FISHERY RESEARCH

IDAHO SUPPLEMENTATION STUDIES

Brood Year 2007 Cooperator Report

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Brood Year 2007 Cooperative Report
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ABSTRACT

The Idaho Supplementation Studies (ISS) project was initiated 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 2007 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), juvenile treatments in three streams, redd counts, and carcass information. The report then follows the resulting juveniles through migration, including natural production estimates and survival to Lower Granite Dam. The number of adults (supplementation and natural origin) passed over weirs in 2007 ranged from zero to 33 fish in the Clearwater River subbasin and from 86 to 337 fish in the Salmon River subbasin. Redd density in survey transects in the Clearwater River subbasin streams averaged 0.8 redds/km and those in the Salmon River subbasin streams averaged 1.7 redds/km. Carcass data were collected concurrently with redd counts except in White Cap and Alturas Lake creeks, which were surveyed from the air. We collected 848 carcasses in 2007. We estimated 574,412 brood year 2007 natural origin juvenile Chinook salmon emigrated from 18 ISS streams with screw traps. Survival to Lower Granite Dam was similar to previous years, with age-1 smolt survival generally between 50% and 60% and summer and fall emigrant survival between 20% and 40%.

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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 the study streams across the Clearwater and Salmon river subbasins as developed in the original study design (Bowles and Leitzinger 1991). Data collected include estimates of escapement for natural and supplementation origin adults, 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 *Oncorhynchus tshawytscha* 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 Idaho's 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 document summarizes activities conducted by ISS cooperators and data collected between 2007 and 2009 on Chinook salmon that spawned in 2007 (brood year 2007) and their resulting progeny. Our summary includes data on the number of adults that returned to collection facilities, supplementation adults passed onto spawning grounds (adult treatments), juvenile treatments in three streams, 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 subject to change, and final analysis will occur after the smolt out-migration in 2014. Adult data are from natural origin (produced from natural spawning and identified by the presence of an adipose fin), supplementation origin (see Bowles and Leitzinger [1991]) identified by an adipose fin and a coded-wire tag or ventral fin clip, and general production strays (identified by a missing adipose fin or other identifying marks or tags). Additionally, we provide preliminary data on adult returns for 2008 (Appendix A) and 2009 (Appendix B). Beginning with the report covering brood year 2002 activities (Venditti et al. 2005), the ISS now produces a single, cooperative 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, 17 treatment and 14 control streams are included in ISS. The Clearwater River subbasin contains 10 treatment and five control streams. The Salmon River subbasin includes six treatment and nine control streams (Figure 1).

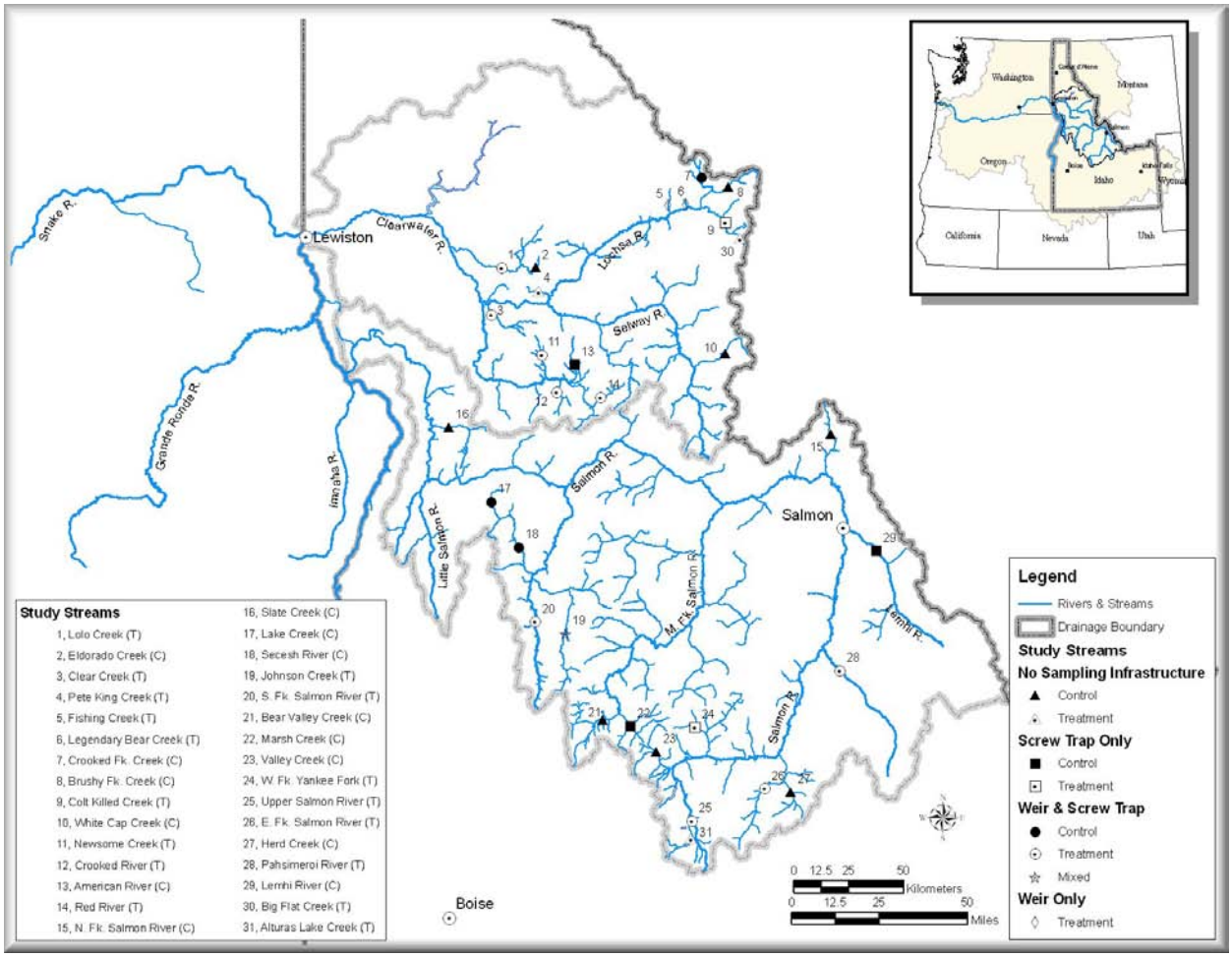

Figure 1. Current treatment and control streams in the Salmon River and Clearwater River subbasins monitored by the four agencies participating in the Idaho Supplementation Studies. Cooperators include the Idaho Department of Fish and Game, Nez Perce Tribe, Shoshone-Bannock Tribes, and the U.S. Fish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

Fish communities are similar across all 31 ISS study streams. Anadromous species in all streams include wild/natural (hereafter natural) and hatchery Chinook salmon and summer-run steelhead *O. mykiss*. Sockeye salmon *O. nerka* are present in the upper Salmon River, and

Pacific lamprey *Lampetra tridentata* are present in the Clearwater River tributaries. 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 basin, we operated adult weirs on Crooked River, Red River, Crooked Fork Creek, Clear Creek, Lolo Creek, and Newsome Creek (Figure 1; sites 12, 14, 7, 3, 1, and 11). In the Salmon basin, weirs were located on the South Fork Salmon River, Pahsimeroi River, upper Salmon River, East Fork Salmon River, and Johnson Creek (Figure 1; sites 20, 28, 25, 26, and 19). All natural origin adults were passed above weirs to spawn, and supplementation origin adults were passed in numbers that did not exceed the natural component (Bowles and Leitzinger 1991), except at Johnson Creek, where natural origin adults were used for broodstock and supplementation adults were passed over the weir without limit. Surplus supplementation adults at other locations were incorporated into hatchery broodstocks. 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 (opercle punch) to unmarked carcasses in surveys to estimate total spawning escapement with a simple Peterson mark–recapture estimator (Everhart and Youngs 1981).

Two passive weirs operated in the Secesh River during 2007. The ISS project took over the operation of the video weir on Lake Creek, and the Chinook Salmon Adult Abundance Monitoring Project (BPA Project No. 199703000) continued the operation of an acoustic imaging (dual frequency identification sonar or DIDSON) recorder in the Secesh River (Kucera 2008). The video weir was located at the mouth of Lake Creek (Figure 1; site 17). 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, identified fish to species, and examined fish images for fin clips or other marks. The 24-hour video footage throughout the season provided a census of fish that moved into Lake Creek. A DIDSON recorder and video recorder were operated on the Secesh River (Kucera 2008) at river kilometer 30.0 (Figure 1; site 18). 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 a census of fish that moved into the Secesh River. The video recorder provided species identification and validation for the DIDSON data (Kucera 2008).

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 in recent years to include all probable spawning habitat. Most reaches were surveyed two 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 and Colt Killed creeks (Figure 1; sites 30 and 9), 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. Alturas Lake Creek and White Cap Creek (Figure 1; sites 31 and 10, respectively) were also surveyed once with an aerial count. A combination of aerial and ground counts were used for redd surveys on the Lemhi and upper Salmon rivers, and Lolo Creek (Figure 1; sites 29, 25, and 1).

Redds observed during ground counts were flagged, assigned a unique number, recorded using a global positioning system, and designated as complete or in progress. The presence of any adult Chinook salmon observed on or near redds was also recorded. 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 ground count.

Carcass Recoveries

We collected data from Chinook salmon carcasses to determine their origin (general production hatchery, supplementation, or natural), ocean age, spawning status, and fish health. Measurements collected included FL, mid-eye to hypural plate length (nearest cm), and sex. We checked carcasses for fin clips, marks, tags, radio transmitters, and coded-wire tags (CWT). We collected dorsal fin rays (Kiefer et al. 2002) and scales for age determination and fin tissue for DNA analysis. Structures collected varied by stream, and we did not collect all structures from all carcasses. We inspected visceral cavities to estimate egg retention in females that had spawned, to look for PIT tags (some observers also used PIT tag detectors), and to determine the prevalence of prespawn mortality. During examination, female carcasses were given a percent spawn measure from zero (skeins fully intact) to 100% (no or few eggs remaining in body). We considered a female with >75% of intact skeins a prespawn mortality. All male carcasses recovered prior to observance of any spawning activity were designated prespawn mortalities. After spawning commenced, we generally did not evaluate male carcasses for spawning contribution. Finally, on the upper Salmon River (above Sawtooth Hatchery) and Pahsimeroi River, we collected kidney and spleen tissues for monitoring viral and bacterial pathogens.

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 Lake Creek twice a week and in Johnson Creek once a week to locate prespawn carcasses. We also surveyed known staging areas in the South Fork Salmon, Red, and Crooked rivers beginning in mid-July. These surveys continued throughout the summer and concluded in September.

Supplementation Treatments

In 2004, we stopped releasing supplementation origin juveniles into all but three ISS study streams (Venditti et al. 2005); however, adult treatments continued through 2007 as adults returned from brood year 2002 releases. As supplementation origin adult Chinook salmon returned, they were intercepted at weirs, identified, and passed upstream (in numbers not greater than the natural component, except as described for Johnson Creek above) to supplement natural spawning. However, Lolo and Newsome creeks continue to receive juvenile treatments from the Nez Perce Tribal Hatchery (NPTH; Project Number 1983-350-03) and Johnson Creek received smolts from the Johnson Creek Artificial Production and Evaluation program (Project number 1996-043-00). Treatment goals are 150,000 and 75,000 presmolts annually to Lolo and Newsome creeks, respectively, and 100,000 smolts annually to Johnson Creek. Juvenile treatments will continue in these streams until escapement goals (USDOE/BPA 1997) are met.

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 (YOY) 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 29, and 28) 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.

Rotary Screw Trap Estimates

We operated rotary screw traps on 18 streams to collect juvenile Chinook salmon migrating downstream. Screw trap data enables estimates of migrant abundance and survival 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. Traps were checked and fish were processed 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), the traps were checked 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 standard length 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 dye (described below) to estimate trap efficiency. Fish needed to be ≥60 mm FL to be PIT tagged or ≥35 mm FL to be dyed. PIT tagging protocols followed procedures described by Kiefer and Forster (1991) and the PIT Tag Steering Committee (1992). We sterilized PIT tagging needles and PIT tags in a 70% to 100% ethanol solution for 10 min prior to and between uses. 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 a subsample of 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, and the number of fish in these releases was based on a predetermined percentage of the daily catch designed to distribute PIT tags proportionally over the entire trapping season. All other fish were held in separate live boxes and released downstream of the trap. All fish were released after recovery from the anesthetic. 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., 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 parameters: 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 set a lower limit of seven mark 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, precocial Chinook salmon were not included in parr, presmolt, or smolt migrant estimates for the brood year being studied. These groups were not included in estimates because we could not estimate trapping efficiency for these groups, which likely differed from other PIT-tagged migrants.

Bismarck Brown Stain Marking—Fry <60 mm FL represent a large fraction of the total juvenile migration from some study streams, and we used Bismarck Brown stain to conduct a complementary mark-recapture migration estimate that included fish too small to PIT tag. 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 (within 1-2°C of river) temperature in the baths. When properly stained, the mark lasted 3-4 d, but could be adjusted by changing the dye concentration and/or exposure time.

We derived abundance or migration estimates from Bismarck Brown 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 to be snorkeled 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 type 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 nonsalmonids. The thalweg length of each snorkel site was measured 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 Lower Granite Dam using PIT tag interrogations at dams on the Snake and Columbia rivers and the Survival Under Proportional Hazards (SURPH) model (Lady et al. 2001). Because juveniles from the Lemhi and Pahsimeroi rivers display both stream- and ocean-type life histories (Healey 1991), we report survival estimates separately for each group (age-0 and age-1 smolts) within a brood year.

Summer Parr Remote PIT Tagging

We collected natural parr and PIT tagged them in some ISS streams. Snorkeling was used to determine where large numbers of juveniles were located. Juveniles were collected via seining by IDFG and NPT Fisheries personnel. Bowles and Leitzinger (1991) recommended a target goal of 300-500 parr for PIT tagging.

Genetic Sample Inventory

As part of the ISS program, we have 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% nondenatured ethyl alcohol. We sample every adult passed over weirs and at least 50 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 has been acknowledged, and the Independent Scientific Review Panel (ISRP) recommended that 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 E). This inventory will be updated annually.

Data Storage

Data from the ISS program is available through several sources. Redd count data are available through Streamnet (http://www.streamnet.org). 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 through the authors.

RESULTS

Adult Escapement

Weirs

The number of adult Chinook salmon that escaped to weirs varied among study streams and basins in 2007. Returns of general production, natural, and supplementation origin fish were generally lower in the Clearwater River subbasin and ranged from 53 fish in Newsome Creek to 588 fish in Clear Creek. Returns to weirs in the Salmon River subbasin ranged from 86 fish in Lake Creek to 3,745 fish at the South Fork Salmon River weir (Table 1). Except for Lake Creek, these numbers are only the counts of fish handled and do not represent total escapement above the weirs. The video weir on Lake Creek experienced no down time in 2007, so we believe this represents an accurate estimate of the number of adults that escaped to this stream.

The expanded estimates of total spawning escapement above weirs where mark recapture data were collected (Appendix C) indicated that ISS weirs had a wide range of efficiency in 2007. The Johnson Creek, South Fork Salmon River, and Sawtooth Hatchery weirs (upper Salmon River) were >90% efficient (>90% of recovered carcasses were marked). Conversely, the number of unmarked carcasses recovered was equal to or outnumbered marked carcasses in Clear and Crooked Fork creeks (Appendix C).

Redd Counts and Carcass Recoveries

The number of redds varied between streams in 2007, but redd densities (redds/km) were generally higher in the Salmon River subbasin than in the Clearwater subbasin. Redd density in streams in the Clearwater River basin averaged 0.8 redds/km, while those in the Salmon River basin averaged 1.7 redds/km. In the Clearwater basin, Crooked Fork Creek had the highest redd density (4.3 redds/km), while no redds were observed in Big Flat, Eldorado, and Fishing creeks (Table 2). Salmon River basin redd densities were highest in the South Fork Salmon River (6.6 redds/km), while no redds were observed in Alturas Lake and Slate creeks (Table 2).

The ISS cooperators maintained the increased carcass sampling effort described in Lutch et al. (2003). We sampled 338 carcasses from the Clearwater basin and 510 from the Salmon basin totaling 848 carcasses in 2007. The total included 428, 262, and 108 carcasses of natural, general production, and ISS supplementation origin carcasses, respectively. The origin of 50 carcasses could not be determined. The number of carcasses recovered in the Clearwater basin ranged from zero in Big Flat, Brushy Fork, Colt Killed, Pete King, and Eldorado creeks to 253 in Red River. The number recovered in the Salmon basin ranged from zero in Slate Creek to 120 in Johnson Creek (Table 3).

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 2007. Catch numbers are not expanded and do not represent total escapement. General production adults were generally not passed over the weirs, but see Appendix A. Table 4.

	General production			Supplementation			Natural			Undetermined			
Stream Name	**M**	**F**	**U**	**M**	**F**	**U**	**M**	**F**	**U**	**M**	**F**	**U**	**Total**
Clearwater River Subbasin													
Clear Creek	382	187	0	1	0	0	15	3	0	0	0	0	588
Crooked Fork Creek	27	17	14	0	0	0				0	0	0	91
Crooked River [a]	127	0	225	0	0	1	1	1	11	0	0	0	366
Lolo Creek	3	5	0	5	5	0	25	18	0	0	0	0	60
Newsome Creek	14	8	0	12	4	0	10	5	0	0	0	0	53
Red River [a]	215	0	309	0	0	0	4	0	17	0	0	0	545
Salmon River Subbasin													
Johnson Creek	11	0	0	187	27	0	105	50	0	0	0	0	380
Lake Creek	-	-	9	-	-	-	-	-	-	-	-	77	86
Pahsimeroi River	319	242	0	8	10	0	80	58	0	0	0	0	717
South Fork Salmon River	2,522	883	0	17	43	0	175	105	0	0	0	0	3,745
East Fork Salmon River	1	0	0	0	0	0	62	27	0	0	0	0	90
Upper Salmon River	1,303	77	0	13	10	0	131	52	0	0	0	0	1,576

[a] General production fish trapped at the Crooked River and Red River weirs were ponded together before sex was determined; therefore, most adults were categorized as unknown. Jacks were assumed to be males.

Table 2. Number of Chinook salmon redds counted in survey transects within Idaho Supplementation Study (ISS) streams in 2007 and summary information on transect length, number of passes, method of data collection, and when redd counting effort was stopped. Cases for which no data were available are designated ND.

Stream	Survey length (km)	Redds	Redds per km	Passes	Last pass	Survey method
Clearwater Subbasin						
American R.	34.6	25	0.7	3	09/27/07	Ground
Big Flat Cr.	3.0	0	0	1	09/27/07	Ground
Brushy Fk. Cr.	16.1	5	0.3	4	09/18/07	Ground
Clear Cr.	20.2	22	1.1	4	09/17/07	Ground
Colt Killed Cr.	31.6	11	0.4	1	10/15/07	Ground
Crooked Fk. Cr.	18.7	80	4.3	8	09/14/07	Ground
Crooked R.	18.8	4	0.2	3	09/27/07	Ground
Eldorado Cr.	17.1	0	0	3	09/11/07	Ground
Fishing Cr.	6.2	0	0	3	09/12/07	Ground
Legendary Bear Cr.	6.8	1	0.2	3	09/13/07	Ground
Lolo Cr.	38.3	14	0.4	4	09/13/07	Ground & Aerial
Newsome Cr.	18.2	2	0.1	3	09/10/07	Ground
Pete King Cr.	5.8	1	0.2	3	09/06/07	Ground
Red R.	38.5	155	4.0	3	09/26/07	Ground
White Cap Cr.	12.9	1	0.1	1	08/31/07	Aerial
Salmon Subbasin						
Alturas Lake Cr.	14.0	0	0	1	09/04/07	Aerial
Bear Valley Cr.	35.7	79	2.2	3	09/12/07	Ground
EF Salmon R.	15.3	81[a]	5.3	3	09/27/07	Ground
Herd Cr.	16.4	7	0.5	3	09/26/07	Ground
Johnson Cr.	38.1	72	1.9	2-11	09/18/07	Ground
Burnt Log Cr.	3.3	2	0.6	8	09/08/07	Ground
Lake Cr.	16.8	31	1.9	3	09/10/07	Ground
Lemhi R.	51.7	29	0.6	2	09/21/07	Aerial
Marsh Cr.	11.0	44	0.4	6	09/11/07	Ground
NF Salmon R.	36.8	21	0.6	3	09/15/07	Ground
Pahsimeroi R.	19.2	77	4.0	6	09/30/07	Ground
Secesh R.	40.1	52	1.3	3	09/27/07	Ground
SF Salmon R.	24.5	162	6.6	3	09/05/07	Ground
W.F. Yankee Fork S.R.	11.6	10[b]	0.9	3	09/25/07	Ground
Upper Salmon R.	50.3	48	1.0	1	09/04/07	Aerial
Valley Cr.	33.2	26	0.8	3	09/11/07	Ground
Slate Cr.	15.4	0	0	2	09/20/07	Ground

[a] A total of 18 redds by natural origin females and 63 redds by captive origin females from Project Number 199700100.

[b] A total of three redds by natural origin females and seven redds by captive origin females from Project Number 199700100.

Supplementation Treatments

We passed 1,287 adult Chinook salmon at ISS weirs in 2007 (Table 4). Of these, 1,277 were of natural or supplementation origin (Table 4). Natural origin fish passed ranged from zero (Lolo Creek) to 33 (Crooked Fork Creek) fish in the Clearwater River subbasin and from 86

(Lake Creek) to 337 (South Fork Salmon River) fish in the Salmon River subbasin. Naturally-produced fish outnumbered supplementation origin adults at all locations except Johnson Creek in 2007, which is not unexpected since this is the last year of supplementation returns at most locations and Johnson Creek continues to be supplemented. One general production fish was passed at the Newsome Creek weir, and we observed nine general production fish straying into Lake Creek at the video weir (Table 4).

Juvenile treatment releases were made in Lolo, Newsome, and Johnson creeks again in 2007. Treatment goals were met or exceeded in all streams this year (Table 5). We will continue to report adult and juvenile supplementation treatments in these streams through the final adult returns of BY02 adults (i.e., spawn year 2007; this report). After this, these NPT projects (Lolo and Newsome creeks; Project number 1983-350-03 and Johnson Creek; Project number 1996-043-00) will provide results.

Broodstocks to create future juvenile release groups for Lolo, Newsome, and Johnson creeks were collected in 2007. The origin of adults retained for broodstocks included natural, ISS supplementation, and general production origin adults for Lolo and Newsome creeks, and natural and ISS supplementation in Johnson Creek. Actual take numbers and origins are available in progress reports from the respective programs (e.g., Lolo and Newsome creeks [Backman et al. 2008]; Johnson Creek [Rabe and Nelson 2007]).

Table 3. Number, origin (GP = general production hatchery, ISS = supplementation), and sex of adult Chinook salmon carcasses collected during 2007 spawning ground surveys on Idaho supplementation study (ISS) streams.

Stream	Sex	Unknown	Natural	GP	ISS	Total
Clearwater R.						
American R.	Males	0	1	6	0	7
	Females	0	1	6	0	7
	Unknown	0	0	1	0	1
	Total	**0**	**2**	**13**	**0**	**15**
Big Flat Cr.	Males	0	0	0	0	0
	Females	0	0	0	0	0
	Unknown	0	0	0	0	0
	Total	**0**	**0**	**0**	**0**	**0**
Brushy Fk. Cr.	Males	0	0	0	0	0
	Females	0	0	0	0	0
	Unknown	0	0	0	0	0
	Total	**0**	**0**	**0**	**0**	**0**
Clear Cr.	Males	0	4	3	0	7
	Females	0	1	1	1	3
	Unknown	0	0	0	0	0
	Total	**0**	**5**	**4**	**1**	**10**
Colt Killed Cr.	Males	0	0	0	0	0
	Females	0	0	0	0	0
	Unknown	0	0	0	0	0
	Total	**0**	**0**	**0**	**0**	**0**
Crooked Fk. Cr.	Males	0	2	6	0	8
	Females	1	9	17	0	27
	Unknown	0	0	0	0	0
	Total	**1**	**11**	**23**	**0**	**35**

Table 3. Continued.

Stream	Sex	Unknown	Natural	GP	ISS	Total
Crooked R.	Males	0	0	0	0	0
	Females	0	3	0	0	3
	Unknown	0	0	0	0	0
	Total	**0**	**3**	**0**	**0**	**3**
Eldorado Cr.	Males	0	0	0	0	0
	Females	0	0	0	0	0
	Unknown	0	0	0	0	0
	Total	**0**	**0**	**0**	**0**	**0**
Fishing Cr.	Males	0	0	0	0	0
	Females	0	1	0	0	1
	Unknown	0	0	0	0	0
	Total	**0**	**1**	**0**	**0**	**1**
Legendary Bear Cr.	Males	0	0	0	0	0
	Females	0	1	0	0	1
	Unknown	0	0	0	0	0
	Total	**0**	**1**	**0**	**0**	**1**
Lolo Cr.	Males	1	6	0	1	8
	Females	0	8	0	0	8
	Unknown	1	0	0	0	1
	Total	**2**	**14**	**0**	**1**	**17**
Newsome Cr.	Males	0	0	1	1	2
	Females	0	1	0	0	1
	Unknown	0	0	0	0	0
	Total	**0**	**1**	**1**	**1**	**3**
Pete King Cr.	Males	0	0	0	0	0
	Females	0	0	0	0	0
	Unknown	0	0	0	0	0
	Total	**0**	**0**	**0**	**0**	**0**
Red R.	Males	0	13	112	0	125
	Females	2	12	97	0	111
	Unknown	13	2	2	0	17
	Total	**15**	**27**	**211**	**0**	**253**
Salmon R.						
Bear Valley Cr.	Males	0	2	0	0	2
	Females	0	4	0	0	4
	Unknown	0	2	0	0	2
	Total	**0**	**8**	**0**	**0**	**8**
EF Salmon R.	Males	0	3	0	0	3
	Females	0	7	0	0	7
	Unknown	0	0	0	0	0
	Total	**0**	**10**	**0**	**0**	**10**
Herd Cr.	Males	0	2	0	0	2
	Females	0	1	0	0	1
	Unknown	0	0	0	0	0
	Total	**0**	**3**	**0**	**0**	**3**
Johnson Cr.	Males	1	31	0	59	91
	Females	0	19	0	9	28
	Unknown	1	0	0	0	1
	Total	**2**	**50**	**0**	**68**	**120**
Lake Cr.	Males	0	20	0	0	20
	Females	0	14	0	0	14
	Unknown	1	0	0	0	1
	Total	**1**	**34**	**0**	**0**	**35**

Table 3. Continued.

Stream	Sex	Unknown	Natural	GP	ISS	Total
Lemhi R.	Males	0	1	0	0	1
	Females	0	1	0	0	1
	Unknown	0	0	0	0	0
	Total	**0**	**2**	**0**	**0**	**2**
Marsh Cr.	Males	0	8	0	0	8
	Females	0	13	0	0	13
	Unknown	1	1	0	0	2
	Total	**1**	**22**	**0**	**0**	**23**
NF Salmon R.	Males	0	2	0	0	2
	Females	0	10	0	0	10
	Unknown	0	0	0	0	0
	Total	**0**	**12**	**0**	**0**	**12**
Pahsimeroi R.	Males	0	10	0	3	13
	Females	1	10	0	3	14
	Unknown	2	0	0	0	2
	Total	**3**	**20**	**0**	**6**	**29**
Secesh R.	Males	0	28	6	0	34
	Females	0	21	2	0	23
	Unknown	0	0	0	0	0
	Total	**0**	**49**	**8**	**0**	**57**
SF Salmon R.	Males	1	49	1	6	57
	Females	0	30	1	23	54
	Unknown	0	0	0	0	0
	Total	**1**	**79**	**2**	**29**	**111**
Slate Cr.	Males	0	0	0	0	0
	Females	0	0	0	0	0
	Unknown	0	0	0	0	0
	Total	**0**	**0**	**0**	**0**	**0**
Upper Salmon R.	Males	0	49	0	1	50
	Females	0	25	0	1	26
	Unknown	0	0	0	0	0
	Total	**0**	**74**	**0**	**2**	**76**
Valley Cr.	Males	4	0	0	0	4
	Females	8	0	0	0	8
	Unknown	7	0	0	0	7
	Total	**19**	**0**	**0**	**0**	**19**
WFYF S.R.	Males	3	0	0	0	3
	Females	2	0	0	0	2
	Unknown	0	0	0	0	0
	Total	**5**	**0**	**0**	**0**	**5**

Juvenile Production Estimates

Rotary Screw Trap Estimates

We operated screw traps to collect brood year 2007 juvenile Chinook salmon on 18 ISS study streams in 2008 and 2009 for 4,422.5 trap days. Brood year 2007 juvenile collection exceeded 300 days (mean = 331.0 d) at four traps; nine traps operated from 200-299 days (mean = 249.4 d); and five traps operated 100-199 days (170.7 d; Appendix D). High spring

runoff, torrential precipitation, and hatchery releases were responsible for most lost trap days, although low summer flows also made some traps inoperable.

Table 4. Summary of adult Chinook salmon passed above weirs as adult treatments to Idaho Supplementation Study (ISS) streams in 2007. 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.

	Supplementation			Natural			General production			Total
	M	F	U	M	F	U	M	F	U	
Clearwater Subbasin										
Clear Creek	1	0	0	15	3	0	0	0	0	19
Crooked Fork Creek	0	0	0	23	10	0	0	0	0	33
Crooked River	0	0	1	1	1	11	0	0	0	14
Lolo Creek	0	0	0	0	0	0	0	0	0	0
Newsome Creek	5	0	0	5	0	0	1	0	0	11
Red River	0	0	0	4	0	17	0	0	0	21
Salmon Subbasin										
Johnson Creek [a]	187	27	0	81	21	0	0	0	0	318
Lake Creek	-	-	-	-	-	77	-	-	9	86
Pahsimeroi River	8	9	0	80	58	0	0	0	0	155
S. F. Salmon River	16	43	0	173	105	0	0	0	0	337
E. F. Salmon River	0	0	0	62	27	0	0	0	0	89
Upper Salmon River	13	10	0	131	52	0	0	0	0	206

[a] Two supplementation males that strayed to the SFSR trap were trucked to Johnson Creek.

Cooperators used data from PIT-tagged fish recaptured at screw traps to estimate the number of brood year 2007 juveniles that migrated from ISS study streams in 2008 and 2009. We collected 68,474 brood year 2007 juvenile Chinook salmon. Summing the point estimates for all the traps yielded a total brood year 2007 migration estimate of 574,412 juvenile Chinook salmon from ISS study streams with screw traps. The Salmon River subbasin accounted for the majority of the juvenile production with 534,871 (80.1%) juveniles collected and an estimated 513,193 (89.3%) migrants. Migration estimates ranged from 455 fish from Crooked River to 159,748 fish from the upper Salmon River (Table 6).

Snorkel Estimates

We used snorkel observations to estimate juvenile Chinook salmon densities in three study streams in the Clearwater subbasin and four in the Salmon subbasin. The observed densities were highly variable and ranged from zero to 7.0 fish/100 m^2 (Table 7). Storm events and turbidity prevented us from snorkeling Bear Valley Creek in 2008.

Table 5. Summary information for brood year 2007 juvenile Chinook salmon released into ISS study streams. Juveniles were either the progeny of natural origin returning (NOR) adults to the receiving streams or adults sourced from the Lolo Creek (LC), Clearwater Hatchery (CL), Johnson Creek (JC), Dworshak Hatchery (DW), or Newsome Creek (NE) traps. Juveniles were reared at the Nez Perce Tribal Hatchery (NPTH) or McCall Fish Hatchery (MCH) and were marked with either PIT or coded-wire tags (CWT).

Stream	Release dates	Number released	Life stage	Number PIT tagged	Number CWT	Broodstock Source (%)	Rearing facility
Lolo/Yoosa Cr.	10/7-10/20/08	161,019	presmolt	8,859	159,238	49%LC, 29%CL, 22%DW	NPTH
Newsome Cr.	10/8-10/21/08	79,330	presmolt	5,776	78,854	4%NE, 96%DW	NPTH
Johnson Cr.	3/16-3/18 2009	91,080	Smolt	2,094	91,533	100% NOR	MCH

Table 6. Seasonal and overall migration estimates of brood year 2007 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	3	NE	NE	NE
		Parr	84	NE	NE	NE
		Presmolt	623	2,162	1,792	2,694
		Smolt	429	2,641	1,813	4,427
		Brood Year Total	**1,139**	**4,803**	**3,605**	**7,121**
Clear Creek	T	Fry	88	NE	NE	NE
		Smolt	5	NE	NE	NE
		Brood Year Total	**93**	**NE**	**NE**	**NE**
Colt Killed Creek	T	Fry	0	NE	NE	NE
		Parr	15	NE	NE	NE
		Presmolt	192	1,090	776	1,544
		Smolt	52	345	167	702
		Brood Year Total	**244**	**1,435**	**1,021**	**2,025**
Crooked Fork Creek	C	Fry	47	NE	NE	NE
		Parr	157	691	402	1,206
		Presmolt	873	2,770	2,458	3,091
		Smolt	123	942	579	1,611
		Brood Year Total	**1,153**	**4,403**	**3,743**	**5,273**
Crooked River	T	Fry	0	NE	NE	NE
		Parr	4	NE	NE	NE
		Presmolt	0	NE	NE	NE
		Smolt	87	455	246	714
		Brood Year Total	**91**	**455**	**246**	**714**

Table 6. Continued.

Stream	T/C	Life Stage	Catch	Estimate	LCI	UCI
Lolo Creek	T	Fry/Parr	NE			
		Presmolt	752	4,163	3,275	5,375
		Smolt	141	9,400	NE	NE
		Brood Year Total	**893**	**13,563**	**NE**	**NE**
Newsome Creek	T	Fry/Parr	NE			
		Presmolt	892	2,149	1,824	2,617
		Smolt	13	157	NE	NE
		Brood Year Total	**905**	**2,306**	**NE**	**NE**
Red River	T	Fry	646	5,347	4,249	6,765
		Parr	4,599	18,253	16,924	19,725
		Presmolt	3,416	6,989	6,605	7,363
		Smolt	424	3,665	2,332	5,123
		Brood Year Total	**9,085**	**34,254**	**30,110**	**38,976**
Salmon River						
Marsh Creek	C	Fry	943	7,308	5,246	10,535
		Parr	3,045	22,089	18,803	27,424
		Presmolt	5,034	17,323	16,352	18,412
		Smolt	268	1,053	733	1,664
		Brood Year Total	**9,290**	**47,773**	**43,425**	**54,089**
Pahsimeroi River	T	Fry	13	NE	NE	NE
		Parr	514	2,443	2,015	3,032
		Presmolt	824	9,863	7,544	13,107
		Smolt	73	1,080	444	2,146
		Brood Year Total	**1,493**	**14,143**	**11,470**	**17,145**
Upper Salmon River	T	Fry	150	NE	NE	NE
		Parr	1,003	121,238	68,714	232,273
		Presmolt	601	32,782	19,086	58,029
		Smolt	1,209	5,728	4,944	6,852
		Brood Year Total	**2,813**	**159,748**	**102,699**	**265,440**
South Fork Salmon	T	Fry	263	NE	NE	NE
		Parr	5,733	38,994	35,187	42,934
		Parr	347	1,104	910	1,342
		Presmolt	4,508	12,848	12,054	13,721
		Smolt	1,520	4,866	4,380	5,412
		Brood Year Total	**12,371**	**57,811**	**53,905**	**61,863**
Lake Creek	C	Fry	22	318	160	549
		Parr	6,205	23,992	20,539	29,313
		Presmolt	4,666	9,529	8,953	10,128
		Smolt	181	2,294	1,310	4,458
		Brood Year Total	**11,074**	**36,134**	**32,112**	**42,004**
Secesh River	C	Fry	67	2,714	1,340	5,184
		Parr	3,587	87,150	61,866	131,122
		Presmolt	2,811	46,674	33,505	69,066
		Smolt	246	1,753	1,143	3,145
		Brood Year Total	**6,711**	**138,291**	**107,399**	**190,749**
Johnson Creek	T	Fry	147	1,286	747	2,265
		Parr	2,499	16,782	13,782	21,871
		Presmolt	2,995	7,781	7,312	8,325
		Smolt	649	3,632	2,828	4,812
		Brood Year Total	**6,290**	**29,481**	**24,669**	**37,273**
EF Salmon River	T	Parr	498	5,644	4,603	10,948
		Presmolt	3,157	15,489	13,724	17,663
		Smolt	273	2,135	1,511	2,759
		Brood Year Total	**3,928**	**23,330**	**21,347**	**25,356**

Table 6. Continued.

Stream	T/C	Life Stage	Catch	Estimate	LCI	UCI
Lemhi River	C	Fry	28	NE	NE	NE
		Parr	48	NE	NE	NE
		Presmolt	607	3,903	3,184	4,826
		Smolt	77	285	185	428
		Brood Year Total	**760**	**4,188**	**3,481**	**5,147**
WF Yankee Fork Salmon River	T	Parr	11	NE	NE	NE
		Presmolt	111	2,294	843	2,728
		Smolt	19	NE	NE	NE
		Brood Year Total	**141**	**2,294**	**NE**	**NE**

Juvenile Migration and Survival

Screw Trap Estimates

We estimated survival to Lower Granite Dam from PIT tag detections of the various groups of naturally produced juvenile Chinook salmon tagged and released in ISS study streams. A total of 38,810 brood year 2007 juvenile Chinook salmon were PIT tagged at ISS screw traps. Survival estimates for brood year 2007 smolts from study stream to Lower Granite Dam were generally higher in the Clearwater River subbasin than in the Salmon River subbasin (Table 8). Parr, presmolt, and smolt survival averaged 21%, 25%, and 51%, respectively, in the Salmon River tributaries. Presmolt and smolt survival in the Clearwater tributaries averaged 30% and 63%, respectively. Insufficient numbers of age-0 smolts in the Lemhi River and parr from most Clearwater River tributaries were tagged to produce estimates. Survival of brood year 2007 age-0 smolts from the Pahsimeroi River to Lower Granite Dam was 46% (Table 8).

Table 7. Densities of brood year 2007 juvenile Chinook salmon calculated from direct underwater observations in Idaho Supplementation Study (ISS) streams without screw traps in 2008.

Stream	Density (Number/100 m^2)
Clearwater River Subbasin	
Fishing Creek	0.0
Legendary Bear Creek	0.1
Pete King Creek	0.0
Salmon River Subbasin	
Slate Creek	0.0
Valley Creek	1.8
Herd Creek	7.0
Bear Valley Creek[a]	NA

[a] Storm event and severe turbidity stymied snorkel sampling efforts.

Summer Parr Remote PIT Tagging

A total of 699 additional brood year 2007 juvenile Chinook salmon were PIT tagged during remote PIT tagging activities during 2008 in the Lemhi River (Table 9). We attempted tagging summer parr in Fishing and Legendary Bear creeks during 2008. However, no redds were found in Fishing Creek during the 2007 spawning ground surveys and only one redd was found in Legendary Bear Creek, resulting in zero summer parr being tagged in either stream.

Table 8. Estimated survival (proportion) and standard error (SE) to Lower Granite Dam for different life stages of naturally produced brood year 2007 juvenile Chinook salmon PIT tagged in Idaho Supplementation Studies (ISS) streams. Survival estimates were computed using the SURPH2 Model (Lady et al. 2001). Groups having no detections or insufficient detections for estimation are designated ND.

Stream	Life stage	Number tagged	Survival (SE)
Salmon Subbasin			
Lemhi River	Age-0 smolt	3	ND
Lemhi River	Parr-presmolt	2,262	0.38 (0.01)
Lemhi River	Age-1 smolt	201	0.75 (0.75)
South Fork Salmon River	Parr	3,252	0.19 (0.01)
South Fork Salmon River	Presmolt	2,723	0.30 (0.01)
South Fork Salmon River	Smolt	1,491	0.61 (0.02)
Marsh Creek	Parr	2,298	0.26 (0.01)
Marsh Creek	Presmolt	4,026	0.36 (0.01)
Marsh Creek	Smolt	265	0.45 (0.04)
Pahsimeroi River	Age-0 smolt	547	0.46 (0.07)
Pahsimeroi River	Parr-Presmolt	856	0.28 (0.02)
Pahsimeroi River	Age-1 smolt	77	0.51 (0.08)
Upper Salmon River	Parr	650	0.19 (0.02)
Upper Salmon River	Presmolt	929	0.22 (0.02)
Upper Salmon River	Smolt	1,210	0.63 (0.03)
East Fork Salmon River	Parr	201	0.13 (0.02)
East Fork Salmon River	Presmolt	296	0.19 (0.03)
East Fork Salmon River	Smolt	223	0.56 (0.08)
West Fork Yankee Fork	Parr	4	ND
West Fork Yankee Fork	Presmolt	48	0.06 (0.04)
West Fork Yankee Fork	Smolt	14	0.61 (0.21)
Lake Creek	Parr	1,116	0.20 (0.02)
Lake Creek	Presmolt	1,567	0.26 (0.01)
Lake Creek	Smolt	177	0.17 (0.03)
Lake Creek	Yearlings	154	0.16 (0.04)
Secesh River	Parr	373	0.26 (0.03)
Secesh River	Presmolt	1,210	0.29 (0.02)
Secesh River	Smolt	233	0.28 (0.04)
Secesh River	Yearlings	45	0.28 (0.14)
Johnson Creek	Parr	2,339	0.24 (0.01)
Johnson Creek	Presmolt	2,746	0.35 (0.01)
Johnson Creek	Smolt	640	0.54 (0.03)

Table 8. Continued.

Stream	Life stage	Number tagged	Survival (SE)
Clearwater Subbasin			
American River	Parr	39	ND
American River	Presmolt	625	0.28 (0.05)
American River	Smolt	337	0.40 (0.06)
Clear Creek	Presmolt	0	ND
Clear Creek	Smolt	5	ND
Colt Killed Creek	Presmolt	158	0.24 (0.04)
Colt Killed Creek	Smolt	52	1.17 (0.82)
Crooked Fork Creek	Parr-Presmolt	862	0.40 (0.03)
Crooked Fork Creek	Smolt	123	0.77 (0.15)
Crooked River	Parr	2	ND
Crooked River	Presmolt	0	ND
Crooked River	Smolt	78	0.56 (0.19)
Red River	Parr	405	0.08 (0.01)
Red River	Presmolt	2338	ND
Red River	Smolt	260	0.16 (0.04)
Lolo Creek	Parr	0	ND
Lolo Creek	Presmolt	610	0.29 (0.03)
Lolo Creek	Smolt	124	0.72 (0.05)
Newsome Creek	Parr	0	ND
Newsome Creek	Presmolt	605	0.29 (0.02)
Newsome Creek	Smolt	11	ND

Table 9. Number of brood year 2007 Chinook salmon summer parr PIT tagged in Idaho Supplementation Study (ISS) streams during 2008. 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	0
Fishing Creek	0
Salmon River Subbasin	
Lemhi River	699

DISCUSSION

Fish Communities

Adult coho salmon *O. kisutch* that returned to the Clearwater basin in 2008 were released into Lapwai, Lawyer, and Big Canyon creeks. In the future, adult coho salmon may be released or stray into ISS study and represent a potential confounding factor during the final study analysis.

A summer-run Chinook salmon program is currently being initiated within the South Fork Clearwater River drainage. Fertilized eggs from the summer-run stock at McCall Hatchery were

transferred to the Clearwater Hatchery in 2009, and should produce approximately 200,000 smolts for release in 2011. Fish are being raised at the Clearwater Hatchery and will be released at the Crooked River satellite facility. Juveniles in this release group will be ad-intact to prevent harvest in the sport fishery and increase adult rack returns, but will be 100% coded-wire tagged to distinguish them from natural origin fish returning to the weir. Fish from the 2011 release will return as jacks in 2012, and will be removed at the Crooked River weir to preserve the ISS adult protocol. The goal for this program is to increase the size of the program to 600,000 then 1,000,000 smolts, so all fish returning as age-4 adults in 2013 will likely be used for broodstock. Jacks and adults returning in 2014 will arrive after ISS activities have ended, so weir management at that time will not affect the ISS study design. When the 1 million smolt goal has been achieved, 600,000 smolts will be released in the Selway River and 400,000 in the Crooked River.

Adult Escapement

Total spawning escapement provided by the Peterson mark-recapture estimates (Appendix C) is an important analysis variable for the ISS program and should be continued on all streams with weirs. The exception would be streams with video or acoustic weirs, where marking would not be possible. Based on this analysis, all fish released above study weirs should be opercle punched and the presence/absence of this mark should be recorded during all carcass collections.

Supplementation Treatments

In 2007, additional Chinook salmon releases not associated with the ISS program occurred in ISS study streams. We report these activities to ensure that their effects are included in future analyses. The IDFG Chinook Captive Rearing Program (BPA project number 1997-001-00) made adult releases into the West Fork Yankee Fork Salmon River and East Fork Salmon River and eyed-egg plants into the East Fork Salmon River. The West Fork Yankee Fork received 260 adults, which were believed to have constructed seven redds (Stark et al. 2008). The East Fork Salmon River received 313 adults from this program, which produced 63 redds (Stark et al. 2008).

Supplementation activities will continue in Johnson, Lolo, and Newsome creeks beyond brood year 2007 (this report). Reporting on these streams as part of the ISS program will stop at that time, because the protocols used there do not contribute to ISS beyond Phase II. Data from the Johnson Creek Artificial Propagation and Evaluation program (Project Number 1996-043-00, Johnson Creek; Project Number 1983-350-003, Lolo and Newsome creeks) will be available for analyses as recommended by the ISRP (ISRP 2003-8).

Summer Parr Remote PIT Tagging

Since biologists with the National Oceanographic and Atmospheric Association (NOAA) Northwest Science Center 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 do not collect summer parr for our program in these streams. Data from NOAA 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. 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 2008. 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. Table 4.

	General production			Supplementation			Natural			Undetermined			
Stream Name	**M**	**F**	**U**	**M**	**F**	**U**	**M**	**F**	**U**	**M**	**F**	**U**	**Total**
Clearwater River Subbasin													
Clear Creek	310	483	0	0	0	0	7	8	0	0	0	0	808
Crooked Fork Creek	70	57	0	0	0	0	30	13	0	0	0	0	170
Crooked River	0	0	728	0	0	0	34	17	10	0	0	0	789
Red River	0	0	919	0	0	0	5	26	14	0	0	0	964
Salmon River Subbasin													
Lake Creek [a]	--	--	--	--	--	--	--	--	--	--	--	--	255
Pahsimeroi River	2,069	461	0	0	0	0	143	86	0	0	0	0	2,759
South Fork Salmon River [b]	3,410	2,552	0	0	0	0	415	174	0	0	0	0	6,551
East Fork Salmon River	1	1	0	0	0	0	145	62	0	0	0	0	209
Upper Salmon River	3,520	1,708	0	0	0	0	306	86	0	0	0	0	5,620

[a] Video weir cannot parse origin or sex.
[b] An additional 10 Johnson Creek adults were culled at the South Fork Salmon River weir.

Appendix A. Table 2. Number of Chinook salmon redds counted in survey transects within Idaho Supplementation Study (ISS) streams in 2008 and summary information on transect length, number of passes, method of data collection, and date of final redd count.

Stream	Survey length (km)	Redds	Redds per km	Passes	Last pass	Survey method
Clearwater Subbasin						
American R.	34.6	172	5.0	3	9/23/08	ground
Big Flat Cr.	0	0	0	1	9/04/08	ground
Brushy Fk. Cr.	16.1	38	2.4	4	9/18/08	ground
Clear Cr.	20.2	164	8.1	4	9/17/08	ground
Colt Killed Cr.	31.6	42	1.3	1	9/06/08	ground
Crooked Fk. Cr.	21.7	105	4.8	6	9/17/08	ground
Crooked R.	18.8	17	0.9	3	9/22/08	ground
Eldorado Cr.	17.1	0	0	3	9/16/08	ground
Fishing Cr.	6.0	38	6.3	3	9/15/08	ground
Legendary Bear Cr.	6.8	40	5.9	3	9/16/08	ground
Pete King Cr.	5.8	2	0.3	3	9/16/08	ground
Red R.	38.5	239	6.2	3	9/24/08	ground
White Cap Cr.	14.0	4	0.3	1	8/30/08	aerial
Salmon Subbasin						
Bear Valley Cr.	35.7	90	2.5	2	9/19/08	ground
EF Salmon R.	15.3	106[a]	6.9	IDFG[b]	9/24/08	ground
Herd Cr.	16.4	24	1.5	3	9/07/08	ground
Lake Cr.	20.8	158	7.6	3	9/25/08	ground
Lemhi R.	51.7	33	0.6	5/2	9/24/08	ground/aerial
Marsh Cr.	7.2	44	6.1	4	9/04/08	ground
NF Salmon R.	40.8[c]	22	0.5	4	9/19/08	ground
Pahsimeroi R.	19.2	82	4.3	4	9/29/08	ground
Secesh R.	40.1	226	5.6	3	9/24/08	ground
SF Salmon R.	24.7	222	9.0	3	9/13/08	ground
W.F. Yankee Fork S.R.	11.6	24[d]	2.0	2[e]	9/18/08	ground
Upper Salmon R.	66	99	1.5	1	9/02/08	aerial
Valley Cr.	33.2	54	1.6	3	9/16/08	ground
Slate Cr.	15.4[f]	10	0.7	3	9/22/08	ground

[a] Fifty-one natural origin redds and 55 captive rearing redds (IDFG observations).
[b] Multiple passes (every 2-3 days) conducted by IDFG.
[c] One redd was observed 2.39 km upstream of Pierce Creek; we extended our survey boundary upstream to Moose Creek.
[d] Seven natural origin redds and 17 captive rearing redds (IDFG observations).
[e] Two SBT ISS redd counts and multiple (every 2-3 days) redd counts by IDFG.
[f] Did not walk the entire 34.61 km because no fish could get above barriers.

Appendix A. Table 3. Number, origin, and sex of adult Chinook salmon carcasses collected during 2008 spawning ground surveys on Idaho Supplementation Study (ISS) streams. Streams where no data were collected are designated ND.

Stream	Sex	Unknown	Natural	General production	ISS supplementation
Clearwater R.					
American R.	Male	0	18	43	0
	Female	0	29	62	0
	Unknown	1	0	2	0
	Total	**1**	**47**	**107**	**0**
Big Flat Cr.	Males	0	0	0	0
	Females	0	0	0	0
	Unknown	0	0	0	0
	Total	**0**	**0**	**0**	**0**
Brushy Fk. Cr.	Males	1	1	5	0
	Females	1	1	7	0
	Unknown	0	0	0	0
	Total	**2**	**2**	**12**	**0**
Clear Cr.	Males	0	11	63	0
	Females	0	9	41	0
	Unknown	0	0	1	0
	Total	**0**	**20**	**105**	**0**
Colt Killed Cr.	Males	0	1	1	0
	Females	0	1	5	0
	Unknown	0	0	0	0
	Total	**0**	**2**	**6**	**0**
Crooked Fk. Cr.	Males	0	26	23	0
	Females	0	15	27	0
	Unknown	0	1	1	0
	Total	**0**	**42**	**51**	**0**
Crooked R.	Males	0	11	3	0
	Females	0	6	2	0
	Unknown	1	0	0	0
	Total	**1**	**17**	**5**	**0**
Eldorado Cr.	Males	0	0	0	0
	Females	0	0	0	0
	Unknown	0	0	0	0
	Total	**0**	**0**	**0**	**0**
Fishing Cr.	Males	0	3	1	0
	Females	1	9	5	0
	Unknown	3	0	0	0
	Total	**4**	**12**	**6**	**0**
Legendary Bear Cr.	Males	0	9	6	0
	Females	4	6	18	0
	Unknown	1	0	0	0
	Total	**5**	**15**	**24**	**0**

Appendix A Table 3. Continued.

Stream	Sex	Unknown	Natural	General production	ISS supplementation
Pete King Cr.	Males	0	0	0	0
	Females	0	0	0	0
	Unknown	0	0	0	0
	Total	**0**	**0**	**0**	**0**
Red R.	Males	4	35	104	0
	Females	3	38	121	0
	Unknown	3	0	2	0
	Total	**10**	**73**	**227**	**0**
Salmon R.					
Bear Valley Cr.	Males	0	29	0	0
	Females	0	31	0	0
	Unknown	0	16	0	0
	Total	**0**	**76**	**0**	**0**
EF Salmon R.	Males	0	14	0	0
	Females	0	13	0	0
	Unknown	0	0	0	0
	Total	**0**	**27**	**0**	**0**
Herd Cr.	Males	0	0	0	0
	Females	0	2	0	0
	Unknown	0	2	0	0
	Total	**0**	**4**	**0**	**0**
Lake Cr.	Males	0	67	1	0
	Females	0	59	4	0
	Unknown	2	1	0	0
	Total	**2**	**127**	**5**	**0**
Lemhi R.	Males	0	2	0	0
	Females	0	5	0	0
	Unknown	0	0	0	0
	Total	**0**	**7**	**0**	**0**
Marsh Cr.	Males	0	15	0	0
	Females	0	15	0	0
	Unknown	0	0	0	0
	Total	**0**	**30**	**0**	**0**
NF Salmon R.	Males	0	2	0	0
	Females	0	4	0	0
	Unknown	0	0	0	0
	Total	**0**	**6**	**0**	**0**
Pahsimeroi R.	Males	0	21	0	0
	Females	0	8	0	0
	Unknown	0	0	0	0
	Total	**0**	**29**	**0**	**0**
Secesh R.	Males	0	87	4	0
	Females	1	106	16	0
	Unknown	4	2	0	0
	Total	**5**	**195**	**20**	**0**
SF Salmon R.	Males	1	178	0	0
	Females	0	86	0	0
	Unknown	9	1	0	0
	Total	**10**	**265**	**0**	**0**

Appendix A Table 3. Continued.

Stream	Sex	Unknown	Natural	General production	ISS supplementation
Slate Cr.	Males	0	2	0	0
	Females	0	2	0	0
	Unknown	0	0	0	0
	Total	**0**	**4**	**0**	**0**
Upper Salmon R.	Males	1	113	33	1
	Females	1	12	5	0
	Unknown	0	0	0	0
	Total	**0**	**125**	**38**	**0**
Valley Cr.	Males	0	24	1	0
	Females	0	25	0	0
	Unknown	0	21	0	0
	Total	**0**	**70**	**1**	**0**
WFYF S.R.	Males	0	3	2	0
	Females	0	0	0	0
	Unknown	0	0	0	0
	Total	**0**	**3**	**2**	**0**

Appendix A. Table 4. Summary of adult Chinook salmon passed above weirs as adult treatments to Idaho Supplementation Study (ISS) streams in 2008. 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.

	General production			Supplementation			Natural			Undetermined			
Stream Name	**M**	**F**	**U**	**M**	**F**	**U**	**M**	**F**	**U**	**M**	**F**	**U**	**Total**
Clearwater River Subbasin													
Clear Creek	0	0	0	0	0	0	7	8	0	0	0	0	15
Crooked Fork Creek	0	0	0	0	0	0	30	13	0	0	0	0	43
Crooked River	0	0	0	0	0	0	34	17	10	0	0	0	61
Red River	0	0	0	0	0	0	5	26	14	0	0	0	45
Salmon River Subbasin													
Lake Creek	--	--	--	--	--	--	--	--	--	--	--	--	255
Pahsimeroi River	0	0	0	0	0	0	142	84	0	0	0	0	226
South Fork Salmon River	0	0	0	0	0	0	415	174	0	0	0	0	589
East Fork Salmon River	0	0	0	0	0	0	145	62	0	0	0	0	207
Upper Salmon River	0	0	0	0	0	0	304	85	0	0	0	0	389

Appendix B. 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 2009. 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. Table 4.

	General production			Supplementation			Wild/Natural			Undetermined			
Stream Name	**M**	**F**	**U**	**M**	**F**	**U**	**M**	**F**	**U**	**M**	**F**	**U**	**Total**
Clearwater R. Subbasin													
Clear Creek	136	46	393	0	0	0	2	1	7	0	0	0	585
Crooked Fork Creek	30	28	2	0	0	0	18	2	0	0	0	0	80
Crooked River[a]	0	0	474	0	0	0	23	12	2	0	0	0	511
Red River[a]	0	0	571	0	0	0	12	8	0	0	0	0	591
Salmon R. Subbasin													
Lake Creek[b]	--	--	--	--	--	--	--	--	--	--	--	--	390
Pahsimeroi River	6,144	2,755	0	0	0	0	180	145	0	0	0	0	9,224
South Fork Salmon River	6,798	2,387	0	0	0	0	316	236	0	0	0	0	9,737
East Fork Salmon River	9	3	0	0	0	0	132	61	0	0	0	0	205
Upper Salmon River	1,728	1,828	0	0	0	0	285	162	0	0	0	0	4,003

[a] General production fish trapped at the Crooked River and Red River weirs were ponded together before sex was determined; therefore, most adults were categorized as unknown. Jacks were assumed to be males.

[b] Number based on estimates from a video weir, which operated continuously.

Appendix B. Table 2. Number of Chinook salmon redds counted in survey transects within Idaho Supplementation Study (ISS) streams in 2009 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	135	3.90	3	9/22/09	Ground
Big Flat Cr.	5.2	1	0.19	1	9/7/09	Ground
Brushy Fk. Cr.	16.1	17	1.06	5	9/10/09	Ground
Clear Cr.	20.2	22	1.08	4	9/16/09	Ground
Colt Killed Cr.	50.9	25	0.49	1	9/7/09	Ground
Crooked Fk. Cr.	21.7	71	3.27	6	9/16/09	Ground
Crooked R.	18.8	17	0.90	3	9/23/09	Ground
Eldorado Cr.	3.5	0	0	3	9/16/09	Ground
Fishing Cr.	6.0	7	1.17	3	9/3/09	Ground
Legendary Bear Cr.	6.8	32	4.71	3	9/4/09	Ground
Pete King Cr.	5.8	1	0.17	2	9/10/09	Ground
Red R.	38.5	157	4.08	3	9/21/09	Ground
White Cap Cr.	ND					
Salmon Subbasin						
Alturas Lake Cr.	16.7	4	4.17	1	9/2/09	Aerial
Bear Valley Cr.	35.7	106	2.97	2	9/14/09	Ground
EF Salmon R[a]	15.3	76	2.81	3	9/24/09	Ground
Herd Cr.	16.4	35	2.13	2	9/16/09	Ground
Lake Cr.	20.8	191	9.18	3	9/1/09	Ground
Lemhi R.	51.7	91	1.76	5/2	9/22/09	Ground/Aerial
Marsh Cr.	20.2	42	2.08	4	9/5/09	Ground
NF Salmon R.	36.8	40	1.09	4	9/14/09	Ground
Pahsimeroi R.	25.3	198	7.82	3	9/30/09	Ground
Secesh R.	40.1	234	5.91	3	9/11/09	Ground
SF Salmon R.	24.5	281	11.47	4	9/5/09	Ground
Slate Cr.	34.6	8	0.23	2	9/10/09	Ground
Upper Salmon R.	50.3	99	0.51	1	9/2/09	Aerial
Valley Cr.	33.2	86	2.59	3	9/15/09	Ground
WF Yankee Fork S.R[b]	11.6	19	0.15	3	9/24/09	Ground

[a] Fifty-seven wild/natural and 19 captive rearing (8 captive female and wild/natural male; 1 wild/natural female and captive male; and 10 captive female and captive male) from IDFG observations.

[b] Three wild/natural and 16 captive rearing (4 captive female and wild/natural male; 12 captive female and captive male) from IDFG observations.

Appendix B. Table 3. Number, origin, and sex of adult Chinook salmon carcasses collected during 2009 spawning ground surveys on Idaho Supplementation Study (ISS) streams. Streams where no data were collected are designated ND.

Stream	Sex	Unknown	Natural	General production	ISS supplementation
Clearwater Subbasin					
American R.	Male	0	16	52	0
	Female	0	15	57	0
	Unknown	12	2	5	0
	Total	**12**	**33**	**114**	**0**
Big Flat Cr.	Males	0	0	0	0
	Females	0	0	0	0
	Unknown	0	0	0	0
	Total	**0**	**0**	**0**	**0**
Brushy Fk. Cr.	Males	0	1	0	0
	Females	0	2	0	0
	Unknown	0	0	0	0
	Total	**0**	**3**	**0**	**0**
Clear Cr.	Males	1	1	7	0
	Females	0	0	5	0
	Unknown	0	0	0	0
	Total	**1**	**1**	**12**	**0**
Colt Killed Cr.	Males	0	1	1	0
	Females	0	3	0	0
	Unknown	0	0	0	0
	Total	**0**	**4**	**1**	**0**
Crooked Fk. Cr.	Males	0	11	4	0
	Females	1	5	11	0
	Unknown	0	0	0	0
	Total	**1**	**16**	**15**	**0**
Crooked R.	Males	0	3	0	0
	Females	1	1	0	0
	Unknown	2	0	0	0
	Total	**3**	**4**	**0**	**0**
Eldorado Cr.	Males	0	0	0	0
	Females	0	0	0	0
	Unknown	0	0	0	0
	Total	**0**	**0**	**0**	**0**
Fishing Cr.	Males	0	0	0	0
	Females	0	0	1	0
	Unknown	1	0	0	0
	Total	**1**	**0**	**1**	**0**
Legendary Bear Cr.	Males	0	1	4	0
	Females	1	3	12	0
	Unknown	3	0	1	0
	Total	**4**	**4**	**17**	**0**
Pete King Cr.	Males	0	0	0	0
	Females	0	0	0	0
	Unknown	0	0	0	0
	Total	**0**	**0**	**0**	**0**
Red R.	Males	3	26	126	0
	Females	1	17	116	0
	Unknown	20	1	5	0
	Total	**24**	**44**	**247**	**0**

Appendix B. Table 3. Continued.

Stream	Sex	Unknown	Natural	General production	ISS supplementation
Salmon Subbasin					
Bear Valley Cr.	Males	0	19	0	0
	Females	0	28	0	0
	Unknown	0	6	0	0
	Total	**0**	**53**	**0**	**0**
EF Salmon R.[a]	Males	0	10	0	0
	Females	0	18	0	0
	Unknown	0	1	0	0
	Total	**0**	**29**	**0**	**0**
Herd Cr.	Males	0	0	0	0
	Females	0	1	0	0
	Unknown	0	1	0	0
	Total	**0**	**2**	**0**	**0**
Lake Cr.	Males	0	66	1	0
	Females	0	70	2	0
	Unknown	4	0	0	0
	Total	**4**	**136**	**3**	**0**
Lemhi R.	Males	0	5	0	0
	Females	0	9	0	0
	Unknown	0	0	1	0
	Total	**0**	**11**	**1**	**0**
Marsh Cr.	Males	0	25	0	0
	Females	0	20	0	0
	Unknown	1	0	0	0
	Total	**1**	**45**	**0**	**0**
NF Salmon R.	Males	0	2	1	0
	Females	0	2	0	0
	Unknown	0	0	0	0
	Total	**0**	**4**	**1**	**0**
Pahsimeroi R.	Males	0	12	1	0
	Females	0	11	1	0
	Unknown	1	0	0	0
	Total	**1**	**23**	**2**	**0**
Secesh R.	Males	0	101	2	0
	Females	1	85	5	0
	Unknown	0	2	0	0
	Total	**1**	**188**	**7**	**0**
S.F. Salmon R.	Males	1	149	4	0
	Females	2	134	3	0
	Unknown	3	0	0	0
	Total	**6**	**283**	**7**	**0**
Slate Cr.	Males	0	0	0	0
	Females	0	1	1	0
	Unknown	0	0	0	0
	Total	**0**	**1**	**1**	**0**
Upper Salmon R.	Males	0	75	4	0
	Females	0	22	0	0
	Unknown	0	0	0	0
	Total	**0**	**97**	**4**	**0**

Appendix B. Table 3. Continued.

Stream	Sex	Unknown	Natural	General production	ISS supplementation
Valley Cr.	Males	0	29	0	0
	Females	0	12	0	0
	Unknown	0	5	0	0
	Total	**0**	**46**	**0**	**0**
WFYF S.R[a]	Males	0	0	0	0
	Females	0	0	0	0
	Unknown	0	0	0	0
	Total	**0**	**0**	**0**	**0**

[a] Observations from IDFG.

Appendix B. Table 4. Summary of adult Chinook salmon passed above weirs as adult treatments to Idaho Supplementation Study (ISS) streams in 2009. 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.

	Supplementation			Natural			General production			
	M	F	U	M	F	U	M	F	U	Total
Clearwater Subbasin										
Clear Creek	0	0	0	2	1	7	0	0	0	10
Crooked Fork Creek	0	0	0	18	2	0	0	0	0	20
Crooked River	0	0	0	23	12	2	0	0	0	37
Red River	0	0	0	12	8	0	0	0	0	20
Salmon Subbasin										
Lake Creek	--	--	--	--	--	--	--	--	--	390
Pahsimeroi River	0	0	0	178	144	0	0	0	0	322
South Fork Salmon River	0	0	0	314	232	0	0	0	0	546
East Fork Salmon River	0	0	0	132	61	0	0	0	0	193
Upper Salmon River	0	0	0	285	162	0	0	0	0	447

Appendix C. 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	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	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] Total	2009	33	7	0	0	141	ND
Total	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]	2009	26	1	0	4	150	37
	2008	47	6	0	2	62	19
	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

Appendix C. Continued.

Stream	Year	Marked fish: Number passed	Marked fish: Number recovered	Unmarked fish: Number passed	Unmarked fish: Number recovered	Escapement estimate upstream from weir: Estimate	Escapement estimate upstream from weir: ± 95% Confidence interval
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	2009	322	22	0	2	368	54
	2008	229	29	0	0	229	0
South Fork Salmon River	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	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 D. Juvenile trap operations to collect brood year 2007 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 2008	03/26/2008	06/30/2008	65.5
	Summer 2008	07/01/2008	08/31/2008	55.5
	Fall 2008	09/01/2008	10/22/2008	44.5
	Spring 2009	04/01/2009	06/30/2009	33
	Total	**03/26/2008**	**06/30/2009**	**198.5**
Clear Creek	Spring 2008	03/11/2008	05/15/2008	66
	Spring 2009	04/10/2009	06/05/2009	57
	Total	**03/11/2008**	**06/05/2009**	**123**
Crooked River	Spring 2008	03/27/2008	06/30/2008	55
	Summer 2008	07/01/2008	08/31/2008	56
	Fall 2008	09/01/2008	10/17/2008	1
	Spring 2009	04/06/2009	06/30/2009	59
	Total	**03/27/2008**	**06/30/2009**	**171**
Red River	Spring 2008	04/23/2008	06/30/2008	42
	Summer 2008	07/01/2008	08/31/2008	57
	Fall 2008	09/01/2008	10/22/2008	44
	Spring 2009	04/07/2009	06/30/2009	23
	Total	**04/23/2008**	**06/30/2009**	**166**
Crooked Fork Creek	Spring 2008	03/20/2008	06/30/2008	47
	Summer 2008	07/01/2008	08/31/2008	59
	Fall 2008	09/01/2008	11/04/2008	64.5
	Spring 2009	03/25/2009	06/30/2009	59.5
	Total	**03/20/2008**	**06/30/2009**	**230**
Colt Killed Creek	Spring 2008	03/20/2008	06/30/2008	47
	Summer 2008	07/01/2008	08/31/2008	58.5
	Fall 2008	09/01/2008	11/04/2008	65
	Spring 2009	03/25/2009	06/30/2009	59.5
	Total	**03/20/2008**	**06/30/2009**	**230**
Salmon River Subbasin				
Lake Creek	Spring 2008	04/10/2009	06/05/2009	77
	Summer 2008	**03/11/2008**	**06/05/2009**	60
	Fall 2008	03/27/2008	06/30/2008	65
	Spring 2009	07/01/2008	08/31/2008	75
	Total	09/01/2008	10/17/2008	**277**
Secesh River	Spring 2008	06/05/2008	06/30/2008	25
	Summer 2008	07/01/2008	08/31/2008	60
	Fall 2008	09/01/2008	11/04/2008	63
	Spring 2009	04/24/2009	06/30/2009	47
	Total	**06/05/2008**	**06/30/2009**	**195**
South Fork Salmon River	Spring 2008	02/28/2008	06/30/2008	67
	Summer 2008	07/01/2008	08/31/2008	54
	Fall 2008	09/01/2008	10/23/2008	53
	Spring 2009	02/26/2009	06/30/2009	46.5
	Total	**02/28/2008**	**06/30/2009**	**220.5**
Marsh Creek	Spring 2008	03/22/2008	06/30/2008	87.5
	Summer 2008	07/01/2008	08/31/2008	62
	Fall 2008	09/01/2008	11/06/2008	64.5
	Spring 2009	03/22/2009	06/30/2009	90
	Total	**03/22/2008**	**06/30/2009**	**304**

Appendix D. Continued.

Stream	Season and Calendar Year	Start Date	End Date	Total Days Trapped
	Fall 2008	09/01/2008	11/06/2008	56
	Spring 2009	03/22/2009	06/30/2009	77
	Total	**03/20/2008**	**06/30/2009**	**289.5**
Pahsimeroi River	Spring 2008	02/28/2008	06/30/2008	94.5
	Summer 2008	07/01/2008	08/31/2008	62
	Fall 2008	09/01/2008	12/01/2008	91.5
	Spring 2009	03/03/2009	06/30/2009	76.5
	Total	**03/20/2008**	**06/30/2009**	**324.5**
Lemhi River	Spring 2008	03/12/2008	06/30/2008	106.5
	Summer 2008	07/01/2008	08/31/2008	62
	Fall 2008	09/01/2008	12/08/2008	96
	Spring 2009	03/15/2009	06/30/2009	92
	Total	**03/12/2008**	**06/30/2009**	**349.5**
East Fork Salmon River	Spring 2008	04/02/2008	06/26/2008	73
	Summer 2008	07/01/2008	08/31/2008	62
	Fall 2008	09/01/2008	11/12/2008	73
	Spring 2009	03/17/2009	06/26/2009	66
	Total	**04/02/2008**	**06/26/2009**	**274**
WF Yankee Fork Salmon River	Spring 2008	04/17/2008	06/30/2008	64
	Summer 2008	07/01/2008	08/31/2008	62
	Fall 2008	09/01/2008	11/11/2008	72
	Spring 2009	04/13/2009	06/30/2009	50
	Total	**04/17/2008**	**06/30/2009**	**248**

Appendix E. 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), 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
		age-0 precocial	Nat	15	EFGL
	2007	adult	Sup	17	EFGL
		adult	Nat	138	EFGL
		Parr/presmolt			
		smolt			
	2008	Adult	Nat	224	EFGL
		Parr/presmolt	Nat	68	NR
		Age-0 precocial	Nat	30	NR
		Smolt	Nat	41	NR
Upper Salmon River	2002	adult	Sup	546	NR
		adult	Nat	794	NR
		parr/presmolt	Nat	765	NR
		smolt	Nat	620	NR
	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

Appendix E. Continued.

Sample site	Brood Year	Life Stage	Origin	Number Collected	Archive Location
	2005	adult	Sup	159	NR
		adult	Nat	286	NR
		parr/presmolt	Nat	238	NR
		smolt	Nat	188	NR
		precocial	Nat	15	NR
Upper Salmon River (cont.)	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
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
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
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[a]	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

Appendix E. Continued.

Sample site	Brood Year	Life Stage	Origin	Number Collected	Archive Location
	2008	Adult	Hat[b]	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	100	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
Lemhi River	2004	Smolt	Nat	100	NR
	2005	parr/presmolt	Nat	100	NR
		Smolt	Nat	81	NR
	2006	parr/presmolt	Nat	99	NR
	2007	parr/presmolt	Nat	98	NR
		Smolt	Nat	16	NR
	2008	parr/presmolt	Nat	51	NR
		Smolt	Nat	13	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
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
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
	2008	juvenile	Nat	155	NR
Clear Creek	2004	adult	Sup	57	IFRO
		adult	Nat	61	IFRO
	2005	adult	Sup	8	IFRO
		adult	Nat	8	IFRO

Appendix E. Continued.

Sample site	Brood Year	Life Stage	Origin	Number Collected	Archive Location
	2006	adult	Sup	13	IFRO
		adult	Nat	16	IFRO
		smolt	Nat	39	IFRO
	2007	adult	Sup	1	IFRO
		adult	Nat	18	IFRO
	2008	adult	Nat	7	IFRO
Fishing Creek	2002	adult	H	1	NPTM
	2003	parr	Nat	60	NPTM
		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
		adult	Nat	11	NPTM
		adult	H	6	NPTM
	2009	adult	H	1	NPTM
Lake Creek	2002	juvenile			
		adult	H	7	NPTM
		adult	Nat	144	NPTM
	2003	juvenile			NPTM
		adult	Nat	229	NPTM
	2004	juvenile			NPTM
		adult	H	8	NPTM
		adult	Nat	168	NPTM
		adult	Unk	3	NPTM
	2005	juvenile	Nat	892	NPTM
		adult	Nat	75	NPTM
	2006	juvenile	Nat	800	NPTM
		adult	H	2	NPTM
		adult	Nat	26	NPTM
	2007	juvenile	Nat	900	NPTM
		adult	Nat	33	NPTM
	2008	juvenile	Nat	900	NPTM
		adult	Nat	123	NPTM
		adult	H	5	NPTM
	2009	adult	H	5	NPTM
		adult	Nat	110	NPTM
Legendary Bear Creek	2002	parr	Nat	60	NPTM
		adult	H	12	NPTM
		adult	Nat	14	NPTM
		adult	Unk	1	NPTM
	2003	parr	Nat	60	NPTM
		adult	H	2	NPTM
		adult	Nat	3	NPTM
	2004	parr	Nat	80	NPTM
		adult	H	10	NPTM
		adult	Sup	8	NPTM
		adult	Nat	7	NPTM
		adult	Unk	1	NPTM
	2005	parr	Nat	80	NPTM
		adult	Nat	1	NPTM

Appendix E. Continued.

Sample site	Brood Year	Life Stage	Origin	Number Collected	Archive Location
	2006	parr	Nat	60	NPTM
		adult	H	6	NPTM
		adult	Nat	4	NPTM
	2008	parr	Nat	100	NPTM
		adult	Nat	14	NPTM
		adult	H	19	NPTM
		adult	Unk	1	NPTM
	2009	adult	H	12	NPTM
Secesh River	2002	adult	H	16	NPTM
		adult	Sup	2	NPTM
		adult	Nat	130	NPTM
	2003	adult	H	3	NPTM
		adult	Nat	242	NPTM
	2004	adult	H	2	NPTM
		adult	Nat	111	NPTM
		adult	Unk	1	NPTM
	2005	juvenile	Nat	892	NPTM
		adult	H	1	NPTM
		adult	Nat	76	NPTM
	2006	juvenile	Nat	864	NPTM
		adult	H	2	NPTM
		adult	Nat	34	NPTM
		adult	Unk	1	NPTM
	2007	juvenile	Nat	900	NPTM
		adult	H	8	NPTM
		adult	Nat	47	NPTM
	2008	juvenile	Nat	900	NPTM
		adult	Nat	183	NPTM
		adult	H	19	NPTM
		adult	Unk	1	NPTM
	2009	adult	H	5	NPTM
		adult	Nat	155	NPTM
Slate Creek	2002	adult	H	2	NPTM
		adult	Nat	17	NPTM
		adult	Unk	1	NPTM
	2003	adult	H	1	NPTM
		adult	Nat	1	NPTM
	2008	adult	Nat	4	NPTM
	2009	adult	H	1	NPTM

[a] Ponded fish, not released upstream.
[b] These fish were deliberately passed as unmarked fish, later identified as hatchery-origin by PIT tags.

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