Nez Perce Tribal Hatchery Monitoring and Evaluation Project

Fall Chinook Salmon (*Oncorhynchus tshawytscha*) Supplementation in the Clearwater River Subbasin

Annual Report 2012

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EXECUTIVE SUMMARY

For this 2012 report we have incorporated the Nez Perce Tribal Hatchery (NPTH) M&E Project and the Fall Chinook Acclimation Project (FCAP) M&E. This is year eleven of fall Chinook salmon Monitoring and Evaluation (M&E) for the Nez Perce Tribal Hatchery (NPTH) located on the lower Clearwater River in Idaho and year seventeen for the FCAP Project. Phase I of the NPTH is to produce 625,000 spring and 1.4 million fall Chinook salmon for supplementation releases in the Clearwater River Subbasin. The NPTH fall Chinook salmon subyearling release goal of 1.4 million was met and exceeded by 160,005 fish for 2012. For the FCAP subyearlings, total releases were close to the goal of 1.4 million with a total of 1,419,757 fish reported released. The FCAP total release goal of 450,000 yearlings was exceeded by 39,871 fish. A grand total of 3,469,633 fall Chinook salmon were released by the Nez Perce Tribe in 2012. Coded wire tagging (CWT) and marking (adipose fin clipping) goals were met for all fall Chinook releases in 2012. Final CWT retention rates were high on all CWT groups and ranged between 0.982-1.0. The average condition factors (K-factors) on all NPTH and asscociated release sites and ranged between 0.93 and 1.32.

All fall Chinook salmon yearling and subyearling releases from FCAP and NPTH facilities were made prior to warm (>16 ^{o}C) summer water temperatures. The releases for the FCAP yearlings occurred in late March and mid-April while the FCAP subyearlings were released in late May. The Captain John yearling release was made on March 28, two weeks earlier than the Big Canyon and Pittsburg Landing yearling releases due to an earlier acclimation timing. The subyearling releases from NPTH facilities occurred in mid-June, except for the North Lapwai Valley acclimated group which was released two weeks earlier because water temperatures were warming in Lapwai Creek and at the facility. Temperatures in the upper Clearwater River Subbasin exceeded 20 ^{o}C throughout much of July and August with the lower Clearwater varying between a more moderate 11-13 ^{o}C during the same period because of cold water releases from Dworshak Reservoir. Most first detections at Lower Granite Dam (LGR) for all FCAP, NPTH and associated acclimated releases occurred before temperatures exceed 20 ^{o}C in the Snake River. Cold water releases from Dworshak Reservoir moderated warm Snake River temperatures by 2-3 ^{o}C keeping water temperatures below or near 20 ^{o}C at LGR during July and August. Detections of natural fall Chinook occurred from mid-July thru mid-December when temperatures at LGR were 20 ^{o}C and below. Most hatchery fall Chinook detections from FCAP and NPTH releases occurred during the spill period at LGR. In contrast, few PIT tagged natural fall Chinook could have experienced summer spill as most detections occurred later in the fall. For genetic monitoring, we collected a random non-lethal subsample (upper caudal fin clips) from 207 natural subyearling Chinook salmon captured on the Clearwater River during 2012.

Using Passive Integrated Transponder (PIT) tag technology we monitored hatchery and naturally produced fall Chinook salmon in the lower Clearwater and Snake rivers. Through beach seining we sampled a total of 1,691 natural Chinook salmon subyearlings on the lower Clearwater River of which 1,614 were large enough ($\geq$ 50 mm) to PIT tag. We also recaptured 23 natural fish that averaged 0.79 mm of growth per day. Average K-factor for natural fish was 1.14 at the time of tagging. Estimated index survivals of PIT tagged natural subyearling fall Chinook salmon from the Clearwater River to LGR was 24.0%, but could not be calculated to McNary Dam. The natural fish from the Clearwater River had 45 detections in 2013 as holdover yearlings,

representing 13.2% of the total number of unique PIT tags detected. Only 35 (0.25%) hatchery fall Chinook released in 2012 from the NPTH and associated acclimation facilities were detected in 2013 as holdovers. The FCAP yearling and subyearling 2012 releases were not detected as juveniles holdovers in 2013. Estimated index survival for the NPTH on-station release was 79.0% to LGR and 63.0% to McNary Dam. The estimated index survivals for the NPTH acclimation releases were 68.0% and 47.0% for Cedar Flats, 85.0% and 64.0% for Luke's Gulch, and 71.0% and 84.0% for NLV to LGR and McNary Dam, respectively. The estimated index survival to LGR for subyearling releases from FCAP facilities ranged between 79.0% from Big Canyon to 85.0% from the Pittsburg acclimation sites. Estimated index survival to LGR for the FCAP yearling acclimated releases ranged between 93.0% from the Pittsburg Landing acclimation site to 94.0% from both the Big Canyon and Captain John acclimation sites. As in previous years, the NPTH acclimated releases from Luke's Gulch and Cedar Flats migrated at a faster rate (22.5 and 17.2 Rkm/d, respectively) than the other NPTH releases to LGR, while the natural fall Chinook from the Clearwater River migrated much slower (0.90 Rkm/d) on average to LGR. The yearling and subyearling releases from the PLAP facility migrated at a faster rate (27.1 and 16.9 Rkm/d, respectively) to LGR than the other FCAP releases.

During aerial fall Chinook surveys during 2012, we observed a total of 1,118 redds and estimated a total of 1,610 redds in the mainstem Clearwater River. Aerial surveys on the Potlatch and the N.F. Clearwater rivers resulted in 283 redds and zero redds observed, respectively. We also observed one redd in Big Canyon Creek. The M.F. Clearwater, S.F. Clearwater, and the Selway rivers redd counts resulted in 1, 41, and 20 redds, respectively. Surveys on the Grande Ronde, Imnaha, and Salmon rivers resulted in a total of 303, 85, and 34 redds observed, respectively. One spawning ground survey on Alpowa Creek resulted in 6 fall Chinook redds observed. There were a total of 4,254 fall Chinook salmon redds counted and/or estimated above Lower Granite during 2012 representing the third highest in the Snake River Basin since surveys began in 1988.

The total fall Chinook salmon returning to Lower Granite Dam (LGR) in 2012 was estimated to be 36,248 adults and 18,902 jacks for a total of 55,150 fish. During 2012, the number of fall Chinook salmon trapped and hauled from LGR to NPTH and LFH for broodstock needs and run reconstruction purposes was 948 and 5,056 fish, respectively. The fall Chinook salmon escapement estimate to the spawning grounds was 30,363 adults and 16,884 jacks for a total of 47,247 fish. It was estimated that the natural adult escapement above Lower Granite was 11,315 (37.3%) and 4,138 (24.5%) natural jacks. We collected a total of 152 fall Chinook salmon carcasses in the Snake River Basin during 2012. Analysis of carcasses collected resulted in 51.4% unmarked/untagged fish that emigrated as subyearlings, 25.4% known hatchery subyearlings that emigrated as subyearlings, followed by 12.3% natural origin fish that reservoir reared. Out-of-Snake Basin hatchery "strays" made up 1.4% of the carcasses sampled in the Clearwater River during 2012. Most carcasses collected returned at total age-3 (64.5%), followed by age-4 fish (18.8%), age-2 or jacks (10.1%), and lastly age-5 fish (6.5%).

The smolt-to-adult returns (SAR) back to the Snake River for the most recent 4-years of complete adult returns resulted in 2007 and 2009 releases having the lowest SARs across all NPTH and FCAP release groups. The highest estimated SARs and smolt-to-adult survivals (SASs) that includes harvest were for all 2008 release groups with NLV having the highest SAR (1.46%) and the highest SAS (2.07%) for the NPTH releases. For the FCAP releases in 2008,

the Big Canyon release showed the highest SAR (1.67%) and SAS (2.3%) for the subyearlings, with a high SAR (3.1%) and SAS (4.2%) for the yearlings releases at Captain John.

A total of 948 fall Chinook were hauled from Lower Granite Dam for NPTH broodstock which consisted of 534 females and 414 males. There were a total of 468 females and 325 males used for broodstock. The greatest female broodstock contribution (27.8%) was unmarked/untagged fish with a subyearling emigration life history and FCAP and LFH yearling releases (26.5%). from the three FCAP acclimation sites and LFH on-station releases. Subyearling releases from the three FCAP site contributed 13.7% to the brood. The NPTH and associated acclimation releases contributed 4.5% to the female brood. The greatest male broodstock contribution (37.4%) was also unmarked/untagged subyearlings with a subyearling emigration life history. FCAP subyearling releases contribute 13.5% to the male broodstock while yearling releases from FCAP and LFH together only contributed 2.1%. Total age composition of all fall Chinook salmon females processed at NPTH resulted in 51.3% age-4, 34.6% age-3, and 12.2% age-5 fish. Total age composition of all males processed resulted in 68.9% age-3, 27.1% age-4, and 2.8% age-5. No known out-of-Snake River Basin female or male strays were used in the broodstock for 2012.

Beginning in 2011 and continuing for 2012, parental based tagging (PBT) was initiated at both LFH and NPTH for all broodstock. The results of PBT will be a better tracking of parents to returning offspring and monitoring and evaluation of different rearing and release strategies. Also through PBT analysis, we will be able to determine more accurately the composition of natural adult returns to the Snake River Basin to assist in recovery efforts.

ACKNOWLEDGEMENTS

Nez Perce Tribal Hatchery monitoring and evaluation of fall Chinook salmon supplementation in the Clearwater River Subbasin would not be possible without the dedication of the field biologists, technicians and office personnel. The contributions and efforts of Mark Pishl, Charles Axtell, Carol Reuben, and Richard Johnson to the monitoring and evaluation program have been invaluable. We thank Lance Campbell and John Sneva of the Washington Department of Fish and Wildlife for adult fall Chinook salmon scale reading and analysis. Shawn Narum of the Columbia River Inter-Tribal Fish Commission processed and analyzed the genetic samples collected. We also thank Jonathan McCloud of the Bonneville Power Administration for his patience, assistance and support.

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INTRODUCTION

Chinook salmon (*Oncorhynchus tshawytscha)* and other native fishes have been a crucial part of the diet, culture, economy, and spirituality of the Nez Perce people. Immense declines in salmon populations over the last century have affected the tribe's ability to preserve a principle element of its culture and identity. As a sovereign nation, the Nez Perce Tribe has an implied right to govern the management of natural resources within their traditional territory. The United States is obligated to ensure that treaty rights are perpetuated for the benefit of the tribe (BPA et al. 1997).

The National Marine Fisheries Service (NMFS) listed the Snake River fall Chinook salmon as "threatened" in 1992 in accordance with provisions of the Endangered Species Act (NMFS 1992) and included the Clearwater River Subbasin fall Chinook salmon as part of the evolutionarily significant unit (ESU). As such, the Snake River fall Chinook salmon is considered and managed as one population within the Snake River Basin (Zimmerman et al. 2007 Draft). Fall Chinook salmon within the Clearwater and Snake rivers above Lower Granite Dam (LGR) represent an important component of the Snake River ESU fall Chinook salmon population. Maintenance and function of fall Chinook salmon population dynamics within these systems and their tributaries will play an important role in recovery of the Snake River fall Chinook salmon.

In 1994, through *U.S. v. Oregon*, the Nez Perce Tribe (NPT) reached an agreement with States and Federal agencies to release yearling fall Chinook salmon beginning in 1996 as replacement of lost production from adults trapped at LGR and hauled to Lyons Ferry Hatchery (LFH) for broodstock needs and to cull non-Snake River Basin strays. The agreement stipulated the release of 450,000 yearlings annually on-station from LFH and outplanting an additional 450,000 to acclimation facilities upstream of LGR to supplement natural fall Chinook salmon production. The NPT operates the Fall Chinook Acclimation Project (FCAP), which consists of two juvenile acclimation facilities along the Snake River and one along the Clearwater River with the intent of effectively enhancing population size and distributing natural fall Chinook salmon spawning throughout the existing habitat areas above LGR. The FCAP facilities began operation at Pittsburg Landing on the Snake River in 1996, Big Canyon Creek on the Clearwater River in 1997 and at Captain John Rapids on the Snake River in 1998. In addition, due to sufficient broodstock levels at LFH, subyearling fall Chinook salmon have been available for release from the FCAP facilities since 1997.

The Nez Perce Tribal Hatchery (NPTH) was approved for construction to rear and release 1.4 million subyearling fall Chinook salmon and 625,000 spring Chinook salmon in the Clearwater River Subbasin starting in 2002. The NPTH produced its first release of subyearling fall Chinook salmon in 2003 (Arnsberg et al. 2007).

Since supplementation may pose some risk to natural populations, the primary purpose of the NPTH and FCAP Monitoring and Evaluation (M&E) program is to evaluate the performance of hatchery released fall Chinook salmon and the potential risks to the natural fall Chinook salmon population (Hesse and Cramer 2000). The NPTH was constructed based on the NATURES rearing approach as an attempt to produce Chinook salmon more closely mimicking the

phenotypic, genetic, and behavioral characteristics of natural origin Chinook salmon populations (Maynard et al., 2001). The NPTH program has the following goals (BPA et al. 1997):

1. Protect, mitigate, and enhance Clearwater Subbasin anadromous fish resources.
2. Develop, reintroduce, and increase natural spawning populations of salmon within the Clearwater Subbasin.
3. Provide long-term harvest opportunities for Tribal and non-Tribal anglers within Nez Perce Treaty lands within four generations (20 years) following project initiation.
4. Sustain long-term fitness and genetic integrity of targeted fish populations.
5. Keep ecological and genetic impacts to non-target populations within acceptable limits.
6. Promote Nez Perce Tribal Management of Nez Perce Tribal Hatchery Facilities and production areas within Nez Perce Treaty lands (BPA et al. 1997).

The NPTH M&E Project is designed to provide information that enables adaptive management of the NPTH (Hesse and Cramer 2000). Proper adaptive management will require information from multiple life stages of hatchery and natural spring, fall, and early-fall Chinook salmon. Supplementation benefits to be evaluated under the proposed M&E program include increases in the distribution, abundance, and harvest of hatchery and natural Chinook salmon populations in the both the Clearwater and Snake river Subbasins. To measure these benefits, changes in the abundance of Chinook salmon in these systems and their tributaries will be monitored over the next 15 to 20 years (Hesse and Cramer 2000). In addition to measuring project-related benefits, the NPTH and FCAP M&E Program are designed to provide information on the capacity of the natural environment to support Chinook salmon production, give early warning of adverse effects caused by the project on resident biota, and track trends in environmental quality, management, and policy that may affect project success.

These combined M&E projects examine the performance and status of hatchery and natural fish, and effects to non-targeted fish populations, sustainability of harvest, and communicates its findings to enable adaptive management of NPTH and FCAP. Treatment streams in the Clearwater River include the lower reaches of the South Fork Clearwater, Middle Fork Clearwater and Selway rivers for early-fall Chinook salmon, and the mainstem Clearwater River for fall Chinook salmon. Treatment streams in the Snake River basin include the free flowing mainstem Snake River above Asotin, Washington and the Grande Ronde, Imnaha and Salmon rivers.

Monitoring and Evaluation Project Goals and Objectives:

<u>Long Term Goals:</u>

Monitor, evaluate and provide recommendations to adaptively manage NPTH and FCAP programs in order to optimize hatchery and natural production, sustain harvest, and minimize deleterious ecological effects. The fall Chinook salmon M&E projects are designed to provide information that enables adaptive management of the NPTH (Hesse and Cramer 2000) and FCAP programs. Proper adaptive management will require information from multiple life stages of hatchery and natural spring, fall, and early fall Chinook salmon.

OBJECTIVES:

Objective 1. Determine if program targets for contribution rate of hatchery fish are being achieved and can be improved.

Objective 2. Determine the increase/decrease in natural production that results from supplementation of Chinook salmon in the Clearwater River, Snake River, associated tributaries, and treatment streams.

Objective 3. Estimate ecological and genetic effects to fish populations.

Objective 4. Determine how harvest opportunities for spring, early-fall, and fall Chinook salmon can be optimized for tribal and non-tribal anglers within Nez Perce Treaty lands.

Objective 5. Effectively communicate monitoring and evaluation program approach and findings to resource managers.

This 2012 annual report details monitoring and evaluation activities associated with the fall Chinook salmon component of the Nez Perce Tribal Hatchery and FCAP programs from January 1 through December 31, 2012, thus providing data that will be used to analyze the effectiveness of supplementation activities. We summarize adult returns from NPTH, FCAP and associated acclimated fall Chinook releases from 2007 to 2009 (complete adult returns) along with contributions to ocean and freshwater fisheries. Included in the report are 2012 release numbers, juvenile survivals, emigration timing statistics, adult brood year returns from the most recent three years of complete returns, and contributions to ocean and freshwater fisheries. Also reported are 2012 fall Chinook salmon aerial redd counts on the Clearwater River and tributaries, lower Grande Ronde, Imnaha, and Salmon rivers. The first decade of NPTH M&E fall Chinook salmon results can be found in annual reports under primary author Arnsberg on the Columbia Basin Fish and Wildlife Program's website: https://www.cbfish.org/PiscesPublication.mvc/SearchByTitleDescriptionAuthorOrDate. A Supplementation Symposium for the first five-years of NPTH Production and Monitoring & Evaluation was held in January 2009 and other symposiums are scheduled every five years after. Earlier FCAP M&E results can be found in annual reports by primary author S. Rocklage under the same above website.

STUDY AREA

The NPTH M&E study area for fall Chinook salmon supplementation encompasses the lower Clearwater River, North Fork (N.F.) Clearwater River (mouth up to Dworshak Dam), Middle Fork (M.F.) Clearwater River, lower South Fork (S.F.) Clearwater River, lower Selway River, and lower portions of smaller tributaries including Potlatch River and Lapwai Creek (Figure 1).

The NPTH and all facilities associated with rearing, acclimation and release of fall Chinook salmon in the Clearwater River Subbasin are described below. A more detailed description of

rearing and acclimation sites can be found in the Nez Perce Tribal Hatchery Program Final Environmental Impact Statement (BPA et al. 1997).

The FCAP M&E study area for fall Chinook salmon supplementation encompasses all treatment streams and tributaries of the lower Clearwater River and free flowing Snake River above Asotin, Washington (Figure 2). The Fall Chinook Acclimation Project (FCAP) release facility location and descriptions are also described below.

Nez Perce Tribal Hatchery (NPTH) Facilities

The NPTH, located on the lower Clearwater River 38 km above its mouth at Tribal Allotment 1705, and is the central incubation and rearing facility for spring and fall Chinook salmon (Figure 1). Incubation for all Chinook salmon occurs at NPTH, with early rearing of one million fish in inside troughs and final rearing and acclimation of 500,000 fall Chinook salmon in two earthen and river rock-lined ponds. Fall Chinook salmon can be volitionally released or forced from the ponds.

Sweetwater Springs

Sweetwater Springs is located approximately 20 km southeast of Lewiston, Idaho and feeds the westernmost fork of Sweetwater Creek which is a tributary to Lapwai Creek (Figure 1). This facility will be used to accommodate up to 400,000 early fall Chinook salmon fry to be grown and transferred to Cedar Flats on the Selway River and Luke's Gulch on the South Fork Clearwater River for final acclimation and release (200,000 subyearling smolts at each facility).

North Lapwai Valley Acclimation Pond

Lapwai Creek drains directly into the mainstem Clearwater River 19 km upstream from its confluence with the Snake River (Figure 1). Approximately 1 km above the mouth of Lapwai Creek, two river rock-lined acclimation ponds were constructed to serve as final rearing and acclimation of 500,000 fall Chinook salmon that will be transferred from NPTH. Fall Chinook salmon can be volitionally released or forced from the North Lapwai Valley (NLV) acclimation ponds into Lapwai Creek. This site was selected so adult returns would home and spawn in the lower Clearwater River where there is an abundance of under-utilized spawning habitat (Arnsberg et al. 1992).

Luke's Gulch Acclimation Facility

Luke's Gulch Acclimation Site is located on the S.F. Clearwater River 13 km upstream of its mouth (Figure 1). Final rearing and acclimation of early fall Chinook salmon at this site will occur in ten 5.8 m diameter circular aluminum tanks and fish will be released directly into the S.F. Clearwater River. The target number of subyearlings for release will be 200,000 which will be transferred as fry from NPTH or Sweetwater Springs if this facility is utilized for early rearing.

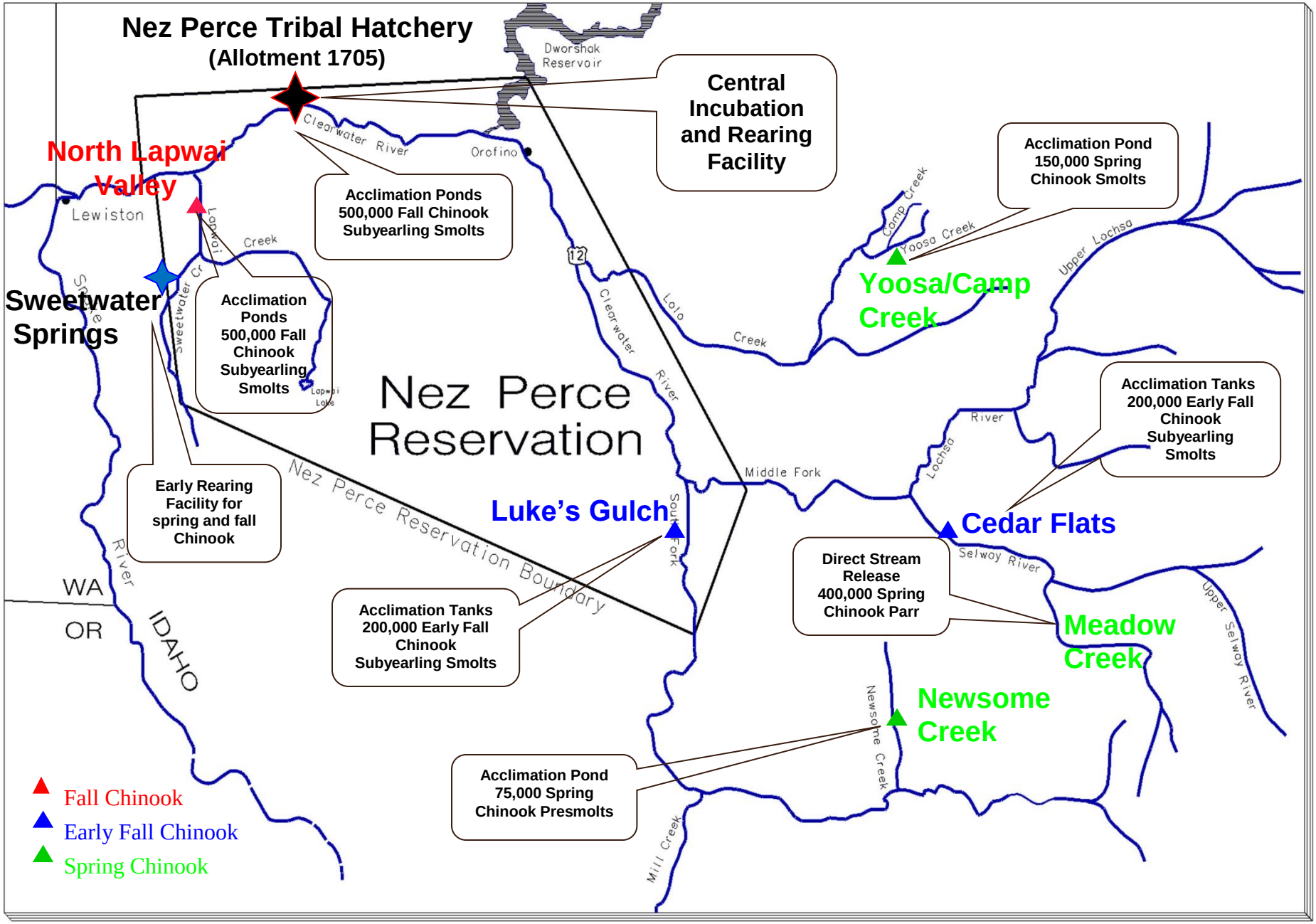

Figure 1. Nez Perce Tribal Hatchery and Chinook salmon acclimation and early rearing facilities within the Clearwater River Subbasin.

Cedar Flats Acclimation Facility

Cedar Flats Acclimation Facility is located on the Selway River 8 km above its mouth and confluence with the Lochsa River which forms the M.F. Clearwater River (Figure 1). Cedar Flats is a developed site just east of the United States Forest Service (USFS) Selway District Ranger Station. Final rearing and acclimation at this site will also occur in ten 5.8 m diameter circular aluminum tanks and fish will be released directly to the Selway River. The target number of subyearlings for release will be 200,000 which will be transferred as fry from NPTH or Sweetwater Springs if this facility is utilized for early rearing.

Fall Chinook Acclimation Project (FCAP) Facilities

Big Canyon Creek Acclimation Facility

Located on the Clearwater River at Big Canyon Creek (Rkm 57) (Figure 2) this facility is the final rearing and acclimation site for 150,000 yearling and 500,000 subyearling fall Chinook salmon. Juveniles are held in sixteen 5.8 m diameter circular aluminum tanks and fish released directly to the Clearwater River.

Pittsburg Landing Acclimation Facility

Located on the Snake River at Pittsburg Landing (Rkm 346) (Figure 2) this facility is the final rearing and acclimation site for 150,000 yearling and 400,000 subyearling fall Chinook salmon. Juveniles are held in sixteen 5.8 m diameter circular aluminum tanks and fish released directly to the Snake River.

Captain John Rapids Acclimation Facility

Located on the Snake River at Pittsburg Landing (Rkm 263) (Figure 2) this facility is the final rearing and acclimation site for 150,000 yearling and 500,000 subyearling fall Chinook salmon. Juveniles are acclimated in a single in-ground 150'X 50' acclimation pond and released volitionally with any fish remaining by the final release date forced out by draining the pond.

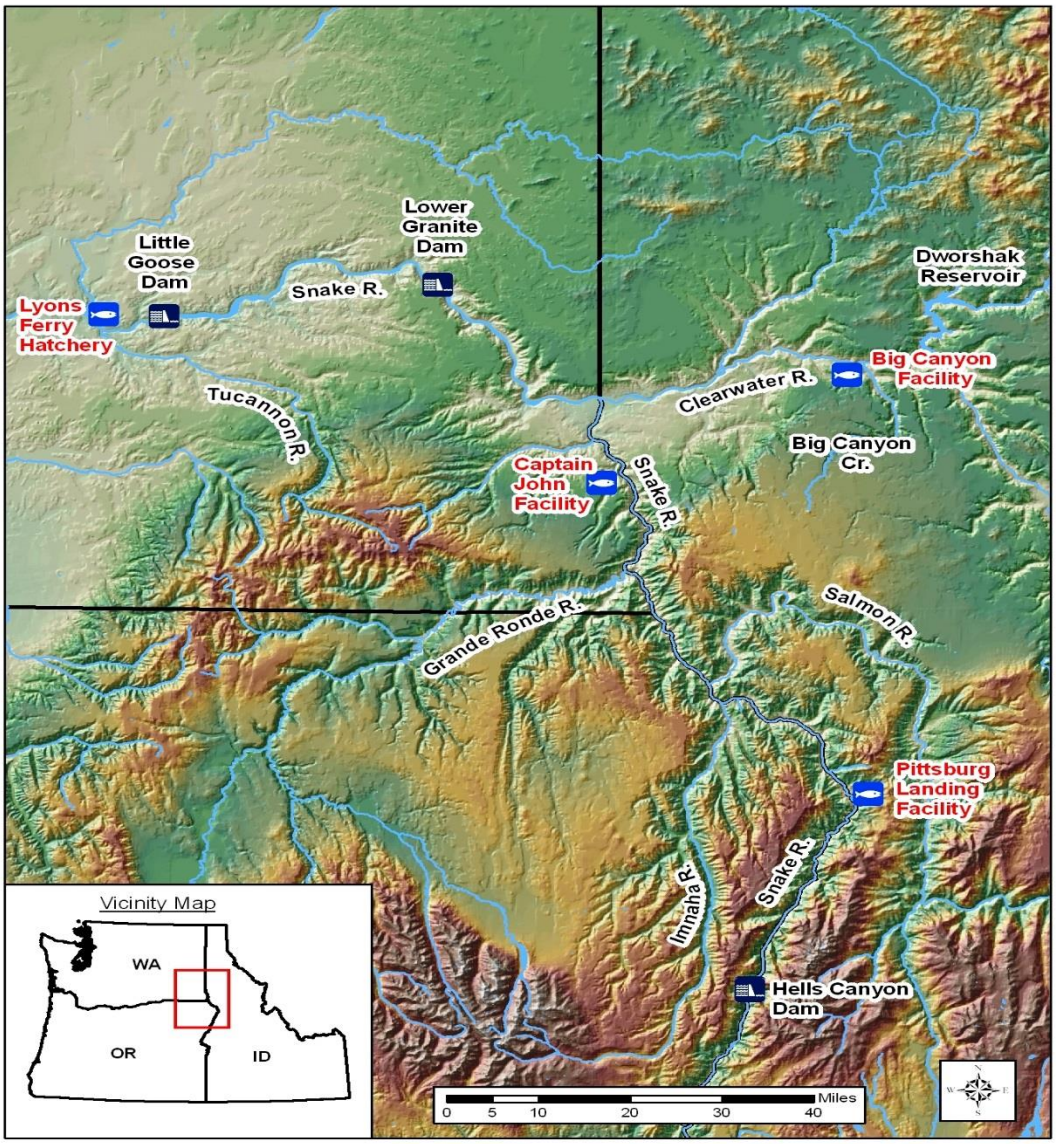

Figure 2. Lyons Ferry Hatchery and Fall Chinook Acclimation Project (FCAP) facilities including Pittsburg Landing and Captain John on the Snake River and Big Canyon on the Clearwater River.

METHODS

Supplementation

The Nez Perce Tribe's supplementation program for fall Chinook salmon began in 1996 on the Snake River at Pittsburg Landing and in 1997 on the Clearwater River at Big Canyon Creek with the acclimation and release of Lyons Ferry Hatchery (LFH) fall Chinook salmon yearlings and subyearlings when available. A second acclimation site on the Snake River at Captain John Rapids began releasing fall Chinook in 1998.

All releases from NPTH and associated facilities are scheduled to be subyearlings, the historic dominant life history characteristic for "ocean type" emigration and for the "wild" or natural Snake River fall Chinook salmon. The first release of subyearlings occurred in 2003 from NPTH. The NPTH fish are differentially coded wire tagged to measure adult returns as compared to the FCAP fall Chinook salmon and to measure adult contributions in ocean and freshwater fisheries. As part of our aerial redd surveys and carcass collections in the Clearwater River Subbasin, we report all fall Chinook salmon contributions, including FCAP, LFH, and out-of-Snake Basin hatchery strays in the carcass recovery section of this report. We also report all fall Chinook salmon contributions in the NPTH spawning summary for 2012.

This was the sixteenth year for FCAP yearling and subyearling production releases of fall Chinook from FCAP facilities in the Snake River Subbasin. It is also the ninth year for fall Chinook salmon subyearling releases from NPTH into the Clearwater River Subbasin. However, after working out new facility issues, 2009 was the first year where full production of 1.4 million subyearlings was accomplished and slightly exceeded at NPTH and associated acclimation facilities. Release numbers were only slightly less than the goal of 1.4 million in 2010 but release numbers exceeded the release goal in 2011 by 335,906 fish and by 160,005 fish in 2012.

Monitoring and Evaluation

Baseline fall Chinook salmon data collection for adult spawner abundance, spawn timing, and habitat evaluations has been occurring in the Clearwater River since 1988 and in major tributaries including the S.F. Clearwater River since 1992, M.F. Clearwater River and lower Selway River since 1994 (Arnsberg and Statler 1995). The M&E on fish produced from NPTH facilities began in 2003 (Arnsberg et al. 2007). Fall Chinook salmon spawning surveys began in the mainstem Snake River in 1986. The M&E program on fish produced from FCAP facilities began in 1997. Standardized performance measures quantified and utilized in program performance evaluations are described in Table 1. In addition, other experiments often occur as part of the M&E program. One example is the U.S. Army Corps of Engineers (Corps) Transportation/Spill study, initiated in 2006, involved passive integrated transponder (PIT) tagging additional production fall Chinook salmon, other than for standard juvenile emigration survivals, at Luke's Gulch and Cedar Flats Acclimation facilities. Funding was not available for

Table 1. Standardized performance measures and definitions quantified for evaluation of Nez Perce Tribal Hatchery fall Chinook production.

Performance Measure		Definition
Abundance	Adult Escapement (to Snake Basin upstream of Lower Granite Dam)	Number of adult fish, including jacks that have "escaped" past fisheries to Lower Granite Dam. Partitioned by origin, age, and release group. Based on run-reconstruction.
	Index of Spawner Abundance - redd counts	Counts of redds in spawning areas via multiple pass extensive area aerial counts.
	Hatchery Fraction	1) Percent of fish on spawning ground that originated from a hatchery. Determined from carcass sampling for individual spawning aggregates. 2) Also reported for total spawner abundance upstream of Lower Granite Dam. From run-reconstruction. 3) Percentage of fish used in broodstock of Snake Basin hatchery origin.
	Ocean/Mainstem Harvest	Raw measure (primary). Number of fish caught in ocean, mainstem or tributary fisheries (commercial, tribal, or recreational). Determined from CWT commercial landings, creel surveys, etc.
	Hatchery Production Abundance	Raw measure (primary). Number of parr, presmolts, or smolts released from a hatchery per year.
	Run Prediction	Derived measure. Short-term forecast of expected adult returns to some point (e.g., mouth of Columbia, or Snake River) based on current data (e.g., # smolts out, prior years adult returns, etc.).
Survival – Productivity	Smolt-to-Adult Return Rate	Raw measure (secondary): Number of adults from a given brood year returning to a point (e.g. LGR dam) divided by the number of smolts that left this point 1-3 years prior, integrated over all return years.
	Juvenile Survival to Lower Granite Dam	Raw measure (secondary): Survival rate measure estimated from detection of PIT tagged smolts at first mainstem dam, or model derived survival rates based on detections at first and second mainstem dams (e.g. using SURPH). Smolts or parr are tagged in the tributary rearing areas.
	Juvenile Survival to all Mainstem Dams	Raw measure (secondary): Survival from first dam where stock enters mainstem Columbia or Snake River to Bonneville. Derived from PIT tag detections.
	Post-release Survival	Raw measure (secondary): Survival from release (e.g., parr, presmolt, or smolt) to further sampling points (e.g., rotary screw traps at outlet of tributary, first mainstem dam encountered by smolts, dam encountered on return).
Distribution	Adult Spawner Spatial Distribution	Raw measure: Tributary spawner distribution – extensive estimates of where spawners are found within a tributary. Subbasin spawner distribution - presence/absence surveys across multiple tributaries within a subbasin.
	Stray Rate	1) Percentage of non-Snake Basin hatchery origin adults in the spawner abundance estimate based on run-reconstruction. 2) Percentage of non-Snake Basin hatchery origin fish included in hatchery broodstock (based on known mark type and scale-pattern origin determination).
Life History	Age Class Structure	Derived measure: The proportion of escapement composed of individuals of different brood years, typically assessed via length measurements and length at age relationships, from analysis of calcified structures, using scales, and recovering marks.
	Age–at–Return	Raw measure (primary): Age distribution of spawners on spawning ground determined from length at age relationships, scale analysis, calcified structure analysis, or mark recovery from carcass surveys.
	Age–at-Emigration	Raw measure (primary): Age distribution of emigrants (e.g., proportion of emigrants as subyearling vs holdover or reservoired reared) from tributaries, estimate determined from PIT tag detections at mainstem Snake and Columbia River dams.
	Size-at-Emigration/Release	1) Size distribution and average (length, weight) of emigrants (e.g., proportion of emigrants at fry, parr, presmolt, and smolt stages) from tributaries determined from seine, fyke nets, or rotary screw trap. 2) Length frequency, average length, and fish/lb estimates for each release group within 3 days of release (start of volitional).
	Condition of Juveniles at Emigration	Derived measure: A species-specific length to weight relationship used as an index of growth (W/L^3). Comparative length/weight data are determined from in-hatchery evaluations, tributaries and beach seining, fyke nets and rotary screw trap operation.
	Adult Spawner Sex Ratio	Raw measure (primary): Carcass or weir counts.
	Juvenile Emigration Timing	Raw measure (primary): Distribution of emigration dates within major tributaries. Peak, range and 10^{th}-90^{th} percentiles.
	Water Temperature	Raw Measure: Water temperatures of all supplementation study streams.

2007 production fish but was for the 2008-2012 releases and results will be included in a separate report forthcoming through the Corps.

Chinook salmon abundance and population trends can be assessed by monitoring juvenile densities, juvenile emigration numbers, adult escapement and spawning (Steward 1996, Hesse and Cramer 2000, Johnson et al. 2007). Accurate estimates of abundance and escapement are needed to determine the success of supplementation efforts. For the lower Clearwater River, emigration timing and survival are assessed by beach seining and PIT tagging naturally produced fall Chinook salmon and a subsample of all hatchery subyearling release groups. Additionally, we employed a larger seine in the lower 3-4 km impounded section of the Clearwater to capture fall Chinook salmon rearing in that "reservoir type" environment.

Fall Chinook salmon adult escapement was estimated through aerial redd surveys and counts/releases over Lower Granite Dam (the last dam in a series of eight on the Columbia and Snake rivers). We estimated adult natural and hatchery fall Chinook salmon spawning contributions to the lower Clearwater River through carcass collections and identification of hatchery marks or tags and through the fall Chinook run reconstruction analysis. We also monitored and evaluated NPTH spawning composition of hatchery and natural fall Chinook salmon spawned for the 2012 broodyear.

Performance Measures

Fish population performance measures (Table 1) address how fish populations are meeting NPTH and FCAP management objectives. Performance measures are derived from data collected during juvenile and adult monitoring and evaluation activities. We report on most performance measures listed in this table while others will take several years of data collection before analysis can be performed. For example, ocean and mainstem freshwater harvest estimates are often not reported by various agencies until the following year and sometimes longer after the harvest has occurred. In the following methods, we describe those performance measures that were evaluated during 2012 along with constraints that limited full evaluation of the performance measure in an annual report.

Juvenile Monitoring

Life History, Emigration Timing, and Survival Estimates

During 2012, we beach seined along the lower Clearwater River shoreline areas below the North Fork Clearwater River where most fall Chinook salmon spawning occurred in 2011. We primarily target naturally produced fall Chinook salmon subyearlings in the lower Clearwater River, while secondarily collect any PIT tag recapture information from the FCAP, NPTH and associated acclimation facility hatchery releases. Fall Chinook salmon hatchery yearlings and subyearlings from the FCAP are released earlier in the spring, emigrate immediately, and usually have emigrated downstream of the lower Clearwater River when annual beach seining begins.

Evaluation parameters for natural and hatchery fall Chinook captured included fish size, growth rates if already PIT tagged, emigration timing and survival to the Snake River dams. We used

experimental 30.5 m x 1.8 m and 15.2 m x 1.2 m beach seines (0.48 cm mesh) with weighted multi-stranded mudlines with center bags of the same mesh size. The larger seine was pulled from the back of a jet boat deck in a large arc until approximately half the net was deployed, then the boat was directed to shore in which all crew members assisted in pulling the seine to shore. The less accessible beach seining sites required the smaller seine pulled from the shoreline utilizing personnel in the water wearing neoprene waders. All salmonids captured were placed in 18.9 L buckets and then placed in larger aerated 114 L plastic holding bins. Salmonids were anesthetized in a 3 ml tricaine methanesulfonate (MS-222) stock solution (100 g/L) per 19 L of water buffered with a sodium bicarbonate solution. All Chinook salmon subyearlings were measured to the nearest 1 mm fork length and weighed to the nearest 0.1 gm with a digital Ohaus portable advanced balance.

All natural fall Chinook salmon captured and PIT tagged by seining are included in the emigration timing and survival analysis, along with the PIT tagged fish that were released from the FCAP, NPTH, and associated acclimation facilities. We PIT tagged fall Chinook salmon juveniles following methods developed by Prentice et al. (1990a, 1990b) and protocols established by the PIT Tag Steering Committee (1992). Subyearling Chinook salmon $\geq$ 60 mm fork length that were not hatchery origin based on an adipose fin clip, coded wire tag, or had the appearance of being an unmarked hatchery fish were PIT tagged with standard length 12 mm tags. These fish were considered natural. Natural fish were generally much smaller at the time of seining with slightly different coloration and more prominent parr marks than hatchery fish. We used 8.5 mm PIT tags for natural fall Chinook that measured 50-59 mm fork length. We checked all Chinook salmon for the presence of an adipose fin clip and/or a coded wire tag that would signify a hatchery fish using a Northwest Marine Technologies Field Sampling Detector model FSD-I. Our tagging goal was a minimum of 1,000 and up to a maximum of 8,000 natural subyearling fall Chinook salmon. After a minimum 10 minute recovery period, we released all Chinook salmon juveniles back to the river where captured.

All FCAP yearling and subyearling releases were PIT tagged at Lyons Ferry Hatchery prior to transfer to associated acclimation sites, while all NPTH subyearlings were PIT tagged at each acclimation site after transfer. PIT tagging was completed using a Wells Cargo gooseneck trailer converted for use with five fresh-flow stainless steel PIT tagging stations. Standard sterile 12 mm PIT tags using BIOMARK's HPT-12 pre-loaded trays and MK-25 rapid implant guns were used on all hatchery PIT tag samples. Records of all new PIT tagged fish and PIT tag recaptures were submitted to the PIT Tag Information System (PTAGIS). All PIT tag files were uploaded under the Project Leader's BDA coordinator ID and natural fish identified as 13W (1 = Chinook salmon, 3 = fall run, and W = wild rearing type), hatchery fish as 13H (1 = Chinook salmon, 3 = fall run, and H = hatchery rearing type), and recaptures as 15U (1 = Chinook salmon, 5 = unknown run, and U = unknown rearing type).

To investigate emigration timing and survival through the mainstem hydro-system, 2012 project PIT tagging goals for all hatchery fall Chinook salmon subyearling releases from NPTH and FCAP facilities was approximately 3,000 fish at all sites. Additional Juveniles were PIT tagged in 2012 from Luke's Gulch, Cedar Flats and all FCAP acclimation facilities for the large scale U.S. Army Corps of Engineers (Corps) transportation/spill study. Detections and travel times of PIT tagged fish at the Lower Snake River and Columbia River dams were obtained from

PTAGIS. The combined probability of survival and subyearling emigration from point of release to the Lower Snake River dams were estimated by the Cormack, Jolly, and Seber (1964, 1965, and 1965, respectively, as cited in Smith et al. 1994) methodology using the Survival Using Proportional Hazards (SURPH) computer modeling program (Lady et al. 2002). However, this model assumes that all fish arriving at Lower Granite Dam have an equal probability of detection. Because a proportion of the Snake River fall Chinook salmon subyearlings emigrate later in the fall/winter and early spring after detection facilities are shut down, this basic assumption is violated. Since we are unable to determine the proportion of fish that migrate when detection facilities are shut down, the model results are an underestimate (or index) of fall Chinook salmon survival to Lower Granite, depending on the proportion that hold over for a given year and emigrate as yearlings.

The NPTH M&E staff coded wire tagged and ad-clipped fish from NPTH releases with the Auto-Fish Tagging Trailer designed by Northwest Marine Technology and purchased through the Bonneville Power Administration (BPA). Tagging goals for 2012 were to tag each subyearling fall Chinook salmon release group with a unique CWT code (200,000) for adult return evaluations and have a 100,000 CWT/ad-clip group for fishery evaluations (Rocklage and Hesse, 2004). Washington Department of Fish and Wildlife (WDFW) staff coded wire tagged and ad-clipped fish at Lyons Ferry Hatchery prior to transfer for all FCAP yearling and subyearling releases. Tagging goals were accomplished in 2012 for NPTH and FCAP releases. The CWT retention rates were measured initially during tagging and final retention rates were measured at least three weeks after tagging on 500 fish per release group.

Length and weight data from PIT tagging were used to calculate condition factor (K) at the time of tagging and from pre-release samples done one day prior to releases (Tesch 1971) using the following equation:

$$\hat{K} = \frac{W}{L^3} \times 100{,}000$$

Where:
W = weight in grams,
L = length in millimeters,
and 100,000 is a constant used as a scalar.

Condition factor (Tesch 1971) can be a useful indicator of fish health, since individuals with a low condition factor might be considered light for their length, a potential indication of malnutrition or disease (Wootton 1990).

Flow and Temperature

Flow data for the Clearwater River were obtained from the U.S. Geological Survey (USGS) Spalding, Idaho gauging station online at *http://waterdata.usgs.gov/id/nwis/current/?type=flow*. We placed Onset temperature loggers in lower Lapwai Creek at NLV, and upstream in the lower South Fork Clearwater, Selway, and Middle Fork Clearwater rivers. Flow, temperature, and spill data for the Snake River at Lower Granite Dam were provided by the Corps and obtained online at *http://www.cbr.washington.edu/dart/river.html*.

Genetic Monitoring

The target goal for genetic analysis was a random 200 non-lethal upper caudal fin clips from natural subyearling Chinook salmon captured by seining on the lower Clearwater River. Tissue samples were placed in vials of alcohol and sent to the Hagerman Laboratory in Idaho for deoxyribonucleic acid (DNA) analysis by the Columbia River Inter-Tribal Fish Commission (CRITFC) genetics staff. Analyses determine percent composition of spring/summer or fall Chinook salmon and will build upon baseline fall Chinook salmon genetic profiles.

Adult Monitoring

Spawning Ground Surveys

We used aerial (by helicopter) spawning ground surveys as an index of fall Chinook salmon spawner abundance and distribution. We scheduled 3-4 surveys from the first part of October to the end of November along the entire Clearwater River (120 km), lower Potlatch River (6.5 km), lower N.F. Clearwater River (2 km), entire M.F. Clearwater River (37 km), S.F. Clearwater River from the mouth to the town of Harpster (22.5 km), and on the Selway River (31 km) from the mouth to Selway Falls (Figure 3). For the first time, we also conducted one ground survey on the lower one mile of Big Canyon Creek. As part of the FCAP M&E, we conducted aerial redd surveys on the Grande Ronde River from the mouth up to the highway bridge above Troy, OR (Rkm 84.8), on the Imnaha River from the mouth up to the town of Imnaha (19.5 km) (Figure 4), and on the Salmon River from the mouth up to the S.F. Salmon River (RKm 214) (Figure 5). An extended area this year on the Grande Ronde covered from the highway bridge above Troy up to the Wallowa River (29 miles), lower Wallowa River (8.0 kms), and lower Wenaha River (10.5 kms). On each survey, we mapped, took photos, documented spawn timing, number and distribution of fall Chinook salmon redds. Surveys were conducted from mid-morning to mid-day to take advantage of the best lighting conditions. We noted general weather conditions, water discharges at USGS gauging stations on the Clearwater River (Spalding and Orofino, ID), S.F. Clearwater River (Harpster, ID), lower Selway River (Lowell, ID), Grande Ronde River (Troy, OR), Imnaha River (Imnaha, OR), and Salmon River (Whitebird, ID). We recorded general water transparencies (poor to excellent) on each survey, with excellent being $\geq$ 5 m, good being 3-4 m, and poor < 3 m. For the first time, we also conducted one ground survey on November 27 on the lower one mile of Big Canyon Creek. Also, the lower 0.4 km (mouth to old Hwy 12 Bridge) of Alpowa Creek was surveyed from the ground on during one survey. We report a summary of Snake River Basin fall Chinook survey results since 1988, the year surveys began in the Clearwater River.

During aerial surveys during 2012, the mainstem Clearwater River was an estimated count since no count could be conducted after 8 November due to persistent rains and turbid water. To estimate redds missed on the Clearwater, we averaged the previous 5 years counts up to 8 November and got a percentage of the overall total redds counted to that date (0.6942) and applied that correction factor to observed redd numbers.

Total fall Chinook salmon redds in the Snake River Basin above Lower Granite Dam (LGD) are reported for 2012 (Arnsberg et al. 2013). We also report the estimated adult escapement above LGD (Young et al. 2012) and calculate the adult/redd number for 2012 and average adults/redd

since 1988. Finally, we regressed fall Chinook salmon redds counted in the Snake River Basin above Lower Granite Dam from 1987-2012 with adult (not including jacks) escapement over Lower Granite Dam from past years' run estimates (*US v Oregon* Technical Advisory Committee unpublished data; Washington Department of Fish and Wildlife unpublished data; Sands 2003; Steinhorst et al. 2006, 2007; Young et al. 2012) to obtain a correlation coefficient.

Escapement and Carcass Recoveries

Adult fall Chinook salmon escapement to the Clearwater River Subbasin was estimated from redd counts in the Snake River Basin and the number of fish estimated over Lower Granite Dam through the fall Chinook salmon run reconstruction process (Young et al. 2012). This process included members from the *US v Oregon* Technical Advisory Committee (TAC), LFH and NPTH monitoring and evaluation, and NOAA Fisheries. Total 2012 fall Chinook salmon escapement estimates have been completed for natural and hatchery fish to Lower Granite Dam (Young et al. 2012) and are included in this report.

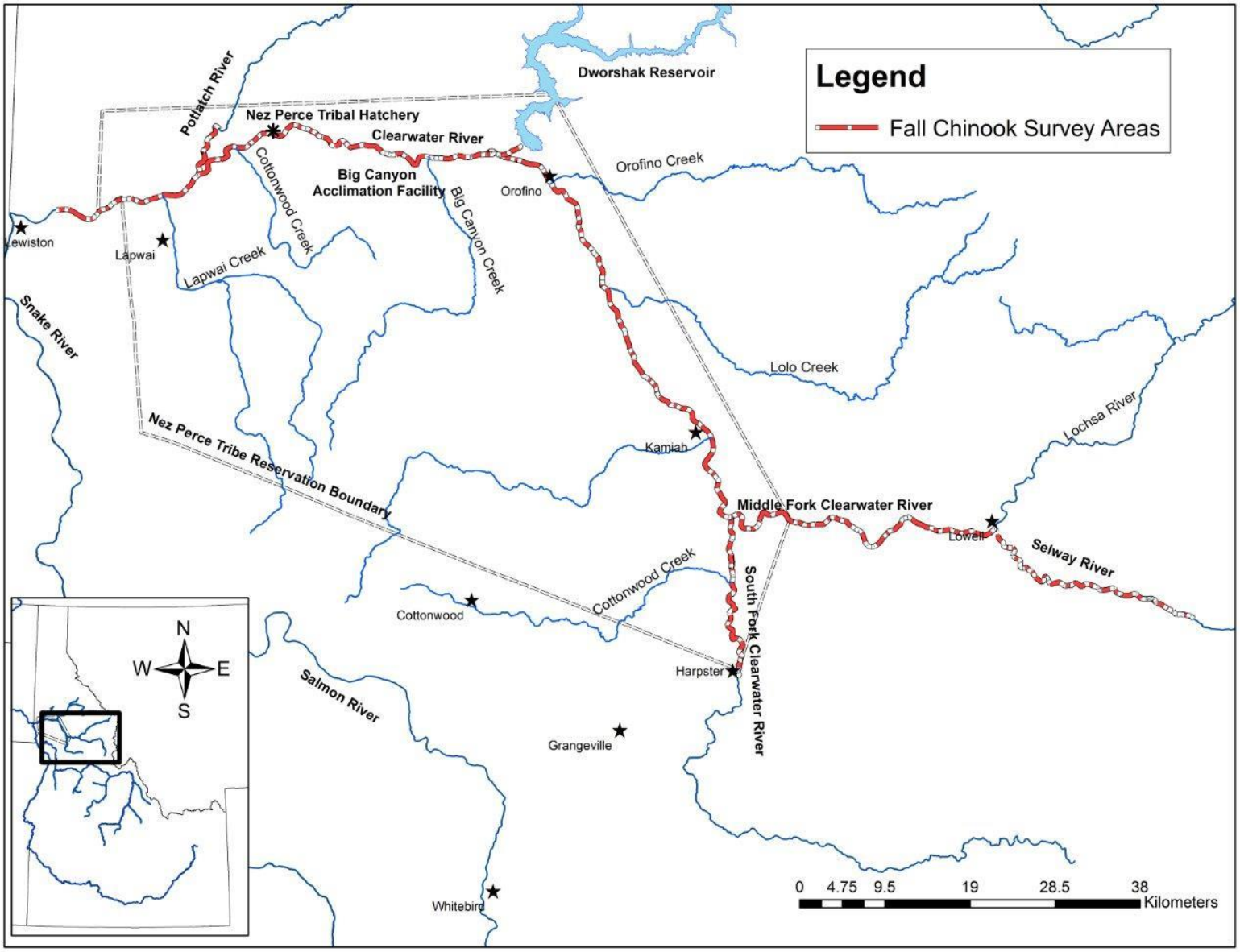

Figure 3. Fall Chinook salmon aerial redd survey areas within the Clearwater River Subbasin conducted by the Nez Perce Tribe.

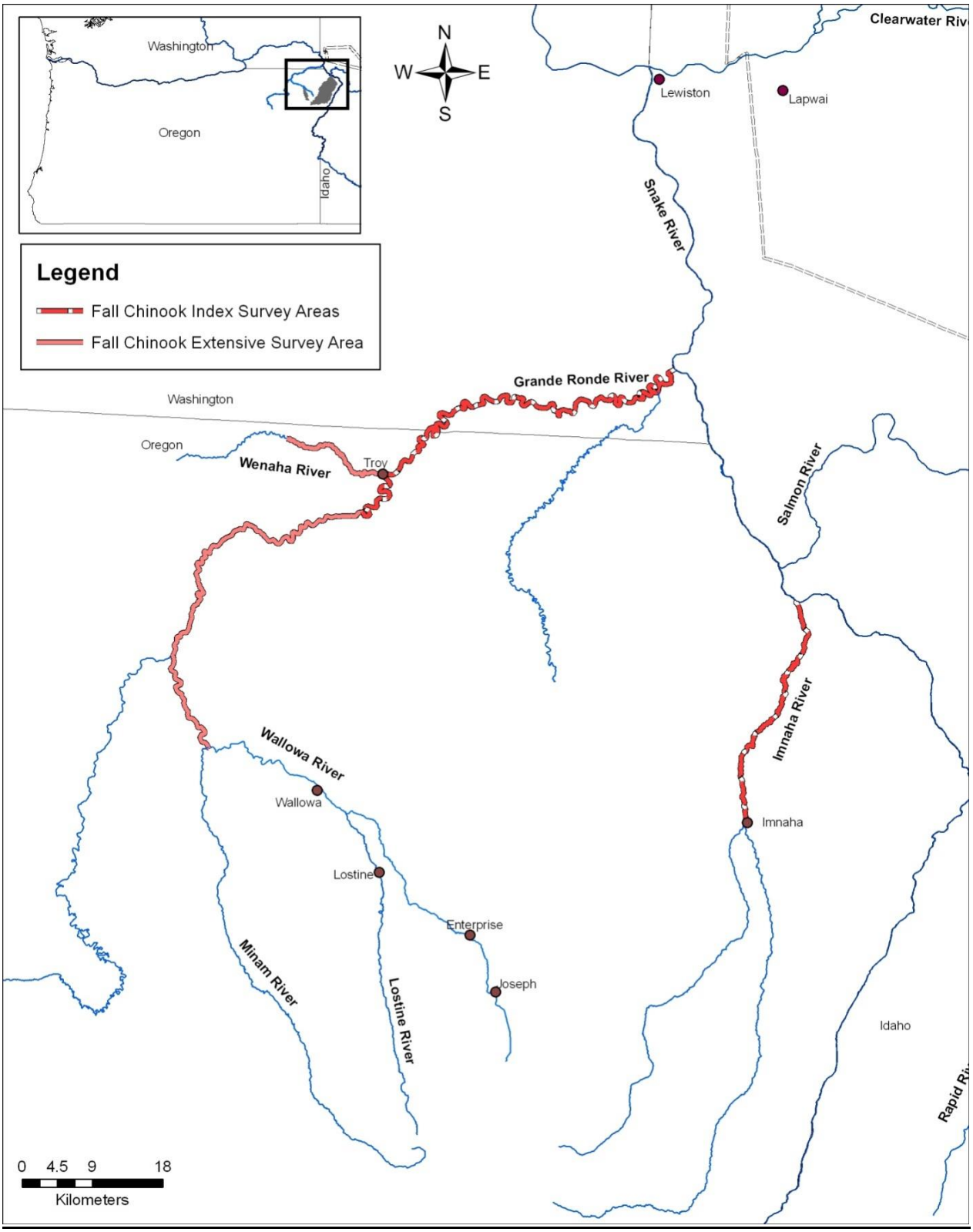

Figure 4. Fall Chinook salmon aerial redd survey areas within the Grande Ronde and Imnaha River subbasins conducted by the Nez Perce Tribe.

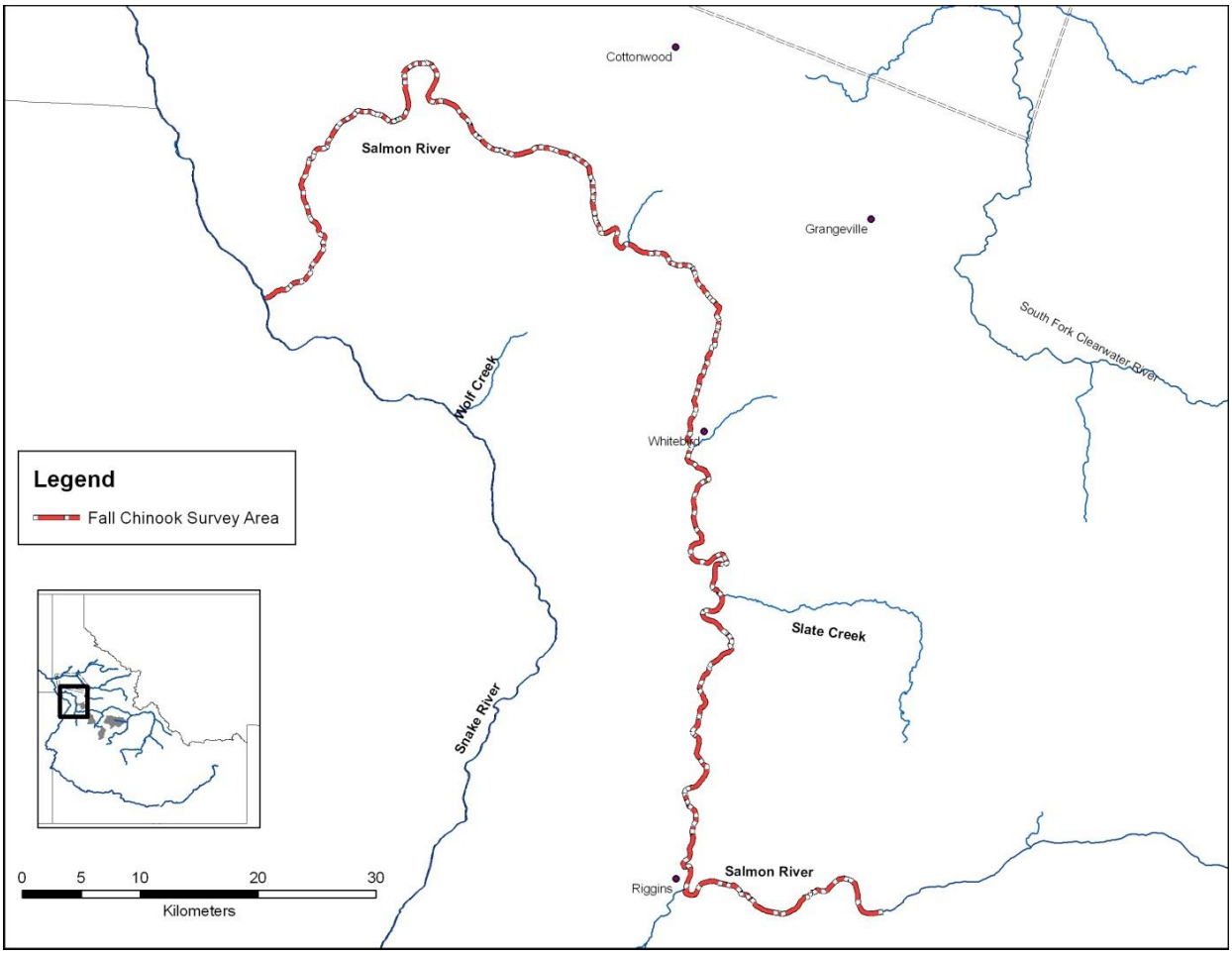

Figure 5. Fall Chinook salmon aerial redd survey areas within the Salmon River conducted by the Nez Perce Tribe.

During 2012, fall Chinook salmon carcasses in the Clearwater River were numerous just a few weeks after spawning commenced and were collected below major spawning reaches as time permitted. Biological information collected included fork length, sex composition, percent egg retention, identification of hatchery marks, coded wire tags, PIT tags, and scale samples to determine total age, subyearling or reservoir reared emigration life history, and years spent in the ocean. Scale analysis is no longer a reliable tool to determine hatchery from natural or wild fish and has not been used for that purpose in recent years. Percent natural spawners above Lower Granite Dam is now determined by a hatchery subtraction method through the fall Chinook run reconstruction process (Young et al. 2012). Snouts were collected from any carcass with an adipose fin clip or CWT and wire extracted later in the lab, read, and location and date of release identified. After processing, tails were removed from carcasses to ensure fish were not re-sampled and returned to the river for nutrient enhancement. Scale samples were sent to the Washington Department of Fish and Wildlife (WDFW) Olympia Lab for analysis.

Smolt-to-Adult Return Estimates

Smolt-to-adult returns (SARs) estimates were calculated through yearly fall Chinook run reconstructions to Lower Granite Dam (Young et al. 2012). The most recent three years of complete returns of fall Chinook salmon from releases at NPTH, associated acclimation sites, and FCAP sites are summarized. This would include up to age-5 returning adults for the 2007 subyearling and yearling broodyears. We do see a few age six returning fall Chinook, however, these are few and should not affect the SARs substantially. Adult returns are summarized, expanded for trapping rates at Lower Granite Dam, and a total SAR is given for each release group. We also include fall Chinook salmon contributions in ocean and freshwater fisheries as reported to the Regional Mark Processing Center (RMPC) and calculate an SAS (smolt-to-adult survival) for each release group.

Hatchery Spawning

Before the 2012 fall Chinook salmon run began, the Lower Granite Dam (LGR) trapping rate was set at a 15% sampling rate of the entire run. Water temperatures were unfavorable for trapping fall Chinook on August 18. Lyons Ferry Hatchery began hauling fall Chinook from LGR on August 30 and NPTH began hauling on September 2. Even with the late trapping season, all broodstock needs were met at NPTH, therefore, it was not necessary to open the adult fish ladder to collect more brood. During 2012, enough fall Chinook salmon adults were collected at NPTH and LFH to meet full production for 2013 releases.

Spawning of volunteer and hauled fall Chinook salmon from Lower Granite Dam occurred weekly from October 23 to November 27 at NPTH for a total of six spawn days. Monitoring and evaluation staff collected biological information on all fish spawned that included: fork length, identification of hatchery marks (ad-clips, visible implant elastomer (VIE) tags, etc.) and removing snouts containing a CWT. The CWTs were read immediately after spawning to determine origin so that known "strays" may be excluded from the broodstock. Scales were taken to determine total age, emigration strategy (i.e. either subyearling, hatchery yearling, or "reservoir reared" life history), and years spent in the ocean. A fin clip was also taken from all spawned fish for DNA analysis as collaboration on a parental based tagging (PBT) effort on all Snake River fall Chinook salmon at LFH and NPTH that began in 2011.

Genetic Monitoring

We collected tissue samples from all fall Chinook salmon adult carcasses collected from the spawning grounds that were in fair to good condition and all fall Chinook salmon spawned at NPTH for DNA analysis. A representative subsample of 145 carcasses would be analyzed. Samples consisted of opercle punches from each individual stored in separate vials of alcohol labeled with the fish ID number, date, and where it was taken. All samples were sent to the Hagerman Laboratory and analyzed by CRITFC staff to build upon baseline fall Chinook salmon genetic profiles and examine genetic differentiation between Snake River Basin and known "stray" fall Chinook salmon. However, as mentioned above, all NPTH spawned fish were sampled for DNA in 2012 as part of PBT in the Snake River Basin. Results for the 2012 carcass samples will be in a later comprehensive genetic analysis report.

RESULTS

Supplementation

During the 2011 fall Chinook salmon run, gametes were taken from fish hauled from Lower Granite Dam and adult volunteers to the NPTH fish ladder for 2012 subyearling releases. All fall chinook releases were coded wire tagged and adipose fin clipped prior to release as planned, meeting target goals (Table 2). There were a total of 489,871 yearling fall Chinook (from LFH broodyear 2010) released at the three FCAP sites exceeding the release goal by 39,871 fish. Subyearlings released at FCAP facilities were close to the release goal of 1.4 million fish. The NPTH on-station and NLV releases goals of 500,000 subyearlings each site were exceeded by 60,005 and 63,213 fish, respectively (Table 2). Upriver NPTH acclimation sites at Cedar Flats and Luke's Gulch both were very close to the release goal of 200,000 at each facility. A grand total of 3,469,633 fall Chinook salmon were released by the Nez Perce Tribe in 2012 (Table 2). Final CWT retention rates were high on all CWT groups and ranged between 0.982-1.0 (Table 2). Available data for condition factors (K-factors) are presented in Table 2.

Monitoring and Evaluation

Juvenile Monitoring

Life History, Emigration Timing, and Survival Estimates

We sampled a total of 1,691 natural fall Chinook salmon subyearlings on the lower Clearwater River of which 1,614 were large enough to PIT tag (Table 3). Sampling did not start until the week of June 25 due to high spring flows. During the first week of sampling, 83 fall Chinook subyearlings were captured and PIT tagged, averaging 75.8 mm in length (Table 3). During the entire sampling season, 345 (21.4%) juveniles were tagged with the smaller 8.5 mm PIT tags. Flows decreased sharply until Dworshak Dam releases began the first week in July which kept flows relatively on a slow decline until late August and early September. Sampling in the impounded portion of the lower Clearwater River occurred on two separate occasions, resulting in 28 natural fall Chinook salmon subyearlings PIT tagged. Sampling ceased in the Clearwater River on August 1. We recaptured 25 natural PIT tagged Chinook salmon and measured growth rates between 0 to 1.1 mm/d with an average of 0.77 mm/d. Average condition factor (K) for the natural fish was 1.13. Average condition factor (K) for the hatchery fish at release was 1.06, 1.01, 0.93, and 1.32 for the NPTH on-station release, Cedar Flats, Luke's Gulch and NLV, respectively (Table 2). No data is available for reporting condition factor for the FCAP releases in 2012.

Table 2. Fall Chinook salmon released, number coded wire tag (CWT), final CWT retentions, number adipose fin clipped (Ad-clip), number unmarked/untagged, number passive integrated transponder (PIT) tagged, fish per pound, and condition factor (K-factor) at release from Fall Chinook Acclimation Facilities (FCAP) and at Nez Perce Tribal Hatchery (NPTH) on-station and associated acclimation facilities, 2012.

Release Site/ Life Stage	Release Dates	Total Release Number	Number CWT only	Number CWT/ Ad-clip	Number Ad-clip only	Number Unmarked/ Untagged	CWT Codes	Final CWT Retention	Fish/ lb	K-Factor	Number PIT Tagged
FCAP Captain Johns Yearlings	3/28	155,134	81,042	72,233	432	1,427	CWT=220320 AD/CWT= 220321	0.983 0.984	10.3	N/D	18,961
FCAP Pittsburg Landing Yearlings	4/11	171,122	90,110	79,519	316	1,177	CWT=220319 AD/CWT= 220322	0.987 0.996	9.4	N/D	18,813
FCAP Big Canyon Yearlings	4/12	163,615	86,184	74,973	903	1,555	CWT=220318 AD/CWT= 220323	0.982 0.988	9.7	N/D	18,201
FCAP Captain Johns Subyearlings	5/21	505,728	100,818	101,194	202	303,514	CWT=220327 AD/CWT= 220326	0.996 0.998	47.0	N/D	41,055
FCAP Pittsburg Landing Subyearlings	5/22	402,400	100,500	100,850	405	200,645	CWT=220325 AD/CWT= 220324	0.990 0.996	46.5	N/D	32,870
FCAP Big Canyon Subyearlings	5/23	511,629	101,327	101,565	0	308,737	CWT=220328 AD/CWT= 220329	1.000 1.000	45.5	N/D	41,062
NPTH On-station Subyearlings	6/15	598,486	202,095	103,487	1,813	291,091	CWT=220223 AD/CWT= 220217	0.990 0.980	51.7	1.06	5,918
NPTH Cedar Flats Subyearlings	6/12	199,450	99,570	94,079	5,305	496	CWT=220213 AD/CWT= 220214	0.990 0.970	51.7	1.01	16,561
NPTH Luke's Gulch Subyearlings	6/13	198,856	95,710	96,099	1,276	5,771	CWT=220215 AD/CWT= 220216	0.950 0.995	49.6	0.93	16,415
NPTH North Lapwai Valley Subyearlings	5/8 and 5/30	563,213	191,699	98,697	4,363	268,454	CWT=220224 AD/CWT= 220218	0.996 0.996	115/ 53.9	1.32	2,986
Totals		3,469,633	1,149,055	922,696	15,015	1,382,867					212,842

Table 3. Weekly number, average fork length, and number passive integrated transponder (PIT) tagged natural subyearling fall Chinook salmon sampled on the lower Clearwater River, 2012.

Week of	Clearwater River Avg. Weekly Temps.[1] (^{0}C)	Clearwater River Avg. Weekly Flows[1] (cms)	Dworshak Dam Spill (%)	Total Number Captured	Number PIT Tagged	Weekly Average Fork Lth. (mm)	Weekly Average Condition Factor (K)
June 25	12.4	776.9	10.86	83	83	75.8	1.14
July 2	13.8	541.0	5.36	451	399	61.7	1.12
July 9	13.6	551.8	21.99	290	266	63.5	1.11
July 16	13.7	499.0	18.51	769	768	77.7	1.14
July 23	12.4	460.5	21.92	74	74	76.5	1.17
July 30	11.8	437.5	24.76	24	24	102.3	1.16
Totals				1691	1614		

[1]obtained from the USGS gauging station at Spalding, ID.

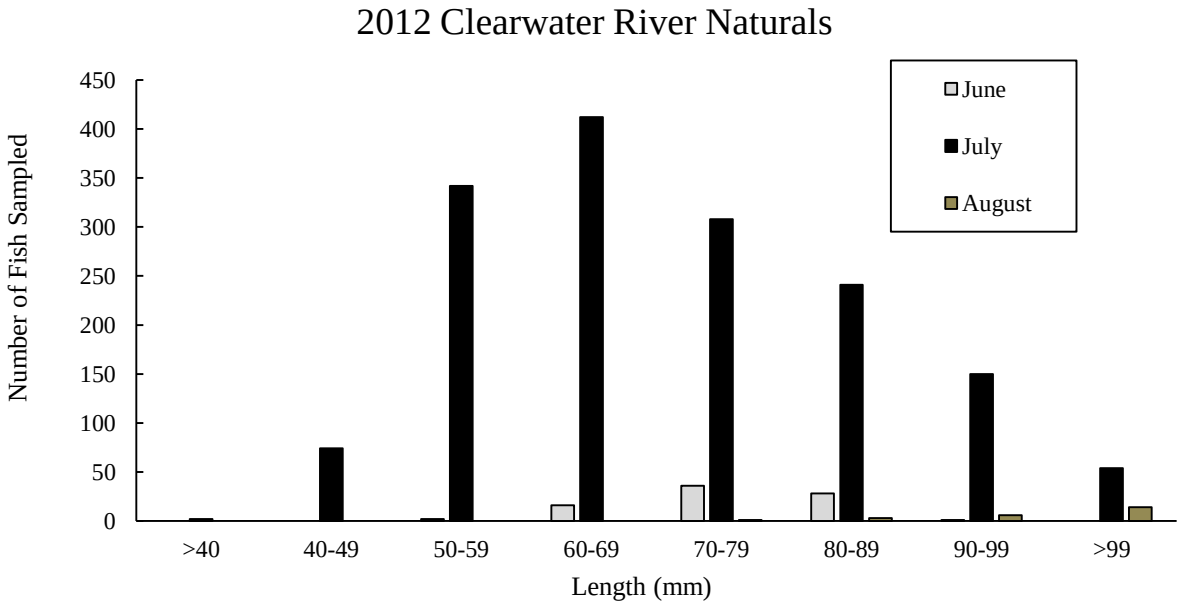

Figure 6. Length frequencies of natural fall Chinook salmon sampled in the lower Clearwater River, 2012.

Length frequencies for the natural subyearling fall Chinook sampled in the lower Clearwater River during the months of June, July and August are provided in Figure 6. We did not sample any subyearlings during June and August that were 49mm or less and too small to be PIT tagged with the 8.5 mm tags (Figure 6).

For NPTH and associated releases, the Luke's Gulch and Cedar Flats releases showed the highest number of unique detections at all juvenile detection points below Lower Granite (Table

4), a direct result of more PIT tagged juveniles released from these two sites as compared to the other NPTH releases (Table 6). The Clearwater River natural PIT tag group was detected at 21.1% at all juvenile detection sites below Lower Granite Dam. All 2012 FCAP releases showed a high number of unique detections because of the large number of PIT tagged individuals released from these sites (Table 5). As in previous years, very few NPTH PIT tagged fish were first detected as yearlings in 2013, in contrast to 45 (13.2%) Clearwater River naturals (Table 4). The FCAP yearling and subyearling 2012 releases were not detected as juveniles holdovers in 2013 (Table 5).

Estimated index survival of PIT tagged natural subyearling fall Chinook salmon from the Clearwater River to Lower Granite Dam was 24%, but could not be calculate to McNary Dam (Table 6). Index survival includes subyearlings that were detected up until December 15, or when the detection facility at Lower Granite was shut down, and does not include "holdovers" or those fish that overwintered and migrated as yearlings. Estimated index survival for hatchery production releases from NPTH and FCAP releases are shown in Table 6 and Table 7, respectively.

Table 4. Unique PIT tag detections at all hydrosytem juvenile detection facilities from passive integrated transponder (PIT) tagged releases of fall Chinook salmon subyearlings (0+) in the lower Clearwater River, Nez Perce Tribal Hatchery (NPTH) and associated acclimation facilities, 2012.

Release Site	Brood Year	Release Strategy	Unique PIT Tag Detections	Detected in Migratory Year 2012	Detected as Holdovers In 2013
Clearwater Naturals	2011	0+	341	296 (86.8%)	45 (13.2%)
NPTH On-Station	2011	0+	1,366	1,357 (99.3%)	9 (0.70%)
Cedar Flats	2011	0+	5,179	5,167 (99.8%)	12 (0.20%)
Luke's Gulch	2011	0+	6,165	6,153 (99.8%)	12 (0.20%)
North Lapwai Valley	2011	0+	1,194	1,192 (99.8%)	2 (0.20%)

Table 5. Unique PIT tag detections at all hydrosytem juvenile detection facilities from passive integrated transponder (PIT) tagged releases of hatchery fall Chinook salmon yearlings (1+) and subyearlings (0+) from the Fall Chinook Acclimation Project (FCAP) in the lower Clearwater River at the Big Canyon Acclimation facility (BCCAP) and on the Snake River at the Pittsburg Landing (PLAP) and Captain John Rapids (CJRAP) acclimation facilities, 2012.

Release Site	Brood Year	Release Strategy	Unique PIT Tag Detections	Detected in Migratory Year 2012	Detected as Holdovers In 2013
BCCAP	2010	1+	12,331	12,331 (100%)	0 (0.00%)
	2011	0+	17,050	17,050 (100%)	0 (0.00%)
PLAP	2010	1+	13,168	13,168 (100%)	0 (0.00%)
	2011	0+	17,098	17,098 (100%)	0 (0.00%)
CJRAP	2010	1+	13,629	13,629 (100%)	0 (0.00%)
	2011	0+	19,778	19,778 (100%)	0 (0.00%)

Table 6. Estimated index survivals (using SURPH) with 95% confidence intervals (CI's) from passive integrated transponder **(**PIT) tagged releases of natural fall Chinook salmon subyearlings in the lower Clearwater River and Nez Perce Tribal Hatchery (NPTH) releases to Lower Granite and McNary dams, 2012 (LGR = Lower Granite Dam, MCN = McNary Dam, CI = confidence interval at the 95% level).

Release Site	Release PIT Tag Number	Index Survival to LGR (95% CI's)	Index Survival to MCN (95% CI's)
Clearwater Naturals	1,614	0.24 [0.21 - 0.27]	-----[a]
NPTH On-Station	5,918	0.79 [0.76 - 0.82]	0.63 [0.58 - 0.68]
Cedar Flats	16,561	0.68 [0.63 - 0.74]	0.47 [0.41– 0.53]
Luke's Gulch	16,415	0.85 [0.79 - 0.92]	0.64 [0.57 - 0.70]
North Lapwai Valley (NLV)	2,986	0.71 [0.64 - 0.79]	0.84 [0.69 - 0.92]

[a]Insufficient downstream detections to calculate survival.

Table 7. Estimated index survivals (using SURPH) with 95% confidence intervals (CI's) from passive integrated transponder (PIT) tagged releases of hatchery fall Chinook salmon yearlings (1+) and subyearlings (0+) from the Fall Chinook Acclimation Project (FCAP) in the lower Clearwater River at the Big Canyon Acclimation facility (BCCAP) and on the Snake River at the Pittsburg Landing (PLAP) and Captain John Rapids (CJRAP) acclimation facilities to Lower Granite and McNary dams, 2012 (LGR = Lower Granite Dam, MCN = McNary Dam, CI = confidence interval at the 95% level).

Release Site	Release Strategy	Release Pit Tag Number	Index Survival to LGR (95% CI's)	Index Survival to MCN (95% CI's)
BCCAP	1+	18,201	0.94 [0.92 - 0.95]	0.79 [0.72 - 0.81]
	0+	41,042	0.79 [0.76 - 0.82]	0.63 [0.58 - 0.68]
PLAP	1+	18,813	0.93 [0.91 - 0.94]	0.74 [0.69– 0.79]
	0+	32,859	0.85 [0.82 - 0.87]	0.64 [0.60 - 0.66]
CJRAP	1+	18,961	0.94 [0.93 - 0.96]	0.69 [0.63 - 0.75]
	0+	41,038	0.84 [0.82 - 0.87]	0.71 [0.66 - 0.73]

Total detections represents the total number of PIT tags detected at each dam and not necessarily unique detections. The major juvenile detection facilities with the most detections continue to be Lower Granite, Little Goose, and McNary dams. Total detections were also used to establish mean migration rates to these three detection points for natural subyearlings from the lower Clearwater River and hatchery releases from the FCAP and NPTH acclimation facilities in 2012 (Figure 7, Figure 8, Figure 9). As in previous years, the acclimated releases from Luke's Gulch and Cedar Flats migrated at a faster rate than the other NPTH releases, while the natural fall Chinook from the Clearwater River migrated much slower on average to Lower Granite Dam (Figure 7). The yearling and subyearling releases from the PLAP facility migrated at a faster rate to Lower Granite Dam than the other FCAP releases (Figure 8, Figure 9). All PIT tag release groups had adequate detections during 2012 to derive an index of the 10th, 50th, and 90th percentile arrival dates to Lower Granite Dam (Table 8, Table 9). The 90th Percentile arrival date to Lower Granite Dam for the 2012 natural fall Chinook released in the Clearwater River occurred on December 4 (Table 8). Cumulative arrival timing for all natural and hatchery releases are shown in Figure 10.

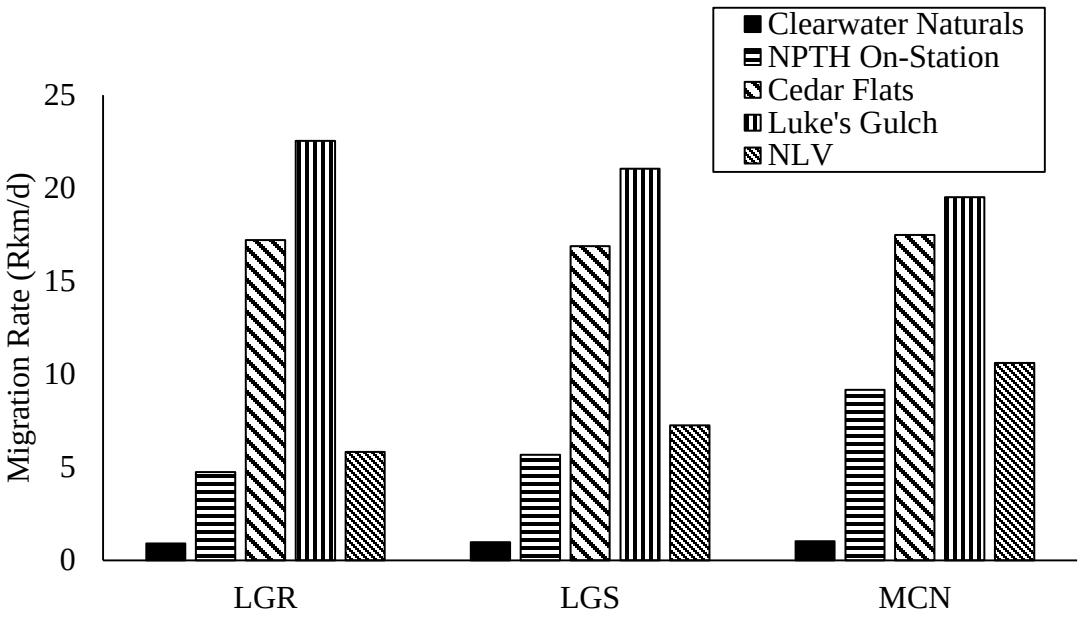

Figure 7. Total detection mean migration rate to selected Snake and Columbia River dams of passive integrated transponder (PIT) tagged Clearwater River natural fall Chinook salmon subyearlings, Nez Perce Tribal Hatchery (NPTH) on-station releases, and acclimated releases at Cedar Flats, Luke's Gulch, and North Lapwai Valley (NLV) 2012 (LGR = Lower Granite Dam, LGS = Little Goose Dam, MCN = McNary Dam).

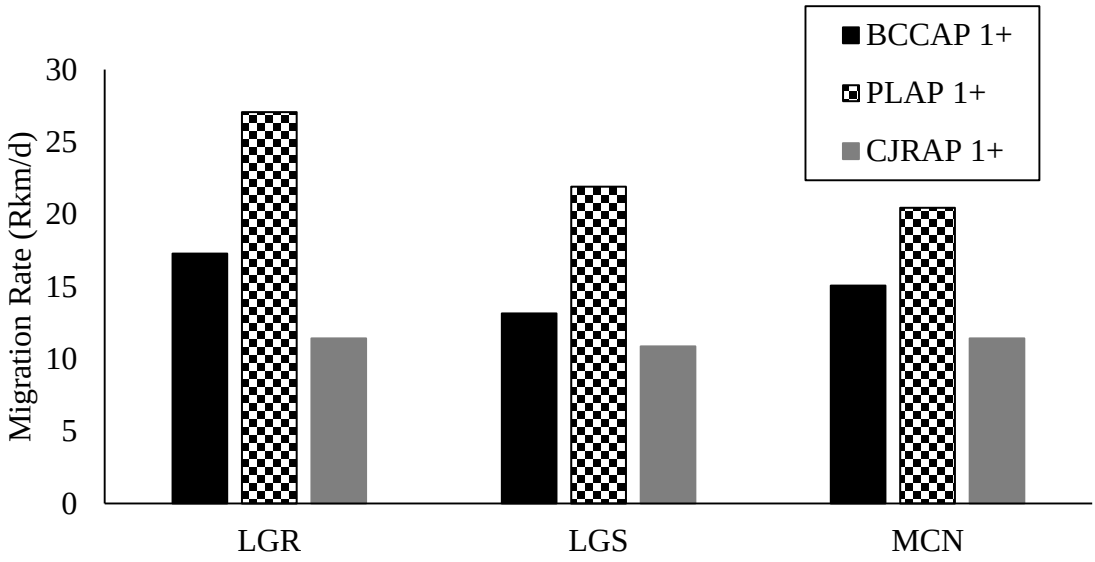

Figure 8. Total detection mean migration rate to selected Snake and Columbia River dams of passive integrated transponder (PIT) tagged releases of hatchery fall Chinook salmon yearlings (1+) from the Fall Chinook Acclimation Project (FCAP) in the lower Clearwater River at the Big Canyon Acclimation facility (BCCAP) and on the Snake River at the Captain John Rapid (CJRAP) and Pittsburg Landing (PLAP) acclimation facilities, 2012 (LGR = Lower Granite Dam, LGS = Little Goose Dam, MCN = McNary Dam).

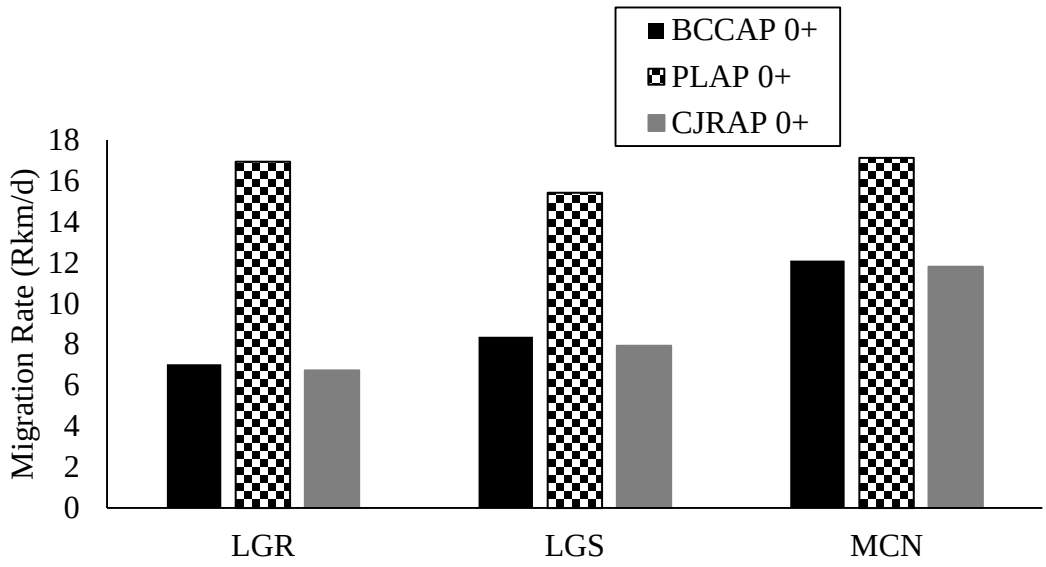

Figure 9. Total detection mean migration rate to selected Snake and Columbia River dams of passive integrated transponder (PIT) tagged releases of hatchery fall Chinook salmon subyearlings (0+) from the Fall Chinook Acclimation Project (FCAP) in the lower Clearwater River at the Big Canyon Acclimation facility (BCCAP) and on the Snake River at the Captain John Rapid (CJRAP) and Pittsburg Landing (PLAP) acclimation facilities, 2012 (LGR = Lower Granite Dam, LGS = Little Goose Dam, MCN = McNary Dam).

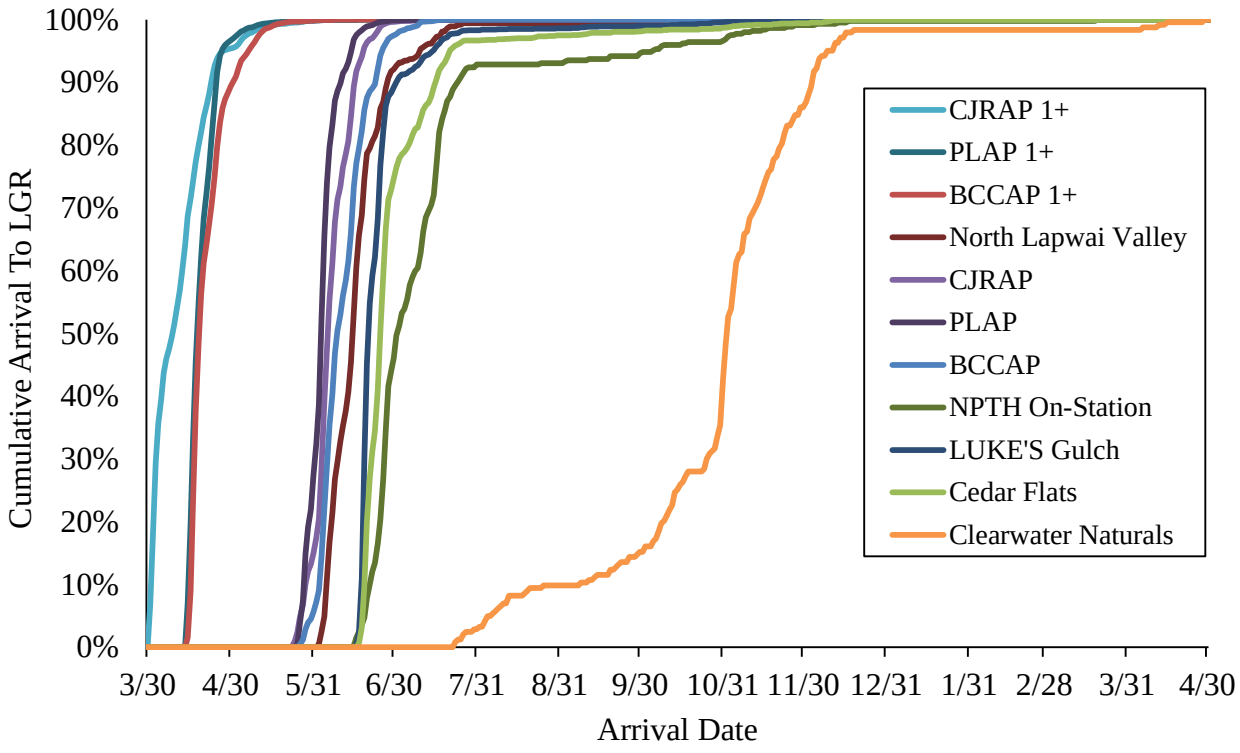

Figure 10. Cumulative arrival timing of Clearwater River natural and hatchery releases from the NPTH and FCAP acclimation facilities to Lower Granite Dam 2012.

Table 8. Total detections for the 10th, 50th, and 90th percentile arrival timing to Lower Granite Dam of natural fall Chinook salmon passive integrated transponder (PIT) tagged on the lower Clearwater River, Nez Perce Tribal Hatchery (NPTH) on-station releases, and acclimated releases at Cedar Flats, Luke's Gulch, and North Lapwai Valley in 2012.

Release Group	Release Strategy	Release Date	Lower Granite Dam (LGR) PIT Tag Detections	% Arrival Timing to LGR		
			n	10%	50%	90%
Clearwater River Naturals	0+	6/28 – 8/1	243	9/8	11/2	12/4
NPTH On-Station	0+	6/11	447	6/21	7/2	7/24
Cedar Flats	0+	6/12	1,622	6/20	6/25	7/16
Luke's Gulch	0+	6/13	1,674	6/18	6/21	7/1
North Lapwai Valley (NLV)	0+	5/30	366	6/5	6/15	6/28

Table 9. Total detections for the 10th, 50th, and 90th percentile arrival timing from passive integrated transponder **(**PIT) tagged releases of hatchery fall Chinook salmon yearlings (1+) and subyearlings (0+) from the Fall Chinook Acclimation Project (FCAP) in the lower Clearwater River at the Big Canyon Acclimation facility (BCCAP) and on the Snake River at the Pittsburg Landing (PLAP) and Captain John Rapid (CJRAP) acclimation facilities to Lower Granite Dam 2012.

Release Group	Release Strategy	Release Date	Lower Granite Dam (LGR) PIT Tag Detections	% Arrival Timing to LGR		
			n	10%	50%	90%
CJRAP	1+	3/28	7,742	4/1	4/9	4/23
PLAP	1+	4/11	7,040	4/15	4/18	4/25
BCCAP	1+	4/12	5,986	4/16	4/19	5/1
CJRAP	0+	5/21	7,369	5/28	6/6	6/16
PLAP	0+	5/22	6,620	5/28	6/3	6/11
BCCAP	0+	5/23	5,670	6/3	6/9	6/24

Temperature and Flow

All fall Chinook subyearling releases from NPTH facilities were made prior to warm (>16 ^{o}C) summer water temperatures. The releases of FCAP yearlings occurred in Late March and mid-April, while the FCAP subyearlings were released in May with temperatures still cool in the Clearwater and Snake rivers. The CJRAP yearling release was made two weeks earlier than the BCCAP and PLAP yearling releases due to an earlier acclimation schedule. The subyearling releases from NPTH facilities occurred approximately mid-June, except for the NLV acclimated group which was released two weeks earlier on May 30. Temperatures in the upper Clearwater River Subbasin exceeded 20 ^{o}C throughout much of July and early August with the lower Clearwater varying between a much cooler 11-13 ^{o}C during the period of cold water releases from Dworshak Reservoir. Most detections at Lower Granite Dam for all FCAP, NPTH and associated acclimated releases occurred before temperatures exceeded 20 ^{o}C in the Snake River (Figure 11). Cold water releases from Dworshak Reservoir moderated warm Snake River temperatures by 2-3 ^{o}C keeping water temperatures below 20 ^{o}C at Lower Granite Dam during July and August Detections of natural fall Chinook occurred from mid-July thru mid-December when temperatures at Lower Granite Dam were 20 ^{o}C and below (Figure 11).

Detections of natural subyearling at Lower Granite Dam began late September, continuing through mid-December until the juvenile detection facility was de-watered for the winter months (Figure 11). All subyearling releases from the NPTH and FCAP facilities were made after the peak flows in the Clearwater and Snake rivers (Figure 12, Figure 13). All FCAP yearlings were made prior to the peak spring flows on the Clearwater and Snake rivers (Figure 13). While these releases were made during higher spring flows, sampling Clearwater natural fall Chinook could not begin until the Clearwater flows were below 800 cubic meters per second (cms) and dropping (Figure 12). PIT tag detections at Lower Granite Dam (LGR) in relation to mean daily flows and spill recorded at LGR of the Clearwater naturals and all combined hatchery fall Chinook releases from NPTH and associated acclimation facilities are shown in Figure 14. Most hatchery detections occurred during the spill period at Lower Granite (Figure 14). In contrast, few natural fish might have experienced summer spill as most PIT tag detections occurred later in the fall when Lower Granite Dam stopped spilling (Figure 14).

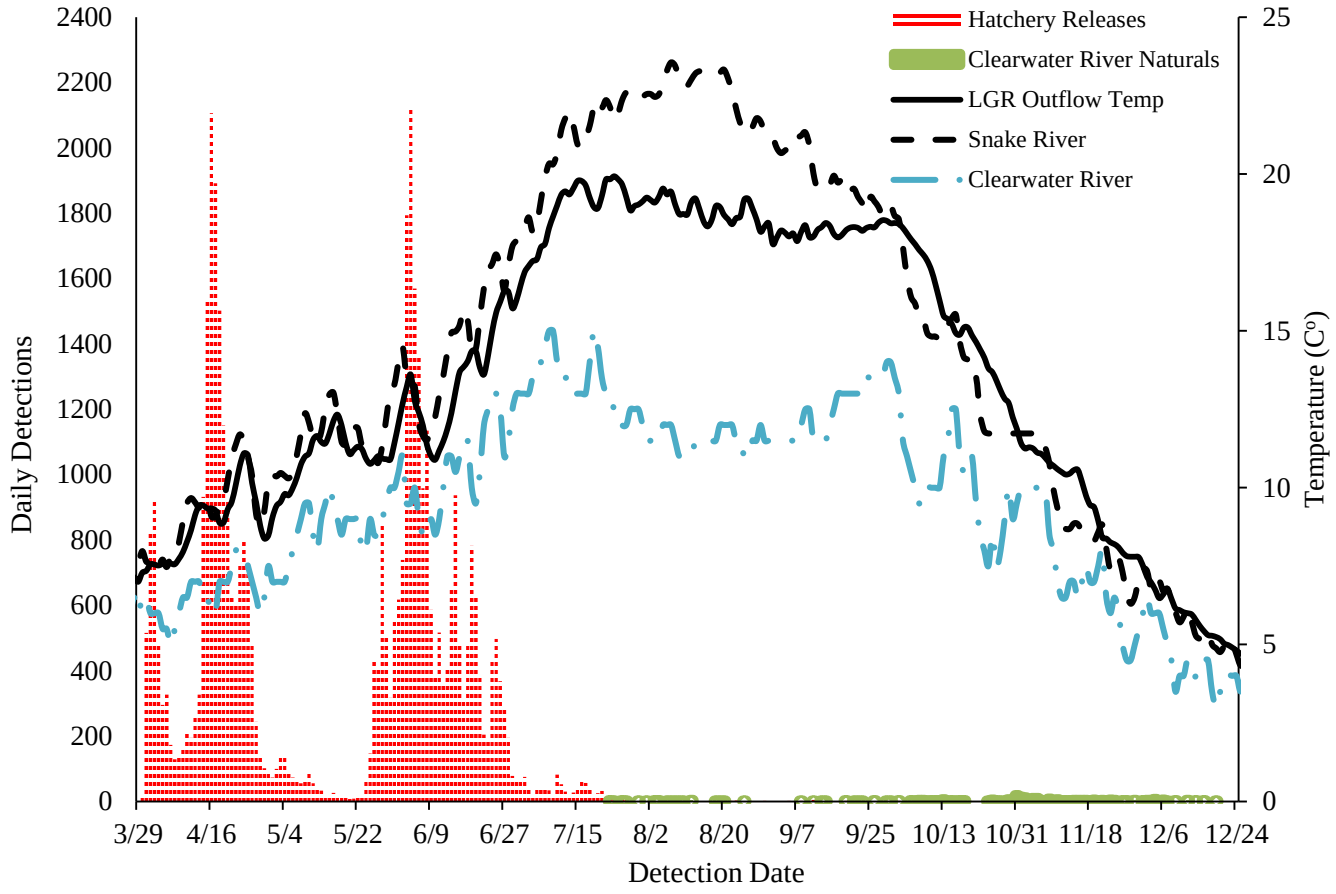

Figure 11. Passive integrated transponder (PIT) fall Chinook detections of Clearwater River naturals and combined detections from the Nez Perce Tribal Hatchery, Cedar Flats, Luke's Gulch, North Lapwai Valley, and FCAP facilities at Lower Granite Dam in relation to mean daily temperatures recorded in the Clearwater River (USGS Spalding gauge), Snake River (USGS Anatone gauge) and at Lower Granite Dam (LGR), 2012.

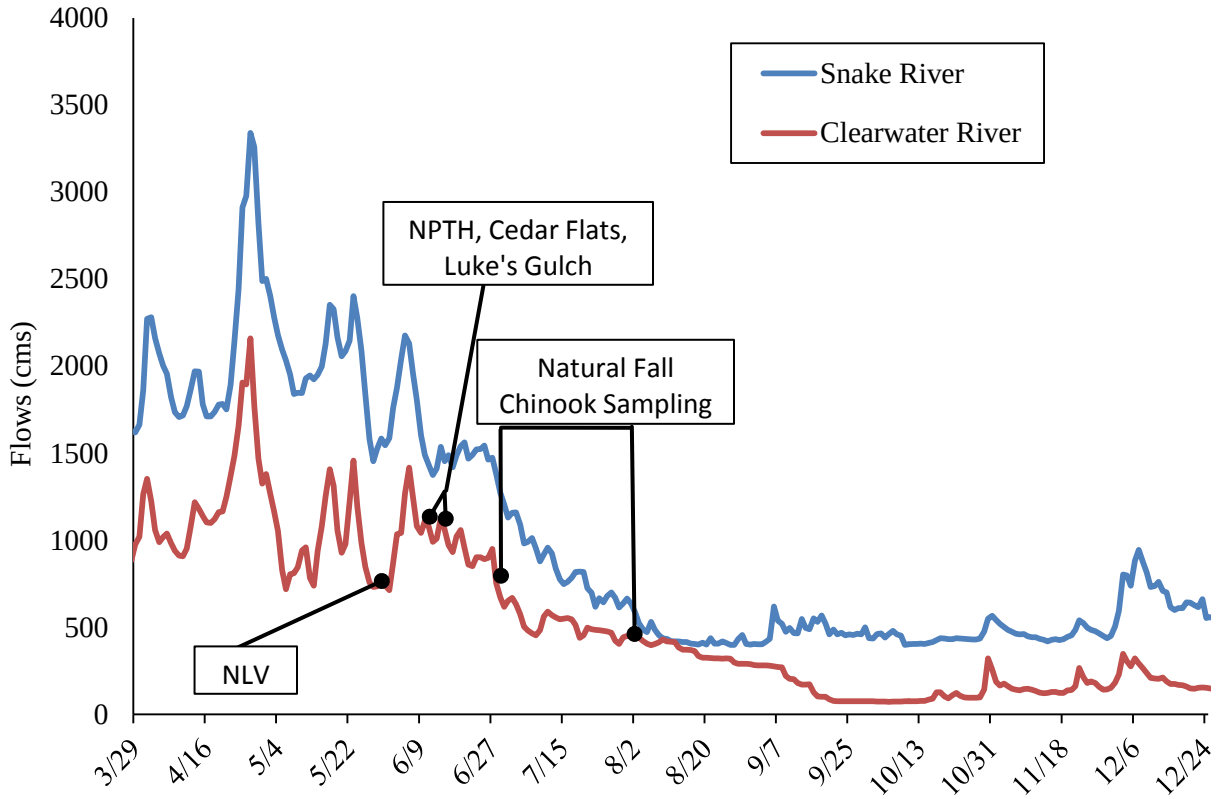

Figure 12. Mean daily flows recorded in the Clearwater River Subbasin, timing of natural fall Chinook sampling on the Clearwater River and hatchery releases from Nez Perce Tribal Hatchery (NPTH), Cedar Flats, Luke's Gulch, and North Lapwai Valley (NLV), 2012.

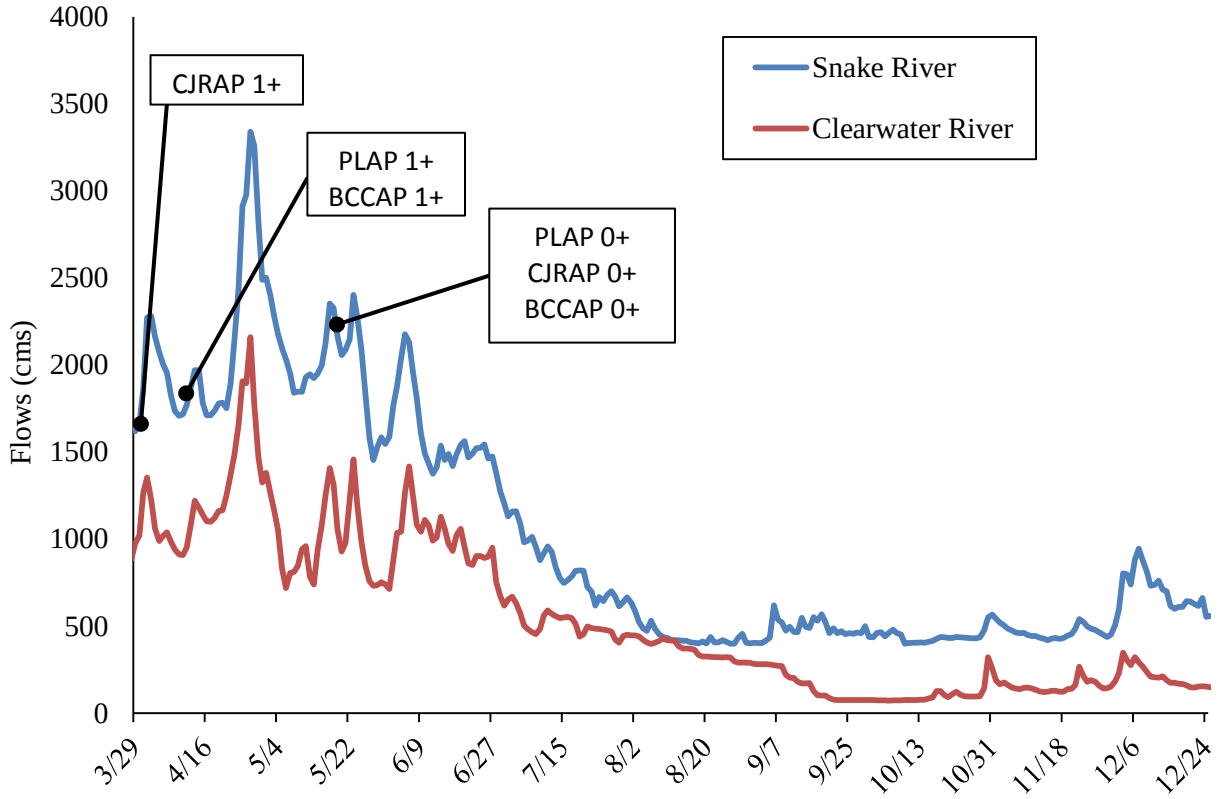

Figure 13. Release timing of hatchery fall Chinook salmon yearlings (1+) and subyearlings (0+) from the Fall Chinook Acclimation Project (FCAP) in the lower Clearwater River at the Big Canyon Acclimation facility (BCCAP) and on the Snake River at the Pittsburg Landing (PLAP) and Captain John Rapid (CJRAP) acclimation facilities in relation to mean daily flows recorded in the Clearwater River (USGS Spalding gauge) and the Snake River (USGS Anatone gauge), 2012.

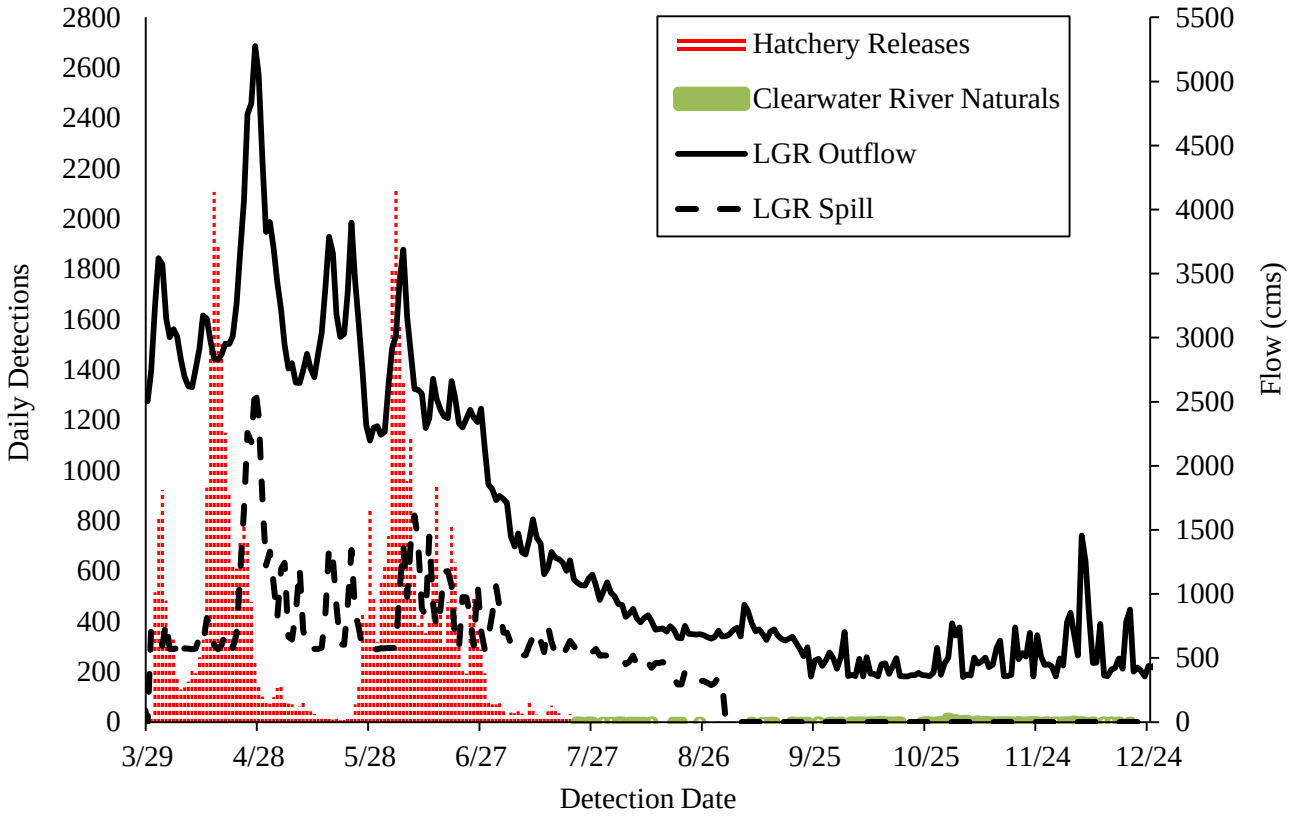

Figure 14. Passive integrated transponder (PIT) Fall Chinook detections of Clearwater River naturals and combined detections from the Nez Perce Tribal Hatchery, Cedar Flats, Luke's Gulch, North Lapwai Valley, and FCAP facilities at Lower Granite Dam (LGR) in relation to mean daily flows and spill recorded at the dam, 2012.

Genetic Monitoring

We collected a random non-lethal subsample (upper caudal fin clips) from 200 natural subyearling Chinook salmon captured on the Clearwater River during 2012. All genetic samples were sent to the Hagerman Laboratory in Idaho and analyzed by the CRITFC staff to determine percent composition of spring/summer or fall Chinook salmon and to build upon baseline fall Chinook salmon genetic profiles. The 2012 genetic analysis will be combined with subsequent year's genetic monitoring data and provided in a later report.

Adult Monitoring

Spawning Ground Surveys

During aerial fall Chinook surveys during 2012, we observed a total of 1,118 redds and estimated a total of 1,610 redds in the Clearwater River (Arnsberg et al. 2013; Appendix A). There were 210 redds observed during the first survey on October 17 in the lower Clearwater and 908 new redds observed on November 8 for a total of 1,118 redds counted. We observed 37 redds in the upper Clearwater River above the N.F. Clearwater and applied the same correction factor to estimate

52 total redds. Aerial surveys on the Potlatch and the N.F. Clearwater rivers were on the same days as the lower Clearwater. No redds were observed on the October 17 survey in Potlatch River and 283 redds counted on November 8. No redds were observed in the N.F. Clearwater River on either survey. This was the first time we surveyed Big Canyon Creek and one redd was observed about 0.5 miles upstream of the mouth. The upper Clearwater (from Orofino Creek upstream to the M.F. Clearwater), the S.F. Clearwater, M.F. Clearwater, and the Selway rivers were surveyed on October 22 and November 14. Survey counts were 0 and 37 redds in the Clearwater, 1 and 40 redds for the S.F. Clearwater, 2 and 1 redds for the M.F. Clearwater, and 3 and 17 redds for the Selway rivers, respectively, for the two survey dates. Survey conditions were fair and excellent on the two upriver survey dates, respectively, then deteriorated for the last scheduled November 26 survey which was not conducted.

During the fall Chinook spawning period, Dworshak Reservoir discharges remained stable at 1,600 cfs (Appendix A). Flows on the lower Clearwater (USGS Gauging Station at Spalding, ID) were slightly higher than normal on both surveys (4,810 and 5,100 cfs), then fluctuated throughout the rest of the season but water clarity remained poor because of frequent rains. Since 2008, the mean number of redds occurring in the Clearwater River Subbasin has been 1,533 ranging between 965 and 1,958 (Figure 15). The lowest redd count for the Clearwater River Subbasin, since intensive surveys began was 4 redds in both 1990 and 1991, while the highest count (estimated) was 1,958 redds in 2012 (Arnsberg et al. 2013).

A total of four aerial surveys on the Grande Ronde River resulted in a total of 303 redds observed. Surveys on 17 October, 5 November, and 28 November resulted in two, 262, and 20 new redds counted, respectively, with 19 redds counted in an extended survey conducted on 15 November. In the extended area, one redd was observed in the Wallowa and 5 redds observed in the Wenaha. The NPT steelhead project staff observed 4 redds in Joseph Creek about 1-3 kms above the mouth of the Grande Ronde. On the mainstem Grande Ronde, redds were seen in 68 distinct spawning locations. Survey conditions were fair on the first two surveys and good during the last surveys, therefore only a few deep water redds may have been missed. Flows were slightly higher than last year and ranged between 1,030 and 1,290 cfs (USGS Gauging Station at Troy, OR). Since 2008, the mean number of redds counted in the Grande Ronde River Subbasin has been 203, ranging from 101 to 313. The lowest redd count for the Grande Ronde Subbasin since intensive surveys began, was zero in 1989 and 1991, while the highest count was 313 in 2012 (Arnsberg et al. 2013).

A total of three aerial surveys on the Imnaha River resulted in a total of 85 redds observed. Surveys on 17 October, 5 November, and 28 November resulted in 1, 79, and 5 new redds counted, respectively. Flows during surveys ranged from 150 to 208 cfs (USGS Gauging Station at Imnaha, OR). Survey conditions were good on the first two surveys and excellent on the last survey resulting in a good final count. Since 2008, the mean number of redds observed in the Imnaha River has been 69, ranging from 24 to 132. The lowest redd count for the Imnaha River, since intensive surveys began was zero redds in 1994, while the highest count was 132 in 2010 (Arnsberg et al. 2013).

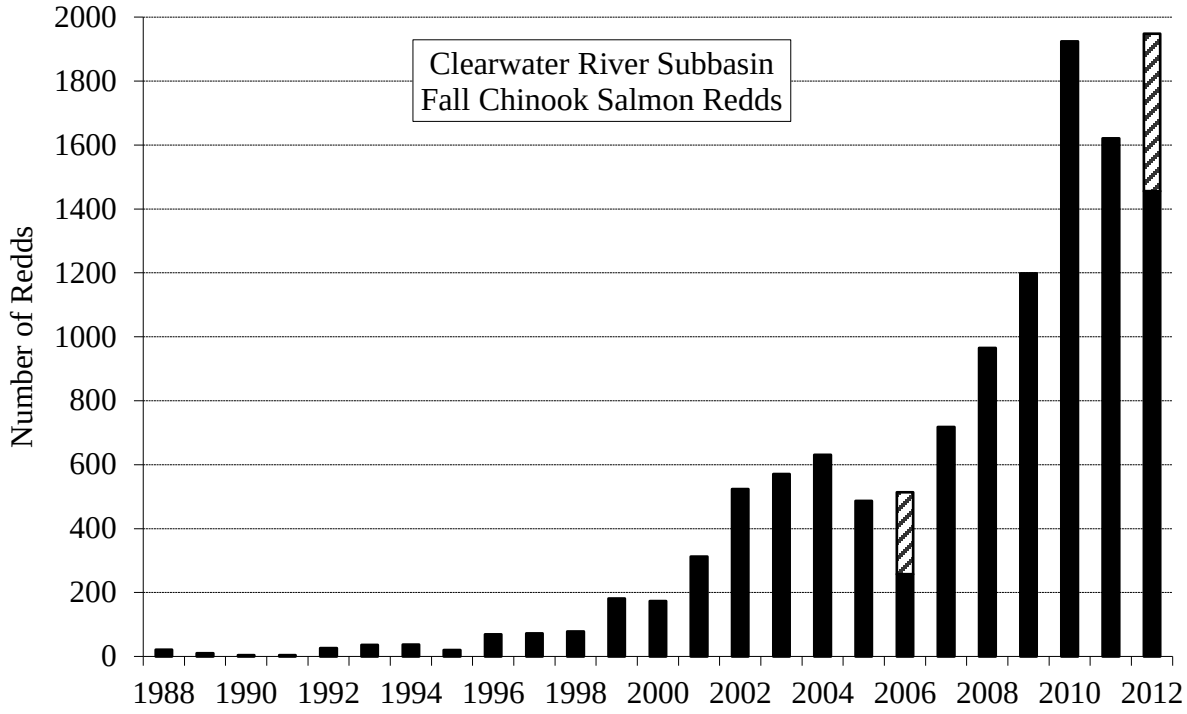

Figure 15. Fall Chinook salmon redds counted in the Clearwater River Subbasin, 1988-2012 (cross hatches indicates an estimated redd number missed due to turbid water conditions and incomplete surveys).

One aerial survey conducted November 14 on the Salmon River resulted in 34 redds observed. A survey scheduled November 7 was not conducted because of inclement weather. Rains and turbid water caused the last survey scheduled on November 29 to be cancelled. Salmon River flow was moderate at 4,590 cfs during the survey and conditions were only fair, therefore, a number of redds were probably missed, especially deep water redds. Since 2008, the mean number of redds occurring in the Salmon River has been 30, ranging between 8 and 60. The lowest redd count for the Salmon River, since intensive surveys began in 1992, was zero redds in both 1999 and 2000, while the highest count was 60 in 2011 (Arnsberg et al. 2013).

One spawning ground survey conducted November 27 on Alpowa Creek resulted in 6 fall Chinook redds observed and about a dozen live fish still spawning. This is the third year we have looked for redds in Alpowa Creek. A total of 31 redds were observed in the lower Alpowa Creek in 2010 while no redds were seen in 2011 (Arnsberg et al. 2013).

There were a total of 4,254 fall Chinook salmon redds counted and/or estimated above Lower Granite Dam and 541 redds estimated in the Tucannon River for a total of 4,795 redds in the Snake River Basin during 2012 (Arnsberg et al. 2013). The 2012 fall Chinook redd estimate represents the third highest in the Snake River Basin since surveys began in 1988 (Figure 16). The adult escapement above Lower Granite Dam in 2012 was estimated to be 30,363 adults (Young et al. 2012). The adult-to-redd ratio above Lower Granite Dam was calculated to be 7.1 adults/redd in 2012 with an average of 5.9 adults/redd averaged across all years since 1988. Redd counts continue to show a high correlation ($R^2 = 0.932$) with yearly escapement estimates

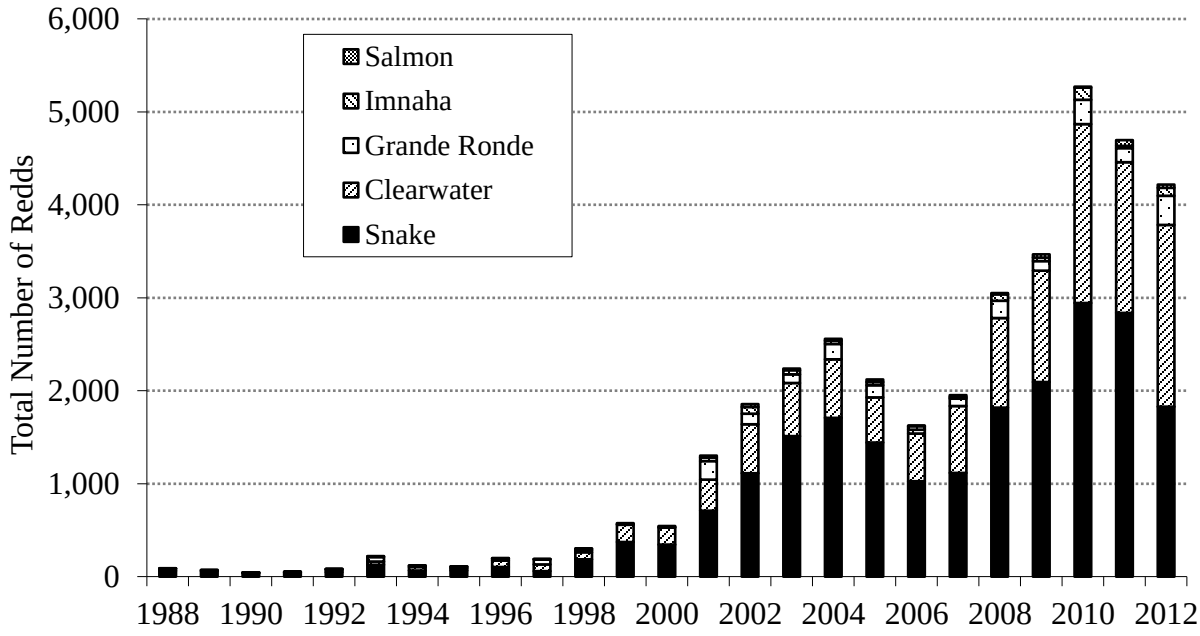

Figure 16. Fall Chinook salmon redds counted in the Snake River Basin above Lower Granite Dam, 1988-2012.

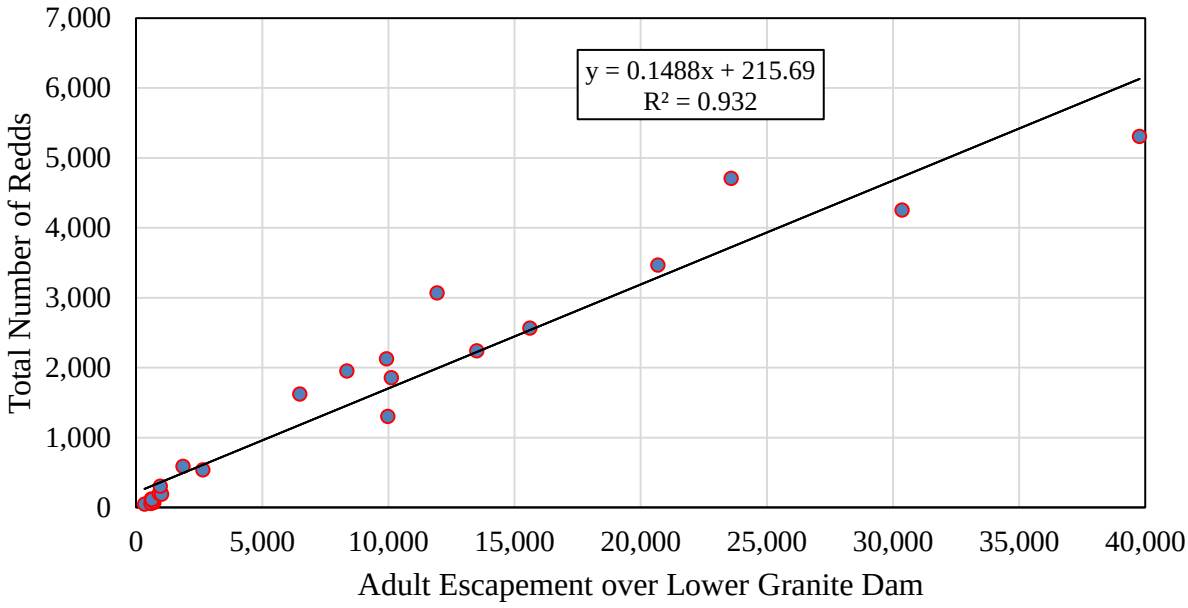

Figure 17. Fall Chinook salmon redds counted in the Snake River Basin above Lower Granite Dam and adult (not including jacks) escapement regression over Lower Granite Dam from run reconstructions, 1988-2012.

over Lower Granite Dam (Figure 17). Using the adult/redd number of 7.1 in 2012, the estimated adult escapement to the Clearwater River Subbasin was approximately 13,902 adults (1-ocean fish or jacks not included).

Escapement and Carcass Recoveries

The total fall Chinook salmon returning to Lower Granite Dam (LGR) in 2012 was estimated to be 36,248 adults and 18,902 jacks for a total of 55,150 fish (Young et al. 2012). During 2012, the number of fall Chinook salmon trapped and hauled from LGR to NPTH and LFH for broodstock needs and run reconstruction purposes was 948 and 5,056 fish, respectively. After subtracting hauled fish from the LGR return estimate, volunteers to LFH, and fallback through LGR, the preliminary fall Chinook salmon escapement estimate to the spawning grounds was 30,363 adults and 16,884 jacks for a total of 47,247 fish (Young et al. 2012). It was estimated that the natural adult escapement above Lower Granite was 11,315 (37.3%) and 4,138 (24.5%) natural jacks. Natural adults and natural jacks combined made up 32.7% of the fall Chinook escapement above Lower Granite Dam in 2012.

A total of 152 fall Chinook salmon carcasses were collected in the Snake River Basin during 2012 (Appendix B). One coho carcass was also collected in the Clearwater River. There was a total of 34 females (23.6%) and 110 males (76.4%) among carcasses collected in the Clearwater River. Another 3 fall Chinook carcasses were collected in Alpowa Creek and 5 collected in Joseph Creek. Of all female carcasses cut open and examined, about 97.3% were 100% spawned-out or eggs were spent. Only 1 female examined had retained about half her eggs (Appendix B).

The breakdown of fall Chinook salmon carcasses of subyearling versus yearling hatchery released fall Chinook salmon, number of unknown fish (scale analysis could not determine for certain if hatchery or natural), natural fish that reservoir reared by scale analysis, and out-of-Snake Basin hatchery strays are summarized in Table 10. Analysis of the composition of fall Chinook salmon carcasses collected in the Clearwater River Subbasin using coded wire tags, adipose fin clips, and scale readings resulted in identifying 71 (51.4%) unmarked/untagged fish that emigrated as subyearlings, 35 (25.4%) known hatchery subyearlings that emigrated as subyearlings, followed by 17 (12.3%) natural origin fish that reservoir reared (Table 10, Appendix B). The unmarked/untagged fish contains a proportion of NPTH released fish as about 30% of the subyearlings released are not coded wire tagged or adipose fin clipped. The 2 known (from wire) out-of-Snake Basin hatchery "strays" made up 1.4% of the carcasses sampled in the Clearwater River during 2012. Most carcasses collected returned at total age-3 (64.5%), followed by age-4 fish (18.8%), age-2 or jacks (10.1%), and lastly age-5 (6.5%) (Table 10; Appendix B). There were no age-6 carcasses collected.

Table 10. Number of each age class, percent of the total sample identified by emigration life history type from coded wire tags, adipose fin clips, and scale analysis; fork length (cm) range and average fork length in parenthesis of total age 2-5 fall Chinook salmon carcasses (n=138) collected in the Clearwater River Subbasin during 2012.

Release Strategy/Emigration Life History type	No. Age 2 Fk Lth Range (avg.)	No. Age 3 Fk Lth Range (avg.)	No. Age 4 Fk Lth Range (avg.)	No. Age 5 Fk Lth Range (avg.)	Total of Life History type (% of total)
Subyearling Hat Release/Subyearling Emigration	8 (5.8%) 43-50 (48)	26 (18.8%) 59-75 (67)	1 (0.7%) 83 (83)	0	35 (25.4%)
Subyearling Hat Release/ Reservoir Reared	0	3 (2.1%) 61-65 (63)	0	0	3 (2.1%)
Yearling Hat Release	0	4 (2.9%) 52-60 (57)	6 (4.3%) 69-81 (74)	0	10 (7.2%)
Unknown with Subyearling Emigration	6 (4.3%) 43-49 (47)	50 (36.2%) 46-81 (66)	10 (7.2%) 66-95 (82)	5 (3.6%) 67-101 (90)	71 (51.4%)
Natural Reservoir Reared	0	4 (2.9%) 58-63 (60)	9 (6.5%) 64-89 (79)	4 (2.9%) 87-96 (91)	17 (12.3%)
Out-of-Snake Basin Hatchery Strays	0	2 (1.4%) 63 (63)	0	0	2 (1.4%)
Total Collected by Age	14 (10.1%)	89 (64.5%)	26 (18.8%)	9 (6.5%)	138

Smolt-to-Adult Return Estimates

The fall Chinook salmon run reconstruction estimates from 2007-2011 (Young et al. 2012), expanded for trapping rates at Lower Granite Dam and estimated contributions in the ocean and Columbia River fisheries from NPTH and associated releases are provided in Table 11 and Figure 18. The lowest smolt-to-adult returns (SAR) back to the Snake River and subsequent ocean and freshwater harvest rates were for the 2007 and 2009 release groups. The highest estimated SARs and smolt-to-adult survivals (SASs) were for the 2008 release groups with NLV having the highest return rate back to the Snake River (1.46%) and the highest harvest rate (0.61%) for a total SAS of 2.07% (Table 11; Figure 18).

A similar trend resulted in the FCAP subyearling releases from 2006-2009 in terms of SARs and SASs (Table 12; Figure 19). The lowest SARs and SASs occurred for the 2007 and 2009 releases while the highest SARs back to the Snake River for all release groups occurred for the 2008 releases with Big Canyon release having the highest SAR of 1.67%. All FCAP subyearling

Table 11. Estimated fall Chinook Salmon smolt-to-adult returns (SARs) and smolt-to-adult survivals (SASs) for Nez Perce Tribal Hatchery (NPTH) on-station and associated subyearling releases from 2006-2009 (coded wire tag recoveries as reported to the Regional Mark Processing Center (RMPC) using estimated numbers i.e. expanded, and expanded numbers at Lower Granite Dam (Snake River recoveries) through run reconstructions (includes 1-ocean returns).

Release Location	Release Year	Total # coded wire tags	Total Ocean Fisheries recoveries	Total Freshwater Fisheries recoveries	Total Snake River recoveries	Grand Total recoveries	SARs (%) to Snake	Total SASs %
North Lapwai Valley	2006	198,108	170	79	799	1,048	0.40	0.53
Cedar Flats	2006	25,478	28	0	281	309	1.10	1.21
Lukes Gulch	2006	25,099	18	0	172	190	0.69	0.76
NPTH	2006	296,606	302	57	1,662	2,021	0.56	0.68
North Lapwai Valley	2007	144,841	20	24	101	145	0.07	0.10
Cedar Flats	2007	24,890	0	4	49	53	0.20	0.21
Lukes Gulch	2007	24,906	1	0	19	20	0.08	0.08
NPTH	2007	293,935	66	15	625	706	0.21	0.24
North Lapwai Valley	2008	167,976	590	441	2,451	3,482	1.46	2.07
Cedar Flats	2008	99,641	309	13	1,027	1,349	1.03	1.35
Lukes Gulch	2008	99,456	213	7	1,383	1,603	1.39	1.61
NPTH	2008	249,827	558	393	2,186	3,137	0.88	1.26
North Lapwai Valley	2009	280,079	53	29	702	784	0.25	0.28
Cedar Flats	2009	196,600	80	45	438	563	0.23	0.29
Lukes Gulch	2009	196,511	68	23	626	717	0.32	0.37
NPTH	2009	272,475	62	44	1,025	1,131	0.38	0.42

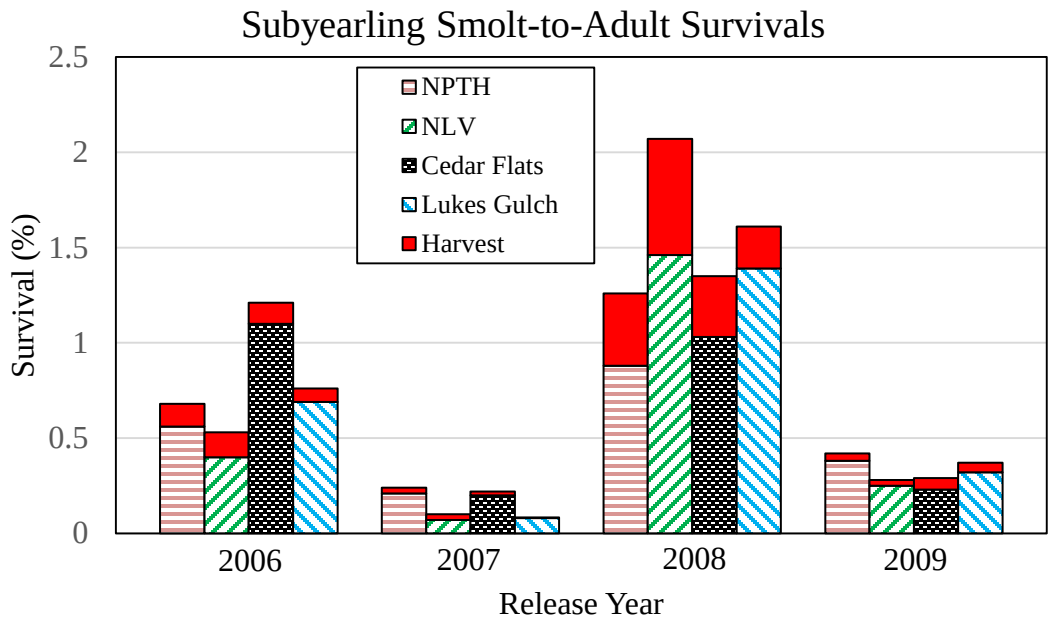

Figure 18. Fall Chinook salmon smolt-to-adult returns (SARs) to the Snake River plus ocean and freshwater harvest estimates (in red) for total smolt-to-adult survivals (SASs) from juvenile subyearling releases at Nez Perce Tribal Hatchery (NPTH) and associated acclimation sites at North Lapwai Valley (NLV), Cedar Flats, and Lukes Gulch (includes 1-ocean fish).

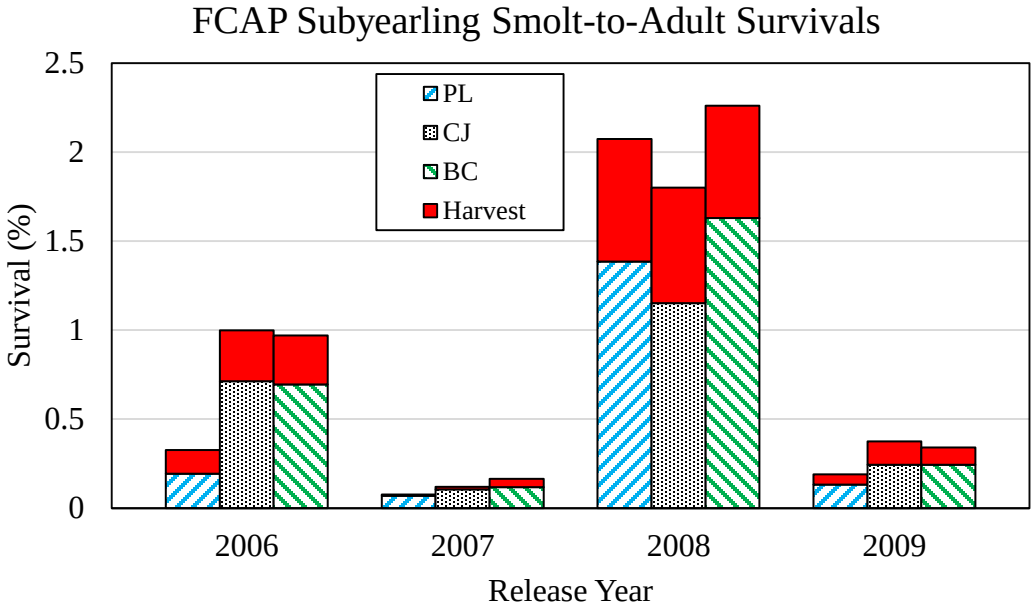

Figure 19. Fall Chinook salmon smolt-to-adult returns (SARs) to the Snake River plus ocean and freshwater harvest estimates (in red) for total smolt-to-adult survivals (SASs) from juvenile subyearling releases from the Fall Chinook Acclimation Project (FCAP) at Pittsburg Landing (PL), Captain John Rapids (CJ), and at Big Canyon Creek (BC) acclimation sites (includes 1-ocean fish).

Table 12. Estimated fall Chinook Salmon smolt-to-adult survivals (SASs) for the Fall Chinook Acclimation Project (FCAP) subyearling acclimated releases from 2006-2009 (coded wire tag recoveries as reported to the Regional Mark Processing Center (RMPC) using estimated numbers i.e. expanded, and expanded numbers at Lower Granite Dam (Snake River recoveries) through run reconstructions (includes 1-ocean returns).

Release Location/strategy	Release year	Total # coded wire tags	Total # coded wire tags + ad-clipped	CWT code	Total Ocean Fisheries recoveries	Total Freshwater Fisheries recoveries	Total Snake R. recoveries	Grand Total recoveries	SARs (%) to Snake	Total SASs (%)
Pittsburg Landing	2006	-	185,413	094419	113	131	360	604	0.19	0.33
Captain Johns	2006	99,366	-	610177	130	3	631	764	0.64	0.77
Captain Johns	2006	-	98,699	610176	238	194	782	1214	0.79	1.23
Big Canyon	2006	98,994	-	610175	144	0	660	804	0.67	0.81
Big Canyon	2006	-	97,763	610174	205	193	707	1105	0.72	1.13
Pittsburg Landing	2007	98,046	-	612731	0	0	67	67	0.07	0.07
Pittsburg Landing	2007	-	97,668	612732	12	4	69	85	0.07	0.09
Captain Johns	2007	99,212	-	612728	6	0	89	95	0.09	0.10
Captain Johns	2007	-	99,107	612727	4	18	119	141	0.12	0.14
Big Canyon	2007	100,103	-	612730	20	0	112	132	0.11	0.13
Big Canyon	2007	-	98,546	612729	48	28	121	197	0.12	0.20

Table 12. Continued.

Release Location/strategy	Release year	Total # coded wire tags	Total # coded wire tags + ad-clipped	CWT code	Total Ocean Fisheries recoveries	Total Freshwater Fisheries recoveries	Total Snake R. recoveries	Grand Total recoveries	SARs (%) to Snake	Total SASs (%)
Pittsburg Landing	2008	99,802	-	612522	270	12	1,206	1,488	1.21	1.49
Pittsburg Landing	2008	-	99,371	612519	507	586	1,550	2,643	1.56	2.66
Captain Johns	2008	98,734	-	612521	183	0	778	961	0.79	0.97
Captain Johns	2008	-	98,282	612518	507	586	1,492	2,585	1.52	2.63
Big Canyon	2008	99,367	-	612520	270	10	1,416	1,696	1.43	1.71
Big Canyon	2008	-	98,903	612517	581	389	1,902	2,872	1.92	2.90
Pittsburg Landing	2009	99,727	-	610184	31	0	55	86	0.06	0.09
Pittsburg Landing	2009	-	95,227	610181	43	40	203	286	0.21	0.30
Captain Johns	2009	99,521	-	610183	32	5	199	236	0.20	0.24
Captain Johns	2009	-	100,383	610180	131	91	288	510	0.29	0.51
Big Canyon	2009	99,332	-	610182	35	3	191	229	0.19	0.23
Big Canyon	2009	-	100,093	610179	78	77	294	449	0.29	0.45

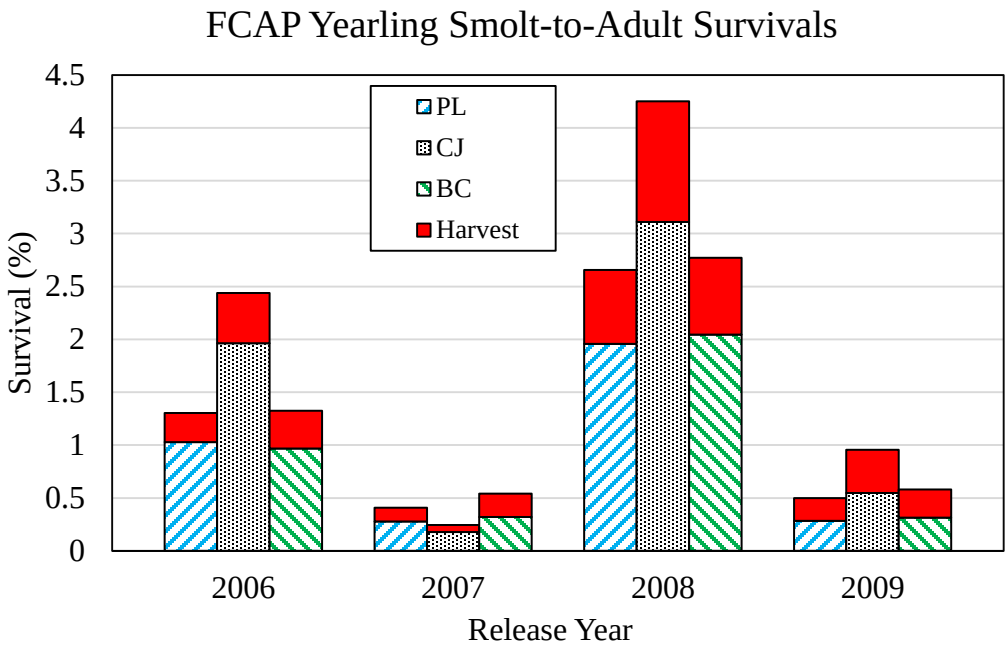

Figure 20. Fall Chinook salmon smolt-to-adult returns (SARs) to the Snake River plus ocean and freshwater harvest estimates (in red) for total smolt-to-adult survivals (SASs) from juvenile yearling releases from the Fall Chinook Acclimation Project (FCAP) at Pittsburg Landing (PL), Captain John Rapids (CJ), and at Big Canyon Creek (BC) acclimation sites (includes 1-ocean fish).

release groups had similar harvest rates for all three acclimation sites within each release year (Table 12, Figure 19).

The FCAP yearling releases also show similar higher SARs and SASs for the 2006-2008 releases with the 2007 and 2009 having the lowest returns back to the Snake River and the lowest contributions to harvest (Table 13, Figure 20). The highest average SAR and SAS was also for the 2008 release groups with Captain John having the highest SAR of 3.1% back to the Snake River and also the highest harvest rate of 1.1%, for a total SAS of 4.2% (Table 13; Figure 20).

Table 13. Estimated fall Chinook Salmon smolt-to-adult survivals (SASs) for the Fall Chinook Acclimation Project (FCAP) yearling acclimated releases from 2006-2009 (coded wire tag recoveries as reported to the Regional Mark Processing Center (RMPC) using estimated numbers i.e. expanded, and expanded numbers at Lower Granite Dam (Snake River recoveries) through run reconstructions (includes 1-ocean returns).

Release Location	Release year	Total # coded wire tags	Total # coded wire tags + ad-clipped	CWT code	Total Ocean Fisheries recoveries	Total Freshwater Fisheries recoveries	Total Snake R. recoveries	Grand Total recoveries	SARs (%) to Snake	Total SASs (%)
Pittsburg Landing	2006	77,644	-	610153	129	0	799	928	1.03	1.20
Pittsburg Landing	2006	-	66,987	610150	132	140	687	959	1.03	1.43
Captain Johns	2006	78,156	-	610152	157	4	1,573	1734	2.01	2.22
Captain Johns	2006	-	70,185	610151	243	301	1,338	1882	1.91	2.68
Big Canyon	2006	59,465	-	610144	93	3	591	687	0.99	1.16
Big Canyon	2006	-	66,732	610148	169	185	631	985	0.95	1.48
Pittsburg Landing	2007	72,805	-	612510	62	0	217	279	0.30	0.38
Pittsburg Landing	2007	-	70,969	612505 612661	46	80	181	307	0.26	0.43
Captain Johns	2007	78,588	-	612509	40	0	148	188	0.19	0.24
Captain Johns	2007	-	69,180	612506	35	23	115	173	0.17	0.25
Big Canyon	2007	77,220	-	612508	102	7	168	277	0.22	0.36
Big Canyon	2007	-	67,891	612507	102	110	296	508	0.44	0.75

Table 13. Continued.

Release Location	Release year	Total # coded wire tags	Total # coded wire tags + ad-clipped	CWT code	Total Ocean Fisheries recoveries	Total Freshwater Fisheries recoveries	Total Snake R. recoveries	Grand Total recoveries	SARs (%) to Snake	Total SASs (%)
Pittsburg Landing	2008	81,476	-	612515	331	0	1,676	2,007	2.06	2.46
Pittsburg Landing	2008	-	68,129	612512	401	311	1,254	1,966	1.84	2.89
Captain Johns	2008	82,934	-	612514	489	5	2,442	2,936	2.94	3.54
Captain Johns	2008	-	69,056	612511	721	519	2,283	3,523	3.31	5.10
Big Canyon	2008	77,749	-	612516	304	14	1,894	2,212	2.44	2.85
Big Canyon	2008	-	68,199	612513	474	269	1,089	1,832	1.60	2.69
Pittsburg Landing	2009	78,673	-	612754	86	0	233	319	0.30	0.41
Pittsburg Landing	2009	-	71,169	612751	153	82	193	428	0.27	0.60
Captain Johns	2009	66,821	-	612755	156	10	288	454	0.43	0.68
Captain Johns	2009	-	70,325	612752	187	205	462	854	0.66	1.21
Big Canyon	2009	80,783	-	612753	108	25	262	395	0.32	0.49
Big Canyon	2009	-	80,783	612750	191	108	245	544	0.30	0.67

Hatchery Spawning

Fall Chinook adults are first counted on August 18 at Lower Granite Dam (LGR), although there is some overlap on either side of that date with summer Chinook salmon. Water temperatures were unfavorable for trapping on August 18 and trapping did not begin until August 28 during 2012. The NPTH staff did not start hauling fall Chinook for broodstock until September 2. The last haul date from LGR was October 9 when enough broodstock had been hauled. The NPTH did not have to open the fish ladder at NPTH during 2012 to trap additional fish for brood.

A total of 948 fall Chinook were hauled from Lower Granite Dam for NPTH broodstock which consisted of 534 females (Appendix C) and 414 males (Appendix D). There were a total of 468 females used for broodstock, 62 died in the pond prior to spawning, and 4 were green or the eggs not viable (labeled as KO or killed outright in Appendix C). A total of 325 males were used for broodstock, 39 died in the pond prior to spawning, and 35 were killed outright and not used for brood, and 15 were released back to the river to spawn naturally (Appendix D). Most of the KO males were smaller and sacrificed to extract and read coded wire tags for run reconstruction purposes.

The greatest broodstock contribution of females (n=130 or 27.8%) was unmarked/untagged fish with a subyearling emigration life history scale pattern (Appendix C). The unmarked/untagged unknown origin fish contains natural or wild fish and a proportion of NPTH and NLV fish as well since not all hatchery fish are marked/tagged. The second highest contribution of females (n=124 or 26.5%) were yearling releases from the three FCAP acclimation sites and LFH on-station releases. Subyearling releases from the three FCAP site contributed 13.7% to the brood. The NPTH and associated acclimation releases contributed 4.5% to the brood. There were no known out-of-Snake River Basin strays in the female broodstock for 2012 (Appendix C).

The greatest male broodstock contribution (n=175 or 37.4%) to the broodstock was also unmarked/untagged subyearlings showing a subyearling emigration life history by scales (Appendix D). Some larger males were spawned multiple times with the number of females spawned identified in a separate column (Appendix D). FCAP subyearling releases contribute 13.5% to the brood while yearling releases from FCAP and LFH together only contributed 2.1%. The NPTH and associated acclimation releases contributed 5.8% to the brood. Natural/wild males identified by PIT tags or scales contributed 10.5% to the brood. Only one out-of-Snake River Basin hatchery stray was identified and was not used for broodstock (Appendix D).

Total age composition of all fall Chinook salmon females processed at NPTH resulted in 51.3% age-4, 34.6% age-3, and 12.2% age-5 of fish that could be identified (Appendix C). There was only two 1-ocean age-3 females identified and had a reservoir reared emigration scale pattern. Total age composition of all fall Chinook salmon males processed at NPTH resulted in 68.9% age-3, 27.1% age-4, and 2.8% age-5 (Appendix D). There were no 1-ocean yearling jacks used for brood. All age-3 1-ocean males (n=11 or 2.4%) used for brood had a reservoir reared emigration scale pattern. There were no age-6 fish processed during 2012.

Genetic Monitoring

Beginning in 2011, parental based tagging (PBT) was initiated at both LFH and NPTH for all broodstock. Since we were slightly short on males to spawn on a one-to-one ratio during 2012, we used the larger males multiple times in the spawning (Appendix D). The results of PBT will be a better tracking of parents to returning offspring and monitoring and evaluation of different rearing and release strategies. We also subsampled 100% (n=153) fall Chinook salmon carcasses collected on the spawning grounds for DNA analysis, although only a subsample will be analyzed. A comprehensive genetic analysis report on NPTH broodstock and carcass recovery will be forthcoming in a later publication.

DISCUSSION

Supplementation

During the 2012 fall Chinook salmon run, gametes were taken from fish hauled from Lower Granite Dam and adult volunteers to the NPTH fish ladder for 2013 subyearling releases. All fall chinook releases were coded wire tagged and adipose fin clipped prior to release as planned. There were a total of 489,871 yearling fall Chinook (from LFH broodyear 2010) released at the three FCAP sites exceeding the release goal by 39,871 fish. Subyearlings released at FCAP facilities were close to the release goal of 1.4 million fish. The NPTH on-station and NLV releases goals of 500,000 subyearlings each site were exceeded by 60,005 and 63,213 fish, respectively. Upriver NPTH acclimation sites at Cedar Flats and Luke's Gulch both were very close to the release goal of 200,000 at each facility. A grand total of 3,469,633 fall Chinook salmon were released by the Nez Perce Tribe in 2012.

Monitoring and Evaluation

Juvenile Monitoring

Life History, Emigration Timing, and Survival Estimates

All of the FCAP and NPTH hatchery fall Chinook releases migrated at a significantly faster rate than the natural subyearling fall Chinook from the Clearwater River. Hatchery Fall Chinook migration rate from release to each detection point seems to be impacted by the release location and the distance each location is from the beginning of Lower Granite Dam pool near Lewiston, Idaho. The emigration timing and life history strategies may be directly correlated with size at release, release date, and smoltification timing. PIT tag detections were sufficient for survival to be estimated to Lower Granite Dam. All project hatchery fall Chinook exhibited good survival estimates to Lower Granite and McNary dams. The NLV subyearling release group show an increase in survival estimates from Lower Granite to McNary dams, which can be contributed to low precision in PIT tag detections and subsequent wider confidence boundaries around the SURPH estimate to McNary Dam. The Lower Granite Dam juvenile bypass and PIT tag detectors are usually operational from late March thru the end of October, but continued operation in 2012 into mid-December. This especially enhances the emigration timing and survival estimates for the Clearwater River natural subyearling fall Chinook, providing more time and detections at Lower Granite Dam. In previous years when the PIT tag detectors are shut down on October 31, there were not yet enough detections at Lower Granite and subsequent

facilities to estimate survival below Lower Granite for the natural Clearwater River releases. To accurately study the Clearwater River natural fall Chinook population and their life history using PIT tag technology, it is essential that detectors at all juvenile facilities are in operation for as long as possible.

Flow and Temperature

There was more inflow at Lower Granite Dam in 2012 compared to the ten year average (2002-2011). More spill at Lower Granite Dam occurred form mid-April to mid-May in 2012 as compared to the ten year average (2002-2011), but was relatively comparable during the entire spill duration. Over 90% of the hatchery FCAP and NPTHC releases had reached Lower Granite Dam during periods of high inflow and subsequent spill, while the majority of PIT tag detections of natural fall Chinook at the dam occurred during periods of low flow and lack of spill. Water temperature extremes between the lower Clearwater River and the Snake River during natural fall Chinook emigration conditions show a difference of about 10 ^{o}C during mid-July through August, similar to recent years. Water temperatures on the Clearwater River were a cool 11-13 ^{o}C while at the same time the Snake River temperatures were 20-23 ^{o}C. This temperature difference may be a thermal barrier causing delayed Clearwater River natural fall Chinook salmon subyearling emigration resulting in significantly more holdovers or reservoir reared fish. The colder water in the Clearwater River as compared to the Snake River during egg incubation also delays emergence from the spawning beds and subsequent growth and smoltification, further delaying emigration.

Genetic Monitoring

As mentioned earlier, parental based tagging (PBT) was initiated at both LFH and NPTH for all broodstock beginning in 2011 and continued in 2012. The results of PBT will be a better tracking of parents to returning offspring and monitoring and evaluation of different rearing and release strategies. Also through PBT analysis, we will be able to determine more accurately the composition of natural adult returns to the Snake River Basin to assist in recovery efforts. A comprehensive genetic analysis report on NPTH broodstock and carcass recovery will be forthcoming in a later publication.

Adult Monitoring

Spawning Ground Surveys

This was the second year since fall Chinook redd surveys began (1988) in the Clearwater that redds had to be estimated because of rain and turbid water. Higher water during spawning initiation may have been the reason fall Chinook moved into Potlatch River which had a record count of 283 redds. This was the first time we surveyed Big Canyon Creek and one redd was observed there. Redds were also seen in Joseph Creek and Alpowa Creek this year which is not typical fall Chinook spawning habitat. There were likely additional areas or streams fall Chinook likely spawned that were not searched or missed and probably why a higher than average adult/redd was calculated for 2012. Even so, redd numbers from 1988-2012 showed a high correlation with yearly escapement estimates over Lower Granite Dam. This is the first year since intensive redd surveys began in the Snake River Basin in 1988 that the Clearwater River Subbasin fall Chinook redd count has exceeded the mainstem Snake River by 130 redds.

Escapement and Carcass Recoveries

The total fall Chinook salmon returning to Lower Granite Dam (LGR) in 2012 was estimated to be 36,248 adults and 18,902 jacks for a total of 55,150 fish. During 2012, the number of fall Chinook salmon trapped and hauled from LGR to NPTH and LFH for broodstock needs and run reconstruction purposes was 948 and 5,056 fish, respectively. The fall Chinook salmon escapement estimate to the spawning grounds was 30,363 adults and 16,884 jacks for a total of 47,247 fish. It was estimated that the natural adult escapement above Lower Granite was fairly high at 11,315 (37.3%). A total of 152 fall Chinook salmon carcasses were collected in the Snake River Basin during 2012. The number of carcasses collected was lower than usual because late rains and turbid water. There was a high percentage (64.5%) of age-3 carcasses collected during 2012 and a low percentage of age-4 (18.8%) and age-5 (6.5%). Out-of-Snake Basin hatchery "strays" continue to be relatively low at only 1.4% of all carcasses sampled.

Smolt-to-Adult Return Estimates

For the most recent four years of complete adult returns, the lowest smolt-to-adult returns (SAR) back to the Snake River and subsequent ocean and freshwater harvest rates were for all NPTH and FCAP 2007 and 2009 release groups. The highest SARs and smolt-to-adult survivals (SASs) were for all 2008 release groups with NLV having the highest return rate back to the Snake River (1.46%) and the highest harvest rate for NPTH releases. For the FCAP subyearling releases, Big Canyon had the highest SAR of 1.67% with Captain John having the highest SAR of 3.1% for the yearling releases during 2008. Higher SARs can be obtained when juvenile survivals are high and ocean conditions are favorable. Higher harvest rates are also seen when juvenile survivals are high.

Hatchery Spawning

During the 2012 run, water temperatures in the Snake River were unfavorable for trapping fish at Lower Granite Dam and fall Chinook trapping did not begin until August 28, 10 days later than normal. The NPTH staff did not start hauling fall Chinook for broodstock until September 2, however, since the trapping rate was initially set fairly high at 15% of the run, NPTH did not have to open their fish ladder to trap additional fish for brood. This strategy results in a higher percentage of natural fall Chinook incorporated into the broodstock, since most all volunteers into the NPTH fish ladder are hatchery origin. A high percentage of unmarked/untagged fish into the brood was seen for both females (27.8%) and males (37.4%). The unmarked/untagged unknown origin fish are natural or wild fish and a proportion of NPTH and NLV fish as well since not all hatchery fish are marked/tagged. Incorporating natural/wild fish into the brood continues to be a high priority at NPTH with a target of 30%. A summary of how well we are meeting this target over the years will be in a later report.

Genetic Monitoring

As mentioned earlier, parental based tagging (PBT) was initiated at both LFH and NPTH for all broodstock for 2011 and 2012. The results of PBT will be a better tracking of parents to returning offspring and monitoring and evaluation of different rearing and release strategies. A comprehensive genetic analysis report on NPTH broodstock and carcass recovery will be forthcoming in a later publication.

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Appendix A. Fall Chinook salmon aerial redd surveys with new redds observed during given flight date on the Clearwater River, 2012.

RM	RKM	LANDMARK	New Redds Counted by Flight Date					Estimated Number
			10/17	10/22	11/8	11/14	Totals	
6.8	10.9	Below Casino			3		3	4
8.0	12.9	Above Casino			6		6	9
11.1	17.8	Above 95 Bridge			2		2	3
14.0	22.5	Catholic Creek			14		14	20
16.4	26.4	Above Gibbs Eddy			4		4	6
17.3	27.9	Island Above Gibbs Eddy			2		2	3
18.0	29.0	Lower Myrtle	44		49		93	134
19.1	30.7	Lower Cottonwood	10		24		34	49
19.3	31.1	Mid Cottonwood-Channel			25		25	36
21.0	33.8	Below Cherrylane Bridge	12		64		76	109
21.7	35.0	Fir Island (Hwy 12 Side Channel)	2				2	3
22.0	35.4	Fir Island (Cherrylane-1705)	97		156		253	364
22.2	35.7	NPTH (1705) Ladder	11		134		145	209
23.3	37.5	Pine Creek			67		67	96
23.9	38.5	Below Thunderbird Market			1		1	1
26.5	42.7	Above Bedrock Creek	6				6	8
27.5	44.3	Below Rest Area	5		49		54	78
28.4	45.7	Rest Area	5		27		32	46
30.1	48.4	House on Cliff			32		32	46
31.5	50.7	Below Tomahawk-Tree Farm			1		1	1
32.5	52.3	Below Tomahawk	1				1	1
35.7	57.4	Below Old Peck Bridge			67		67	96
35.7	57.5	Above Old Peck Bridge			2		2	3
36.2	58.3	Above Old Peck Bridge			26		26	37
39.1	62.9	Below Pink House Boatramp	1		3		4	6
39.6	63.7	Above Pink House Boatramp			13		13	19
40.3	64.9	Ahsahka Islands	16		103		119	171
0.2	0.3	N.F. Clearwater						0
45.0	72.4	Above Mouth of Orofino Creek				2	2	3
49.8	80.2	Above Fords Creek				5	5	7
51.4	82.7	Below Greer Bridge				5	5	7
52.4	84.4	Above Greer Bridge				2	2	3
53.6	86.2	About 1/2 mile below Lolo Cr				3	3	4
58.1	93.5	Clearwater River-Canyon Area				10	10	14
65.7	105.8	Below Kamiah Train Bridge				4	4	6
66.0	106.2	Above Kamiah Hwy 12 Bridge				3	3	4
66.4	106.8	Below powerline above Train Bridge				1	1	1
72.9	117.3	Below SF Clearwater by gravel pit				2	2	3
		Totals	210	0	871	37	1118	1610
		River Mile Start	4	45	4	45		
		River Mile End	45	75	45	75		
		Flow at Spalding Gauge (cfs)	4,810	N/A	5,100	N/A		
		Avg. Temp at Spalding Gauge	10.8	N/A	8.5	N/A		
		Flow from Dworshak (cfs)	1,600	N/A	1,600	N/A		
		Flow at Orofino Gauge (cfs)	3,240	2,510	3,500	2,780		
		Avg. Temp at Orofino Gauge	11.2	7.5	8.1	4.0		
		General Observation Conditions	Fair	Fair	Good	Excel		

Appendix B. Fall Chinook salmon carcasses collected in the Clearwater River by the Nez Perce Tribe, 2012 (N = no, Y = yes, U = Unknown; DNA taken: 1 = good condition, 2 = fair, 3 = poor; CWT Origin and Age keys are at end of table).

Date	Fish ID #	Fork Lth	Sex	% Spawned	CWT	Ad-Clip	Scales taken	DNA taken	Tag Code	CWT Origin	Pit Tag #	PIT tag Origin	Hat Yearl	European Age	Total Age	Origin Scale Data	Condition	SITE
10/15	12001	78	M	100	N	N	Y	2						0.3	4			Cherrylane
10/18	12002	63	M	100	N	N	Y	2						0.2	3			Cherrylane
10/18	12003	88	M	100	N	N	Y	2						R				Cherrylane
10/18	12004	96	M	100	N	N	Y	2						1.3	5	W	RR	Cherrylane
10/18	12005	95	M	100	N	N	Y	2						0.3	4			Cherrylane
10/24	12006	65	M	100	N	N	Y	2						0.2	3			Cherrylane
10/24	12007	62	M	100	N	N	Y	2						0.2	3			Cherrylane
10/24	12008	77	M	100	N	N	Y	2						1.2	4	W	RR	Cherrylane
10/24	12009	64	M	100	N	N	Y	2						0.2	3			Cherrylane
10/24	12010	68	M	100	N	N	Y	2						0.2	3			Cherrylane
10/24	12011	85	M	100	N	Y	Y	2						0.3	4			Cherrylane
10/24	12012	95	M	100	N	N	Y	2						0.4	5			Cherrylane
10/24	12013	43	M	100	N	N	Y	2						0.1	2			Cherrylane
10/24	12014	74	F	100	N	N	Y	2						1.2	4	W	RR	Cherrylane
10/24	12015	89	M	100	N	N	Y	2						1.2	4	W	RR	Cherrylane
10/24	12016	84	F	100	N	N	Y	3						R				Cherrylane
10/24	12017	92	F	100	N	N	Y	2						1.3	5	W	RR	Cherrylane
10/24	12018	88	F	100	N	N	Y	2						0.3	4			Cherrylane
10/24	12019	87	F	100	N	N	Y	2						1.3	5	W	RR	Cherrylane
10/24	12020	79	F	100	N	N	Y	2						0.3	4			Cherrylane
10/24	12021	88	F	100	N	N	Y	2						1.2	4	W	RR	Cherrylane
11/5	12022	59	M	100	N	N	Y	2						0.2	3			Cherrylane
11/5	12023	50	M	100	Y	Y	Y	2	220209	NPTH10SO				0.1	2			Cherrylane
11/5	12024	68	M	100	N	N	Y	2						0.2	3			Cherrylane
11/5	12025	85	F	100	N	N	Y	1						0.3	4			Cherrylane
11/5	12026	66	M	100	N	N	Y	3						0.3	4			Cherrylane
11/5	12027	47	M	100	N	N	Y	2						0.1	2			Cherrylane
11/5	12028	72	M	100	N	N	Y	2						0.2	3			Cherrylane

Appendix B (continued).

Date	Fish ID #	Fork Lth	Sex	% Spawned	CWT	Ad-Clip	Scales taken	DNA taken	Tag Code	CWT Origin	Pit Tag #	PIT tag Origin	Hat Yearl	Europea n Age	Total Age	Origin Scale Data	Condition	SITE
11/5	12029	64	M	100	N	Y	Y	2						0.2	3			Cherrylane
11/5	12030	74	M	100	N	N	Y	2						0.2	3			Cherrylane
11/5	12031	63	M	100	N	N	Y	2						1.1	3	W	RR	Cherrylane
11/5	12032	70	M	100	Y	N	Y	2	612772	NPTH09SO				0.3	4			Cherrylane
11/5	12033	71	M	100	N	Y	Y	2						0.2	3			Cherrylane
11/5	12034	59	M	100	Y	Y	Y	2	612765	NPTH09SCFA				0.2	3			Cherrylane
11/5	12035	45	M	100	N	N	Y	2						R				Cherrylane
11/5	12036	44	M	100	Y	Y	Y	2	220209	NPTH10SO	3D9.1C2DD51B6F	ADULT TAG COL		0.1	2			Cherrylane
11/5	12037	68	F	100	N	N	Y	2						0.2	3			Cherrylane
11/5	12038	88	M	100	N	N	Y	2						1.2	4	W	RR	Cherrylane
11/5	12039	61	M	100	N	N	Y	2						0.2	3			Cherrylane
11/5	12040	46	M	100	N	N	Y	2						0.2	3			Cherrylane
11/5	12041	43	M	100	Y	N	Y	2	220210	NPTH10SO	3D9.1C2DFF01BC	ADULT TAG COL		R				Cherrylane
11/5	12043	47	M	100	Y	Y	Y	2	220209	NPTH10SO				0.1	2			Cherrylane
11/5	12044	47	M	100	N	N	Y	2						0.1	2			Cherrylane
11/5	12045	55	M	100	N	N	Y	2						0.2	3			Cherrylane
11/5	12046	59	M	100	Y	N	Y	2	220312	LF09YBCA			H	1.2	4			Cherrylane
11/5	12047	71	M	100	N	N	Y	2						0.2	3			Cherrylane
11/5	12048	70	M	100	Y	N	Y	2	612772	NPTH09SO				0.2	3			Cherrylane
11/5	12049	73	M	100	Y	N	Y	2	220306	LF09SBCA				0.2	3			Cherrylane
11/5	12050	60	M	100	N	N	Y	2						0.2	3			Cherrylane
11/5	12051	61	M	100	Y	N	Y	2	220201	NPTH09SNLV A				0.2	3			Cherrylane
11/5	12052	69	M	100	N	N	Y	2						0.2	3			Cherrylane
11/5	12053	77	M	100	N	N	Y	2			3D9.1C2DE8C07F	Adult Tag Col R		0.3	4			Cherrylane
11/5	12054	63	M	100	N	N	Y	2			3D9.1C2D4EC8AC	LF09SCRSURR		1.2	4	W	RR	Cherrylane
11/5	12055	64	M	100	N	N	Y	2						1.2	4	W	RR	Cherrylane
11/5	12056	63	M	100	N	N	Y	2						0.2	3			Cherrylane
11/5	12057	83	F	100	N	N	Y	2						0.3	4			Cherrylane

Appendix B (continued).

Date	Fish ID #	Fork Lth	Sex	% Spawned	CWT	Ad-Clip	Scales taken	DNA taken	Tag Code	CWT Origin	Pit Tag #	PIT tag Origin	Hat Yearl	European Age	Total Age	Origin Scale Data	Condition	SITE
11/5	12058	70	M	100	N	N	Y	2						0.2	3			Cherrylane
11/5	12059	67	M	100	Y	Y	Y	2	220202	NPTH09SNLVA				0.2	3			Cherrylane
11/5	12060	85	F	100	N	N	Y	2						1.2	4	W	RR	Cherrylane
11/5	12061	1010	M	100	N	N	Y	2			3D9.1C2C4E2FBF	SR07SLGRTAILR		0.4	5			Cherrylane
11/15	12062	61	M	100	N	N	Y	2						0.2	3			Cherrylane
11/15	12063	75	M	100	Y	Y	Y	2	220307	LF09SBCA				0.3	4			Cherrylane
11/15	12064	47	M	100	N	N	Y	2						0.1	2			Cherrylane
11/15	12065	63	M	100	Y	Y	Y	2	090330	UMA09SUMAR				0.2	3			Cherrylane
11/15	12066	68	M	100	Y	Y	Y	2	220200	NPTH09SO				0.2	3			Cherrylane
11/15	12067	73	M	100	N	Y	Y	2						0.2	3			Cherrylane
11/15	12068	63	M	100	N	N	Y	2						R				Cherrylane
11/15	12069	69	M	100	N	N	Y	2			3D9.1C2D500D41	LF09SBCA		0.3	4			Cherrylane
11/15	12070	69	F	100	Y	Y	Y	2	220303	LF08YBCA			H	1.2	4			Cherrylane
11/15	12071	69	M	100	N	N	Y	2						0.2	3			Cherrylane
11/15	12072	63	M	100	Y	Y	Y	2	220200	NPTH09SO				0.2	3			Cherrylane
11/15	12073	52	M	100	Y	N	Y	2	220314	LF09YCJA			H	1.1	3			Cherrylane
11/15	12074	52	M	100	N	N	Y	2			3D9.1C2D98628C	LF10SBCA		0.1	2			Cherrylane
11/15	12075	59	M	100	N	Y	Y	3						0.2	3			Cherrylane
11/15	12076	81	M	100	Y	N	Y	2	220300	LF08YCJA			H	1.2	4			Cherrylane
11/15	12077	90	F	100	N	N	Y	2						1.3	5	W	RR	Cherrylane
11/15	12078	62	M	100	N	N	Y	2						0.2	3			Cherrylane
11/15	12079	65	F	100	Y	Y	Y	2	220202	NPTH09SNLVA				0.2	3			Cherrylane
11/15	12080	60	M	100	N	N	Y	2						0.2	3			Cherrylane
11/15	12081	69	M	100	N	N	Y	3						0.2	3			Cherrylane
11/15	12082	60	M	100	N	N	Y	2			3D9.1C2D5E1225	LF09SSRSURR		0.2	3			Cherrylane
11/15	12083	46	M	100	Y	N	Y	3	220205	NPTH10SCFA				0.1	2			Cherrylane
11/15	12084	67	M	100	Y	Y	Y	2	635181	LF09SCCD				0.2	3			Cherrylane
11/15	12085	49	M	100	N	Y	Y	2						0.1	2			Cherrylane

Appendix B (continued).

Date	Fish ID #	Fork Lth	Sex	% Spawned	CWT	Ad-Clip	Scales taken	DNA taken	Tag Code	CWT Origin	Pit Tag #	PIT tag Origin	Hat Yearl	European Age	Total Age	Origin Scale Data	Condition	SITE
11/15	12086	61	M	100	N	N	Y	2			3D9.1C2D5BDBED	LF09SSRSURR		1.1	3	W	RR	Cherrylane
11/15	12087	60	M	100	N	N	Y	2						0.2	3			Cherrylane
11/15	12088	69	M	100	N	N	Y	2						0.2	3			Cherrylane
11/15	12089	66	M	100	N	N	Y	2						0.2	3			Cherrylane
11/15	12090	59	M	100	Y	N	Y	2	612772	NPTH09SO				0.2	3			Cherrylane
11/15	12091	57	M	100	Y	N	Y	2	220314	LF09YCJA			H	1.1	3			Cherrylane
11/19	12092	63	M	100	N	N	Y	2						0.2	3			Cherrylane
11/19	12093	68	M	100	N	N	Y	2						0.2	3			Cherrylane
11/19	12094	64	M	100	Y	Y	Y	2	220200	NPTH09SO	3D9.1C2D356641	TNI		0.3	4			Cherrylane
11/19	12095	63	M	100	Y	N	Y	2	635294	PRH09SCOL				0.2	3			Cherrylane
11/19	12096	75	M	100	N	N	Y	2					H	1.2	4			Cherrylane
11/19	12097	57	M	100	N	N	Y	2						0.2	3			Cherrylane
11/19	12098	65	M	100	N	N	Y	2						0.2	3			Cherrylane
11/19	12099	60	M	100	Y	Y	Y	2	635564	LF09YO			H	1.1	3			Cherrylane
11/19	12100	63	M	100	Y	N	Y	2	612772	NPTH09SO				1.1	3	W	RR	Cherrylane
11/19	12101	67	F	100	N	N	Y	2						0.2	3			Cherrylane
11/19	12102	1007	M	100	N	N	Y	2						0.4	5			Cherrylane
11/19	12103	68	F	100	N	N	Y	2						1.2	4	W	RR	Cherrylane
11/19	12104	74	M	100	Y	N	Y	2	220201	NPTH09SNLVA				0.2	3			Cherrylane
11/19	12105	69	F	100	N	N	Y	2						0.2	3			Cherrylane
11/19	12106	81	M	100	N	N	Y	2						0.2	3			Cherrylane
11/19	12107	75	F	100	N	N	Y	2						1.2	4	W	RR	Cherrylane
11/19	12108	86	F	100	N	N	Y	2						0.4	5			Cherrylane
11/19	12109	67	M	100	Y	Y	Y	2	635181	LF09SCCD				0.2	3			Cherrylane
11/19	12110	75	F	100	N	N	Y	2						0.2	3			Cherrylane
11/19	12111	68	F	100	Y	Y	Y	2	220200	NPTH09SO				0.2	3			Cherrylane
11/19	12112	69	F	100	N	N	Y	2						0.2	3			Cherrylane
11/19	12113	75	F	100	Y	N	Y	2	220302	LF08YBCA			H	1.2	4			Cherrylane

Appendix B (continued).

Date	Fish ID #	Fork Lth	Sex	% Spawned	CWT	Ad-Clip	Scales taken	DNA taken	Tag Code	CWT Origin	Pit Tag #	PIT tag Origin	Hat Yearl	European Age	Total Age	Origin Scale Data	Condition	SITE
11/19	12114	68	M	100	N	N	Y	2						0.2	3			Cherrylane
11/19	12115	73	F	100	Y	Y	Y	2	220302	LF08YBCA			H	1.2	4			Cherrylane
11/19	12116	65	F	100	Y	N	Y	2	612772	NPTH09SO				0.2	3			Cherrylane
11/19	12117	72	F	100	N	N	Y	2						R				Cherrylane
11/19	12118	67	M	100	N	N	Y	2						0.4	5			Cherrylane
11/19	12119	59	M	100	N	N	Y	3						1.1	3	W	RR	Cherrylane
11/19	12120	68	F	100	Y	Y	Y	2	220202	NPTH09SNLVA				0.2	3			Cherrylane
11/19	12121	49	F	100	Y	N	Y	2	220205	NPTH10SCFA	3D9.1C2DD603C5	BONN		0.1	2			Cherrylane
11/19	12122	62	M	100	N	N	Y	2						0.2	3			Cherrylane
11/19	12123	49	M	100	N	N	Y	2						0.1	2			Cherrylane
11/19	12124	83	F	100	Y	N	Y	2	612697	NPTH08SO				0.3	4			Cherrylane
11/19	12125	65	M	100	N	Y	Y	2			3D9.1C2D4FD27C	LF09SCRSURR		1.2	4	W	RR	Cherrylane
11/19	12126	50	M	100	Y	N	Y	2	220120	LF10SCJA				0.1	2			Cherrylane
11/19	12127	51	M	100	N	N	Y	2						0.2	3			Cherrylane
11/19	12128	64	M	100	Y	Y	Y	2	635181	LF09SCCD				0.2	3			Cherrylane
11/19	12129	68	M	100	Y	Y	Y	2	220200	NPTH09SO				0.2	3			Cherrylane
11/19	12130	83	F	100	N	N	Y	2						0.3	4			Cherrylane
11/19	12131	69	M	100	N	N	Y	2						0.2	3			Cherrylane
11/26	12132	65	F	100	N	N	Y	2						0.2	3			Cherrylane
11/26	12133	78	M	100	N	N	Y	2						0.2	3			Cherrylane
11/26	12134	64	M	100	N	N	Y	2						0.2	3			Cherrylane
11/26	12135	79	M	100	N	N	Y	3						0.2	3			Cherrylane
11/26	12136	68	M	100	Y	Y	Y	2	220202	NPTH09SNLVA				0.2	3			Cherrylane
11/26	12137	70	M	100	N	N	Y	3						0.2	3			Cherrylane
11/26	12138	74	M	100	Y	N	Y	2	220201	NPTH09SNLVA				0.2	3			Cherrylane
11/26	12139	60	M	100	N	N	Y	3						1.1	3	W	RR	Cherrylane
11/26	12140	59	M	100	N	N	Y	3						0.2	3			Cherrylane
11/26	12141	74	F	100	Y	Y	Y	3	635166	LF08YO			H	1.2	4			Cherrylane

Appendix B (continued).

Date	Fish ID #	Fork Lth	Sex	% Spawned	CWT	Ad-Clip	Scales taken	DNA taken	Tag Code	CWT Origin	Pit Tag #	PIT tag Origin	Hat Yearl	European Age	Total Age	Origin Scale Data	Condition	SITE
11/26	12142	68	F	100	N	N	Y	2						0.2	3			Cherrylane
11/26	12143	61	F	100	Y	Y	Y	2	635180	LF09SO				0.2	3			Cherrylane
11/26	12144	65	M	100	Y	Y	Y	2	220200	NPTH09SO				0.2	3			Cherrylane
11/26	12145	58	M	100	N	N	Y	2						1.1	3	W	RR	Cherrylane
11/27	12146	58	M	100	N	Y	Y	2						0.2	3			Alpowa Creek
11/27	12147	53	M	100	Y	Y	Y	2	220119	LF10SCJA				0.1	2			Alpowa Creek
11/27	12148	62	M	100	Y	Y	Y	2	635180	LF09SO				0.2	3			Alpowa Creek
11/9	12149	71	F	100	Y	Y	Y	2		No Snout								Joseph Creek
11/15	12150	68	F	100	N	N	Y	2										Joseph Creek
11/15	12151	67	F	50	N	Y	Y	2										Joseph Creek
11/15	12152	65	M	100	N	N	Y	2										Joseph Creek
12/19	12153	62	U	?	?	?	N	3	?									Joseph Creek

***European Age key:** examples: 0.1 = 2-year old that had a subyearling emigration and spent 1-year in salt water, 1.3 = 5-yr old that had a yearling emigration and spent 3-years in salt water, R = regenerated scales that could not be read. Origin scale data: W = wild or natural. Condition: RR = reservoir reared life history.

***Origin key** (from CWT or PIT tag): LF = Lyons Ferry Hatchery, NPTH = Nez Perce Tribal Hatchery, UMA = Umatilla Hatchery, 08 = 2008 broodyear, 10 = 2010 broodyear, Y = yearling release, S = subyearling release, O = on-station release, BCA = Big Canyon Acclimation release, CJA = Captain John Acclimation release, PA = Pittsburg Landing Acclimation release, NLVA = North Lapwai Valley acclimated release, LGA = Lukes Gulch Acclimation release, CFA = Cedar Flats Acclimation release, DWOR = Dworshak subyearling surrogate releases, CCD = Couse Cr. direct release, GRRD = Grande Ronde direct release, IPC = Idaho Power Company direct release at Hells Canyon Dam, BONN = tagged at Bonneville Dam as an adult, LGRTR = Lower Granite Dam tailrace tagged as a juvenile emigrant, TNI = not in PIT tag database.

***Site**: Cherrylane = Clearwater River near Cherrylane.

Appendix C. Fall Chinook salmon female origin, broodyear, and life history summary of fish hauled from Lower Granite Dam that were processed at NPTH with total of each origin spawned for 2012 broodstock (origins from coded wire tags, passive integrated transponder (PIT) tags, adipose fin clips, and scale readings; SP = spawned, DIP = died in pond prior to spawning, KO = killed outright and not used for broodstock i.e. non-viable or green eggs).

Origins of Females (N = 534 processed)	Brood Yr	Hauled from Lower Granite Dam Females (n = 534) SP	DIP	KO	Total Spawned/ Total (468/534)
	07		1		
NPTH (on-station release)	08	1			
subyearling emigration	09	5			6/7
NPTH-North Lapwai Valley	08	2			
release subyearling emigration	09	3	1		5/6
	07	4			
NPTH-Lukes Gulch release	08	1			
subyearling emigration	09	1			6/6
NPTH-Cedar Flats release	08	1			
subyearling emigration	09	1			2/2
NPTH-Cedar Flats release	08	2	1		
reservoir reared	09				2/3
Big Canyon subyearlings	08	6	2		
subyearling emigration	09	18	1		24/27
Big Canyon subyearlings	07	1			
reservoir reared	08	1			2/2
Captain John subyearlings	08	2			
subyearling emigration	09	24	1		26/27
Pittsburg L. subyearlings	08	1	1	1	
subyearling emigration	09	11	1		12/15
	07	6	1		
Hells Canyon Dam (IPC) direct	08	4	1	1	
subyearling emigration	09	13			23/26
	07	1			
LFH on-station subyearlings	08	2			
subyearling emigration	09	8			11/11
Snake R. Couse Creek direct	08	5	1		
subyearling emigration	09	2			7/8
	07	1			
Grande Ronde direct	08	6			
subyearling emigration	09	9	1		16/17
Grande Ronde direct					
reservoir reared	08	1			1/1
Snake R (Pit tag-LGR) unknown	07	2			
subyearling emigration (by scales)	08	3	1		5/6
Snake R (Pit tag-LGR) natural suby					
reservoir reared (by scales)	08	3			3/3
LFH subs-Snake R surrogates	07	5			
(Corps study) suby emigration	08	3	1		
	09	2			10/11

Appendix C (continued).

Origins of Females (N = 534 processed)	Brood Yr	Hauled from Lower Granite Dam Females (n = 534) SP	DIP	KO	Total Spawned/ Total (468/534)
LFH subs-Clearwater R surrogates (Corps study) suby emigration	07				
	08	4			4/4
LFH subs-Clearwater R surrogates (Corps study) reservoir reared	07	5	1		
	08	6			
	09	1			12/13
Unmarked/untagged hatchery subyearlings reservoir reared	07	1			
	08	1			
	09	1			3/3
Unmarked/untagged subyearlings subyearling emigration	07	15	12	2	
	08	58	13		
	09	57			130/157
Snake River Natural (PIT tag) subyearling emigration	07	1			
	08	1			2/2
Wild/Natural reservoir reared (by scales)	07	3	1		
	08	11	2		
	09	1			15/18
Big Canyon yearlings	07	1			
	08	23	2		27/29
Captain John yearlings	07	3			
	08	36	4		39/43
Pittsburg Landing yearlings	07	2			
	08	20	2		22/24
LFH on-station yearlings	07	5	2		
	08	31	4		36/42
Unknown hatchery subyearling ad-clip subyearling emigration	07		1		
	08	2			
	09	5			7/8
Unknown hatchery subyearling ad-clip (no wire) reservoir reared					
	08	1			1/1
Unknown hatchery subyearling no ad-clip (lost wire)					
	08		1		0/1
Unknown hatchery yearling (by scales)	07	1			
	08	1	1		2/3
Unknown origin (no wire, clips) orphan PIT tag					
	08	1			1/1
Unknown hatchery (no clip) lost wire, emigration unknown					
	?	1			1/1
Unknown origin (no wire, clips) emigration unknown					
	?	8	1		8/9
Female Totals (by broodyear)	07	57	19	2	57/78
	08	240	37	2	240/279
	09	162	5	0	162/167
	?	9	1		9/10
Females Grand Total		468	62	4	468/534

Appendix D. Fall Chinook salmon male origin, broodyear, and life history summary of fish hauled from Lower Granite Dam that were processed at NPTH with total of each origin spawned for 2012 broodstock (origins from coded wire tags, passive integrated transponder (PIT) tags, adipose fin clips, and scale readings; SP = spawned, DIP = died in pond prior to spawning, KO = killed outright and not used for broodstock, OUT = outplanted to river to spawn naturally).

Origins of Males (N = 414 processed)	Brood Yr	Hauled from Lower Granite Dam Males (n = 414) SP	DIP	KO	OUT	Number of Females Spawned	Total Spawned/ Total (325/414)
NPTH (on-station release) subyearling emigration	09	10				12	10/10
NPTH (on-station release) reservoir reared	08	1				1	1/1
NPTH-North Lapwai Valley release subyearling emigration	09	9		1		9	9/10
NPTH-Lukes Gulch release	08	1				2	
subyearling emigration	09	1				1	2/2
NPTH-Cedar Flats release subyearling emigration	09	1				1	5/6
NPTH-Cedar Flats release reservoir reared	08	1				1	1/1
Big Canyon subyearlings	08	9	2			14	
subyearling emigration	09	2		3		3	11/16
Captain John subyearlings subyearling emigration	09	25	3	1		30	25/29
Pittsburg L. subyearlings	08	2				6	
subyearling emigration	09	9		4		10	11/15
Hells Canyon Dam (IPC) direct subyearling emigration	09	14	1			20	14/15
LFH on-station subyearlings subyearling emigration	09	6		1		7	6/7
Snake R. Couse Creek direct subyearling emigration	09	9		1		12	9/10
Grande Ronde direct	08	3				5	
subyearling emigration	09	13	2	1		15	16/19
Snake R Wild/Natural (PIT tag)	08	1				1	
subyearling emigration	09	1	1			1	2/3
Snake R (Pit tag-LGR) subyearling	08	1				2	
emigration	09	1	1			1	2/3
Snake R (Pit tag-LGR) subyearling unknown emigration	07	1				1	1/1
Snake R (Pit tag-LGR) natural suby	08	2	4			3	
reservoir reared (by scales)	09	4		1		5	6/11
	07	1				3	
LFH subs-Snake R surrogates	08	3		1		9	
(Corps study) suby emigration	09	6				6	10/11
LFH subs-Snake R surrogates	07	1				1	
(Corps study) reservoir reared	08	1				3	2/2

Appendix D (continued).

Origins of Males (N = 414 processed)	Brood Yr	Hauled from Lower Granite Dam Males (n = 414) SP	DIP	KO	OUT	Number of Females Spawned	Total Spawned/ Total (325/414)
	07	1				6	
LFH subs-Clearwater R surrogates	08	6			1	11	
(Corps study) reservoir reared	09	5				5	12/13
LFH subs-Clearwater R surrogates							
(Corps study) suby emigration	09	3				4	3/3
	07	4	2			16	
Unmarked/untagged subyearlings	08	28	3	1	1	65	
subyearling emigration	09	88	16	6	9	94	120/158
Wild/Natural Clearwater (PIT tag)							
subyearling emigration	07	1				5	1/1
Wild/Natural	08	13	2	1		28	
reservoir reared (by scales)	09	5	1	1		6	18/23
	08	1				3	
Big Canyon yearlings	09			1			1/2
Captain John yearlings	08	3				3	3/3
Pittsburg Landing yearlings	08	2		3	3	2	2/8
LFH on-station yearlings	08	2		1	1	2	2/4
Umatilla R hatchery stray (blank							
wire) no ad-clip	09			1			0/1
Unknown hatchery subyearling							
(ad-clip) lost wire	09	1				1	1/1
Unknown hatchery subyearling (no							
ad-clip) lost wire	09			1			0/1
Unknown hatchery subyearling	08	2				8	
(ad-clip) no wire	09	9		4		9	11/15
Unknown hatchery subyearling (by	08	2				3	
scales) reservoir reared	09	1				1	3/3
Unknown hatchery yearling (ad-	08	1				1	
clip) lost wire	09		1	1		1	1/4
Unknown hatchery yearling (by							
scales)	08	1				1	1/1
Unknown (Adult PIT tagged-Bonn)							
subyearling emigration	08	1				2	1/1
Unknown (Orphan PIT tag)	08	1				5	
subyearling emigration	09	1				1	2/2
Unknown origin (no marks, tags)							
emigration unknown	?	4				6	4/4

Appendix D (continued).

Male Totals (by broodyear)	07	9	2	0	0		9/11
	08	88	11	7	6		88/112
	09	224	26	28	9		224/287
	?	4	0	0	0		4/4
Males Grand Total		325	39	35	15		325/414