appendix J Table 8: Size at age of return in 1997-2002 by sex for CWT LSRCP fish processed by WDFW that were part of subyearling production.

Return			Total Age at Return						
Year	Sex		1(Minijack)	2(Jack)	3	4	5	6	7
1997	Male	N=	-	-	-	-	5	-	-
		Median (cm)	**-**	**-**	**-**	**-**	**107**	**-**	**-**
		Range (cm)	-	-	-	-	76-121	-	-
	Female	N=	-	-	-	-	12	-	-
		Median (cm)	**-**	**-**	**-**	**-**	**87**	**-**	**-**
		Range (cm)	-	-	-	-	75-93	-	-
1998	Male	N=	-	69	-	-	-	-	-
		Median (cm)	**-**	**46**	**-**	**-**	**-**	**-**	**-**
		Range (cm)	-	35-58	-	-	-	-	-
	Female	N=	-	-	-	-	-	-	-
		Median (cm)	**-**	**-**	**-**	**-**	**-**	**-**	**-**
		Range (cm)	-	-	-	-	-	-	-
1999	Male	N=	-	-	146	-	-	-	-
		Median (cm)	**-**	**-**	**62**	**-**	**-**	**-**	**-**
		Range (cm)	-	-	44-89	-	-	-	-
	Female	N=	-	-	45	-	-	-	-
		Median (cm)	**-**	**-**	**70**	**-**	**-**	**-**	**-**
		Range (cm)	-	-	60-76	-	-	-	-
2000	Male	N=	-	634		37	-	-	-
		Median (cm)	**-**	**46**	**-**	**80**	**-**	**-**	**-**
		Range (cm)	-	34-64	-	57-94	-	-	-
	Female	N=	-	-	-	101	-	-	-
		Median (cm)	**-**	**-**	**-**	**80**	**-**	**-**	**-**
		Range (cm)	-	-	-	59-91	-	-	-
2001	Male	N=	-	515	567	-	3	-	-
		Median (cm)	**-**	**46**	**66**	-	**99**	**-**	**-**
		Range (cm)	-	32-62	42-89	-	93-100	-	-
	Female	N=	-	-	375	-	26	-	-
		Median (cm)	**-**	**-**	**70**	**-**	**88**	**-**	**-**
		Range (cm)	-	-	57-87	-	75-93	-	-
2002	Male	N=	-	181	434	144	-	-	-
		Median (cm)	**-**	**43**	**65**	**83**	**-**	**-**	**-**
		Range (cm)	-	35-55	40-91	60-101	-	-	-
	Female	N=	-	-	130	499	-	-	-
		Median (cm)	**-**	**-**	**71**	**82**	**-**	**-**	**-**
		Range (cm)	-	-	55-81	50-99	-	-	-

Appendix J Table 9: Size at age of return in 2003-2008 by sex for CWT LSRCP fish processed by WDFW that were part of subyearling production.

Return			Total Age at Return						
Year	Sex		1(Minijack)	2(Jack)	3	4	5	6	7
2003	Male	N=	-	148	63	33	3	-	-
		Median (cm)	**-**	**43**	**64**	**80**	**100**	**-**	**-**
		Range (cm)	-	32-54	47-78	67-100	98-108	-	-
	Female	N=	-	-	11	91	21	-	-
		Median (cm)	**-**	**-**	**70**	**82**	**90**	**-**	**-**
		Range (cm)	-	-	63-73	65-97	78-97	-	-
2004	Male	N=	-	73	162	4	-	-	-
		Median (cm)	**-**	**49**	**62**	**72**	**-**	**-**	**-**
		Range (cm)	-	34-58	41-78	57-73	-	-	-
	Female	N=	-	-	41	27	10	-	-
		Median (cm)	**-**	**-**	**68**	**81**	**87**	**-**	**-**
		Range (cm)	-	-	56-77	51-88	59-99	-	-
2005	Male	N=	-	39	39	22	2	-	-
		Median (cm)	**-**	**47**	**65**	**74**	**-**	**-**	**-**
		Range (cm)	-	38-58	51-78	62-93	70-100	-	-
	Female	N=	-	-	16	61	4	2	-
		Median (cm)	**-**	**-**	**70**	**79**	**87**	**-**	**-**
		Range (cm)	-	-	65-81	70-89	86-94	82-88	-
2006	Male	N=	-	38	26	4	1	-	-
		Median (cm)	**-**	**48**	**63**	**85**	**-**	**-**	**-**
		Range (cm)	-	38-56	56-76	69-91	80	-	-
	Female	N=	-	-	14	16	12	2	-
		Median (cm)	**-**	**-**	**73**	**80**	**84**	**-**	**-**
		Range (cm)	-	-	63-81	73-89	65-95	87-89	-
2007	Male	N=	-	520	31	2	-	-	-
		Median (cm)	**-**	**48**	**68**	**-**	**-**	**-**	**-**
		Range (cm)	-	34-57	53-82	69-83	-	-	-
	Female	N=	-	-	16	16	3	-	-
		Median (cm)	**-**	**-**	**70**	**79**	**81**	**-**	**-**
		Range (cm)	-	-	67-75	73-87	77-86	-	-
2008	Male	N=	-	75	376	1	1	-	-
		Median (cm)	**-**	**48**	**68**	**65**	**89**	**-**	**-**
		Range (cm)	-	31-55	46-85	65	89	-	-
	Female	N=	-	-	176	5	-	-	-
		Median (cm)	**-**	**-**	**73**	**78**	**-**	**-**	**-**
		Range (cm)	-	-	55-82	69-85	-	-	-

Appendix J Table 10: Size at age of return in 2009-2010 by sex for CWT LSRCP fish processed by WDFW that were part of subyearling production.

Return			Total Age at Return						
Year	**Sex**		**1(Minijack)**	**2(Jack)**	**3**	**4**	**5**	**6**	**7**
2009	Male	N=	-	611	17	28	-	-	-
		Median (cm)	**-**	**48**	**67**	**78**	**-**	**-**	**-**
		Range (cm)	-	39-61	52-80	63-107	-	-	-
	Female	N=	-	-	16	102	-	-	-
		Median (cm)	**-**	**-**	**73**	**83**	**-**	**-**	**-**
		Range (cm)	-	-	65-80	70-94	-	-	-
2010	Male	N=	-	51	216	-	2	-	-
		Median	-	51	68	-	89	-	-
		Range	-	42-64	52-88	-	88-90	-	-
	Female	N=	-	-	185	4	6	-	-
		Median	-	-	74	85	89	-	-
		Range	-	-	65-84	78-86	79-99	-	-

Appendix K: Tucannon River Survey Sections and Historical Escapement

Appendix K. 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, 2011.

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	71
2	Highway 261 Bridge to Smolt trap	0.2	0.2	100	16
3	Smolt trap to Powers Bridge	0.5	0.5	100	50
4	Powers Bridge to upper hog barns	1.2	1.2	100	43
5	Hog barns to Starbuck Br.	2.5	2.4	96	62.5
6	Starbuck Br. To Fletchers Dam	2.7	1.3	48	41.5
7	Fletcher's Dam to Smith Hollow	2.9	2.9	100	13
8	Smith Hollow to Ducharme's Sheep Ranch Br.	4.4	4.4	100	1
9	Ducharme's Bridge to Highway 12	5.5	5.5	100	2
10	Highway 12 to Brines Bridge	6.2	6.2	100	2
11	Brines Bridge to 4.7 Rkm above Brines Bridge	4.7	4.7	100	0
	Total	**33.6**	**31.0**	**95**	**302**

[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 K. Table 2. 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, 1985-2002.

	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]	Adult progeny/ Parent ratio
1985[d]	0	unknown	0	No estim	0	unknown	unknown	Unknown
1986[e]	2[f]	unknown	0	No estim	0	unknown	unknown	Unknown
1987	48	0	16	0	16	unknown	unknown	Pending
1988	78	0	26	0	26	unknown	unknown	Pending
1989	150	27.9	48	2	50	unknown	unknown	pending
1990	186	30.8	62[g]	0	62	unknown	unknown	Pending
1991	150	20.0	50	0	50	unknown	unknown	pending
1992	69	0	23	0	23	unknown	unknown	0.22[h]
1993	84	6.3	28	0	28	unknown	unknown	1.17[h]
1994	75	28.0	25	0	25	unknown	unknown	0.56
1995	87	33.3	29	0	29	unknown	unknown	0.50
1996	144	95.5	43	5	48	0.6[i]	29	0.06
1997	93	5.3	27	4	31	712	22,076	0.71
1998	132	7.1	40	4	44	15	666	0.40
1999	87	9.1	21	8	29	441	12,799	0.67
2000	60	27.8	19	1	20	468	9,352	0.47
2001	219	14.9	65	8	73	336	24,545	0.63
2002	630	35.1	183	27	210	81	17,030	0.05

[a] These preliminary estimates were 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] Data is incomplete for returns of progeny.
[i] Flood event occurred January of 1997, nearly eliminating all the progeny from the 1996 spawn.

Appendix L: Key of Origin Codes Used in 2011

Appendix L1: Key of Origin Codes used in 2011

PARAMETERS EXAMPLE

11-DIGIT CODE TO SUMMARIZE RECOVERY DATA	Origin	Release Area or Source	Brood year	Release Strategy or Life History	Data Source(s) for interpretation decision	Total Age
Example: Known Lyons Ferry on-station subyearling by CWT	H	LF	06	SS	CWT	5

PARAMETERS DEFINITIONS

Origin		Release Area or Source		BroodYear		Release Strategy or Life History		Data Source(s) for interpretation decision		Total Age	
H	hatchery	SN	Snake River (FCAP, CJ, PB AND PITTAG)	04	2004	SS	subyearling	PIT	PITtag	2	total age
W	wild	CL	Clearwater River (FCAP, BC AND PITTAG)	05	2005	RR	reservoir-reared	SCA	Scales	3	total age
U	unknown	LF	Lyons Ferry Hatchery on-station releases	06	2006	YL	yearling	CWT	CWT	4	total age
		HS	Hatchery Stray (out-of-Snake-basin)	07	2007	XX	unknown	BWT	Blank wire tag	5	total age
		NP	Nez Perce Tribal Hatchery releases	08	2008			AWT	Agency wire tag	6	total age
		GR	Grande Ronde River	09	2009			WIR	Lost/Unreadable tag	X	unknown
		IP	Idaho Power	55	unknown			VIE	Visual Implant		
		XX	unknown					CLP	Fin Clip		

Appendix L1: Key of Origin Codes used in 2011

Some Examples	Definition
HCL09SSPIT2	Hatchery origin Clearwater River rearing history by PIT tag
HHS07XXBWT4	Out-of-basin hatchery based on blank wire tag, age determined by scales
HHS55XXAWTX	Out-of-basin hatchery based on 09 blank wire tag
HLF08SSCWT3	Known Lyons Ferry on-station subyearling by CWT
HXX55XXCLPX	Adipose clipped, know hatchery origin but no other data available
HXX08SSCLP3	Adipose clipped, rearing history by scales
USN06RRPIT5	Unknown if hatchery or wild, PIT tagged in Snake, PIT history indicates ResRear
UXX55XXSCAX	Regenerated scales no other data
UXX08RRSCA3	Scales indicate in-basin 3 year old that was Reservoir Reared, but unknown origin
HCL08SSCWT3	Hatchery origin Clearwater River rearing history by CWT origin LF08SBCA
HSN07SSCWT4	Hatchery origin Snake River rearing history by CWT origin LF07SCJA
HIP07SSCWT4	Hatchery origin Idaho Power rearing history by CWT origin LF07IPCHC
HIP08SSCWT3	Hatchery origin Idaho Power rearing history by CWT origin LF08IPCPLA
HGR09SSCWT2	Hatchery origin Grande Ronde River rearing history by CWT origin LF09SGRRD
<u>Summers, Springers, Steelhead and coho</u>	
COHOCL07	Coho, Clearwater origin
SUMMERSN08SSCWT3	Summer Chinook, Snake River origin
SUMMERWEN07SSCWT4	Summer Chinook, Wenatchee River origin
STH55XXVISX	Visual determination of Steelhead species

Appendix M: Salmon Processed and Killed at LFH in 2011

(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 (LF07SO is a LFH hatchery origin fish from the 2007 brood year, released as a subyearling, on-station at LFH).

Appendix M Table 1. Estimated composition of non-wire tagged salmon trapped and killed at LFH during 2011.

Age/Origin Determinations by Method	Males < 53 cm	Females	Males	Grand Total
Snake R. hatchery yearling age 4 by PIT tag	0	0	1	1
Snake R. hatchery LR only yearling age 4	0	4	2	6
Snake R. hatchery LR only yearling age 5	0	0	1	1
STRAY Hat Rock yearling age 4 by PIT tag	0	1	0	1
Unknown hatchery AD sub age 3 by scales	0	1	0	1
Unknown hatchery AD sub age 4 by scales	0	5	2	7
Unknown hatchery AD yearling age 3 by scales	0	0	1	1
Unknown hatchery AD yearling age 4 by scales	0	0	1	1
Unknown hatchery age/origin by AD clip	0	0	1	1
Unknown origin sub age 2 by scales	1	0	0	1
Unknown origin sub age 3 by scales	0	1	0	1
Unknown origin sub age 4 by scales	0	11	2	13
Unknown origin yearling age 2 by scales	1	0	0	1
Unknown age/origin (Presume hatchery)	0	1	1	2
Total	**2**	**24**	**12**	**38**

Appendix M Table 2. Estimated composition of wire tagged fall salmon trapped and killed at LFH during 2011.

Program	OriginCWT	CWT	<53 cm Males	Females	Males	Grand Total
Bonneville/Umatilla	09BLANK	09BLANK	0	6	1	7
Umatilla	UMA07SUMA	090132	0	0	1	1
		090133	0	2	0	2
		090134	0	2	3	5
		090135	0	6	3	9
	UMA08SUMA	094508	0	0	1	1
LSRCP	LF05YO	633598	0	1	0	1
	LF06YBCA	612513	0	1	0	1
	LF06YO	633987	0	13	1	14
		634092	0	28	5	33
	LF07SBCA	612520	0	2	0	2
	LF07SCCD	634671	0	0	1	1
	LF07SCJA	612521	0	1	0	1
	LF07SIPCHC	090136	0	1	0	1
	LF07SO	634672	0	23	7	30
	LF07YBCA	612753	0	1	0	1
	LF07YCJA	612752	0	1	0	1
		612755	0	1	0	1
	LF07YO	634680	0	188	46	234
		634681	0	214	52	266
	LF08SBCA	610182	0	1	0	1
	LF08SCJA	610183	0	0	1	1
	LF08SO	634995	0	8	2	10
	LF08YCJA	220300	0	1	0	1
	LF08YO	635165	1	21	29	51
		635166	4	34	46	84
	LF08YPLA	220304	1	0	0	1
	LF09SCCD	635181	1	0	0	1
	LF09SO	635180	1	0	0	1
	LF09YO	635510	4	0	0	4
		635564	8	0	0	8
	LOST TAG	unknown age	0	3	4	7
	Total		**20**	**559**	**203**	**782**

Appendix M Table 3. Estimated composition of non-wire tagged salmon trapped at LGR Dam that were hauled to LFH and killed during 2011.

Age/Origin Determinations by Method	Males < 53 cm	Females	Males	Grand Total
Snake R. natural sub age 3 by PIT tag	0	0	1	1
Snake R. natural sub age 4 by PIT tag	0	5	2	7
Snake R. natural unknown age by PIT tag	0	1	0	1
Snake R. hatchery sub age 2 by PIT tag	1	0	0	1
Snake R. hatchery sub age 3 by PIT tag	0	13	26	39
Snake R. hatchery sub age 4 by PIT tag	0	122	28	150
Snake R. hatchery yearling age 3 by PIT tag	0	1	0	1
Snake R. hatchery yearling age 4 by PIT tag	0	1	0	1
Unknown Snake R. res rear age 5 by PIT tag	0	4	0	4
Unknown Snake R. sub age 3 by PIT tag	0	0	4	4
Unknown Snake R. sub age 4 by PIT tag	0	6	10	16
Unknown Snake R. sub age 5 by PIT tag	0	2	0	2
Unknown Snake R. unknown age by PIT tag	0	8	6	14
Unknown hatchery AD sub age 2 by scales	1	0	0	1
Unknown hatchery AD sub age 3 by scales	0	5	2	7
Unknown hatchery AD sub age 4 by scales	0	24	5	29
Unknown hatchery AD yearling age 4 by scales	0	3	0	3
Unknown hatchery age/origin by AD clip	1	4	0	5
Unknown origin sub res rear age 3 by scales	0	0	1	1
Unknown origin sub res rear age 5 by scales	0	3	0	3
Unknown origin res rear age 3 by scales	0	2	3	5
Unknown origin res rear age 4 by scales	0	10	9	19
Unknown origin res rear age 5 by scales	0	6	1	7
Unknown origin sub age 2 by scales	0	0	1	1
Unknown origin sub age 3 by scales	0	17	20	37
Unknown origin sub age 4 by scales	0	251	86	337
Unknown origin sub age 5 by scales	0	9	2	11
Unknown origin yearling age 3 by scales	0	1	0	1
Unknown origin yearling age 4 by scales	0	1	0	1
Unknown age/origin (Presume hatchery)	1	33	16	50
Total	**4**	**532**	**223**	**759**

Appendix M Table 4. Estimated composition of wire tagged salmon that were trapped at LGR, hauled to LFH, and killed during 2011.

Origin/CWT	CWT	<53 cm Males	Females	Males	Grand Total
09BLANK	STRAY/unknown age	0	8	1	9
BON06YUMA	094505	0	1	0	1
	094506	0	1	0	1
BON08YUMA	090329	1	0	0	1
BON09YUMA	090355	3	0	0	3
UMA07SUMA	090132	0	1	0	1
	090133	0	2	1	3
	090134	0	4	0	4
	090135	0	5	2	7
UMA08SUMA	090225	0	0	1	1
LF05YBC	612507	0	1	0	1
LF06YBCA	612513	0	1	0	1
	612516	0	2	0	2
LF06YCJA	612511	0	1	1	2
LF06YO	633987	0	3	0	3
	634092	0	4	0	4
LF06YPLA	612515	0	2	0	2
LF07SBCA	612517	0	8	0	8
	612520	0	17	1	18
LF07SCCD	634671	0	7	2	9
LF07SCJA	612518	0	9	2	11
	612521	0	6	0	6
LF07SGRRD	634670	0	6	1	7
LF07SIPCHC	090136	0	13	2	15
	103680	0	2	1	3
	104381	0	1	0	1
	107171	0	0	1	1
	107271	0	3	1	4
	107502	0	2	0	2
LF07SO	634672	0	20	2	22
LF07SPLA	612519	0	9	1	10
	612522	0	14	0	14
LF07YBCA	612750	0	7	2	9
	612753	0	8	4	12
LF07YCJA	612752	0	8	6	14
	612755	0	9	3	12
LF07YO	634680	0	50	19	69
	634681	0	36	18	54
LF07YPLA	612751	0	5	1	6
	612754	0	5	4	9
LF08SBCA	610179	0	2	3	5
	610182	0	1	1	2
LF08SCCD	634996	0	11	7	18
LF08SCJA	610180	0	3	3	6
	610183	0	3	2	5
LF08SGRRD1	634997	0	9	6	15
LF08SGRRD2	612676	0	3	5	8

Appendix M Table 4. Estimated composition of wire tagged salmon that were trapped at LGR, hauled to LFH, and killed during 2011.

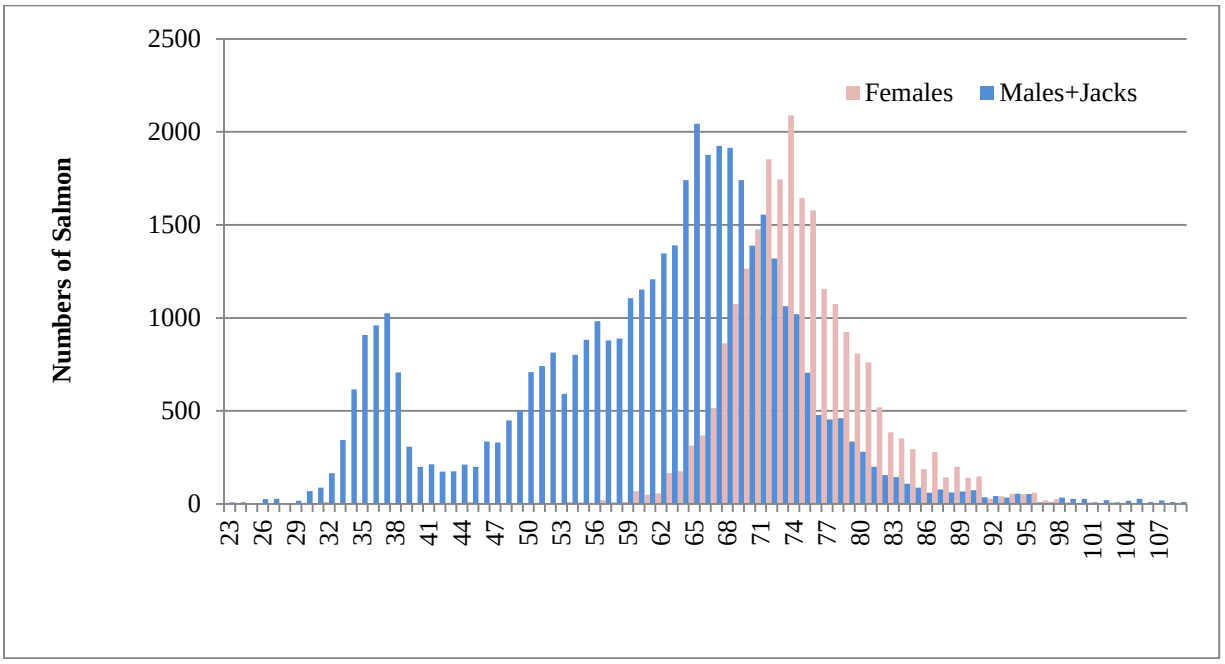
Origin/CWT	CWT	<53 cm Males	Females	Males	Grand Total
LF08SIPCHC	090228	0	4	2	6
	107582	0	0	2	2
	107682	0	1	1	2
LF08SO	634995	0	6	6	12
LF08SPLA	610181	0	2	3	5
	610184	0	0	1	1
LF08YBCA	220302	4	4	26	34
	220303	11	2	17	30
LF08YCJA	220300	5	16	31	52
	220305	3	16	27	46
LF08YO	635165	23	14	58	95
	635166	22	17	61	100
LF08YPLA	220301	6	10	39	55
	220304	10	10	33	53
LF09SBCA	220306	12	0	4	16
	220307	13	0	0	13
LF09SCCD	635181	31	0	3	34
LF09SCJA	220308	14	0	3	17
	220309	15	0	1	16
LF09SGRRD	635182	15	0	2	17
LF09SIPCHC	090331	23	0	3	26
	100142	3	0	1	4
	104383	14	0	1	15
	106482	7	0	0	7
LF09SO	635180	44	0	4	48
LF09SPLA	220310	18	1	0	19
	220311	23	0	0	23
LF09YBCA	220312	7	0	0	7
	220317	17	0	0	17
LF09YCJA	220314	11	0	0	11
	220315	11	0	0	11
LF09YO	635510	38	0	0	38
	635564	40	0	0	40
LF09YPLA	220313	16	0	0	16
	220316	13	0	0	13
NPTH07SCFA	612736	0	7	4	11
NPTH07SLGA	612737	0	14	3	17
NPTH07SNLVA	612694	0	14	2	16
NPTH07SO	612695	0	6	2	8
	612716	0	10	3	13
NPTH08SCFA	612760	0	0	3	3
	612761	0	4	2	6
NPTH08SLGA	612762	0	4	0	4
	612763	0	0	3	3
NPTH08SNLVA	612738	0	0	1	1
	612766	1	3	6	10
NPTH08SO	612697	0	1	1	2
	612739	0	1	4	5

Appendix M Table 4. Estimated composition of wire tagged salmon that were trapped at LGR, hauled to LFH, and killed during 2011.

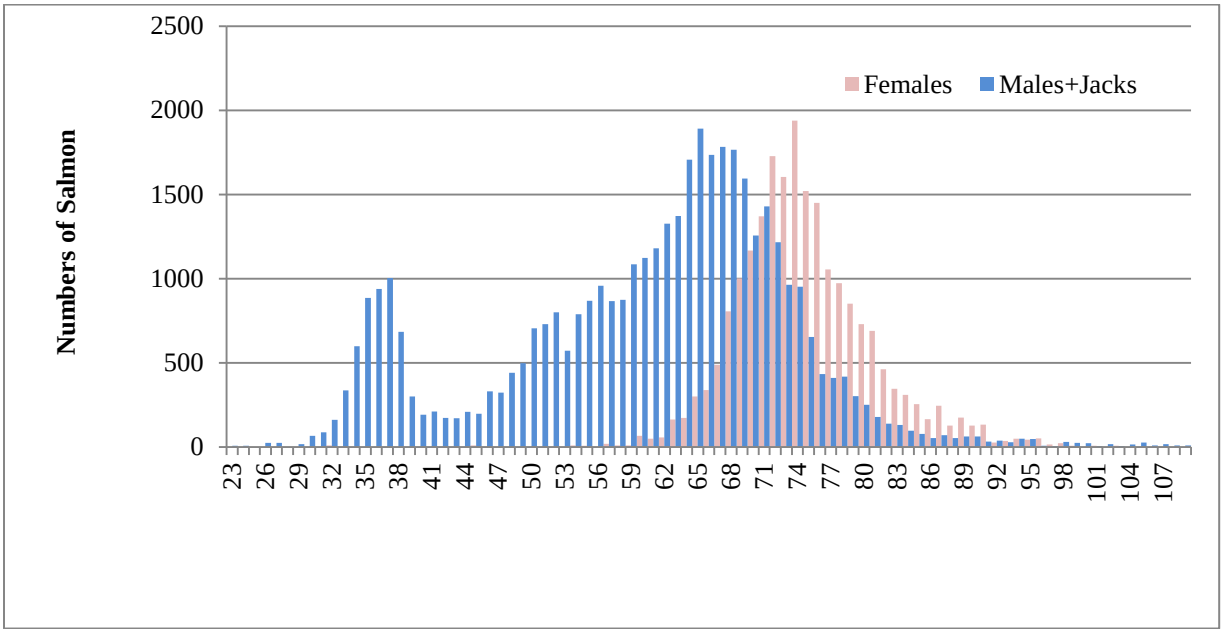
Origin/CWT	CWT	<53 cm Males	Females	Males	Grand Total
NPTH09SCFA	612764	7	0	0	7
	612765	8	0	0	8
NPTH09SLGA	612747	11	0	1	12
	612748	10	0	1	11
NPTH09SNLVA	220201	15	0	1	16
	220202	6	0	1	7
NPTH09SO	220200	11	0	1	12
	612772	17	0		17
LOST TAG	LOST TAG	1	3	2	6
Tag Cut Short	Tag Cut Short	1	0	3	4
LKGL08YSPRLOSTINER	094664	0	0	1	1
Total		**561**	**483**	**478**	**1,522**

Appendix N: Updated Length Frequencies Figures from 2010 Annual Report

(Updated figures replace Figure 17 and 18 in the Lyons Ferry Hatchery Evaluation Fall Chinook Salmon Annual Report:2010)



Appendix N.1: Estimated length frequencies of the fall Chinook run to LGR Dam by sex in 2010.



Appendix N.2: Estimated length frequencies of fall Chinook passing LGR Dam by sex in 2010.

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