Lyons Ferry Hatchery Evaluation
Fall Chinook Salmon
Annual Report: 2014

by

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Executive Summary

This report summarizes activities by the Washington Department of Fish and Wildlife's (WDFW) Lyons Ferry Hatchery (LFH) Evaluation fall Chinook Program for the period 16 April 2014 through 15 April 2015.

During 2014, WDFW collected 3,025 fish at Lower Granite Dam (LGR) for broodstock, monitoring and evaluation of our hatchery releases, and to estimate the run composition at LGR. No fish were collected at Lyons Ferry Hatchery (LFH). At the end of the season, 344 females and 240 males were returned to the Snake River to spawn.

In 2014, we spawned 1,192 females for LFH production for an estimated total green eggtake of 4,787,615; numerically more than full production goals listed in the 2008-2017 *United States v. Oregon* Management Agreement, but well within precision levels expected from large production hatcheries. Green egg to eye-up survival was 96.2%. Based on hatchery records, average fecundity of LGR trapped and spawned females was 4,016 eggs/female. A total of 493 males were spawned, of which 331 fish (67%) were used multiple times to minimize the use of jacks. The proportion of natural origin fish in broodstock (pNOB) was unknown. However, the minimum proportion of hatchery origin fish in the broodstock (pHOB) was 59% with the remaining 41% of unknown origin.

Hatchery staff released BY13 subyearling fall Chinook into the Snake River at LFH and into the Grande Ronde River (GRR) near Cougar Creek in 2014 and BY13 yearlings into the Snake River at LFH in 2015. All WDFW release groups (subyearling and yearling) were represented by a coded wire tag (CWT) group and additionally may have received a passive integrated transponder (PIT) tag as identified in the *US v. Oregon* production tables. PIT tags in 28,267 of the released onstation yearlings (BY13) and 19,906 of the released subyearlings (BY13) will be used to monitor adult and jack returns in-season

Upon adult return, fish from yearling production were larger than subyearlings that return at the same salt water age. Yearling females returned at larger sizes than yearling males of the same salt water age. 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 no jills.

In the spring of 2014 a smolt trap was operated on the Tucannon River to estimate juvenile production. Trapping estimates of fish passing the smolt trap (7,954) were expanded for areas below the smolt trap location. After this expansion we estimate a total of 9,262 naturally produced fall Chinook from the 2013 spawners left the Tucannon River, and production was estimated at 24 smolts/redd. In the fall of 2014, the Tucannon River was surveyed for spawning fall Chinook. An estimated 303 fall Chinook redds were constructed in the river, resulting in an estimated spawning escapement of 909 fall Chinook.

We calculated a minimum of 41,964 (45.9%) of the total LSRCP mitigation goal (91,500 fish) was met in 2014 (WDFW and Fall Chinook Acclimation Project (FCAP) releases combined). This estimate includes: returns to the Snake River (WDFW and FCAP), fully expanded (Coded Wire Tag (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.

The LSRCP escapement goal (18,300 hatchery fish) to the Snake River Basin was exceeded (135%) in 2014 (WDFW and FCAP). An estimated 7,124 jacks and jills (1-salt) and 17,494 adults (2-5 salt) contributed to the returns. An additional 2,616 minijacks (0-salt) were also estimated to have returned to the Snake River, but do not count toward the mitigation goal.

The run size of natural origin fish estimated to reach LGR was 13,886 fish $\geq$ 53 cm fork length and 3,934 fish 30 cm to <53 cm fork length. The remaining portion of the run consisted of 45,617 fish $\geq$ 53 cm fork length and 10,028 fish 30 cm to < 53 cm fork length, all likely hatchery origin from LSRCP, IPC, and NPTH. The stray rate of out of basin fish was estimated at 2.1% for fish $\geq$ 53 cm fork length and 0.0% for fish 30 cm to <53 cm fork length.

Fall Chinook reared at LFH and released into the Snake River at LFH or near Couse Creek (CCD), and into the Grande Ronde River (GRR) contributed to harvest in both sport (2,393) and commercial/tribal fisheries (8,366) in 2014. LFH fall Chinook were also recovered outside the Snake River Basin at hatcheries (Big Creek N=2, Priest Rapids N=18, and Ringold Springs N=2) and on spawning grounds (Columbia River at Hanford reach N=33). Of the total number of fish recovered outside of the Snake River, 77.4% came from commercial fisheries, 22.1 % from sport fisheries, 0.3% from spawning ground surveys, and 0.2% were from hatcheries.

The top four catch areas for fish released as yearling smolts returning in 2014 were located in the Columbia River (44%), in the ocean off the coasts of Washington (24%), Oregon (12%), and British Columbia (11%). The top five catch areas for fish released as subyearling smolts returning in 2014 were located in the Columbia River (46%), in the ocean off the coasts of British Columbia (19%), Washington (15%), and Alaska (10%) and Oregon (10%). Overall, the single largest fishery contributor was the Columbia River Zone 6 Gillnet fishery which consisted of 26.5% of all the fish recovered outside of the Snake River Basin, and the catch consisted primarily of yearlings.

In the Snake River, returns of WDFW released fish consisted primarily of yearlings (onstation releases). There were 1.8 times greater returns in 2014 from the yearling program compared to the WDFW subyearling releases, but this benefit dropped to 1.2 times when comparing only adult returns.

Two methodologies for estimating returns to the Snake River were compared; PIT tags and CWTs released from LFH. For yearlings, at 0-salt and 1-salt returns, PIT tag estimates were consistently greater than CWT estimates. PIT tag estimates for adults were slightly less than estimates derived from CWT expansions. For subyearlings, PIT tag estimates were less for 1-

salt returns and greater for 2-salt returns compared to CWT estimates, although there were only two years of data since subyearlings do not return as 0-salts.

Endangered Species Act (ESA) section 10 (a)(1)(A) Permit # 16607 was revised in June 2015 and is now referred to as permit # 16607 (amended). Overall WDFW was below direct take levels of listed Snake River fall Chinook salmon for adult returns in 2014 and juvenile releases in 2015.

Acknowledgments

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

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We thank the personnel at LFH for their cooperation with sampling and providing information regarding hatchery operations. Thanks also to John Sneva (WDFW) for aging scales collected at LFH and LGR for the run reconstruction and broodstock aging.

We appreciate the efforts of Darren Ogden (NOAA Fisheries) and crew at LGR for trapping, tagging, and documenting fall Chinook salmon for transport to Lyons Ferry Hatchery. We also thank Fred Mensik (WDFW) for providing summarized fallback data from the juvenile collection facility at LGR. We also thank Bill Young (NPT), Stuart Rosenberger (Idaho Power) for their assistance in estimating the run composition estimate at LGR in 2014, and Ben Sandford (NOAA) for bootstrapping the data to get bounds around the estimates.

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Introduction

Program Objectives

This report summarizes activities by the Washington Department of Fish and Wildlife's (WDFW) Lyons Ferry Hatchery Fall Chinook Evaluation Program from 16 April 2014 to 15 April 2015. WDFW's Snake River Lab (SRL) staff completed this work with federal fiscal year 2014/2015 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, steelhead and rainbow 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. 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 (HCD) 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[a]
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**

[a] As defined in the LSRCP document, "adults" include adults and jacks, but not minijacks.

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.

- The summer spill program initiated in 2005 increased juvenile survival from 54% to 71% (DeHart et al 2015)

- 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 natural-origin fish abundance and harvest using supplementation and harvest mitigation releases, respectively. Fish released at LFH and FCAP are subyearlings and yearlings, and NPTH releases are subyearlings. Information about the NPTH is presented in NPT annual reports and is not presented here. The third program administered by Idaho Power Company (IPC)

[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, USFW, personal communication). The LSCRP mitigation goal was based upon 97,500 fall Chinook counted at McNary Dam (MCN) 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.

is primarily mitigation for lost production due to construction of the Hells Canyon Complex (HCC), and consists of subyearling releases. Releases occur at 10 release locations throughout the basin. The three programs are highly coordinated in their operations, including broodstock collection at Lower Granite Dam (LGR) and fish transfers among facilities. Several out of basin hatchery facilities are utilized (Irrigon and Umatilla) in addition to the inbasin facilities and acclimation sites. Marking of hatchery-origin fish is guided by a Snake River Basin Fall Chinook Salmon Production Program Marking Justification white paper (Rocklage and Hesse 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/tagged in some manner, 47% are marked with an adipose fin clip. If changes occur, there is a notification process that needs to be followed per the permit #16607 issued from NOAA-Fisheries (NMFS 2012a, NMFS 2012b).

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

- 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* Agreement 2008-2017.

- 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.

- The immediate goal of the FCAP is a concerted effort to ensure that the Snake River fall Chinook salmon above LGR 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

    1. Increase the natural population of Snake River fall Chinook spawning above LGR.
    2. Sustain long-term preservation and genetic integrity of this population.
    3. Keep the ecological and genetic impacts of non-target fish populations within acceptable limits.
    4. Assist with the recovery of Snake River fall Chinook.
    5. Provide harvest opportunities for both tribal and non-tribal anglers.

- 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 and the co-managers. The LSRCP program at LFH has been guided by the following objectives:

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

While recognizing the overarching purpose and goals established for the LSRCP and 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 v. Oregon* Management Agreement.

3. Spawn enough fish to retain 4.45 million eggs (WDFW 2014) to assure that production goals as stated in 2008–2017 *US v. Oregon* Management Agreement are met. Fecundities vary depending upon return age classes and run composition, but generally 1,300 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 2008–2017 *US v. Oregon* Management Agreement 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), and estimate the numbers of natural origin fish escaping to spawn above LGR. 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 (LMO), which is comprised of 9,988 from LSRCP, 3,206 from NPTH, and 2,290 from IPC. Returns are estimated in-season to LMO and not to Ice Harbor Dam (IHR) (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.

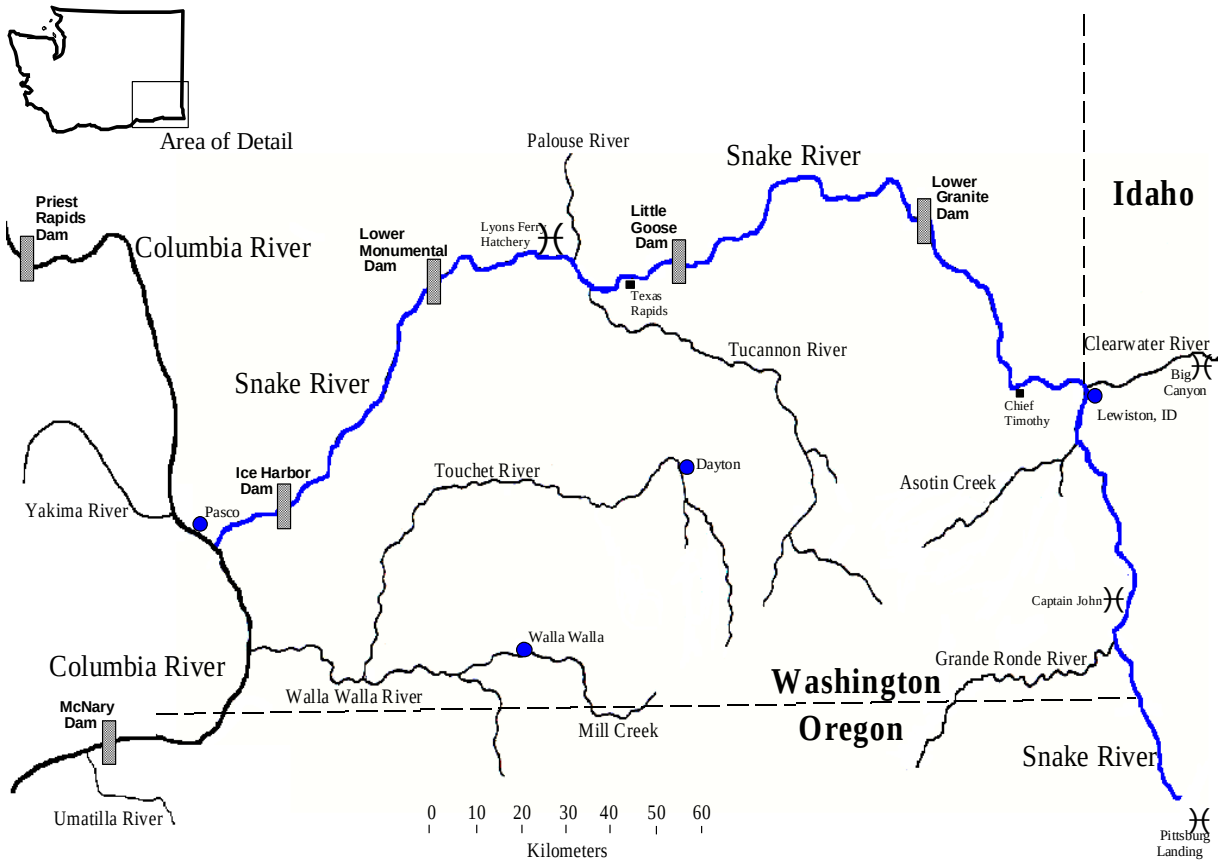
- The long-term goal is for a total return 24,750 hatchery-origin fish above LMO, which is comprised of 18,300 from LSRCP, 3,750 from NPTH, and 2,700 for IPC.

Natural-Origin Return Goals

- Achieve Endangered Species Act (ESA) delisting by attaining interim population abundance in the Snake River Evolutionary Significant Unit (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 LMO.

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



Rkm	Location
0.0	Snake River mouth
16.1	Ice Harbor Dam
66.9	Lower Monumental Dam
95.1	Lyons Ferry Hatchery
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, acclimation sites, and major tributaries in the area.

Broodstock Collection and Management 2014

Fall Chinook are collected at LGR 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 discrepancies are likely data recording errors.

Table 2. Numbers of fall Chinook initially collected at LGR for broodstock, evaluation, and run construction needs in 2014.

Year	Trap location	Number collected/hauled for broodstock	Processed (killed)	Returned to Snake River	Difference from number collected/hauled
2014	LGR	3,025	2,499[a]	584	-58

[a] Includes 41 fish processed by WDFW whose gametes were transferred to NPTH.

Lower Granite Dam Trapping Operations

In 2014, fall Chinook trapping at LGR began 18 August with the trap open 100% of the time for four hours each day because of warm water conditions. The trap was shut down on 19-20 August and 22-29 August due to high water temperatures (>70^{o} F). With the cooling of water temperatures beginning 1 September, fall Chinook were trapped by systematically opening the trap 10% of each hour from 1 September to 1 October and 8% of each hour from 2 October through 11 November. The arrival timing of males and females collected for broodstock at LGR and hauled to LFH is provided (Figure 2). Broodstock goals were met early but trapping continued throughout the run. 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, to identify different trapping rates. Approximately 77.4% of the salmon collected for the fall Chinook broodstock program in the Snake River Basin and for run reconstruction needs, were shipped to LFH and 22.6% were hauled to NPTH. Fish were hauled to LFH in a 5,678 L aerated tank truck by WDFW personnel. The trap at LFH was not operated as trapping at LGR fulfilled all broodstock needs in 2014.

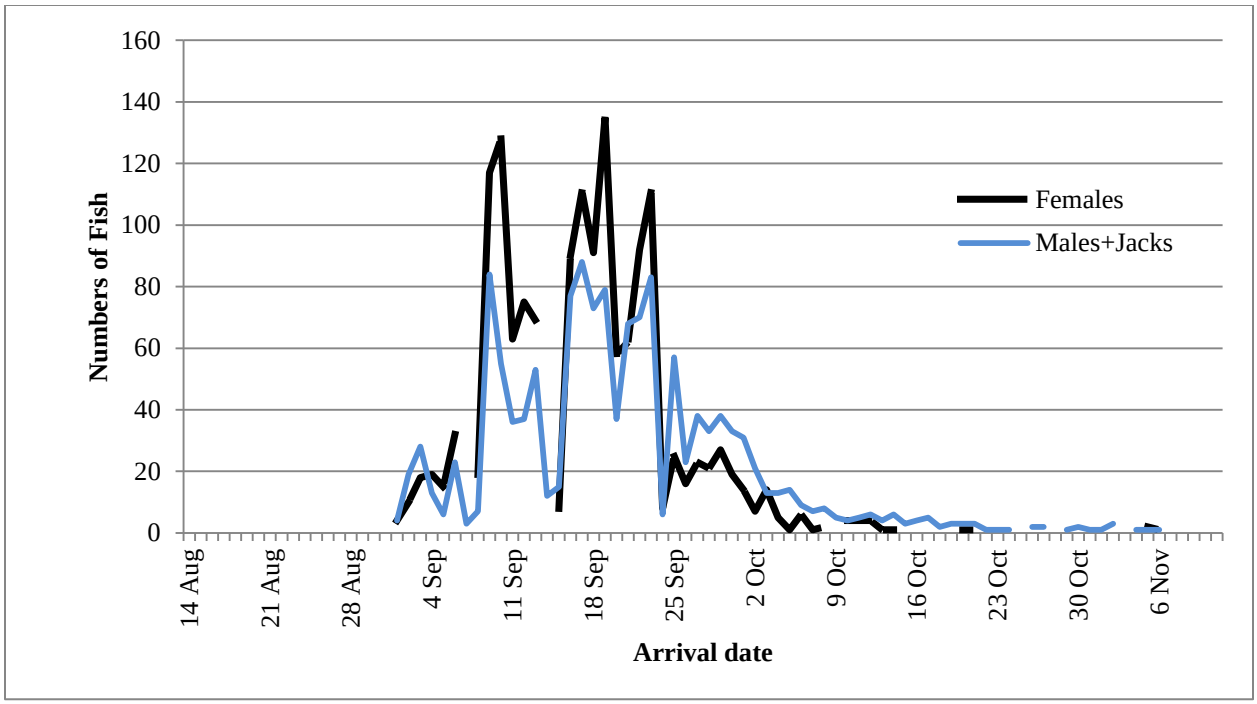


Figure 2. Arrival timing of fall Chinook at LGR that were hauled to LFH in 2014.

Hatchery Operations 2014

Spawning Operations

Spawning and Egg Take

Fish collected at LGR for broodstock, run reconstruction, and monitoring and evaluation purposes were hauled to LFH and NPTH with a goal of a 70:30 split. 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 ponds at LFH holding fish transported from LGR had approximately 0.4:1 sex ratio (males:females) in the adults (75 cm or greater), and 2.5:1 sex ratio (males:females) for fish less than 75 cm. Mate selection and spawning protocols changed weekly according to the numbers of males ripe during the spawn day and to allow for maximum use of unmarked/untagged fish from LGR, older aged males ($\geq$ 2-salt), and fish with a subyearling life history. Mating protocol at LFH is presented in Appendix D.

The duration, peak of spawning, eggtake, and percent egg mortality (Table 3), numbers of fish spawned (Table 4), and the number killed outright or 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. On two spawn days milt from unmarked/ untagged males held overnight and used in matings the following day. The goal is to maximize the use of unmarked/untagged fish during spawning as a way to maximize the proportion of natural origin fish in matings. Composition of fish processed at LFH is presented in Appendix E. Revised composition of fish processed in 2012 and 2013 is presented in Appendix F to exclude fish returned to river. In 2014, eggtake goals were attained.

Table 3. Duration and peak of spawning, egg take, and percent egg mortality at LFH, 1984-2014.

Year	Spawn duration Begin	Spawn duration 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
2012[h]	16 Oct	13 Nov	6 Nov	4,526,108	5,7-9,11,13,15,16	6,10,17	3.1
2013	22 Oct	3 Dec	5 & 6 Nov	4,565,660	10,13,15,16	11,17	2.6
2014	22 Oct	18 Nov	12 & 13 Nov	4,787,615	17	-	3.6

[a] Priority levels as listed in the 2008-2017 *US v. Oregon* Management Agreement production tables (Appendix G).

[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.

[h] Priorities 12 and 14 are not included this year forward as the Transportation Study has ended.

Table 4. Spawn dates, numbers of fall Chinook, and weekly egg take of fish spawned at LFH in 2014. (Jacks are included with males).

Spawn dates	Hatchery and unknown origin males[a]	Hatchery and unknown origin females[a]	Non-viable [b]	Egg take
22 Oct	39	78	2	320,000
28 Oct	53	155	2	622,000
4 & 5 Nov	140	468	4	1,927,315
12 & 13 Nov	261	491	11	1,918,300
LFH production Totals	**493**	**1,192**	**19**	**4,787,615**
NPTH spawn 18 Nov	13	15	0	unknown
Totals	**506**	**1,207**	**19**	**4,787,615**

[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 2014. (Jacks are included with males).

Week ending	Mortality						Killed Outright					
	LF/Snake R.[a]		Natural		Other/Unknown[b]		LF/Snake R.		Natural		Other/Unknown	
	M	F	M	F	M	F	M	F	M	F	M	F
31 Aug	2	0	0	0	0	1	0	0	0	0	0	0
7 Sep	0	0	0	0	0	0	0	0	0	0	0	0
14 Sep	0	1	0	0	0	0	25	0	0	0	2	0
21 Sep	0	0	0	0	0	0	86	0	0	0	6	1
28 Sep	0	0	0	0	0	0	75	3	0	0	13	0
5 Oct	3	0	0	0	1	0	143	5	0	0	77	1
12 Oct	0	1	0	0	1	3	52	0	0	0	1	0
19 Oct	0	2	0	0	0	3	24	1	0	0	4	1
26 Oct	3	5	0	0	1	0	15	0	0	0	0	0
2 Nov	3	3	0	0	3	4	22	7	0	0	0	4
9 Nov	28	6	0	0	6	1	24	1	0	0	21	3
16 Nov	2	0	0	0	5	1	6	39	0	0	2	5
23 Nov	1	2	0	0	5	1	0	0	0	0	0	0
Totals	**42**	**20**	**0**	**0**	**22**	**14**	**472**	**56**	**0**	**0**	**126**	**15**

[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, lost and no tags.

Fish Returned to River

Fish from LGR that were not needed for broodstock were returned to the Snake River near LFH on 18 November (Table 6). Fish were scanned for PIT tags and scales were taken to determine age composition. Co-managers agreed in-season that these fish could be returned to the Snake River near LFH instead of above LGR due to the number released and that it would not affect run reconstruction estimates as the LGR trap had already closed for the season. We estimate that all of these fish remained in the reservoir between LMO and LGR since none were detected in the Tucannon River.

Table 6. Estimated composition of fall Chinook released into the Snake River near LFH at the end of the season in 2014.

Origin	Release age	Origin estimation method	Salt water age	Total age	Females	Males+ Jacks	Total
Snake R hatchery	Subyearling	PIT tag	2	3	6	15	21
	Subyearling	PIT tag	3	4	46	39	85
	Yearling	PIT tag	1	3	1	0	1
	Yearling	PIT tag	2	4	10	2	12
	Yearling	PIT tag	3	5	0	1	1
	Reservoir reared	PIT tag	2	4	1	0	1
	Unknown	PIT tag	-	-	4	0	4
Snake R natural	Subyearling	PIT tag	3	4	1	0	1
Snake R unknown	Reservoir reared	PIT tag	3	5	1	0	1
	Unknown	PIT tag	-	-	4	3	7
Hatchery	Unknown	Clip/Wire/scales	-	-	106	55	161
Unknown	Reservoir reared	Scales	2	4	0	1	1
	Subyearling	Scales	2	3	3	4	7
	Subyearling	Scales	3	4	17	6	23
	Unknown		-	-	144	114	258
Totals					344	240	584

Broodstock Profile

This was the fourth year fin tissues were taken from all fish contributing to broodstock, including those that were spawned but not used (Appendix H). This was the third year scales were taken on all fish contributing to broodstock in order to determine salt age and rearing type subyearling, yearling, or reservoir reared subyearlings). Otoliths were taken from the majority of unmarked/untagged fish (spawned and unspawned) from LGR by staff from the University of Idaho to determine where fall Chinook are rearing in the Snake River basin based on strontium levels found in the otoliths (Hegg 2013).

A concentrated effort is occurring to spawn larger sized males and females because of the large number of jacks and jills that had been used in the past and possible heritability of that trait. While not a completely accurate representation of the overall genetic contribution of larger fish to the broodstock, due to some larger males being used repeatedly, it provides a relative representation that can be used in future years when examining changes in age composition. Salt water age composition of fish used as broodstock are summarized pre and post protocol change in 2010 (Figure 3–Figure 8). The origin composition and length frequencies of fall Chinook used for broodstock at LFH in 2014 are presented in Figure 9 and Figure 10. respectively. Males used multiple times are counted multiple times in both figures and unknown origin includes hatchery or natural origin fish. An estimated 9.9% of the males and 15.1% of the females that contributed gametes for production were returns from yearling releases.

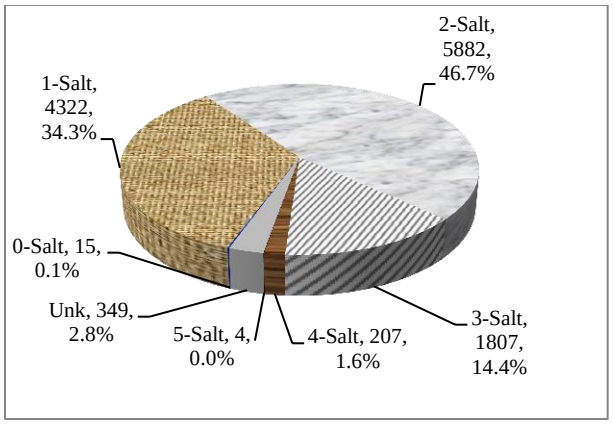


Figure 3. Salt age composition of all broodstock 2005 – 2009

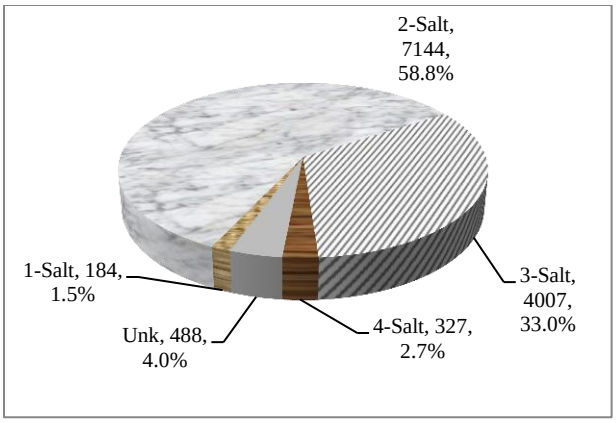


Figure 4. Salt age composition of all broodstock 2010 - 2014

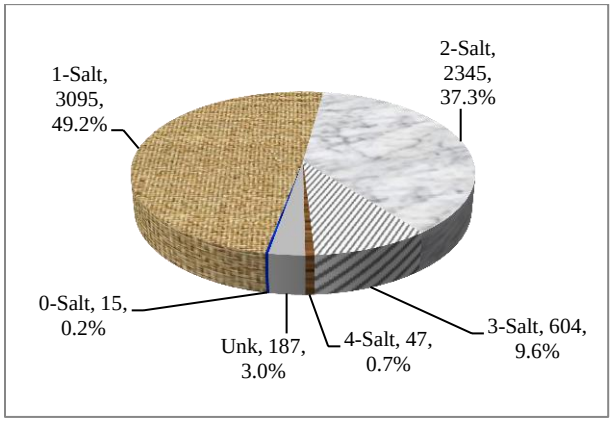


Figure 5. Male salt age composition of broodstock 2005 – 2009

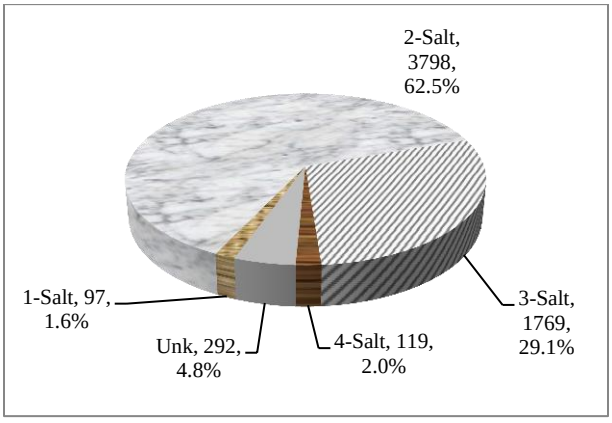


Figure 6. Male salt age composition of broodstock 2010 - 2014

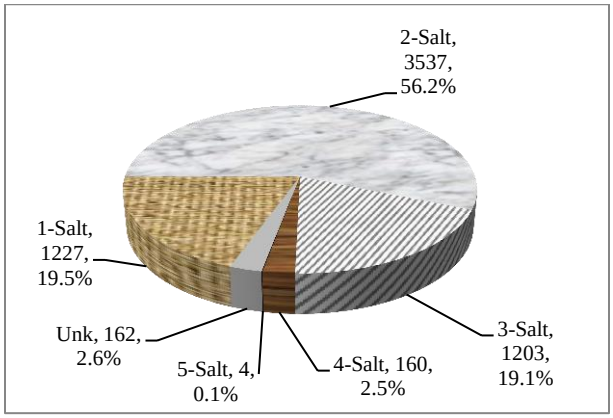


Figure 7. Female salt age composition of broodstock 2005 – 2009

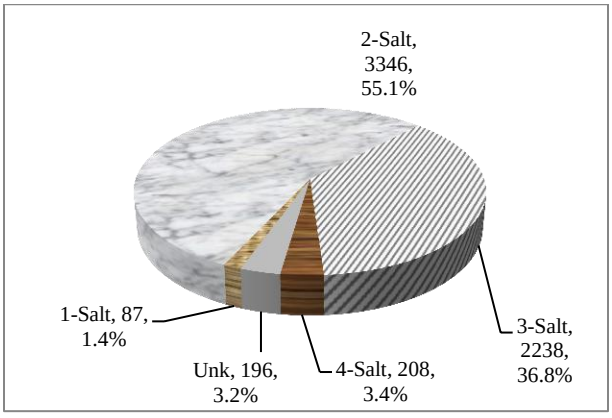


Figure 8. Female salt age composition of broodstock 2010 - 2014

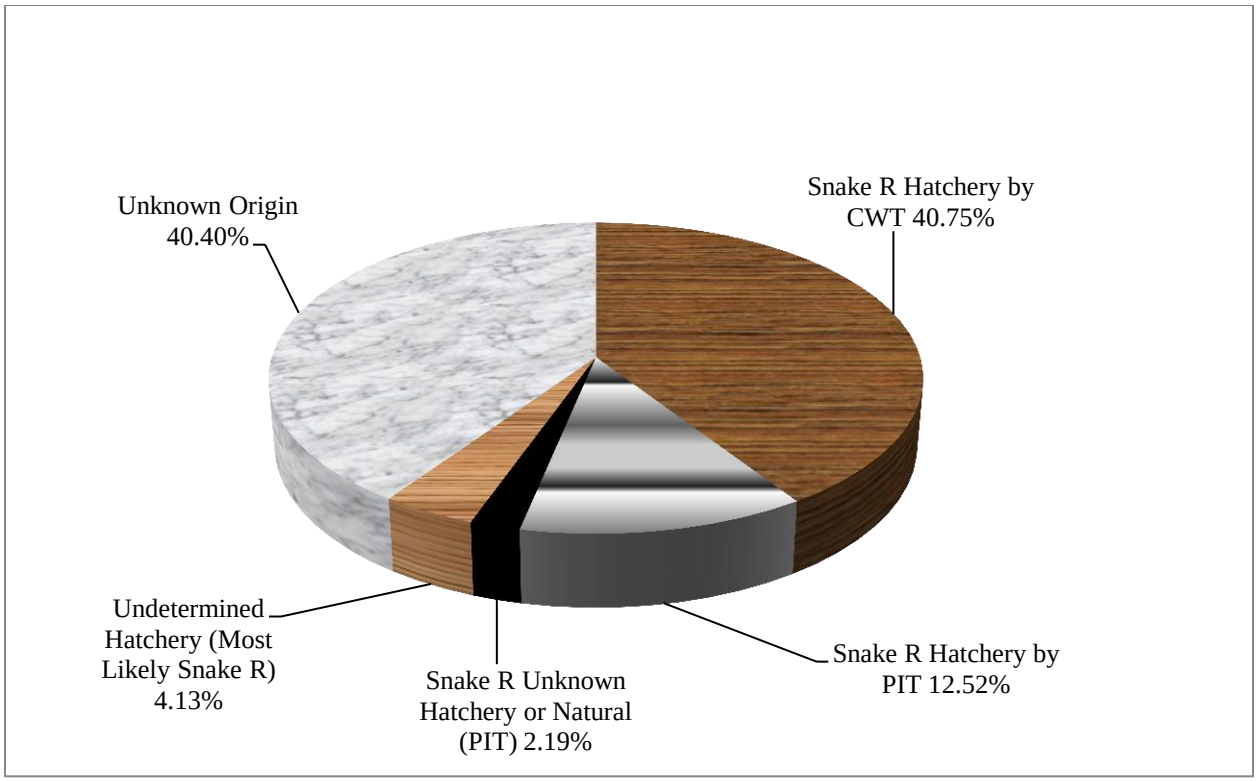


Figure 9. Percentages by fish origin contributing to fall Chinook broodstock at LFH during 2014.

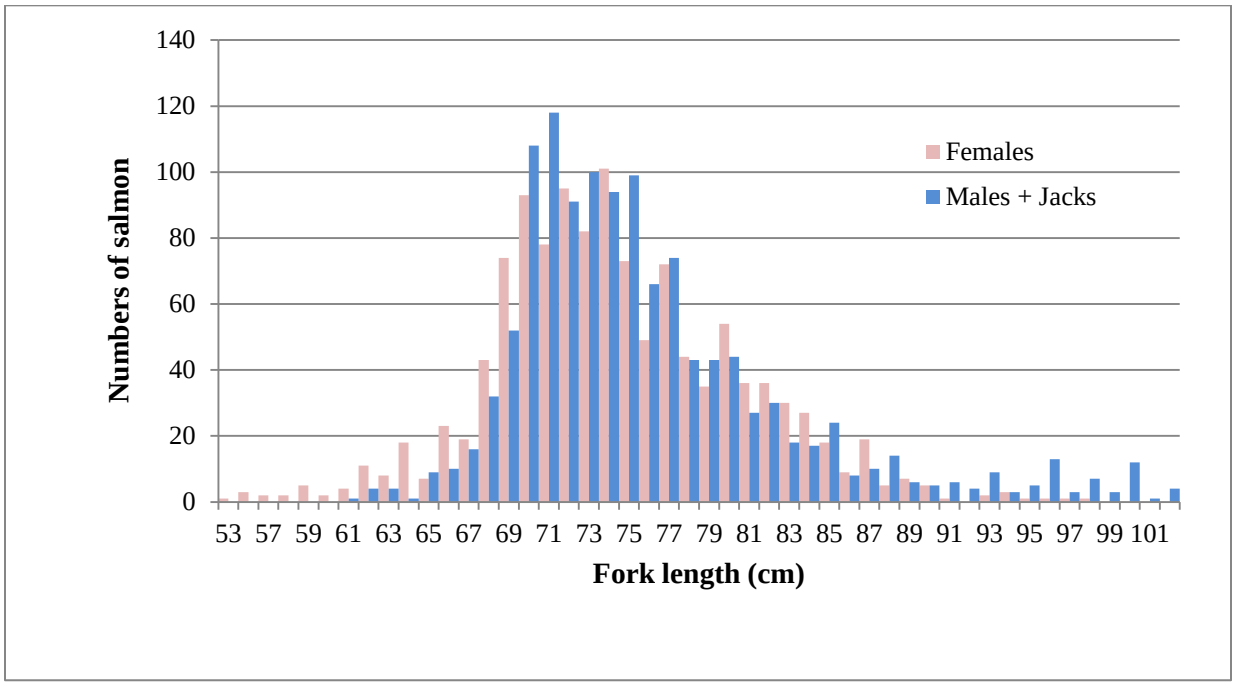


Figure 10. Fork lengths of fall Chinook salmon used as broodstock at LFH in 2014.

Males used in broodstock

Males hauled to LFH were trapped at LGR throughout the run (Figure 11). Older aged males were mated with multiple females, in part, to prevent an unintentional decline in age at maturity of the progeny (Hankin et al.2009). Of the 493 males spawned, 331 fish were used multiple times (Table 7) to:

- reduce the usage of jacks (1-salt) in the broodstock,
- maximize the number of larger, older aged adults,
- select fish with a greater chance of a subyearling rearing history,
- increase the numbers of natural origin fish used.

The calculated effective number of male breeders was 366 (N_b) using procedures described in Busack (2006). The effective male breeders are 74.2% of the census number of males, or 31.5% of the male N_b that would have been achieved if enough males had been available to avoid reuse of males.

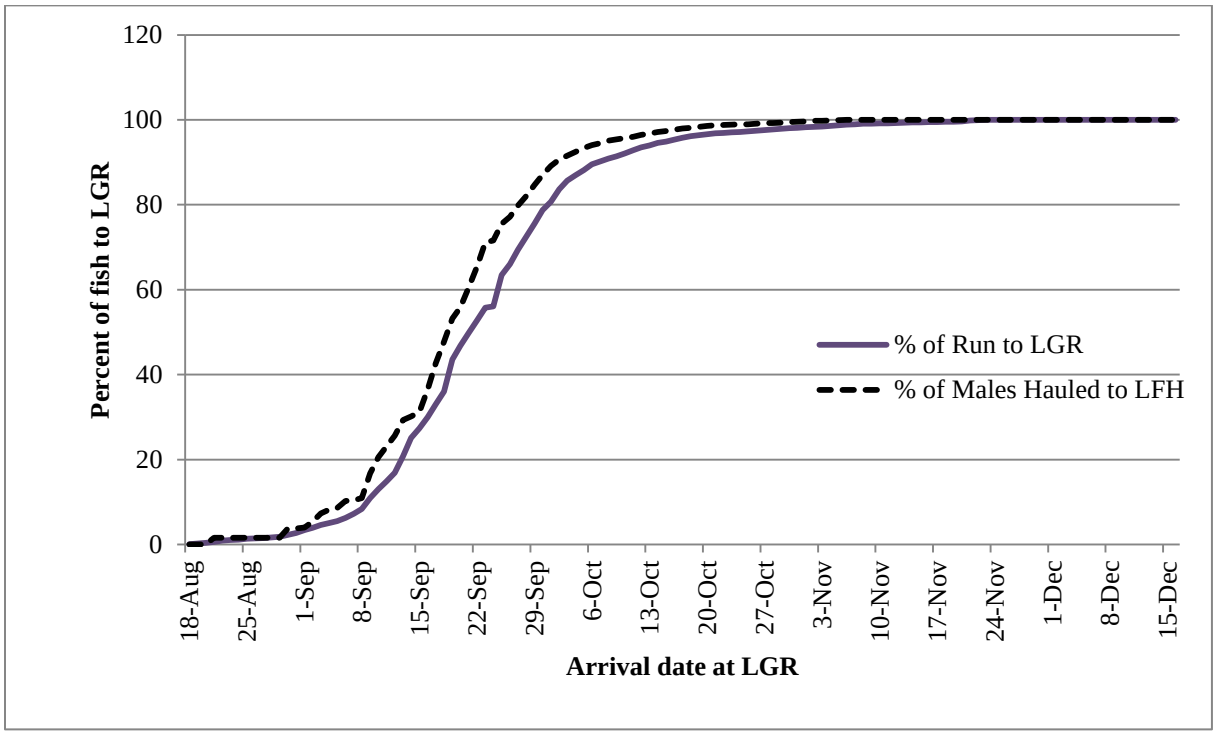


Figure 11. Arrival timing of male fall Chinook at LGR compared to the arrival dates of fall Chinook hauled to LFH during 2014.

Origin and release site information was determined for 55.8% of the males spawned based on CWT or PIT tag data. An additional 4.1% of the males were identified as hatchery origin based AD clip, lost/unreadable tags, or yearling scales with a hatchery check. Males that were unmarked/untagged (hatchery and natural origin) represent 40.1% of the males spawned. Of the

total number of males spawned, 84.8% had subyearling juvenile life history, 9.1% yearling, with the remaining 6.1% from unknown age or reservoir reared fish.

Table 7. Origin and age of males used multiple times, that contributed to production at LFH, 2014.

	Times each male was used for mating								
Origin determination method / age	**1**	**2**	**3**	**4**	**5**	**6**	**8**	**10**	**Total unique**
Snake R hatchery by CWT									
subyearling 2 salt (age3)	17	13	15	4	0	2	0	0	**51**
subyearling 3 salt (age4)	34	24	16	13	0	1	0	0	**88**
subyearling 4 salt (age5)	0	0	2	0	0	0	0	0	**2**
yearling 2 salt (age4)	14	6	14	2	0	3	0	1	**40**
yearling 3 salt (age5)	2	1	0	0	0	0	0	0	**3**
Snake R hatchery by PIT									
subyearling reservoir reared 2 salt (age4)	1	0	1	0	0	0	0	0	**2**
subyearling 2 salt (age3)	6	3	4	0	0	1	0	0	**14**
subyearling 3 salt (age4)	21	19	12	5	0	3	0	0	**60**
yearling 2 salt (age4)	0	0	1	0	0	0	0	0	**1**
Snake R unknown by PIT									
reservoir reared 3 salt (age5)	1	0	0	0	0	0	0	0	**1**
subyearling reservoir reared 2 salt (age4)	0	1	0	0	0	0	0	0	**1**
subyearling 2 salt (age3)	0	0	0	1	0	0	0	0	**1**
subyearling 3 salt (age4)	3	2	2	0	0	2	0	0	**9**
subyearling 4 salt (age5)	1	0	0	0	0	0	0	0	**1**
unknown age	0	1	0	0	0	0	0	0	**1**
Unknown hatchery by clip, wire or yearling scales									
subyearling 2 salt (age3)	5	1	3	2	0	0	0	0	**11**
subyearling 3 salt (age4)	3	0	2	0	1	1	0	0	**7**
subyearling 4 salt (age5)	1	0	0	0	0	0	0	0	**1**
yearling 3 salt (age5)	0	0	0	1	0	0	0	0	**1**
Unknown origin									
reservoir reared 2 salt (age4)	3	0	2	0	0	0	0	0	**5**
reservoir reared 3 salt (age5)	1	0	0	0	0	1	0	0	**2**
subyearling 2 salt (age3)	6	15	14	3	0	2	1	0	**41**
subyearling 3 salt (age4)	38	38	28	11	1	7	1	0	**124**
subyearling 4 salt (age5)	4	0	3	1	0	0	0	0	**8**
unknown age	1	9	5	1	0	2	0	0	**18**
Total unique males	**162**	**133**	**124**	**44**	**2**	**25**	**2**	**1**	**493**

Females Used in Broodstock

Females hauled to LFH were trapped at LGR throughout the season (Figure 12). Origin and release site information was determined for 57.3 % the females spawned based on CWT or PIT tag data. An additional 4.1 % of the females were identified as hatchery origin based either on an AD clip, Agency wire tag (AWT), lost/unreadable tags or yearling scales with a hatchery check. Females that were not tagged or clipped represent 38.6 % of the females spawned. The estimated age composition and origins of females contributing to broodstock at LFH are listed in Table 8. Similar to the males used in broodstock, of the total number of females spawned, 79.9% had subyearling juvenile life history, 15.1% yearling, and the remaining 5.0% were from unknown age or reservoir reared fish.

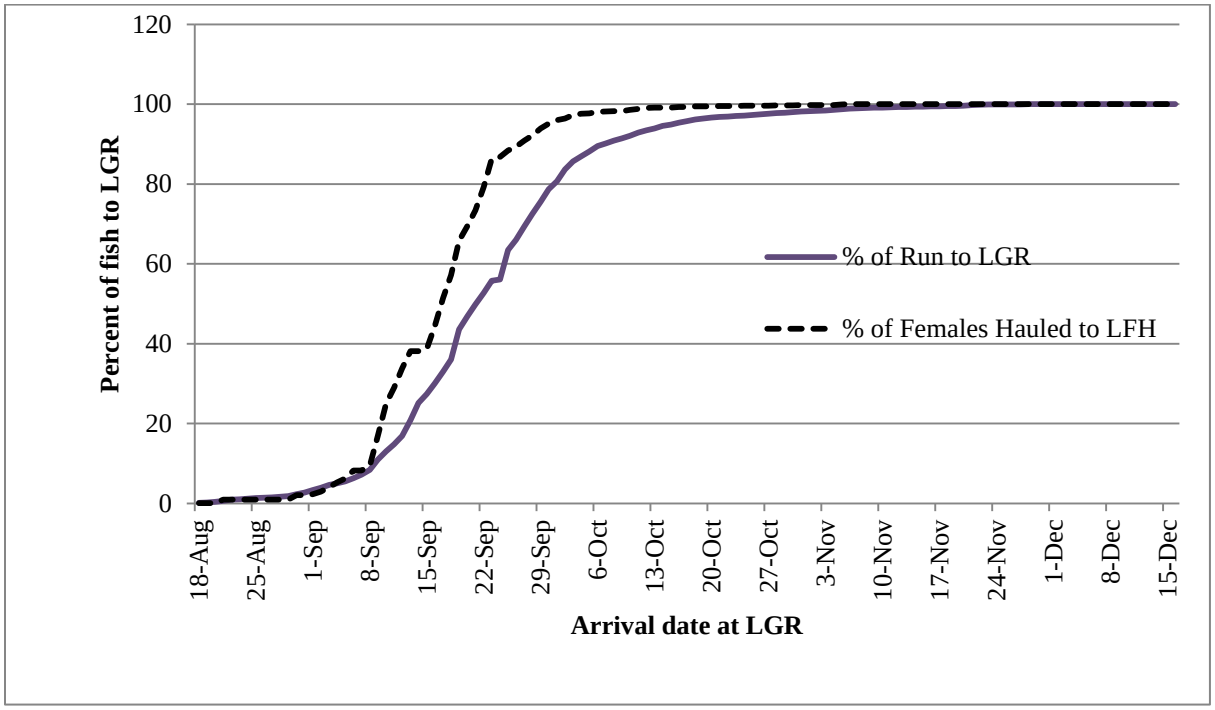


Figure 12. Arrival timing of female fall Chinook at LGR compared to arrival dates of fall Chinook hauled to LFH during 2014.

Table 8. Origin and age of females that contributed to production at LFH, 2014.

Origin determination method	Age	Number of females
Snake R hatchery		
Snake R hatchery by CWT	subyearling reservoir reared 2 salt (age4)	**2**
	subyearling 2 salt (age3)	**37**
	subyearling 3 salt (age4)	**310**
	subyearling 4 salt (age5)	**11**
	yearling 2 salt (age4)	**160**
	yearling 3 salt (age5)	**9**
Snake R hatchery by PIT	subyearling reservoir reared 2 salt (age4)	**4**
	subyearling reservoir reared 3 salt (age5)	**1**
	subyearling 2 salt (age3)	**4**
	subyearling 3 salt (age4)	**107**
	subyearling 4 salt (age5)	**4**
	yearling 2 salt (age4)	**1**
Snake R unknown		
Snake R unknown by PIT	reservoir reared 3 salt (age5)	**7**
	subyearling 3 salt (age4)	**4**
	subyearling 4 salt (age5)	**3**
	unknown age	**2**
Undetermined hatchery		
Undetermined hatchery by clip, wire or yearling scales with a hatchery check	subyearling 2 salt (age3)	**7**
	subyearling 3 salt (age4)	**30**
	subyearling 4 salt (age5)	**2**
	yearling 2 salt (age4)	**3**
	yearling 3 salt (age5)	**2**
	unknown age	**3**
Unknown origin		
Unknown origin	reservoir reared 2 salt (age4)	**4**
	reservoir reared 3 salt (age5)	**8**
	subyearling reservoir reared 2 salt (age4)	**1**
	subyearling 2 salt (age3)	**20**
	subyearling 3 salt (age4)	**352**
	subyearling 4 salt (age5)	**37**
	unknown age	**27**
Total		**1,162**

Lengths by Age of CWT fall Chinook part of the LSRCP Program Compared to Strays

Data presented below consists of LSRCP, FCAP, and out of basin strays with CWTs, and includes fish used as broodstock as well as fish killed outright, non-viable, and dead in pond fish. While the length at age data allow for comparisons by sex, hatchery, and juvenile life history, these data do not represent the age composition of the population because of size selective (non-random) hauling protocols. It should also be noted that some subyearlings classified as 1-salt include some fish that reservoir reared. Size at age of return was calculated for wire tagged yearling (Table 9) and subyearling (Table 10) 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. 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 return LSRCP program fish are provided in Appendix I.

Table 9. Sex, origin, and fork length by age at return of CWT fall Chinook processed in 2014 by WDFW that were part of yearling juvenile releases.

			Total age at return				
Sex	**Origin**	**Fork length**	0-salt	1-salt	2-salt	3-salt	4-salt
Male	LFH	*N*	59	103	100	4	-
		Median (cm)	33	55	70	74	-
		Range (cm)	29-45	43-68	53-87	57-77	-
	Stray	*N*	-	-	1	-	-
		Median (cm)	-	-	-	-	-
		Range (cm)	-	-	74	-	-
Female	LFH	*N*	-	7	202	12	-
		Median (cm)	-	59	74	82	-
		Range (cm)	-	54-64	50-84	72-92	-
	Stray	*N*	-	-	4	3	-
		Median (cm)	-	-	77	79	-
		Range (cm)	-	-	72-85	78-84	-

Table 10. Sex, origin, and fork length by age at return of CWT fall Chinook processed in 2014 by WDFW that were part of subyearling juvenile releases.

			Age at return				
Sex	**Origin**	**Fork length**	0-salt	1-salt	2-salt	3-salt	4-salt
Male	LFH	*N*	-	48	80	49	-
		Median (cm)	-	48	67	76	-
		Range (cm)	-	42-59	53-78	57-100	-
	Stray	*N*	-	-	1	2	-
		Median (cm)	-	-	-	-	-
		Range (cm)	-	-	59	76-79	-
Female	LFH	*N*	-	-	18	133	4
		Median (cm)	-	-	73	79	83
		Range (cm)	-	-	64-76	71-89	81-86
	Stray	*N*	-	-	1	4	1
		Median (cm)	-	-	-	77	-
		Range (cm)	-	-	65	71-80	85

Fecundity

Average fecundity of females used in broodstock that were trapped at LGR was 4,016 eggs/female. These fecundities are only of fish retained for broodstock and not the average fecundity of females returning to the Snake River Basin due to trapping and broodstock spawning protocols that minimize jills from being included in broodstock.

Inclusion of Natural Origin Fish

This was the twelfth year that unmarked/untagged fall Chinook were included in the broodstock in an effort to include the contribution of natural origin fish. The goal is to have 30% of the fish used as broodstock come from Snake River natural origin stock. However, at this time, we cannot determine which unmarked/untagged fish are of natural origin. Starting with the 2016 return, genetic Parental Based Tagging (PBT) will be used to identify all untagged inbasin returns, which will allow us to better estimate natural origin fish by process of elimination.

Jacks and Jills in Broodstock

As described above, WDFW has implemented a size selective mating protocol, with one of the main goals to reduce the contribution/influence of mini-jacks, jacks, and jills in the broodstock. In 2014, 100% of jacks and jills were excluded from broodstock. We calculated saltwater age for wire tagged fish 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. Historical contributions of jacks and jills in broodstock are presented (Table 11) and should be considered minimum estimates because of the above explanation of potential biases in our estimates created by reservoir reared fish. Intensive monitoring of jacks

and jills began in 2010 in order to minimize their contribution (Table 12). This monitoring and subsequent management action has reduced the total matings with 0 and/or 1-salt parentage by nearly 60% within the last five years.

Table 11. Historical number of matings of minijacks, jacks, and jills contributing to broodstock at LFH, 2000-2009, prior to selective size mating protocol.

Year	0-salt	1-salt jack	1-salt jill	Number of matings containing jack x jill mating	% of total matings with 0-salt and/or 1-salt parentage
2000	195	609	157	127	80.4
2001	9	876	67	47	67.6
2002	4	480	11	9	24.7
2003	3	527	78	63	74.5
2004	28	943	254	204	77.3
2005	14	611	57	25	45.4
2006	1	519	121	91	70.0
2007	0	1138	480	408	83.0
2008	0	345	80	30	30.2
2009	1	539	503	143	69.6
Average	**26**	**659**	**181**	**115**	**62.3**

Table 12. Number of matings of minijacks, jacks, and jills contributing to broodstock at LFH, 2010-2014, during selective size mating protocol.

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	50	37	3	6.7
2012	0	2	3	0	0.4
2013	0	9	45	1	4.3
2014	0	0	0	0	0.0
Average	**0**	**25**	**22**	**1**	**2.9**

Inclusion of Strays in Broodstock

Regarding strays, the WDFW goal is to fully exclude strays from broodstock to maintain the genetic integrity of the fall Chinook LFH produces. In cases where broodstock are limited, it was agreed that 5% strays may be included in broodstock. To assure productions goals were met as mandated in the 2008-2017 *United States v. Oregon* Management Agreement, nine stray females were spawned and gametes were retained until the end of the spawning season. When it was verified that production goals could be met without including the strays, the strays were culled. Strays retained as broodstock over the years are presented in Table 13 Males used multiple times are included multiple times in the table below.

Table 13. Historical use of out of basin strays in broodstock: 2007-2014.

Year	Total number of matings	Matings including Stray males	Matings including Stray females	Number of matings containing stray x stray mating	% of total matings with stray parentage
2007	1,458	3	7	0	0.7%
2008	1,309	1	0	0	0.1%
2009	1,293	0	1	0	0.1%
2010	1,238	3	9	0	1.0%
2011	1,251	0	6	0	0.5%
2012	1,184	0	1	0	0.1%
2013	1,240	6	59	1	5.2%
2014	1,162	0	0	0	0.0%
Average	1,267	**2**	**10**	**0**	**0.9%**

Rearing and Marking and Tagging

Information regarding egg taken, egg loss, eggs culled, eggs shipped or retained, and numbers of fish ponded is included in Table 14. Historical egg take and ponding information is listed in Appendix J. Rearing followed standard hatchery procedures as described in the Snake River fall Chinook HGMP available at the Lower Snake River website http://www.fws.gov/lsnakecomplan/Reports/HGMPreports.htm. Detailed information regarding type and size of vessels used for rearing can be found in LFH Annual Reports available at http://www.fws.gov/lsnakecomplan/Reports/WDFWreports.html.

Table 14. Eggs taken and survival numbers by life stage of fall Chinook spawned at LFH, brood years 2010-2014.

Brood year	Eggs taken	Egg loss	Eggs destroyed[a]	Eggs shipped	Eyed eggs retained	Fry ponded	Intended program
2010	4,619,533	124,433	0	1,630,000	2,865,100	980,000	Yearling
						1,885,100	Subyearling
2011	4,723,501	165,001	0	1,785,600	2,772,900	960,000	Yearling
						1,812,900	Subyearling
2012	4,526,108	141,608	0	1,480,000	2,904,500	1,010,000	Yearling
						1,894,000	Subyearling
2013	4,565,660	119,550	0	1,558,800	2,887,310	980,000	Yearling
						1,907,310	Subyearling
2014	4,787,615	177,415	96,700	1,540,000	2,973,500	1,000,000	Yearling
						1,978,500	Subyearling

[a] Eggs culled due to ELISA results, stray or stray mate, and jill or jack mate.

Marking and tagging of fish was consistent with the 2008- 2017 *US v. Oregon* Management Agreement. Yearling fish were ADCWT marked/tagged and CWT tagged from 22 July – 7 August. After marking and tagging, all but 32,000 fish were diverted to the rearing lake. Approximately 16,000 ADCWT fish were diverted into one raceway and 16,000 CWT only fish were diverted into a second raceway. Staff performed tag and fin clip quality control checks from a sample of each group immediately prior to their movement to the rearing lake following PIT tagging (Table 15).

Subyearling (BY13) fish were ADCWT marked/tagged from 2 April - 3 April and 29 April – 1 May. All subyearlings were kept in raceways prior to release. Staff performed tag and fin clip quality control checks from a sample of each group prior to release.

Table 15. Numbers of fall Chinook sampled by WDFW for marking and tagging quality control checks.

Brood year /age	Release site	Mark type	CWT	Number sampled	AD/ CWT	AD only	CWT only	Unmarked/ untagged
2013 Yearling	LFH	ADCWT	636741	1,554	1,499 (96.5%)	43 (2.8%)	5 (0.3%)	7 (0.5%)
	LFH	CWT only	636740	1,515	0 -	0 -	1,492 (98.5%)	23 (1.5%)
2013 Subyearling	LFH	ADCWT	636737	1,567	1,515 (96.7%)	44 (2.8%)	3 (0.2%)	5 (0.3%)
	GRR	ADCWT	636739	1,398	1,325 (94.8%)	69 (4.9%)	3 (0.2%)	1 (0.1%)

Staff PIT tagged 28,400 BY13 onstation yearlings and 20,000 BY13 onstation subyearlings for the purpose of monitoring outmigration timing, adult returns in-season, and to compare two methods (CWTs vs PIT tags) of estimating smolt-to-adult survivals (SARs). The tag lists for each release group were 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. Initial tag loss and mortalities of the yearlings could not be collected and scanned for PIT tags, as the fish were diverted directly into the earthen rearing pond where they remained until release. After release, the pond and outlet structure were scanned for shed tags or tags from mortalities. A total of 133 shed tags (0.5%) from BY13 were detected, leaving an estimated 28,267 PIT tags representing the onstation yearling release.

PIT tagged BY13 onstation subyearlings were returned directly to the raceways following PIT tagging. Tagging events resulted in 70 mortalities (0.3%), of which 35 PIT tags were reinserted prior to release, leaving an estimated 19,969 PIT tags representing the onstation subyearling release.

Subyearling fall Chinook salmon at Irrigon Fish Hatchery were also PIT tagged for outmigration timing. Tagging events resulted in 2 mortalities (0.1%) of which those PIT tags were reinserted prior to release, leaving an estimated 3,000 PIT tags representing the subyearling release into the Grande Ronde River.

Juvenile Releases

Brood year 2013

Subyearling

Subyearling fall Chinook salmon at LFH were released 3 June 2014. Fish were measured and weighed and visually appeared in good condition, with no external signs of BKD, pop-eye, descaling, or sexual precocity. An estimated 209,972 fish were released as an ADCWT group. Hatchery staff conducted pound counts and calculated the release at 50.0 fish/lb (fpp). Fish used in the pound counts were set aside for SRL staff to subsample for individual lengths and weights (Table 16). Individual length/weight samples and average pound counts were very similar. The release occurred during an increasing hydrograph. Historical releases (2009 to present) of subyearlings by WDFW, NPT, and IPC are provided in Appendix K.

Subyearling fall Chinook reared at Irrigon FH were released into the Grande Ronde River on 21 May 2014, a couple weeks earlier than programmed due to forecasted low flows. An estimated 202,128 fish were released as an ADCWT group and 201,798 were released as unmarked/untagged. Fish were measured, 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 48.9 fpp, similar to what was calculated from individual length/weight sampling from Snake River Lab (SRL) staff. The release occurred during an increasing hydrograph.

Table 16. Length and weight data from subyearling fall Chinook (BY13) sampled by WDFW and released into the Snake and Grande Ronde rivers during 2014.

Length/weight data	Snake R at LFH	Grande Ronde R at Cougar Creek
Sample date	3 June	19 May
Number sampled	254	400
Avg. length (mm)	88	92
Median length	90	92
Range of lengths	54-116	54-108
SD of lengths	9.5	7.4
CV of length (%)	10.8	8.1
Avg. weight (g)	8.2	9.7
SD of weight	2.6	2.3
Avg. K factor	1.17	1.22
FPP	55.1	47.0

Yearling

Yearling fall Chinook salmon at LFH were released from 6 April to 8 April 2015, with peak emigration occurring on 6 and 7 April. Fish were measured, weighed, and visually appeared in good condition, with no external signs of BKD, pop-eye, descaling, or sexual precocity. Fish were well smolted, slender and very uniform in size. An estimated 227,446 fish were released from the ADCWT group, and 224,926 were released from the CWT only group. Hatchery staff used pound counts and calculated the release at 9.7 fpp. Fish used in the pound counts were set aside for SRL staff to subsample for individual lengths and weights (Table 17). Individual length/weight samples and pound count were very similar. Most of the emigration occurred prior to the morning of 7 April. The rearing lake was fully drained 8 April with the last few fish leaving the release structure that day. The release occurred during an increasing hydrograph. Historical releases from 2010 forward for yearlings by WDFW and NPT are provided in Appendix K.

Table 17. Length and weight data from yearling fall Chinook (BY13) released at LFH in 2015.

	Yearlings	
Length/weight data	**ADCWT**	**CWT only**
CWT code	636741	636740
Number sampled	200	248
Avg. length (mm)	162	164
Median length	162	163
Range of lengths	120-217	125-211
SD of length	12.7	13.0
CV of length (%)	8.3	7.9
Avg. weight (g)	47.1	48.6
SD of weight	12.7	12.4
Avg. K factor	1.08	1.08
FPP	9.6	9.3

Survival Rates to Release

The estimated number of eggs and fish present at life stages in the hatchery were used for 2009-2013 broods to calculate survival rates within the hatchery environment (Table 18). The original survival goal for the program was calculated as 80% [(9,160,000 juveniles/11,450,000 eggs) x 100] from USACOE 1975 and has been achieved annually for yearlings since 2003 and since 1990 for subyearlings (Appendix L).

Table 18. Estimated survivals (%) between various life stages at LFH for fall Chinook, 2009-2013 brood years.

Brood year	Release stage	Green egg-ponded fry	Ponded fry-release	Green egg-release
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
2011	Yearling	95.0	102.8	97.7
	Subyearling	95.0	98.5	96.4
2012	Yearling	95.9	99.9	95.8
	Subyearling	95.9	103.1	93.0
2013	Yearling	97.4	94.6	91.2
	Subyearling	97.4	102.5	94.1
	%	**95.8**	**99.5**	**95.1**
Yearling mean:	**SD**	**1.3**	**3.3**	**3.1**
	%	**95.8**	**101.1**	**94.6**
Subyearling mean:	**SD**	**1.3**	**1.8**	**1.3**

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

Migration Timing

The PTAGIS website (www.ptagis.org) was queried on 9 March 2015 for Grande Ronde River (GRR) and onstation subyearling releases and again on 28 July for onstation yearling releases. Interrogation summaries were used to populate Table 19-Table 21. Migration speed generally increased for all releases as fish moved downstream through the system (Figure 13 and Figure 14). The yearling release slowed their migration between IHR and MCN, possibly due to the low flows encountered in the Columbia River, but subsequently increased their speed through the lower Columbia River.

Table 19. Migration timing of BY13 PIT tagged subyearlings released near Cougar Creek in the GRR in 2014.

	Detection facilities						
Metric	**LGR**	**LGO[a]**	**LMO**	**IHR**	**MCN**	**JDD[a]**	**BONN[a]**
Number detected[b]	**424**	**588**	**238**	**155**	**352**	**146**	**114**
Median travel days from GRR[c]	20	21	20	24	29	31	30
Median passage date	10 Jun	11 Jun	10 Jun	14 Jun	18 Jun	21 Jun	20 Jun
First detection date	24 May	27 May	29 May	2 Jun	5 Jun	8 Jun	8 Jun
Last detection date	19 Jul	17 Jul	9 Aug	12 Aug	1 Aug	15 Aug	31 Jul
10% of run passage date	29 May	1 Jun	2 Jun	6 Jun	11 Jun	10 Jun	12 Jun
90% of run passage date	21 Jun	19 Jun	27 Jun	22 Jun	4 Jul	5 Jul	3 Jul
TDG on median date of passage (%)[d]	111.0	113.3	114.4	114.0	117.5	112.6	114.6
Outflow on median date of passage (kcfs)[d]	98.7	91.0	92.5	80.1	259.3	264.7	245.9
Spill on median date of passage (kcfs)[d]	20.3	27.3	23.9	24.3	129.7	84.1	100.3

[a] LGO=Little Goose Dam, JDD= John Day Dam, BONN= Bonneville Dam
[b] Numbers of fish detected from the tailrace of each dam..
[c] Travel days are from the date of release.
[d] TDG, outflow and spill for BONN are detected six miles downstream at Warrendale.

Table 20. Migration timing of BY13 PIT tagged subyearlings released at LFH in 2014.

Metric	Detection facilities				
	LMO	**IHR**	**MCN**	**JDD**	**BONN**
Number detected[a]	**1,236**	**862**	**2,184**	**1,128**	**738**
Median travel days from LFH[b]	7	14	18	22	23
Median passage date	10 Jun	17 Jun	21 Jun	25 Jun	26 Jun
First detection date	4 Jun	5 Jun	7 Jun	12 Jun	14 Jun
Last detection date	27 Jul	19 Jul	21 Jul	3 Aug	25 Jul
10% of run passage date	4 Jun	10 Jun	15 Jun	19 Jun	18 Jun
90% of run passage date	18 Jun	25 Jun	3 Jul	4 Jul	8 Jul
TDG on median date of passage (%)[c]	114.4	114.3	117.9	115.6	115.4
Outflow on median date of passage (kcfs)[c]	92.5	76.1	265.3	281.3	266.8
Spill on median date of passage (kcfs)[c]	23.9	32.2	133.1	89.0	90.9

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

Table 21. Migration timing of BY13 PIT tagged yearlings released at LFH in 2015.

Metric	Detection facilities				
	LMO	**IHR**	**MCN**	**JDD**	**BONN**
Number detected[a]	**570**	**1,032**	**2,261**	**1,776**	**1,867**
Median travel days from LFH[b]	13	7	18	20	24
Median passage date	19 Apr	13 Apr	24 Apr	26 Apr	30 Apr
First detection date	7 Apr	9 Apr	11 Apr	13 Apr	16 Apr
Last detection date	16 May	9 May	20 May	15 Jul	2 Jun
10% of run passage date	9 Apr	11 Apr	16 Apr	22 Apr	25 Apr
90% of run passage date	24 Apr	20 Apr	29 Apr	5 May	5 May
TDG on median date of passage (%)[c]	118.4	111.9	115.3	113.0	117.0
Outflow on median date of passage (kcfs)[c]	44.4	40.4	159.8	156.3	146.5
Spill on median date of passage (kcfs)[c]	29.4	12.4	63.9	46.9	99.2

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

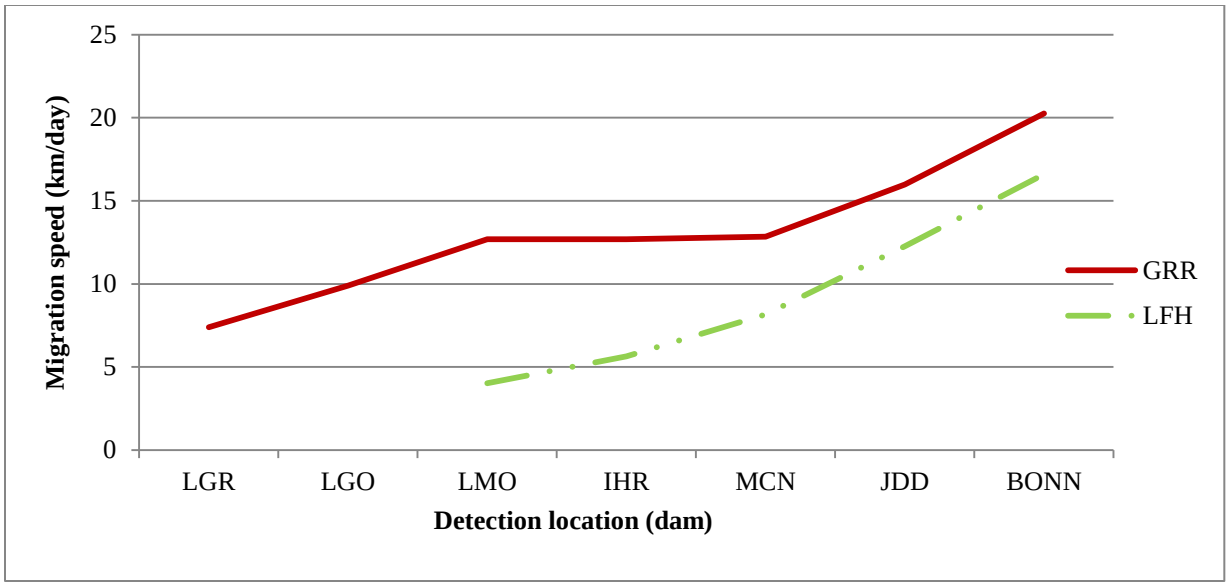


Figure 13. Migration speed of BY13 LFH and GRR subyearling fall Chinook as they passed Snake and Columbia River dams in 2014.

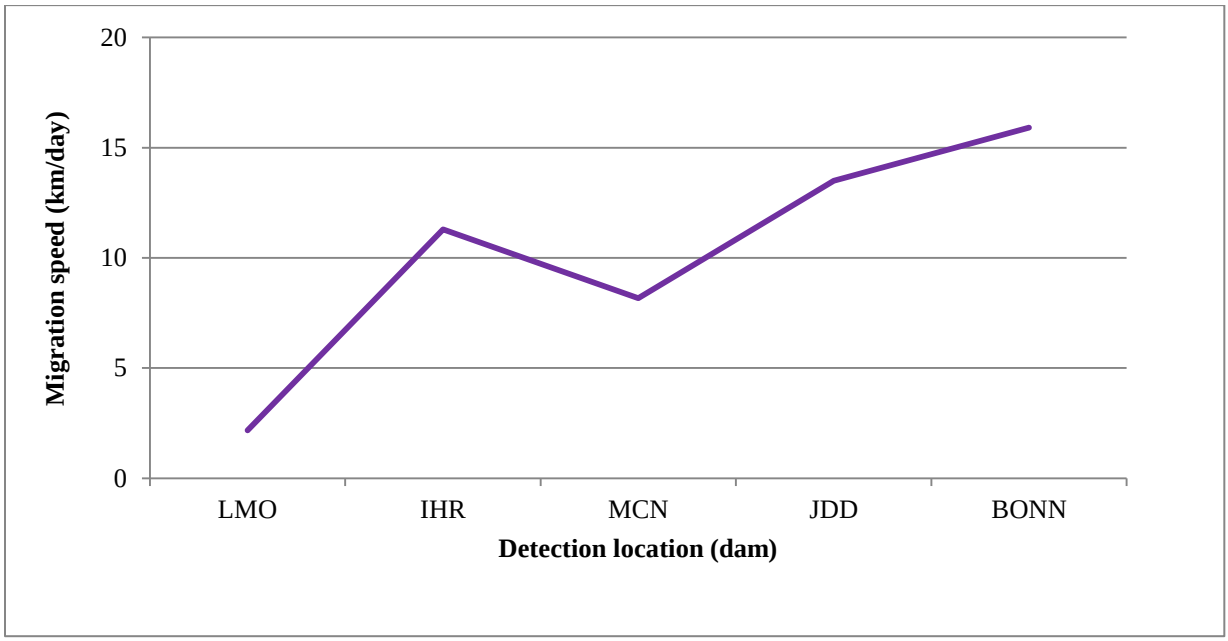


Figure 14. Migration speed of BY13 LFH yearling fall Chinook as they passed Snake and Columbia River dams in 2015.

Adult Progeny to Parent Ratio

We are unable to estimate the adult progeny to parent ratio because we are currently unable to positively identify untagged hatchery returns. This was the fourth year samples for PBT of broodstock were collected at LFH. PBT samples were collected by WDFW staff and fin clips were placed on Whatman paper and identified with a unique fish identification number. Samples were shipped to the genetics lab run by Columbia Intertribal Fish Commission for profiling. Combining data from PBT samples of broodstock at NPTH and LFH will result in the ability to identify all inbasin hatchery releases at return. In 2016, 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 inbasin hatchery returns. Unfortunately, the analysis will not be completed before the run reconstruction estimates are submitted to the Technical Advisory Committee (TAC) for run forecasting. While it is possible to get the PBT samples analyzed by the January 31 deadline, there are no funds in place to increase staffing to do so at this time.

Tucannon River Natural Production 2014

Adult Salmon Surveys

Fall Chinook Redd Surveys

WDFW personnel have conducted spawning ground surveys for fall Chinook salmon on the lower Tucannon River since 1985 (Appendix M). Survey sections in 2014 covered the river from river kilometer (rkm) 1.1-33.6. 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 2014, landowner access restrictions prevented the surveying of 1.5 kilometers of river above the Starbuck Bridge within survey sections 5 and 6. Regular weekly surveys began the week of 26 October and continued until week of 14 December.

An estimated 303 fall Chinook and 39 coho redds were constructed in the Tucannon River during 2014. A total of 303 redds (from all species) were counted in the Tucannon River (Table 22) and we estimate an additional 39 redds occurred in sections of river not surveyed due to access restrictions from landowners . Redds built in inaccessible sections were estimated by calculating redds/km in an adjacent surveyed section and applying it to the non-surveyed area.

Table 22. Date and number of redds and carcasses counted on the Tucannon River in 2014.

	Total redds [a]	Carcasses sampled	
Week beginning	**Chinook & Coho [b]**	**Chinook**	**Coho**
26 Oct	67	4	1
2 Nov	69	8	2
9 Nov	11	3	2
16 Nov	82	21	4
23 Nov	43	19	1
30 Nov	no data	no data	no data
7 Dec	18	48	1
14 Dec	13	20	0
Totals	**303**	**123**	**11**

[a] Observed redds not expanded for sections with access restrictions.
[b] Chinook & Coho redd data estimated through visual counts were combined.
[c] High flows and low visibility prevented surveys from being completed this week.

Escapement and Composition of the Fall Chinook Run in the Tucannon River

The total escapement to the Tucannon River was calculated using an expansion factor of three fish/redd, based on a 1.9 male/female sex ratio including jacks and jills, as estimated in the run reconstruction at LGR. We believe this expansion factor provides a conservative estimate of fish spawning in the Tucannon River. Based on that expansion, an estimated that 909 fall Chinook and 116 coho salmon escaped to the Tucannon River (Table 23). We recovered 123 fall Chinook salmon carcasses equating to 13.6% of the estimated total spawning escapement to the Tucannon River. Coho salmon were also identified on the Tucannon River and associated tables can be found in Appendix M.

Table 23. Estimated escapement, redd construction, and resulting estimates of smolts/redd and total number of emigrants from fall Chinook spawning in the Tucannon River, 2001-2014.[a]

			Redd construction[a]			Success of spawning		
Brood year	Estimated escapement [b]	% Strays in carcasses sampled	# Redds observed	# Redds in no access areas (est.)	Total # of redds (est.)	Estimated smolts/redd [c]	Total # estimated emigrants [d]	Adult progeny to escapement ratio
2001	219	14.9	65	8	73	336	24,545	0.63
2002	630	35.1	183	27	210	81	17,030	0.05
2003	474	65.8	143	15	158	460	72,656	0.04
2004	345	29.4	111	4	115	631	72,655	0.03
2005	198	60.0	61	5	66	320	21,170	0.17
2006 [e]	460	9.7	127	26	153	289	44,296	0.04
2007	326	7.0	93	16	109	unknown[f]	unknown[f]	0.53
2008	763	16.5	209	45	254	20	5,030	0.03
2009[g]	756	10.7	217	35	252	147	36,991	0.35
2010	972	27.0	281	43	324	76	24,315	0.13
2011	906	4.2	278	24	302	67	20,331	0.20[h]
2012	1,623	4.9	256	285[i]	541	231	124,951	0.03[j]
2013	1,158	8.5	261	125[i]	386	24	9,262	0.01[k]
2014	909	10.6	265	38	303	514	155,791	Pending

[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] These estimates were derived using three fish per redd and no adjustments were made for super imposition of redds.
[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.
[h] Estimate through age 4 returns.
[i] Adjustment includes estimates for weeks not walked due to temperature and water conditions.
[j] Estimate through age 3 returns
[k] Estimate through age 2 returns

The methodology used to estimate run composition of fall Chinook in the Tucannon River was modified in 2012 to account for carcass recovery bias. Generally, more recoveries of females occur than males, primarily because females remain in the vicinity of redds when they die. The numbers of females in the composition were expanded to match the estimated number of redds, presuming 1 redd/female. The remainder of the run composition was based on the origins of males collected. CWT and scale analysis were used to determine the origin and age of each carcass**.** Compositions of recovered carcasses are presented in Table 24-Table 26.

Females represented 65.0% of the recoveries; primarily adult 2-salt and 3-salt fish. Tissue samples (fin clips or skin samples from the head) were collected and archived from 116 fall Chinook (genetic sample numbers 14NY1, 14NY2, 14NY4-14NY7, 14NY9-14NY35, 14NY37-14NY119).

Table 24. Composition of wire tagged carcasses recovered and estimated run composition of fall Chinook on the Tucannon River, 2014.

				Raw totals			Expanded to the run			
	Clip	CWT origin	CWT	F	M ≥53cm	M <53cm	F	M ≥53cm	M <53cm	Total
Inbasin wire fish	**AD**	LF09YO	635564	1	0	0	3.8	0.0	0.0	3.8
		LF10SO	635998	1	0	0	3.8	0.0	0.0	3.8
		LF10SGRRD	635999	1	0	0	3.8	0.0	0.0	3.8
		LF10YO	636080	13	2	0	60.6	42.3	0.0	102.9
		LF11SO	636417	1	2	0	3.8	28.2	0.0	32.0
		LF11YO	636443	3	0	0	11.4	0.0	0.0	11.4
		LF11YO	636444	5	5	0	18.9	84.6	0.0	103.5
		LF12SO	636574	0	0	1	0.0	0.0	14.1	14.1
	NO	LF09YO	635510	1	0	0	3.8	0.0	0.0	3.8
		LF10YO	636079	12	7	0	45.5	112.7	0.0	158.2
		LF10YO	636080	5	2	0	18.9	28.2	0.0	47.1
		LF11YO	636443	9	2	1	37.9	28.2	14.1	80.2
		LF11YO	636444	0	1	0	0.0	28.2	0.0	28.2
		LF10YCJA	220320	1	0	0	3.8	0.0	0.0	3.8
Out-of-basin wire fish	AD	UMA10SUMA	090433	1	0	0	3.8	0.0	0.0	3.8
		UMA10SUMA	090435	4	0	0	15.2	0.0	0.0	15.2
		BONN10YUMA	090490	0	2	0	0.0	28.2	0.0	28.2
		BONN10YUMA	090492	2	1	0	7.6	14.1	0.0	21.7
	NO	UMA10SUMA	090436	1	0	0	3.8	0.0	0.0	3.8
		BONN10YUMA	090493	0	1	0	0.0	14.1	0.0	14.1
		BONN11YUMA	090658	0	1	0	0.0	14.1	0.0	14.1
Unknown	AD	Unknown	Lost tag	3	2	0				
	NO	Unknown	Lost tag	1	2	0				
Totals				**65**	**30**	**2**	**246.2**	**422.8**	**28.2**	**697.2**

Table 25. Composition of untagged carcasses recovered and estimated run composition of fall Chinook on the Tucannon River, 2014.

Origin	Clip	European age	Raw totals F	Raw totals M ≥53cm	Raw totals M <53cm	Expanded to the run F	Expanded to the run M ≥53cm	Expanded to the run M <53cm	Total
Hatchery	AD	1.1	1	0	0	3.8	0.0	0.0	3.8
		1.2	0	1	0	0.0	14.1	0.0	14.1
		Unknown	1	3	0	3.8	42.3	0.0	46.1
	NO	1.2	2	0	0	7.6	0.0	0.0	7.6
Unknown	NO	0.2	1	1	0	3.8	14.1	0.0	17.9
		0.4	1	0	0	3.8	0.0	0.0	3.8
		Unknown	8	6	0	30.3	84.6	0.0	114.9
	Unknown	Unknown	1	0	0	3.8	0.0	0.0	3.8
Totals			**15**	**11**	**0**	**56.8**	**155.0**	**0.0**	**211.8**

Table 26. Estimated composition of the fall Chinook run to the Tucannon River by salt water age and origin, 2014.

Origin	0 salt Minijack	1 salt True jack	1 salt True jill	2+ salt Adult F	2+ salt Adult M	Total	% of return
Snake River hatchery (wire)	0.0	169.1	68.2	147.7	211.4	596.4	65.6%
Presumed Snake River hatchery (AD clip or yearling scales)	0.0	0.0	7.6	26.5	56.4	90.5	10.0%
Out-of-basin hatchery (wire)	0.0	14.1	0.0	30.3	56.4	100.8	11.1%
Unknown origin	0.0	0.0	0.0	22.7	98.7	121.4	13.4%
Totals	**0.0**	**183.2**	**75.8**	**227.3**	**422.8**	**909**	**100.0%**
% of return	**0.0%**	**20.2%**	**8.3%**	**25.0%**	**46.5%**		

Juvenile Salmon Emigration

Fall Chinook

Juvenile fall Chinook (BY13) were observed at the Tucannon River smolt trap (rkm 3.0) from 21 January through 1 July 2014 (Figure 15). The last day of trapping before the trap was pulled for the season was 11 July (Gallinat and Ross 2015). Trapping efficiency for fall Chinook ranged from 0.0% to 34.6% (Table 27). Median passage date for fall Chinook was 30 May, approximately 2 weeks earlier than was observed in 2013. Staff captured 1,090 fall Chinook and estimate that 7,548 (95% C.I. = 5,907-10,325) naturally produced fall Chinook parr and smolts passed the smolt trap during 2014. Based on 314 redds estimated above the smolt trap during 2013, an estimated 24 smolts/redd were produced. After including potential production from redds below the smolt trap in 2013, an estimated 9,262 naturally produced fall Chinook parr and smolts left the Tucannon during 2014.

Staff PIT tagged 575 naturally produced fall Chinook at the smolt trap from 5 May through 1 July 2014 to monitor the outmigration. Lengths ranged from 65-100 mm with a mean of 77 mm and median of 76 mm. Migration timing and average speed of migration of naturally produced fall Chinook leaving the Tucannon River to the Snake and Columbia river dams are presented in Table 28 and Figure 15. Arrival dates of juvenile natural origin fall Chinook trapped on the Tucannon River in 2014.

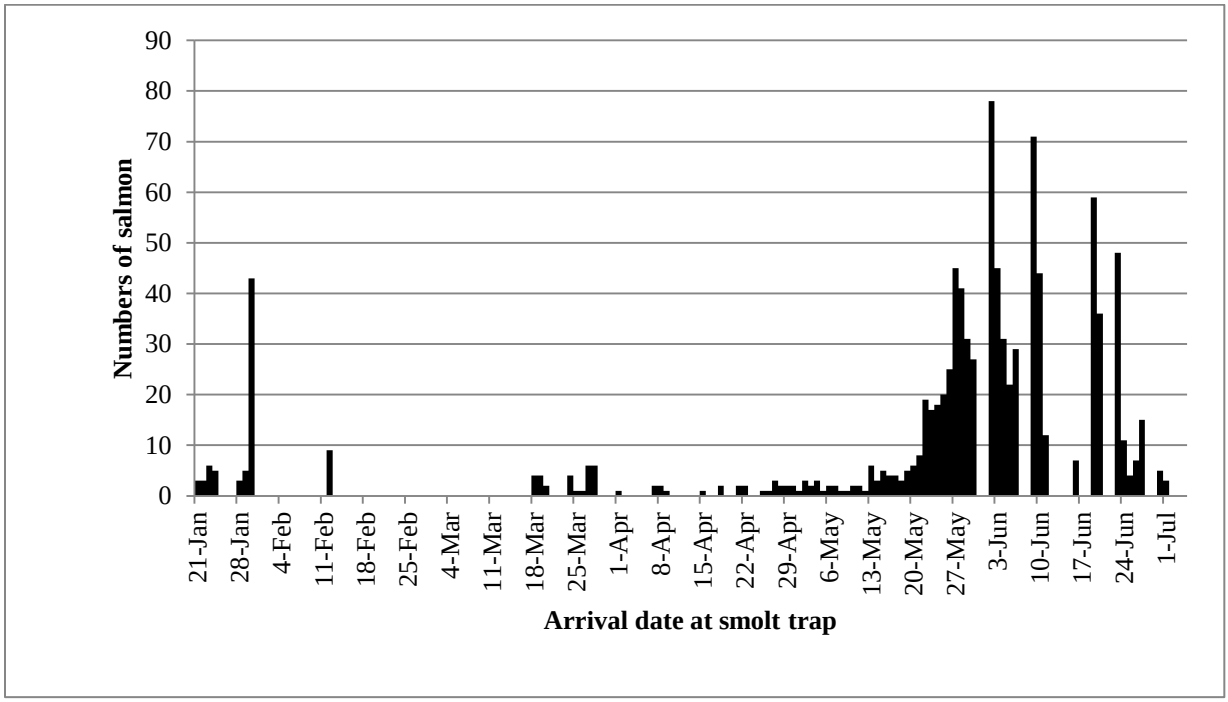


Figure 15. Arrival dates of juvenile natural origin fall Chinook trapped on the Tucannon River in 2014.

Table 27. Trapping efficiency estimates for fall Chinook and coho at the smolt trap on the Tucannon River in 2014.

Week beginning	Fall Chinook recapture efficiency	Coho recapture efficiency
13 Apr	unknown	0.0%
20 Apr	unknown	0.0%
27 Apr	unknown	16.7%
4 May	0	0.0%
11 May	26.1%	23.1%
18 May	22.4%	40.0%
25 May	34.6%	33.3%
1 Jun	20.9%	13.3%
8 Jun	5.5%	5.9%
15 Jun	9.1%	0.0%
22 Jun	7.1%	unknown
29 Jun	12.5%	unknown

Table 28. Migration timing of naturally produced fall Chinook leaving the Tucannon River in 2014.

Metrics	Detection facilities				
	LMO	ICH	MCN	JDD	BONN[a]
Number detected	72	35	76	34	19
Median travel days from TUC[b]	4	10	21	26	30
Rate of travel (km/day) from TUC to dam	9.2	8.8	7.4	10.7	13.0
Median passage date	11-Jun	17-Jun	2-Jul	7-Jul	9-Jul
First detection date	17-May	20-May	31-May	29-May	31-May
Last detection date	20-Jul	12-Jul	29-Jul	2-Aug	29-Jul
10% of run passage date	24-May	24-May	12-Jun	7-Jun	6-Jun
90% of run passage date	27-Jun	29-Jun	17-Jul	18-Jul	18-Jul
TDG on median date of passage (%)[c]	115.7	114.3	118.6	112.9	114.9
Outflow on median date of passage (kcfs)[c]	91.7	76.1	288.0	244.6	229.8
Spill on median date of passage (kcfs)[c]	23.8	32.2	144.1	77.4	95.1

[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.

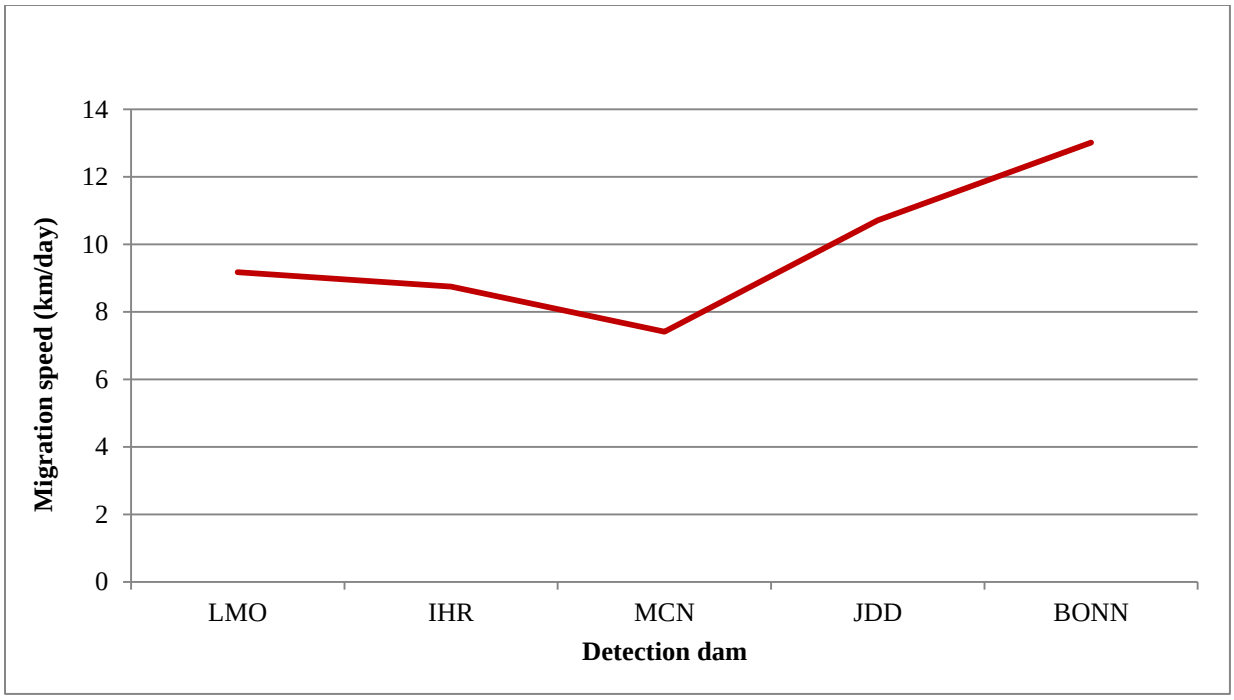


Figure 16. Migration speed of BY13 Tucannon River naturally produced fall Chinook salmon in 2014.

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

Chinook were counted 24 hours per day 15 June through 30 September and 16 hours per day from 1 October through 31 December at the counting window at LGR (U.S. Army Corps of Engineers, 2014). Window counts (day and night) estimated 80,494 fall Chinook (≥ 30 cm fork length) reached LGR in 2014 (Figure 17), which includes 19,807 "jacks" by size (30 cm-52 cm fork length). Chinook passing LGR after 17 August are designated as fall Chinook based on arrival date, which underestimated the fall Chinook return by 0.7%, based on PIT tag data in 2014 as downloaded from http://www.cbr.washington.edu/dart. In addition, fish counts do not include fish less than 30 cm in fork length or adjust for fish that crossed the dam and fell back through the juvenile bypass system, spillway, turbines, or locks, some of which may have reascended the ladder and were double counted.

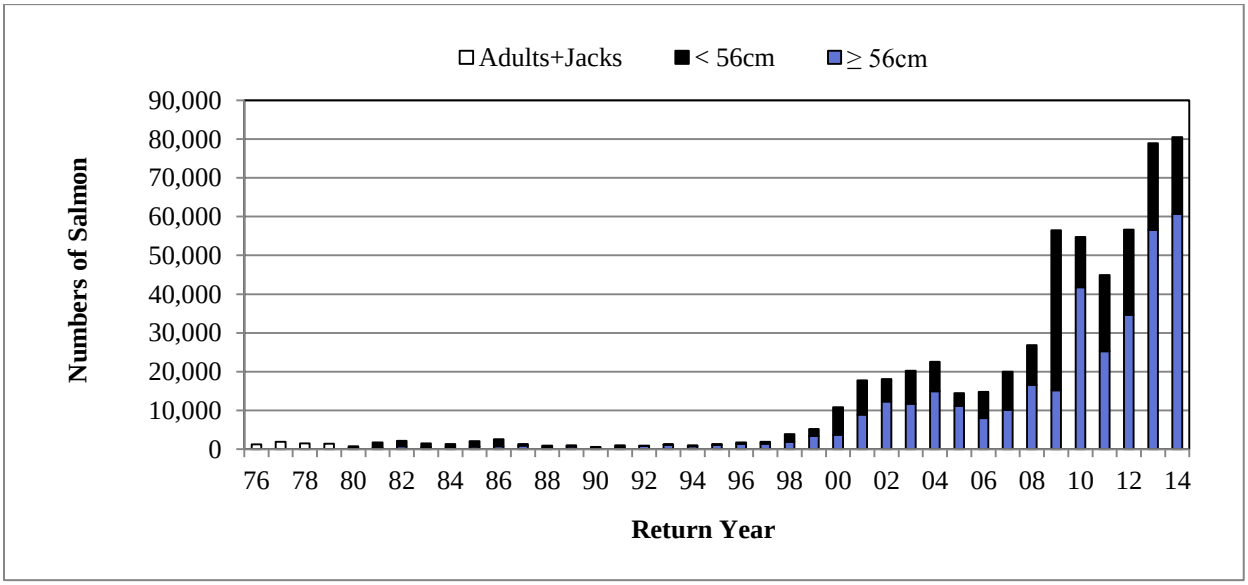


Figure 17. Fall Chinook window counts at LGR, 1976-2014.

The fall Chinook run reconstruction team estimated 73,464 fall Chinook (24.3% wild, 74.1% inbasin hatchery, and 1.7% out of basin hatchery) reached LGR in 2014 (Table 29), after accounting for reascension and fallback. The final run estimate to LGR was 8% less than window count estimates documented at www.fpc.org. The fall Chinook run reconstruction technical team consists of staff from NPT, WDFW, IPC, NOAA, and the Columbia River Inter-Tribal Fish Commission (CRITFC). The estimates were bootstrapped by Ben Sandford of NOAA and confidence intervals were derived for the dataset. Females, regardless of size, were summarized together and males were summarized according to fork length (30 cm - <53 cm and ≥ 53 cm). Data was grouped by total age as requested by TAC. The data does not specifically show true jacks because age 2 fish consist of minijacks (0-salt yearlings) and jacks (1-salt subyearlings) and age 3 fish consist of jacks (1-salt yearlings) and adults (2-salt subyearlings).

Table 29. Estimated composition, standard errors, and confidence intervals for fall Chinook reaching LGR during 2014.

Estimates					Bootstrap standard error					Bootstrap 95% Confidence Interval Upper CI, Lower CI				
Total Run by Origin														
Origin	**F**	**M ≥53cm**	**M <53 cm**	**Total ≥53cm**	**Origin**	**F**	**M ≥53 cm**	**M <53 cm**	**Total ≥53cm**	**Origin**	**F**	**M ≥ 53cm**	**M <53 cm**	**Total ≥53 cm**
total wild	6935	6933	3934	13886	total wild	455	704	521	830	total wild	6028, 7838	5455, 8248	2975, 5052	12165, 15515
total hatchery	18743	26874	10028	45617	total hatchery	491	708	526	805	total hatchery	17777, 19703	25532, 28389	8976, 11081	44062, 47269
Totals	25696	33807	13962	59503	Totals	403	405	329	329	Totals	24859, 26430	33013, 34555	13321, 14643	58853, 60129
Run by origin and age														
Origin	**F**	**M ≥53cm**	**M <53 cm**	**Total ≥53cm**	**Origin**	**F**	**M ≥53cm**	**M <53cm**	**Total ≥53cm**	**Origin**	**F**	**M ≥53cm**	**M <53 cm**	**Total ≥53 cm**
wild age 2	6	221	3617	227	wild age 2	11	220	515	220	wild age 2	-7, 35	-243, 614	2635, 4712	-235, 627
wild age 3	727	3321	317	4048	wild age 3	238	645	141	687	wild age 3	259, 1157	1884, 4471	45, 591	2583, 5234
wild age 4	5476	3133	0	8609	wild age 4	406	378	0	554	wild age 4	4732, 6320	2372, 3888	0, 0	7532, 9741
wild age 5	744	257	0	1002	wild age 5	132	93	0	160	wild age 5	495, 1008	69, 428	0, 0	677, 1328
Hat age 2	41	896	8735	937	Hat age 2	27	233	564	235	Hat age 2	0, 81	441, 1365	7588, 9793	470, 1389
Hat age 3	1947	14092	1293	16039	Hat age 3	279	847	243	884	Hat age 3	1415, 2500	12607, 16024	858, 1845	14440, 17993
Hat age 4	15112	11090	0	26202	Hat age 4	516	617	0	794	Hat age 4	14035, 16027	9791, 12306	0, 0	24601, 27749
Hat age 5	919	293	0	1213	Hat age 5	149	119	0	191	Hat age 5	625, 1219	71, 543	0, 0	813, 1564
stray age 3	72	29	0	101	stray age 3	69	32	0	76	stray age 3	0, 221	0, 114	0, 0	0, 281
stray age 4	566	446	0	1012	stray age 4	267	172	0	318	stray age 4	162, 1193	145, 846	0, 0	458, 1698
stray age 5	85	0	0	85	stray age 5	35	0	0	35	stray age 5	17, 155	0, 0	0, 0	17, 155
strayAWT[a]	0	28	0	28	stray AWT	0	27	0	27	stray AWT	0, 0	0, 89	0, 0	0, 89

[a] AWT refers to agency wire tag with a 09 agency code.

Fallbacks at the LGR Juvenile Collection Facility

A total of 1,183 fallback events were counted at the juvenile collection facility (Table 30) and the separator (Table 31) located below LGR. 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 turbine slot or navigation lock, but we did not estimate fallback for those routes.

Table 30. Documented fallbacks of Chinook at the LGR juvenile collection facility during 2014 by clip and wire.

Run	Clip	Wire	<30cm	30-53cm[a]	Grand total
Chinook[b]	AD	No wire	3	1	4
		Wire	1	5	6
		Unknown	11	73	84
	No clip	No wire	0	3	3
		Wire	0	6	6
		Unknown	9	61	70
Fall Chinook total			**24**	**149**	**173**

[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 summer run Chinook.

Fish encountered at the juvenile collection facility and separator were examined for size, fin clips, and operculum punches. Of the fish < 53 cm, at least 57.3% were hatchery origin, although we expect the actual number of hatchery fish was greater because unclipped fish were not scanned for wire at the separator. Likewise, at least 51.6% of the fish $\geq$ 53 cm were of hatchery origin based solely on adipose clips.

Table 31. Composition of fallbacks of Chinook at the LGR separator in 2014 by clip and length.

Clip	<53cm[a]	≥53 cm[a]	Grand total
AD Clip	138	397	535
No Clip	103	372	475
Grand Total	**241**	**769**	**1,010**

[a] Category includes males and females.

Characteristics of fall Chinook reaching LGR Dam

The following figures use data from fall Chinook handled at the LGR adult trap. These data include hatchery and natural origin fall Chinook.

Sex Ratio

The estimated 2014 return, based on run reconstruction estimates, consisted of 65.0% males, including jacks. The sex ratio of the return based on the trap sample was calculated at 1.9 males/female including jacks and jills. After removal of fish for broodstock, fish passing LGR were 66.3% males resulting in 2.0 males/female including jacks and jills.

Length Frequencies

Salmon trapped at LGR were measured and numbers of fish at each length were expanded by the trapping rate on the day they were captured to represent the overall run at that size during that day (Figure 18). Median fork length for males and females was 63 cm and 77 cm, respectively.

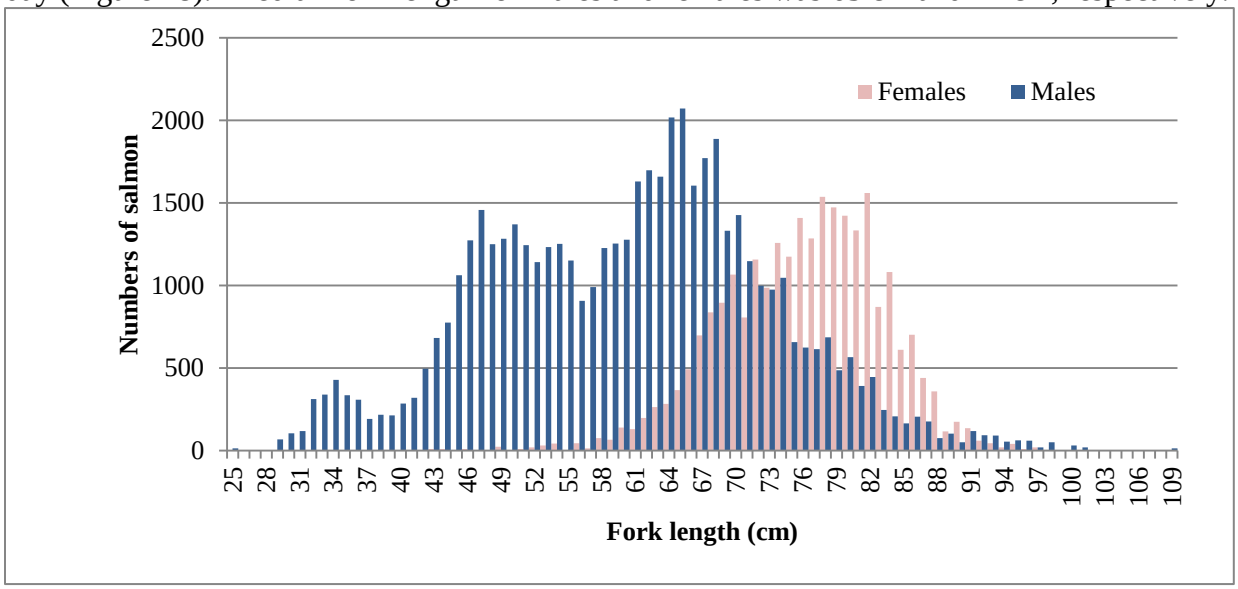


Figure 18. Estimated length frequencies of the fall Chinook run to LGR by sex in 2014.

Fallback Rates at LGR of Fish Released directly from LFH

Fallback rates for fall Chinook that are released onstation at LFH are being assessed through a fidelity and fallback radio telemetry study that is scheduled to run through 2017. Results of fallback rates for LFH onstation releases, as well as other inbasin fall Chinook, will be presented once the study is completed.

Status of Mitigation Requirements

Overall Mitigation Level

To estimate the overall mitigation return, certain caveats of the data are required. Salt water 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 and overestimate adults 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 Regional Mark Processing Center (RMPC) website ,www.rmpc.org, was queried on 16 December 2015 for the 2014 returns of CWT tagged fish associated with the LSRCP (FCAP and WDFW releases).

A minimum estimated 41,964 (45.9%) of the total LSRCP mitigation goal of 91,500 fish was achieved in 2014. An estimated 24,618 fall Chinook (adults+jacks) returned from WDFW and FCAP releases into the Snake River, and at least an additional 17,346 fall Chinook were recovered outside of the Snake River basin.

Returns to the Project Area

The LSRCP mitigation goal of 18,300 fish returning to the Snake River was exceeded in 2014 (Table 32). Combining recoveries of fish harvested below LGR, killed at LFH, the carcasses recovered on Tucannon River and the estimated run to LGR provides the best estimate of mitigation returns (tagged and untagged fish). These estimates do not include hatchery returns from the IPC and the NPTH programs.

Harvest in the Project area

In 2014, anglers in Washington were allowed a daily harvest of six adult fall Chinook and six jacks, all of which must be adipose clipped. In Idaho, anglers were allowed a daily limit of six adipose-clipped adults. There was no limit for jack retention in Idaho.

On the Snake River (Washington and Idaho combined), there were 218 recoveries reported in the Regional Mark Information System (RMIS) database from LSRCP and FCAP releases (Table 33). WDFW catch card estimates indicate 911 fall Chinook were harvested in the Snake River basin in 2014, although expanded estimates by tag code were not available when this report was finalized. IDFG did not report expanded harvest and Tribal harvest was not reported at all.

Table 32. Estimated returns of LSRCP (WDFW and FCAP) fall Chinook to the Snake River and levels of mitigation goals met in 2014.

	Saltwater age								% of LSRCP goal to the Snake River
	0-salt	1-salt			2-5 salt				
Location	Mini-jack[a]	Jack[b]	Jill[c]	Unknown sex	Adult F	Adult M	Unknown sex	Total (A+J)	
Harvested FCH below LGR[d]	1	0	0	2	0	0	2	4	0.0
Carcasses recovered in the Tucannon R.	0	169	76	0	174	268	0	687	3.8
Run to LGR[e] (wire+nowire)	2,615	6,755	122	0	7,373	9,677	0	23,927	130.7
Total	**2,616**	**6,924**	**198**	**2**	**7,547**	**9,945**	**2**	**24,618**	**162.1**

[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 includes recoveries of fish released by WDFW and FCAP.
[e] Estimated run to LGR for LSRCP (includes surrogates part of the transportation study) and FCAP releases and includes fish hauled to LFH and NPTH for processing as well as fish released from the dam.

Table 33. Unexpanded Snake River basin recoveries in 2014 of wire tagged fall Chinook released by WDFW as reported to RMIS. Estimates include LSRCP and FCAP releases.

Freshwater sport location		0-salt Minijack	1-salt	2+salt	Total OBSD	% Catch by location
Below LGR	Snake R Mouth-IHR	0	0	0	0	0.0
	Snake R IHR-LMO	1	0	0	1	0.5
	Snake R LMO-LGO	0	1	0	1	0.5
	Snake R LGO -LGR	0	1	2	3	1.4
Above LGR	Snake R basin above LGR	10	83	120	213	97.7
Totals		**11**	**85**	**122**	**218**	

Recoveries Outside of the Snake River Basin

Approximately 17,346 (24 %) of the 73,200 fish harvest goal was met through returns from LSRCP and FCAP releases in 2014. An estimated 10,842 salmon (15% of the harvest goal) were harvested outside of the Snake River Basin from WDFW releases (onstation at LFH, CCD, and GRR) after expanding for sampling methodologies reported and including associated untagged fish estimated in catches (fully expanded estimates). An additional 6,504 CWT tagged fish (adults and jacks) from FCAP releases were reported to 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 2014, the RMIS database was queried on 16 December 2015 for tag codes associated with brood years 2006-2014. Estimates of harvest for fish released by WDFW are listed in Table 34 – Table 36 and do not include recoveries of fish released by the NPT (LSRCP-FCAP or NPTH programs) or ODFW or IDFG (IPC program).

Outside of the Snake River Basin, the majority (55.6 %) of recoveries reported to RMIS occurred in saltwater locations and 44.4% occurred in freshwater locations. Of the total number of fish recovered outside of the Snake River Basin, 77.4% came from commercial/tribal fisheries, 22.1 % were from sport fisheries, 0.3% were from spawning ground surveys on the Hanford reach, and 0.2% were from hatcheries. Harvest primarily occurred in the ocean off the coasts of Washington, British Columbia, and Oregon, but the single largest fishery contributor to harvest was the Zone 6 Tribal Gillnet fishery which accounted for 26.5 % of all the fish harvested in 2014.

Harvest Adjustments for Non-Selective Fisheries and Errors in Reporting Detection Method

Non-selective fisheries retain any fall Chinook captured, and include all the current commercial and tribal net fisheries. The Washington and Oregon sport fisheries in the Columbia River, and Canadian and Alaskan sport fisheries are also non-selective. The only mark selective fisheries impacting the Snake River fall Chinook is in the Snake River Basin. 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.

Proofing Data Reported to RMIS for Errors Regarding Detection Method

Since onstation yearling releases at LFH consist of two different tag codes and mark types each year, it is possible to determine if reporting agencies are accurately reporting detection methods. For instance, if a fishery is non-selective and detection method is reported as visual, it would be expected that only tag codes associated with AD clipped fish would be reported. In 2014, it is noted that the Columbia River Zone 1-5 and Zone 6 fisheries were reported incorrectly as

electronic. This type of misreporting under estimates harvest in those fisheries, because if the sampling was electronic, there would not be any expansions done for unclipped fish with a tag code. Extensive comparisons and adjustments were performed to assure fish contributing to LSRCP mitigation were accounted for. Misreporting errors were validated by looking at ocean fisheries where ADCWT groups were caught at similar rates as CWT only groups for each brood year. The error was also confirmed by comparing run reconstruction estimates by brood year, and clip. Corrections for misreporting were done using the following formula:

For each run year: Corrected CWT only harvest of tag code #1 by fishery and brood year=(ESTD harvest of ADCWT tag code #2/Total number of tag code # 2 wires released)*(Total number of tag code #1 wires released)

Next, the total number of CWTs were expanded to include untagged fish using the methods described in the following sections for non-selective fisheries.

Expansions to Account for Untagged Fish Harvested in Non-Selective Fisheries

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 harvest 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 tag code recovered was from a release of fish that had ADCWT, CWT only, AD only, and unmarked/untagged fish associated with a single tag code in the release, he following formula was used to expand harvest data of CWT fish to represent the total harvest:

ESTD CWTs harvested by fisheries from RMIS x (total # released that were associated with a tag code/# ADCWT in the release) = Revised ESTD total harvest

Electronic Detection Method

Electronic detection method means all fish were scanned for wire regardless of fin clip. For this detection type the following formula was used to expand the harvest data of CWT fish to estimate the total harvest:

ESTD CWTs harvested by fisheries from RMIS x (total # released that were associated with a tag code/(# ADCWT in the release + # CWT in the release) = Revised ESTD total harvest

Adjustment summary

For WDFW releases, Columbia River harvest estimated harvest was increased by a factor of 1.61, primarily because of misreporting fish as electronically detected when it appears that they were visually detected. Estimated ocean harvest was increased by a factor of 1.32, primarily due to AK and BC primarily reporting as visually detected. The overall adjustment resulted in 4,448 more fish harvested than were reported to RMIS, if only the ESTD were summed, and no expansions were made for untagged fish harvested.

Table 34. Fully expanded recovery estimates of tagged and untagged fall Chinook recovered in the Columbia River Basin (freshwater areas) during 2014 for WDFW releases. Jacks and minijacks included in the estimates.

		Yearlings			Subyearlings							Total recoveries	
		LFH			LFH		CCD		GRR				
Recovery area	Fishery/ Hatchery/ River	EST CWT	EST CWT adj [a]	Total EST wire +no wire[b]	EST CWT	EST wire + no wire	EST CWT	EST wire + no wire	EST CWT	EST wire + no wire	Total EST wire + no wire[b]	Grand Total EST CWT	Grand Total EST wire + no wire
COL R Gillnet	Zone 6 Tribal Net	1,002	1,950	1,975	303	306	284	287	150	296	889	1,738	2,865
	Zone 1-5 Non-tribal Net	299	572	579	82	83	69	69	47	93	245	496	824
COL R Sport	Zone 1-5 Sport	155	197	200	16	17	40	41	28	56	113	240	313
Commercial Seine	Zone 1-5 Commercial Seine	31	31	31	9	9	6	7	5	11	26	52	57
Estuary Sport	COL R Estuary	286	459	466	35	35	23	24	62	123	182	406	648
Freshwater	COL R-Hanford Reach	19	34	34	0		4	4	0	0	4	23	38
Sport	Cowlitz R	0	0	0	1	1	0	0	0	0	1	1	1
Hatchery	Big Creek	1	2	2	0	0	0	0	0	0	0	1	2
	Priest Rapids	0	0	0	0	0	2	2	8	16	18	10	18
	Ringold Springs	0	0	0	0	0	0	0	1	2	2	1	2
Spawning Ground	COL R-Hanford Reach	11	22	22	11	11	0	0	0	0	11	22	33
	Totals	**1,803**	**3,267**	**3,310**	**457**	**462**	**428**	**432**	**302**	**597**	**1491**	**2,990**	**4,801**

[a] Estimate adjusted for unclipped CWT fish caught in nonselective fisheries using visual detection method and electronic detections where unclipped CWT fish were not harvested at the same rate as the ADCWT fish

[b] Estimate adjusted for untagged fish caught in nonselective fisheries..

Table 35. Fully expanded recovery estimates of tagged and untagged fall Chinook in areas outside of the Snake River Basin (saltwater areas) during 2014 for WDFW releases. Jacks and minijacks are included in the estimates.

		Yearlings			Subyearlings							Total recoveries	
		LFH			LFH		CCD		GRR				
Region	Fishery	EST CWT	EST CWT adj	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	Commercial Seine	3	4	4	2	2	0	0	5	9	11	9	15
	Ocean Gillnet non-treaty	1	3	3	2	2	0	0	2	3	5	4	7
	Ocean Sport	13	25	25	3	3	3	3		0	6	19	31
	Ocean Troll - Day Boat	3	4	4	8	8	16	16		0	24	26	28
	Ocean Troll (non-treaty)	50	100	101	87	88	98	99	46	91	277	281	378
BC	Aboriginal Troll	48	91	92	15	15	23	23	12	24	62	97	153
	Ocean Sport	155	279	283	26	26	71	73	24	47	146	276	429
	Ocean Troll (non-treaty)	306	450	456	113	115	126	127	73	146	388	619	844
	Sport (private)	8	8	8	2	2	2	2		0	4	12	12
CA	Ocean Sport	9	18	18		0	0	0	2	4	4	11	22
	Ocean Troll (non-treaty)	7	15	15		0	6	6		0	6	13	20
COL	Sport (private)	75	77	78	4	5	4	4		0	9	83	87
HS	Trawl (CA/OR/WA)	395	395	401		0	0	0		0	0	395	401
OR	Hake Trawl Fishery (OR/WA		0	0		0	0	0		0	0		0
	Ocean Sport	108	108	109	7	7	4	4	4	8	19	123	128
	Ocean Troll (non-treaty)	811	812	823	62	62	72	73	87	173	308	1,032	1,132
WA	Estuary Sport	13	13	13		0	0	0	4	8	8	17	21
	Ocean Sport	0	0	0		0	0	0		0	0	0	0
	Ocean Troll (non-treaty)	411	411	416	50	50	31	32	17	34	116	509	531
	Sport (charter)	232	232	235	11	11	14	14	20	39	64	277	300
	Sport (jetty)	4	4	4		0	0	0		0	0	4	4
	Sport (private)	280	280	284	18	18	12	12	23	45	75	332	359
	Treaty Troll	888	888	899	56	57	53	54	50	99	210	1,047	1,109
	Totals	**5,622**	**7,483**	**7,581**	**922**	**932**	**963**	**973**	**670**	**1,327**	**3,232**	**8,177**	**10,814**

Table 36. Fully expanded recovery estimates (tagged and untagged) of 2014 returns by region, rear type, and release location for fall Chinook released by WDFW. Jacks and minijacks are included in the estimates.

	Yearlings		Subyearlings								Yearlings and Subyearlings combined	
	LFH		LFH		CCD		GRR		Total subyearlings			
Region	ESTD wire +no wire	Recovery comp %	ESTD wire +no wire	Recovery comp by region %	ESTD wire +no wire	Recovery comp by region %	ESTD wire +no wire	Recovery comp by region %	ESTD wire +no wire	Recovery comp by region %	ESTD wire +no wire	Recovery comp by region %
COL R.(freshwater)	3,310	44%	462	50%	432	44%	597	45%	1,491	46%	4,801	44%
AK	137	2%	102	11%	118	12%	103	8%	323	10%	460	4%
BC	839	11%	158	17%	225	23%	216	16%	599	19%	1,438	13%
CA	33	0%	0	0%	6	1%	4	0%	9	0%	42	0%
COL R (marine)	78	1%	5	0%	4	0%	0	0%	9	0%	87	1%
HS	401	5%	0	0%	0	0%	0	0%	0	0%	401	4%
OR	932	12%	70	7%	77	8%	181	14%	328	10%	1260	12%
WA	1,851	24%	136	15%	111	11%	226	17%	473	15%	2,324	21%
Total recoveries	**7,581**		**932**		**973**		**1,327**		**3,232**		**10,814**	
Recoveries by rear type	**70%**								**30%**			

Total Age of Yearling and Subyearlings Recovered Outside of the Snake River Basin

The Columbia River was the primary area fish were recovered outside of the Snake River for both yearling and subyearling production groups (Table 37-Table 40). Fish from ADCWT yearling production and ADCWT subyearling production released into the Snake River at LFH and CCD were primarily recovered as age 4 fish and subyearlings released into the GRR were recovered as age 3 fish. Adjustments were not made to the original data presented by RMIS as ESTD in the tables below and do not include untagged fish.

Table 37. Final locations of ADCWT yearling fall Chinook released onstation at LFH to areas outside of the Snake River basin in 2014 by total age, based on estimated recoveries reported to RMIS as of 12/16/15.

Brood year:	**2011**	**2010**	**2009**	**2008**		**Non-Snake R.**
Total age:	**3 (Jack)**	**4**	**5**	**6**		**recovery**
Tag code:	**636444**	**636080**	**635564**	**635166**		**location**
ADCWT at release:	**240,413**	**246,918**	**226,621**	**250,814**	**A+J**	**comp**
Total released (wires+nowire):	**243,649**	**249,062**	**227,391**	**254,203**	**Totals**	**%**
AK	4	38	25	1	69	2%
BC	37	339	35		411	11%
CA		15	2		17	0%
COL	399	1,213	116		1,728	46%
HS		132			132	4%
OR	15	390	23		427	11%
WA	118	757	72		946	25%
Grand Total	573	2,883	273	1	3730	
Percent of release recovered out-of-basin	**15%**	**77%**	**7%**	**0%**		

Table 38. Final locations of ADCWT subyearling fall Chinook released onstation at LFH to areas outside of the Snake River Basin in 2014 by total age, based on estimated recoveries reported to RMIS as of 12/16/15.

Brood year:	**2012**	**2011**	**2010**	**2009**		**Non-Snake R.**
Total age:	**2 (Jack)**	**3**	**4**	**5**		**recovery**
Tag code:	**636574**	**636417**	**635998**	**635180**		**location**
ADCWT at release:	**210,494**	**198,228**	**200502**	**198,457**	**A+J**	**comp**
Total released (wires+nowire):	**211,599**	**200,900**	**202,200**	**202,328**	**Totals**	**%**
AK		12	89		101	11%
BC		39	114	4	156	17%
COL	34	137	272	19	461	50%
OR		28	41		69	7%
WA		52	80	3	135	15%
Grand Total	34	266	596	26	922	
Percent of recoveries out-of-basin	**4%**	**29%**	**65%**	**3%**		

Table 39. Final locations of ADCWT subyearling fall Chinook released into the Snake River near Couse Creek to areas outside of the Snake River Basin in 2014 by total age, based on estimated recoveries reported to RMIS as of 12/16/15.

Brood year:	2012	2011	2010	2009		Non-Snake R.
Total age:	2 (Jack)	3	4	5		recovery
Tag code:	636575	636418	635997	635181		location
ADCWT at release:	202,159	194,955	200,945	199,326	A+J	comp
Total released (wires+nowire):	205,300	199,300	202,300	203,162	Totals	%
AK			113	4	117	12%
BC		54	153	16	223	23%
CA			6		6	1%
COL	26	91	302	13	432	45%
OR		7	67	2	76	8%
WA	2	36	68	4	110	11%
Grand Total	28	187	709	38	963	
Percent of recoveries out-of-basin	**3%**	**19%**	**74%**	**4%**		

Table 40. Final locations of ADCWT subyearling fall Chinook released into the Grande Ronde to areas outside of the Snake River Basin in 2014 by total age, based on estimated recoveries reported to RMIS as of 12/16/15.

Brood year:	2012	2011	2010	2009		Non-Snake R.
Total age:	2 (Jack)	3	4	5		recovery
Tag code:	636576	636419	635999	635182		location
ADCWT at release:	216,159	192,996	199,460	197,252	A+J	comp
Total released (wires+nowire):	400,543	384,000	397,428	386,840	Totals	%
AK	5	30	9	9	52	8%
BC		44	46	19	109	16%
CA			2		2	0%
COL	23	164	95	20	302	45%
OR		61	27	3	91	14%
WA	4	89	15	5	114	17%
Grand Total	32	387	194	56	670	
Percent of recoveries out-of-basin	**5%**	**58%**	**29%**	**8%**		

Estimated Returns to the Snake River using PIT tags and CWTs

PIT tags were used inseason to assist with estimating returns to the Snake River and to estimate returns to areas below LGR. Over the years, broodstock trapping protocols have focused more on LGR in an effort to increase natural origin fish in broodstock, and less on trapping at LFH. With these changes, fish homing to LFH may not be fully estimated using only returns to the Tucannon River and trapping at LGR because the fish might be remaining in the reservoir waiting for entry into LFH. In addition, fish less than 30 cm FL are not counted at LGR nor are the traps equipped to contain these fish. To fully monitor returns, PIT tags will be used to assess all age classes, regardless of size.

To address these concerns, we compared two methods of estimating returns to the Snake River: 1) PIT tag detections at return and 2) estimated returns of CWT fish. PIT tag detections of our onstation releases were downloaded 1 June 2015 from www.ptagis.org. Comparisons of estimates of returns from juveniles released as yearlings are presented in Table 41 and Table 42 and Figure 19, and subyearlings are presented in Table 43 and Table 44. Data highlighted in red (CWT tables) are based on fish sampled in 2013, during the last 40% of the return due to delays at LGR caused by warm water temperatures which prevented trapping, and may therefore be biased.

By using PIT tagged returns of yearling fall Chinook released at LFH, we detected on average 2.7 times and 1.2 times greater return estimates of 0-salt and 1-salt fish, respectively. Conversely, 0.9 times less return of 2+salt fish were estimated using PIT tags compared to estimates using conventional CWT estimates when all years were combined. This is the third year of returns from the PIT tagged subyearlings released at LFH. Total survival for subyearlings using PIT tags resulted in 0.7 times less 1-salts and 2.4 times greater 2-salts than estimated by using CWTs, although there are only two years of data, since subyearlings do not return as 0-salts.

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 2014.

Brood year	0-salt	1-salt	2-salt	3-salt	4-salt	Total return to date (1-4 salts)
2006	4.0%	1.7%	0.8%	0.0%	0.0%	2.5%
	18,284	7,728	3,601	201	0	11,530
2007	0.4%	0.7%	0.3%	0.1%	0.0%	1.1%
	1,804	3,319	1,413	289	17	5,039
2008	0.6%	0.9%	0.5%	0.0%	0.0%	1.4%
	2,788	4,439	2,344	160	0	6,942
2009	0.4%	0.5%	0.4%	0.1%	-	1.0%
	2,018	2,313	1,925	543		4,781
2010	0.4%	1.3%	0.9%	-	-	2.2%
	2,102	6,321	4,532			10,853
2011	0.6%	0.9%	-	-	-	0.9%
	2,900	4,458				4,458
2012	0.5%	-	-	-	-	-
	2,684					

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 2014. Cells highlighted in red indicate possible biased data due to trapping restrictions during 2013.

Brood year	0-salt	1-salt	2-salt	3-salt	4-salt	Total return to date (1-4 salts)	Total release (wire+nowire)	Tag codes
2006	0.7%	2.2%	0.9%	0.0%	0.0%	3.1%	459,634	634092
	3,435	10,188	4,103	160	0	14,451		633987
2007	0.1%	0.5%	0.6%	0.1%	0.0%	1.2%	455,152	634680
	420	2,241	2,688	321	1	5,251		634681
2008	0.1%	0.6%	0.4%	0.1%	0.0%	1.1%	478,852	635165
	531	3,014	2,114	279	0	5,407		635166
2009	0.2%	0.5%	0.6%	0.1%-	-	1.2%	463,729	635510
	1,097	2,165	2,948	298		5,411		635564
2010	0.2%	1.0%	0.7%	-	-	1.7%	490,000	636079
	1,128	4,842	3,387-			8,229		636080
2011	0.7%	0.4%	-	-	-	0.4%	489,500	636443
	3,658	1,818				1,818		636444
2012	0.4%	-	-	-	-	-	503,273	636583
	1,922							636584

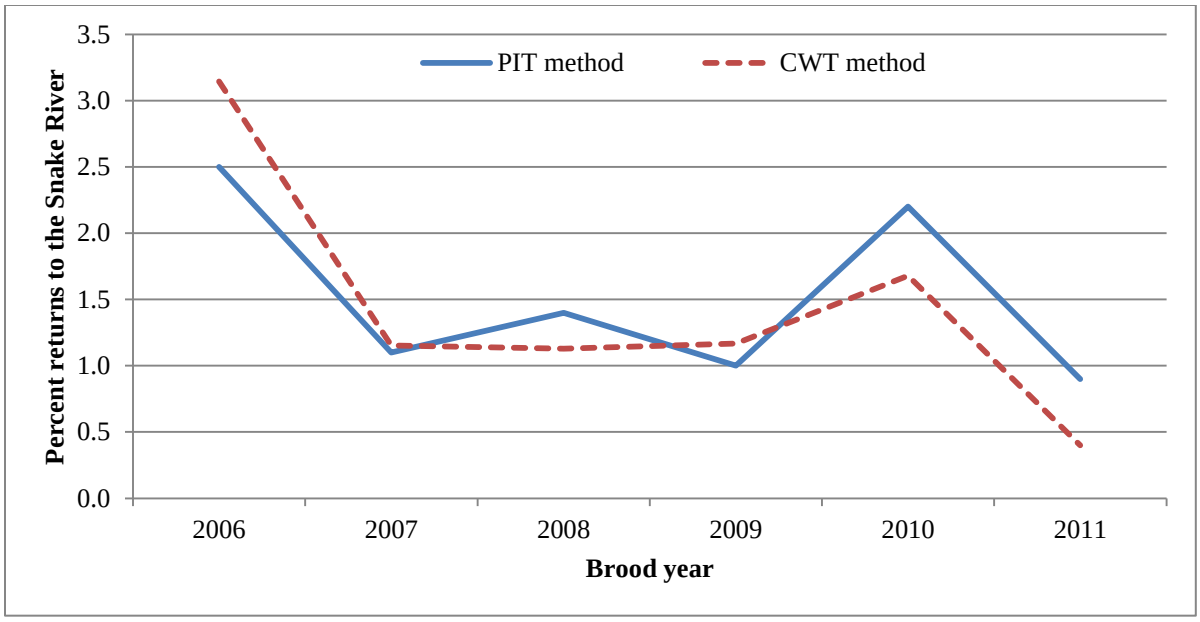


Figure 19. Percent returns of yearling releases from LFH to the Snake River using CWTs and PIT tags through return year 2014.

Table 43. Return estimates to the Snake River for subyearling fall Chinook released at LFH estimated using PIT tag detections in the Snake River through 2014.

Brood year	0-salt	1-salt	2-salt	3-salt	4-salt	Total return to date (1-4 salts)
2011	0.0%	0.1%	0.3%	-	-	0.4%
	0	252	504			756
2012	0.0%	0.1%	-	-	-	0.1%
	0	278				278
2013	0.0%	-	-	-	-	-
	0					

Table 44. Return estimates to the Snake River for subyearling fall Chinook released at LFH estimated using CWT detections in the Snake River through 2014. Cells highlighted in red indicate possible biased data due to trapping restrictions during 2014.

Brood year	0-salt	1-salt	2-salt	3-salt	4-salt	Total Return to Date (1-4 salts)	Total release (wire+nowire)	Tag codes
2011	0.0%	0.1%	0.1%	-	-	0.2%		
	0	242	206			274	200,900	636417
2012	0.0%	0.2%	-	-	-	0.2%		
	0	467				467	211,599	636574
2013	0.0%	-	-	-	-	-		
	0						209,972	636737

Estimated Returns above Bonneville Dam using PIT tags and CWTs

Similar to the preceding section, the return of fall Chinook above Bonneville Dam in the Columbia and Snake rivers were estimated using PIT tags (all detections at or above Bonneville Dam) or CWTs (all recoveries above Bonneville Dam). PIT tag detections for yearlings resulted in an average 3.4 times and 1.3 times greater 0-salt and 1-salt survival estimates, and nearly equal 2+ salt survival estimates than occurred by using CWT estimation methods when all years were combined (Table 45 and Table 46, Figure 20). Total survival for subyearlings using PIT tags resulted in 0.9 times less 1-salts and 2.2 times greater 2-salts than estimated by using CWTs, although there are only two years of data to this point (Table 47 and Table 48).

Table 45. Total survival estimates of yearling fall Chinook released at LFH estimated using PIT tag detections in the Snake and Columbia rivers during 2014.

Brood year	0-salt	1-salt	2-salt	3-salt	4-salt	Total survival estimate (1-4 salts)
2006	4.8%	2.1%	1.4%	0.1%	0.0%	3.6%
	21,916	9,814	6,260	402	0	16,476
2007	0.5%	0.8%	0.6%	0.1%	0.0%	1.5%
	2,417	3,830	2,741	426	17	7,013
2008	0.7%	1.1%	0.7%	0.05%	0.0%	1.8%
	3,516	5,185	3,143	231	18	8,576
2009	0.6%	0.5%	0.8%	0.2%	-	1.5%
	2,810	2,468	3,586	916		6,970
2010	0.6%	1.6%	1.3%	-	-	2.9%
	2,840	7,848	6,502			14,350
2011	1.0%	1.0%	-	-	-	1.0%
	4,944	4,978				4,978
2012	0.8%	-	-	-	-	-
	4,069					

Table 46. Total survival estimates of yearling fall Chinook released at LFH estimated using freshwater CWT recoveries above Bonneville Dam and return estimates of live fish through 2014. Cells highlighted in red indicate possible biased data due to trapping restrictions during 2013.

Brood year	0-salt	1-salt	2-salt	3-salt	4-salt	Total survival estimate (1-4 salts)	Total release (wire+nowire)	Tag codes
2006	0.8%	2.4%	1.4%	0.1%	0.0%	3.8%	459,634	634092
	3,639	11,153	6,283	248	3	17,687		633987
2007	0.1%	0.6%	0.9%	0.1%	0.0%	1.6%	455,152	634680
	456	2,623	4,116	473	10	7,222		634681
2008	0.1%	0.7%	0.6%	0.1%	0.0%	1.4%	478,852	635165
	531	3,555	2,911	412	0	6,878		635166
2009	0.3%	0.5%	0.9%	0.1%	-	1.5%	463,729	635510
	1,167	2,299	4,066	455		6,820		635564
2010	0.2%	1.1%	1.0%	-	-	2.1%	490,000	636079
	1,149	5,317	4,862			10,179		636080
2011	0.8%	0.4%	-	-	-	0.4%	489,500	636443
	3,712	2,177				2,177		636444
2012	0.4%	-	-	-	-	-	503,273	636583
	1,922							636584

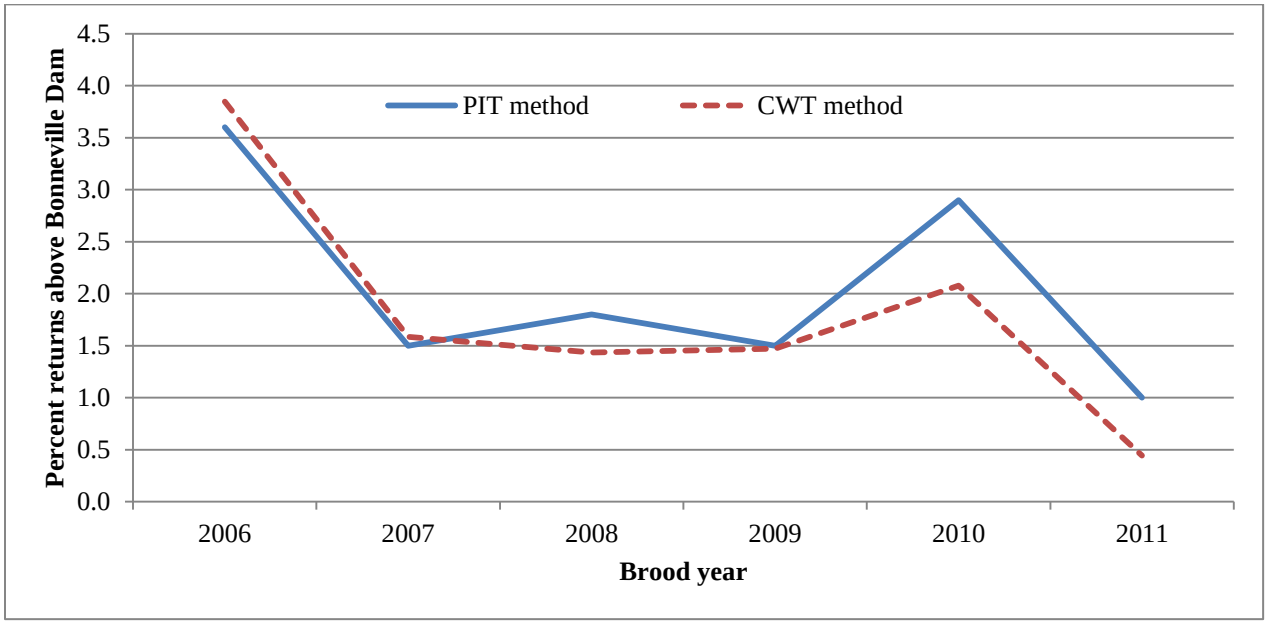


Figure 20. Percent return of yearling fall Chinook released at LFH to areas above Bonneville Dam, including the Snake River, through return year 2014.

Table 47. Total survival estimates of subyearling fall Chinook released at LFH estimated using PIT tag detections in the Snake and Columbia rivers during 2014.

Brood year	0-salt	1-salt	2-salt	3-salt	4-salt	Total survival estimate (1-4 salts)
2011	0.0%	0.2%	0.3%	-	-	0.5%
	0	322	655			977
2012	0.0%	0.2%	-	-	-	0.2%
	0	332				332
2013	0.0%	-	-	-	-	-
	0					

Table 48. Total survival estimates of subyearling fall Chinook released at LFH estimated using freshwater CWT recoveries above Bonneville Dam and return estimates of live fish through 2014. Cells highlighted in red indicate possible biased data due to trapping restrictions during 2013.

Brood year	0-salt	1-salt	2-salt	3-salt	4-salt	Total survival estimate (1-4 salts)	Total release (wire+nowire)	Tag codes
2011	0.0%	0.1%	0.2%	-	-	0.3%		
	0	251	302			554	200,900	636417
2012	0.0%	0.2%	-	-	-	0.2%		
	0	482				482	211,599	636574
2013	0.0%	-	-	-	-	-		
	0						209,972	636737

Direct Take of Listed Snake River fall Chinook Salmon During Fall of 2014 and Spring of 2015

Adult estimates for permit #16607 for LFH production and permit #16615 for NPTH production have been combined in the tables below. Direct take consists of adults spawned in 2014 at LFH and NPTH (highlighted in green), and eggs/loss/release data associated with BY14 subyearlings released in 2015 and BY13 yearlings released in 2015 that were part of LSRCP, LSRCP-FCAP, and IPC programs. Direct takes of listed Snake River fall Chinook were calculated in Table 49 and Table 50 and were generally within limits. The number of unmarked/untagged juveniles released by these programs totaled 1,109,355 fish, which are not included in the table below.

Table 49. Proposed permissible direct take and actual take of listed Snake River fall Chinook salmon adults returning in 2014 and juveniles released in 2015 for fish cultural purposes for the LFH, IPC, and FCAP programs. Red cells indicate take exceeded permitted limit and green cells combine take from LFH and NPTH programs.

		Annual take of listed fish by life stage							
		Egg/fry		Juvenile or smolt		Adult [b]		Carcass	
Type of Take	Mark [a]	Limit	Take	Limit	Take	Limit	Take	Limit	Take
Observe or harass [c]	No fin clip	0		0		1,000		0	
	AD clip	0		0		1,000		0	
Collect for transport [d]	No fin clip	0		0		0		0	
	AD clip	0		0		0		0	
Capture, handle, and release [e]	No fin clip	0		0		0		0	
	AD clip	0		0		0		0	
Capture, handle, tag/marked/tissue sample, and release [f]	No fin clip	0		810,455	755,250	1,500 [j]	458	0	
	AD clip	0		2,335,000	2,475,446	1,100 [j]	125	0	
Intentional lethal take [g]	No fin clip	0		0		2,600 [h]	1,793	0	
	AD clip	0		0		2,200 [h]	607	0	
Unintentional lethal take [i]	No fin clip	7.5%	3.2%	7.5%	6.2%	500	147	0	
	AD clip	7.5%	3.2%	7.5%	6.2%	450	36	0	

[a] "No fin clip" salmon include hatchery-origin and natural –origin fish. The majority of unclipped fish are hatchery origin.

[b] For purposes of this permit, adults are defined as fall Chinook salmon that are at least 3 years old that have spent at least 2 years in the ocean. Fish that spend only one year in the ocean, called "jacks" or "1-salts," represent a natural life history and are thought to contribute to natural production at a low but relatively constant level. These fish are almost exclusively males (females are called "jills"). Jack returns are highly variable and cannot be accurately forecasted. In-season management and take monitoring will classify fish less than 53 cm (FL) as jacks. Post-season reporting will be based on estimated ocean age. Adult take limits are based on programmatic needs-broodstock number and run-0reconstruction numbers – and limits to the overall sampling rate, of the run at age, at the LGR trap and/or supplemental trapping efforts at Lyons Ferry Hatchery and Nez Perce Tribal Hatchery are not to exceed 20%. Any non-lethal take of jacks during trapping efforts is permitted.

[c] Contact with listed fish that could occur from migration delay at dam or traps. Specifically, this refers to fish trapped at LFH and returned to the river without handling, the vast majority being clipped and/or tagged hatchery fish.

[d] Take associate with weir or trapping operations where listed fish are captured and transported, These levels represent full broodstock collection at LGR – see intentional lethal take below.

[e] Take associated with weir or trapping operations where listed fish are captured, handled, and released upstream or downstream.

[f] Take of juveniles due to tagging/marking/PIT tagging prior to release and does not include 1,109,355 unclipped and untagged fish released by LSRCP and LSRCP-FCAP programs. The number shown assumes full production through priority 17 (able B4B. U.S. v. Oregon agreement [2009]) and does not include NPTH production. This number could vary depending on annual egg takes and survival in the hatchery .

[g] Intentional mortality of listed fish as broodstock only. Values represent total need for all program components (LFH, FCAP, NPTH, and IPC). Priority collection occurs at the LGR trap, alternative collection at LFH and NPTH.

[h] Take goal for natural-origin fish for broodstock is 1500 adults. Jacks can compose up to 10% of total broodstock collection

[i] Unintentional mortality from operation of adult traps, including loss of fish during trapping, transport, and holding prior to spawning or release back into the wild after broodstock sorting. Also includes estimates of in-hatchery incubation and rearing mortality, by life-stage. Adult mortality estimates based on 15% prespawning mortality, including adult trapping, holding, and transport.

[j] Adult fish in excess to broodstock needs that are returned to the river from the LFH and the NPTH. These fish are typically fin clipped for re-capture identification.

Table 50. Proposed permissible direct take and actual take of listed Snake River fall Chinook salmon adults returning in 2014 and juveniles released in 2015 for RM&E activities associated with the LFH fall Chinook salmon programs not directly related to fish culture. Green cells combine take from LFH and NPTH programs.

		Annual take of listed fish by life stage							
		Egg/fry		Juvenile or smolt		Adult		Carcass	
Type of Take	Mark	Limit	Take	Limit	Take	Limit	Take	Limit	Take
Observe or harass [a]	No fin clip	0				200	79 [j]	0	
	AD clip	0				600	35 [j]	0	
Collect for transport [b]	No fin clip	0		0		0		0	
	AD clip	0		0		0		0	
Capture, handle, and release [c]	No fin clip	0		Up to 15% of natural juvenile production not to exceed 25,000 fish [h]	14,295			10	0
	AD clip	0						10	0
Capture, handle, tag/mark/tissue sample, and release [d]	No fin clip	0		2,700 [h]	1,000	4,000 [i]	2,620	100	48 [j]
	AD clip	0				2,500 [i]	1,479	300	32 [j]
Removal (e.g. broodstock) [e]	No fin clip	0		0		0		0	
	AD clip	0		0		0		0	
Intentional lethal take [f]	No fin clip	0		0		1,000 [i]	280	0	
	AD clip	0		0		1,000 [i]	165	0	
Unintentional lethal take [g]	No fin clip	0		300 [h]	52	0		0	
	AD clip	0		100 [h]	0	0		0	

[a] Contact with live, ESA-listed fish through juvenile and adult spawning surveys on the Tucannon River and adult spawning surveys on Asotin Creek.
[b] Take of listed fish for transportation only.
[c] Take associated with smolt trapping operations where listed fish are captured, handled, and released. Adult numbers represent adults captured, handled, and released from juvenile trapping operations.
[d] Take associated with adult and juvenile sampling and monitoring projects. These include; adult fall Chinook salmon trapped, handled, sampled, tagged and released from adult trapping facilities and weirs, carcass sampling during spawning ground surveys on the Tucannon River and Asotin Creek, and juvenile fall Chinook salmon captured, handled, sampled, tagged, and released from juvenile trapping, netting, and electro-fishing projects.
[e] RM&E activities do not include broodstock collection.
[f] Intentional mortality of hatchery fish as a result of run reconstruction needs. These are coded-wire tagged hatchery fish.
[g] Unintentional mortality of listed fish, including loss of fish during smolt trapping.
[h] WDFW activities associated with emigrant studies using rotary screw trap and spawning ground surveys on the Tucannon River.
[i] Adults (non-jacks) used for run reconstruction at LGR trap.
[j] Take associated with spawning ground surveys on Asotin Creek located above LGR Dam.

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 Snake River Lab Evaluation staff.

1. Run Reconstruction methodologies were changed in 2013 and reworking of run reconstructions back to 2004 have occurred. Prior to 2004, sub-sampling of VIE tagged fish with CWTs occurred at LFH which will require adjustments to the method employed for 2004-2015.

Recommendation: Assist the Run Reconstruction group in developing methodologies to address sampling changes that occurred prior to 2004.

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

2. 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.

3. The 2008-2017 *US v. Oregon Management Agreement* will end in 2017, and potential production changes regarding the yearling and subyearling programs need to be evaluated to provide direction to the managers. This report shows the contributions of yearlings and subyearlings released onstation at LFH, subyearlings released directly to the Snake River near Couse Creek, and subyearlings released directly to the Grande Ronde River in fisheries and the overall contribution, but it does not split out the data by release site.

Recommendation: Calculate the benefit of each of the release sites by combining completed recoveries and dividing by the total number of fish released.

Recommendation: Meet with the NPT to discuss the analysis methods and work towards comparisons between WDFW and FCAP release sites.

Recommendation: Summarize the results by Snake River, Columbia River, and State/Country of harvest interception.

4. In 2016 PBT sampling at LGR will be able to detect all inbasin hatchery returns and allow us to more precisely (in theory) estimate the numbers of natural origin fish in the overall return, and those that contribute to broodstock.

Recommendation: Work with the run reconstruction technical group to derive run reconstruction estimates based solely on PBT results and compare with standardized run reconstruction estimates. Continue these comparisons for 5 years to determine if the run reconstruction based on CWTs is valid for profiling the return, or if another more accurate methodology should be adopted for the future.

Recommendation: Begin fecundity estimates of fish used for broodstock by origin, age, and release site. We will combine 5 years of data and compare fecundities of hatchery fish to wild fish, by age (as determined by PBT, PIT, scale analysis, and CWTs). Summaries will include differences in fecundity from subyearling releases, yearling releases, and reservoir reared fish.

5. Estimating the numbers of natural origin fish in broodstock have been underestimated for many years since we ceased using scales to determine origin.

Recommendation: Use the same methodology that is used for the Snake River run reconstruction to estimate the composition of untagged fish used in broodstock. Complete those estimates from 2004 forward and present in the 2015 annual report.

Recommendation: Beginning with the 2016 spawning, compare the run reconstruction methodology to the actual determinations of natural origin fish used the broodstock from PBT samples collected during spawning. Present that data in the 2016 annual report.

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Appendix A: Fall Chinook Run to LFH, IHR, LMO, and LGR Dams: 2008-2014

(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 data with COE window counts).

Appendix A Table 1. Numbers of fall Chinook processed at LFH and window counts at IHR, LMO, and LGR dams, 2008-2014.

		Daytime counts				Night video[a]				Totals[b]	
		Through Oct		Nov and Dec		Through Oct		Nov and Dec			
Year	Location	Adults	Jacks	Adults	Jacks	Adults	Jacks	Adults	Jacks	≥ 53 cm FL	< 53 cm FL
2008	IHR	21,907	11,544	nc	nc	nc	nc	nc	nc	21,907	11,544
	LMO	20,923	10,465	nc	nc	nc	nc	nc	nc	20,923	10,465
	LFH									1208	792
	LGR	16,443	10,076	185	152	nc	nc	nc	nc	16,628	10,228
2009	IHR	24,824	38,611	nc	nc	nc	nc	nc	nc	24,824	38,611
	LMO	22,184	39,241	nc	nc	nc	nc	nc	nc	22,184	39,241
	LFH									542	742
	LGR	15,058	40,973	109	312	nc	nc	nc	nc	15,167	41,285
2010	IHR	46,541	12,230	nc	nc	nc	nc	nc	nc	46,541	12,230
	LMO	42,718	15,408	nc	nc	nc	nc	nc	nc	42,718	15,408
	LFH									339	75
	LGR	41,311	12,730	504	165	nc	nc	nc	nc	41,815	12,895
2011	IHR	31,405	19,578	nc	nc	nc	nc	nc	nc	31,405	19,578
	LMO	27,594	17,855	nc	nc	nc	nc	nc	nc	27,594	17,855
	LFH									666	154
	LGR	24,819	19,516	430	139	nc	nc	nc	nc	25,249	19,655
2012	IHR	38,546	21,554	nc	nc	nc	nc	nc	nc	38,546	21,554
	LMO	33,518	22,883	nc	nc	nc	nc	nc	nc	33,518	22,883
	LFH									193	6
	LGR	34,060	21,814	628	176	nc	nc	nc	nc	34,688	21,990
2013	IHR	57,850	19,133	nc	nc	nc	nc	nc	nc	57,850	19,133
	LMO	53,399	23,031	nc	nc	nc	nc	nc	nc	53,399	23,031
	LFH									1,025	42
	LGR	55,839	22,019	726	376	nc	nc	nc	nc	56,565	22,395
2014	IHR	61,389	17,944	nc	nc	nc	nc	nc	nc	61,389	17,944
	LMO	51,402	23,836	nc	nc	nc	nc	nc	nc	51,402	23,836
	LFH									0	0
	LGR	59,753	19,250	934	557	nc	nc	nc	nc	60,617	19,869

[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 2014

2014 Fall Chinook Trapping/Sampling Protocols at LGR

by

Debbie Milks, WDFW
Bill Arnsberg/Bill Young, NPT
Stuart Rosenberger, IPC
Stuart Ellis, CRITFC

August 2014

The following protocol presumes 24 hour trapping 7 days per week: The trapping rate will be set at 10% and kept at that level throughout the season, if possible. If the trap is swamped with fish: Shut down the 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.

If trapping is changed to 4 hours per day operation, any fish collected during that time MUST receive an operculum punch on the right side if they are hauled to the hatcheries.

WDFW is providing two staff for helping with the broodstock collection activities at LGR as well as Aqui-S for trapping.. 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. An additional two staff will be provided by WDFW as part of the Snake River Fall Chinook Salmon Fidelity and Fallback Study (radio telemetry) funded by BPA.

In an effort to reduce the numbers of jacks and jills hauled to the hatcheries and to reduce the numbers of fish sacrificed with wire for run reconstruction purposes the following protocols were approved by co-managers in the basin on 8/15/2014. The sub-sampling of wire tagged fish should allow for ample recoveries for evaluation purposes.

This will be the second year that carcasses of fish used for run reconstruction will be given to Asotin Count Food bank after sampling. Food bank fish will primarily come from wire tagged males <70 cm trapped early in the season. The small males will be held separately from the larger fish for easy access. The food bank may collect fish weekly starting in October.

Wire tagged females <70 cm will be added to the "BIGS" group of fish and may be used for broodstock if needed. If not needed for broodstock, these smaller younger aged females will be used for run reconstruction needs.

Protocols:

1) These protocols presume a 24 hour/day, 7 days per week trapping. Fish trapped during a 24 hour 7 day a week trapping period will not be operculum punched. If the trapping protocol is changed to only 4 hours per day, all fish hauled to the hatcheries must receive an operculum punch on the right side (ROP).

2) This is the second year females will not be inoculated. Males will not be inoculated either.

3) Sort by code fish follow the same haul/release protocol below unless the tag action code indicates that the fish should be radio tagged and released.

4) LFH will haul 70% of the fish trapped fish >70 cm and the NPT will haul 30%.

5) All wire tagged males <70 cm (aka: SMALLS) will be held separately in a tank and hauled to LFH.

6) Wire tagged females <70 will be added to the tank of "LARGE" fish and either hauled to LFH or NPTH.

7) Jacks suspected of being summers will need to be subsampled for wires.

Wire tagged fish:

Fork Length	Action
≥ 70cm	Haul all wires (no scales collected)
<70 cm	Haul 1 out of 5 wires (put F in with "LARGES" and M go into "SMALLS" tank)
	Release 4 out of 5 wires (no scales collected)

Untagged fish:

Fork Length	Action
≥ 70 cm	Haul all fish (collect scales on 1 in 3) data will be used to document arrival timing and profile the run for reconstruction needs.
<70 cm	Release all (collect scales on 1 in 3) data will be used to document arrival timing and profile the run for reconstruction needs.

2014 Fall Chinook Trapping/Sampling Protocols at LGR

by

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Stuart Rosenberger, IPC, Ben Sandford NOAA
Stuart Ellis, CRITFC
September 23, 2014

The trapping rate will remain set at 10%. Hauled fish will receive an operculum punch on the left side to note the change in sampling protocol.

In an effort to get a representative sample of wire tagged fish in the last half of the run, increase the numbers of wild fish and older aged, larger fish available for broodstock, the following modifications the following protocols were adopted by co-managers in the basin on 9/23/2014:

Protocols:

1) All hauled fish will receive 1-LOP

2) The NPTH will collect males above 70 cm in a separate tank to be picked up on Sundays until broodstock needs are met.

3) Sort by code fish follow the same haul/release protocol below unless the tag action code indicates that the fish should be radio tagged and released.

4) Retain all fish ≥ 90 cm for broodstock

5) All wire tagged or unclipped/untagged fish <90 cm will be sub sampled: haul one, pass four.

6) Release all AD clipped fish that do not have a coded wire tag.

Wire tagged fish:

Fork Length	Action
≥ 90cm	Haul all wires (no scales collected)
< 90 cm	Haul 1 out of 5 wires (M and F ≥70 cm go into "LARGES" tank, M (< 70 cm) go into the "SMALLS" tank
	Release 4 out of 5 wires (no scales collected)
UNCLIPPED/ Untagged fish	
≥ 90 cm	Haul all fish (collect scales on all) data will be used to document arrival timing and profile the run for reconstruction needs.
<90 cm	Haul 1 out of 5 (collect scales on sample hauled) data will be used to document arrival timing and profile the run for reconstruction needs.
ADCLIPPED/ Untagged fish:	PASS ALL. Do not take scales.

2014 Fall Chinook Trapping/Sampling Protocols at LGR

by

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October 2, 2014

The trapping rate will be reduced to 8%. Hauled fish will receive 2 operculum punches on the right side to note the change in sampling protocol. Sub-sampling protocols will only change by releasing all untagged fish < 70cm.

Protocols:

1) All hauled fish will receive 2-ROP

2) The NPTH will collect males above 70 cm in a separate tank to be picked up on Sundays until broodstock needs are met.

3) Sort by code fish follow the same haul/release protocol below unless the tag action code indicates that the fish should be radio tagged and released.

4) Retain all fish ≥ 90 cm for broodstock

5) All wire tagged or unclipped/untagged fish <90 cm will be sub sampled: haul one, pass four.

6) Release all AD clipped fish that do not have a coded wire tag.

Wire tagged fish:

Fork Length	Action
≥ 90cm	Haul all wires (no scales collected)
< 90 cm	Haul 1 out of 5 wires (M and F ≥70 cm go into "LARGES" tank, M (< 70 cm) go into the "SMALLS" tank
	Release 4 out of 5 wires (no scales collected)

UNCLIPPED/ Untagged fish	
≥ 90 cm	Haul all fish (collect scales on all) data will be used to document arrival timing and profile the run for reconstruction needs.
70-<90 cm	Haul 1 out of 5 (collect scales on sample hauled) data will be used to document arrival timing and profile the run for reconstruction needs.
<70 cm	Release all (collect scales on 1 out of 5). These fish will not be needed for broodstock
ADCLIPPED/ Untagged fish:	PASS ALL. Do not take scales.

Appendix C: Systematic Sampling Rates at Lower Granite Dam 2003-2014

Appendix C Table 1. Dates, times, and trapping rates of fall Chinook at Lower Granite Adult trap, 2003-2014.

Year	Date opened trap	Trap rate (%)	Date trap closed	Date/time trapping rate changed	Modified trapping rate (%)	Date/time trapping rate changed	Adjusted 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 8:00 am[c]	20	-	12 Sept 2:52 pm	12	26 Sept 3:00 pm	10	21 Nov
2009	18 Aug 7:37 am	12	-	9 Sept 7:25 am	9	-	nc	15 Nov
2010	22 Aug 11:05 am	12	10 Sept-10:50 am [d] 18 Sept-10:50 am [b]	18 Sept 3:00 pm	10	-	nc	18 Nov
2011	18 Aug 10:30 am	10	-	-	nc	-	nc	21 Nov
2012	28 Aug 10:36 am	15	-	-	nc	-	nc	19 Nov
2013	23 Sept 10:07 am	12	27 Sept- 3:00 pm[e]	1 Oct 2:22 pm	15	8 Oct 2:22 pm	20	24 Nov
2014	18 Aug 9:54 am	100	19&20 Aug[f] 22-29 Aug[f]	1 Sept 8:38 am	10	2 Oct 7:40	8	11 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.
[e] Trap was closed down at 3:00 pm for two hours due to large numbers of fall Chinook.
[f] Trap closed down due to high water temperatures.

Appendix D: Trapping and Sorting Protocols at Lyons Ferry Hatchery 2014

2014 Trapping & Mating Protocol at LFH

LFH may start up the volunteer trap if a shortfall of females being collected at LGR happens. Staff will target fish >80 cm to increase numbers of older aged fish for broodstock. The size criteria will be further relaxed to 75 cm in mid-October if necessary.

Sorting protocol

Sort LFH trapped fish during first spawn in October.
Count and sex all fish: 1) Males and females ≥ 75, 2) Males and females <75.

Count LGR trapped females returned to the pond during the spawn day.

Mating protocol at LFH

Our goals are to maximize the use of potentially natural origin fish and larger/older aged fish and to exclude jills and strays from broodstock.

All wire tagged fish must wait until their CWTs are decoded before they are used in a mating.

Strays will be culled based on CWTs. If broodstock limited, up to 60 stray females may be spawned and retained, presuming 1200 matings are needed to make production1. All stray males will be culled. Any male used on a stray female must also be used on another female that will be retained for production (inbasin hatchery origin, or untagged unknown origin).

Wire tagged Males verified as adults can be used on multiple females.

Untagged Males ≥75 cm can be used on multiple females.

Untagged Males 70-74 cm will only be used in 1 x 1 crosses unless there is a shortage of males.

Males <70 cm will not be used in matings unless they are verified as adults. This size criteria may be adjusted in season.

Jills

Jills will be cycled back to the holding pond for the first three weeks. If we have enough adult females to make production goals, jills will not be used in production. If jills are used for broodstock they will be kept separate until a decision can be made regarding what to do with the eggs. Jills verified by CWTs will be spawned with males of a larger fork length. Any male used on a jill must also be used on a larger or older aged fish that will be retained for production. This will be done to ensure if the jill is culled or a fry plant is made, the gametes from the male will still contribute elsewhere in production.

Appendix E: Salmon Processed and Killed at LFH in 2014

(Age/Rearing states origin, brood year, age at release, and release site (LF09SO is a LFH hatchery origin fish from the 2009 brood year, released as a subyearling, onstation at LFH).

Appendix E Table 1: Estimated composition of non-wire tagged salmon trapped at LGR that were hauled to LFH and killed during 2014.

Age/Origin Determinations by Method	< 53 cm Males	Females	≥53 cm Males	Grand Total
Snake R. hatchery sub res rear age 4 by PIT tag	0	0	1	1
Snake R. hatchery sub res rear age 5 by PIT tag	0	5	1	6
Snake R. hatchery sub res rear age 6 by PIT tag	0	1	0	1
Snake R. hatchery sub age 2 by PIT tag	1	0	1	2
Snake R. hatchery sub age 3 by PIT tag	0	10	39	49
Snake R. hatchery sub age 4 by PIT tag	1	108	67	176
Snake R. hatchery sub age 5 by PIT tag	0	5	1	6
Snake R. hatchery yearling age 4 by PIT tag	0	1	1	2
Unknown Snake R. sub res rear age 4 by PIT tag	0	0	1	1
Unknown Snake R. res rear age 5 by PIT tag	0	7	1	8
Unknown Snake R. sub age 3 by PIT tag	0	0	1	1
Unknown Snake R. sub age 4 by PIT tag	0	4	9	13
Unknown Snake R. sub age 5 by PIT tag	0	3	1	4
Unknown Snake R. unknown age by PIT tag	0	3	5	8
Unknown hatchery AD age 2(1salt) by scales	8	0	0	8
Unknown hatchery AD age 3(2salt) by scales	1	9	19	29
Unknown hatchery AD age 4(3salt) by scales	0	30	7	37
Unknown hatchery AD age 5(4salt) by scales	0	3	1	4
Unknown hatchery yearling age 2(0salt) by scales	2	0	0	2
Unknown hatchery yearling age 4(2salt) by scales	0	2	2	4
Unknown hatchery yearling age 5(3salt) by scales	0	1	1	2
Unknown hatchery age/origin by AD clip	2	3	1	6
Unknown origin sub res rear age 2(0salt) by scales	1	0	0	1
Unknown origin sub res rear age 4(2salt) by scales	0	1	0	1
Unknown origin res rear age 2(0salt) by scales	2	0	0	2
Unknown origin res rear age 3(1salt) by scales	0	0	2	2
Unknown origin res rear age 4(2salt) by scales	0	4	6	10
Unknown origin res rear age 5(3salt) by scales	0	8	2	10
Unknown origin age 2(1salt) by scales	28	0	4	32
Unknown origin age 3(2salt) by scales	0	23	71	94
Unknown origin age 4(3salt) by scales	0	372	142	514
Unknown origin age 5(4salt) by scales	0	39	11	50
Unknown age/origin (Presume hatchery)	4	37	33	74
Total	**50**	**679**	**431**	**1,160**

Appendix E Table 2: Estimated composition of wire tagged salmon that were trapped at LGR, hauled to LFH, and killed during 2014.

Origin by CWT	CWT	<53 cm Males	<53 cm Females	≥53 cm Males	Grand total
LF09SBCA	220306	0	1	0	1
LF09SGRR	635182	0	2	0	2
LF09SIPCHC	090331	0	1	0	1
LF09SPLA	220310	0	1	0	1
	220311	0	1	0	1
LF09YBCA	220312	0	1	2	3
	220317	0	0	1	1
LF09YCJA	220314	0	2	0	2
LF09YO	635510	0	5	0	5
	635564	0	3	1	4
LF09YPLA	220316	0	1	0	1
LF10SBCAs	220117	0	11	8	19
	220118	0	17	4	21
LF10SCCD	635997	0	20	13	33
LF10SCJA	220119	0	15	7	22
	220120	0	23	4	27
LF10SGRR	635999	0	6	2	8
LF10SIPCHC	090447	0	2	1	3
	100153	0	11	1	12
LF10SO	635998	0	21	6	27
LF10SPLA	220121	0	10	2	12
	220122	0	13	5	18
LF10YBCA	220318	0	14	9	23
	220323	0	18	7	25
LF10YCJA	220320	0	19	18	37
	220321	0	16	11	27
LF10YO	636079	0	52	24	76
	636080	0	38	17	55
LF10YPLA	220319	0	30	9	39
	220322	0	20	10	30
LF11SBCA	220328	0	3	5	8
	220329	0	2	12	14
LF11SCCD	636418	0	3	6	9
LF11SCJA	220326	0	2	7	9
	220327	0	3	8	11
LF11SGRRD	636419	0	1	14	15
LF11SIPCHC	090587	0	4	9	13
LF11SIPCHC-OXBOW	100201	0	7	9	16
LF11SO	636417	0	0	5	5

Appendix E Table 2: Estimated composition of wire tagged salmon that were trapped at LGR, hauled to LFH, and killed during 2014.

Origin by CWT	CWT	<53 cm Males	<53 cm Females	≥53 cm Males	Grand total
LF11SPLA	220324	0	2	8	10
	220325	0	2	16	18
LF11YBCA	220331	2	0	7	9
	220333	2	0	8	10
LF11YCJA	220332	2	1	7	10
	220335	5	1	4	10
LF11YO	636443	5	3	27	35
	636444	3	2	17	22
LF11YPLA	220330	1	0	2	3
	220334	4	0	7	11
LF12SBCA	220142	1	0	0	1
	220144	3	0	1	4
LF12SCCD	636575	4	0	1	5
LF12SCJA	220141	5	0	1	6
	220143	3	0	1	4
LF12SGRRD	636576	3	0	0	3
LF12SIPCHC	090703	1	0	0	1
LF12SO	636574	11	0	0	11
LF12SPLA	220145	7	0	1	8
	220146	4	0	2	6
LF12YBCA	220336	4	0	0	4
	220341	4	0	0	4
LF12YCJA	220338	1	0	0	1
	220339	2	0	0	2
LF12YO	636583	24	0	0	24
	636584	20	0	0	20
LF12YPLA	220337	3	0	0	3
	220340	1	0	0	1
NPTH09SCFA	612765	0	2	0	2
NPTH09SLGA	612748	0	1	1	2
NPTH09SNLVA	220201	0	1	1	2
NPTH09SO	220200	0	3	0	3
	612772	0	1	0	1
NPTH10SCFA	220205	0	17	7	24
	220206	0	23	8	31
NPTH10SLGA	220207	0	13	5	18
	220208	0	20	9	29
NPTH10SNLVA	220203	0	18	3	21
	220204	0	17	7	24

Appendix E Table 2: Estimated composition of wire tagged salmon that were trapped at LGR, hauled to LFH, and killed during 2014.

		<53 cm		≥53 cm	
Origin by CWT	**CWT**	**Males**	**Females**	**Males**	**Grand total**
NPTH10SO	220209	0	22	6	28
	220210	0	46	12	58
	220211	0	9	6	15
	220212	0	14	5	19
NPTH11SCFA	220215	1	4	14	19
	220216	0	1	11	12
NPTH11SLGA	220213	0	1	13	14
	220214	0	1	8	9
NPTH11SNLVA	220218	0	3	7	10
	220224	0	0	9	9
NPTH11SO	220217	0	1	6	7
	220223	1	3	9	13
NPTH12SCFA	220221	5	1	3	9
	220222	6	0	0	6
NPTH12SLGA	220220	1	0	0	1
NPTH12SNLV	220225	5	0	1	6
	220231	6	0	2	8
NPTH12SO	220232	4	0	1	5
	220226	11	0	2	13
BON09YUMA	090355	0	1	0	1
	090356	0	2	0	2
BON10YUMA	090493	0	5	1	6
CALFEATHERRIVER11SNETPEN	060393	0	1	0	1
KLICK10SO	635979	0	1	0	1
PRIEST10SCOL	635972	0	0	1	1
	635973	0	1	0	1
UMA09SUMA	090330	0	1	0	1
UMA10SUMA	090434	0	1	1	2
	090435	0	1	0	1
UMA11SUMA	090586	0	0	1	1
09BLANK	Stray/unknown age	0	0	1	1
MARIONFORKS10YSPRINGCH	090527	0	0	1	1
TUC12YSPCH	636441	1	0	0	1
LOST TAG	Age 4(3salt)	0	3	0	3
	Age 4(2salt)	0	2	2	4
	unknown age	6	1	4	11
Total		**172**	**652**	**515**	**1,339**

Appendix F: Revised Estimated Composition of Non-wire Tagged Salmon Trapped at LGR Dam that were Hauled to LFH and Killed During 2012 and 2013.

(Data exclude live fish hauled back to the Snake River.)

Appendix F Table 1: Revised Appendix L Table 3, Estimated composition of non-wire tagged salmon trapped at LGR Dam that were hauled to LFH and killed during 2012, originally presented in Lyons Ferry Hatchery Evaluation Fall Chinook Salmon Annual Report:2012. Data exclude live fish hauled back to the Snake River.

Age/Origin Determinations by Method	< 53 cm Males	Females	Males	Grand Total
Snake R. natural res rear age 4 by PIT tag	0	1	0	1
Snake R. natural sub age 4 by PIT tag	0	1	0	1
Snake R. natural sub age 5 by PIT tag	0	4	3	7
Snake R. hatchery sub age 2 by PIT tag	4	0	1	5
Snake R. hatchery sub age 3 by PIT tag	0	87	95	182
Snake R. hatchery sub age 4 by PIT tag	0	80	27	107
Snake R. hatchery sub age 5 by PIT tag	0	25	2	27
Snake R. hatchery yearling age 3 by PIT tag	0	0	0	0
Snake R. hatchery yearling age 4 by PIT tag	0	1	2	3
Snake R. hatchery yearling age 5 by PIT tag	0	1	0	1
Snake R. hatchery sub res rear age 3 by PIT tag	0	0	1	1
Snake R. hatchery sub res rear age 4 by PIT tag	0	1	1	2
Unknown Snake R. res rear age 3 by PIT tag	0	1	0	1
Unknown Snake R. res rear age 4 by PIT tag	0	1	0	1
Unknown Snake R. res rear age 5 by PIT tag	0	0	1	1
Unknown Snake R. sub age 3 by PIT tag	0	1	1	2
Unknown Snake R. sub age 4 by PIT tag	0	1	0	1
Unknown Snake R. sub age 5 by PIT tag	0	1	0	1
Unknown Snake R. unknown age by PIT tag	0	15	22	37
Unknown hatchery AD sub res rear age 4 by scales	0	1	0	1
Unknown hatchery AD sub age 2 by scales	1	0	0	1
Unknown hatchery AD sub age 3 by scales	0	25	24	49
Unknown hatchery AD sub age 4 by scales	0	11	0	11
Unknown hatchery AD sub age 5 by scales	0	5	0	5
Unknown hatchery yearling age 4 by scales	0	8	1	9
Unknown hatchery age/origin by AD clip	2	5	3	10
Unknown origin sub res rear age 3 by scales	0	0	2	2
Unknown origin sub res rear age 4 by scales	0	5	1	6
Unknown origin sub res rear age 5 by scales	0	3	0	3
Unknown origin res rear age 3 by scales	0	3	1	4
Unknown origin res rear age 4 by scales	0	28	7	35
Unknown origin res rear age 5 by scales	0	19	5	24
Unknown origin sub age 2 by scales	6	0	2	8
Unknown origin sub age 3 by scales	0	210	188	398
Unknown origin sub age 4 by scales	0	149	29	178
Unknown origin sub age 5 by scales	0	62	11	73
Unknown age/origin (Presume hatchery)	0	53	28	81
Total	**13**	**808**	**458**	**1,279**

Appendix F Table 2: Revised Appendix L Table 3, Estimated composition of non-wire tagged salmon trapped at LGR Dam that were hauled to LFH and killed during 2013, originally presented in Lyons Ferry Hatchery Evaluation Fall Chinook Salmon Annual Report 2013. Data exclude live fish hauled back to the Snake River.

Age/Origin Determinations by Method	< 53 cm Males	Females	Males	Grand Total
Snake R. natural sub res rear age 4 by PIT tag	0	0	1	1
Snake R. natural res rear age 4 by PIT tag	0	1	0	1
Snake R. natural sub age 3 by PIT tag	0	0	1	1
Snake R. natural sub age 4 by PIT tag	0	1	1	2
Snake R. hatchery sub res rear age 3 by PIT tag	0	0	1	1
Snake R. hatchery sub res rear age 4 by PIT tag	0	8	4	12
Snake R. hatchery sub res rear age 5 by PIT tag	0	3	0	3
Snake R. hatchery sub age 3 by PIT tag	0	30	38	68
Snake R. hatchery sub age 4 by PIT tag	0	38	13	51
Snake R. hatchery sub age 5 by PIT tag	0	1	0	1
Snake R. hatchery yearling age 4 by PIT tag	0	0	1	1
Unknown Snake R. res rear age 4 by PIT tag	0	3	6	9
Unknown Snake R. sub age 4 by PIT tag	0	0	3	3
Unknown Snake R. sub age 5 by PIT tag	0	6	8	14
Unknown Snake R. unknown age by PIT tag	0	2	3	5
Out-of-basin hatchery sub age 4	0	1	0	1
Unknown hatchery AD age 2(1salt) by scales	2	0	0	2
Unknown hatchery AD age 3(2salt) by scales	0	14	13	27
Unknown hatchery AD age 4(3salt) by scales	0	14	8	22
Unknown hatchery yearling age 3(1salt) by scales	0	1	1	2
Unknown hatchery yearling age 4(2salt) by scales	0	7	2	9
Unknown hatchery age/origin by AD clip	0	5	0	5
Unknown origin sub res rear age 4(2salt) by scales	0	3	0	3
Unknown origin sub res rear age 5(3salt) by scales	0	1	0	1
Unknown origin res rear age 3(1salt) by scales	0	0	2	2
Unknown origin res rear age 4(2salt) by scales	0	14	10	24
Unknown origin res rear age 5(3salt) by scales	0	1	1	2
Unknown origin age 2(1salt) by scales	0	95	161	256
Unknown origin age 3(2salt) by scales	0	143	81	224
Unknown origin age 4(3salt) by scales	0	11	1	12
Unknown age/origin (Presume hatchery)	2	12	31	45
Total	**4**	**415**	**391**	**810**

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

Appendix G Table B4B. Revised production table listing Snake River fall Chinook salmon production priorities for LFH per the 2008-2017 *US v. Oregon 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[a]**
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+	Captain John Rapids 2nd Release	200K ADCWT
~~12~~	~~DNFH/Umatilla~~	~~250,000~~	~~0+~~	Transportation Study[b,c]	~~250K PIT Tag only~~
13	Irrigon[d]	200,000	0+	Grande Ronde River	200K ADCWT
~~14~~	~~DNFH/Umatilla~~	~~78,000~~	~~0+~~	~~Transportation Study[b,c]~~	~~78K PIT tag only~~
15	Umatilla	200,000	0+	Hells Canyon Dam	200K ADCWT
16	Irrigon[d]	200,000	0+	Grande Ronde River	200K Unmarked
17	Umatilla	600,000	0+	Hells Canyon Dam	600K AD only
TOTAL	**Yearlings**	**900,000**			
	Subyearlings	**3,200,000[e]**			

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).

[e] Total does not include 328,000 from Transportation Study.

Appendix H: LFH 2014 Broodstock PBT Tissue Samples

Appendix H Table 1: Lyons Ferry Hatchery 2014 broodstock PBT tissue samples by fish ID number.

Genetic ID	Fish ID	Genetic ID	Fish ID	Genetic ID	Fish ID	Genetic ID	Fish ID
1	M3803	41	1033	81	1051	204	M3841
2	M3802	42	1029	82	1052	205	M3844
3	M3801	43	1032	83	1053	206	M3845
4	M3804	44	1038	84	M3833	207	M3846
5	M3805	45	1027	85	1054	208	M3849
6	M3806	46	1039	86	1055	209	M3847
7	1006	47	1040	87	1059	210	M3848
8	1004	48	1012	88	1058	211	2024
9	1003	49	1034	89	1056	212	2025
10	1005	50	1015b	90	1057	213	2023
11	1002	51	1035	91	1060	214	2026
12	1010	52	1024	92	1061	215	M3850
13	1001	53	1023	93	1062	216	2029
14	M3807	54	1041	94	1070	217	M3851
15	M3808	55	1042	95	M3836	218	2028
16	1018	56	1016	96	1066	219	2032
17	1019	57	1037	97	1068	220	2030
18	1017	58	M3821	98	1069	221	2020
19	1014	59	M3824	99	1072	222	2034
20	M3811	60	1025	100	1071	223	2033
21	M3812	61	1036	101	1067	224	2031
22	1020	62	1026	102	1065	225	2022
23	1021	63	1011	103	M3837	226	2018
24	1013	64	M3809	104	1063	227	2017
25	M3814	65	M3825	105	M3835	228	2015
26	M3813	66	1043	106	1064	229	M3852
27	M3810	67	1046	107	1074	230	2019
28	M3815	68	1048	108	1073	231	2027
29	1022	69	1045	109	1075	232	2021
30	1015	70	1044	110	M3834	233	2036
31	M3816	71	1047	111	1078	234	2038
32	M3817	72	M3826	112	M3839	235	M3853
33	M3818	73	M3827	113	1077	236	2041
34	M3819	74	1049	114	1076	237	M3855
35	1031	75	1050	115	M3838	238	2045
36	1030	76	M3829	116	1079	239	2042
37	M3820	77	M3831	117	1080	240	2043
38	1028	78	M3832	201	M3840	241	2040
39	M3822	79	M3830	202	M3842	242	M3857
40	M3823	80	M3828	203	M3843	243	2050

Appendix H Table 1: Lyons Ferry Hatchery 2014 broodstock PBT tissue samples by fish ID number.

Genetic ID	Fish ID	Genetic ID	Fish ID	Genetic ID	Fish ID	Genetic ID	Fish ID
244	2051	284	2071	324	2085	364	M3884
245	2048	285	2070	325	2086	365	2120
246	M3859	286	2082	326	M3876	366	2121
247	M3860	287	2010	327	2092	367	2122
248	2047	288	2072	328	2093	368	2123
249	M3862	289	2066	329	2091	369	2124
250	2052	290	2002	330	2090	370	2125
251	2049	291	2014	331	M3878	371	2132
252	2055	292	2011	332	M3877	372	2131
253	2053	293	2056	333	2094	373	M3885
254	M3856	294	2067	334	2095	374	2130
255	2057	295	2076	335	2096	375	M3886
256	M3863	296	2004	336	2099	376	2127
257	2058	297	2016	337	2100	377	M3887
258	2062	298	2035	338	2098	378	2133
259	M3865	299	2037	339	2097	379	2134
260	M3864	300	2065	340	2105	380	2135
261	2063	301	2046	341	2101	381	2126
262	2059	302	2013	342	2102	382	M3888
263	2061	303	2054	343	2104	383	M3889
264	M3861	304	2003	344	2106	384	2136
265	2060	305	2008	345	2103	385	2137
266	2001	306	2068	346	2107	386	2128
267	2007	307	2006	347	2108	387	2139
268	2009	308	2069	348	2110	388	2140
269	2005	309	2039	349	M3879	389	M3890
270	2012	310	2077	350	M3880	390	2138
271	M3866	311	M3867	351	2109	391	2141
272	M3858	312	M3869	352	M3882	392	M3891
273	M3854	313	M3868	353	M3881	393	2142
274	2064	314	M3871	354	2112	394	M3892
275	2074	315	M3872	355	2111	395	2129
276	2044	316	M3873	356	2113	396	2144
277	2073	317	M3870	357	2114	397	2143
278	2083	318	2087	358	2115	398	M3893
279	2081	319	2088	359	2116	399	2148
280	2078	320	2089	360	2117	400	2149
281	2079	321	M3874	361	2118	401	M3894
282	2080	322	M3875	362	2119	402	2151
283	2075	323	2084	363	M3883	403	2153

Appendix H Table 1: Lyons Ferry Hatchery 2014 broodstock PBT tissue samples by fish ID number.

Genetic ID	Fish ID	Genetic ID	Fish ID	Genetic ID	Fish ID	Genetic ID	Fish ID
404	2154	532	3025	572	3048	612	M3932
405	2152	533	M3900	573	3042	613	3080
406	2157	534	3016	574	M3921	614	3077
407	2146	535	3027	575	3049	615	M3931
408	2156	536	3023	576	M3923	616	M3933
409	2147	537	3015	577	3050	617	3083
410	2155	538	3018	578	M3922	618	M3934
411	2150	539	3010	579	3054	619	3084
412	2145	540	3011	580	3053	620	3087
501	M3895	541	3029	581	M3924	621	3088
502	M3896	542	3005	582	3056	622	3090
503	3001	543	M3909	583	3055	623	M3936
504	M3898	544	3012	584	3052	624	3091
505	3002	545	M3910	585	3051	625	M3937
506	M3899	546	M3911	586	M3915	626	3085
507	3007	547	M3912	587	M3925	627	3078
508	M3901	548	3031	588	3059	628	3073
509	3008	549	M3913	589	3062	629	3089
510	3009	550	3033	590	3058	630	M3935
511	M3902	551	3030	591	3063	631	M3938
512	3014	552	3032	592	3057	632	3094
513	3004	553	3035	593	M3926	633	3092
514	3006	554	3037	594	3060	634	3081
515	3003	555	M3917	595	M3927	635	3082
516	3013	556	3036	596	3066	636	3086
517	M3908	557	M3918	597	M3929	637	3069
518	3019	558	M3919	598	3064	638	M3940
519	3020	559	3039	599	3061	639	M3941
520	M3907	560	3034	600	M3928	640	3097
521	M3906	561	3038	601	3067	641	M3942
522	3021	562	3041	602	3071	642	3101
523	3022	563	3043	603	M3930	643	3104
524	M3905	564	M3914	604	3070	644	3102
525	3026	565	M3916	605	3065	645	3107
526	3028	566	3044	606	3068	646	3105
527	M3904	567	3045	607	3076	647	3103
528	3024	568	3040	608	3075	648	3109
529	M3903	569	3047	609	3074	649	3108
530	3017	570	3046	610	3072	650	3093
531	M3897	571	M3920	611	3079	651	3098

Appendix H Table 1: Lyons Ferry Hatchery 2014 broodstock PBT tissue samples by fish ID number.

Genetic ID	Fish ID	Genetic ID	Fish ID	Genetic ID	Fish ID	Genetic ID	Fish ID
652	3114	692	3150	732	3180	772	3195
653	M3939	693	3151	733	3181	773	3208
654	3110	694	3146	734	3179	774	3212
655	3119	695	3135	735	3176	775	M3960
656	3099	696	3141	736	M3950	776	3210
657	3106	697	3148	737	M3951	777	3209
658	3112	698	3152	738	3183	778	3214
659	3120	699	3154	739	M3952	779	3211
660	3123	700	3159	740	3184	780	3213
661	3115	701	3158	741	3185	781	3218
662	3095	702	3157	742	3182	782	3215
663	3113	703	3160	743	3186	783	3219
664	3111	704	3164	744	3187	784	M3962
665	3096	705	3162	745	3188	785	3216
666	3100	706	3156	746	3189	786	M3961
667	3131	707	3139	747	3177	787	3217
668	3132	708	3169	748	M3953	788	M3963
669	3116	709	3165	749	M3956	789	M3964
670	3128	710	3155	750	3192	790	3220
671	3126	711	3142	751	M3955	791	3221
672	3133	712	3172	752	3193	792	3223
673	3121	713	3166	753	3190	793	M3965
674	3122	714	3170	754	3198	794	3222
675	3130	715	3153	755	M3957	795	3229
676	3129	716	3167	756	3201	796	3224
677	3125	717	3168	757	M3954	797	3230
678	3127	718	3138	758	3196	798	3234
679	M3943	719	M3947	759	3200	799	3235
680	3118	720	3171	760	3197	800	3236
681	3134	721	3161	761	3191	801	3237
682	3124	722	3136	762	3202	802	M3966
683	3117	723	3149	763	3199	803	3232
684	M3944	724	3163	764	3205	804	3225
685	M3945	725	3145	765	3207	805	3231
686	3137	726	M3948	766	3194	806	3233
687	3140	727	3173	767	3204	807	3227
688	3143	728	3175	768	M3958	808	3228
689	3144	729	M3949	769	3203	809	M3967
690	M3946	730	3178	770	M3959	810	3239
691	3147	731	3174	771	3206	811	3240

Appendix H Table 1: Lyons Ferry Hatchery 2014 broodstock PBT tissue samples by fish ID number.

Genetic ID	Fish ID	Genetic ID	Fish ID	Genetic ID	Fish ID	Genetic ID	Fish ID
812	M3968	852	3274	892	M3989	932	3307
813	3245	853	3283	893	M3987	933	3304
814	3238	854	3284	894	3287	934	M3998
815	3249	855	3282	895	M3990	935	3338
816	3251	856	3260	896	3290	936	3340
817	3252	857	M3969	897	M3991	937	M4602
818	3250	858	3277	898	3301	938	M4605
819	3253	859	3244	899	3310	939	3339
820	3257	860	3276	900	M3993	940	3337
821	3254	861	3247	901	3313	941	3320
822	3248	862	3258	902	M3996	942	M3999
823	3246	863	3242	903	M3995	943	3347
824	3241	864	M3975	904	3318	944	M4606
825	3243	865	M3977	905	3323	945	3348
826	3256	866	M3978	906	M3994	946	M4609
827	3226	867	3292	907	3317	947	3351
828	M3970	868	M3976	908	3327	948	M4607
829	3261	869	M3980	909	3326	949	3355
830	3262	870	3285	910	3322	950	3357
831	3263	871	M3979	911	M3992	951	3361
832	M3971	872	3293	912	3324	952	3352
833	3259	873	3296	913	3336	953	3363
834	M3972	874	3298	914	M3986	954	3364
835	3266	875	3299	915	3335	955	M4608
836	3265	876	3295	916	3321	956	3343
837	3268	877	3300	917	3330	957	3362
838	3267	878	M3981	918	3316	958	M4603
839	3255	879	3297	919	3332	959	3359
840	3271	880	3291	920	3325	960	3365
841	3269	881	3288	921	3319	961	3358
842	3275	882	3286	922	3315	962	3360
843	3270	883	M3982	923	3328	963	3349
844	M3973	884	M3984	924	3312	964	M4610
845	3273	885	3289	925	3334	965	3353
846	3278	886	M3985	926	3306	966	3346
847	M3974	887	M3983	927	3314	967	3341
848	3272	888	3303	928	3309	968	3356
849	3281	889	M3988	929	3311	969	3342
850	3280	890	3302	930	3308	970	3344
851	3279	891	3294	931	3305	971	3345

Appendix H Table 1: Lyons Ferry Hatchery 2014 broodstock PBT tissue samples by fish ID number.

Genetic ID	Fish ID	Genetic ID	Fish ID	Genetic ID	Fish ID	Genetic ID	Fish ID
972	3350	1012	3402	1052	3434	1092	3450
973	3369	1013	3400	1053	3435	1093	M4639
974	3354	1014	3401	1054	M4622	1094	M4642
975	3371	1015	3405	1055	M4629	1095	M4640
976	3372	1016	M3997	1056	3437	1096	3455
977	M4000	1017	3404	1057	M4632	1097	3452
978	3368	1018	3366	1058	3438	1098	M4644
979	M4613	1019	3403	1059	M4620	1099	M4643
980	3374	1020	3393	1060	3447	1100	3459
981	3375	1021	3396	1061	3445	1101	M4646
982	M4611	1022	3382	1062	3442	1102	3467
983	3370	1023	3392	1063	3431	1103	M4650
984	3377	1024	3329	1064	3444	1104	3473
985	M4614	1025	3399	1065	3441	1105	M4652
986	3378	1026	3331	1066	3443	1106	3471
987	3376	1027	M4601	1067	3436	1107	3477
988	3379	1028	M4619	1068	3419	1108	3479
989	M4615	1029	M4621	1069	3440	1109	M4653
990	3367	1030	M4627	1070	3428	1110	M4651
991	3373	1031	3407	1071	3414	1111	3472
992	M4617	1032	M4626	1072	3446	1112	3469
993	3383	1033	M4628	1073	3411	1113	3476
994	3384	1034	3406	1074	3413	1114	M4647
995	3381	1035	M4624	1075	3424	1115	3474
996	3386	1036	M4633	1076	3410	1116	M4645
997	M4616	1037	3416	1077	3408	1117	3470
998	3388	1038	M4635	1078	M4636	1118	M4637
999	3389	1039	3412	1079	3409	1119	3464
1000	3385	1040	3421	1080	3418	1120	M4648
1001	M4618	1041	3417	1081	3439	1121	3468
1002	3390	1042	M4631	1082	3430	1122	3453
1003	3380	1043	3420	1083	3415	1123	3462
1004	3387	1044	M4634	1084	3422	1124	3458
1005	3391	1045	3426	1085	3433	1125	3461
1006	M4612	1046	3429	1086	3432	1126	3478
1007	3395	1047	M4623	1087	3448	1127	3465
1008	M4604	1048	3427	1088	3423	1128	3466
1009	3397	1049	M4630	1089	3449	1129	3456
1010	3333	1050	3425	1090	M4641	1130	3454
1011	3398	1051	M4625	1091	M4638	1131	3463

Appendix H Table 1: Lyons Ferry Hatchery 2014 broodstock PBT tissue samples by fish ID number.

Genetic ID	Fish ID	Genetic ID	Fish ID	Genetic ID	Fish ID	Genetic ID	Fish ID
1132	3460	1236	4016	1276	4053	1316	4098
1133	3457	1237	M4668	1277	4058	1317	4079
1134	3475	1238	4027	1278	4055	1318	4097
1135	3451	1239	4030	1279	4054	1319	4092
1136	M4649	1240	4028	1280	4063	1320	4073
1201	4001	1241	M4670	1281	4050	1321	M4687
1202	M4654	1242	M4669	1282	4051	1322	4091
1203	4002	1243	4031	1283	4047	1323	4095
1204	M4655	1244	4025	1284	4026	1324	4093
1205	4003	1245	4011	1285	4049	1325	4082
1206	M4656	1246	M4674	1286	4057	1326	4080
1207	4005	1247	4032	1287	M4683	1327	4096
1208	M4657	1248	4033	1288	4056	1328	4083
1209	4009	1249	M4672	1289	4064	1329	4102
1210	4010	1250	4036	1290	4044	1330	4090
1211	M4658	1251	4037	1291	M4684	1331	4075
1212	4013	1252	4035	1292	4065	1332	4088
1213	4014	1253	4034	1293	4066	1333	4084
1214	M4659	1254	4038	1294	4067	1334	4099
1215	4017	1255	M4675	1295	M4685	1335	4100
1216	4019	1256	4039	1296	4068	1336	4094
1217	4018	1257	4042	1297	M4686	1337	4046
1218	M4665	1258	M4671	1298	4071	1338	4101
1219	4021	1259	4040	1299	4072	1339	4086
1220	4023	1260	4041	1300	4070	1340	M4682
1221	M4660	1261	M4677	1301	4074	1341	M4696
1222	M4661	1262	M4676	1302	4076	1342	M4673
1223	4022	1263	4045	1303	4077	1343	M4698
1224	4015	1264	4043	1304	4078	1344	M4697
1225	M4662	1265	4048	1305	M4691	1345	M4704
1226	4020	1266	M4681	1306	M4692	1346	4103
1227	M4663	1267	4029	1307	4085	1347	M4700
1228	4012	1268	M4680	1308	M4688	1348	4105
1229	4008	1269	M4679	1309	M4694	1349	M4701
1230	M4664	1270	4059	1310	4081	1350	M4705
1231	4007	1271	4061	1311	M4693	1351	M4695
1232	M4666	1272	M4678	1312	4089	1352	4110
1233	4006	1273	4062	1313	M4690	1353	4106
1234	4024	1274	4052	1314	4087	1354	M4708
1235	M4667	1275	4060	1315	M4689	1355	4109

Appendix H Table 1: Lyons Ferry Hatchery 2014 broodstock PBT tissue samples by fish ID number.

Genetic ID	Fish ID	Genetic ID	Fish ID	Genetic ID	Fish ID	Genetic ID	Fish ID
1356	4114	1396	4104	1436	4116	1476	M4742
1357	M4712	1397	M4720	1437	4179	1477	M4741
1358	4121	1398	4113	1438	4155	1478	4201
1359	4118	1399	4117	1439	4146	1479	4202
1360	4122	1400	M4719	1440	M4709	1480	M4739
1361	4123	1401	4115	1441	4126	1481	4203
1362	M4714	1402	M4721	1442	4188	1482	M4736
1363	M4716	1403	4148	1443	4187	1483	4204
1364	M4715	1404	4154	1444	4143	1484	4206
1365	4130	1405	4149	1445	4181	1485	4210
1366	4108	1406	M4726	1446	4185	1486	M4743
1367	M4710	1407	4151	1447	4183	1487	4211
1368	4131	1408	M4725	1448	4184	1488	4212
1369	M4713	1409	4150	1449	4194	1489	M4749
1370	4107	1410	M4727	1450	4192	1490	4216
1371	4112	1411	4156	1451	4165	1491	4217
1372	4137	1412	4158	1452	4191	1492	M4753
1373	4139	1413	M4728	1453	4164	1493	M4744
1374	4140	1414	4141	1454	4167	1494	4213
1375	M4702	1415	M4729	1455	4173	1495	M4754
1376	4144	1416	4163	1456	4178	1496	4218
1377	M4703	1417	M4723	1457	4157	1497	4221
1378	4145	1418	4166	1458	4175	1498	M4756
1379	4136	1419	4153	1459	4172	1499	4226
1380	4147	1420	M4730	1460	4189	1500	M4758
1381	M4711	1421	M4718	1461	4152	1501	4229
1382	M4699	1422	4161	1462	4186	1502	4228
1383	4132	1423	M4724	1463	4159	1503	M4759
1384	4133	1424	4168	1464	4127	1504	4234
1385	4138	1425	4170	1465	4195	1505	4230
1386	4142	1426	M4722	1466	4196	1506	M4748
1387	4129	1427	4174	1467	4197	1507	4233
1388	4128	1428	4176	1468	M4733	1508	4232
1389	4124	1429	4134	1469	4198	1509	4231
1390	4125	1430	4180	1470	4199	1510	4224
1391	4135	1431	M4731	1471	4200	1511	4222
1392	4119	1432	4162	1472	M4732	1512	4225
1393	M4707	1433	M4717	1473	M4737	1513	4215
1394	M4706	1434	4120	1474	M4738	1514	4223
1395	4111	1435	4169	1475	M4740	1515	4220

Appendix H Table 1: Lyons Ferry Hatchery 2014 broodstock PBT tissue samples by fish ID number.

Genetic ID	Fish ID	Genetic ID	Fish ID	Genetic ID	Fish ID	Genetic ID	Fish ID
1516	M4757	1556	4266	1596	4289	1636	4281
1517	4219	1557	M4761	1597	4245	1637	4297
1518	M4735	1558	M4772	1598	M4768	1638	4302
1519	M4752	1559	4269	1599	M4787	1639	4300
1520	4208	1560	4265	1600	M4796	1640	4305
1521	M4747	1561	4258	1601	4290	1641	4315
1522	M4755	1562	M4771	1602	4276	1642	4318
1523	4227	1563	4267	1603	4279	1643	4310
1524	M4746	1564	4270	1604	M4799	1644	4278
1525	M4734	1565	M4777	1605	M4800	1645	4312
1526	M4751	1566	4268	1606	4292	1646	1301
1527	4205	1567	M4775	1607	4280	1647	4282
1528	4209	1568	M4764	1608	M4797	1648	4287
1529	4253	1569	M4776	1609	M4773	1649	4264
1530	4214	1570	M4779	1610	4296	1650	M4784
1531	M4750	1571	4238	1611	4298	1651	M4783
1532	M4745	1572	4283	1612	4294	1652	4237
1533	4235	1573	M4782	1613	M4786	1653	4263
1534	4207	1574	M4778	1614	M4781	1654	4316
1535	4236	1575	4272	1615	4299	1655	M4794
1536	4239	1576	4257	1616	4303	1656	4244
1537	M4760	1577	4274	1617	4293	1657	4319
1538	4240	1578	M4788	1618	M4774	1658	4262
1539	4241	1579	4275	1619	4306	1659	4321
1540	M4762	1580	4284	1620	4304	1701	4323
1541	4247	1581	M4789	1621	4308	1702	M4812
1542	4246	1582	4285	1622	4314	1703	M4802
1543	4248	1583	M4793	1623	M4785	1704	4325
1544	M4767	1584	4286	1624	M4790	1705	M4810
1545	4250	1585	4277	1625	4313	1706	M4813
1546	4254	1586	M4792	1626	M4765	1707	4324
1547	M4770	1587	4288	1627	4320	1708	4331
1548	4256	1588	4251	1628	4317	1709	M4805
1549	4252	1589	M4798	1629	4295	1710	4333
1550	4255	1590	4242	1630	M4791	1711	4330
1551	4259	1591	M4766	1631	4307	1712	4332
1552	4260	1592	4249	1632	4309	1713	4336
1553	4261	1593	4291	1633	M4780	1714	4328
1554	M4769	1594	M4795	1634	4271	1715	M4811
1555	M4763	1595	4273	1635	4311	1716	M4804

Appendix H Table 1: Lyons Ferry Hatchery 2014 broodstock PBT tissue samples by fish ID number.

Genetic ID	Fish ID	Genetic ID	Fish ID	Genetic ID	Fish ID	Genetic ID	Fish ID
1717	4326	1757	4358	1797	M4860	1837	4421
1718	4322	1758	M4825	1798	4367	1838	M4881
1719	4337	1759	4363	1799	M4859	1839	4424
1720	M4819	1760	4361	1800	4386	1840	M4886
1721	4327	1761	4360	1801	M4858	1841	4429
1722	M4816	1762	M4846	1802	4387	1842	4432
1723	4348	1763	4368	1803	4392	1843	M4888
1724	4341	1764	M4849	1804	M4868	1844	4414
1725	4350	1765	4359	1805	M4869	1845	4416
1726	4334	1766	4375	1806	4393	1846	4419
1727	4344	1767	4365	1807	4383	1847	4400
1728	M4821	1768	M4848	1808	4394	1848	4436
1729	M4826	1769	M4815	1809	4395	1849	M4891
1730	M4832	1770	4371	1810	M4874	1850	4433
1731	4346	1771	M4845	1811	4378	1851	4404
1732	4355	1772	4364	1812	M4873	1852	M4889
1733	M4809	1773	4374	1813	4397	1853	4425
1734	4353	1774	M4851	1814	M4871	1854	M4892
1735	4339	1775	4369	1815	4402	1855	M4890
1736	4342	1776	4366	1816	M4870	1856	4435
1737	M4834	1777	M4835	1817	4405	1857	M4887
1738	M4831	1778	M4836	1818	4407	1858	4428
1739	4352	1779	4370	1819	4403	1859	4431
1740	M4824	1780	M4850	1820	4409	1860	4438
1741	4347	1781	M4843	1821	4410	1861	M4885
1742	4335	1782	M4838	1822	4411	1862	4437
1743	M4830	1783	4376	1823	4412	1863	4401
1744	4340	1784	M4844	1824	M4865	1864	M4893
1745	4349	1785	4377	1825	M4862	1865	M4895
1746	4329	1786	4362	1826	4389	1866	4442
1747	M4833	1787	M4853	1827	M4867	1867	M4896
1748	4338	1788	M4855	1828	4380	1868	4451
1749	4351	1789	M4854	1829	M4861	1869	M4900
1750	4345	1790	M4829	1830	M4866	1870	4452
1751	4343	1791	M4837	1831	M4864	1871	M4901
1752	M4801	1792	M4839	1832	4423	1872	4448
1753	M4818	1793	4373	1833	4422	1873	4444
1754	M4807	1794	4356	1834	M4877	1874	4446
1755	4357	1795	M4847	1835	4426	1875	M4903
1756	M4808	1796	M4857	1836	4406	1876	4455

Appendix H Table 1: Lyons Ferry Hatchery 2014 broodstock PBT tissue samples by fish ID number.

Genetic ID	Fish ID	Genetic ID	Fish ID	Genetic ID	Fish ID	Genetic ID	Fish ID
1877	M4909	1917	M4856	1957	4484	1997	M4932
1878	4458	1918	M4897	1958	M4937	1998	M4899
1879	4454	1919	M4921	1959	4488	1999	M4894
1880	4460	1920	M4922	1960	M4936	2000	M4827
1881	4391	1921	M4840	1961	4473	2001	M4920
1882	M4916	1922	M4841	1962	4494	2002	M4904
1883	4462	1923	M4908	1963	4493	2003	M4884
1884	4413	1924	M4882	1964	4470	2004	M4926
1885	M4912	1925	M4913	1965	4492	2005	M4883
1886	4415	1926	M4875	1966	M4934	2006	4467
1887	4459	1927	M4806	1967	4491	2007	4449
1888	M4914	1928	M4876	1968	M4935	2008	4447
1889	4439	1929	M4820	1969	4495	2009	M4939
1890	M4823	1930	M4924	1970	4498	2010	4474
1891	4453	1931	4450	1971	4500	2011	4417
1892	4440	1932	4466	1972	4501	2012	4420
1893	4434	1933	M4878	1973	M4930	2013	4418
1894	M4814	1934	M4929	1974	4502	2014	4398
1895	4430	1935	4461	1975	4503	2015	4465
1896	M4842	1936	M4928	1976	M4931	2016	M4872
1897	4443	1937	4456	1977	4499	2017	4390
1898	4441	1938	4381	1978	4504	2018	4396
1899	4382	1939	4457	1979	4505	2019	M4863
1900	4399	1940	4472	1980	4489	2020	4385
1901	4388	1941	M4925	1981	4486	2021	4384
1902	4379	1942	M4923	1982	4480	2022	4354
1903	4408	1943	M4927	1983	4490	2023	4372
1904	M4902	1944	4479	1984	M4817	2024	M4852
1905	M4915	1945	M4917	1985	4487	2101	M4946
1906	M4880	1946	4476	1986	M4911	2102	M4944
1907	M4803	1947	4481	1987	4469	2103	M4947
1908	M4907	1948	M4938	1988	4477	2104	M4952
1909	M4822	1949	4478	1989	4464	2105	M4951
1910	M4898	1950	M4942	1990	4463	2106	M4955
1911	4427	1951	4483	1991	M4933	2107	M4958
1912	M4879	1952	4475	1992	M4919	2108	M4960
1913	M4828	1953	M4940	1993	4497	2201	M4943
1914	M4905	1954	4482	1994	4468	2202	M4945
1915	M4910	1955	4485	1995	4471	2203	3507
1916	M4918	1956	M4941	1996	M4906	2204	3506

Appendix H Table 1: Lyons Ferry Hatchery 2014 broodstock PBT tissue samples by fish ID number.

Genetic ID	Fish ID	Genetic ID	Fish ID	Genetic ID	Fish ID	Genetic ID	Fish ID
2205	3505						
2206	3502						
2207	3501						
2208	3503						
2209	3504						
2210	3509						
2211	3512						
2212	3511						
2213	3510						
2214	3513						
2215	3508						
2216	3514						
2217	M4948						
2218	M4949						
2219	M4950						
2220	M4953						
2221	3516						
2222	3515						
2223	3517						
2224	3518						
2225	3520						
2226	3519						
2227	3521						
2228	M4954						
2229	M4956						
2230	M4957						
2231	M4959						
2232	M4961						
2233	M4962						

Appendix I: Historical Size at Age of Return of CWT LSRCP Origin Fish Processed by WDFW: 1985-2013

(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. 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 I Table 1: Size at age of return in 1985-1990 by sex for CWT LSRCP fish processed by WDFW that were from 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=	241	88	552	-	-	-
		Median (cm)	**36**	**54**	**80**	**-**	**-**	**-**
		Range (cm)	29-49	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	200	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 I Table 2: Size at age of return in 1991-1996 by sex for CWT LSRCP fish processed by WDFW that were from 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	-	161	22	-	-
		Median (cm)	**34**	**-**	**73**	**89**	**-**	**-**
		Range (cm)	29-39	-	46-110	60-102	-	-
	Female	N=	-	-	241	34	1	-
		Median (cm)	**-**	**-**	**71**	**80**	**85**	**-**
		Range (cm)	-	-	55-90	68-94	85	-
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 I Table 3: Size at age of return in 1997-2002 by sex for CWT LSRCP fish processed by WDFW that were from 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	76-82	-
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=	412	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**	**-**
		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 I Table 4: Size at age of return in 2003-2008 by sex for CWT LSRCP fish processed by WDFW that were from 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	31-97	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**	**81**	**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 I Table 5: Size at age of return in 2009-2013 by sex for CWT LSRCP fish processed by WDFW that were from 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=	-	545	389	11	1	-
		Median (cm)	**-**	**65**	**77**	**85**	**-**	-
		Range (cm)	-	53-88	61-90	80-92	80	-
2010	Male	N=	137	201	161	4	1	-
		Median (cm)	**35**	**59**	**77**	**93**	**-**	-
		Range (cm)	30-56	48-77	50-105	84-100	89	-
	Female	N=	-	20	504	20	-	-
		Median (cm)	**-**	**67**	**79**	**86**	**-**	-
		Range (cm)	-	53-74	55-98	72-92	-	-
2011	Male	N=	165	457	155	7	-	-
		Median (cm)	**35**	**57**	**72**	**85**	**-**	**-**
		Range (cm)	32-45	41-72	60-89	78-102	-	-
	Female	N=	-	142	526	53	2	-
		Median	**-**	**64**	**76**	**80**	**-**	**-**
		Range	-	55-79	63-90	66-91	80-87	-
2012	Male	N=	342	438	120	6	-	-
		Median (cm)	**35**	**56**	**69**	**84**	**-**	-
		Range (cm)	28-67	32-69	51-92	56-94	-	-
	Female	N=	-	24	475	59	2	-
		Median (cm)	**-**	**63**	**76**	**83**	**-**	**-**
		Range (cm)	-	50-68	62-89	72-95	77-86	-
2013	Male	N=	260	263	193	10	-	-
		Median (cm)	**35**	**57**	**71**	**79**	**-**	**-**
		Range (cm)	29-54	38-73	52-88	68-90	-	-
	Female	N=	-	60	393	62	1	-
		Median (cm)	**-**	**61**	**72**	**78**	**-**	**-**
		Range (cm)	-	49-85	62-83	68-91	82	-

Appendix I Table 6: Size at age of return in 1985-1990 by sex for CWT LSRCP fish processed by WDFW that were from 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)	**-**	**-**	**-**	**81**	**-**	**-**	-
		Range (cm)	-	-	74-76	66-99	-	-	-
1989	Male	N=	-	6	112	19	5	-	-
		Median (cm)	**-**	**44**	**63**	**81**	**100**	**-**	-
		Range (cm)	-	43-50	41-76	57-95	96-105	-	-
	Female	N=	-	-	42	50	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 I Table 7: Size at age of return in 1991-1996 by sex for CWT LSRCP fish processed by WDFW that were from 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)	**-**	**47**	**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 I Table 8: Size at age of return in 1997-2002 by sex for CWT LSRCP fish processed by WDFW that were from 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)	-	32-61	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 I Table 9: Size at age of return in 2003-2008 by sex for CWT LSRCP fish processed by WDFW that were from 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**	**-**	**-**	**-**	**-**
		Range (cm)	-	31-55	46-85	65	89	-	-
	Female	N=	-	-	176	5	-	-	-
		Median (cm)	**-**	**-**	**73**	**78**	**-**	**-**	**-**
		Range (cm)	-	-	55-82	69-85	-	-	-

Appendix I Table 10: Size at age of return in 2009-2013 by sex for CWT LSRCP fish processed by WDFW that were from 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	**-**	**48**	**67**	**78**	**-**	**-**	**-**
		Range	-	39-61	52-80	63-107	-	-	-
	Female	N=	-	-	16	102	-	-	-
		Median	**-**	**-**	**73**	**83**	**-**	**-**	**-**
		Range	-	-	65-80	70-94	-	-	-
2010	Male	N=	-	51	216	-	2	-	-
		Median	**-**	**51**	**68**	**-**	**-**	**-**	**-**
		Range	-	42-64	52-88	-	88-90	-	-
	Female	N=	-	-	185	4	6	-	-
		Median	**-**	**-**	**74**	**85**	**89**	**-**	**-**
		Range	-	-	65-84	78-86	79-99	-	-
2011	Male	N=	-	204	40	17	-	-	-
		Median	**-**	**47**	**68**	**80**	**-**	**-**	**-**
		Range	-	34-60	53-81	61-86	-	-	-
	Female	N=	-	1	48	122	-	-	-
		Median	**-**	**-**	**72**	**82**	**-**	**-**	**-**
		Range	-	45	61-86	63-99	-	-	-
2012	Male	N=	-	371	627	7	2	-	-
		Median	**-**	**48**	**65**	**75**	**-**	**-**	**-**
		Range	-	35-62	41-85	65-84	81-88	-	-
	Female	N=	-	-	255	56	10	-	-
		Median	**-**	**-**	**71**	**80**	**82**	**-**	**-**
		Range	-	-	54-82	72-88	70-92	-	-
2013	Male	N=	-	10	116	42	-	-	-
		Median	**-**	**46**	**69**	**75**	**-**	**-**	**-**
		Range	-	41-58	51-78	62-99	-	-	-
	Female	N=	-	-	104	95	2	-	-
		Median	**-**	**-**	**70**	**78**	**-**	**-**	**-**
		Range	-	-	57-80	65-89	90	-	-

Appendix J: Egg Take and Early Life Stage Survival Brood Years: 1990-2009

Appendix J Table 1: Egg take and survival numbers by life stage of Lyons Ferry origin fall Chinook spawned at LFH, brood years 1990-2009.

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
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
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
2008	5,010,224	0	1,810,800	2,969,200	1,000,000	Yearling
					1,969,200	Subyearling
2009	4,574,182	0	1,507,300	2,853,020	977,667	Yearling
					1,875,353	Subyearling

[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 K: LFH/Snake River Origin Fall Chinook Releases Brood Years: 2008-2013

Appendix K Table 1: 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]
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 hatchery-IPC-direct	8 May	107482	51,950	-	5,836	-	54.7			4,900
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			13,479
2010	Y	2008	LFH	12-15 April	635165	-	221,376	-	3,273	9.8			13,490
2010	Y	2008	CJ1	5 April	220305	70,925	-	1,284	-	8.0			8,922

Appendix K Table 1: 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	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
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			14,932

Appendix K Table 1: 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]
2011	Y	2009	LFH	12-15 April	635510	-	236,175	-	163	9.9			14,940
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
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			14,930

Appendix K Table 1: 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]
2012	Y	2010	LFH	10-13 Apr	636079		236,056		4,882	10.4			14,914
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
2012	S	2011	LFH	29-30 May	636417	198,228	261	2,270	141	50.0			19,943
2012	S	2011	CJ1	21 May	220326	101,194		202		47.0			20,586
2012	S	2011	CJ1	21 May	220327		100,818		303,514	47.0			20,469
2012	S	2011	BC1	23 May	220329	101,565				46.0			20,555
2012	S	2011	BC1	23 May	220328		101,327		308,737	46.0			20,507
2012	S	2011	PL1	22 May	220324	100,850		405		47.0			16,497
2012	S	2011	PL1	22 May	220325		100,500		200,645	47.0			16,373
2012	S	2011	Couse Creek Direct [vs. CJ1 Accl. Study]	29-30 May	636418	194,955	658	3,548	139	54.0			16,313
2012	S	2011	GRR Direct	24 May	636419	192,996		9,723	181,281	48.0			32,432
2012	S	2011	Snake R. below HC Dam-Oxbow hatchery-IPC-direct	3 May	100201	187,146		15,135		48.0			14,910
2012	S	2011	Snake R. below HC Dam-Irrigon hatchery-IPC-direct	22-24 May	090587	200,844	273	587,232	12,051	46.0			36,927
2012	S	2011	NPTH-Lukes Gulch Accl..	13 June	220213	94,079		5,305		49.6			8,179
2012	S	2011	NPTH-Lukes Gulch Accl.	13 June	220214		99,570		496	49.6			8,236
2012	S	2011	NPTH-Cedar Flats Accl..	12 June	220215	96,099		1,276		51.7			8,110
2012	S	2011	NPTH-Cedar Flats Accl.	12 June	220216		95,710		5,771	51.7			8,451
2012	S	2011	NPTH-North Lapwai Valley Accl.	8&30 May	220224		191,699		268,454	115/54			2,440
2012	S	2011	NPTH-North Lapwai Valley Accl.	8&30 May	220218	98,697		4,363		115/54			546
2012	S	2011	NPTH-Site 1705	11-15 June	220223		202,095		291,091	51/53			4,877
2012	S	2011	NPTH-Site 1705	11-15 June	220217	103,487		1,813		51/53			1,041
2012	S	2011	Snake R. at Couse Creek-Surrogates	21 May-8 June	none				226,852				226,786
2012	S	2011	Clearwater R. at BC-Surrogates	18 June-6 July	none				101,062				92,964
2013	Y	2011	LFH	10-12 Apr	636444	240,413	809	809	1,618	10.2			14,675
2013	Y	2011	LFH	10-12 Apr	636443		243,085		2,766	10.2			14,531
2013	Y	2011	CJ1	1 Apr	220335	71,930		580		9.5			1,372

Appendix K Table 1: 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]
2013	Y	2011	CJ1	1 Apr	220332		89,993		720	9.5			1,716
2013	Y	2011	BC1	17 Apr	220333	71,973		580		9.8			1,369
2013	Y	2011	BC1	17 Apr	220331		85,359		1,005	9.8			1,629
2013	Y	2011	PL1	16 Apr	220334	71,679		564		9.7			1,285
2013	Y	2011	PL1	16 Apr	220330		88,908		1,761	9.7			1,612
2013	S	2012	LFH	10 May	636574	210,494	138	967		68.0			19,772
2013	S	2012	CJ1	17 May	220141	101,234				47.0			1,497
2013	S	2012	CJ1	17 May	220143		100,631		297,721	47.0			1,489
2013	S	2012	BC1	22 May	220142	100,804		202		44.0			1,505
2013	S	2012	BC1	22 May	220144		99,807		301,474	44.0			1,488
2013	S	2012	PL1	20 May	220145	100,673		404		44.0			1,495
2013	S	2012	PL1	20 May	220146		101,085		195,865	44.0			1,495
2013	S	2012	Couse Creek Direct [vs. CJ1 Accl. Study]	9-10 May	636575	202,159	2,012	1,006	123	68.0			2,985
2013	S	2012	GRR Direct	21 May	636576	216,159	430	861	183,093	49.5			3,000
2013	S	2012	Snake R. below HC Dam-Irrigon hatchery-IPC-direct	20-22 May	90703	228,054	156	651,123	413	50.4			2,994
2013	S	2012	NPTH-Cedar Flats Accl.	10 June	220221		101,113		10,899	49.4			1,570
2013	S	2012	NPTH-Cedar Flats Accl.	10 June	220222	97,468		4,384		49.4			1,427
2013	S	2012	NPTH-Lukes Gulch Accl.	11 June	220219		94,062		11,357	48.5			1,545
2013	S	2012	NPTH-Lukes Gulch Accl.	11 June	220220	96,387		2,524		48.5			1,450
2013	S	2012	NPTH-North Lapwai Valley Accl.	10 May	220231		199,689		194,398	85.0			2,374
2013	S	2012	NPTH-North Lapwai Valley Accl.	10 May	220225	100,435		1,015		85.0			611
2013	S	2012	NPTH-Site 1705	7 June	220232		194,561		387,401	74.0			2,532
2013	S	2012	NPTH-Site 1705	13 June	220226	97,477		7,154		74.0			455
2014	Y	2012	LFH	8-11 April	636583		250,362		2,019	9.6			14,902
2014	Y	2012	LFH	8-11 April	636584	247,714	1,673	502	1,003	9.6			14,908
2014	Y	2012	CJ1	1 April	220338		86,972		350	9.9			530
2014	Y	2012	CJ1	1 April	220339	76,256		306		9.9			464
2014	Y	2012	BC1	17 April	220336		86,380		580	8.8			526
2014	Y	2012	BC1	17 April	220341	75,180		1,274		8.8			463
2014	Y	2012	PL1	14 April	220337		88,140		295	9.0			533
2014	Y	2012	PL1	14 April	220340	76,657		774		9.0			466
2014	S	2013	LFH	3 June	636737	203,004	402	5,896	670	50.0			19,969

Appendix K Table 1: 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]
2014	S	2013	CJ1	21 May	220346	101,241		2,801		47.0			1,024
2014	S	2013	CJ1	21 May	220343		99,142		308,643	47.0			975
2014	S	2013	BC1	22 May	220345	94,950		9,588		49.7			1,023
2014	S	2013	BC1	22 May	220342		98,628		324,660	49.7			966
2014	S	2013	PL1	20 May	220347	100,063		1,404		53.0			1,008
2014	S	2013	PL1	20 May	220344		99,455		199,946	53.0			989
2014	S	2013	CJ 2nd Release	6 June	636738	185,799		5,352		53.4			1,999
2014	S	2013	GRR Direct	21 May	636739	191,711	434	9,983	201,798	48.9			2,999
2014	S	2013	Snake R. below HC Dam-Irrigon hatchery-IPC-direct	19 May	090818	191,092	525	717,974	2,023	49.4			3,000
2014	S	2013	NPTH-Cedar Flats Accl.	10 June	220235		99,344		50,375	49.7			1,181
2014	S	2013	NPTH-Cedar Flats Accl.	10 June	220233	102,430		740		49.7			813
2014	S	2013	NPTH-Lukes Gulch Accl.	10 June	220236		103,285		50,399	47.6			1,203
2014	S	2013	NPTH-Lukes Gulch Accl.	10 June	220234	100,870		729		47.6			795
2014	S	2013	NPTH-North Lapwai Valley Accl.	11 June	220240		202,383		110,492	63.5			1,501
2014	S	2013	NPTH-North Lapwai Valley Accl.	11 June	220238	100,911		1,770		63.5			492
2014	S	2013	NPTH-Site 1705	11 June	220239		207,537		215,099	52.5			1,605
2014	S	2013	NPTH-Site 1705	11 June	220237	102,898		744		52.5			394
2015	Y	2013	LFH	6-8 April	636740		221,511		3,415	9.7			13,318
2015	Y	2013	LFH	6-8 April	636741	219,396	732	6,294	1,025	9.7			14,949
2015	Y	2013	CJ1	1 April	220353	72,145			72,145	9.6			470
2015	Y	2013	CJ1	1 April	220350		80,656		324	9.6			528
2015	Y	2013	BC1	10 April	220351	72,369		145	72,514	9.7			466
2015	Y	2013	BC1	10 April	220348		81,558		808	9.7			529
2015	Y	2013	PL1	9 April	220352	72,595		144	72,739	9.6			467
2015	Y	2013	PL1	9 April	220349		82,413		324	9.6			531

[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 L: Historical Estimated Survivals (%) Between Various Life Stages at LFH Brood Years: 1990-2008

Appendix L Table 1: Estimated survivals (%) between various life stages at LFH for fall Chinook of LFH/Snake River hatchery origin.

Brood year	Release age	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
Yearling mean:	**%**	**92.8**	**90.7**	**84.1**
	SD	**2.6**	**9.4**	**8.3**
Subyearling mean:	**%**	**93.3**	**97.8**	**90.7**
	SD	**2.3**	**4.2**	**3.6**

Appendix M: Tucannon River Survey Sections and Historical Escapement

Appendix M 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, 2014.

Section	Description	Length of section (km)[a]	Length surveyed (km)	% of productive reach surveyed[b]	Estimated total # of Redds[c]
1	Mouth of Tucannon R to highway 261 Bridge	2.8	1.7	100	32
2	Highway 261 Bridge to Smolt trap	0.2	0.2	100	9
3	Smolt trap to Powers Bridge	0.5	0.5	100	46
4	Powers Bridge to upper hog barns	1.2	1.2	100	26
5	Hog barns to Starbuck Br.	2.5	2.4	96	40.6
6	Starbuck Br. To Fletchers Dam	2.7	1.3	48	70.6
7	Fletcher's Dam to Smith Hollow	2.9	2.9	100	24
8	Smith Hollow to Ducharme's Sheep Ranch Br.	4.4	4.4	100	31
9	Ducharme's Bridge to Highway 12	5.5	5.5	100	19
10	Highway 12 to Brines Bridge	6.2	6.2	100	4
11	Brines Bridge to 4.7 km above Brines Bridge	4.7	4.7	100	1
	Total	**33.6**	**31.0**	**95**	**303**

[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 M Table 2: Estimated escapement, % stray component of the run, and number of redds (observed and estimated), estimates of smolts/redd, and total number of emigrants from fall Chinook spawning in the Tucannon River, and parent to progeny ratios, 1985-2000.

	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

[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.

Escapement and Composition of Coho Run to the Tucannon River in 2014

Tissue samples (fin clips and head tissue) were collected and archived from 11 coho. Coho produced an estimated 39 redds when expanded for areas not surveyed. Eleven Coho carcasses were recovered resulting in a 9.5% sample of the total Coho escapement estimate. The majority of Coho were untagged fish of unknown origin (Appendix M, Table 3).

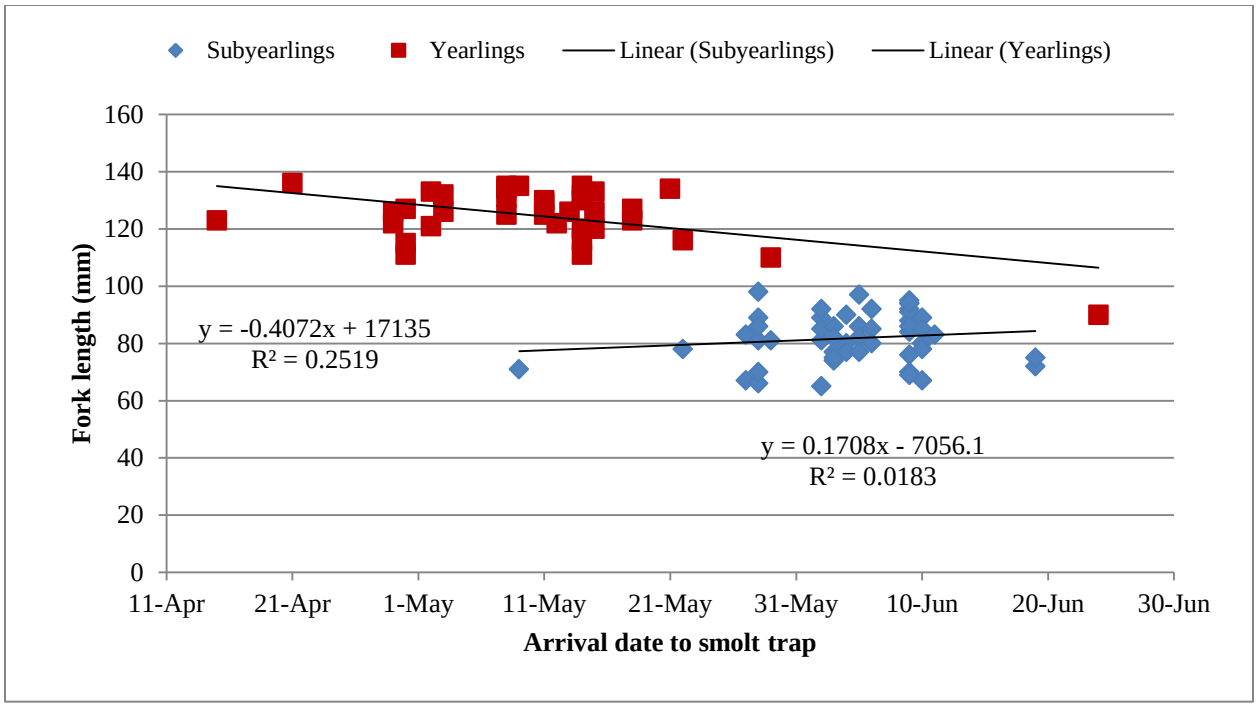
Appendix M Table 3. Composition of Coho carcasses recovered on the Tucannon River in 2014.

	Females			Males			
Origin	**AD clip**	**No clip**	**Unknown**	**AD clip**	**No clip**	**Unknown**	**Totals**
Wire tagged coho							
Clearwater (CWTs) 220008	0	0	0	0	1	0	1
No wire							
Unknown origin	2	2	0	0	6	0	10
Total	**2**	**2**	**0**	**0**	**7**	**0**	**11**

Juvenile Coho Emigration

Juvenile coho salmon were also captured at the Tucannon River smolt trap. Mark-recapture trap efficiencies were calculated, but were highly variable. Excluding the invalid tests, efficiencies averaged 13.2% during the trapping period (Table 27). Staff captured 122 coho but could not estimate the number of naturally produced coho parr and smolts that passed the Tucannon River smolt trap during 2014 as there were not enough recaptures. Juvenile coho were observed at the smolt trap from 27 February through 24 June. Median passage date was 22 May. Staff took fork lengths on all 122 fish which ranged from 25-140 mm in length, with a mean of 92 mm and median of 89 mm. Weights from 111 fish ranged from 2.1-28.1 g. with a mean of 12.5 and a median of 9.5 g. K-factors ranged from 0.76-1.91, with a mean of 1.19 and median of 1.17.

Based on scale results and fork length, it was determined there are two age classes of coho emigrants as shown in Appendix M Figure 1. There is a correlation between size and arrival date for yearlings, but no correlation subyearlings. Of the 86 scale samples taken for coho, 50 were determined to be subyearlings. Fork lengths of the subyearlings ranged from 65-98 mm with a mean and median of 82 mm. Yearlings ranged from 90-136 mm in length with a mean of 125 mm and a median of 126 mm.



Appendix M Figure 1. Arrival dates and sizes of natural origin coho trapped on the Tucannon River in 2014 by age classes.