FISHERY RESEARCH

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NEZ PERCE TRIBE
TREATY OF 1855

SHOSHONE BANNOCK TRIBES OF THE FORT HALL RESERVATION
IDAHO

IDAHO SUPPLEMENTATION STUDIES

Brood Year 2012 Synthesis Report

IDFG Report Number 15-16
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Brood Year 2012 Synthesis Report

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ABBREVIATIONS AND ACRONYMS

Acronym	Definition	Acronym	Definition
BPA	Bonneville Power Administration	M	Male
BY	Brood year	mm	Millimeter
C	Control	n	Number
cm	Centimeter	ND	No Data
cfs	Cubic feet per second	NOAAF	National Oceanic and Atmospheric Administration Fisheries
CRITFC	Columbia River Intertribal Fisheries Commission	NPTM	Nez Perce Tribe, McCall Office
CWT	Coded Wire Tag	NR	Nampa Research
d	Days	PIT	Passive Integrated Transponder
DIDSON	Dual Frequency Identification Sonar	PTAGIS	PIT Tag Information System
DNA	Deoxyribonucleic acid	SE	Standard Error
EFGL	Eagle Fish Genetics Laboratory	SURPH	Survival Under Proportional Hazards model
F	Female	T	Treatment
FL	Fork Length	U	Undetermined
GP	General Production (hatchery)	UCI	Upper Confidence Interval
IFRO	Idaho Fisheries Resource Office	VSP	Viable Salmonid Population
ISRP	Independent Scientific Review Panel	WFYF	West Fork Yankee Fork Salmon River
km	Kilometer		
LCI	Lower Confidence Interval		
m	Meter		

ABSTRACT

The Idaho Supplementation Studies (ISS) project was implemented in 1992 to evaluate the benefits and risks of using hatchery supplementation to increase natural production of spring/summer Chinook Salmon *Oncorhynchus tshawytscha*. This report documents ISS research tasks completed by the four cooperating agencies (Idaho Department of Fish and Game, Nez Perce Tribe, Shoshone-Bannock Tribes, and U.S. Fish and Wildlife Service). We present a summary of all activities associated with brood year 2012 Chinook Salmon in ISS study streams including data on the number of adults that returned to collection facilities (escapement), adults passed onto spawning grounds (adult treatments), redd counts, and carcass information. The report then follows the resulting juveniles through migration, including natural production estimates and survival to Lower Granite Dam. Beginning with brood year 2008 the ISS project entered its final phase of evaluating post supplementation population responses. The last supplementation adults returned in 2007, therefore no further data are available for this group. The number of natural origin adults passed over weirs in 2012 ranged from seven to 94 fish in the Clearwater River subbasin and from 216 to 504 fish in the Salmon River subbasin. Redd density in survey transects in the Clearwater River subbasin streams averaged 2.07 redds/km. Salmon River subbasin streams averaged 3.97 redds/km. Carcass data were collected concurrently with redd counts. We collected 2,017 carcasses in 2012. We estimated 1,245,781 brood year 2012 natural origin, juvenile Chinook Salmon emigrated from 15 ISS streams with screw traps. Presmolt and smolt survival to Lower Granite Dam in the Clearwater subbasin averaged 13.9% and 45.5%, respectively, while parr, presmolt, and smolt survival in the Salmon subbasin averaged 10.6%, 19.9%, and 48.1%, respectively. Survival of age-0 smolts from the Pahsimeroi River was 17.7% to Lower Granite Dam.

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INTRODUCTION

Background

The Idaho Supplementation Studies (ISS) is a cooperative research project involving the Idaho Department of Fish and Game (IDFG), the Nez Perce Tribe (NPT), the Shoshone-Bannock Tribes (SBT), and the United States Fish and Wildlife Service (USFWS), and is funded by the Bonneville Power Administration (BPA). Each agency is responsible for data collection on a subset of study streams across the Clearwater and Salmon river subbasins as developed in the original study design (Bowles and Leitzinger 1991). Beginning with brood year 2008 the ISS project entered its final phase of evaluating post supplementation population responses. The last supplementation adults returned in 2007, therefore no further data are available for them. Data collected include estimates of escapement for natural origin adult Chinook Salmon *Oncorhynchus tshawytscha*, biological data from salmon carcasses, juvenile production in treatment and control streams, juvenile passive integrated transponder (PIT) tag interrogations at detection facilities throughout the Columbia River basin, and stray rates of general production hatchery adults into study streams.

The ISS study addresses critical uncertainties associated with hatchery supplementation of Chinook Salmon populations (i.e., effects on productivity, persistence, establishment, and advantages of localized broodstocks) in Idaho (Bowles and Leitzinger 1991). The ISS program also addresses questions identified in the Supplementation Technical Work Group Five-Year Work Plan (STWG 1988), defines the potential role of supplementation in managing Snake River basin anadromous fisheries, and evaluates its usefulness as a recovery tool for salmon populations in the Snake River basin (Bowles and Leitzinger 1991).

The ISS program initially identified two goals in the Salmon and Clearwater subbasins: 1) assess the use of hatchery Chinook Salmon to increase natural populations, and 2) evaluate the genetic and ecological impacts of hatchery Chinook Salmon on naturally reproducing Chinook Salmon populations. In response to these goals, ISS addresses four objectives: 1) monitor and evaluate the effects of supplementation on presmolt and smolt numbers and spawning escapement of naturally produced Chinook Salmon; 2) monitor and evaluate changes in the productivity and genetic composition of naturally spawning target and adjacent populations following supplementation activities; 3) determine which supplementation strategies (broodstock and release stage) provide the most rapid and successful response in natural production without adverse effects on productivity; and 4) develop supplementation recommendations (Bowles and Leitzinger 1991).

This is the final ISS annual report. Monitoring brood year 2012 smolt emigration completed the ISS dataset. This document summarizes activities conducted by ISS cooperators and data collected between 2012 and 2014 on Chinook Salmon that spawned in 2012 (brood year 2012) and their resulting progeny. Our summary includes data on the number of adults that returned to collection facilities, redd counts, and carcass information. The report then provides information on the resulting juveniles through migration, including natural production estimates and survival to Lower Granite Dam. Summaries and estimates contained herein are preliminary. Adult data are from natural origin and general production strays. Beginning with the report covering brood year 2002 activities (Venditti et al. 2005), the ISS now produces a single, synthesis report each year based on the brood year activities instead of individual agency reports covering either brood or calendar years.

Study Area

The ISS program incorporates treatment and control streams in the Clearwater River and Salmon River subbasins. Currently, 14 treatment and 13 control streams are included in ISS. The Clearwater River subbasin contains eight treatment and four control streams. The Salmon River subbasin includes six treatment and eight control streams (Figure 1).

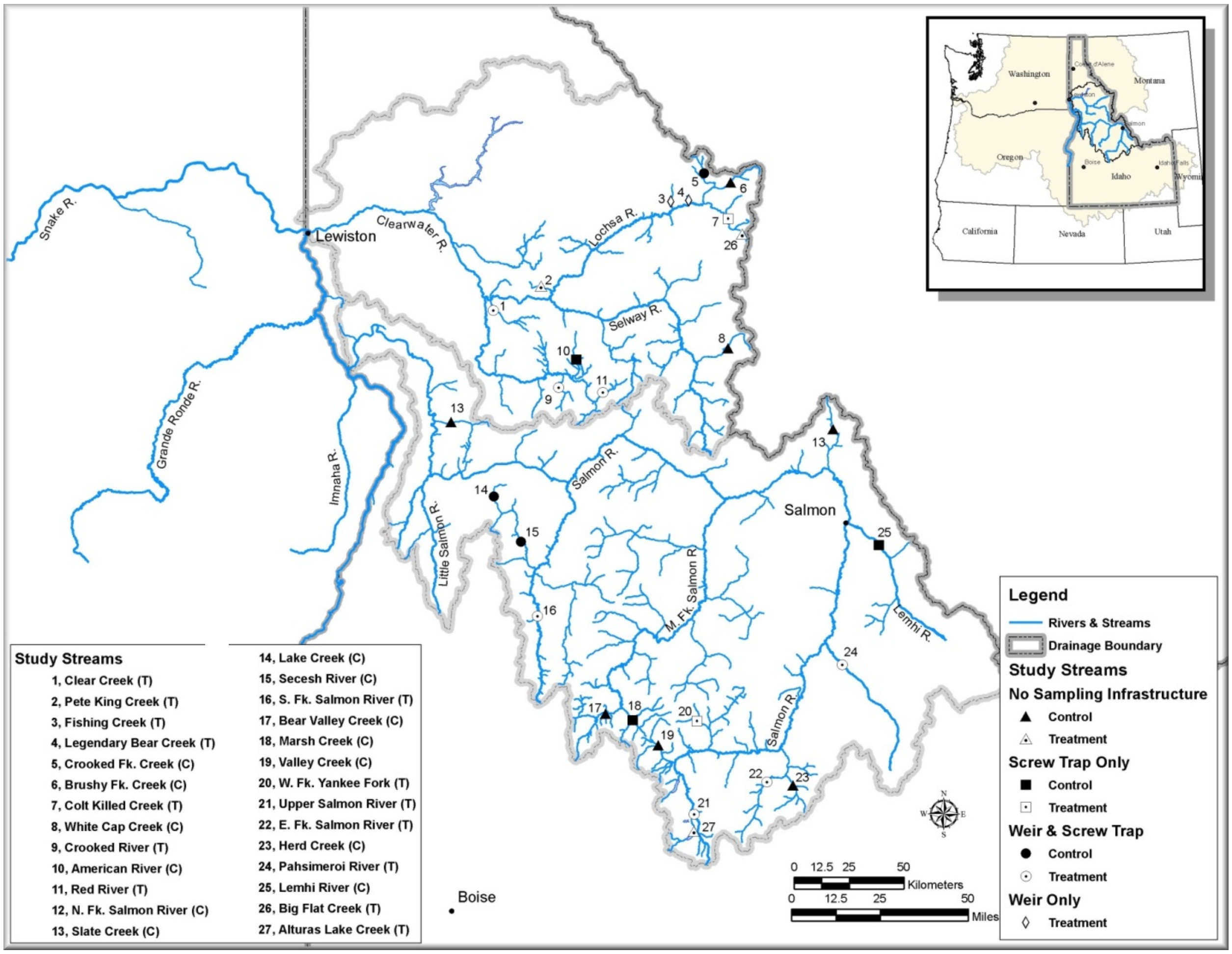

Figure 1. Current treatment and control streams in the Salmon River and Clearwater River subbasins monitored by the four agencies participating in the Idaho Supplementation Studies. Cooperators include the Idaho Department of Fish and Game, Nez Perce Tribe, Shoshone-Bannock Tribes, and the U.S. Fish and Wildlife Service. Legendary Bear and Fishing creeks are revised names for Papoose Creek and Squaw Creek, respectively.

Supplementation activities will continue in Johnson, Newsome, and Lolo/Eldorado creeks through other programs. Because the protocols used there do not contribute to ISS in phase three, the last year we reported data from these streams was in the brood year 2008 report (Venditti et al. 2012). Data from the Johnson Creek Artificial Propagation and Evaluation Program (Project Number 1996-043-00) and Nez Perce Tribal Hatchery Monitoring and

Evaluation Program (Project Number 1983-350-003) for Lolo and Newsome creeks will be available for analyses as recommended by the Independent Scientific Review Panel (ISRP) (ISRP 2003-8).

Fish communities are similar across all ISS study streams. Anadromous species in all streams include wild/natural (hereafter natural) and hatchery Chinook Salmon, summer-run Steelhead trout *O. mykiss*, and Pacific Lamprey *Entosphenus tridentatus*. Sockeye Salmon *O. nerka* are present in the upper Salmon River. Resident fish communities for the Clearwater and Salmon river subbasins include Bull Trout *Salvelinus confluentus*, Westslope Cutthroat Trout *O. clarkii lewisi*, Mountain Whitefish *Prosopium williamsoni*, Redside Shiner *Richardsonius balteatus*, Northern Pikeminnow *Ptychocheilus oregonensis*, Sculpin *Cottus* spp., Dace *Rhinichthys* spp., Suckers *Catostomus* spp., resident Redband Rainbow Trout *O. mykiss*, and Eastern Brook Trout *S. fontinalis* (Bowles and Leitzinger 1991). However, not all species inhabit all streams.

METHODS

Adult Escapement

Weirs

Where possible, we used adult weirs to capture, enumerate, and manage adult Chinook Salmon entering ISS study streams. Evaluation of escapement into streams without weirs was limited to spawning ground surveys and carcass recoveries. In the Clearwater subbasin, we operated adult weirs on Crooked River, Red River, Crooked Fork Creek, and Clear Creek (Figure 1; sites 9, 11, 5, 1). In the Salmon subbasin, weirs were located on the South Fork Salmon River, Pahsimeroi River, upper Salmon River, and East Fork Salmon River (Figure 1; sites 16, 24, 21, 22). All natural origin adults were passed above weirs to spawn. At most locations, adults passed above weirs were marked with an operculum punch to allow mark/recapture escapement estimates from carcass recovery data. We transported general production hatchery Chinook Salmon intercepted at weirs to the hatchery or recycled them into an ongoing fishery downstream of ISS evaluation reaches. In addition to enumeration, we recorded fork length (FL), sex, external tags, marks, and fin clips. We collected DNA samples from the fins of all adults passed above weirs. We used the ratio of marked (operculum punch) to unmarked carcasses in surveys to estimate total spawning escapement with a simple Peterson mark–recapture estimator (Everhart and Youngs 1981).

We operated two passive weirs in the Secesh River drainage during 2012. The ISS project took over the operation of a video weir on Lake Creek in 2007 and continued to operate it through this reporting period. The video weir was located at the mouth of Lake Creek (Figure 1; site 14). The design of the weir allowed fish to pass freely through the weir and in front of a video camera, which recorded fish passages in both directions on videotape. From these tapes, program personnel enumerated fish passages and identified fish to species. The 24-hour video footage throughout the season provided an estimate of fish that moved into Lake Creek. The Chinook Salmon Adult Abundance Monitoring Project (BPA Project No. 199703000) continued the operation of an acoustic imaging (dual frequency identification sonar or DIDSON) and video recorder in the Secesh River (Kucera et al. 2014) at river kilometer 30.0 (Figure 1; site 15). The design of the structure allowed fish to pass freely past the sonar array. Program personnel enumerated fish passages and measured fish lengths from the DIDSON files. The files recorded all fish passages in both directions, providing an estimate of fish that moved into the Secesh River, and the video camera provided validation for the DIDSON data (Kucera et al. 2014).

Redd Counts

Chinook Salmon redds were counted in all study streams from July through September to estimate spawning escapement. Since precise measures of production are critical to ISS evaluation, we maintained index reaches as reported in Walters et al. (1999) as well as expanding survey reaches to include all probable spawning habitat. Most reaches were surveyed three or more times with ground counts following standard procedures outlined in IDFG's Redd Count Manual (Hassemer 1993). Multiple ground counts allow observation either during redd construction or shortly thereafter and aid in redd identification. Multiple counts also increase the number of adult Chinook Salmon carcasses recovered over what would have been collected in a single count design. Exceptions included Big Flat, Colt Killed, and White Cap creeks (Figure 1; sites 26, 7, and 8), which are remote streams where access is difficult. We surveyed these streams once with a single pass ground count that, based on historic spawn timing, we believe coincided with peak spawning activity. In 2012, we surveyed Alturas Lake Creek, the upper Salmon, Pahsimeroi and Lemhi rivers with a combination of aerial and ground counts.

Redds observed during ground counts were flagged, assigned a unique number, and recorded using a global positioning system. The location of all redds observed in aerial surveys were recorded with a global positioning system. Surveyors recorded the presence of any adult Chinook Salmon observed. For streams that received multiple ground counts, the final redd count was the sum of all new redds observed in each pass. We removed our flags during the last count.

Carcass Recoveries

We collected data from Chinook Salmon carcasses to determine their origin (general production hatchery or natural), ocean age, spawning status, and sex. Measurements collected included FL and mid-eye to hypural plate length (nearest cm). We checked carcasses for fin clips, marks, tags (e.g., PIT and CWT), and radio transmitters. We collected dorsal fin rays (Kiefer et al. 2002) and scales for age determination and fin tissue for DNA analysis. Otoliths were collected in Middle Fork Salmon River tributaries. Structures collected varied by stream, and we did not collect all structures from all carcasses. We inspected visceral cavities to estimate egg retention and to determine the prevalence of prespawn mortality. During examination, female carcasses were given a percent spawned measure that ranged from zero (skeins fully intact) to 100% (no or few eggs remaining in body) in 25% increments. We considered female carcasses with a percent spawn value ≤25% a prespawn mortality. All male carcasses recovered prior to observance of any spawning activity were designated prespawn mortalities. After spawning commenced, we did not evaluate male carcasses for spawning contribution.

Prespawn mortality occurs in all spawning streams and is influenced by such factors as stream flow, water temperature, natural predators, fish density, and crowding and handling at adult traps. During recent years, sport and tribal fisheries likely added an additional stressor. Beginning the first week of July, prior to the commencement of spawning activities, we surveyed all probable spawning areas in the Secesh River and Lake Creek twice a week to locate prespawn carcasses, and we surveyed known staging areas in the South Fork Salmon River beginning in mid-July.

Juvenile Production

We based life stages used in production estimates on age, biological development, and arbitrary seasonal trapping dates. Newly emerged, young-of-the-year juveniles captured prior to July 1 (spring trapping season) were considered fry. Fry became "parr" as they entered their first summer and included age-0 fish collected between July 1 and August 31 (summer trapping season) as they migrated from natal streams. Presmolts were juvenile fish that were collected moving downstream between September 1 and trap removal at ice-up (fall trapping season). Although we defined juveniles in the act of migration before September 1 as parr in this report, they could also be considered presmolts. Migrating presmolts did not show typical smolt characteristics (e.g., silvery color and the tendency to lose their scales easily). Smolts were generally age-1 migrants captured between the start of spring trapping and June 30. However, a portion of the age-0 juveniles PIT tagged in the Lemhi and Pahsimeroi rivers (Figure 1; sites 25, and 24) during the spring trapping period were interrogated at detection facilities on the Lower Snake and Columbia rivers in that same year and were actually age-0 smolts (Copeland and Venditti 2009).

Rotary Screw Trap Estimates

We operated rotary screw traps on 15 streams to collect juvenile Chinook Salmon migrating downstream to estimate cohort abundance and survival to Lower Granite Dam as well as important life history information, such as size at migration and the timing of peak movements. We deployed traps as early in the spring as possible and fished them continuously until ice-up in the fall. We positioned the screw traps in the thalweg to maximize capture efficiency. Program personnel checked traps and processed fish at least once daily between 0700 hours and 1830 hours. However, high flows, debris, and ice prevented trap operation on some days. When we anticipated problems (e.g., high flows, ice, or debris) or when unusually high numbers of juveniles were passing (generally immediately following hatchery releases) we checked the traps several times throughout the day and night as necessary. We may have also moved traps out of the thalweg and/or stopped fishing them (i.e., raised the cone) during those times until it was prudent to resume fishing.

We processed juvenile Chinook Salmon collected in screw traps using standard protocols. Captured fish were anesthetized in buffered Tricaine Methanesulfonate (MS-222), scanned for PIT tags, weighed (to nearest 0.1 g), and measured to the nearest 1 mm FL. We anesthetized no more than 30 juvenile fish at one time to reduce exposure time to the anesthetic. A subsample of fish was marked with PIT tags (see below) to estimate trap efficiency and survival to Lower Granite Dam. In some streams, a large percentage of juveniles were too small to be PIT tagged. In these streams, juveniles were marked with Bismarck Brown Y dye (described below) to estimate trap efficiency. Fish needed to be ≥60 mm FL to be PIT tagged with a 12 mm tag or ≥35 mm FL to be dyed. A number of Chinook Salmon ≥50 mm FL were tagged with 9 mm PIT tags, and these data will be reported separately to maintain consistency with past ISS protocols. PIT tagging followed established protocols (Kiefer and Forster 1991; PIT Tag Steering Committee 1992; CBFWA 1999). Cooperators used single use injectors to PIT tag BY 2012 juveniles. After tagging and prior to release, we allowed fish to recover in large, lidded plastic boxes with sufficient free flow of water or in buckets of water with aeration and temperature control.

To estimate the efficiency of our traps, we released marked fish approximately 0.4 km or at least two riffles and a pool upstream of the trap. We selected release sites to maximize the probability that marked fish would mix randomly with the general population prior to their recapture. We made trap efficiency releases daily using PIT-tagged fish and every 3-4 d when staining fry. The number of fish tagged daily was based on a predetermined percentage of the daily catch designed to distribute PIT tags proportionally over the entire trapping season and the maximum number of fry that could be effectively stained. We held all other fish in separate live boxes and released them downstream of the trap. In streams with a high abundance of predators, we released fish after dusk. We held fish no longer than necessary to reduce negative effects on their migration.

We calculated life stage (i.e., fry, parr, presmolt, and smolt) specific migration (or population) estimates within the brood year from rotary screw trap operations with a computer program developed for use with screw trap data (Steinhorst et al. 2004). The program needs three inputs: the number of unmarked fish trapped (Capture); the number of captured fish marked and released upstream of the trap (Mark); and the number of marked fish recaptured (Recapture). The program uses the Lincoln-Petersen estimator and modifications (e.g., Bailey's estimator) for calculating abundance and bootstrap methods for calculating confidence intervals (Steinhorst et al. 2004; Hong 2002). We divided each trap season into periods of varying length corresponding to our life stage definitions above (i.e., fry, parr, presmolt, and smolt). Trap efficiency was monitored to detect changes relative to environmental conditions (e.g., flow and temperature), and efficiency strata were established within the periods based on these conditions. This resulted in an improvement in overall efficiency estimation and, therefore, tighter bounds on migration estimates. To maintain robustness for analysis, we targeted a lower limit of seven recaptures for any strata (Steinhorst et al. 2004). If a stratum did not contain a sufficient number of recaptures, it was included with the previous or subsequent strata depending on stream and trap conditions. Young-of-the-year Chinook Salmon fry were not included in smolt estimates for the spring season. Likewise, we did not include precocial Chinook Salmon in brood year estimates for parr, presmolt, or smolt emigrants. We did not estimate precocial Chinook Salmon emigrants because we could not estimate trapping efficiency for this group, which likely differed from other PIT-tagged migrants.

Bismarck Brown Y Stain Marking—Fry <60 mm FL represent a large fraction of the total juvenile migration from some study streams, and we used Bismarck Brown Y stain to conduct a complementary mark-recapture migration estimate that included fish too small to PIT tag with standard 12 mm tags. Once or twice a week, we selected a subsample of 10% of the total trap catch (up to a maximum of 300 individuals) for staining. We applied the mark by holding fish in the dye (0.4g/16 L solution) for 1 h. We used four battery-powered aerators to maintain oxygen saturation and ice packs to maintain an appropriate temperature (within 1-2°C of the river) in the baths. When properly stained, the mark lasted 3-4 d, but changing the dye concentration and/or exposure time provided some ability to adjust the mark's effective lifespan.

We derived abundance or migration estimates from Bismarck Brown Y stained fish using the same techniques as described for PIT-tagged fish, with the exception that marked fish were identified visually instead of via a scanner. To better detect stained fish, personnel removed no more than 10 fish in any one net load from the trap box and placed them in a shallow, white tub of water where stained fish were readily identifiable.

Snorkel Estimates

We used underwater observations by snorkelers in a number of ISS study streams to estimate the density of juvenile Chinook Salmon because of a lack of available screw traps, access issues, and limited potential trap locations. Techniques and rationale used during underwater observations to determine Chinook Salmon parr abundance and density follow Thurow (1994), Petrosky and Holubetz (1985), Hankin (1986), and Hankin and Reeves (1988).

Streams were divided into sampling strata based on channel and habitat types and areas that Chinook Salmon historically used for rearing. Channel types included confined, steep gradient reaches (Type B) and lower gradient, meandering reaches (Type C) (Rosgen 1985, 1994). We also identified four habitat types: pool, riffle, run, and pocket water. Pool, riffle, and run (glide) correspond to the definitions of Bisson et al. (1982). Pocket water was predominantly swift with numerous protruding boulders or other large obstructions, which create scour holes (pockets) or eddies (McCain et al. 1990). We established multiple sample sites in each stratum. Each sample site included one or more habitat types confined at both the upper and lower borders by a hydraulic control (Platts et al. 1983; McCain et al. 1990).

We performed snorkel surveys during July and August. To ensure adequate light, we made observations between 1000 and 1800 hours on non-overcast days. We measured underwater visibility prior to snorkeling, and then used enough snorkelers to observe the entire stream width in one pass. We identified and counted all salmonids and estimated their total length. We also recorded the presence of non-salmonids. We measured the thalweg length of each snorkel site along with three wetted stream widths (top, near midpoint, and bottom of transect). We then estimated Chinook Salmon parr density (number per 100 m^2) for each snorkel site by dividing the total number of parr observed by the total area snorkeled and then multiplying the result by 100.

Juvenile Migration and Survival

Screw Trap Estimates

We estimated the survival of PIT-tagged juveniles to LGR using PIT tag interrogations at dams on the Snake and Columbia rivers and the Survival Under Proportional Hazards (SURPH) model (Lady et al. 2001). Juveniles from the Lemhi and Pahsimeroi rivers display both stream- and ocean-type life histories (Healey 1991), but the number of age-0 smolts from the Lemhi are typically too few to estimate survival and are included with parr. We report survival estimates separately for both groups from the Pahsimeroi River (age-0 and age-1 smolts) within a brood year.

Summer Parr Remote PIT Tagging

We collected natural origin parr and PIT tagged them in some ISS streams. Fisheries personnel from IDFG and NPT snorkeled to determine where juveniles were concentrated, and then collected them via beach seine. Bowles and Leitzinger (1991) recommended a target goal of 300-500 parr for PIT tagging. We used 9 mm PIT tags (instead of standard 12 mm tags) in fish from Legendary Bear and Fishing creeks (Figure 1; sites 3, 4) in 2013. We used the smaller tags because fish in these streams are typically so small it required an inordinate amount of time to collect sufficient numbers of fish ≥60 mm FL, and greatly reduced the number of fish we needed to handle.

Genetic Sample Inventory

As part of the ISS program, we collected both adult and juvenile DNA samples from various traps and weirs for multiple purposes. Individual samples include tissue removed from fins stored in 100% non-denatured ethyl alcohol or on blotter paper. We sampled every adult passed over weirs, adults from carcass surveys not sampled at weirs, and approximately 100 juveniles from each brood year. Samples have been used to compare the reproductive contribution of natural and supplementation-hatchery origin adults (Leth 2005) and to contribute to the genetic baseline for genetic stock identification of Chinook Salmon adults passing Lower Granite Dam (Narum et al. 2007). The importance of collecting and archiving DNA from a variety of ISS study streams for current and future analyses have been acknowledged by the ISRP, which recommended we continue to collect and archive tissue samples (ISRP 2005-18, ISRP 2006-4B). In order to better manage the growing archive of DNA, we have compiled an inventory of the DNA samples the program currently maintains (Appendix A).

Data Storage

Data from the ISS program is available through several sources. Redd count and carcass data are available through StreamNet (http://www.streamnet.org) and Idaho Fish and Wildlife Information System (IFWIS; https://fishandgame.idaho.gov/ifwis/portal). Adult and juvenile PIT tag data are available through the PTAGIS database (http://www.ptagis.org). Coded wire tag data are available through the Regional Mark Processing Center (http://www.rmpc.org). Other data types are maintained in project and agency specific databases and spreadsheets. These data are available from the authors.

Beginning in 2010, the ISS program began operating a second screw trap on Marsh Creek and conducting additional redd counts in streams above this trap. Data from these efforts are not part of the ISS study but are used for regional viable salmonid population (VSP) monitoring efforts (Crawford and Rumsey 2011). The trap is located approximately 1 km downstream from the confluence of Marsh and Beaver creeks. Additional multiple pass redd counts have been initiated in Cape Horn, Beaver, Banner, and Marsh creeks that along with traditional ISS counts in Marsh and Knapp creeks will provide high intensity (fish-in fish-out) monitoring data for this population.

RESULTS

Adult Escapement

Weirs

The number of adult Chinook Salmon that escaped to weirs varied among study streams and basins in 2012. Returns of general production and natural origin fish were generally lower in the Clearwater River subbasin and ranged from 19 fish in Crooked Fork Creek to 1,020 fish in Clear Creek. Returns to weirs in the Salmon River subbasin ranged from 244 fish in the East Fork Salmon River to 6,749 fish at the South Fork Salmon River weir (Table 1). Except for Lake Creek, these numbers are only the fish handled and do not represent total escapement above the weirs. The video weir on Lake Creek experienced no down time in 2012, so these counts represent an accurate estimate of the number of adults that escaped to this stream.

Of the fish captured at ISS weirs, we passed 1,573 adults including 1,562 natural-origin and 11 general production adult Chinook Salmon onto the spawning grounds in 2012. These ranged from 7 (Crooked Fork Creek) to 94 (Red River) fish in the Clearwater subbasin and from 216 (Pahsimeroi River) to 504 (Upper Salmon River) fish in the Salmon subbasin (Table 2). Lake Creek is not included in these results, since origin breakdown was not available from the video record.

The expanded estimates of total spawning escapement above weirs where mark recapture data were collected (Appendix B) indicated that ISS weirs had a wide range of efficiency in 2012. The South Fork Salmon River and Pahsimeroi weirs were ≈ 90% efficient (≈ 90% of recovered carcasses were marked), and the upper Salmon River weir was 63% efficient. Conversely, the number of unmarked carcasses outnumbered marked carcasses recovered above weirs on Clear and Crooked Fork creeks.

Table 1. The number, origin, and sex (male = M, female = F, and undetermined = U) of adult Chinook Salmon captured or counted at weirs on Idaho Supplementation Study (ISS) streams in 2012. Catch numbers are not expanded and do not represent total escapement. General production adults were generally not passed over the weirs, but see Appendix B.

	General production			Wild/Natural			Undetermined			
Stream Name	**M**	**F**	**U**	**M**	**F**	**U**	**M**	**F**	**U**	**Total**
Clearwater R. Subbasin										
Clear Creek	394	488	125	11	1	1	0	0	0	1,020
Crooked Fork Creek	7	5	0	7	0	0	0	0	0	19
Crooked River	2	2	68	19	20	1	0	0	0	112
Red River	4	2	837	45	38	4	0	0	0	930
Salmon R. Subbasin										
Lake Creek	0	0	0	0	0	0	0	0	265	265
Pahsimeroi River	344	301	0	127	89	0	0	0	0	861
South Fork Salmon River	1,116	1,141	0	251	205	0	0	0	0	2,713
East Fork Salmon River	0	0	0	133	111	0	0	0	0	244
Upper Salmon River	3,359	2,886	0	308	196	0	0	0	0	6,749

Table 2. Summary of adult Chinook Salmon passed above weirs as adult treatments to Idaho Supplementation Study (ISS) streams in 2012. Treatments are broken down by sex (male = M, female = F, and undetermined = U) and origin. Release numbers are not expanded and do not represent total escapement.

	Natural			General production			
	M	**F**	**U**	**M**	**F**	**U**	**Total**
Clearwater Subbasin							
Clear Creek	11	1	1	0	0	0	13
Crooked Fork Creek	7	0	0	0	0	0	7
Crooked River	19	20	1	2	2	0	44
Red River	45	38	4	4	2	1	94
Salmon Subbasin							
Lake Creek	0	0	0	0	0	0	265
Pahsimeroi River	127[a]	89	0	0	0	0	216
South Fork Salmon River	250[b]	204	0	0	0	0	454
East Fork Salmon River	133	111	0	0	0	0	244
Upper Salmon River	308[c]	196	0	0	0	0	504

[a] Includes 19 males spawned in the integrated broodstock program and released.
[b] Includes 49 males spawned in the integrated broodstock program and released.
[c] Includes 27 males spawned in the integrated broodstock program and released.

Redd Counts and Carcass Recoveries

The number of redds varied between streams in 2012, but redd densities (redds/km) were typically higher in the Salmon subbasin than the Clearwater subbasin. Redd density in the Clearwater River basin averaged 2.07 redds/km, while those in the Salmon River basin averaged 3.97 redds/km. In the Clearwater basin, Crooked Fork Creek had the highest redd density (4.47 redds/km), and Crooked River (0.11 redds/km) had the lowest (Table 3). Salmon River basin redd densities were highest in Lake Creek (8.10 redds/km), and lowest in the Alturas Lake Creek (0.66 redds/km; Table 3).

The ISS cooperators maintained the increased carcass sampling effort described in Lutch et al. (2003). We sampled 895 carcasses from the Clearwater basin and 1,122 from the Salmon basin totaling 2,017 carcasses in 2012. The total included 1,298, 596, and 123 carcasses of natural, general production, and unknown origin, respectively. In the Clearwater basin general production carcasses (N = 501) outnumbered natural origin carcasses (N = 288), but in Salmon basin streams natural origin carcasses (N = 1,298) outnumbered general production strays (N = 123), even in streams without weirs (Table 4).

Juvenile Production Estimates

Rotary Screw Trap Estimates

We operated screw traps to collect brood year 2012 juvenile Chinook Salmon on 15 ISS study streams in 2013 and 2014 for 4,099.5 trap days. Brood year 2012 juvenile collection exceeded 300 days (mean = 337.9 d) at four traps; 10 traps operated from 200-299 days (mean = 261.4 d); and one trap operated 134 days (Appendix C). High spring runoff, torrential precipitation, and hatchery releases were responsible for most lost trap days, although low summer flows also made some traps inoperable.

Cooperators used data from PIT-tagged and stained fish recaptured at screw traps to estimate the number of brood year 2012 juveniles that migrated from ISS study streams in 2013 and 2014. We collected 178,925 brood year 2012 juvenile Chinook Salmon. Summing the point estimates for all the traps yielded a total brood year 2012 migration estimate of 1,245,781 juvenile Chinook Salmon from ISS study streams with screw traps. The Salmon River subbasin accounted for the majority of the juvenile production with 165,697 (92.6%) juveniles collected and an estimated 1,166,820 (93.7%) migrants. Migration estimates from traps that operated over the entire migration period ranged from 3,523 fish from Colt Killed Creek to 279,552 fish from the Secesh River (Table 5).

Table 3. Number of Chinook Salmon redds counted in survey transects within Idaho Supplementation Study (ISS) streams in 2012 and summary information on transect length, number of passes, method of data collection, and date of final redd count. Cases where no data are available are designated ND.

Stream	Survey length (km)	Redds	Redds per km	Passes	Last pass	Survey method
Clearwater Subbasin						
American R.	34.6	102	2.95	3	9/19	Ground
Big Flat Cr.[d]	5.2	ND	ND	ND	ND	ND
Brushy Fk. Cr.	21.7	35	1.61	3	9/05	Ground
Clear Cr.	20.2	45	2.22	4	9/10	Ground
Colt Killed Cr.[d]	50.9	ND	ND	ND	ND	ND
Crooked Fk. Cr.	21.7	97	4.47	4	9/12	Ground
Crooked R.	18.8	2	0.11	1	8/23	Ground
Fishing Cr.	6.0	19	3.17	3	9/10	Ground
Legendary Bear Cr.	6.8	17	2.5	3	9/11	Ground
Pete King Cr.	5.8	1	0.17	3	9/11	Ground
Red R.	38.5	129	3.35	3	9/18	Ground
White Cap Cr.	12.9	2	0.16	1	9/11	Ground
Salmon Subbasin						
Alturas Lake Cr.	16.6	11	0.66	1	9/07	Ground
Bear Valley Cr.	35.7	269	7.54	3	9/11	Ground
EF Salmon R	27.0	95	3.52	3	9/10	Ground
Herd Cr.	17.1	63	3.68	3	9/11	Ground
Lake Cr.	16.8	136	8.10	3	9/05	Ground
Lemhi R.	51.7	82	1.59	4/1	9/17	Ground/Aerial
Marsh Cr.	14.7	118	8.02	4	9/04	Ground
Knapp Cr.[c]	5.5	13	2.36	1	9/5	Aerial
NF Salmon R.[a]	36.8	42	1.14	2	9/04	Ground
Pahsimeroi R.	26	134	3.32	3	10/02	Ground
Secesh R.	40.1	242	6.03	3	9/17	Ground
SF Salmon R.	25.3	196	7.74	4	9/11	Ground
Slate Cr.	7.5	12	1.6	2	8/31	Ground
Upper Salmon R.	51.7	181	3.50	1	9/05	Aerial
Valley Cr.[b]	33.2	129	3.89	3	9/19	Ground
WF Yankee Fork S.R.[e]	11.6	9	0.78	1	9/19	Ground

[a] Partial third pass, but only in core areas due to the Mustang Complex Fire.
[b] Only two passes (1st and last) completed in upper Valley Creek due to Halstead Complex Fire.
[c] Only one pass due to Halstead Fire. Typically, Knapp Cr. count combined with Marsh Cr.
[d] Could not access streams due to Powell Complex Fire.
[e] Only one pass was possible due to Halstead Complex Fire.

Table 4. Number, origin, and sex of adult Chinook Salmon carcasses collected during 2012 spawning ground surveys on Idaho Supplementation Study (ISS) streams. Streams where no data were collected are designated ND.

Stream	Sex	Unknown	Natural	General production
Clearwater Subbasin				
American R.	Male	2	42	7
	Female	3	39	14
	Unknown	6	5	4
	Total	**11**	**86**	**25**
Big Flat Cr.[a]	Males	ND	ND	ND
	Females	ND	ND	ND
	Unknown	ND	ND	ND
	Total	**ND**	**ND**	**ND**
Brushy Fk. Cr.	Males	0	3	3
	Females	1	7	2
	Unknown	0	0	0
	Total	**1**	**10**	**5**
Clear Cr.	Males	0	1	24
	Females	0	1	32
	Unknown	0	0	0
	Total	**0**	**2**	**56**
Colt Killed Cr.[a]	Males	ND	ND	ND
	Females	ND	ND	ND
	Unknown	ND	ND	ND
	Total	**ND**	**ND**	**ND**
Crooked Fk. Cr.	Males	0	17	7
	Females	2	12	16
	Unknown	0	0	0
	Total	**2**	**29**	**23**
Crooked R.	Males	0	0	0
	Females	0	1	0
	Unknown	1	2	0
	Total	**1**	**2**	**0**
Fishing Cr.	Males	0	2	1
	Females	2	10	0
	Unknown	0	0	0
	Total	**2**	**12**	**1**
Legendary Bear Cr.	Males	0	1	0
	Females	0	4	2
	Unknown	3	0	0
	Total	**3**	**5**	**2**
Pete King Cr.	Males	0	0	0
	Females	1	0	0
	Unknown	0	0	0
	Total	**1**	**0**	**0**
Red R.	Males	14	77	132
	Females	15	49	218
	Unknown	56	16	39
	Total	**85**	**142**	**389**

Table 4. Continued.

Stream	Sex	Unknown	Natural	General production
Salmon Subbasin				
Bear Valley Cr.	Males	0	27	0
	Females	0	29	0
	Unknown	0	0	0
	Total	**0**	**56**	**0**
EF Salmon R.	Males	0	64	0
	Females	0	36	0
	Unknown	0	0	0
	Total	**0**	**100**	**0**
Herd Cr.	Males	0	3	0
	Females	0	4	0
	Unknown	0	0	0
	Total	**0**	**7**	**0**
Lake Cr.	Males	0	36	1
	Females	1	76	1
	Unknown	1	2	0
	Total	**2**	**114**	**2**
Lemhi R.	Males	0	2	0
	Females	0	11	0
	Unknown	0	0	0
	Total	**0**	**13**	**0**
Marsh Cr.	Males	1	38	1
	Females	0	55	1
	Unknown	0	0	0
	Total	**1**	**93**	**2**
NF Salmon R.	Males	0	5	0
	Females	0	10	0
	Unknown	0	0	0
	Total	**0**	**15**	**0**
Pahsimeroi R.	Males	0	8	0
	Females	0	1	0
	Unknown	0	0	0
	Total	**0**	**9**	**0**
Secesh R.	Males	1	104	1
	Females	2	122	1
	Unknown	1	1	0
	Total	**4**	**227**	**2**
S.F. Salmon R.	Males	0	84	13
	Females	1	71	6
	Unknown	6	0	0
	Total	**7**	**155**	**19**
Slate Cr.	Males	0	0	0
	Females	0	1	0
	Unknown	0	0	0
	Total	**0**	**1**	**0**
Upper Salmon R.	Males	1	138	52
	Females	0	69	19
	Unknown	0	0	0
	Total	**1**	**207**	**71**

Table 4. Continued.

Stream	Sex	Unknown	Natural	General production
Valley Cr.	Males	0	7	0
	Females	0	7	0
	Unknown	0	0	0
	Total	**0**	**14**	**0**
WFYF S.R.	Males	0	0	0
	Females	0	0	0
	Unknown	0	0	0
	Total	**0**	**0**	**0**

[a] Stream could not be accessed due to Powell Complex Fire.

Snorkel Estimates

We used snorkel observations to estimate juvenile Chinook Salmon densities in two study streams in the Clearwater subbasin and one in the Salmon subbasin. The observed densities were highly variable and ranged from 1.52 to 16.05 fish/100 m^2 (Table 6).

Table 5. Seasonal and overall migration estimates of brood year 2012 juvenile Chinook salmon and corresponding lower (LCI) and upper (UCI) 95% confidence intervals from 11 treatment (T) and seven control (C) study streams with rotary screw traps. Estimates are based on the total catch, recapture rate of tagged fish, and the estimated trap efficiency. Instances where no estimate was made are noted NE.

Stream	T/C	Life Stage	Catch	Estimate	LCI	UCI
Clearwater River						
American River	C	Fry	41	861	126	525
		Parr	103	901	346	1,523
		Presmolt	693	5,285	3,985	7,332
		Smolt	596	4,229	3,321	5,615
		Brood Year Total	**1,433**	**11,276**	**8,678**	**14,995**
Clear Creek	T	Smolt	67	226	142	401
		Brood Year Total	**67**	**226**	**142**	**401**
Colt Killed Creek	T	Fry	101	NE	NE	NE
		Parr	8	NE	NE	NE
		Presmolt	485	2,907	2,262	3,629
		Smolt	78	616	353	1,106
		Brood Year Total	**563**	**3,523**	**2,879**	**4,412**
Crooked Fork Creek	C	Fry	329	NE	NE	NE
		Parr	234	1,231	791	1,760
		Presmolt	3,642	21,136	18,792	24,280
		Smolt	226	2,591	1,510	4,811
		Brood Year Total	**4,102**	**24,958**	**21,901**	**28,721**

Table 5. Continued.

Stream	T/C	Life Stage	Catch	Estimate	LCI	UCI
Crooked River	T	Fry	1	NE	NE	NE
		Parr	21	105	20	85
		Presmolt	1,841	5,509	4,722	6,596
		Smolt	615	2,254	1,863	2,766
		Brood Year Total	**2,478**	**7,868**	**6,605**	**9,447**
Red River	T	Fry	68	385	130	502
		Parr	759	6,539	4,572	9,682
		Presmolt	2,126	8,768	7,482	10,350
		Smolt	678	7,912	5,410	12,872
		Brood Year Total	**3,631**	**23,604**	**17,594**	**33,406**
Salmon River						
Marsh Creek	C	Fry	11,323	81,317	68,700	99,968
		Parr	15,177	100,259	91,482	111,745
		Presmolt	14,076	92,263	80,706	107,086
		Smolt	1,176	4,960	4,310	5,720
		Brood Year Total	**41,752**	**278,799**	**257,648**	**304,726**
Pahsimeroi River	T	Fry	246	5,931	3,241	11,154
		Parr	105	NE	NE	NE
		Presmolt	2,051	37,374	30,050	47,102
		Smolt	654	6,693	5,264	8,429
		Brood Year Total	**2,951**	**49,998**	**41,424**	**60,421**
Upper Salmon River	T	Fry	1,131	20,425	13,019	33,528
		Parr	3,033	36,377	31,268	42,142
		Presmolt	3,706	48,528	40,780	57,313
		Smolt	2,418	29,701	21,864	50,574
		Brood Year Total	**10,288**	**135,031**	**119,329**	**157,559**
South Fork Salmon	T	Fry	2,055	8,967	6,882	11,802
		Parr	22,281	73,567	69,215	78,412
		Presmolt	7,501	16,971	16,092	17,888
		Smolt	254	1,359	995	1,840
		Brood Year Total	**32,091**	**100,864**	**95,779**	**106,245**
Lake Creek	C	Fry	5,681	104,155	56,444	200,382
		Parr	33,677	151,009	130,751	178,025
		Presmolt	4,294	13,767	11,690	16,460
		Smolt	257	1,692	1,151	2,573
		Brood Year Total	**43,909**	**270,622**	**216,917**	**379,782**
Secesh River	C	Fry	339	15,170	7,978	28,819
		Parr	20,676	231,466	150,668	418,014
		Presmolt	7,515	30,232	26,279	35,797
		Smolt	180	2,684	1,498	5,478
		Brood Year Total	**28,710**	**279,552**	**196,263**	**464,602**
EF Salmon River	T	Fry	246	1,514	889	1,800
		Parr	1,359	15,237	13,109	19,143
		Presmolt	1,366	10,832	9,480	12,743
		Smolt	777	4,995	4,266	6,966
		Brood Year Total	**3,748**	**36,435**	**32,774**	**41,309**
Lemhi River	C	Fry	84	441	232	893
		Parr	21	NE	NE	NE
		Presmolt	552	6,118	4,616	8,216
		Smolt	950	5,163	4,474	5,993
		Brood Year Total	**1,586**	**11,721**	**9,988**	**13,803**

Table 5. Continued.

Stream	T/C	Life Stage	Catch	Estimate	LCI	UCI
WF Yankee Fork Salmon River	T	Fry	16	NE	NE	NE
		Parr	248	1,420	981	1,970
		Presmolt	379	2,144	1,627	2,447
		Smolt	19	NE	NE	NE
		Brood Year Total	**662**	**3,798**	**2,667**	**4,421**

Table 6. Densities of brood year 2012 juvenile Chinook salmon calculated from direct underwater observations in Idaho Supplementation Study (ISS) streams without screw traps in 2013.

Stream	Density (Number/100 m^2)
Clearwater River Subbasin	
Fishing Creek	10.15
Legendary Bear Creek	16.05
Salmon River Subbasin	
Slate Creek	1.52

Juvenile Migration and Survival

Screw Trap Estimates

We estimated survival to Lower Granite Dam from PIT tag detections of the various life stage groups of naturally produced juvenile Chinook Salmon tagged and released in ISS study streams. We PIT tagged 35,587 brood year 2012 juvenile Chinook Salmon at ISS screw traps for survival estimates in 2013 and 2014. This brood year produced few parr in Clearwater subbasin streams, so survival estimates for this life stage are typically not available. Sufficient numbers of parr were typically produced and collected in Salmon subbasin streams for survival estimates to be calculated for this life stage. Survival was generally higher in the Salmon subbasin than in the Clearwater subbasin (Table 7). Parr, presmolt, and smolt survival averaged 10.6%, 19.9%, and 47.7%, respectively, in the Salmon River tributaries. Parr, presmolt and smolt survival in the Clearwater tributaries averaged 12.7%, 13.9%, and 45.5%, respectively. Survival of brood year 2012 age-0 smolts from the Pahsimeroi River to Lower Granite Dam was 17.7% (Table 7).

Table 7. Estimated survival (proportion) and standard error (SE) to Lower Granite Dam for different life stages of naturally produced brood year 2012 juvenile Chinook salmon PIT tagged in Idaho Supplementation Studies (ISS) streams. Survival estimates were computed using the SURPH2 or SURPH3 Model (Lady et al. 2001, Lady et al. 2010). Groups having no detections or insufficient detections for estimation are designated ND.

Stream	Life stage	Number tagged	Survival (SE)
Salmon Subbasin			
Lemhi River	Fry	41	0.146 (0.0552)
Lemhi River	Parr	20	ND
Lemhi River	Presmolt	531	0.348 (0.0259)
Lemhi River	Age-1 smolt	950	0.702 (0.0313)
South Fork Salmon River	Fry	234	0.130(0.0324)
South Fork Salmon River	Parr	2458	0.095(0.0070)
South Fork Salmon River	Presmolt	1939	0.191(0.0106)
South Fork Salmon River	Smolt	250	0.502(0.0622)
Marsh Creek	Parr	3724	0.1325 (0.0065)
Marsh Creek	Presmolt	2727	0.1810 (0.0091)
Marsh Creek	Smolt	1170	0.4503 (0.0276)
Pahsimeroi River	Age-0 smolt	1709	0.1767 (0.0848)
Pahsimeroi River	Parr	28	ND
Pahsimeroi River	Presmolt	1662	0.2336 (0.0137)
Pahsimeroi River	Age-1 smolt	671	0.5657 (0.0287)
Upper Salmon River	Parr	1932	0.0978 (0.0085)
Upper Salmon River	Presmolt	2250	0.2091 (0.0119)
Upper Salmon River	Smolt	2219	0.6001 (0.0201)
East Fork Salmon River	Parr	383	0.124 (0.021)
East Fork Salmon River	Presmolt	493	0.146 (0.019)
East Fork Salmon River	Smolt	523	0.504 (0.054)
West Fork Yankee Fork	Parr	62	0.085 (0.037)
West Fork Yankee Fork	Presmolt	243	0.159 (0.025)
West Fork Yankee Fork	Smolt	12	ND
Lake Creek	Parr	366	0.082(0.0143)
Lake Creek	Parr 9mm	484	0.085 (0.0154)
Lake Creek	Presmolt	620	0.145 (0.0177)
Lake Creek	Smolt	251	0.310 (0.0455)
Lake Creek	Yearlings	26	0.546 (0.1192)
Secesh River	Parr	767	0.125 (0.0142)
Secesh River	Parr 9mm	429	0.139 (0.0184)
Secesh River	Presmolt	1081	0.177 (0.0133)
Secesh River	Smolt	170	0.182 (0.0455)
Secesh River	Yearlings	37	0.292 (0.0828)
Clearwater Subbasin			
American River	Parr	35	ND
American River	Presmolt	469	0.0171 (0.0060)
American River	Smolt	559	0.4812 (0.1678)
Clear Creek	Smolt	48	ND
Colt Killed Creek	Parr	2	ND
Colt Killed Creek	Presmolt	454	0.1962 (0.0292)
Colt Killed Creek	Smolt	78	0.6410 (0.3755)

Table 7. Continued.

Stream	Life stage	Number tagged	Survival (SE)
Crooked Fork Creek	Parr	107	0.1533 (0.0426)
Crooked Fork Creek	Presmolt	1809	0.1869 (0.0117)
Crooked Fork Creek	Smolt	219	0.3668 (0.0507)
Crooked River	Parr	7	ND
Crooked River	Presmolt	585	0.1470 (0.0212)
Crooked River	Smolt	507	0.3857 (0.0489)
Fishing Creek	Parr	468	0.140 (0.0253)
Legendary Bear	Parr	424	0.087 (0.0197)
Red River	Parr	48	ND
Red River	Presmolt	733	0.1470 (0.0212)
Red River	Smolt	573	0.4007 (0.1165)

Summer Parr Remote PIT Tagging

Efforts to tag summer parr in ISS streams were variable in 2013. We tagged 892 summer parr in two streams in 2013 (Table 8).

Table 8. Number of brood year 2012 Chinook salmon summer parr PIT tagged in Idaho Supplementation Study (ISS) streams during 2013. Legendary Bear and Fishing creeks are proposed name changes for Papoose and Squaw creeks, respectively.

Stream	Number PIT tagged
Clearwater River Subbasin	
Legendary Bear Creek	424
Fishing Creek	468

DISCUSSION

Clear Creek Trap Relocation

The Clear Creek screw trap had been located immediately below the Kooskia Hatchery intake. Renovations to the intake rendered the site unusable. In response, the trap was relocated approximately 1 km downstream in 2011. The new site was marginal due to lack of a pool deep enough to float the screw trap and allow for the rotation of the cone, even at high flows. This site was abandoned in 2012 and a new trapping technique (fyke net) was employed. The use of a fyke net was complicated by several factors, primarily the inability to maintain the net during periods of high flow when large amounts of debris flush out of the system and the lack of stream coverage provided by the net. Because of these factors, the fyke net was also abandoned and the screw trap was re-installed approximately 0.5 km above the hatchery intake. The trap was operational for juvenile trapping in 2013 and 2014.

Redd Count Methodology

The spawning distribution of Chinook Salmon in the Pahsimeroi River spread upstream after the Big Springs Creek reconnect. Areas that were previously unavailable for spawning are now being utilized, with a concurrent reduction in spawning in the traditional spawning areas. Much of the newly accessible spawning area is on private property, where access was not granted. In response, we used a combination of ground and aerial redd counts to complete our counts in this system. We will consider these changes in our final analyses; however, aerial redd counts in sections we were unable to access from the ground will be the only counts available.

Big Timber Creek was reconnected to the Lemhi River in 2009, which added an additional 15 km of potential spawning and rearing habitat. No spawning has been documented to date.

After a helicopter accident in 2010, IDFG re-evaluated where aerial redd counts could be reduced. In response, several aerial counts were replaced with ground counts. In the Clearwater subbasin, a single pass ground count replaced the traditional single flight on White Cap Creek. In the Salmon subbasin one aerial transect on the upper Salmon River (OS-6) was replaced with a single ground count, and we conducted a single ground count on Alturas Lake Creek covering transects OS1-3 and NS-12. Ground counts in both subbasins were timed to correspond with peak spawning activity and aerial counts in adjacent stream reaches.

Effects of Other Programs

Beginning with brood year 2010 and continuing through the end of the ISS program, consistent with the hatchery management strategies, a portion of the Chinook Salmon broodstocks at the Sawtooth, Pahsimeroi, and McCall hatcheries were used to create an integrated program. The purpose of this program was to incorporate a number of natural origin adults into the hatchery program. To avoid removing ISS treatment adults from natural spawning and evaluation areas, it was decided that for brood years 2010-2012 only sexually mature males collected at hatchery traps on spawning days would be used in the integrated program. An approximate 5 ml sample of milt was expressed from sexually mature males and used to fertilize eggs from hatchery origin females. The males were then passed immediately over the weir. It was our judgment that this action would not affect the spawning performance of these fish or the overall productivity of the population (Young 2009).

The Shoshone Bannock Tribes Supplementation Monitoring and Evaluation Program is continuing an ongoing Chinook Salmon reintroduction project in the Yankee Fork Salmon River initiated in 2008 to assist in returning 2,000 adults for Tribal conservation and harvest management objectives. Operations include managing two adult picket weirs for adult escapement and a screw trap on the mainstem Yankee Fork Salmon River to estimate juvenile emigration. All natural origin adults collected at the lower weir were released immediately above the weir for natural spawning. Any hatchery influence (i.e., returns or adult outplants) were transported above the upper weir for spawning to prevent migration into the West Fork Yankee Fork Salmon River to minimize conflicts and preserve protocols with the Idaho Supplementation Studies.

Adult Escapement

Total spawning escapement provided by the Peterson mark-recapture estimates (Appendix B) was an important analysis variable for the ISS program and should be continued on all streams with weirs for VSP monitoring. All fish released above weirs should be operculum punched and the presence/absence of this mark should be recorded during all carcass collections.

Summer Parr Remote PIT Tagging

Since NOAAF collects and PIT tags summer parr in a number of ISS study streams (Lake Creek, Secesh River, Bear Valley Creek, Valley Creek, Marsh Creek, South Fork Salmon River, Herd Creek), we did not collect summer parr for our program in these streams. Data from NOAAF marked fish will be available for future analyses and can be found in reports from Project Number 1991-028-00.

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APPENDICES

Appendix A. Inventory of adult and juvenile (parr, presmolt, and smolt) DNA samples collected from ISS sampling sites including number collected and location of the samples. Adults are separated by origin (natural = Nat, general production hatchery = H, and supplementation = Sup). Locations include the Eagle Fish Genetics Laboratory (EFGL), IDFG Nampa Research (NR), Idaho Fishery Resource Office (IFRO), Columbia River Intertribal Fisheries Commission (CRITFC) and NPT McCall (NPTM).

Sample site	Brood Year	Life Stage	Origin	Number Collected	Archive Location
Pahsimeroi River	2002	adult	Sup	142	EFGL
		adult	Nat	264	EFGL
		parr/presmolt	Nat	442	EFGL
		smolt	Nat	692	EFGL
	2003	adult	Sup	435	EFGL
		adult	Nat	325	EFGL
		parr/presmolt	Nat	375	EFGL
		smolt	Nat	511	EFGL
	2004	adult	Sup	281	EFGL
		adult	Nat	200	EFGL
		parr/presmolt	Nat	959	EFGL
		smolt	Nat	476	EFGL
		age 1 precocial	Nat	74	EFGL
	2005	adult	Sup	302	EFGL
		adult	Nat	326	EFGL
		parr/presmolt	Nat	349	EFGL
		age 0 precocial	Nat	74	EFGL
		smolt	Nat	305	EFGL
		age 1 precocial	Nat	106	EFGL
	2006	adult	Sup	76	EFGL
		adult	Nat	97	EFGL
		parr/presmolt	Nat	561	EFGL
		Smolt	Nat	231	EFGL
	2007	adult	Sup	17	EFGL
		adult	Nat	138	EFGL
		parr/presmolt	Nat	453	NR
		smolt	Nat	84	NR
	2008	adult	Nat	224	EFGL
		parr/presmolt	Nat	111	NR
		smolt	Nat	41	NR
	2009	adult	Nat	322	EFGL
		parr/presmolt	Nat	59	NR
		smolt	Nat	19	NR
	2010	adult	Nat	292	NR
		parr/presmolt	Nat	48	NR
	2011	adult	Nat	372	NR
		parr/presmolt	Nat	49	NR
		smolt	Nat	99	NR
	2012	parr/presmolt	Nat	74	NR
		smolt	Nat	83	NR
Upper Salmon River	2002	adult	Sup	546	NR
		adult	Nat	794	NR
		parr/presmolt	Nat	765	NR
		smolt	Nat	620	NR

Appendix A. Continued.

Sample site	Brood Year	Life Stage	Origin	Number Collected	Archive Location
Upper Salmon River (cont.)	2003	adult	Sup	371	NR
		adult	Nat	381	NR
		parr/presmolt	Nat	437	NR
		smolt	Nat	850	NR
	2004	adult	Sup	215	NR
		adult	Nat	473	NR
		parr/presmolt	Nat	597	NR
		smolt	Nat	332	NR
	2005	adult	Sup	159	NR
		adult	Nat	286	NR
		parr/presmolt	Nat	238	NR
		smolt	Nat	188	NR
		precocial	Nat	15	NR
	2006	adult	Sup	99	NR
		adult	Nat	294	NR
		parr/presmolt	Nat	397	NR
		smolt	Nat	123	NR
	2007	adult	Sup	23	NR
		adult	Nat	183	NR
		parr/presmolt	Nat	351	NR
		smolt	Nat	571	NR
	2008	adult	Nat	390	NR
		parr/presmolt	Nat	83	NR
		smolt	Nat	61	NR
	2009	adult	Nat	438	NR
		parr/presmolt	Nat	68	NR
		smolt	Nat	54	NR
	2010	adult	Nat	681	NR
		parr/presmolt	Nat	69	NR
		smolt	Nat	18	NR
	2011	adult	Nat	582	EFGL
		parr/presmolt	Nat	63	NR
		smolt	Nat	33	NR
	2012	parr/presmolt	Nat	23	NR
		smolt	Nat	37	NR
Crooked Fork Creek	2004	smolt	Nat	52	NR
	2005	adult	Nat	27	NR
		parr/presmolt	Nat	251	NR
		smolt	Nat	41	NR
	2006	adult	Nat	26	NR
		parr/presmolt	Nat	287	NR
		smolt	Nat	84	NR
	2007	adult	Nat	36	NR
		parr/presmolt	Nat	21	NR
		smolt	Nat	25	NR
	2008	adult	Nat	41	NR
		parr/presmolt	Nat	57	NR
		smolt	Nat	85	NR
	2009	adult	Nat	20	NR
		parr/presmolt	Nat	28	NR
		smolt	Nat	20	NR

Appendix A. Continued.

Sample site	Brood Year	Life Stage	Origin	Number Collected	Archive Location
Crooked Fork Creek (cont.)	2010	adult	Nat	23	NR
		parr/presmolt	Nat	22	NR
		smolt	Nat	50	NR
	2011	adult	Nat	27	NR
		parr/presmolt	Nat	41	NR
		smolt	Nat	22	NR
	2012	adult	Nat	5	NR
		parr/presmolt	Nat	76	NR
		smolt	Nat	79	NR
Colt Killed Creek	2004	smolt	Nat	25	NR
	2005	parr/presmolt	Nat	37	NR
		smolt	Nat	3	NR
	2006	parr/presmolt	Nat	36	NR
		smolt	Nat	42	NR
	2007	parr/presmolt	Nat	73	NR
		smolt	Nat	27	NR
	2008	parr/presmolt	Nat	55	NR
		smolt	Nat	40	NR
	2009	parr/presmolt	Nat	42	NR
		smolt	Nat	49	NR
	2010	parr/presmolt	Nat	43	NR
		smolt	Nat	24	NR
	2011	parr/presmolt	Nat	55	NR
		smolt	Nat	40	NR
	2012	parr/presmolt	Nat	116	NR
		smolt	Nat	66	NR
South Fork Salmon River	2005	adult	Sup	132	NR
		adult	Nat	251	NR
		parr/presmolt	Nat	1,885	NR
		smolt	Nat	444	NR
	2006	adult	Sup[i]	75	NR
		adult	Sup	245	NR
		adult	Nat	259	NR
		parr/presmolt	Nat	576	NR
		smolt	Nat	117	NR
		yearling	Nat	71	NR
	2007	adult	Sup	60	NR
		adult	Nat	276	NR
		parr/presmolt	Nat	340	NR
		Smolt	Nat	105	NR
		Yearling	Nat	9	NR
	2008	Adult	Hat[ii]	5	NR
		Adult	Nat	580	NR
		parr/presmolt	Nat	102	NR
		smolt	Nat	42	NR
		yearling	Nat	13	NR
	2009	Adult	Hat[ii]	10	NR
		Adult	Nat	539	NR
		parr/presmolt	Nat	111	NR
		smolt	Nat	43	NR
		Yearling	Nat	36	NR

Appendix A. Continued.

Sample site	Brood Year	Life Stage	Origin	Number Collected	Archive Location
South Fork Salmon River (cont.)	2010	Adult	Nat	1338	NR
		parr/presmolt	Nat	100	NR
		Smolt	Nat	34	NR
		Yearling	Nat	40	NR
	2011	Adult	Nat	690	NR
		Parr/presmolt	Nat	113	NR
		Smolt	Nat	51	NR
		Yearling	Nat	9	NR
	2012	Adult	Nat	401	NR
		Parr/presmolt	Nat	100	NR
		Smolt	Nat	28	NR
		Yearling	Nat	7	NR
Marsh Creek	2004	smolt	Nat	61	NR
	2005	parr/presmolt	Nat	496	NR
		smolt	Nat	77	NR
	2006	parr/presmolt	Nat	43	NR
		smolt	Nat	37	NR
		age 1 precocial	Nat	95	NR
	2007	parr/presmolt	Nat	34	NR
		smolt	Nat	44	NR
		age 1 precocial	Nat	51	NR
	2008	parr/presmolt	Nat	63	NR
		smolt	Nat	54	NR
	2009	parr/presmolt	Nat	53	NR
		smolt	Nat	21	NR
	2010	parr/presmolt	Nat	135	NR
		smolt	Nat	54	NR
	2011	parr/presmolt	Nat	131	NR
		smolt	Nat	44	NR
	2012	parr/presmolt	Nat	74	NR
		smolt	Nat	62	NR
Lemhi River	2004	Smolt	Nat	100	NR
	2005	parr/presmolt	Nat	100	NR
	2005	Smolt	Nat	81	NR
	2006	parr/presmolt	Nat	99	NR
	2007	parr/presmolt	Nat	98	NR
	2007	Smolt	Nat	16	NR
	2008	parr/presmolt	Nat	51	NR
		Smolt	Nat	13	NR
	2009	parr/presmolt	Nat	67	NR
		Smolt	Nat	98	NR
	2010	parr/presmolt	Nat	100	NR
		Smolt	Nat	50	NR
	2011	parr/presmolt	Nat	45	NR
		Smolt	Nat	83	NR
	2012	parr/presmolt	Nat	78	NR
		Smolt	Nat	50	NR
American River	Unk	Juvenile	Nat	55	NR
	Unk	Juvenile	Nat	100	NR
	2005	Juvenile	Nat	100	NR
	2006	Juvenile	Nat	44	NR
	2007	Juvenile	Nat	150	NR

Appendix A. Continued.

Sample site	**Brood Year**	**Life Stage**	**Origin**	**Number Collected**	**Archive Location**
American River (cont.)	2008	Juvenile	Nat	155	NR
	2009	Juvenile	Nat	94	NR
	2010	Juvenile	Nat	52	NR
	2011	Juvenile	Nat	104	NR
	2012	Juvenile	Nat	129	NR
Crooked River	Unk	Juvenile	Nat	105	NR
	Unk	Juvenile	Nat	50	NR
	2005	Juvenile	Nat	100	NR
	2006	Juvenile	Nat	18	NR
	2007	Juvenile	Nat	4	NR
	2008	Juvenile	Nat	123	NR
	2009	Juvenile	Nat	148	CRITFC
	2010	Juvenile	Nat	65	CRITFC
	2011	Juvenile	Nat	106	NR
	2012	Juvenile	Nat	116	NR
Red River	Unk	Juvenile	Nat	102	NR
	Unk	Juvenile	Nat	50	NR
	2005	Juvenile	Nat	100	NR
	2006	Juvenile	Nat	47	NR
	2007	Juvenile	Nat	173	NR
	2008	Juvenile	Nat	178	NR
	2009	Juvenile	Nat	103	NR
	2010	Juvenile	Nat	53	NR
	2011	Juvenile	Nat	98	NR
	2012	Juvenile	Nat	147	NR
Clear Creek	2004	adult	Sup	57	IFRO
			Nat	61	IFRO
	2005	adult	Sup	8	IFRO
			Nat	8	IFRO
	2006	adult	Sup	13	IFRO
			Nat	16	IFRO
	2006	smolt	Nat	39	IFRO
	2007	adult	Sup	1	IFRO
	2007		Nat	18	IFRO
	2008	adult	Nat	7	IFRO
	2009	adult	Nat		IFRO
	2010	adult	Nat	7	IFRO
	2011	adult	Nat	11	IFRO
	2011	adult	H	50	IFRO
	2011	adult	Nat	11	IFRO
	2012	adult	Nat	10	IFRO
Fishing Creek	2002	adult	H	1	NPTM
	2003	parr	Nat	60	NPTM
	2003	adult	Nat	2	NPTM
	2004	adult	Nat	3	NPTM
	2005	parr	Nat	80	NPTM
	2006	adult	Nat	1	NPTM
	2007	adult	Nat	1	NPTM
	2008	parr	Nat	100	NPTM
	2008	adult	Nat	11	NPTM
	2008	adult	H	6	NPTM

Appendix A. Continued.

Sample site	Brood Year	Life Stage	Origin	Number Collected	Archive Location
	2009	adult	H	1	NPTM
	2009	parr	Nat	60	NPTM
	2010	parr	Nat	60	NPTM
	2011	parr	Nat	60	NPTM
	2011	adult	Nat	1	NPTM
	2011	adult	H	2	NPTM
	2012	adult	Nat	11	NPTM
	2012	adult	H	1	NPTM
	2012	parr	Nat	60	NPTM
Lake Creek	2002	juvenile			
	2002	adult	H	9	NPTM
	2002	adult	Nat	141	NPTM
	2003	juvenile			NPTM
	2003	adult	Nat	229	NPTM
Lake Creek (cont.)	2004	juvenile			NPTM
	2004	adult	H	4	NPTM
	2004	adult	Nat	170	NPTM
	2004	adult	Unk	3	NPTM
	2005	juvenile	Nat	892	NPTM
	2005	adult	Nat	74	NPTM
	2006	juvenile	Nat	800	NPTM
	2006	adult	H	2	NPTM
	2006	adult	Nat	26	NPTM
	2007	juvenile	Nat	900	NPTM
	2007	adult	Nat	32	NPTM
	2008	juvenile	Nat	865	NPTM
	2008	adult	Nat	121	NPTM
	2008	adult	H	5	NPTM
	2009	adult	H	2	NPTM
	2009	adult	Nat	109	NPTM
	2009	juvenile	Nat	100	NPTM
	2010	juvenile	Nat	100	NPTM
	2010	adult	Nat	168	NPTM
	2010	adult	H	1	NPTM
	2011	adult	Nat	67	NPTM
	2012	adult	Nat	101	NPTH
	2012	adult	H	2	NPTH
	2012	Juvenile	Nat	100	NPTM
Legendary Bear Creek	2002	parr	Nat	60	NPTM
	2002	adult	H	12	NPTM
	2002	adult	Nat	14	NPTM
	2002	adult	Unk	1	NPTM
	2003	parr	Nat	60	NPTM
	2003	adult	H	2	NPTM
	2003	adult	Nat	3	NPTM
	2004	parr	Nat	80	NPTM
	2004	adult	H	10	NPTM
	2004	adult	Sup	8	NPTM
	2004	adult	Nat	7	NPTM
	2004	adult	Unk	1	NPTM
	2005	parr	Nat	80	NPTM
	2005	adult	Nat	1	NPTM

Appendix A. Continued.

Sample site	Brood Year	Life Stage	Origin	Number Collected	Archive Location
Legendary Bear Creek (cont.)	2006	parr	Nat	60	NPTM
	2006	adult	H	6	NPTM
	2006	adult	Nat	4	NPTM
	2008	parr	Nat	100	NPTM
	2008	adult	Nat	14	NPTM
	2008	adult	H	19	NPTM
	2008	adult	Unk	1	NPTM
	2009	adult	H	12	NPTM
	2009	adult	Nat	3	NPTM
	2009	parr	Nat	60	NPTM
	2010	parr	Nat	60	NPTM
	2011	parr	Nat	60	NPTM
	2011	adult	Nat	1	NPTM
	2011	adult	H	5	NPTM
	2012	adult	Nat	5	NPTM
	2012	adult	H	2	NPTM
	2012	juvenile	Nat	60	NPTM
Secesh River	2002	adult	H	16	NPTM
	2002	adult	Sup	2	NPTM
	2002	adult	Nat	129	NPTM
	2003	adult	H	3	NPTM
	2003	adult	Nat	241	NPTM
	2004	adult	H	2	NPTM
	2004	adult	Nat	111	NPTM
	2004	adult	Unk	1	NPTM
	2005	juvenile	Nat	892	NPTM
	2005	adult	H	1	NPTM
	2005	adult	Nat	76	NPTM
	2006	juvenile	Nat	864	NPTM
	2006	adult	H	2	NPTM
	2006	adult	Nat	34	NPTM
	2006	adult	Unk	1	NPTM
	2007	juvenile	Nat	900	NPTM
	2007	adult	H	7	NPTM
	2007	adult	Nat	46	NPTM
	2008	juvenile	Nat	887	NPTM
	2008	adult	Nat	181	NPTM
	2008	adult	H	19	NPTM
	2008	adult	Unk	1	NPTM
	2009	adult	H	5	NPTM
	2009	adult	Nat	153	NPTM
	2009	juvenile	Nat	100	NPTM
	2010	juvenile	Nat	100	NPTM
	2010	adult	Nat	286	NPTM
	2010	adult	H	1	NPTM
	2011	adult	Nat	207	NPTM
	2011	adult	H	13	NPTM
	2011	adult	Unk	1	NPTM
	2012	adult	Nat	207	NPTM
	2012	adult	H	2	NPTM
	2012	Juvenile	Nat	100	NPTM

Appendix A. Continued.

Sample site	Brood Year	Life Stage	Origin	Number Collected	Archive Location
Slate Creek	2002	adult	H	2	NPTM
	2002	adult	Nat	17	NPTM
	2002	adult	Unk	1	NPTM
	2003	adult	H	1	NPTM
	2003	adult	Nat	1	NPTM
	2008	adult	Nat	4	NPTM
	2009	adult	H	1	NPTM
	2011	adult	H	1	NPTM
	2012	adult	Nat	1	NPTM
Pete King Creek	2011	Adult	Nat	1	IFRO

Appendix B. Expanded (Peterson estimator; Everhart and Youngs 1981) estimates of spawning escapement into project study streams with weirs for years in which mark-recapture data were collected. Streams for which no data are available are designated ND.

		Marked fish		**Unmarked fish**		**Escapement estimate upstream from weir**	
Stream	**Year**	**Number passed**	**Number recovered**	**Number passed**	**Number recovered**	**Estimate**	**± 95% Confidence interval**
Clearwater Subbasin							
Clear Creek	2012	10	2	0	56	290	354
	2011	11	3	0	52	202	190
	2010	7	0	0	233	ND	ND
	2009	10	1	0	13	150	270
	2008	15	12	0	113	156	38
	2007	19	3	0	7	63	55
	2006	30	5	0	14	114	79
	2005	17	3	0	10	74	67
	2004	122	15	0	60	610	259
	2003	65	1	0	13	910	1,706
	2002	56	4	0	89	1,302	1,203
Crooked Fork Creek	2012	7	1	1	64	455	820
	2011	27	4	0	67	479	422
	2010	24	0	0	33	NE	NE
	2009	20	5	0	29	136	96
	2008	43	16	0	90	285	102
	2007	33	2	0	33	578	754
	2006	23	3	0	16	146	142
	2005	28	0	0	9		
	2004	81	15	0	36	275	106
	2003	40	1	0	10	440	813
	2002	35	4	0	86	788	710
	2001	176	26	1	200	1,530	511
	2000	17	2	2	95	825	1,063
	1999	0	0	3	19		
Lolo Creek[a]	2010	23	0	0	8	101[b]	ND
	2009	33	7	0	0	141	ND
	2008	58	17	0	36	182	54
Total		0	0	0	16	29[b]	ND
Upper	2007	0	0	0	0		
Lower		0	0	0	16		
Total		16	3	0	0	34[c]	ND
Upper	2006	12	1	0	0		
Lower		4	2	0	0		
Total		27	4	0	22	176	146
Upper	2005	13	1	0	9	130	233
Lower		14	3	0	13	75	68
Total		154	33	0	72	490	123
Upper	2004	143	31	0	22	244	49
Lower		11	2	0	50	286	352
Total		23	2	0	69	817	1,067
Upper	2003	10	1	0	16	170	702
Lower		13	1	0	53	308	1,311
Total	2002	111	22	0	121	621	211
Total	2001	1,081	363	0	523	2,638	170
Total	2000	161	19	0	102	1,025	398
Total	1999	65	4	0	3	114	71
Newsome Creek[a]	2010	137	15	0	5	183	44
	2009	26	1	0	4	150	37
	2008	47	6	0	2	62	19

Appendix B. Continued.

		Marked fish		Unmarked fish		Escapement estimate upstream from weir	
Stream	Year	Number passed	Number recovered	Number passed	Number recovered	Estimate	± 95% Confidence interval
	2007	3	0	8	2	11	ND
	2006	3	1	0	0	3	0
	2005	24	6	0	2	32	11
	2004	83	17	0	1	88	9
	2003	290	49	0	20	408	56
	2002	219	43	0	5	244	21
	2001	263	88	0	24	335	26
	2000	93	15	0	21	223	79
Salmon Subbasin							
Johnson Creek	2009	666	318	0	46[d]	786	33
	2008	550	328	0	4	557	4
	2007	315	103	0	7	336	14
	2006	113	57	0	0	113	0
	2005	119	65	0	0	119	0
	2004	246	68	0	6	267	16
	2003	691	478	0	16	714	6
	2002	1,085	606	0	11	1,105	8
	2001	1,335	837	0	4	1,341	4
	2000	78	19	0	8	110	22
	1998	60	38	0	30	107	14
Pahsimeroi River	2013	NE	NE	NE	NE	NE	NE
	2012	216	8	0	1	243	55
	2011	372	29	0	4	385	25
	2010	293	15	0	2	332	56
	2009	322	22	0	2	368	54
	2008	229	29	0	0	229	0
South Fork Salmon River	2013	328	68	0	0	328	0
	2012	454	151	0	20	514	23
	2011	693	269	0	7	711	11
	2010	1,339	651	2	9	1358	9
	2009	546	291	0	2	550	4
	2008	589	261	0	4	598	7
	2007	337	101	0	10	370	18
	2006	505	119	0	26	615	45
	2005	382	165	0	10	405	11
	2004	849	216	0	451	2,622	248
	2003	2,381	1,235	0	177	2,722	44
	1997	547	322	0	80	700	23
Upper Salmon River	2013	384	104	0	3	395	11
	2012	504	175	0	101	795	58
	2011	597	148	0	12	645	25
	2010	723	293	0	7	740	10
	2009	447	100	0	1	452	8
	2008	390	107	0	55	590	56
	2007	206	76	0	0	206	0
	2006	394	135	0	4	406	9
	2005	445	96	0	0	445	0
	2004	709	185	0	5	728	15
	1999	128	28	0	3	142	14

[a] Adults removed for Nez Perce Tribal Hatchery broodstock not included in these estimates.

[b] Based on an expansion of 2.1 fish per redd for redds located above the lower weir.

[c] Based on an expansion of 2.3 fish per redd for redds located above the lower weir.

[d] All unmarked fish recovered were age 3 males; likely a small hole in a picket weir. All adults (>age 3) recovered were marked (n = 209).

Appendix C. Juvenile trap operations to collect brood year 2012 spring/summer Chinook salmon in Idaho Supplementation Study (ISS) streams. The spring trapping season extends from trap deployment in the spring to June 30. The summer season extends from July 1 to August 31. The fall season runs from September 1 to trap removal.

Stream	Season and Calendar Year	Start Date	End Date	Total Days Trapped
Clearwater River Subbasin				
American River	Spring 2013	3/21/2013	6/30/2013	96
	Summer 2013	7/1/2013	8/31/2013	33
	Fall 2013	9/1/2013	11/5/2013	45
	Spring 2014	3/19/2014	6/30/2014	92.5
	Total	**3/21/2013**	**6/30/2014**	**266.5**
Clear Creek	Spring 2013	04/03/13	06/28/13	86
	Spring 2014	04/15/14	06/02/14	48
	Total	**04/03/13**	**06/02/14**	**134**
Crooked River	Spring 2013	3/22/2013	6/30/2013	94.5
	Summer 2013	7/1/2013	8/31/2013	37.5
	Fall 2013	9/1/2013	11/5/2013	53
	Spring 2014	3/18/2014	6/30/2014	101
	Total	**3/22/2013**	**6/30/2014**	**286**
Red River	Spring 2013	4/11/2013	7/14/2013	79.5
	Summer 2013	7/1/2013	8/31/2013	49
	Fall 2013	9/1/2013	11/5/2013	65.5
	Spring 2014	4/16/2014	6/30/2014	74.5
	Total	**4/11/2013**	**6/30/2014**	**268.5**
Crooked Fork Creek	Spring 2013	03/26/13	06/30/13	78.5
	Summer 2013	07/01/13	08/31/13	59.5
	Fall 2013	09/01/13	11/06/13	65.5
	Spring 2014	03/25/14	06/30/14	67.5
	Total	**03/26/13**	**06/30/14**	**271**
Colt Killed Creek	Spring 2013	03/26/13	06/30/13	76.5
	Summer 2013	07/01/13	08/31/13	59.5
	Fall 2013	09/01/13	11/06/13	66
	Spring 2014	03/25/14	06/30/14	62
	Total	**03/26/13**	**06/30/14**	**264**
Salmon River Subbasin				
Lake Creek	Spring 2013	03/21/13	06/30/13	87
	Summer 2013	07/01/13	08/31/13	61.5
	Fall 2013	09/01/12	11/03/12	63
	Spring 2014	03/27/14	06/30/14	85.5
	Total	**03/21/13**	**06/30/14**	**297.5**
Secesh River	Spring 2013	04/10/13	06/30/13	68.5
	Summer 2013	07/01/13	08/31/13	62
	Fall 2013	09/01/13	11/03/13	61.5
	Spring 2014	04/12/14	06/30/14	63
	Total	**04/10/13**	**06/30/14**	**255**
South Fork Salmon River	Spring 2013	03/05/13	06/30/13	61.5
	Summer 2013	07/01/13	08/31/13	61
	Fall 2013	09/01/13	11/04/13	51
	Spring 2014	03/14/14	06/30/14	46
	Total	**03/05/13**	**06/30/14**	**219.5**
Marsh Creek	Spring 2013	03/21/13	06/30/13	97.5
	Summer 2013	07/01/13	08/31/13	60.5
	Fall 2013	09/01/13	11/01/13	60
	Spring 2014	03/22/14	06/30/14	96
	Total	**03/21/13**	**06/30/14**	**314**

Appendix C. Continued.

Stream	**Season and Calendar Year**			
Upper Salmon River	Spring 2013	03/21/13	06/30/13	94
	Summer 2013	07/01/13	08/31/13	60.5
	Fall 2013	09/01/13	11/01/13	61
	Spring 2014	03/22/14	06/30/14	99
	Total	**03/21/13**	**06/30/14**	**314.5**
Pahsimeroi River	Spring 2013	03/01/13	06/30/13	104
	Summer 2013	07/01/13	08/31/13	60
	Fall 2013	09/01/13	12/02/13	93
	Spring 2014	02/26/14	06/30/14	104.5
	Total	**03/01/13**	**06/30/14**	**361.5**
Lemhi River	Spring 2013	3/6/2013	6/30/2013	112.5
	Summer 2013	7/1/2013	8/31/2013	60
	Fall 2013	9/1/2013	11/20/2013	77.5
	Spring 2014	3/11/2014	6/30/2014	111.5
	Total	**3/6/2013**	**6/30/2014**	**361.5**
East Fork Salmon River	Spring 2013	03/25/13	06/30/13	69
	Summer 2013	07/01/13	08/31/13	62
	Fall 2013	09/01/13	11/13/13	72
	Spring 2014	03/18/14	06/30/14	63
	Total	**03/25/13**	**06/30/14**	**266**
WF Yankee Fork Salmon River	Spring 2013	03/25/13	06/30/13	90
	Summer 2013	07/01/13	08/31/13	53
	Fall 2013	09/01/13	11/05/13	39
	Spring 2014	04/08/14	06/30/14	38
	Total	**03/25/13**	**06/30/14**	**220**

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