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Brood Year 2004 Cooperative Report

Photo by Nez Perce Tribe

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ABSTRACT

The Idaho Supplementation Studies 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 2004 and include data on the number of adults that returned to collection facilities (escapement), supplementation 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 and passage timing to Lower Granite Dam. Total adult escapement to sites in the Clearwater River basin in 2004 ranged from 160 in Newsome Creek to 657 in the Crooked River. Escapement to sites in the Salmon River streams was generally higher and ranged from 152 in the East Fork Salmon River to 6,189 in the South Fork Salmon River. The number of adults (supplementation and natural) passed over weirs in the two basins also followed this trend with 28 to 154 adults passed at weirs in the Clearwater River subbasin and from 152 to 849 adults passed at weirs in the Salmon River subbasin. Mark-recapture data from carcass collections above study weirs were analyzed where available to provide expanded spawning escapement estimates for all years available. Based on this, we recommend marking all fish passed over study weirs and recording the presence/absence of these marks in all carcass surveys. Redd counts were conducted on all ISS study streams. Redd density in survey transects in the Clearwater River subbasin streams ranged from 0.0 redds/km in White Cap Creek to 8.7 redds/km in Papoose Creek (Legendary Bear Creek). Transects in the Salmon River subbasin streams generally had higher densities of redds and ranged from 0.3 redds/km in Herd Creek to 26.0 redds/km in the South Fork Salmon River. Carcass data were collected concurrently with redd counts except in White Cap and Alturas Lake creeks, which were surveyed from the air. Rotary screw traps were operated on 18 ISS streams to estimate the number and seasonal migration timing of naturally produced juveniles. Migration estimates (based on the recapture of individuals tagged with passive integrated transponder [PIT] tags) totaled 2,163,364 brood year 2004 Chinook salmon juveniles. However, a large number of subtaggable sized juveniles migrated from our study streams. Based on this, we stained a subsample of juveniles with Bismarck Brown dye and released them upstream of the trap to estimate trap efficiency and fry migrant estimates. Trap efficiency generally differed for stained fish <60 mm fork length and PIT tagged fish, but were the same for fish ≥60 mm regardless of mark. However, due to the important survival and migration information provided by PIT tags, they should be used as soon as practical. Cooperators again used the Survival Under Proportional Hazards model to estimate life stage specific survival to Lower Granite Dam. Survival to Lower Granite Dam ranged from 2%-36% for parr, 12%-27% for presmolts and 18%-74% for smolts. Survival to Lower Granite Dam for brood year 2004 Pahsimeroi River age-0 smolts was 19%. We provide historic life-stage survival estimates for all years data are available for all screw trap locations operated by the Idaho Supplementation Studies project.

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INTRODUCTION

Background

The Idaho Salmon Supplementation (ISS) Studies addresses critical uncertainties associated with hatchery supplementation of Chinook salmon *Oncorhynchus tshawytscha* populations (i.e. effects on productivity, persistence, establishment, 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 initially identified two goals: 1) assess the use of hatchery Chinook salmon to increase natural populations in the Salmon River and Clearwater River subbasins, 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).

The ISS program 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). The Bonneville Power Administration (BPA) provides funding for the project. Each agency is responsible for data collection on a subset of the study streams across the Clearwater River 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, supplementation treatments, and stray rates of general production hatchery adults into study streams.

This document summarizes activities conducted by ISS cooperators and data collected between 2004 and 2006 on Chinook salmon that spawned in 2004 and their resulting progeny. 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). Additionally, we provide preliminary data on adult returns for 2005 and 2006 (Appendix A; Appendix B). Beginning with the report covering brood year 2002 activities (Venditti et al. 2005), the ISS now produces single, cooperative reports based on 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, 16 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).

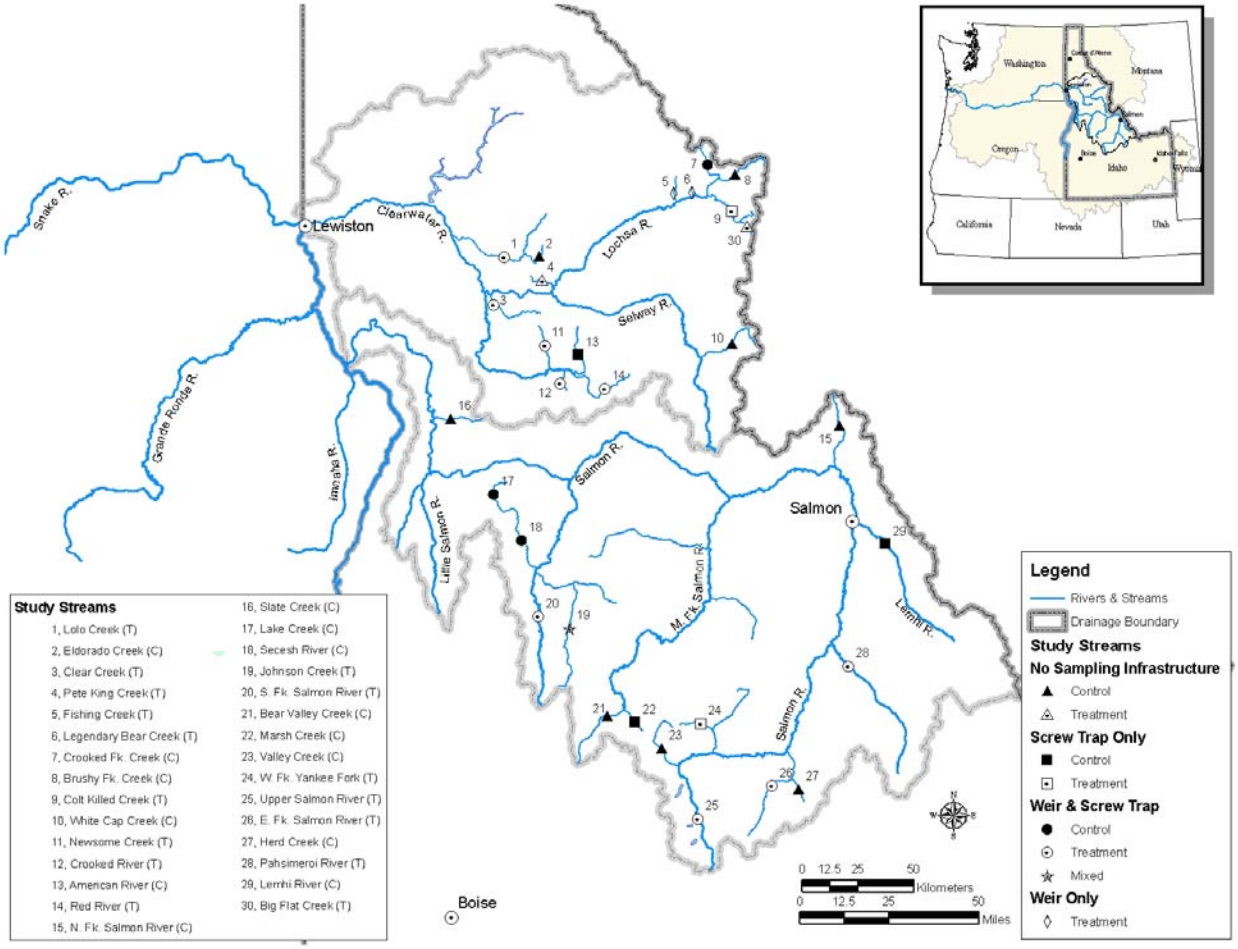

Figure 1. Current treatment and control streams in the Salmon River and Clearwater River subbasins monitored by the four agencies participating in the Idaho Supplementation Studies. Cooperators include the Idaho Department of Fish and Game, Nez Perce Tribe, Shoshone-Bannock Tribe, and the U.S. Fish and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

Fish communities are similar across all 30 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 also present in the upper Salmon River subbasin. Resident fish communities for the Clearwater River and Salmon River subbasins include bull trout *Salvelinus confluentus*, westslope cutthroat trout *O. clarkii*, mountain whitefish

Prosopium williamsoni, redside shiner *Richardsonius balteatus*, northern pikeminnow *Ptychocheilus oregonensis*, sculpin *Cottus* spp., dace *Rhinichthys* spp., suckers *Catostomus* spp., resident rainbow trout *O. mykiss*, and eastern brook trout *S. fontinalis* (Bowles and Leitzinger 1991). However, not all resident 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. We operated adult weirs on the South Fork Salmon River, Pahsimeroi River, upper Salmon River, Crooked River, Red River, East Fork Salmon River, Crooked Fork Creek, Clear Creek, Lolo Creek, Newsome Creek, and Johnson Creek (Figure 1; sites 20, 28, 25, 12, 14, 26, 7, 3, 1, 11, 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). All adults passed above weirs were marked with an operculum punch to allow mark/recapture escapement estimates from carcass recovery data. In most cases, 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 adult enumeration, we recorded fork length (FL), sex, external tags, marks, or fin clips for fish passed above weirs.

We estimated total spawning escapement above program weirs using the ratio of marked (opercle punch) to unmarked carcasses in surveys with a simple Peterson mark–recapture estimator (Everhart and Youngs 1981). Cooperators have produced these estimates for all program years in which adults were marked, and will continue to produce these estimates annually.

In 2004, the Chinook Salmon Adult Abundance Monitoring Project (BPA Project No. 199703000) operated video and acoustic imaging (dual frequency identification sonar or DIDSON) recorders in Lake Creek and the Secesh River, respectively (Kucera et al. 2005). The video weir was located at the mouth of Lake Creek (Figure 1; site 17), and its design allowed fish to pass freely through the weir and in front of a video camera, which recorded fish passages in both directions on video tape. From these tapes, program personnel enumerated fish passages, identified fish to species, examined fish images for fin clips or other marks, and identified age group 1.1 fish (i.e. jacks) based on size. The video footage provided a census of fish that moved into Lake Creek. For sonar image recording, a DIDSON recorder was operated on the Secesh River (Kucera et al. 2005) at river kilometer 30.0 (Figure 1; site 18). The design of the structure allowed fish to pass freely over an artificial substrate past the sonar array. A sonar camera recorded fish passage in both directions on video tape. Program personnel again enumerated fish passages and measured fish lengths (Kucera et al. 2005). The sonar footage also provided a census of fish that moved into the Secesh River. In conjunction with the DIDSON, a video fish counting station was operated 100m upstream of the DIDSON station as an independent method to compare daily net upstream movements and total upstream passage. A regression of the unadjusted daily passages revealed that both methods were highly correlated (r^2 = 0.998) and an adjusted directional regression was identical (Kucera et al. 2005).

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), and surveyed most of these index reaches two, three, or more times with ground counts following standard procedures outlined in IDFG's Redd Count Manual (Hassemer 1993). Multiple ground counts allowed observation either during redd construction or shortly thereafter, thereby aiding in redd identification. Multiple counts also increased 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 Creek, 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 were also surveyed once with an aerial count, and a combination of aerial and ground counts were used for redd surveys on the Lemhi and upper Salmon rivers.

Redds observed during ground counts were flagged, assigned a unique number to avoid duplicate counts, locations recorded using a global positioning system, and designated as complete or in progress. We also recorded the presence of any adult Chinook salmon observed on or near redds. The final redd count was the sum of all new redds observed in each pass, for streams with multiple ground surveys. 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, apparent contribution to spawning, and fish health. Measurements collected included FL and mid-eye to hypural plate length (nearest cm) and sex. We checked carcasses for fin clips, marks, tags, or radio transmitters, and in most cases tested for coded-wire tags (CWT) either by collecting snouts for laboratory analysis or by scanning fish with detectors in the field. We collected dorsal fin rays (Kiefer et al. 2002) and scales for age determination and fin tissue for DNA analysis for ISS (Lutch et al. 2005) and other research programs. 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). 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), we collected kidney and spleen tissues for monitoring viral and bacterial pathogens.

Prespawn mortality is likely affected by several factors, and we tried to document the prevalence of this mortality in several study streams. Prespawn mortality occurs in all spawning streams and is likely influenced by such factors as stream flow, water temperature, natural predators, fish density, and crowding and handling at adult traps. During recent years of relatively higher escapement, 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

River beginning in mid-July. These surveys continued throughout the summer until the final scheduled redd surveys in September.

Supplementation Treatments

In 2004, juvenile treatments ended in all but three ISS study streams (Venditti et al. 2005); however, adult treatments will continue through 2007 as adults return from brood year 2002 juvenile release groups. As supplementation origin adult Chinook salmon returned, they were intercepted at weirs, identified, and passed upstream (in numbers not greater than the natural component) to supplement natural spawning. However, Lolo and Newsome creeks continue to receive juvenile treatments from the Nez Perce Tribal Hatchery (NPTH; Project Number 198335003). Treatment goals for are 150,000 and 75,000 presmolts annually to Lolo and Newsome creeks, respectively, and 100,000 smolts annually to Johnson Creek. Juvenile treatments and will continue in these streams until escapement goals 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 may 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 at the same time as age-1 migrants in the Lemhi and Pahsimeroi rivers were detected at Lower Snake River detection facilities during the same year they were tagged.

Rotary Screw Trap Estimates

We operated rotary screw traps on 18 streams to collect downstream migrating juvenile Chinook salmon. Screw traps were positioned in the thalweg to maximize capture efficiency, and a portion of the fish collected were marked with PIT tags daily to estimate the number of spring, summer, and fall migrants and to estimate the survival of these groups to Lower Granite Dam. Screw trap data also provided additional life history information, such as size during migration and migration timing. We deployed traps as early in the spring as possible and fished them continuously until ice-up in the fall. However, high flows, debris, and ice prevented trap operation on some days. Traps were checked and fish processed at least once daily between 0700 hours and 1830 hours. However, when we anticipated problems (e.g., high water, 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 these times until it was prudent to resume fishing. When a trap day was missed, migration for that day was interpolated by averaging migration estimates from the previous and subsequent day or via linear regression for longer periods.

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 retention time in the anesthetic. A subsample of fish was marked with PIT tags 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 fin clipped or 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, 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 before release.

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 mixed 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 seasonal and brood year specific migration (or population) estimates from rotary screw trap operations using a computer program developed by the University of Idaho (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 routinely 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 emigrant 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 PIT tagged migrants.

Fry Estimates

Bismarck Brown Stain Marking—Fry <60 mm represent a large fraction of the total juvenile migration from some study streams, so 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 in the dye solution and ice packs maintained 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 did not remove more than about 10 fish in any one net load from the trap box and then placed them in a shallow, white tub of water where stained fish were readily identifiable.

We compared the capture efficiency of stained and PIT tagged juveniles released concurrently in four streams to determine the effect of size and mark. We present weekly mark and recapture data for traps on Crooked Fork Creek and the South Fork and upper Salmon rivers for PIT tagged juveniles and two groups of stained fish (<60 mm and ≥60 mm). We compared capture efficiency between groups to produce fry migrant estimates and to determine when PIT tagging alone would represent the entire run passing the trap. In addition, paired releases of juveniles >60 mm Fl were made in the East Fork Salmon River to determine if trap efficiency differed by mark type.

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 Petrosky and Holubetz (1985), Hankin (1986), and Hankin and Reeves (1988).

Streams were first 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 estimates during July and August. To ensure adequate light, we made observations between 1000 and 1800 hours on non-overcast days. Counts were also limited to periods when water temperature was above 10°C (Thurow 1994) unless the stream did not routinely reach this temperature (e.g., the American River). 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. 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.

Migration and Survival

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). Juveniles from the Lemhi and Pahsimeroi rivers display both stream- and ocean-type life histories, and we report survival estimates separately for each group (age-0 and age-1 smolts) within a brood year.

Summer Parr PIT Tagging

When densities were high enough to make collection feasible, we collected natural parr and PIT tagged them in some ISS streams. Juveniles were collected via electrofishing by IDFG, NPT, and NOAAF personnel (PBA program 1991-028-00). We then compared the migration timing and survival of these groups to trap groups. Bowles and Leitzinger (1991) recommended a target goal of 500-700 parr for PIT tagging.

RESULTS

Adult Escapement

Weirs

The number of adult Chinook salmon that escaped to weirs varied among study streams and basins in 2004. Returns were generally lower in the Clearwater River subbasin and ranged from 160 fish in Newsome Creek to 657 in the Crooked River. Escapement to weirs in the Salmon River subbasin ranged between 152 fish in the East Fork Salmon River and 6,189 fish at the South Fork Salmon River weir (Table 1). These numbers are only the counts of fish handled and do not represent estimated escapement. In 2004, we counted 373 adult Chinook salmon at the video weir (Table 1). Since the weir experienced no downtime in 2004, we believe this represents a census of the adults in Lake Creek.

The expanded estimates of spawning escapement above weirs where mark recapture data were collected indicated that none of the weirs was 100% efficient. The number of unmarked carcasses recovered consistently outnumbered marked carcasses in Clear, Crooked Fork, and Lolo creeks, while the majority of carcasses recovered in Newsome Creek and the upper Salmon and South Fork Salmon rivers were marked (Appendix C).

Redd Counts and Carcass Recoveries

The number of redds varied between streams in 2004, but redd densities (redds/km) were generally similar within basins. Redd densities ranged between zero and 9.6 redds/km in both drainages except for the South Fork Salmon River, which had 26 redds/km (Table 2). Redd density in streams in the Clearwater River basin averaged 3.0 redds/km while those in the Salmon River basin (excluding the South Fork Salmon River) averaged 2.8 redds/km. In the Clearwater basin, Legendary Bear Creek (proposed name change for Papoose Creek) had the

highest redd density (8.7 redds/km), while no redds were observed in White Cap Creek (Table 2). Salmon River basin redd densities were highest in the South Fork Salmon River (26.0 redds/km) followed by the Pahsimeroi River at 9.6 redds/km in 2004. Conversely, redd density in the Salmon River drainage was lowest (0.4 redds/km) in Alturas Lake Creek (Table 2).

The ISS cooperators maintained the increased carcass sampled effort described in Lutch (2003). We sampled 1,561 carcasses from the Clearwater basin and 2,848 from the Salmon basin totaling 4,409 carcasses in 2004. This included 2,090, 1,665, and 526 carcasses of natural, general production, and ISS supplementation origin carcasses, respectively. The origin of 138 carcasses could not be determined. The number of carcasses recovered in the Clearwater basin ranged from zero in Big Flat Creek to 380 in Red River, and in the Salmon basin from zero in Slate Creek to 690 in the South Fork Salmon River (Table 3).

Table 1. The number, rearing type, 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 2004. Catch numbers are not expanded and do not represent total escapement. General production adults were generally not passed over the weirs, but see 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	187	248	3	34	59	1	45	34	0	0	0	0	611
Crooked Fork Creek	27	29	0	24	11	0	45	36	0	0	0	0	172
Crooked River	0	0	545	9	5	0	64	33	0	0	1	0	657
Lolo Creek	6	7	0	42	37	0	91	69	0	0	0	4	256
Newsome Creek	14	17	0	31	29	0	39	30	0	0	0	0	160
Red River	0	0	547	2	1	0	17	8	0	0	0	0	575
Salmon River Subbasin													
East Fork Salmon River	3	1	1	0	0[a]	0	82	45	20	0	0	0	152
Johnson Creek	7	9	0	73	38	0	115	96	0	0	0	0	338
Lake Creek	-	-	11	-	-	-	-	-	-	-	-	362	373
Pahsimeroi River	1,207	1,400	0	215	309	0	100	100	0	0	0	0	3,331
South Fork Salmon River	3,070	2,269	0	140	115	0	385	210	0	0	0	0	6,189
Upper Salmon River	868	441	0	127	99	0	329	154	0	0	0	0	2,018

[a] Four female Chinook salmon from the captive rearing program (Project Number 199700100) were released above the EFSR weir for volitional spawning

Table 2. Number of Chinook salmon redds counted in survey transects within Idaho Supplementation Study (ISS) streams in 2004, and summary information on transect length, number of passes, method of data collection, and when redd counting effort was stopped. Cases where 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	144	4.2	3	29-Sept	Ground
Big Flat Cr.	5.2	3	0.6	1	3-Sept	Ground
Brushy Fk. Cr.	16.1	43	2.7	3	16-Sept	Ground
Clear Cr.	20.2	56	2.8	5	20-Sept	Ground
Colt Killed Cr.	50.2	45	0.9	1	7-Sept	Ground
Crooked Fk. Cr.	18.0	100	5.6	3	13-Sept	Ground
Crooked R.	18.8	25	1.3	3	30-Sept	Ground
Eldorado Cr.	3.5	5	1.4	2	22-Sept	Ground
Fishing Cr.	6.0	21	3.5	4	2-Sept	Ground
Legendary Bear Cr.	6.8	59	8.7	3	21-Sept	Ground
Lolo Cr.	43.4	152	3.5	3/2	27-Sept	Ground/Aerial
Newsome Cr.	19.2	36	1.9	3	30-Sept	Ground
Pete King Cr.	5.8	3	0.5	3	9-Sept	Ground
Red R.	38.5	280	7.3	3	28-Sept	Ground
White Cap Cr.	14.0	0	0	1	1-Sept	Aerial
Salmon Subbasin						
Alturas Lake Cr.	14.0	6	0.4	1	7-Sept	Aerial
Bear Valley Cr.	35.7	80	2.2	2	2-Sept	Ground
EF Salmon R.[a]	15.3	21	1.4	3	16-Sept	Ground
Herd Cr.	16.4	5	0.3	3	16-Sept	Ground
Johnson Cr.[b]	40.9	129	3.2	3	16-Sept	Ground
Lake Cr.	20.8	183	8.8	3	9-Sept	Ground
Lemhi R.	51.7	30	0.6	3/2	30-Sept	Ground/Aerial
Marsh Cr.	11.0	32	2.9	3	6-Sept	Ground
NF Salmon R.	36.8	42	1.1	3	17-Sept	Ground
Pahsimeroi R.	24.5	235	9.6	3/1	29-Sept	Ground/Aerial
Secesh R.	40.1	212	5.3	4	22-Sept	Ground
SF Salmon R.[c]	24.5	638	26.0	4	7-Sept	Ground
W.F. Yankee Fork S.R.[d]	11.6	15	1.3	3	16-Sept	Ground
Upper Salmon R.	45.0	133	3.0	1	7-Sept	Aerial
Valley Cr.	33.2	64	1.9	3	15-Sept	Ground
Slate Cr.	15.4	7	0.5	3	24-Sept	Ground

[a] One redd constructed by a female from the IDFG Captive Rearing Program (Program Number 199700100) and a natural origin male—IDFG observations.
[b] Includes data from Burnt Log Creek, a tributary to Johnson Creek.
[c] Includes all possible spawning reaches in Cabin, Warm Lake, Curtis, and Rice creeks.
[d] Four natural and 11 captive rearing redds from IDFG observations.

Table 3. Number, rearing type (GP = general production hatchery, ISS = supplementation), and sex of adult Chinook salmon carcasses collected during 2004 spawning ground surveys on Idaho supplementation study (ISS) streams.

Stream	Sex	Unknown	Natural	GP	ISS	Total
Clearwater R.						
American R.	Males	0	13	26	0	39
	Females	1	10	34	0	45
	Unknown	0	0	0	0	0
	Total	1	23	60	0	84
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	1	0	1
	Females	0	3	0	0	3
	Unknown	0	0	0	0	0
	Total	0	3	1	0	4
Clear Cr.	Males	0	7	21	8	36
	Females	1	14	17	7	39
	Unknown	0	0	0	0	0
	Total	1	21	38	15	75
Colt Killed Cr.	Males	0	0	1	0	1
	Females	0	0	1	0	1
	Unknown	0	0	0	0	0
	Total	0	0	2	0	2
Crooked Fk. Cr.	Males	0	22	3	2	27
	Females	0	14	7	0	21
	Unknown	0	0	0	0	0
	Total	0	36	12	2	50
Crooked R.	Males	0	3	4	0	7
	Females	0	2	6	0	8
	Unknown	1	0	0	0	1
	Total	1	5	10	0	16
Eldorado Cr.	Males	0	0	0	0	0
	Females	0	0	1	0	1
	Unknown	0	0	0	0	0
	Total	0	0	1	0	1
Fishing Cr.	Males	0	0	0	0	0
	Females	0	3	0	0	3
	Unknown	0	0	0	0	0
	Total	0	3	0	0	3
Legendary Bear Cr.	Males	0	3	6	0	9
	Females	3	11	5	0	19
	Unknown	5	0	0	0	5
	Total	8	14	11	0	33
Lolo Cr.	Males	2	24	10	9	45
	Females	4	27	1	30	62
	Unknown	3	0	0	0	3
	Total	9	51	11	39	110
Newsome Cr.	Males	0	7	0	3	10
	Females	0	5	1	1	7
	Unknown	0	0	0	0	0
	Total	0	12	1	4	17

Table 3. Continued.

Stream	Sex	Unknown	Natural	GP	ISS	Total
Clearwater R.						
Pete King Cr.	Males	0	0	0	0	0
	Females	0	2	0	0	2
	Unknown	0	0	0	0	0
	Total	0	2	0	0	2
Red R.	Males	2	35	158	2	197
	Females	5	23	159	1	188
	Unknown	0	0	4	0	4
	Total	7	58	312	3	380
Salmon R.						
Bear Valley Cr.	Males	0	6	0	0	6
	Females	0	12	0	0	12
	Unknown	0	0	0	0	0
	Total	0	18	0	0	18
EF Salmon R.	Males	0	2	0	0	2
	Females	0	6	0	0	6
	Unknown	0	1	0	0	1
	Total	0	9	0	0	9
Herd 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
Johnson Cr.	Males	0	29	0	18	47
	Females	1	23	1	11	36
	Unknown	3	0	0	0	3
	Total	4	52	1	29	86
Lake Cr.	Males	1	85	0	0	86
	Females	3	91	5	0	99
	Unknown	1	0	0	0	1
	Total	5	176	5	0	186
Lemhi R.	Males	0	1	0	0	1
	Females	0	5	0	0	4
	Unknown	0	0	0	0	0
	Total	0	6	0	0	5
Marsh Cr.	Males	0	3	0	0	3
	Females	0	8	0	0	8
	Unknown	0	0	0	0	0
	Total	0	11	0	0	11
NF Salmon R.	Males	0	8	1	0	10
	Females	0	6	0	0	6
	Unknown	0	0	0	0	0
	Total	0	14	1	0	16
Pahsimeroi R.	Males	0	9	0	10	19
	Females	0	14	0	13	27
	Unknown	0	0	0	0	0
	Total	0	23	0	23	46
Secesh R.	Males	2	58	1	0	61
	Females	3	66	1	0	70
	Unknown	5	0	0	0	5
	Total	10	124	2	0	136
SF Salmon R.	Males	12	132	268	38	450
	Females	2	109	88	32	231
	Unknown	9	0	0	0	9
	Total	23	241	356	70	690

Table 3. Continued.

Stream	Sex	Unknown	Natural	GP	ISS	Total
Salmon R.						
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	70	0	41	111
	Females	0	49	0	37	86
	Unknown	0	0	0	0	0
	Total	0	119	0	78	197
Valley Cr.	Males	0	6	0	0	6
	Females	0	13	0	0	13
	Unknown	0	0	0	0	0
	Total	0	19	0	0	19
WFYF S.R.	Males	0	0	0	0	0
	Females	0	4	0	0	4
	Unknown	0	0	0	0	0
	Total	0	4	0	0	4

We observed varying levels of prespawn mortality in all streams where early surveys took place. Prespawn mortality ranged from approximately 2% in Lake Creek to 17% in the South Fork Salmon River. Prespawn mortality was intermediate in Johnson Creek at approximately 10%.

Supplementation Treatments

We passed 28-849 adult Chinook salmon of natural or supplementation origin above weirs on treatment streams to provide prescribed adult treatments (Table 4). Naturally produced fish outnumbered supplementation origin adults at all locations except the Pahsimeroi River in 2004. Surplus supplementation origin adults collected at the Pahsimeroi Hatchery weir were incorporated into the hatchery broodstock.

Supplementation juveniles created from adult broodstock spawning in 2004 were used for continued juvenile treatments in Lolo, Newsome, and Johnson creeks. We met our treatment goal in Lolo Creek with the release of about 161,400 presmolts on July 29 and October 17, 2005. Approximately 68,700 presmolts were released into Newsome Creek on October 4-5, 2005, which was several thousand fish less than prescribed (Table 5), and 90,450 smolts into Johnson Creek on March 15, 2006. Broodstocks for Lolo and Newsome creeks included natural, ISS supplementation, and general production origin adults, and natural and ISS supplementation origin adults in Johnson Creek (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). After this time these results will be reported by other NPT programs (Lolo and Newsom creeks project 198335003) and Johnson Creek (Project number 199604300).

Table 4. Summary of adult Chinook salmon passed above weirs as adult treatments to Idaho Supplementation Study (ISS) streams in 2004. Treatments are broken down by sex (M = male, F = Female, U = unknown) and rearing type (Supplementation–adults derived from ISS broodstocks, Natural–wild/natural adults, Reserve–hatchery general production adults). Catch numbers are not expanded and do not represent total escapement.

	Supplementation		Natural			Reserve			Total
	M	F	M	F	U	M	F	U	
Clearwater Subbasin									
Clear Creek	25	35	32	29	0	0	0	0	121
Crooked River	9	5	64	33	0	0	1	0	112
Red River	2	1	17	8	0	0	0	0	28
Lolo Creek	22	24	66	42	0	0	0	0	154
Newsome Creek	21	18	23	20	0	0	2	0	84
Salmon Subbasin									
S. F. Salmon River	140	115	384	210	0	0	0	0	849
Pahsimeroi River	148	133	100	100	0	0	0	0	481
Upper Salmon River	127	99	329	154	0	0	0	0	709
Johnson Creek	73	38	88	65	0	0	0	0	264
E. F. Salmon River	0	0[a]	82	45	20	3	1	1	152

[a] Four female Chinook salmon from the captive rearing program were released above the weir.

Table 5. Summary information for brood year 2004 juvenile Chinook salmon released into ISS study streams. Juveniles were either the progeny of natural returning adults to the receiving streams or adults sourced from the Powell (POW), Johnson Creek (JC), or Newsome Creek (NEW) traps. Juveniles were reared at the Nez Perce Tribal Hatchery (NPTH) or McCall Fish Hatchery (MCH) and may have been marked with a PIT tag or coded-wire tag (CWT).

Stream	Release dates	Number released	Life stage	Number PIT tagged	Number CWT	Broodstock source	Rearing facility
Lolo/Yoosa Cr.	7/29 & 10/17/05	161,431	Presmolt	13,662	157,742[a]	100% POW	NTPH
Newsome Cr.	10/4&5/05	68,685	Presmolt	5,840	66,899[a]	34% POW 66% NEW	NTPH
Johnson Cr.	03/15/06	90,450	Smolt	12,058	90,450	100% JC	MFH

[a] All fish were implanted with a CWT; number released was based on an average tag retention at 24 days of 97.8%.

Juvenile Production Estimates

Rotary Screw Trap Estimates

We operated screw traps to collect brood year 2004 juvenile Chinook salmon on 18 ISS study streams in 2005 and 2006 for 4,835 trap days. Initial spring trap installation dates ranged from February 28, 2005 on the Pahsimeroi River through May 6, 2005 on the Secesh River, with the majority of traps operational by mid-March 2005. Removal dates ranged from June 22 on Clear Creek to December 5, 2005 on the Lemhi River, with the majority of the traps operational until mid-November (Appendix D). Brood year 2004 juvenile collection exceeded 300 days (mean = 340.5 d) at five traps; 11 traps operated from 200-299 days (mean = 257.5 d); and two traps operated 100-199 days (mean = 150.3 d) (Appendix D). High spring runoff or torrential precipitation events were responsible for most lost trap days. Debris severely damaged the Clear Creek trap, which we removed on April 6, 2006. The trap could not be repaired, so a new one was purchased. Unfortunately, the new trap could not be installed before the end of the trapping season.

Cooperators used data from PIT-tagged fish recaptured at screw traps to estimate the number of brood year 2004 juveniles that migrated from ISS study streams in 2005 and 2006. We collected 283,681 brood year 2004 juvenile Chinook salmon. Summing the migration point estimates for all the traps yielded a total brood year 2004 migration estimate of 2,163,364 juvenile Chinook salmon from ISS study streams. The Salmon River subbasin accounted for the majority of the juvenile production with 242,818 (85.6%) juveniles collected and an estimated 1,918,275 (88.7%) migrants. Migration estimates ranged from 6,099 from Colt Killed Creek to 585,131 from the Secesh River (Table 6).

Table 6. Seasonal and overall migration estimates of brood year 2004 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.

Stream	T/C	Trapping season	Catch	Estimate	L CI	U CI
Clearwater River						
American River	C	Summer 2005	1,775	NE	NE	NE
		Fall 2005	3,697	19,197	14,883	26,227
		Spring 2006	951	9,071	6,985	12,440
		Brood Year Total	4,648	28,268	23,399	36,193
Clear Creek	T	Spring 2005	ND	ND	ND	ND
		Spring 2006	ND	ND	ND	ND
		Brood Year Total	ND	ND	ND	ND
Colt Killed Creek	C	Spring 2005	366	2,489	1,122	5,066
		Summer 2005	34	119	59	224
		Fall 2005	336	1,747	1,361	2,240
		Spring 2006	138	1,744	983	3,169
		Brood Year Total	874	6,099	4,257	8,775
Crooked Fork Creek	C	Spring/Summer 2005	1,609	16,970	10,947	28,217
		Fall 2005	4,379	17,437	16,136	18,829
		Spring 2006	280	3,963	2,428	7,063
		Brood Year Total	6,268	38,370	31,565	46,578
Crooked River	T	Fall 2005	1,010	6,326	4,317	9,845
		Spring 2006	512	1,498	1,269	1,817
		Brood Year Total	1,522	7,824	5,692	11,603
Lolo Creek	T	Spring 2005	ND	ND	ND	ND
		Summer/Fall 2005	9,144	33,288	30,590	36,782
		Spring 2006	1,531	27,144	21,430	34,679
		Brood Year Total	10,675	60,432	53,826	68,985
Newsome Creek	T	Spring 2005	ND	ND	ND	ND
		Summer/Fall 2005	8,556	50,324	42,771	61,034
		Spring 2006	268	1,434	1,043	2,079
		Brood Year Total	8,824	51,758	44,011	61,779
Red River	T	Spring 2005	7,915	NE	NE	NE
		Summer 2005	2,045	23,397	16,299	36,562
		Fall 2005	5,611	23,715	21,630	26,134
		Spring 2006	396	5,226	3,478	8,789
		Brood Year Total	8,052	52,338	44,356	66,220
Salmon River						
Marsh Creek	C	Spring 2005	243	2,066	1,219	3,745
		Summer 2005	1,577	11,243	9,724	13,145
		Fall 2005	1,047	7,457	6,317	8,835
		Spring 2006	213	854	583	1,398
		Brood Year Total	3,080	21,620	19,351	24,359
Pahsimeroi River	T	Spring 2005	3,847	16,229	15,205	17,354
		Summer 2005	95	1,003	526	1,900
		Fall 2005	1,711	13,026	11,436	14,876
		Spring 2006	1,470	6,731	5,954	7,731
		Brood Year Total	7,123	36,989	34,696	39,602

Table 6. Continued.

Stream	T/C	Trapping season	Catch	Estimate	L CI	U CI
Clearwater River						
Upper Salmon River	T	Spring 2005	1,848	41,511	28,764	63,898
		Summer 2005	4,608	79,575	63,785	104,437
		Fall 2005	5,602	98,146	83,435	115,605
		Spring 2006	1,634	17,682	15,297	20,957
		Brood Year Total	13,692	236,914	211,037	274,210
South Fork Salmon	T	Spring 2005 (Fry)	13,510	150,618	122,490	188,743
		Summer 2005	71,803	270,471	244,264	303,713
		Fall 2005	18,976	43,524	40,463	47,162
		Spring 2006	1,589	6,446	5,722	7,275
		Brood Year Total	105,878	471,059	438,220	511,850
Lake Creek	C	Spring 2005	5,062	285,370	161,233	523,701
		Summer 2005	18,342	182,856	144,204	235,380
		Fall 2005	11,856	20,813	19,278	22,541
		Spring 2006	296	1,150	849	1,641
		Brood Year Total	35,556	490,189	354,134	741,863
Secesh River	C	Spring 2005	7,132	189,658	136,833	271,799
		Summer 2005	41,427	326,089	277,275	388,582
		Fall 2005	8,233	65,646	47,665	98,864
		Spring 2006	266	3,738	2,305	6,250
		Brood Year Total	57,058	585,131	506,148	700,383
Johnson Creek	T	Spring 2005	353	5,373	2,975	9,672
		Summer 2005	3,301	15,553	13,276	19,859
		Fall 2005	4,527	9,290	8,837	9,811
		Spring 2006	2,552	9,403	8,418	10,748
		Brood Year Total	10,733	39,619	35,467	46,125
EF Salmon River	T	Spring 2005	1,261	NE	NE	NE
		Summer 2005	551	3,011	2,330	3,856
		Fall 2005	5,532	19,845	18,266	21,653
		Spring 2006	463	2,522	1,990	3,357
		Brood Year Total	7,807	25,491	23,590	27,530
Lemhi River	C	Spring 2005	23	ND	ND	ND
		Summer/Fall 2005	1,409	9,951	8,365	12,024
		Spring 2006	413	1,312	1,077	1,678
		Brood Year Total	1,822	11,263	9,688	13,784
WF Yankee Fork Salmon River	T	Spring 2005	11	NE	NE	NE
		Summer 2005	18	NE	NE	NE
		Fall 2005	39	NE	NE	NE
		Spring 2006	1	NE	NE	NE
		Brood Year Total	69	NE	NE	NE

Results of our combined PIT tagging and staining efforts in three streams suggest that patterns in the recapture rates for the two groups may be stream specific, and both marking techniques will need to continue in order to better estimate juvenile production. In the South Fork Salmon River the recapture rate of stained fish <60 mm and PIT tagged fish differed and their relative recapture rates changed throughout the season. During June (when fish were only stained) recapture efficiency averaged less than 10%, but when fish became available for PIT tagging (July 3 and after), the recapture rate of stained fish increased more than three-fold for

the remainder of the summer period, and was consistently 8%-15% higher than the recapture rate of PIT-tagged fish (Table 7). Overall, for the summer trapping period in the South Fork Salmon River, stained fish <60 mm were recaptured at a higher rate (29.2%) than PIT tagged fish (20.4%; Table 7). Comparing only the July through August period, the recapture rate of stained fish <60 mm was 32.3% compared to 20.4% for PIT tagged fish. During the fall period, this difference reversed, with PIT tagged fish collected at a higher rate (51.9%) than the <60 mm stained group (42.0%). We suspect possible sample size bias affected these results, as we rarely had comparable numbers of fish for each treatment within the same period. There was no difference in the recapture rate of stained fish >60 mm and PIT tagged juveniles during the fall period. However, in the upper Salmon River, stained Chinook salmon <60 mm and PIT tagged juveniles were recaptured at similar rates throughout the season at 4.7% and 4.9%, respectively (Table 7). In Crooked Fork Creek, overall recapture rates for PIT tagged fish (21.9%) were more than twice that of the <60 mm stained group (8.4%; Table 7).

During the BY04 summer/fall trapping season on the EFSR Shoshone Bannock Tribes personnel conducted evaluations of trap efficiencies using two different marking methods: PIT tags and Bismarck Brown stain. From August 24 to November 2, 2005, 27 paired releases occurred above the EFSR trap to evaluate potential differences in trap efficiencies. Release groups consisted of fish greater than 60 mm fork length randomly assigned to marking groups (i.e. PIT tag or stain). Size distributions of the PIT tagged and stained release groups were comparable. Paired releases (n = 27) occurred at the same location above the EFSR screw trap and consisted of groups of 10 to 28 fish (mean 20). Mean trap efficiencies from paired releases were 0.31 and 0.33 for PIT tagged and Bismarck Brown stained fish, respectively. We found no significant difference (paired two-sample *t*-test; P = 0.45) in trap efficiencies between marking groups. Results suggest that Chinook parr/presmolt greater than 60 mm show no significant differences in trap efficiencies when marked with either PIT tags or stain in the EFSR.

Table 7. Comparison of screw trap efficiencies obtained for young-of-year Chinook salmon by marking with Bismarck Brown stain vs. PIT tagging in three study streams in 2005. Fish were generally stained once a week, while PIT tag data were generally obtained from multiple days of releases encompassing the staining date.

	Chinook stained with Bismarck Brown				**Chinook marked with PIT tags**	
Week of evaluation	**Number <60 mm**	**Percent recaptured**	**Number ≥60 mm**	**Percent recaptured**	**Number >60 mm**	**Percent recaptured**
S.F. Salmon R.						
Jun 5	40	5.0	0	—	0	—
Jun 12	300	7.0	0	—	0	—
Jun 19	179	10.6	0	—	0	—
Jun 26	300	10.3	0	—	0	—
Jul 3	300	29.7	0	—	51	21.6
Jul 10	300	28.0	0	—	162	22.8
Jul 17	300	14.0	0	—	145	10.3
Jul 24	296	44.9	0	—	49	28.6
Jul 31	300	38.0	0	—	82	19.5
Aug 7	263	32.7	0	—	47	23.4
Aug 14	158	36.1	0	—	35	20.0
Aug 21	300	29.7	0	—	81	14.8
Aug 28	300	40.0	0	—	50	40.0
Summer Period[a]	**3,336**	**29.2**	**0**	**—**	**702**	**20.4**

Table 7. Continued.

Week of evaluation	Chinook stained with Bismarck Brown				Chinook marked with PIT tags	
Sep 4	210	29.0	45	28.9	0	—
Sep 11	300	41.7	50	74.0	51	58.8
Sep 18	52	55.8	24	29.2	24	58.3
Sep 25	100	58.0	50	50.0	50	52.0
Oct 2	50	58.0	50	48.0	52	46.2
Oct 9	30	33.3	30	70.0	32	46.9
Oct 16	0	—	30	50.0	30	50.0
Fall Period[a]	**742**	**42.0**	**279**	**50.9**	**239**	**51.9**
Upper Salmon						
May 21	19	0	0	—	0	—
May 26	4	25.0	0	—	1	—
May 30	9	11.1	0	—	5	—
Jun 2	19		0	—	6	—
Jun 7	48	4.2	0	—	26	3.8
Jun 11	50		0	—	20	5.0
Jun 13	81	3.7	0	—	31	3.2
Jun 17	46	8.7	0	—	40	5.0
Jun 23	14	21.4	0	—	40	
Jun 27	40	2.5	0	—	161	2.5
June[a]	**298**	**4.4**	**0**	**—**	**324**	**2.8**
Jul 3	40	5.0	0	—	307	8.5
Jul 16	25	4.0	0	—	199	7.0
Jul 28	10	10.0	192	6.7	100	2.0
July[a]	**75**	**5.3**	**192**	**6.7**	**606**	**6.9**
Aug 23	0	0	17	0	97	0
Total[a]	**405**	**4.7**	**209**	**6.7**	**1033**	**4.9**
Crooked Fk.						
7-Jun	19	0	0	—	0	—
12-Jun	14	0	0	—	0	—
17-Jun	14	14.3	0	—	0	—
25-Jun	17	5.9	0	—	0	—
29-Jun	10	10.0	0	—	2	0.0
June[a]	**74**	**5.4**	**0**	**—**	**2**	**0.0**
9-Jul	19	0	0	—	17	5.9
29-Jul	13	0	0	—	22	13.6
July[a]	**32**	**0**	**0**	**—**	**39**	**10.3**
3-Aug	16	25.0	0	—	28	17.9
8-Aug	12	33.3	0	—	72	18.1
15-Aug	15	0	0	—	34	29.4
August[a]	**43**	**18.6**	**0**	**—**	**134**	**20.9**
1-Sep	17	11.8	16	6.3	125	20.8
11-Sep	1	0	19	10.5	129	27.9
September[a]	**18**	**11.1**	**35**	**8.6**	**254**	**24.4**
Total[a]	**167**	**8.4**	**35**	**8.6**	**429**	**21.9**

[a] Period and monthly recapture values are overall values not averages.

Snorkel Estimates

We used snorkel observations to estimate juvenile Chinook salmon densities in 10 study streams in the Clearwater subbasin and eight in the Salmon subbasin. The observed densities were highly variable and ranged from 0.01 to about 45 fish/100 m^2 (Table 8).

Migration and Survival

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. Survival estimates for brood year 2004 juveniles from study stream to Lower Granite Dam were generally higher from the Clearwater subbasin and for groups PIT tagged as smolts (Table 9). Parr, presmolt, and smolt survival averaged 20.3%, 23.0%, and 47.8% in the Clearwater River tributaries and 12.6%, 17.1%, and 47.0% in the Salmon subbasin study streams. Pahsimeroi River age-0 smolt survival to Lower Granite Dam was 19.0%. Insufficient numbers of age-0 smolts from the Lemhi River were tagged to produce estimates. Survival estimates for all brood years for which data are available are found in Appendix E.

Summer Parr Tagging

A total of 8,771 brood year 2004 juvenile Chinook salmon were PIT tagged as summer parr in ISS study streams. Of these, 1,087 were tagged in the Clearwater River subbasin and 7,684 were tagged in the Salmon River subbasin (Table 10). This tagging effort was part of a cooperative effort with NOAA Fisheries (BPA Project Number 1991-028-00).

Table 8. Densities of brood year 2004 juvenile Chinook salmon calculated from direct underwater observations in Idaho Supplementation Study (ISS) streams in 2005.

Stream	Density (No./100 m^2)
Clearwater River Subbasin	
American River	33.28
Clear Creek	0.01
Crooked River	6.11
Eldorado Creek	
Fishing Creek	12.55
Legendary Bear Creek	45.40
Lolo Creek	5.91
Newsome Creek	16.11
Pete King Creek	0.38
Red River	20.57
Salmon River Subbasin	
Slate Creek	0.90
Lake Creek	31.57
Secesh River	14.04
West Fork Yankee Fork Salmon R.	3.90
Valley Creek	4.79
Herd Creek	1.92
Bear Valley Creek	5.93

Table 9. Estimated survival (%) and standard error (SE) to Lower Granite Dam for different life-stages of naturally produced brood year 2004 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	Percent Survival (SE)
Salmon Subbasin			
Lemhi River	Age-0 smolt	23	ND
Lemhi River	Parr	13	0.08 (ND)
Lemhi River	Presmolt	1,367	0.34 (0.02)
Lemhi River	Age-1 smolt	409	0.68 (0.04)
South Fork Salmon River	Parr	1,309	0.10 (0.01)
South Fork Salmon River	Presmolt	3,042	0.15 (0.01)
South Fork Salmon River	Smolt	1,561	0.36 (0.02)
South Fork Salmon River	Yearlings[b]	41	0.10 (0.05)
Marsh Creek	Parr	1,181	0.20 (0.01)
Marsh Creek	Presmolt	937	0.22 (0.02)
Marsh Creek	Smolt	211	0.52 (0.07)
Pahsimeroi River	Age-0 smolt	3,315	0.19 (0.01)
Pahsimeroi River	Parr	259	0.02 (0.02)
Pahsimeroi River	Presmolt	1,736	0.23 (0.02)
Pahsimeroi River	Age-1 smolt	1,461	0.64 (0.02)
Upper Salmon River	Parr	1,828	0.09 (0.01)
Upper Salmon River	Presmolt	2,628	0.16 (0.01)
Upper Salmon River	Smolt	1,634	0.57 (0.03)
East Fork Salmon River	Parr	223	0.18 (0.11)
East Fork Salmon River	Presmolt	60	0.05 (0.03)
East Fork Salmon River	Smolt	173	0.80 (0.20)
West Fork Yankee Fork	Parr	3	ND
West Fork Yankee Fork	Presmolt	20	ND
West Fork Yankee Fork	Smolt	0	ND
Lake Creek	Parr	533	0.09 (0.01)
Lake Creek	Presmolt	780	0.12 (0.01)
Lake Creek	Smolt	273	0.18 (0.05)
Lake Creek	Parr[a]	413	0.08 (0.02)
Lake Creek	Yearlings[b]	216	0.10 (0.05)
Secesh River	Parr	1,322	0.14 (0.01)
Secesh River	Presmolt	881	0.16 (0.02)
Secesh River	Smolt	239	0.18 (0.06)
Secesh River	Parr[a]	1,094	0.09 (0.01)
Secesh River	Yearlings[b]	62	0.19 (0.06)
Clearwater Subbasin			
American River	Parr	ND	ND
American River	Presmolt	638	0.13 (0.02)
American River	Smolt	384	0.37 (0.05)
Clear Creek	Presmolt	ND	ND
Clear Creek	Smolt	ND	ND
Colt Killed Creek	Parr	ND	ND
Colt Killed Creek	Presmolt	364	0.26 (0.03)
Colt Killed Creek	Smolt	139	0.60 (0.10)
Crooked Fork Creek	Parr	300	0.36 (0.13)
Crooked Fork Creek	Presmolt	2,734	0.27 (0.02)
Crooked Fork Creek	Smolt	278	0.48 (0.10)

Table 9. Continued.

Stream	Life-stage	Number tagged	Percent Survival (SE)
Clearwater Subbasin			
Crooked River	Parr	ND	ND
Crooked River	Presmolt	ND	ND
Crooked River	Smolt	80	1.26 (0.97)
Red River	Parr	176	0.15 (0.04)
Red River	Presmolt	1,792	0.16 (0.02)
Red River	Smolt	106	0.23 (0.04)
Legendary Bear	Parr	742	0.12 (0.02)
Legendary Bear	Yearlings[b]	2	ND
Fishing Creek	Parr	345	0.18 (0.03)
Fishing Creek	Yearlings[b]	1	ND
Lolo Creek	Parr	ND	ND
Lolo Creek	Presmolt	3,074	0.30 (0.01)
Lolo Creek	Smolt	1,422	0.74 (0.02)
Newsome Creek	Parr	ND	ND
Newsome Creek	Presmolt	3,203	0.26 (0.01)
Newsome Creek	Smolt	221	0.46 (0.05)

[a] Tagged by BPA Project Number 1991-028-00.
[b] Yearling designation based on subjective comparison of size and appearance compared to other fish caught the same day.

Table 10. Number of brood year 2004 Chinook salmon summer parr PIT tagged in Idaho Supplementation Study (ISS) streams during 2005.

Stream	Number PIT tagged
Clearwater River Subbasin	
Legendary Bear Creek	742
Fishing Creek	345
Salmon River Subbasin	
Bear Valley Creek	961[a]
Herd Creek	447[a]
Lake Creek	413[a]
Lemhi River	696
Marsh Creek	1,577
Secesh River	1,094[a]
South Fork Salmon River	1,009[a]
Valley Creek	1,487[a]

[a] PIT tagged by NOAA Fisheries (BPA Project # 1991-028-00).

DISCUSSION

Adult Escapement

The Peterson mark-recapture spawning escapement expansions demonstrated the importance of performing this work on all stream 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.

Beginning in 2007, far fewer marked (i.e. general production) fish should be present above the weir on the South Fork Salmon River. Because of design limitations, the original weir on this stream could not be operated early enough in seasons with high flow to intercept early returning adults. The IDFG replaced this weir with a new structure that is operable during periods of higher flow. We also believe the new weir will have higher trap efficiency for jacks and other smaller adults, which may have been able to bypass the old structure. However, to verify these assumptions it will be necessary to continue our mark-recapture efforts.

Supplementation Treatments

In 2004, 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 70 adults, which were believed to have constructed 11 redds (Baker et al. 2006). The East Fork Salmon River received four maturing females from this program, and one was known to have constructed a redd (Baker et al. 2006). Additionally, 24,503 eyed-eggs of East Fork Salmon River stock spawned by the captive rearing program were distributed to SBT biologists for placement in in-stream incubators. Tribal biologists monitored the incubators to evaluate the hatch and emergence rates and dates (Baker et al. 2006).

Rotary Screw Trap Estimates

Based on the data collected during this year of concurrent releases of stained and PIT tagged juvenile Chinook salmon of various sizes, the necessity of releasing stained groups will need to be evaluated on a case-by-case basis. The South Fork Salmon River and Crooked Fork Creek appear to be two cases where staining juveniles too small to PIT tag will provide important information. In these streams the number of juvenile Chinook salmon <60 mm moving past the trap in the summer represent a large fraction of the total migration, both during that season and for the year. The disparity between recapture rates for the two groups indicates that the PIT tagged groups are not representative of the entire migrant population moving past the traps. Continued releases of stained fish at these sites will be necessary to better estimate juvenile migration at these locations. At the upper Salmon River trap, however, the similarity between recapture rates between the two size classes may make staining. One possible reason for this similarity may be that most of the subtaggable sized fish collected at the upper Salmon River trap are between 50 and 60 mm FL. In this case, it appears the PIT tagged group is representative of the entire population moving past the trap.

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APPENDICES

Appendix A. Table 1. The number, rearing type, 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 2005. Catch 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	129	118	0	6	6	0	8	2	0	0	0	0	269
Crooked Fork Creek	8	3	41	2	3	0	16	11	1	0	0	0	85
Crooked River	P	E	N	D	I	N	G						
Lolo Creek	0	0	0	5	6	0	26	18	0	0	0	0	55
Newsome Creek	9	2	0	12	11	0	17	9	0	0	0	0	60
Red River	P	E	N	D	I	N	G						
Salmon River Subbasin													
East Fork Salmon River[a]	0	0	0	0	0	0	42	21	0	0	0	0	63
Johnson Creek	2	1	0	35	28	0	43	13	0	0	0	0	122
Lake Creek[b]	—	—	—	—	—	—	—	—	—	—	—	—	140
Pahsimeroi River	405	499	0	157	281	0	162	166	0	0	0	0	1,670
South Fork Salmon River	1,485	1,344	0	118	13	0	137	117	0	0	0	0	3,214
Upper Salmon River	593	515	0	103	56	0	167	119	0	0	0	0	1,553

[a] Data from IDFG Captive Rearing Program (BPA Project Number 1997-001-00).
[b] Data from a video weir that did not allow origin to be determined.

Appendix A. Table 2. Summary of adult Chinook salmon passed above weirs as adult treatments to Idaho Supplementation Study (ISS) streams in 2005. Treatments are broken down by sex and rearing type (Supplementation–adults derived from ISS broodstocks, Natural–wild/natural adults, Reserve–hatchery general production adults). Catch 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	4	4	0	6	3	0	0	0	0	17
Crooked River	0	0	0	3	0	0	14	8	1	0	0	0	26
Lolo Creek	0	0	0	1	3	0	17	8	0	0	0	0	29
Newsome Creek	1	0	0	7	4	0	9	3	0	0	0	0	24
Red River	0	0	0	0	0	1	7	5	0	0	0	0	13
Salmon River Subbasin													
East Fork Salmon River	0	0	0	0	0	0	42	21	0	0	0	0	63
Johnson Creek	0	0	0	35	28	0	43	13	0	0	0	0	119
Pahsimeroi River	0	0	0	140	165	0	162	166	0	0	0	0	633
South Fork Salmon River	0	0	0	116	13	0	136	117	0	0	0	0	382
Upper Salmon River	0	0	0	103	56	0	167	119	0	0	0	0	445

Appendix A. Table 3. Number of Chinook salmon redds counted in survey transects within Idaho Supplementation Study (ISS) streams in 2005 and summary information on transect length, number of passes, method of data collection, and when redd counting effort was stopped.

Stream	Survey length (km)	Redds	Redds per km	Passes	Last pass	Survey method
Clearwater Subbasin						
American R.	34.6	31	0.9	3	09/21/05	Ground
Big Flat Cr.	5.2	2	0.4	1	09/06/05	Ground
Brushy Fk. Cr.	16.1	14	0.9	3	09/18/05	Ground
Clear Cr.	20.2	12	0.6	5	09/14/05	Ground
Colt Killed Cr.	50.2	11	0.2	1	09/07/05	Ground
Crooked Fk. Cr.	18.0	48	2.7	3	09/17/05	Ground
Crooked R.	18.8	5	0.3	3	09/22/05	Ground
Eldorado Cr.	9.6	0	0	3	09/19/05	Ground
Fishing Cr.	6.0	2	0.3	3	09/16/05	Ground
Legendary Bear Cr.	6.8	8	1.2	3	09/16/05	Ground
Lolo Cr.	54.6	45	0.82	3	09/15/05	Ground
Newsome Cr.	19.2	7	0.36	3	09/13/05	Ground
Pete King Cr.	5.8	0	0	3	08/31/05	Ground
Red R.	38.5	58	1.5	3	09/21/05	Ground
White Cap Cr.	19.8	0	0	1		Air
Salmon Subbasin						
Alturas Lake Cr.	16.7	8	0.5	1	09/05/05	Air
Bear Valley Cr.	35.7	94	2.6	3	09/13/05	Ground
EF Salmon R.	15.3	15[a]	1.0	3	09/09/05	Ground
Herd Cr.	16.4	10	0.6	3	09/15/05	Ground
Johnson Cr.	40.9	55	1.3	4	09/16/05	Ground
Lake Cr.	20.8	79	3.8	3	09/07/05	Ground
Lemhi R.	51.7	50	1.0	3/1	09/12/05	Ground/Air
Marsh Cr.	11	21	1.9	4	09/17/05	Ground
NF Salmon R.	36.8	20	0.5	3	09/09/05	Ground
Pahsimeroi R.	24.5	273	11.1	3	09/29/05	Ground
Secesh R.	40.1	126	3.1	3	09/22/05	Ground
SF Salmon R.	24.5	171	7.0	4	09/08/05	Ground
W.F. Yankee Fork S.R.	11.6	7[b]	0.6	3	09/06/05	Ground
Upper Salmon R.	50.3	136	2.7	1	09/05/05	Air
Valley Cr.	33.2	16	.05	3	09/05/05	Ground
Slate Cr.	34.6	2	0.1	3	09/15/05	Ground

[a] Eight redds constructed by IDFG Captive Rearing Program (Project Number 199700100) adults (from IDFG observations).

[b] Five redds constructed by natural origin adults, two by IDFG Captive Rearing program adults (from IDFG observations.

Appendix A. Table 4. Number, rearing type, and sex of adult Chinook salmon carcasses collected during 2005 spawning ground surveys on Idaho Supplementation Study (ISS) streams. Streams where no data was collected (e.g., redds counted via aerial surveys) are designated ND.

Stream	Sex	Unknown	Natural	General production	ISS supplementation
Clearwater R.					
American R.	Male	0	4	5	0
	Female	0	5	8	0
	Unknown	0	0	1	0
	Total	0	9	14	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	0	0	0
	Females	0	0	0	0
	Unknown	0	0	0	0
	Total	0	0	0	0
Clear Cr.	Males	0	1	7	1
	Females	0	1	2	1
	Unknown	0	0	0	0
	Total	0	2	9	2
Colt Killed Cr.	Males	0	0	0	0
	Females	0	0	0	0
	Unknown	0	0	0	0
	Total	0	0	0	0
Crooked Fk. Cr.	Males	0	1	4	0
	Females	0	1	3	0
	Unknown	0	0	0	0
	Total	0	2	7	0
Crooked R.	Males	0	4	0	0
	Females	0	6	0	0
	Unknown	3	0	0	0
	Total	3	10	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	0	0
	Unknown	0	0	0	0
	Total	0	0	0	0
Legendary Bear Cr.	Males	0	1	0	0
	Females	0	0	0	0
	Unknown	0	0	0	0
	Total	0	1	0	0
Lolo Cr.	Males	3	8	0	0
	Females	1	16	0	1
	Unknown	7	0	0	0
	Total	11	24	0	1
Newsome Cr.	Males	0	3	1	1
	Females	0	2	0	3
	Unknown	2	0	0	0
	Total	2	5	1	4

Appendix A. Table 4. 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	0	3	20	0
	Females	0	10	23	0
	Unknown	3	0	1	0
	Total	3	13	44	0
Salmon R.					
Bear Valley Cr.	Males	0	12	0	0
	Females	0	26	0	0
	Unknown	0	19	0	0
	Total	0	57	0	0
EF Salmon R.	Males	0	1	0	0
	Females	0	6	0	0
	Unknown	0	0	0	0
	Total	0	7	0	0
Herd Cr.	Males	0	0	0	0
	Females	0	0	0	0
	Unknown	0	1	0	0
	Total	0	1	0	0
Johnson Cr.	Males	0	36	0	0
	Females	0	9	2	0
	Unknown	1	0	0	0
	Total	1	45	2	0
Lake Cr.	Males	0	34	0	0
	Females	0	41	0	0
	Unknown	0	0	0	0
	Total	0	75	0	0
Lemhi R.	Males	0	1	0	0
	Females	0	7	0	0
	Unknown	0	0	0	0
	Total	0	8	0	0
Marsh Cr.	Males	0	2	0	0
	Females	0	9	0	0
	Unknown	0	11	0	0
	Total	0	0	0	0
NF Salmon R.	Males	0	4	0	0
	Females	0	3	0	0
	Unknown	0	0	0	0
	Total	0	7	0	0
Pahsimeroi R.	Males	0	22	0	14
	Females	0	22	0	40
	Unknown	0	0	0	0
	Total	0	44	0	54
Secesh R.	Males	0	40	0	0
	Females	1	40	1	0
	Unknown	2	1	0	0
	Total	3	81	1	0
SF Salmon R.	Males	3	65	3	41
	Females	0	56	0	5
	Unknown	0	1	0	1
	Total	3	122	3	47

Appendix A. Table 4. Continued.

Stream	Sex	Unknown	Natural	General production	ISS supplementation
Slate Cr.	Males	0	0	0	0
	Females	0	0	0	0
	Unknown	0	0	0	0
	Total	0	0	0	0
Upper Salmon R.	Males	0	21	0	16
	Females	1	39	0	17
	Unknown	3	0	0	0
	Total	4	60	0	33
Valley Cr.	Males	0	5	0	0
	Females	0	12	0	0
	Unknown	0	0	0	0
	Total	0	17	0	0
WFYF S.R.	Males	0	0	0	0
	Females	0	4	0	0
	Unknown	0	0	0	0
	Total	0	0	0	0

Appendix B. Table 1. The number, rearing type, 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 2006. Catch numbers are not expanded and do not represent total escapement.

	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	219	387	0	18	27	0	8	8	0	0	0	0	667
Crooked Fork Creek	41	40	8	0	0	0	14	10	0	0	0	0	113
Crooked River[a]	0	0	443	0	0	1	3	3	2	0	0	0	452
Lolo Creek	2	5	0	20	16	0	44	30	0	0	0	0	117
Newsome Creek	17	33	0	2	1	0	13	13	0	0	0	0	79
Red River[a]	0	0	675	1	4	1	15	12	9	0	0	0	719
Salmon R. Subbasin													
Johnson Creek	9	4	0	51	21	0	70	32	0	0	0	0	187
Lake Creek[b]													
Pahsimeroi River	225	291	0	54	66	0	50	47	0	0	0	0	733
South Fork Salmon River	865	698	0	156	169	0	170	93	0	0	0	0	2,151
East Fork Salmon River	0	0	0	0	0	0	59	21	0	0	0	0	80
Upper Salmon River	175	191	0	55	44	0	207	87	0	0	0	0	759

[a] General production catch at Crooked and Red River weirs combined for South Fork Clearwater brood, not sexed until spawning at Clearwater Hatchery.

[b] Number based on estimates from a video weir, which operated continuously, and can be considered a census count.

Appendix B. Table 2. Summary of adult Chinook salmon passed above weirs as treatments to Idaho Supplementation Study (ISS) streams in 2006. Treatments are broken down by sex (M = male, F = Female, U = unknown) and rearing type (Supplementation–adults derived from ISS broodstocks, Natural–wild/natural adults, Reserve–hatchery general production adults). Catch 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	6	8	0	7	9	0	0	0	0	30
Crooked River	0	0	1	3	3	2	0	0	0	9
Red River	1	4	1	15	12	9	0	0	0	42
Lolo Creek[a]	9	2	0	28	3	0	0	0	0	42
Newsome Creek[b]	1	0	0	8	2	0	0	0	0	11
Salmon Subbasin										
South Fork Salmon River	107	138	0	168	92	0	0	0	0	505
Pahsimeroi River	36	40	0	50	47	0	0	0	0	173
Johnson Creek	51	21	0	38	4	0	0	0	0	114
Upper Salmon River	55	44	0	207	87	0	0	0	0	393

[a] 25 males and 1 female returned to Lolo Creek on 08/29/06. These fish were originally collected as broodstock, but were surplus to hatchery needs.

[b] Eight males returned to Newsome Creek on 08/29/06. These fish were originally collected as broodstock, but were surplus to hatchery needs.

Appendix B. Table 3. Number of Chinook salmon redds counted in survey transects within Idaho Supplementation Study (ISS) streams in 2006 and summary information on transect length, number of passes, method of data collection, and when redd counting effort was stopped. 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	57	1.65	3	09/22/06	Ground
Big Flat Cr.	3.0	0	0	1	09/14/06	Ground
Brushy Fk. Cr.	16.1	4	0.2	5	09/11/06	Ground
Clear Cr.	20.2	42	2.08	4	09/13/06	Walk
Colt Killed Cr.	31.6	9	0.3	1	09/16/06	Ground
Crooked Fk. Cr.	18.0	29	1.6	5	09/13/06	Ground
Crooked R.	18.8	2	0.11	3	09/20/06	Ground
Eldorado Cr.	ND	ND	ND	ND		
Fishing Cr.	6.0	7	1.17	3	09/13/06	Walk
Legendary Bear Cr.	6.8	8	1.18	3	09/14/06	Walk
Lolo Cr.	ND	ND	ND	ND		
Newsome Cr.	ND	ND	ND	ND		
Pete King Cr.	5.8	1	0.17	3	9/06/06	Walk
Red R.	38.5	64	1.66	3	9/19/06	Ground
White Cap Cr.	ND	ND	ND	ND		
Salmon Subbasin						
Alturas Lake Cr.	16.7	1	0.06	1	09/05/06	Aerial
Bear Valley Cr.	35.7	38	1.06	3	09/27/06	Walk
EF Salmon R.	15.3	17[a]	1.11	3	09/13/06	Walk
Herd Cr.	16.4	13	0.79	3	09/28/06	Walk
Johnson Cr.	41.4	38	0.92	10	09/13/06	Walk
Lake Cr.	20.8	39	1.88	4	09/06/06	Walk
Lemhi R.	51.7	38	0.73	3	09/20/06	Walk/Aerial
Marsh Cr.	11.0	36	3.3	4	09/12/06	Ground
NF Salmon R.	36.8	21	0.57	4	09/12/06	Walk
Pahsimeroi R.	19.2	64	3.33	3	09/29/06	Ground
Secesh R.	40.1	36	0.90	3	09/25/06	Walk
SF Salmon R.	24.5	310	12.65	4	09/06/06	ground
Slate Cr.	34.6	3	0.09	3	09/20/06	Walk
Upper Salmon R.	50.3	92	1.8	1	09/05/06	Aerial
Valley Cr.	33.2	23	0.69	4	09/18/06	Walk
WF Yankee Fork S.R.	11.6	14[b]	1.21	2	09/19/06	Walk

[a] Four natural and 13 captive rearing redds from IDFG observations.
[b] Four natural and eight captive rearing redds from IDFG observations.

Appendix B. Table 4. Number, rearing type, and sex of adult Chinook salmon carcasses collected during 2006 spawning ground surveys on Idaho Supplementation Study (ISS) streams.

Stream	Sex	Unknown	Natural	General production	ISS supplementation
American R.	Male	0	2	15	0
	Female	0	1	22	0
	Unknown	1	0	1	0
	Total	1	3	38	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	0	0	0
	Females	0	0	0	0
	Unknown	0	0	0	0
	Total	0	0	0	0
Clear Cr.	Males	0	7	6	2
	Females	0	2	12	2
	Unknown	0	0	1	0
	Total	0	9	19	4
Colt Killed Cr.	Males	0	0	0	0
	Females	0	0	2	0
	Unknown	0	0	0	0
	Total	0	0	2	0
Crooked Fk. Cr.	Males	0	5	3	0
	Females	0	3	11	0
	Unknown	0	0	0	0
	Total	0	8	14	0
Crooked R.	Males	0	0	1	0
	Females	0	0	0	0
	Unknown	0	1	0	0
	Total	0	1	1	0
Eldorado Cr.	Males	0	0	0	0
	Females	0	0	0	0
	Unknown	1	0	0	0
	Total	1	0	0	0
Fishing Cr.	Males	0	0	0	0
	Females	0	0	0	0
	Unknown	0	0	0	0
	Total	0	0	0	0
Legendary Bear Cr.	Males	0	1	0	0
	Females	0	3	0	0
	Unknown	0	1	0	0
	Total	0	5	0	0
Lolo Cr.	Males	1	1	0	1
	Females	1	1	0	0
	Unknown	1	0	0	0
	Total	3	2	0	1
Newsome Cr.	Males	0	1	2[a]	0
	Females	0	0	0	0
	Unknown	0	0	0	0
	Total	0	1	2[a]	0

Appendix B. Table 4. 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	1	12	46	0
	Females	1	17	34	0
	Unknown	3	1	1	0
	Total	5	30	81	0
Bear Valley Cr.	Males	0	5	0	0
	Females	0	5	0	0
	Unknown	0	6	0	0
	Total	0	16	0	0
EF Salmon R.	Males	0	0	0	0
	Females	0	1	0	0
	Unknown	0	0	0	0
	Total	0	1	0	0
Herd Cr.	Males	0	0	0	0
	Females	0	1	0	0
	Unknown	0	1	0	0
	Total	0	2	0	0
Johnson Cr.[b]	Males	3	20[c]	0	25
	Females	0	6	0	9
	Unknown	1	0	0	0
	Total	4	26	0	34
Lake Cr.	Males	0	12	2	0
	Females	0	15	0	0
	Unknown	1	0	0	0
	Total	1	27	2	0
Lemhi R.	Males	0	1	0	0
	Females	0	1	0	0
	Unknown	0	0	0	0
	Total	0	2	0	0
Marsh Cr.	Males	0	14	0	0
	Females	0	18	0	0
	Unknown	1	0	0	0
	Total	1	32	0	0
NF Salmon R.	Males	0	4	0	0
	Females	0	6	0	0
	Unknown	0	0	0	0
	Total	0	10	0	0
Pahsimeroi R.	Males	0	10	0	8
	Females	0	2	0	2
	Unknown	0	0	0	0
	Total	0	12	0	10
Secesh R.	Males	0	22	0	0
	Females	1	10	1	0
	Unknown	0	0	0	0
	Total	1	32	1	0
S.F. Salmon R.	Males	6	33	5	15
	Females	2	28	10	50
	Unknown	6	0	0	0
	Total	14	61	15	65

Appendix B. Table 4. Continued.

Stream	Sex	Unknown	Natural	General production	ISS supplementation
Slate Cr.	Males	0	0	0	0
	Females	0	0	0	0
	Unknown	0	0	0	0
	Total	0	0	0	0
Upper Salmon R.	Males	0	0	83	26
	Females	0	0	20	22
	Unknown	0	0	0	0
	Total	0	0	103	48
Valley Cr.	Males	0	5	0	0
	Females	0	4	0	0
	Unknown	0	2	0	0
	Total	0	11	0	0
WFYF S.R.	Males	0	2	0	0
	Females	0	3	0	0
	Unknown	0	1	0	0
	Total	0	6	0	0

[a] Carcasses resultant from Rapid River Hatchery surplus adult outplant in the South Fork Clearwater River approximately 3.1 km downstream from the mouth of Newsome Creek.

[b] Numbers include Burnt Log Creek.

[c] Number includes one yearling Chinook salmon.

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 where 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	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	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]	2006	16	3	0	4	37	29
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]	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							
South Fork Salmon River	2006	505	119	0	26	615	45
	2005	382	165	0	10	405	11
	2004	849	216	0	474	2,712	259
	2003	2,218	1,174	0	121	2,447	29
Upper Salmon River	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.

Appendix D. Juvenile trap operations to collect BY04 spring/summer Chinook salmon in Idaho Supplementation Study 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, and 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 2005	03/16/05	06/30/05	96.5
	Summer 2005	07/01/05	08/31/05	45.5
	Fall 2005	09/01/05	10/31/05	49.5
	Spring 2006	03/29/06	06/30/06	74.5
	Total			266
Clear Creek	Spring 2005	03/03/05	06/22/05	94
	Spring 2006	03/17/06	04/06/06	19
	Total	03/17/06	04/06/06	113
Crooked River	Spring 2005	03/16/05	06/30/05	74
	Summer 2005	07/01/05	08/31/05	37.5
	Fall 2005	09/01/05	10/31/05	8
	Spring 2006	04/11/06	06/30/06	68
	Total			187.5
Lolo Creek	Spring 2005	03/11/05	06/30/05	90.0
	Summer 2005	07/01/05	08/31/05	0.0
	Fall 2005	09/01/05	09/14/05	71.0
	Spring 2006	03/16/06	06/30/06	96.0
	Total			257.0
Newsome Creek	Spring 2005	03/10/05	06/30/05	91.0
	Summer 2005	07/01/05	08/31/05	0.0
	Fall 2005	09/01/05	11/21/05	51.5
	Spring 2006	04/12/06	06/30/06	73.0
	Total			215.5
Red River	Spring 2005	03/16/05	06/30/05	77
	Summer 2005	07/01/05	08/31/05	56
	Fall 2005	09/01/05	10/31/05	58.5
	Spring 2006	04/11/06	06/30/06	62
	Total			253.5
Crooked Fork Creek	Spring 2005	03/23/05	06/30/05	81
	Summer 2005	07/01/05	08/31/05	60.5
	Fall 2005	09/01/05	11/01/05	62
	Spring 2006	03/22/06	06/30/06	70
	Total	03/23/05	06/30/06	279.5
Colt Killed Creek	Spring 2005	03/23/05	06/30/05	79
	Summer 2005	07/01/05	08/31/05	62
	Fall 2005	09/01/05	11/01/06	61
	Spring 2006	03/22/06	06/30/06	72.5
	Total	03/23/05	06/30/06	279.5
Salmon River Subbasin				
Johnson Creek	Spring 2005	04/14/05	06/30/05	71
	Summer 2005	07/01/05	08/31/05	62
	Fall 2005	09/01/05	11/21/05	78
	Spring 2006	03/01/06	06/30/06	99
	Total	04/14/05	06/30/06	310

Appendix D. Continued.

Stream	Season and Calendar Year	Start Date	End Date	Total Days Trapped
Lake Creek	Spring 2005	04/30/05	06/30/05	60
	Summer 2005	07/01/05	08/31/05	62
	Fall 2005	09/01/05	11/05/05	66
	Spring 2006	04/06/06	06/30/06	72
	Total	04/30/05	06/30/06	260
Secesh River	Spring 2005	05/06/05	06/30/05	54
	Summer 2005	07/01/05	08/31/05	62
	Fall 2005	09/01/05	11/05/05	66
	Spring 2006	04/20/06	06/30/06	56
	Total	05/06/05	06/30/06	237
South Fork Salmon River	Spring 2005	03/03/05	06/30/05	90
	Summer 2005	07/01/05	08/31/05	62
	Fall 2005	09/01/05	11/03/05	64
	Spring 2006	03/08/06	06/30/06	45
	Total	03/03/05	06/30/06	261
Marsh Creek	Spring 2005	03/21/05	06/30/05	98
	Summer 2005	07/01/05	08/31/05	62
	Fall 2005	09/01/05	11/05/05	66
	Spring 2006	03/18/06	06/30/06	101
	Total	03/21/05	06/30/06	327
Upper Salmon River	Spring 2005	03/21/05	06/30/05	99.5
	Summer 2005	07/01/05	08/31/05	62
	Fall 2005	09/01/05	11/09/05	70
	Spring 2006	03/18/06	06/30/06	84
	Total	03/21/05	06/30/06	315.5
Pahsimeroi River	Spring 2005	02/28/05	06/30/05	105.5
	Summer 2005	07/01/05	08/31/05	63
	Fall 2005	09/01/05	11/27/05	88.5
	Spring 2006	02/28/06	06/30/06	109
	Total	02/28/05	06/30/06	366
Lemhi River	Spring 2005	03/04/05	06/30/05	117
	Summer 2005	07/01/05	08/31/05	61.5
	Fall 2005	09/01/05	12/05/05	94.5
	Spring 2006	03/10/06	06/30/06	111
	Total	03/04/05	06/30/06	384
East Fork Salmon River	Spring 2005[a]	03/17/05	06/14/05	90
	Summer 2005[a]	07/06/05	08/31/05	57
	Fall 2005	09/01/05	11/05/05	66
	Spring 20062	03/15/06	06/30/06	72
	Total	03/17/05	06/30/06	285
WF Yankee Fork Salmon River	Spring 2005	04/05/05	06/30/05	87
	Summer 2005[a]	07/06/05	08/31/05	57
	Fall 2005	09/01/05	11/06/05	66
	Spring 2006[b]	04/27/06	06/30/06	28
	Total	04/05/05	6/30/06	238

[a] The WFYF screw trap was pulled from 7/01/05 to 7/05/05 and the EFSR screw trap was pulled from 6/15/05 to 7/05/05 due to high flows and personnel issues.

[b] The WFYF screw trap was pulled from 5/15/06 to 6/22/06 and the EFSR screw trap was pulled from 5/15/06 to 6/21/06 due to high flows.

Appendix E. Life stage specific survival estimates for PIT tagged juvenile Chinook salmon from Idaho Supplementation Studies streams for brood year (BY) 1991 through 2004. Survival and standard error (SE) estimates are from tagging location (generally a screw trap) to Lower Granite Dam and were generated using the SURPH2 model. All fish tagged were naturally produced unless otherwise noted. Groups with insufficient detections to compute survival and SE are designated by (***).

Trap	BY	Life Stage	Number Tagged	Survival	SE
Upper Salmon River	1991	presmolt	746	0.10	0.03
Upper Salmon River	1991	smolt	153	0.67	0.24
Upper Salmon River	1992	presmolt	100	0.11	0.03
Upper Salmon River	1992	smolt	231	0.31	0.04
Upper Salmon River	1993	presmolt	1,129	0.18	0.02
Upper Salmon River	1993	smolt	613	0.56	0.03
Upper Salmon River	1994	presmolt	565	0.33	0.04
Upper Salmon River	1994	smolt	246	0.71	0.08
Upper Salmon River	1996	presmolt	116	0.37	0.05
Upper Salmon River	1996	smolt	222	0.75	0.05
Upper Salmon River	1997	parr	78	0.30	0.09
Upper Salmon River	1997	presmolt	275	0.29	0.03
Upper Salmon River	1997	smolt	279	0.66	0.06
Upper Salmon River	1998	parr	281	0.24	0.03
Upper Salmon River	1998	presmolt	738	0.27	0.02
Upper Salmon River	1998	smolt	527	0.58	0.04
Upper Salmon River	1999	parr	276	0.20	0.02
Upper Salmon River	1999	presmolt	632	0.27	0.02
Upper Salmon River	1999	smolt	384	0.62	0.03
Upper Salmon River	2000	parr	1,519	0.12	0.02
Upper Salmon River	2000	presmolt	1,038	0.24	0.02
Upper Salmon River	2000	smolt	695	0.59	0.04
Upper Salmon River	2001	parr	1,494	0.07	0.01
Upper Salmon River	2001	presmolt	2,093	0.17	0.01
Upper Salmon River	2001	smolt	2,649	0.52	0.02
Upper Salmon River	2002	parr	1,282	0.06	0.01
Upper Salmon River	2002	presmolt	2,912	0.13	0.01
Upper Salmon River	2002	smolt	2,507	0.47	0.01
Upper Salmon River	2003	parr	1,737	0.07	0.01
Upper Salmon River	2003	presmolt	1,245	0.15	0.01
Upper Salmon River	2003	smolt	4,126	0.53	0.01
Upper Salmon River	2004	parr	1,828	0.09	0.01
Upper Salmon River	2004	presmolt	2,628	0.16	0.01
Upper Salmon River	2004	smolt	1,634	0.57	0.03
Marsh Creek	1991	smolt	170	0.58	0.10
Marsh Creek	1992	parr	1,309	0.30	0.02
Marsh Creek	1992	presmolt	5,299	0.31	0.01
Marsh Creek	1992	smolt	163	0.35	0.15
Marsh Creek	1993	parr / presmolt	3,383	0.26	0.01
Marsh Creek	1993	smolt	220	0.42	0.04
Marsh Creek	1994	parr / presmolt	274	0.41	0.06
Marsh Creek	1994	smolt	3		
Marsh Creek	1996	parr	259	0.58	0.05
Marsh Creek	1996	presmolt	748	0.58	0.02
Marsh Creek	1996	smolt	25	1.20	0.83

Appendix E. Continued.

Trap	BY	Life Stage	Number Tagged	Survival	SE
Marsh Creek	1997	parr	1,233	0.28	0.01
Marsh Creek	1997	presmolt	947	0.40	0.02
Marsh Creek	1997	smolt	157	0.69	0.07
Marsh Creek	1998	parr	1,019	0.25	0.02
Marsh Creek	1998	presmolt	1,105	0.35	0.02
Marsh Creek	1998	smolt	263	0.63	0.06
Marsh Creek	2000	parr	519	0.30	0.04
Marsh Creek	2000	presmolt	1,047	0.39	0.04
Marsh Creek	2000	smolt	119	0.54	0.07
Marsh Creek	2001	parr	1,785	0.15	0.01
Marsh Creek	2001	presmolt	1,342	0.19	0.01
Marsh Creek	2001	smolt	650	0.48	0.03
Marsh Creek	2002	parr	1,207	0.10	0.01
Marsh Creek	2002	presmolt	2,713	0.18	0.01
Marsh Creek	2002	smolt	2,174	0.33	0.01
Marsh Creek	2003	parr	1,401	0.10	0.01
Marsh Creek	2003	presmolt	1,119	0.10	0.01
Marsh Creek	2003	smolt	729	0.28	0.02
Marsh Creek	2004	parr	1,181	0.20	0.01
Marsh Creek	2004	presmolt	937	0.22	0.02
Marsh Creek	2004	smolt	211	0.52	0.07
Pahsimeroi River	1991	presmolt	580	0.22	0.02
Pahsimeroi River	1991	smolt	60	0.45	0.27
Pahsimeroi River	1992	presmolt	432	0.27	0.03
Pahsimeroi River	1992	smolt	239	0.33	0.04
Pahsimeroi River	1992	zero	44	0.68	0.28
Pahsimeroi River	1993	parr	404	0.17	0.02
Pahsimeroi River	1993	presmolt	1,965	0.29	0.01
Pahsimeroi River	1993	zero	247	0.27	0.11
Pahsimeroi River	1993	smolt	699	0.37	0.02
Pahsimeroi River	1994	presmolt	257	0.31	0.04
Pahsimeroi River	1994	zero	355	0.57	0.03
Pahsimeroi River	1994	smolt	20	****	****
Pahsimeroi River	1995	presmolt	87	0.30	0.08
Pahsimeroi River	1995	zero	392	0.68	0.06
Pahsimeroi River	1995	smolt	21	0.67	0.17
Pahsimeroi River	1996	presmolt	228	0.38	0.04
Pahsimeroi River	1996	zero	357	0.51	0.04
Pahsimeroi River	1996	smolt	51	0.53	0.24
Pahsimeroi River	1997	parr	218	0.27	0.04
Pahsimeroi River	1997	parr / presmolt	878	0.36	0.02
Pahsimeroi River	1997	presmolt	660	0.39	0.02
Pahsimeroi River	1997	zero	1,168	0.73	0.02
Pahsimeroi River	1997	smolt	478	0.73	0.03
Pahsimeroi River	1998	parr / presmolt	825	0.37	0.02
Pahsimeroi River	1998	zero	791	0.63	0.03
Pahsimeroi River	1998	smolt	320	0.74	0.07
Pahsimeroi River	1999	presmolt	1,434	0.27	0.01
Pahsimeroi River	1999	zero	1,126	0.50	0.03
Pahsimeroi River	1999	smolt	120	0.53	0.05
Pahsimeroi River	2000	presmolt	320	0.21	0.04
Pahsimeroi River	2000	zero	680	0.13	0.01

Appendix E. Continued.

Trap	BY	Life Stage	Number Tagged	Survival	SE
Pahsimeroi River	2000	smolt	127	0.61	0.1
Pahsimeroi River	2001	parr	515	0.11	0.03
Pahsimeroi River	2001	parr / presmolt	2,721	0.20	0.02
Pahsimeroi River	2001	presmolt	2,206	0.22	0.02
Pahsimeroi River	2001	zero	1,667	0.67	0.06
Pahsimeroi River	2001	smolt	1,304	0.58	0.03
Pahsimeroi River	2002	parr / presmolt	2,639	0.23	0.01
Pahsimeroi River	2002	zero	1,971	0.50	0.03
Pahsimeroi River	2002	smolt	810	0.48	0.03
Pahsimeroi River	2003	parr / presmolt	1,920	0.22	0.01
Pahsimeroi River	2003	zero	3,110	0.30	0.01
Pahsimeroi River	2003	smolt	1,422	0.43	0.01
Pahsimeroi River	2004	parr	259	0.02	0.02
Pahsimeroi River	2004	parr / presmolt	1,995	0.21	0.02
Pahsimeroi River	2004	presmolt	1,736	0.23	0.02
Pahsimeroi River	2004	zero	3,315	0.19	0.01
Pahsimeroi River	2004	smolt	1,461	0.64	0.02
East Fork Salmon River	1993	smolt	217	0.46	0.05
East Fork Salmon River	1993	presmolt	198	0.14	0.03
East Fork Salmon River	1994	smolt	28	0.32	0.20
East Fork Salmon River	1994	presmolt	1,173	0.15	0.01
East Fork Salmon River	1995	smolt	353	0.49	0.04
East Fork Salmon River	1995	presmolt	110	0.31	0.11
East Fork Salmon River	1996	smolt	24	0.56	0.24
East Fork Salmon River	1997	presmolt	31	ND	ND
East Fork Salmon River	1999	presmolt	0	ND	ND
East Fork Salmon River	2000	smolt	363	0.55	0.07
East Fork Salmon River	2000	parr	65	0.20	0.05
East Fork Salmon River	2000	presmolt	233	0.33	0.03
East Fork Salmon River	2001	smolt	68	0.56	0.06
East Fork Salmon River	2001	parr	22	ND	ND
East Fork Salmon River	2001	presmolt	266	0.09	0.02
East Fork Salmon River	2002	parr	22	ND	ND
East Fork Salmon River	2003	smolt	302	0.49	0.05
East Fork Salmon River	2004	smolt	235	0.54	0.03
East Fork Salmon River	2004	parr	246	0.07	0.02
East Fork Salmon River	2004	presmolt	779	0.13	0.01
West Fork Yankee Fork	1998	smolt	73	0.44	0.07
West Fork Yankee Fork	1998	parr	38	ND	ND
West Fork Yankee Fork	1998	presmolt	848	0.28	0.02
West Fork Yankee Fork	1999	smolt	446	0.59	0.03
West Fork Yankee Fork	1999	parr	185	0.11	0.04
West Fork Yankee Fork	1999	presmolt	376	0.25	0.04
West Fork Yankee Fork	2000	smolt	643	0.49	0.05
West Fork Yankee Fork	2002	smolt	20	0.10	0.07
West Fork Yankee Fork	2002	parr	59	ND	ND
West Fork Yankee Fork	2003	smolt	152	0.57	0.06
West Fork Yankee Fork	2004	smolt	1	ND	ND
West Fork Yankee Fork	2004	parr	37	ND	ND
West Fork Yankee Fork	2004	presmolt	40	0.17	0.07
Lake Creek	1996	presmolt	264	0.39	0.05

Appendix E. Continued.

Trap	BY	Life Stage	Number Tagged	Survival	SE
Lake Creek	1996	smolt	61	0.54	0.07
Lake Creek	1997	parr	466	0.22	0.03
Lake Creek	1997	presmolt	4,175	0.26	0.01
Lake Creek	1997	smolt	90	0.40	0.07
Lake Creek	1998	parr	742	0.28	0.02
Lake Creek	1998	presmolt	1,114	0.29	0.02
Lake Creek	1998	smolt	168	0.40	0.06
Lake Creek	1999	parr	789	0.27	0.02
Lake Creek	1999	presmolt	1,544	0.39	0.01
Lake Creek	1999	smolt	203	0.49	0.04
Lake Creek	2000	parr	1,122	0.11	0.02
Lake Creek	2000	presmolt	1,346	0.15	0.01
Lake Creek	2000	smolt	148	0.39	0.07
Lake Creek	2001	parr	1,002	0.08	0.01
Lake Creek	2001	presmolt	2,095	0.10	0.01
Lake Creek	2001	smolt	457	0.28	0.03
Lake Creek	2002	parr	395	0.06	0.01
Lake Creek	2002	presmolt	1,176	0.09	0.01
Lake Creek	2002	smolt	457	0.34	0.02
Lake Creek	2003	parr	763	0.11	0.01
Lake Creek	2003	presmolt	1,374	0.16	0.01
Lake Creek	2003	smolt	447	0.28	0.02
Lake Creek	2004	parr	533	0.09	0.01
Lake Creek	2004	presmolt	780	0.12	0.01
Lake Creek	2004	smolt	273	0.18	0.05
South Fk Salmon R	1991	presmolt	398	0.31	0.04
South Fk Salmon R	1991	smolt	25	0.36	0.10
South Fk Salmon R	1992	presmolt	1,455	0.02	0.01
South Fk Salmon R	1992	smolt	1,893	0.35	0.03
South Fk Salmon R	1993	presmolt	2,456	0.13	0.01
South Fk Salmon R	1993	smolt	197	0.43	0.05
South Fk Salmon R	1994	presmolt	1,081	0.21	0.03
South Fk Salmon R	1994	smolt	209	0.43	0.08
South Fk Salmon R	1995	parr	361	0.22	0.15
South Fk Salmon R	1995	presmolt	979	0.18	0.03
South Fk Salmon R	1995	smolt	417	0.45	0.05
South Fk Salmon R	1996	parr	666	0.24	0.02
South Fk Salmon R	1996	presmolt	1,058	0.26	0.02
South Fk Salmon R	1996	smolt	416	0.47	0.04
South Fk Salmon R	1997	parr	1,147	0.15	0.02
South Fk Salmon R	1997	presmolt	1,664	0.16	0.01
South Fk Salmon R	1997	smolt	949	0.52	0.02
South Fk Salmon R	1998	parr	1,031	0.17	0.02
South Fk Salmon R	1998	presmolt	3,447	0.21	0.01
South Fk Salmon R	1998	smolt	1,582	0.38	0.02
South Fk Salmon R	1999	parr	266	0.19	0.03
South Fk Salmon R	1999	presmolt	1,128	0.19	0.01
South Fk Salmon R	1999	smolt	480	0.48	0.02
South Fk Salmon R	2000	parr	844	0.10	0.01
South Fk Salmon R	2000	presmolt	468	0.12	0.02
South Fk Salmon R	2000	smolt	650	0.51	0.05
South Fk Salmon R	2001	parr	648	0.03	0.01

Appendix E. Continued.

Trap	BY	Life Stage	Number Tagged	Survival	SE
South Fk Salmon R	2001	presmolt	1,598	0.08	0.01
South Fk Salmon R	2001	smolt	587	0.46	0.03
South Fk Salmon R	2002	parr	903	0.08	0.01
South Fk Salmon R	2002	presmolt	2,546	0.10	0.01
South Fk Salmon R	2002	smolt	1,375	0.38	0.01
South Fk Salmon R	2003	parr	836	0.09	0.01
South Fk Salmon R	2003	presmolt	1,730	0.15	0.01
South Fk Salmon R	2003	smolt	2,583	0.38	0.01
South Fk Salmon R	2004	parr	1,309	0.10	0.01
South Fk Salmon R	2004	presmolt	3,042	0.15	0.01
South Fk Salmon R	2004	smolt	1,561	0.36	0.02
Johnson Creek	1997	summer parr	1,174	0.24	0.02
Johnson Creek	1997	parr	717	0.26	0.02
Johnson Creek	1997	presmolt	3,549	0.31	0.01
Johnson Creek	1997	smolt	3,501	0.63	0.02
Johnson Creek	1998	summer parr	907	0.24	0.03
Johnson Creek	1998	parr	1,075	0.27	0.03
Johnson Creek	1998	presmolt	3,099	0.30	0.01
Johnson Creek	1998	smolt	1,167	0.50	0.03
Johnson Creek	1998	smolt	8,043	0.36	0.01
Johnson Creek	1999	summer parr	655	0.24	0.02
Johnson Creek	1999	parr	1,115	0.31	0.01
Johnson Creek	1999	presmolt	2,230	0.34	0.01
Johnson Creek	1999	smolt	2,120	0.62	0.01
Johnson Creek	2000	summer parr	232	0.21	0.04
Johnson Creek	2000	parr	1,130	0.32	0.03
Johnson Creek	2000	presmolt	5,329	0.27	0.01
Johnson Creek	2000	smolt	529	0.50	0.04
Johnson Creek	2001	summer parr	1,039	0.13	0.02
Johnson Creek	2001	parr	2,935	0.12	0.01
Johnson Creek	2001	presmolt	5,044	0.13	0.01
Johnson Creek	2001	smolt	2,370	0.39	0.01
Johnson Creek	2002	parr	1,966	0.13	0.01
Johnson Creek	2002	presmolt	5,004	0.16	0.01
Johnson Creek	2002	smolt	2,401	0.40	0.01
Johnson Creek	2003	parr	4,205	0.14	0.01
Johnson Creek	2003	presmolt	6,669	0.20	0.01
Johnson Creek	2003	smolt	3,904	0.43	0.01
Johnson Creek	2003	smolt	12,049	0.35	0.01
Johnson Creek	2004	parr	948	0.22	0.02
Johnson Creek	2004	presmolt	4,424	0.26	0.01
Johnson Creek	2004	smolt	2,543	0.56	0.02
Secesh River	1996	presmolt	588	0.34	0.03
Secesh River	1996	smolt	98	0.36	0.05
Secesh River	1997	parr	260	0.18	0.03
Secesh River	1997	presmolt	1,819	0.17	0.01
Secesh River	1997	smolt	205	0.31	0.03
Secesh River	1998	parr	735	0.38	0.06
Secesh River	1998	presmolt	1,014	0.33	0.02
Secesh River	1998	smolt	183	0.25	0.04
Secesh River	1999	parr	1,274	0.31	0.01

Appendix E. Continued.

Trap	BY	Life Stage	Number Tagged	Survival	SE
Secesh River	1999	presmolt	1,754	0.37	0.01
Secesh River	1999	smolt	510	0.39	0.02
Secesh River	2000	parr	1,462	0.16	0.01
Secesh River	2000	presmolt	1,309	0.21	0.02
Secesh River	2000	smolt	288	0.45	0.06
Secesh River	2001	parr	1,893	0.10	0.01
Secesh River	2001	presmolt	1,802	0.11	0.01
Secesh River	2001	smolt	609	0.20	0.02
Secesh River	2002	parr	505	0.08	0.01
Secesh River	2002	presmolt	1,254	0.12	0.01
Secesh River	2002	smolt	563	0.22	0.02
Secesh River	2003	parr	874	0.10	0.01
Secesh River	2003	presmolt	1,753	0.17	0.01
Secesh River	2003	smolt	659	0.20	0.02
Secesh River	2004	parr	1,322	0.14	0.01
Secesh River	2004	presmolt	881	0.16	0.02
Secesh River	2004	smolt	239	0.18	0.06
Crooked Fork Creek	1991	presmolt	582	0.31	0.03
Crooked Fork Creek	1991	smolt	304	0.58	0.05
Crooked Fork Creek	1992	parr / presmolt	1,824	0.30	0.02
Crooked Fork Creek	1992	smolt	340	0.55	0.14
Crooked Fork Creek	1993	parr / presmolt	2,696	0.20	0.01
Crooked Fork Creek	1993	smolt	162	0.49	0.07
Crooked Fork Creek	1994	presmolt	360	0.30	0.04
Crooked Fork Creek	1994	smolt	11	0.45	0.15
Crooked Fork Creek	1995	presmolt	541	0.24	0.03
Crooked Fork Creek	1995	smolt	35	0.57	0.24
Crooked Fork Creek	1996	parr / presmolt	989	0.54	0.02
Crooked Fork Creek	1996	smolt	300	0.58	0.04
Crooked Fork Creek	1997	parr / presmolt	2,604	0.31	0.01
Crooked Fork Creek	1997	smolt	527	0.58	0.03
Crooked Fork Creek	1998	parr / presmolt	1,127	0.32	0.02
Crooked Fork Creek	1998	smolt	195	0.59	0.10
Crooked Fork Creek	1999	parr / presmolt	608	0.38	0.02
Crooked Fork Creek	1999	smolt	236	0.52	0.03
Crooked Fork Creek	2000	parr	370	0.11	0.02
Crooked Fork Creek	2000	presmolt	1,164	0.24	0.03
Crooked Fork Creek	2000	smolt	139	0.40	0.05
Crooked Fork Creek	2001	parr	197	0.12	0.03
Crooked Fork Creek	2001	presmolt	2,375	0.10	0.01
Crooked Fork Creek	2001	smolt	237	0.41	0.05
Crooked Fork Creek	2002	parr	132	0.12	0.03
Crooked Fork Creek	2002	presmolt	2,332	0.19	0.01
Crooked Fork Creek	2002	smolt	263	0.32	0.03
Crooked Fork Creek	2003	parr	746	0.15	0.01
Crooked Fork Creek	2003	presmolt	1,004	0.23	0.01
Crooked Fork Creek	2003	smolt	285	0.49	0.03
Crooked Fork Creek	2004	parr	300	0.36	0.13
Crooked Fork Creek	2004	presmolt	2,734	0.27	0.02
Crooked Fork Creek	2004	smolt	278	0.48	0.10

Appendix E. Continued.

Trap	BY	Life Stage	Number Tagged	Survival	SE
Colt Killed Creek	1997	parr / presmolt	160	0.23	0.03
Colt Killed Creek	1997	smolt	177	0.62	0.06
Colt Killed Creek	1998	parr / presmolt	99	0.59	0.16
Colt Killed Creek	1998	smolt	165	0.39	0.06
Colt Killed Creek	1999	presmolt	15	0.44	0.15
Colt Killed Creek	1999	smolt	48	0.72	0.07
Colt Killed Creek	2000	parr / presmolt	754	0.19	0.02
Colt Killed Creek	2000	smolt	29	0.43	0.16
Colt Killed Creek	2001	parr / presmolt	687	0.10	0.02
Colt Killed Creek	2001	smolt	189	0.35	0.05
Colt Killed Creek	2002	presmolt	500	0.13	0.02
Colt Killed Creek	2002	smolt	88	0.37	0.05
Colt Killed Creek	2003	parr / presmolt	380	0.30	0.02
Colt Killed Creek	2003	smolt	230	0.59	0.04
Colt Killed Creek	2004	presmolt	364	0.26	0.03
Colt Killed Creek	2004	smolt	139	0.60	0.10
American River	1997	parr / presmolt	307	0.12	0.03
American River	1997	smolt	532	0.46	0.03
American River	1998	parr / presmolt	945	0.17	0.02
American River	1998	smolt	622	0.46	0.03
American River	1999	parr / presmolt	45	0.14	0.05
American River	1999	smolt	75	0.43	0.07
American River	2000	parr / presmolt	289	0.17	0.12
American River	2000	smolt	326	0.64	0.05
American River	2001	parr / presmolt	305	0.02	0.01
American River	2001	smolt	1,559	0.50	0.02
American River	2002	parr / presmolt	1,494	0.03	0.00
American River	2002	smolt	1,047	0.52	0.02
American River	2003	parr / presmolt	1,491	0.14	0.01
American River	2003	smolt	1,231	0.70	0.02
American River	2004	presmolt	638	0.13	0.02
American River	2004	smolt	384	0.37	0.05
Red River	1991	presmolt	244	0.21	0.06
Red River	1991	smolt	519	0.52	0.04
Red River	1992	parr / presmolt	999	0.29	0.02
Red River	1992	smolt	377	0.54	0.10
Red River	1993	parr / presmolt	1,405	0.17	0.01
Red River	1993	smolt	1,218	0.53	0.02
Red River	1994	presmolt	551	0.27	0.03
Red River	1994	smolt	150	0.65	0.11
Red River	1995	presmolt	31	0.23	0.08
Red River	1995	smolt	63	0.84	0.34
Red River	1996	presmolt	1,394	0.33	0.02
Red River	1996	smolt	316	0.66	0.06
Red River	1997	parr / presmolt	1,244	0.17	0.02
Red River	1997	smolt	447	0.45	0.04
Red River	1998	parr	147	0.12	0.04
Red River	1998	presmolt	1,044	0.26	0.02
Red River	1998	smolt	994	0.47	0.03
Red River	1999	parr / presmolt	366	0.23	0.02
Red River	1999	smolt	184	0.50	0.04

Appendix E. Continued.

Trap	BY	Life Stage	Number Tagged	Survival	SE
Red River	2000	parr / presmolt	405	0.11	0.02
Red River	2000	smolt	589	0.69	0.08
Red River	2001	presmolt	723	0.04	0.01
Red River	2001	smolt	769	0.34	0.02
Red River	2002	parr	99	0.10	0.03
Red River	2002	presmolt	1,548	0.07	0.01
Red River	2002	smolt	1,326	0.44	0.01
Red River	2003	parr	254	0.18	0.03
Red River	2003	presmolt	2,845	0.16	0.01
Red River	2003	smolt	1,930	0.43	0.02
Red River	2004	parr	176	0.15	0.04
Red River	2004	presmolt	1,792	0.16	0.02
Red River	2004	smolt	106	0.23	0.04
Crooked River	1991	presmolt	85	0.38	0.15
Crooked River	1991	smolt	88	0.69	0.12
Crooked River	1992	presmolt	357	0.26	0.03
Crooked River	1992	smolt	1,656	0.48	0.04
Crooked River	1993	presmolt	1,164	0.12	0.01
Crooked River	1993	smolt	2,297	0.43	0.01
Crooked River	1994	presmolt	33	0.09	0.05
Crooked River	1994	smolt	154	0.41	0.08
Crooked River	1996	presmolt	85	0.27	0.05
Crooked River	1996	smolt	393	0.62	0.05
Crooked River	1997	presmolt	274	0.23	0.04
Crooked River	1997	smolt	465	0.46	0.03
Crooked River	1998	presmolt	236	0.16	0.03
Crooked River	1998	smolt	151	0.53	0.12
Crooked River	1999	smolt	65	0.53	0.06
Crooked River	2000	presmolt	208	0.25	0.12
Crooked River	2000	smolt	917	0.43	0.04
Crooked River	2001	smolt	472	0.32	0.04
Crooked River	2002	parr	61		
Crooked River	2002	smolt	927	0.42	0.02
Crooked River	2003	parr	219	0.16	0.03
Crooked River	2003	presmolt	720	0.23	0.02
Crooked River	2003	smolt	1,196	0.36	0.02
Crooked River	2004	presmolt	119	****	****
Crooked River	2004	smolt	80	1.26	0.97
Fishing Creek	1997	parr	173	0.18	0.04
Fishing Creek	2001	parr	279	0.14	0.03
Fishing Creek	2002	parr	736	0.13	0.01
Fishing Creek	2004	parr	345	0.18	0.03
Legendary Bear Creek	1997	parr	833	0.16	0.02
Legendary Bear Creek	2000	parr	747	0.14	0.02
Legendary Bear Creek	2001	parr	1,026	0.10	0.01
Legendary Bear Creek	2002	parr	557	0.06	0.01
Legendary Bear Creek	2003	parr	752	0.07	0.01
Legendary Bear Creek	2004	parr	742	0.12	0.03

Appendix E. Continued.

Trap	BY	Life Stage	Number Tagged	Survival	SE
Clear Creek	1996	Presmolt	301	0.45	1.05
Clear Creek	1996	smolt	84	0.61	0.12
Clear Creek	1997	parr	61	0	0
Clear Creek	1997	Presmolt	397	0.27	0.03
Clear Creek	1997	smolt	480	0.75	0.04
Clear Creek	1998	parr	48	0.15	0.05
Clear Creek	1998	Presmolt	230	0.26	0.05
Clear Creek	1998	smolt	56	0.77	0.2
Clear Creek	2000	parr	306	0.14	0.03
Clear Creek	2000	presmolt	191	0.00	0.00
Clear Creek	2000	smolt	233	0.00	0.00
Clear Creek	2001	parr	275	0.07	0.02
Clear Creek	2001	presmolt	190	0.11	0.02
Clear Creek	2001	smolt	233	0.42	0.04
Clear Creek	2002	parr	129	0.16	0.03
Clear Creek	2002	presmolt	70	0.14	0.04
Clear Creek	2002	smolt	204	0.49	0.04
Clear Creek	2003	presmolt	73	0.39	0.06
Clear Creek	2003	smolt	225	0.35	0.03
Clear Creek	2004	presmolt	414	0.24	0.03
Clear Creek	2004	smolt	98	0.61	0.13
Lolo Creek Upper	1993	presmolt	752	0.17	0.02
Lolo Creek Lower	1993	presmolt	900	0.25	0.02
Lolo Creek	1993	smolt	647	0.71	0.03
Lolo Creek Upper	1994	presmolt	69	0.1	0.06
Lolo Creek Lower	1994	presmolt	53	0	0
Lolo Creek Upper	1994	smolt	13	0.77	0.32
Lolo Creek Lower	1994	smolt	49	0.73	0.29
Lolo Creek Upper	1996	presmolt	624	0.47	0.03
Lolo Creek Lower	1996	smolt	230	0.83	0.06
Lolo Creek Upper	1997	presmolt	1184	0.18	0.01
Lolo Creek Lower	1997	presmolt	818	0.2	0.02
Lolo Creek	1997	smolt	490	0.68	0.03
Lolo Creek Upper	1998	presmolt	419	0.12	0.02
Lolo Creek Lower	1998	presmolt	172	0.35	0.05
Lolo Creek	1998	smolt	506	0.88	0.07
Lolo Creek Upper	1999	presmolt	1052	0.19	0.01
Lolo Creek Lower	1999	presmolt	67	0.4	0.06
Lolo Creek	1999	smolt	268	0.66	0.03
Lolo Creek	2000	presmolt	2028	0.17	0.02
Lolo Creek	2000	smolt	941	0.72	0.03
Lolo Creek	2001	presmolt	2110	0.08	0.01
Lolo Creek	2001	smolt	1239	0.72	0.02
Lolo Creek	2002	presmolt	3017	0.13	0.01
Lolo Creek	2002	smolt	1139	0.68	0.01
Lolo Creek	2003	presmolt	2492	0.25	0.01
Lolo Creek	2003	smolt	736	0.68	0.02
Lolo Creek	2004	presmolt	3074	0.26	0.01
Lolo Creek	2004	smolt	1422	0.74	0.02
Newsome Creek	1993	presmolt	935	0.11	0.01
Newsome Creek	1993	smolt	1200	0.69	0.02

Appendix E. Continued.

Trap	BY	Life Stage	Number Tagged	Survival	SE
Newsome Creek	1996	smolt	28	0.43	0.09
Newsome Creek	1997	presmolt	1992	0.17	0.01
Newsome Creek	1997	smolt	30	0.4	0.13
Newsome Creek	1998	presmolt	1973	0.15	0.01
Newsome Creek	1998	smolt	39	0.56	0.14
Newsome Creek	1999	presmolt	23	0	0
Newsome Creek	1999	smolt	3	0	0
Newsome Creek	2000	presmolt	1771	0.12	0.01
Newsome Creek	2000	smolt	201	0.51	0.08
Newsome Creek	2001	presmolt	1827	0.07	0.01
Newsome Creek	2001	smolt	364	0.32	0.03
Newsome Creek	2002	presmolt	3020	0.1	0.01
Newsome Creek	2002	smolt	265	0.5	0.03
Newsome Creek	2003	presmolt	3820	0.15	0.01
Newsome Creek	2003	smolt	542	0.45	0.03
Newsome Creek	2004	presmolt	3203	0.26	0.01
Newsome Creek	2004	smolt	221	0.46	0.05
Non-ISS Release Groups					
Secesh River	1995	parr[a]	260	0.23	0.03
Secesh River	1996	parr[a]	588	0.30	0.24
Secesh River	1997	parr[a]	936	0.14	0.02
Secesh River	1998	parr[a]	907	0.16	0.02
Secesh River	1999	parr[a]	586	0.33	0.02
Secesh River	2000	parr[a]	1,489	0.09	0.01
Secesh River	2001	parr[a]	1,040	0.03	0.01
Secesh River	2002	parr[a]	1,142	0.04	0.01
Secesh River	2003	parr[a]	1,074	0.07	0.01
Secesh River	2004	parr[a]	1,094	0.09	0.01
Lake Creek	1996	parr[a]	418	0.23	0.02
Lake Creek	1997	parr[a]	545	0.19	0.05
Lake Creek	1998	parr[a]	603	0.15	0.02
Lake Creek	2000	parr[a]	695	0.07	0.01
Lake Creek	2001	parr[a]	709	0.04	0.01
Lake Creek	2002	parr[a]	664	0.05	0.01
Lake Creek	2003	parr[a]	650	0.06	0.01
Lake Creek	2004	parr[a]	413	0.08	0.02
Johnson Creek	1998	hatchery smolt	8,043	0.359	0.012
Johnson Creek	2000	hatchery smolt	9,987	0.242	0.006
Johnson Creek	2001	hatchery smolt	12,132	0.244	0.009
Johnson Creek	2002	hatchery smolt	12,186	0.279	0.004
Johnson Creek	2003	hatchery smolt	12,049	0.350	0.006
Johnson Creek	2004	hatchery smolt	12,055	0.327	0.017
Fishing Creek	1997	hatchery parr	990	0.00	0.00
Fishing Creek	2000	hatchery parr	700	0.05	0.01
Fishing Creek	2001	hatchery parr	701	0.02	0.01
Fishing Creek	2002	hatchery parr	797	0.01	0.00

Appendix E. Continued.

Trap	BY	Life Stage	Number Tagged	Survival	SE
Legendary Bear Creek	1997	hatchery smolt	1,500	0.60	0.03
Legendary Bear Creek	2000	hatchery smolt	750	0.69	0.05
Legendary Bear Creek	2001	hatchery smolt	799	0.25	0.03
Legendary Bear Creek	2002	hatchery smolt	801	0.39	0.02

[a] PIT tagged by NOAA Fisheries (BPA Project # 1991-028-00).

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