November 2001

SALMON SUPPLEMENTATION STUDIES IN IDAHO RIVERS (covering field work completed from 1992 to 2000)

Annual Report 1999 -2000

DOE/BP-00004012-2

This report was funded by the Bonneville Power Administration (BPA), U.S. Department of Energy, as part of BPA's program to protect, mitigate, and enhance fish and wildlife affected by the development and operation of hydroelectric facilities on the Columbia River and its tributaries. The views of this report are the author's and do not necessarily represent the views of BPA.

This document should be cited as follows:

Lewis, Bert, Doug Taki, Angelo Teton, Evelyn Galloway - Shoshone-Bannock Tribes, 2001, Salmon Supplementation Studies in Idaho Rivers FY 1999 and 2000 Annual Report (covering field work completed from 1992 to 2000), Report to Bonneville Power Administration, Contract No. 00004012, Project No. 198909803, 80 electronic pages (BPA Report DOE/BP-00004012-2)

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BPA PROJECT 1989-098-3

FY 1999 and 2000 ANNUAL REPORT
(Covering field work completed from 1992 to 2000)

SALMON SUPPLEMENTATION STUDIES IN IDAHO RIVERS

REPORT TO:

BONNEVILLE POWER ADMINISTRATION

SHOSHONE-BANNOCK TRIBES FISHERIES DEPARTMENT

FORT HALL, IDAHO

SALMON SUPPLEMENTATION STUDIES IN IDAHO RIVERS

Progress Report

Period Covered: January 1, 1999 to December 31, 2000

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Project No. 89-098-3
Contract Number 92-BI-49450

November 2001

PREFACE

This project, No. 89-098-03, was funded by the Bonneville Power Administration (BPA) under Contract No. 92-BI-49450. This annual report contains information detailing tribal fisheries work completed from 1999 to 2000.

ACKNOWLEDGMENTS

We would like to thank the following people for their part during field work, data collection, and data entry: Ken Ariwite, Rob Trahant, Sonny Snipe, Evelyn Galloway, Jeff Anderson, and Kermit Bacon.

ABSTRACT

As part of the Idaho Supplementation Studies, fisheries crews from the Shoshone-Bannock Tribes have been snorkeling tributaries of the Salmon River to estimate chinook salmon (*Oncorhynchus tshawytscha*) parr abundance; conducting surveys of spawning adult chinook salmon to determine the number of redds constructed and collect carcass information; operating a rotary screw trap on the East Fork Salmon River and West Fork Yankee Fork Salmon River to enumerate and PIT-tag emigrating juvenile chinook salmon; and collecting and PIT-tagging juvenile chinook salmon on tributaries of the Salmon River. The Tribes work in the following six tributaries of the Salmon River: Bear Valley Creek, East Fork Salmon River, Herd Creek, South Fork Salmon River, Valley Creek, and West Fork Yankee Fork Salmon River.

Snorkeling was used to obtain parr population estimates for ISS streams from 1992 to 1997. However, using the relatively vigorous methods described in the ISS experimental design to estimate summer chinook parr populations, results on a project-wide basis showed extraordinarily large confidence intervals and coefficients of variation. ISS cooperators modified their sampling design over a few years to reduce the variation around parr population estimates without success. Consequently, in 1998 snorkeling to obtain parr population estimates was discontinued and only General Parr Monitoring (GPM) sites are snorkeled.

The number of redds observed in SBT-ISS streams has continued to decline as determined by five year cycles. Relatively weak strongholds continue to occur in the South Fork Salmon River and Bear Valley Creek.

A rotary screw trap was operated on the West Fork Yankee Fork during the spring and fall of 1999 and the spring of 2000 to monitor juvenile chinook migration. A screw trap was also

operated on the East Fork of the Salmon River during the spring and fall from 1993 to 1997 and 1999 (fall only) to 2000.

Significant supplementation treatments have occurred in the South Fork Salmon River (IDFG). The East Fork Salmon River received supplementation treatments yearly through 1995. There have been no treatments since 1995, and no significant future treatments from local broodstock are conceivable due to extremely poor escapement. The West Fork Yankee Fork received a single presmolt treatment in 1994. Similarly, no significant future treatments are planned for the WFYF due to extremely poor escapement. However, small scale experimental captive rearing and broodstock techniques are currently being tested with populations from the EFSR and WFYF. Captive rearing/broodstock techniques could potentially provide feedback for evaluation of supplementation. The other three SBT-ISS streams are control streams and do not receive hatchery treatments.

TABLE OF CONTENTS

LIST OF TABLES

Page

LIST OF APPENDICES

Page

INTRODUCTION

The Idaho Supplementation Studies (ISS) is a multiple agency effort to evaluate supplementation as a tool for helping to recover declining stocks of chinook salmon (*Oncorhynchus tshawytscha*) in Idaho rivers. Supplementation is being evaluated as an interim recovery tool to help maintain and restore declining chinook salmon stocks before and after mainstem Snake and Columbia River travel corridors are altered to reduce juvenile and adult mortality. A detailed description of the studies' experimental design can be found in "Salmon Supplementation Studies in Idaho Rivers" (Bowles and Leitzinger 1991).

The Idaho Supplementation Studies is a cooperative effort between the Idaho Department of Fish and Game (IDFG), Nez Perce Tribe, Shoshone-Bannock Tribes (SBT), U. S. Fish and Wildlife Service, and the University of Idaho. Each cooperator is responsible for different aspects of the studies objectives either individually or jointly with one or more of the other cooperators.

The SBT are responsible for monitoring and evaluating the implementation of supplementation study objectives in six streams in the Salmon River system. Three streams are treatment streams: East Fork Salmon River (above the Idaho Department of Fish and Game adult weir), South Fork Salmon River (above the Idaho Department of Fish and Game adult weir), and West Fork Yankee Fork Salmon River. The other three streams are control streams: Bear Valley Creek (above the confluence of Elk Creek), Herd Creek, and Valley Creek. The designations of treatment and control streams may change in the future based on whether treatments have occurred or will occur in the future. Some streams may be dropped from the study.

To evaluate treatment effects, we are monitoring a number of production and productivity response variables. Production variables measure the effects of supplementation on fish numbers including adults, redds, parr, emigrants, and smolts to the lower Snake River. Productivity variables measure the effects of supplementation on the overall replacement ability and performance of natural populations. These variables include female: male ratio, run timing, survival, and age structure.

Final evaluation of supplementation is dependent on the response of adult escapement to treatments (Bowles and Leitzinger 1991). Several interim production and productivity evaluation points have been established to provide baseline information and initial feedback on population responses to treatments prior to adult returns. This report focuses on parr abundance, PIT-tagging summer parr, fall and spring outmigration estimates, PIT-tagging for outmigration survival estimates, and redd counts. A more detailed discussion of these evaluation points is contained in the ISS experimental design.

Information contained in this report will be collated with other ISS cooperator data collected from Salmon and Clearwater River tributary streams. Significant analysis of data presented in this report and supplementation evaluation will occur at a project-wide level (ISS 5 year report, *submitted to BPA*).

OBJECTIVES

The first five years (1992 to 1997) of data collection provide baseline information. Subsequent data collection (1998 to 2007) should provide results of supplementation treatments and will be compared to baseline information to assess supplementation effects.

The primary use of data collected by individual ISS cooperators will be to provide supplementation analysis on a project-wide basis (ISS Five year report). In some situations, paired treatment/control comparisons can be made by individual cooperators without collating project-wide data.

The project objectives are:

1. To monitor and evaluate the effects of supplementation on presmolt and smolt numbers and spawning escapement of naturally produced chinook salmon.
2. To monitor and evaluate changes in natural productivity and genetic composition of target and adjacent populations following supplementation.
3. To determine which supplementation strategies (broodstock and release stage) provide the quickest and highest response in natural production without adverse effects on productivity.
4. To develop supplementation recommendations.

ISS is an attempt to address several questions associated with two unknowns: "Can supplementation work?" and "What supplementation strategies work best?"

1. Does supplementation of existing chinook salmon populations in Idaho enhance natural production?
2. Does supplementation with existing hatchery stocks establish natural populations of chinook salmon in areas of Idaho where chinook salmon were extirpated?
3. Does supplementation of existing chinook salmon populations in Idaho reduce natural productivity of target or adjacent populations below acceptable levels (e.g., replacement)?
4. How often is supplementation required to maintain populations at satisfactory levels?

5. Can existing hatcheries and broodstocks be used effectively to supplement target populations within local or adjacent subbasins?

6. Is there an advantage to developing new and localized broodstocks with a known natural component for supplementation of existing natural populations?

7. Which life stage release (i.e., parr, presmolt, smolt) provides the quickest and highest response in rebuilding natural populations?

8. What effect does life stage at release have on existing natural productivity and genetic composition?

These questions relate directly to questions 2, 3, 6, and 7 specified as important critical uncertainties by the Supplementation Technical Work Group (1988). In addition to addressing these questions with general application to the Columbia River Basin, the Salmon Supplementation Studies in Idaho Rivers may provide case history evaluations of several supplementation programs in Idaho.

STUDY AREA

The six tributaries of the Salmon River drainage monitored by the SBT include Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), South Fork Salmon River (SFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF).

Bear Valley Creek, located in Valley County, Idaho, flows northeast for 54.5 km to its confluence with Marsh Creek to form the Middle Fork of the Salmon River. BVC is a control stream in which no supplementation occurs. Chinook salmon populations were monitored in that portion of BVC from the confluence with Elk Creek to the headwaters. BVC is generally a low to medium gradient system that meanders through subalpine meadows and lodgepole pine (*Pinus contorta*) forest in a granitic batholith. Alluvial deposits of highly erosive sandy soils typify the region. All land in the BVC drainage is under federal ownership as part of the Boise National Forest. Current uses in BVC include system-wide livestock grazing and recreation.

East Fork Salmon River is located in Custer County, Idaho. EFSR is a treatment stream receiving hatchery smolts which are progeny of adult chinook salmon collected at the IDFG adult weir 29 river kilometers upstream of the confluence with Salmon River. Chinook salmon populations were monitored in that portion of EFSR from the IDFG adult weir to the headwaters. Upper EFSR is generally a low to medium gradient system which flows through moderately wide valleys of lodgepole pine and Douglas fir (*Pseudotsuga menziesii*) forests, improved pasture ranchlands, sagebrush/grass areas, and narrow canyons. Most of the system is roaded and lies in an area of Challis Volcanics which is characterized by highly erosive sandy and clay-loam soils. Adjacent lands are managed by the Salmon-Challis National Forest, Sawtooth National Forest, Salmon District Bureau of Land Management, and private landowners.

Herd Creek, a tributary of the EFSR, is located in Custer County, Idaho. HC is a control stream in which no supplementation occurs. Chinook salmon populations were monitored in that portion of HC from just above its confluence with the EFSR to the headwaters. HC is generally a low gradient system which flows through a moderately narrow valley of improved pasture rangelands and sagebrush/grass. Most of the system lies in an area of Challis Volcanics which is characterized by highly erosive sandy and clay-loam soils. Adjacent lands are managed by the Salmon-Challis National Forest, Salmon District Bureau of Land Management, and private landowners.

South Fork Salmon River is located in Valley County, Idaho. SFSR is a treatment stream receiving hatchery smolts reared from eggs collected from adult chinook salmon trapped at the IDFG adult weir. Chinook salmon populations were monitored in that portion of SFSR from the IDFG adult weir to the headwaters. Upper SFSR is generally a low to medium gradient system which flows through wide grass valleys of lodgepole pine and Douglas fir, and a reach of narrow canyons. Adjacent lands are managed by the Boise National Forest.

Valley Creek, located in Custer County, Idaho, is a major tributary to the Salmon River. VC is a control stream in which no supplementation occurs. Chinook salmon populations were monitored in that portion of VC from the confluence with the Salmon River to the headwaters. VC is generally a low to medium-low gradient system that meanders through subalpine meadows and lodgepole pine forest. Adjacent lands are managed by the Salmon-Challis National Forest, Sawtooth National Recreation Area, and private landowners.

West Fork Yankee Fork Salmon River (WFYF) located in Custer County, Idaho, is a major tributary to the Yankee Fork Salmon River. WFYF is a treatment stream that received hatchery chinook salmon presmolts in 1994 from eggs collected from adult chinook salmon trapped at the

IDFG Sawtooth Fish Hatchery. Chinook salmon populations were monitored in that portion of WFYF from the confluence with the Yankee Fork Salmon River to the headwaters. WFYF is a low to moderately high gradient system that meanders through subalpine meadows and lodgepole pine forest. Adjacent lands are managed by the Salmon-Challis National Forest.

METHODS

Parr Abundance

For purposes of this report, juvenile salmon lifestages are broken out as follows: Fry - swim-up until 30 June; Parr - 1 July until 31 Aug; Presmolts - 1 Sept until 1 Jan; Smolts - 1 Jan until 30 June.

Chinook salmon parr abundance was estimated by collecting snorkeling data at multiple sites on each of the study streams. Snorkeling data was collected using standardized procedures as described by Thurow (1994). All streams were snorkeled during July and the first part of August in an attempt to document the summer rearing population of chinook salmon parr. Attempts were made to limit snorkeling activities to periods when water temperatures were above 10EC and underwater visibility was greater than 3 m. At water temperatures below 10EC stream-dwelling salmonids tend to seek concealment cover, making them more difficult to locate and count (Thurow 1994). During the few snorkel sessions when underwater visibility was less then 3 m additional snorkelers were added.

Fish observed during snorkel counts were identified by species and size (estimated to the nearest 10 millimeters). Length information was collected in this manner so each fish could later be assigned to an age group. Fish counts were either recorded on underwater slates or called to a data recorder on the streambank. Only the presence or absence of sculpins *Cottus spp.* and dace *Rhinichthys spp.* was noted because their cryptic nature makes accurate counts difficult. The following fish were observed in one or more of the study streams: chinook salmon, steelhead trout *Oncorhynchus mykiss*, cutthroat trout *O. clarkii*, brook trout *Salvelinus fontinalis*, bull trout *S. confluentus*, mountain whitefish *Prosopium williamsoni*, sucker *Catostomus spp.*, dace, sculpin, and redside shiner *Richardsonius balteatus*.

The streams were subdivided into sampling strata based on stream size, channel type (Rosgen 1985), gradient, and traditional chinook salmon usage for both spawning and rearing. A description of strata boundaries and lengths can be found in Appendix A. Systematically

established snorkel sites were spaced from 400 to 800 m apart in each stratum. Each site was composed of one or more habitat units defined as a specific habitat type confined at both the upper and lower borders by a hydraulic control. For the purposes of this study, four habitat types were utilized: pool, riffle, run, and pocket water. Pool, riffle, and run (glide) habitats correspond to the general habitat categories and definitions described by Bisson et al. (1982). Pocket water is predominantly moderate velocity run habitat with numerous protruding boulders forming "pockets" of low velocity behind them. A list of streams, strata, number of sites sampled per stratum, number of each habitat type sampled per stratum, and predominate channel type present are listed in Table 1.

Population size was estimated from snorkeling data using a stratified systematic design (Scheaffer et al. 1986, Van Den Avyle 1993). Estimates were calculated by snorkel site (the area snorkeled irrespective of habitat type) and by habitat type. The variability in fish count data was expected to be less between units of the same habitat type than between sites composed of one or more different habitat types (site data). The net benefit of using habitat type data would be a reduction in the variability of the final population estimate.

Using the relatively vigorous methods described above to estimate summer chinook parr populations, results on a project-wide basis showed extraordinarily large confidence intervals and coefficients of variation. ISS cooperators modified their sampling design over a few years to reduce the variation around parr population estimates without success.

In the spring 1998, ISS cooperators decided to indefinitely discontinue effort in obtaining summer parr population estimates due to poor results. In the past, we collected data for the General Parr Monitoring (GPM) database during our ISS snorkeling activities. Cooperators decided to continue to snorkel GPM sites to provide trend information on juvenile densities without expending significant effort.

Table 1. List of Idaho Supplementation Study streams, strata lengths (m), number of sites sampled per stratum, and the predominant channel type present during 1995 (Rosgen 1985). Six tributaries of the Salmon River were sampled: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), South Fork Salmon River (SFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF).

				Number of each habitat type				
Stream	Stratum	Stratum Length (m)	Number of sites	Pool	Riffle	Run	Pocket water	Channel type
BVC	3	12,700	19	13	18	12	0	C
	4	11,200	13	10	10	6	0	C
	5	4,000	8	7	7	3	0	C
	6	2,300	7	5	7	2	0	C
	7	5,500	8	6	5	3	0	B
EFSR	1	6,275	14	9	9	6	0	B
	2	5,149	9	8	8	8	0	B
	3	7,521	4	4	4	2	0	B
	4	8,077	5	4	4	5	0	B/C
HC	0	3,000	3	3	2	3	0	B
	1	5,500	8	7	8	4	0	B/C
	2	8,600	11	9	11	6	0	B/C
SFSR	C[a]	2,626	4	3	3	3	0	B
	1	8,695	4	3	4	2	0	B
	2	9,656	17	16	11	10	0	B/C
	3	8,208	10	8	5	5	5	B
VC	1	10,854	6	5	4	4	0	C
	2	14,032	12	12	10	9	0	C
	3	8,308	12	7	9	9	2	C
	5	3,030	0	0	0	0	0	B/C
	6	4,450	4	2	3	2	0	B
WFYF	0	4,141	3	3	2	3	0	B
	1	6,955	13	12	7	8	0	C
	2	4,613	7	5	5	5	0	B

[a] Curtis Creek is a major tributary of the South Fork Salmon River.

Habitat Measurements

After snorkeling a site, each habitat unit was measured to determine surface area. Between one and six width measurements were taken for each unit depending on the unit's length and the stream sinuosity. The length of each unit was measured along the thalweg between the hydraulic controls forming the unit's boundaries. The snorkel sites were measured by habitat type so population estimates could be generated by habitat type or by site.

Each study stream was habitat-typed by stratum during redd counts conducted in late August 1993. EFSR was habitat-typed again in 1995 due to high water levels to better represent the habitat types present. A crew member would tally the habitat type adjacent to their position every 10 paces while conducting redd counts. Each observation was tallied under one of four columns: pool, riffle, run, or pocket water. These data were used to determine the percent of each habitat type present, by stratum, for each stream (Table 2). Habitat assessments for Elk Creek and Stanley Lake Creek, tributaries of Valley Creek, were done by Sawtooth National Recreation Area crews in 1990 and 1992, respectively. Information on the percent of each habitat type present for Curtis Creek was provided by the Forest Service from work conducted in 1991. The data were ultimately used to calculate population estimates by habitat type.

Redd Counts

Redd counts were conducted on five ISS streams by SBT crews and on the SFSR by IDFG crews between the first of August and the first week of October. We used procedures outlined in IDFG's Redd Count Manual (Hassemer 1991). Each stream was counted between two and four times at approximately 11-day intervals. Multiple ground counts allowed crews to be on the stream either during redd construction or shortly thereafter, thus aiding in redd identification. Multiple counts also increased the number of adult chinook salmon carcasses recovered. In 1998, additional surveys were conducted with the sole purpose of collecting a greater number of carcasses. Redd count information was summarized by stream and stratum. The location of each redd encountered in 1994 and 1996 through 1998 was recorded on USGS, 7.5 minute

Table 2. Percent of each habitat type found during a 10-pace habitat survey conducted on the following ISS streams: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF), during August 1993 and during 1995. The percentage of each habitat type was calculated by stratum and for all strata combined.

		Percent of each habitat type			
Stream	Stratum	Pool	Riffle	Run	Pocket water
BVC	3	36	35	29	0
	4	16	29	55	0
	5	30	19	51	0
	6	37	46	17	0
	7	28	37	35	0
	ALL	30	34	36	0
EFSR	1	27	44	29	0
	2	18	41	41	0
	3	27	57	16	0
	4	24	41	35	0
	ALL	24	48	28	0
HC	0	17	54	29	0
	1	39	43	18	0
	2	24	53	23	0
	ALL	29	49	22	0
SFSR	2	28	35	35	2
	3	12	30	21	37
	C[a]	16	67	17	0
	ALL	23	33	30	14
VC	1	39	38	23	0
	2	24	40	36	0
	3	7	33	58	2
	5	5	42	53	0
	6	5	64	31	0
	ALL	21	36	42	1
WFYF	1	10	58	32	0
	2	30	40	30	0
	ALL	23	46	31	0

[a] Curtis Creek is a major tributary of the South Fork Salmon River.

topographic maps. Redd locations provide information about spawning distribution between years at different escapement levels and areas of probable high rearing densities the following summer.

Information was collected from each adult chinook salmon carcass encountered. For each carcass, crews measured the fork length and mid-eye to hypural plate length to the nearest centimeter; determined the sex and percent spawned; and checked each fish for fin clips, tags, and radio transmitters. Carcass fork length data was generally grouped into the following age classes: jack ($\leq$ 62 cm), 2-ocean (63-79 cm), and 3-ocean ($\geq$ 80 cm) (Hassemer 1993). In some years, the age of carcasses we recovered was determined based on the Sawtooth Fish Hatchery estimated length at age. Sawtooth Fish Hatchery was able to collect known length at age data from a portion of adult returns to the weir due to coded wire tag and PIT-tag recoveries.

In addition, scales were collected following procedures set forth by Hassemer (1991). Genetic tissue samples and otoliths were collected from all carcasses encountered in 1997. In 1998, 1999, and 2000 genetic tissue samples and fin rays were collected from carcasses, and otoliths were collected from carcasses sampled in Bear Valley Creek. At the end of each field season the scale samples, otoliths, fin rays, and genetic tissue samples were sent to IDFG Research to be analyzed or to be archived for future analysis. Otoliths collected were transferred to the Forest Service's Intermountain Research Laboratory in Boise.

Rearing, Marking, and Releases

Supplementation fish were reared in existing Idaho Department of Fish and Game hatcheries and satellite facilities following standard hatchery practices. A subsample of juvenile chinook salmon were PIT-tagged in the hatchery prior to release. The experimental design called for PIT-tagging up to 500 chinook salmon smolts released in the spring and 1,000 chinook salmon presmolts released in the fall from each treatment (i.e. hatchery release). Fish were PIT-tagged primarily to evaluate survival from time of release to detection at the lower Snake River dams. All treatment fish were marked initially with a right or left pelvic fin clip to enable

identification of adult returns and ensure differentiation from natural adults for broodstock collection.

Supplementation fish trucked to the East Fork Salmon River were released with no acclimation at two locations in 1995. The initial release of 31,250 chinook salmon smolts occurred near Wickiup Creek from March 28-30. A second group of 17,595 fish with high levels of bacterial kidney disease were released at the EFSR adult weir on April 3. Supplementation fish released in 1995 had a left pelvic fin clip. Table 3 presents the number of smolts and presmolts released in the EFSR since 1986. A summary and history of the East Fork Salmon River adult weir operations and hatchery program since installation and proposed supplementation efforts are given in Bowles and Leitzinger (1991).

The West Fork Yankee Fork received a presmolt treatment in 1994. Treatment fish were upper Salmon River stock reared at Sawtooth Fish Hatchery. They were helicoptered in to the WFYF and were not acclimated.

The captive rearing/broodstock project (IDFG) has taken juvenile salmon from the EFSR and WFYF in captivity for rearing. In 1997, the first adults were released back into their natal streams. Four jacks were released in the WFYF and no adults were released in the EFSR. In 1998, some adults were released in WFYF and some adults were held in the hatchery for broodstock. In addition, adults destined for the EFSR were held in the hatchery for broodstock. Eggs were outplanted later in 1998 in both the EFSR and WFYF. These treatments will be monitored in coordination with SBT-ISS. South Fork Salmon River treatments are reported in IDFG-ISS reports.

Supplementation treatments in the upper Salmon River basin have not occurred to the degree called for in the ISS Experimental Design (Bowles and Leitzinger, 1991). The primary reason for reduced treatments is the lack of local broodstock. Poor and declining adult escapement to the upper Salmon River basin will continue to constrain the availability of locally adapted broodstock.

Table 3. Chinook salmon releases in the East Fork Salmon River (EFSR) and West Fork Yankee Fork Salmon River (WFYF) from 1986 to 1999. No releases occurred in 2000.

Stream	Brood year	Release date	Number released[a]		Fin Clip	Number PIT-tagged	Adult collection site	Rearing facility[b]
			Presmolts	Smolt				
EFSR	1999	8/25/99	7 captive reared adults (6 female and 1 male) were released to spawn naturally.					
EFSR	1999	1999	1,035 eyed eggs from captive reared adults were planted in Jordan-Scotty boxes.					
EFSR[d]	1998	1998	2,039 eyed eggs from captive reared adults were planted in Jordan-Scotty boxes.					
EFSR	1998	1998	15,240 eyed-eggs from captive reared adults were planted in Jordan-Scotty boxes.					
EFSR	1997	8/97	4 captive reared jacks were released to spawn naturally.					
EFSR	1996	N/A	No release from this brood year.					
EFSR	1995	N/A	No release from this brood year.					
EFSR	1994	N/A	No release from this brood year.					
EFSR	1993	04/03/95	N/A	17,595[c]	Left Pelvic	0	EFSR	Sawtooth FH
EFSR	1993	03/28/95	N/A	31,250	Left Pelvic	499	EFSR	Sawtooth FH
EFSR	1992	04/08/94	N/A	12,368	Right Pelvic	387	EFSR	Sawtooth FH
EFSR	1991	04/20/93	N/A	35,172	Left Pelvic	350	Salmon River	Sawtooth FH
EFSR	1990	1992	N/A	79,300	Left Pelvic	0	EFSR	Sawtooth FH
EFSR	1989	1991	N/A	98,300	No clip	0	Sawtooth	Sawtooth FH
EFSR	1988	1990	N/A	514,600	No clip	0	EFSR	Sawtooth FH
EFSR	1987	1989	N/A	305,300	No clip	0	EFSR	Sawtooth FH
EFSR	1986	1988	N/A	249,200	No clip	0	EFSR	Sawtooth FH
EFSR	1985	1987	N/A	195,100	No clip	0	EFSR	Sawtooth FH
EFSR	1984	1986	N/A	108,690	No clip	0	EFSR	Sawtooth FH
WFYF[e]	1999	1999	2,297 eyed-eggs from captive reared adults were placed in the WFYF.					
WFYF	1998	1998	3,393 eyed-eggs from captive reared adults were place in a streamside incubator.					
WFYF	1998	8/98	44 captive reared adults released to spawn naturally to produce BY 98 offspring					
WFYF	1997	8/97	4 captive reared jacks released to spawn naturally.					
WFYF	1993	10/19-29/94	25,025	N/A	Adipose	1,000	Salmon River	Sawtooth FH

[a] from Idaho Department of Fish and Game annual hatchery reports.
[b] from Idaho Department of Fish and Game, Fisheries Research, Stocking summary for EFSR and WFYF, 1986-1998.
[c] these fish were diagnosed with high levels of bacterial kidney disease.
[d] eggs planted in Big Boulder Creek.
[e] 829 eyed-eggs were placed in Jordan-Scotty boxes and 1,468 eyed-eggs were placed in a streamside incubator.

Screw Trapping

A rotary screw trap (EG Solutions, Corvallis, Oregon) was operated on the WFYF about 25 meters upstream from the confluence of the Yankee Fork Salmon River to trap emigrating juvenile chinook salmon during 1999 (spring and fall) and 2000 (spring only). The trap was suspended in the thalweg of the channel by a cable strung across the stream. One goal of trapping is to capture and PIT-tag up to 500 emigrating chinook salmon as smolts, presmolts, and parr.

In 1999 (fall only) and 2000 (spring and fall) a screw trap was operated about 300 m downstream of the Idaho Department of Fish and Game adult weir on the EFSR for the same purposes as mentioned above. Traps were operated in the same general manner regardless of location. Dates the rotary screw trap was installed and removed on the West Fork Yankee Fork Salmon River and the East Fork Salmon River are presented in Table 4.

Traps were generally checked twice daily, in the morning and in the evening just before dusk. During the morning check all fish were removed and sorted into separate buckets by size. Chinook salmon (> 60 mm), steelhead trout (> 70 mm), and bull trout were collected in buckets and transported to a tagging tent or trailer. The average, maximum, and minimum fork length of PIT-tagged chinook salmon by year and season is presented in Table 5. Minimum size of chinook salmon juveniles PIT-tagged varied between years and has ranged from 55 to 65 mm. Non-target species were counted, measured to the nearest millimeter (fork length), sometimes weighed, and released below the trap. Environmental variables such as air and water temperature, stage (water level), weather, and water clarity were recorded on the daily trapping sheet. During the evening check all fish tagged during the day were released, and the trap was checked to make sure it was operating properly. In some circumstances, fish tagged in the morning were allowed to recover for 15 to 30 minutes and were then released above the trap. Environmental variables such as water temperature and stage level were recorded on the release data sheet.

Table 4. Dates the rotary screw trap was installed and removed on the West Fork Yankee Fork Salmon River and the East Fork Salmon River. The West Fork Yankee Fork trap location was 25 meters above the mouth and the East Fork trap location was approximately 300 meters below the Idaho Department of Fish and Game adult weir.

West Fork Yankee Fork Salmon River

Year	Season	Date installed	Date removed
2000	Spring	07-Mar-00	24-May-00
1999	Spring	29-Mar-99	01-Jul-99
	Fall	06-Jul-99	14-Oct-99
1998*	Spring	25-Mar-98	30-Jun-98
	Summer	1-Jul-98	31-Aug-98
	Fall	1-Sept-98	20-Nov-98

East Fork Salmon River

Year	Season	Date Installed	Date Removed
2000	Spring	07-Mar-00	20-May-00
	Fall	20-Jul-00	07-Nov-00
1999	Fall	02-Aug-99	14-Oct-99
1997	Fall	09-Sept-97	10-Oct-97
1996	Spring	04-Mar-96	30-May-96
1995	Spring	07-Mar-95	31-May-95
	Fall	08-Aug-95	11-Nov-95
1994	Spring	14-Mar-94	27-May-94
	Fall	15-Aug-94	22-Nov-94
1993	Spring	07-Apr-93	21-May-93
	Fall	16-Aug-93	21-Nov-93

* trap operated all season (3/25/98 to 11/20/98) in 1998.

Table 5. Average, maximum, and minimum fork lengths (mm) for chinook salmon juveniles on the East Fork Salmon River (EFSR) and the West Fork Yankee Fork Salmon River (WFYF) by year and season. N is equal to sample size.

Stream	Tag Year	Season	N	Average	Maximum	Minimum
WFYF	2000	Spring	640	82	119	66
	1999	Spring	449	82	125	65
		Fall	677	70	99	60
	1998	Spring	88	82	105	60
		Summer	28	89	135	62
		Fall	1460	79	122	55
EFSR	2000	Spring	362	95	114	73
		Fall	338	88	109	62
	1999	Fall	205	81	105	54
	1996	Spring	150	96	126	76
	1995	Spring	353	89	122	68
		Fall	110	91	108	71
	1994	Spring	21	104	120	95
		Summer	498	75	96	56
		Fall	542	80	138	59
	1993	Spring	217	96	126	70
		Fall	198	96	108	70

Mechanical failures, high flows, debris, ice, personnel constraints, and other situations prevented consistent trap operation. There were some periods of up to a week and longer when the trap was not operating correctly and in situations not operating at all. Not all newly tagged fish released above the trap had the same likelihood of being recaptured. When the trap was not operating or only operated partially, or when flows increased or decreased significantly, or when the trap was moved to a different part of the channel, fish recapture probabilities changed significantly. Recapture probabilities often changed as frequently as day to day.

Instead of splitting up a particular trapping season to account for many significant differences in trap efficiency, we used a season long efficiency estimate to calculate a population estimate. When no trap efficiency data was available historic trap efficiencies were used to generate population estimates. For 1999 and 2000 data a new software program developed by Kirk Stienhorst at the University of Idaho was used to estimate population parameters associated with screw trap efforts (Stienhorst 2000).

Discharge was monitored at the screw trap by establishing a permanent stage gage and developing a general linear model relating actual discharges (m^3/s) with stage readings. Discharge was measured using the United States Geological Survey midsection method (Orth 1983). Velocities were measured using a Swoffer current meter.

Steelhead trout greater than 70 mm and all bull trout caught were tagged to assist projects being administered by the IDFG. PIT-tagging of steelhead trout and bull trout started during the spring of 1994 and fall of 1993, respectively. Scale samples were collected from bull trout on the left side of the fish as described for adult chinook salmon in the redd count manual. Bull trout scale samples were transferred to IDFG Fisheries Research. PIT-tagging and scale sampling of bull trout was discontinued in 2000.

Fish were PIT-tagged daily following procedures defined by Kiefer and Forster (1991) and the PIT-tag Steering Committee (1992). PIT-tagging data were recorded by using a PIT-tagging Station (Biomark Inc., Boise, Idaho) following methods outlined in Prentice et al. (1990). No more than 10 juveniles were anesthetized (MS-222 and sodium bicarbonate buffer)

at one time and equipment was sterilized in a 70% ethanol solution to reduce transmission of disease. After tagging, most fish were held in flow through boxes until dusk when they were released.

All tagged fish were released in calm water above at least the first riffle upstream from the screw trap. During the spring of 1993 fish were held for approximately 30 hours (until dusk of the day after tagging) to monitor mortality and tag retention. It was determined that nothing was gained by holding the fish beyond dusk of the day tagged. After the spring of 1993 no fish were held longer than 24 hours. Fish were alternately released from the right and left bank. Chinook salmon juveniles were always released on the opposite bank from any steelhead trout or bull trout being released.

The recapture of tagged fish allowed for estimation of trap efficiency. Recaptured fish were released downstream of the screw trap.

Trapping efficiency was calculated for each trapping season separately. The total number of emigrants was estimated by using a trap efficiency calculated for the entire trapping period. Trap efficiency was estimated by:

$$p = r/n; \qquad (1)$$

where p is the estimated trap efficiency, r is number of marked fish recaptured, and n is number of marked fish.

In 1996, ISS coordinators determined the use of the method described in Fleiss (1981), for calculation of confidence intervals for a proportion (trap efficiency), would be more appropriate than methods used in the past. Fleiss (1981) provides equations for proportions which are appropriate when the products (n*p) and (n*q) are >5.

Where: p = trap efficiency

q = 1 - p

n = the number of fish tagged and released above the trap

When p is not $0.3 \leq p \leq 0.7$, equations (2) and (3) apply.

In all cases, trap efficiency was less than 0.3. Therefore, equations 2 and 3 were used in calculating 95% confidence limits for trap efficiencies. The lower limit of the trap efficiency confidence interval is calculated by:

$$P_L = [(2np+C^2-1)-C\{C^2-(2+1/n)+4p(nq+1)\}^{1/2}]/2(n+C^2) \quad (2)$$

where C is the critical value of a two-tailed significance test at the .05 level of significance for a binomial distribution. The upper limit of the trap efficiency confidence interval is calculated by:

$$P_U = [(2np+C^2+1)+C\{C^2+(2-1/n)+4p(nq-1)\}^{1/2}]/2(n+C^2) \quad (3)$$

Population estimates of the total number of fish emigrating past the screw trap were calculated for the time interval in which the trap was operated. The population estimate was calculated by using the proportion of marked fish to recaptured fish (trap efficiency) to expand the unmarked catch and estimate the total number of fish emigrating (Thedinga et al. 1994). The total number of fish emigrating was estimated by:

$$N = U/p; \quad (4)$$

where N is the estimated number of fish emigrating, and U is the unmarked fish caught. Confidence limits (95%) for outmigrant population estimates were approximated by entering the lower and upper 95% confidence limits for the trapping efficiency into equation 4.

In 1998, ISS cooperators agreed to use the bootstrap method for calculating trap efficiencies, population estimates, and confidence intervals. All trapping estimates reported in the ISS Five Year Report (*submitted to BPA*) were calculated using the Bootstrap method. For purposes of this report, the Bootstrap method was used only in calculating estimates for 1998 trapping data.

Software developed by the National Marine Fisheries Service Auke Bay Laboratory was used to estimate trap efficiencies and numbers of chinook juveniles emigrating past the traps (ISS Five Year Report). The software calculates trap efficiency as follows:

$$\hat{E} = \frac{R+1}{M+1}$$

where $\hat{E}$ = trap efficiency, R = number of marked fish recaptured, and M = number of marked fish released above the trap. Trap efficiencies were calculated for two periods, fall (July 1 through December 31) and spring (January 1 through June 30). In 1998, the spring period was extended to July 6, the last day we caught brood year 1996 emigrants. The software then uses the bootstrap method to estimate the number of emigrants passing the trap (Efron and Tibshirani 1986, 1993, Murphy et al. 1992, Thedinga et al. 1994). Spring (smolt) and fall (presmolt) emigrant were estimates followed by 1,000 iterations to obtain each estimate. Confidence intervals (90%) were then calculated for each estimate, based on the percentiles of the bootstrap distribution (Buckland 1984, Efron and Tibshirani 1993).

Maximum likelihood population estimates with confidence intervals (alpha .05) for 1998, 1999, and 2000 data were calculated using a Gauss outmigration program version 4-12-01 developed by Kirk Steinhorst at the University of Idaho (Steinhorst, 2000).

Summer Parr PIT-tagging

In the summer of 1999 and 2000, the Shoshone-Bannock Tribes worked cooperatively with NMFS (S. Achord) to PIT-tag summer parr in Bear Valley, Valley, and Herd Creeks. Information from these tagging events are not included in this report. Results and analysis from summer parr tagging will be available in NMFS published reports and will be included in future ISS project-wide summary reports.

Detections

PIT-tags are read when the fish passes through an interrogation site at one of the detection facilities located within some of the Columbia River and Snake River dams. The interrogation sites are incorporated in the juvenile passage facilities at the dams. All detections are transferred via modem to the PTAGIS database housed and administered by the Pacific States Marine Fisheries Commission. During migration years 1999 through 2000 detection facilities were operating at Snake River Trap (1999 only), Lower Granite Dam (GRJ), Little

Goose Dam (GOJ), Lower Monumental Dam (LMJ), and McNary Dam (MCJ), John Day Dam (JDA), Bonneville Dam (BON), and the Columbia River Estuary (TWX).

The detection facilities only detect a portion of the tagged fish passing by the facility. For any group of tagged fish migrating past a dam with a detection facility, some will go though the facility and be interrogated, some will go through the turbines and not be interrogated, and some may be spilled and not be interrogated. The proportion of the tagged population passing through the detection facilities is difficult to determine and will vary for several reasons related to the operation of the dams and river conditions. These facts need to be kept in mind when comparing rates of detection between years and between different groups of tagged fish.

PIT-tag detection information from migrating juvenile and adult salmon is stored in and disseminated from the PTAGIS database. Observation summary reports can be generated in the PTAGIS database which provides information used to determine the number of tagged fish detected, travel time, dates of detections, etc. In-river survival estimates presented in this report are based on the enumeration of unique detections at any detection facility

RESULTS

Parr Abundance

Large confidence intervals associated with our parr population estimates resulted in ISS cooperators deciding not to spend the extensive effort it takes to collect the information. The last year of snorkeling data used to estimate parr populations was collected in 1997. At the same time ISS cooperators agreed to continue to snorkel General Parr Monitoring sites, approximately 20% of previous snorkeling duties. Information regarding population estimates, abundance, and densities by habitat type are presented in Tables 6, 7, and 8. Densities of chinook salmon and bull trout observed during snorkeling activities in 1999 and 2000 are summarized in Tables 9 and 10. Densities of non-target fish species by stream and stratum are found in Appendix C.

Redd Counts

Redd counts in 1999 were 46-100% lower than 1998 counts in BVC, EFSR, HC, VC, and WFYF. No redds were found in the WFYF in 1999. Year 2000 redd counts were 33-90% lower than 1998 counts in EFSR, HC, VC, and WFYF. The number of redds counted, live adult chinook salmon observed, number of carcasses encountered, and the number of redds per kilometer from 1992 to 2000 are presented in Table 11. Carcass data collected from 1999 to 2000 are presented in Tables 12 and 13. Carcass data should not be used to represent trends in abundance. Dissimilar carcass collection effort was expended between and within years. Carcass survey information should be used to reconstruct brood year success by determining age of adult at return. In addition, mark recovery information from carcasses will be used to help determine adult return rate from various marked groups of fish.

Table 6. Chinook salmon parr population estimates (Pop.), 90% confidence intervals (expressed as a percent of the population estimate), and coeffecient of variation for Idaho Supplementation Studies streams snorkeled from 1992 to 2000. Population estimates were calculated using numbers of fish counted per snorkel site (BY SITE) and numbers of fish counted per habitat unit within each snorkel site (BY HABITAT). Six tributaries of the Salmon River were sampled: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), South Fork Salmon River (SFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF). NE = no estimate, N/A = not applicable.

	2001[a] 2000[a], 1999[a], 1998[a]	1997			1996			1995			1994			1993			1992		
Stream		Pop.	90% CI	CV	Pop.	90% CI	CV	Pop.	90% CI	CV	Pop.	90% CI	CV	Pop.	90% CI	CV	Pop.	90% CI	CV
By Site																			
BVC	--	1,236	(78%)	0.46	11	(204%)	0.96	535	(55%)	0.33	25,451	(24%)	0.14	5,259	(66%)	0.38	9,153	(51%)	0.30
EFSR	--	NE			NE			464	(59%)	0.34	9,176	(53%)	0.30	161	(160%)	0.68	NS	NS	NS
HC	--	2,044	(115%)	0.57	0	N/A	N/A	190	(65%)	0.38	39,944	(34%)	0.20	863	(113%)	0.62	16,333	(39%)	0.22
SFSR	--	6,303	(51%)	0.30	6,381	(62%)	0.21	3,796	(46%)	0.27	144,115	(17%)	0.10	12,521	(51%)	0.30	8,820	(42%)	0.24
VC	--	NE			NE			119	(58%)	0.34	136,046	(16%)	0.09	4,126	(50%)	0.28	11,874	(29%)	0.17
WFYF	--	2,180	(106%)	0.60	0	N/A	N/A	4,039	(42%)	0.24	13,465	(33%)	0.19	113	(123%)	0.61	8,285	(103%)	0.58
By Habitat																			
BVC	--	1,405	(100%)	0.34	12	(172%)	0.97	592	(45%)	0.27	26,842	(21%)	0.13	4,621	(69%)	0.40	NS	NS	NS
EFSR	--	NE			NE			539	(67%)	0.39	4,524	(27%)	0.16	34	(105%)	0.54	NS	NS	NS
HC	--	1,807	(199%)	0.68	0	N/A	N/A	105	(76%)	0.45	31,053	(25%)	0.15	513	(116%)	0.68	8,298	(35%)	0.20
SFSR	--	5,696	(55%)	0.23	8,814	(68%)	0.37	3,402	(36%)	0.21	99,435	(18%)	0.11	8,358	(35%)	0.21	5,581	(34%)	0.20
VC	--	NE			NE			145	(73%)	0.44	97,642	(10%)	0.06	2,370	(48%)	0.28	9,590	(30%)	0.17
WFYF	--	1,100	(140%)	0.48	0	N/A	N/A	2,791	(43%)	0.26	11,935	(26%)	0.15	92	(125%)	0.67	NS	NS	NS

[a] snorkeling effort was reduced in 1998, 1999, 2000 and 2001. As a result information for these years is not presented in this table.

Table 7. Estimated abundance of chinook salmon parr rearing by habitat type from 1992 to 2000. Six tributaries of the Salmon River were sampled: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), South Fork Salmon River (SFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF). NA= habitat breakdown not available, NE= no estimate due to low parr densities, NP= habitat type not present in sampled sites, NS= not snorkelled.

Stream	Pool	Riffle	Run	Pocket Water	Total
		2000[a], 1999[a], 1998[a]			
		1997			
BVC	1,011	369	25	NP	1,405
EFSR	NE	NE	NE	NE	NE
HC	1,807	0	0	NP	1,807
SFSR	2,868	333	2,172	323	5,696
VC	NE	NE	NE	NE	NE
WFYF	739	68	294	NP	1,100
		1996			
BVC	0	0	8	NP	8
EFSR	NE	NE	NE	NE	NE
HC	0	0	0	NP	0
SFSR	1,789	4,400	886	893	7,969
VC	NE	NE	NE	NE	NE
WFYF	0	0	0	NP	0
		1995			
BVC	247	113	233	NP	593
EFSR	137	267	135	NP	539
HC	33	34	39	NP	106
SFSR	1,119	858	340	777	3,094
VC	2	27	113	3	145
WFYF	1,149	673	969	NP	2,791
		1994			
BVC	13,479	4,109	9,255	NP	26,843
EFSR	1,997	926	1,601	NP	4,524
HC	22,162	2,439	6,453	NP	31,054
SFSR	37,224	9,673	28,945	23,594	99,436
VC	39,976	16,009	41,183	474	97,642
WFYF	3,825	928	7,182	NP	11,935
		1993			
BVC	1,845	474	2,302	NP	4,621
EFSR	34	0	0	NP	34
HC	474	39	0	NP	513
SFSR	4,777	1,393	1,563	626	8,358
VC	1,001	0	1,369	NA	2,370
WFYF	32	60	0	NP	92
		1992			
BVC	NA	NA	NA	NA	NA
EFSR	NS	NS	NS	NS	NS
HC	5,356	1,447	1,495	NP	8,298
SFSR	2,986	1,111	1,219	265	5,581
VC	2,846	440	6,304	NA	9,590
WFYF	NA	NA	NA	NA	NA

[a] snorkeling effort was reduced in 1998, 1999, and 2000. As a result, information for these years is not presented in this table.

Table 8. Densities (fish/100 m^2) of chinook salmon parr observed while snorkeling by habitat type and site from 1992 to 2000. The "By habitat" column is a weighted mean based on the amount of each habitat type present. Percent habitat type present was determined by habitat surveys conducted in 1993 and 1995. Six tributaries of the Salmon River were sampled: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), South Fork Salmon River (SFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF). NP= habitat type not present in sampled sites, NA= habitat breakdown not available, NS= not sampled.

Stream	Pool	Riffle	Run	Pocket Water	By Habitat	By Site
			2000			
BVC	1.13	0.25	0.85	NP	NA	NA
EFSR	3.33	0.00	0.40	NP	NA	NA
VC	2.39	1.96	1.13	NP	NA	NA
WFYF	0.00	0.00	0.00	NP	NA	NA
			1999			
BVC	12.46	4.41	8.54	0.00	NA	NA
EFSR	1.20	0.00	0.19	NP	NA	NA
VC	16.33	7.02	23.55	0.62	NA	NA
WFYF	14.46	0.00	3.09	NP	NA	NA
			1998[a]			
BVC	5.83	1.45	1.21	NP	NA	NA
EFSR[b]	0.00	NP	0.63	NP	NA	NA
VC	7.69	2.48	1.46	NP	NA	NA
WFYF	0.30	NP	13.53	NP	NA	NA
-						
			1997			
BVC	0.71	0.23	1.19	NP	0.72	0.38
EFSR	0.2	0.0	0.22	NP	0.11	0.1
HC	7.5	0.0	0.0	NP	2.18	2.6
SFSR	6.37	0.41	2.77	1.6	2.66	2.44
VC	2.11	0.25	0.06	NP	0.56	0.38
WFYF	2.29	0.09	0.79	NP	0.81	1.37
			1996			
BVC	0.0	0.0	0.01	NP	0.003	0.001
EFSR	0.0	0.0	0.0	NP	0.0	0.0
HC	0.0	0.0	0.0	NP	0.0	0.0
SFSR	3.3	2.0	1.0	4.0	2.3	3.2
VC	0.2	0.0	0.2	0.0	0.13	0.06
WFYF	0.0	0.0	0.0	NP	0.0	0.0
			1995			
BVC	0.3	0.1	0.3	NP	0.2	0.2
EFSR	0.2	0.3	0.1	NP	0.2	0.2
HC	0.2	0.1	0.2	NP	0.1	0.2
SFSR	1.7	1.4	0.6	2.5	1.4	1.3
VC	0.01	0.03	0.1	0.1	0.1	0.1
WFYF	4.8	1.0	2.5	NP	2.2	2.9

[a] Snorkeling effort was reduced to GPM sites in 1998, 1999, and 2000.

Table 8 (cont.). Densities (fish/100 m^2) of chinook salmon parr observed while snorkeling by habitat type and site from 1992 to 2000. The "By habitat" column is a weighted mean based on the amount of each habitat type present. Percent habitat type present was determined by habitat surveys conducted in 1993 and 1995. Six tributaries of the Salmon River were sampled: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), South Fork Salmon River (SFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF). NP= habitat type not present in sampled sites, NA= habitat breakdown not available, NS= not sampled.

Stream	Pool	Riffle	Run	Pocket Water	By Habitat	By Site
			1994			
BVC	12.7	5.7	8.8	NP	8.9	10.1
EFSR	10.8	0.7	2.8	NP	3.7	4.6
HC	91.2	6.8	26.3	NP	35.6	50.3
SFSR	85.2	12.4	46.9	69.1	47.4	59.9
VC	56.6	11.7	28.5	11.1	28.2	34.0
WFYF	19.4	1.7	13.8	NP	9.3	11.9
			1993			
BVC	1.7	0.5	1.0	NP	1.0	1.2
EFSR	0.3	0.0	0.0	NP	0.04	0.1
HC	1.6	0.1	0.0	NP	0.5	0.7
SFSR	10.3	1.9	2.4	3.1	4.1	10.0
VC	1.4	0.0	1.1	NA	0.8	1.0
WFYF	0.1	0.1	0.0	NP	0.1	0.1
			1992			
BVC	NA	NA	NA	NA	NA	3.4
EFSR	NS	NS	NS	NS	NS	NS
HC	23.1	6.4	24.8	NP	15.3	21.0
SFSR	5.5	2.9	2.3	0.9	3.0	4.3
VC	6.2	0.5	5.9	NA	4.3	5.1
WFYF	NA	NA	NA	NA	NA	5.0

Table 9. Chinook salmon parr observed while snorkeling by date and site from 1999-2000. Four tributaries of the Salmon River were sampled: Bear valley Creek (BVC), East Fork Salmon River (EFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF).

Survey Date	Stream	Strata	Section	Chinook Parr	Chinook parr/100m^2
12-Jul-00	BVC	2	A	45	1.41
12-Jul-00		2	B	0	0.00
12-Jul-00		3	A	10	0.57
12-Jul-00		5	A	28	2.03
12-Jul-00		7	BIG-MDW-L	0	0.00
12-Jul-00		9	B	0	0.00
20-Jul-99	BVC	2	A	198	5.13
19-Jul-99		2	B	71	8.05
20-Jul-99		3	A	320	24.69
02-Jul-99		5	A	106	7.55
21-Jul-99		7	BIG-MDW-L	0	0.00
22-Jul-99		9	B	0	0.00
10-Jul-00	EFSR	ABOVE WEIR	2	0	0.00
10-Jul-00		ABOVE WEIR	3	0	0.00
10-Jul-00		BLW WEIR	FOX CR	51	4.08
10-Jul-00		BLW WEIR	ZIEGLER HL	6	0.715
27-Jul-99	EFSR	ABOVE WEIR	2	0	0.00
27-Jul-99		ABOVE WEIR	3	0	0.00
03-Aug-99		BLW WEIR	FOX CR	19	1.50
27-Jul-99		BLW WEIR	ZIEGLER HL	3	0.29
11-Jul-00	VC	1	B	0	0.00
11-Jul-00		3	A	55	4.46
11-Jul-00		3	B	4	0.51
11-Jul-00		6	B	12	2.54
23-Jul-99	VC	1	B	30	2.12
23-Jul-99		3	A	261	17.38
23-Jul-99		3	B	340	34.80
23-Jul-99		6	B	3	0.55
13-Jul-00	SFSR	-99	STOLLE1	6	0.40
13-Jul-00		-99	STOLLE2	36	3.27
13-Jul-00		-99	5	41	5.04
05-Aug-99	SFSR	-99	STOLLE1	130	10.27
05-Aug-99		-99	STOLLE2	559	47.24
05-Aug-99		-99	5	196	30.94
29-Jun-00	WFYF	2	6.2	0	0.00
28-Jul-99	WFYF	2	6.2	85	14.46

Table 10. Bull trout observed while snorkeling by date and site from 1999-2000. Five tributaries of the Salmon River were sampled: Bear valley Creek (BVC), East Fork Salmon River (EFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF).

Survey Date	Stream	Strata	Section	Bull Trout	Bull Trout/100m^2
12-Jul-00	BVC	2	A	0	0.00
12-Jul-00		2	B	0	0.00
12-Jul-00		3	A	0	0.00
12-Jul-00		5	A	0	0.00
12-Jul-00		7	BIG-MDW-L	2	0.19
12-Jul-00		9	B	0	0.00
20-Jul-99	BVC	2	A	1	0.04
19-Jul-99		2	B	5	0.20
20-Jul-99		3	A	2	0.17
02-Jul-99		5	A	0	0.00
21-Jul-99		7	BIG-MDW-L	0	0.00
22-Jul-99		9	B	0	0.00
10-Jul-00	EFSR	ABOVE WEIR	2	0	0.00
10-Jul-00		ABOVE WEIR	3	5	0.84
10-Jul-00		BLW WEIR	FOX CR	1	0.08
10-Jul-00		BLW WEIR	ZIEGLER HL	0	0.00
27-Jul-99	EFSR	ABOVE WEIR	2	0	0.00
27-Jul-99		ABOVE WEIR	3	0	0.00
03-Aug-99		BLW WEIR	FOX CR	0	0.00
27-Jul-99		BLW WEIR	ZIEGLER HL	0	0.00
11-Jul-00	VC	1	B	0	0.00
11-Jul-00		3	A	0	0.00
11-Jul-00		3	B	0	0.00
11-Jul-00		6	B	2	0.41
23-Jul-99	VC	1	B	0	0.00
23-Jul-99		3	A	0	0.00
23-Jul-99		3	B	0	0.00
23-Jul-99		6	B	0	0.00
13-Jul-00	SFSR	-99	STOLLE1	0	0.00
13-Jul-00		-99	STOLLE2	0	0.00
13-Jul-00		-99	5	0	0.00
05-Aug-99	SFSR	-99	STOLLE1	0	0.00
05-Aug-99		-99	STOLLE2	0	0.00
05-Aug-99		-99	5	0	0.00
29-Jun-00	WFYF	2	6.2	0	0.00
28-Jul-99	WFYF	2	6.2	0	0.00

Table 11. Summary of stream length, chinook salmon redds counted, live chinook salmon adults observed, chinook salmon carcasses sampled, and redds per kilometer in four tributaries of the Salmon River: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), Valley Creek (VC), and the Yankee Fork Salmon River (YFSR). Multiple Ground counts were conducted between mid August and the beginning of October, 1992 to 2000.

Year	Stream Length (km)	Redds Counted	Live Adults	Carcasses Counted	Redds Per Kilometer
			BVC		
2000	35.7	59	110	28	1.65
1999	35.7	26	12	17	0.73
1998	35.7	89	24	19	1.79
1997	35.7	41	27	6	0.84
1996	35.7	12	12	4	0.34
1995	35.7	3	1	0	0.08
1994	35.7	4	1	1	0.11
1993	35.7	138	8	84	3.87
1992	35.7	26	22	10	0.73
			EFSR		
2000	27.0	2	1	0	0.07
1999	27.0	8	5	1	0.30
1998	27.0	21	13	2	0.78
1997	27.0	0	0	1	0.00
1996	27.0	2	0	0	0.07
1995	27.0	0	0	0	0.00
1994	27.0	5	3	0	0.19
1993	27.0	19	19	2	0.70
1992	27.0	1	1	1	0.04
			HC		
2000	17.1	3	2	0	0.18
1999	17.1	3	2	0	0.18
1998	17.1	10	7	0	0.58
1997	17.1	14	17	8	0.82
1996	17.1	0	0	0	0.00
1995	17.1	0	0	0	0.00
1994	17.1	4	3	0	0.23
1993	17.1	43	57	13	2.51
1992	14.1	3	4	0	0.21

Table 11 (cont.). Summary of stream length, chinook salmon redds counted, live chinook salmon adults observed, chinook salmon carcasses sampled, and redds per kilometer in four tributaries of the Salmon River: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), Valley Creek (VC), and the Yankee Fork Salmon River (YFSR). Multiple Ground counts were conducted between mid August and the beginning of October, 1992 to 2000.

Year	Stream Length (km)	Redds Counted	Live Adults	Carcasses Counted	Redds Per Kilometer
			VC		
2000	33.2	23	66	13	0.69
1999	33.2	18	14	6	0.54
1998	33.2	33	19	13	0.99
1997	33.2	5	11	6	0.15
1996	48.7	1	0	1	0.02
1995	48.7	0	0	0	0.00
1994	43.7	4	2	2	0.09
1993	52.3	73	21	39	1.40
1992	33.2	7	15	11	0.21
			WFYF		
2000	11.6	4	0	0	0.34
1999	11.6	0	0	0	0.00
1998	11.6	12	4	0	1.03
1997	11.6	6	9	0	0.52
1996	11.6	7	5	1	0.60
1995	11.6	0	1	0	0.00
1994	11.6	9	3	1	0.78
1993	11.6	14	5	0	1.21
1992	11.6	6	6	0	0.52

Table 12. Number and fork length (cm) of chinook salmon carcasses measured during redd counts conducted on tributaries of the Salmon River. Multiple ground counts were conducted between mid August and the beginning of October, 2000.

		Carcass Fork Length (cm)					
		1-Ocean		2-Ocean		3-Ocean	
Stream[a]	Number of carcasses measured[b]	Male	Female	Male	Female	Male	Female
BVC	8			71	75	82	
				75	76	83	
				76		84	
VC	8	55		72	65	89	
				73	74		
				78	78		
WFYF	1			70			
HC	2		45	75			
EFSR	N/A						

[a] BVC = Bear Valley Creek, VC = Valley Creek, WFYF = West Fork Yankee Fork Salmon River, HC = Herd Creek, EFSR = East Fork Salmon River

[b] this number represents only carcasses that were measured. Other carcasses were either not measured or were too decayed for measurements to be taken.

Table 13. Number and fork length (cm) of chinook salmon carcasses measured during redd counts conducted on tributaries of the Salmon River. Multiple ground counts were conducted between mid August and the beginning of October, 1999.

		Carcass Fork Length (cm)					
		1-Ocean		2-Ocean		3-Ocean	
Stream[a]	Number of carcasses measured[b]	Male	Female	Male	Female	Male	Female
BVC	8				74	92	80
						103	82
							83
							88
							95
VC	1					90	
WFYF	N/A						
HC	N/A						
EFSR	N/A						

[a] BVC = Bear Valley Creek, VC = Valley Creek, WFYF = West Fork Yankee Fork Salmon River, HC = Herd Creek, EFSR = East Fork Salmon River

[b] this number represents only carcasses that were measured. Other carcasses were either not measured or were too decayed for measurements to be taken.

West Fork Yankee Fork Salmon River Screw Trap

Screw trap operations occurred from 29-March to 01-July in 1999. During this period, 631 juvenile chinook were caught and 450 were PIT-tagged. An estimated 1,239 chinook smolts migrated past the trap. In the fall of 1999, trapping occurred from 06-July to 14-October resulting in a catch of 2,137 juvenile chinook. Of those, 938 were PIT-tagged and released and 136 were held and transferred to the Sawtooth Hatchery for captive rearing. An estimated 8,018 presmolt chinook migrated past the trap.

In the spring of 2000, trapping occurred between 07-March and 24-May. During this period 755 juvenile chinook were caught and 655 chinook were PIT-tagged. An estimated 5,364 chinook smolts migrated past the trap.

Chinook trapping data are presented in Tables 14 and 15. Numbers of non-target fish caught during trapping operations are presented in Tables 15.

East Fork Salmon River Screw Trap

Screw trap operations ran from 02-August to 14-October in the fall of 1999. During this period 361 juvenile chinook were caught and 135 of those were held and transferred to the Sawtooth Hatchery for captive rearing. No PIT-tagging occurred during this season.

In the spring of 2000, trapping occurred from 07-March to 20-May. Three hundred eighty six juvenile chinook were caught and PIT-tagged. An estimated 6,420 chinook smolts migrated past the trap. In the fall of 2000, screw trap operations ran from 20-July to 07-November. During this period, 343 juvenile chinook were caught and 302 were PIT tagged. Due to a lack of trap efficiency data, a population estimate of emigrating chinook will not be presented.

Table 14. Total number of juvenile chinook salmon caught, total number marked for trap efficiency estimate, total number recaptured (Recaps) for trap efficiency estimate, and total number of mortalities (Morts) associated with the operation of a screw trap on the West Fork Yankee Fork Salmon River (WFYF) 1998-2000 and the East Fork Salmon River (EFSR) 1993-2000. Trap efficiencies (Trap eff.), outmigrant population estimates (Est. # CH), and lower and upper confidence intervals (LCI-UCI) are presented where applicable. Alpha is equal to 0.05. Population estimates from 1998 to present were calculated using a maximum likelihood estimator.

Stream	Trap Season-Yr	Captured	Marked[3]	Recaps[2]	Morts	Trap eff.	Est. # CH[4]	LCI-UCI
WFYF	Spring-00	733	81	11	5	0.136	5,276	2,785-14,731
	Fall-99	2083[a]	203	53	9	0.261	7,949	6,369-10,285
	Spring-99	459	450	173	4	0.384	1,239	1,073-1,454
	98	1,374	1,319	285	1	0.216	7,034	6,051-9,037
EFSR	Fall-00	343	0	0	2	[1]	[1]	[1]
	Spring-00	386	250	15	5	0.060	6,420	4,054-11,101
	Fall-99	361[b]	0	0	0	[1]	[1]	[1]
	Fall-97	8[c]	0	0	2	[1]	[1]	[1]
	Spring-96	153	150	23	2	0.159	974	706-1,350
	Fall-95	113	110	9	0	0.090	1,230	754-1,906
	Spring-95	367	353	55	1	0.158	2,304	1,866-2,840
	Fall-94	643	542	57	1	0.107	6,011	4,842-7,391
	Spring-94	21	21	5	0	0.273	79	40-149
	Fall-93	211	198	36	4	0.186	1,140	874-1,489
	Spring-93	225	217	28	3	0.133	1,701	1,243-2,249

[1] no trap efficiency/population estimate data available.
[2] in some cases not all recaps were used in trap efficiency estimation.
[3] in some cases not all marked fish were released upstream for trap efficiency estimates.
[4] population estimates of emigrating chinook do not include precocious males or chinook fry.
[a] 136 juveniles were transferred to the Sawtooth Fish Hatchery (SFH) for captive rearing.
[b] 135 juveniles were transferred to the SFH for captive rearing.
[c] 5 juveniles were transferred to the SFH for captive rearing.

Table 15. Number of non-target fish caught in the screw trap on the West Fork Yankee Fork Salmon River and the East Fork Salmon River during 1999 and 2000. Fish caught include: chinook salmon fry (CF), steelhead trout (SH), steelhead fry (SF), bull trout (BT), whitefish (WF), whitefish fry (WFF), cutthroat trout (CT), and sculpin (SC).

WFYF

Season	Dates	CF	SH	SF	BT	WF	WFF	CT	SC
Spring	3/07-5/24/00	9	53	30	9	14	0	1	7
Fall	7/06-10/14/99	0	17	0	13	4	63	4	61
Spring	3/29-7/01/99	157	41	41	19	11	0	0	40

EFSR

Season	Dates	CF	SH	SF	BT	WF	WFF	CT	SC
Fall	7/20-11/07/00	0	22	0	8	13	11	3	71
Spring	3/07-5/02/00	74	29	1	20	1	0	1	2
Fall	8/02-10/14/99	0	15	0	7	0	8	3	14

Summer Parr PIT-tagging

Chinook salmon parr were collected with electrofishing gear and PIT-tagged during 1999, and 2000. Collections and tagging were conducted cooperatively with NMFS (S. Achord) in BVC, VC, and HC. In addition, NMFS tagged parr in the SFSR. Results and analysis from parr tagging will be available in published format from NMFS. ISS analysis from summer parr tagging will occur at the project-wide level.

The SBT have not conducted any other summer parr tagging since 1994. The numbers of rearing chinook salmon parr have generally been too low to attempt collecting and PIT-tagging.

West Fork Yankee Fork Salmon River Detections

Fifty three percent of the wild smolts tagged at the WFYF screw trap and released during the spring of 1999 were detected at downstream interrogation sites. The largest percentage of detections (48%) occurred at Little Goose Dam. In the fall of 1999, 8 percent of the wild smolts tagged and released at the WFYF screw trap were detected at downstream interrogation sites the following spring. The majority of detections (48%) occurred at Lower Granite Dam (Table 16).

In the spring of 2000, 30 percent of the wild smolts tagged and released during screw trap operations on the WFYF were detected at downstream interrogation sites. Most detections (42%) occurred at Lower Granite Dam (Table 16). Mean travel time (days) by reach and associated standard errors are presented in Table 17.

East Fork Salmon River Detections

Thirty three percent of wild smolts tagged and released at the EFSR screw trap during the spring of 2000 were detected at downstream interrogation sites. The majority of detections

(52%) occurred at Lower granite Dam (Table 18). Mean travel time (days) by reach and associated standard errors are presented in Table 19.

Table 16. Detections at Snake and Columbia River juvenile detection facilities of PIT-tagged wild spring chinook salmon juveniles released on the West Fork Yankee Fork Salmon River during migration years 1998 to 2000. Wild chinook salmon juveniles were caught with a screw trap, tagged, and released. Total tagged is the total number of juvenile chinook salmon tagged, N is the number of unique detections by dam, and % is the percent detections by dam.

	Wild				Hatchery	
	Presmolts		Smolts		Smolts	
	N	%	N	%	N	%
Migration Year 2000						
Total tagged	581[1]		655		--	
Lower Granite	23	4.0	83	12.7	--	--
Little Goose	15	2.6	58	8.9	--	--
Lower Monumental	9	1.5	23	3.5	--	--
Mcnary	0	0.0	31	4.7	--	--
John Day	1	0.2	2	0.3	--	--
Total detected	48	8.3	197	30.1	--	--
Migration Year 1999						
Total tagged	1,154		450		--	
Lower Granite	66	5.7	59	13.1	--	--
Little Goose	108	9.3	115	25.6	--	--
Lower Monumental	26	2.3	51	11.3	--	--
Mcnary	8	0.7	5	1.1	--	--
John Day	6	0.5	10	2.2	--	--
Total detected	214	18.5	240	53.3	--	--
Migration Year 1998						
Total tagged	--		97		--	
Lower Granite	--	--	16	16.5	--	--
Little Goose	--	--	7	7.2	--	--
Lower Monumental	--	--	2	2.1	--	--
Mcnary	--	--	2	2.1	--	--
John Day	--	--	2	2.1	--	--
Total detected	--	--	29	30.0	--	--

[1]581 represents only those fish that have PIT tags entered into PITAGIS database.

Table 17. PIT-tag release and observation summary for West Fork Yankee Fork Salmon River screw trap efforts 1999-2000. Total tagged is the total number of juvenile chinook salmon PIT-tagged. N is the number of detections by dam.

Release Year Spring 2000

Migration Year 2000	N	Mean travel time (days) by reach (with SE)
Total Tagged	655	
Lower Granite	83	47.80 (1.25)
Little Goose	87	51.10 (1.51)
Lower Monumental	46	55.75 (2.09)
Mcnary	61	58.40 (2.25)
John Day	9	62.64 (3.39)
Bonneville	18	59.37 (1.78)

Release Year Fall 1999

Migration Year 2000	N	Mean travel time (days) by reach (with SE)
Total Tagged	938	
Lower Granite	23	246.32 (4.89)
Little Goose	23	246.91 (3.96)
Lower Monumental	10	242.70 (6.11)
Mcnary	10	243.68 (5.65)
John Day	8	243.96 (6.02)
Bonneville	7	265.03 (10.33)

Release Year Spring 1999

Migration Year 1999	N	Mean travel time (days) by reach (with SE)
Total Tagged	450	
Snake River Trap	2	29.73 (4.48)
Lower Granite	59	36.99 (1.45)
Little Goose	149	37.27 (0.78)
Lower Monumental	143	38.87 (0.72)
Mcnary	43	41.35 (1.28)
John Day	60	42.71 (1.28)
Bonneville	23	43.10 (1.38)

Table 18. Detections at Snake and Columbia River juvenile detection facilities of PIT-tagged wild and hatchery spring chinook salmon juveniles released at or above the IDFG adult weir on the East Fork Salmon River during migration years 1993 to 2000. Wild chinook salmon juveniles were caught with a screw trap, tagged, and released below the IDFG adult weir. Hatchery juveniles were reared and tagged at Sawtooth Fish Hatchery before being released above the IDFG adult weir. Total tagged is the total number of juvenile chinook salmon tagged, N is the number of unique detections by dam, and % is the percent detections by dam.

	Wild				Hatchery	
	Presmolts		Smolts		Smolts	
	N	%	N	%	N	%
Migration Year 2000						
Total tagged	--		368		--	
Lower Granite	--	--	64	17.3	--	--
Little Goose	--	--	23	6.3	--	--
Lower Monumental	--	--	18	4.9	--	--
Mcnary	--	--	14	3.8	--	--
John Day	--	--	5	1.4	--	--
Total detected	--	--	124	33.7	--	--
Migration Year 1999[1]						
Migration Year 1998[2]						
Migration Year 1997[3]						
Migration Year 1996						
Total tagged	110		150		--	
Lower Granite	7	6.4	33	22.0	--	--
Little Goose	10	9.1	12	8.0	--	--
Lower Monumental	5	4.5	8	5.3	--	--
Mcnary	0	0.0	4	2.7	--	--
Total detected	22	20.0	57	38.0	--	--
Migration Year 1995						
Total tagged	542		353		498	
Lower Granite	57	10.5	78	22.1	17	3.4
Little Goose	18	3.3	42	11.9	5	1.0
Lower Monumental	10	1.8	31	8.8	7	1.4
Mcnary	6	1.1	7	2.0	3	0.6
Total detected	91	16.8	158	44.8	32	6.4

Table 18 (cont.). Detections at Snake and Columbia River juvenile detection facilities of PIT-tagged wild and hatchery spring chinook salmon juveniles released at or above the IDFG adult weir on the East Fork Salmon River during migration years 1993 to 2000. Wild chinook salmon juveniles were caught with a screw trap, tagged, and released below the IDFG adult weir. Hatchery juveniles were reared and tagged at Sawtooth Fish Hatchery before being released above the IDFG adult weir. Total tagged is the total number of juvenile chinook salmon tagged, N is the number of unique detections by dam, and % is the percent detections by dam.

	Wild				Hatchery	
	Presmolts		Smolts		Smolts	
	N	%	N	%	N	%
Migration Year 1994						
Total tagged	198		21		372	
Lower Granite	13	6.6	3	14.3	26	7.0
Little Goose	4	2.0	1	4.8	3	0.8
Lower Monumental	4	2.0	1	4.8	9	2.4
Mcnary	4	2.0	1	4.8	10	2.7
Total detected	25	12.6	6	28.6	48	12.9
Migration Year 1993						
Total tagged	--		217		332	
Lower Granite	--	--	47	21.7	20	6.0
Little Goose	--	--	28	12.9	6	1.8
Lower Monumental	--	--	9	4.1	1	0.3
Mcnary	--	--	11	5.1	8	2.4
Total detected	--	--	95	43.8	35	10.5

[1] 365 juvenile chinook caught, 135 of those fish were transferred to the Sawtooth Fish Hatchery for captive rearing, no PIT-tagging occurred.

[2] screw trap not operated.

[3] 8 chinook caught, 5 of those fish were transferred to the Sawtooth Fish Hatchery for captive rearing, no PIT-tagging occurred.

Table 19. PIT-tag release and observation summary for East Fork Salmon River screw trap efforts in 2000. Total tagged is the total number of juvenile chinook salmon PIT-tagged. N is the number of detections by dam.

	Release Year Spring 2000	
Migration Year 2000	N	Mean travel time (days) by reach (with SE)
Total Tagged	368	
Lower Granite	64	36.06 (1.58)
Little Goose	42	38.64 (2.05)
Lower Monumental	31	41.12 (1.99)
Mcnary	29	43.92 (1.99)
John Day	6	40.10 (3.27)
Bonneville	15	50.52 (2.57)

DISCUSSION

ISS monitoring is providing important information regarding natural variability in population parameters and life history characteristics of anadromous salmonids in the upper Salmon River basin. However, supplementation treatments in the upper Salmon River basin have not occurred to the degree called for in the ISS Experimental Design (Bowles and Leitzinger, 1991). The primary reason for reduced treatments is the lack of local broodstock. Unfortunately, poor and declining adult escapement to the upper Salmon River basin may continue to constrain the availability of locally adapted broodstock. During the study period differences have been observed between streams and years in chinook salmon parr production, adult escapement, juvenile outmigration patterns, detection rates measured at downstream interrogation sites, and juvenile migration timing.

From 1992 to 1997 parr population estimates were generated using intensive snorkeling surveys. The ISS experimental design called for confidence intervals no greater than 30% of the population estimate in order to have enough power to detect a change due to supplementation efforts (Bowles and Leitzinger 1991). Confidence interval goals were achieved in only one stream for one year during 1992 and 1993 whereas confidence interval goals were achieved in all six streams for population estimates stratified by habitat type during 1994. The main difference between 1994 and the earlier years was larger numbers of chinook salmon parr observed, wider distribution of parr in the study streams, and the presence of parr at most of the sites snorkeled. This resulted in reduced between site variability and narrower confidence intervals. However, in subsequent years parr abundance was again low, parr were not observed in many snorkel sites, and population estimate confidence intervals did not meet the ISS study design criteria.

Consequently, in 1998 after considerable debate by the ISS cooperators snorkeling effort was reduced and only densities of chinook salmon juveniles are reported in subsequent years.

Adult escapement as measured by redd counts was monitored in the upper Salmon River basin ISS streams from 1992 to 2000. In most streams, redd counts were highest in 1993 followed by 1998. However, 1998 counts in BVC, HC, and VC were 50-75% lower than 1993 counts. Redd counts were at an all time low for all ISS streams in 1995 with no redds observed in EFSR, HC, VC, and WFYF. Redd counts in 1999 were 46-100% lower than 1998 counts in BVC, EFSR, HC, VC, and WFYF. Year 2000 redd counts were 33-90% lower than 1998 counts in EFSR, HC, VC, and WFYF. Only counts in BVC during year 2000 were similar to those found in 1998.

We utilized screw traps to monitor juvenile outmigration patterns in the East Fork Salmon River (1993-2000) and the West Fork Yankee Fork Salmon River (1998-2000). The majority of emigration occurred in the fall for all brood years. Ninety three percent of brood year 1992, 72 % of brood year 1993, and 60% of brood year 1994 juveniles moved past the trap during the fall as presmolts in the EFSR. On the WFYF 80% of brood year 1997 and 60% of brood year 1998 emigrated past the trap during the fall as presmolts.

1994 was the first year we successfully collected and PIT-tagged chinook salmon summer parr. Those fish migrated in the spring of 1995. Detection rates for both groups of fish (EFSR and WFYF) were just over 11%. Detection rates for summer-tagged fish were lower than rates for fall-tagged fish based on data from fish tagged in the EFSR in 1994. This difference is not unusual, as some mortality between tagging periods would be expected. In 1994, this difference was 2.3% (11% versus 14.1% detected

We observed differences in detection rates of hatchery smolts, wild smolts, and wild presmolts as measured by interrogations at downstream facilities during migration years 1993 to 2000 in the East Fork Salmon River and during migration years 1998 to 2000 in the West Fork Yankee Fork Salmon River. In all years where comparisons were available in the EFSR, detection rates of wild smolts were significantly higher than hatchery smolts. Detection rates of hatchery smolts ranged from 6.4 to 12.9% in 1993, 1994, and 1995 while those for wild smolts ranged from 28.6 to 44.8%. Comparisons between natural presmolt and natural smolt detection rates by brood year also showed differences. In general, smolt detection rates were higher (28.6-44.8%) than presmolt rates (12.6-20.0%) in the EFSR from 1993 to 2000. Similar rates for smolts (30.0-53.3%) and presmolts (8.3-18.5%) were observed in the WFYF during 1998, 1999, and 2000. Again, some mortality would be expected between tagging periods and detection at downstream interrogation sites, possibly explaining the higher smolt detection rates observed.

In the East Fork Salmon River hatchery chinook salmon exhibited slightly different migration patterns than wild fish in 1993, 1994, and 1995. Median travel time was less for hatchery fish and their migration window past lower Snake River dams was shorter than for wild fish.

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APPENDIX A

Table A1. Standard stratum descriptions used by the Shoshone-Bannock Idaho Supplementation Studies project from 1992 to 1998.

Streams	Stratum Descriptions
Bear Valley Creek	
Stratum 2	Fir Creek confluence upstream to Elk Creek confluence Stratum length = 11,100 m
Stratum 3	Elk Creek confluence upstream to Cache Creek confluence Stratum length = 12,700 m
Stratum 4	Cache Creek confluence upstream to intermittent stream ~1.6 kilometers upstream of FS Road 563 on FS Road 582 Stratum length = 11,200 m
Stratum 5	Intermittent stream upstream to downstream border of mined area Stratum length = 4,000
Stratum 6	Mined area inclusive Stratum length = 2,300 m
Stratum 7	Upstream border of mined area to headwaters Stratum length = 5,500 m
East Fork Salmon River	
Stratum 1	IDFG adult weir upstream to Wickiup Creek confluence Stratum length = 6,275 m
Stratum 2	Wickiup Creek confluence upstream to waterfall ~100 to 200 m upstream of Bowery Creek confluence Stratum length = 5,149
Stratum 3	Waterfall ~100 to 200 m upstream of Bowery Creek confluence upstream to Bowery Guard Station bridge Stratum length = 7,521 m
Stratum 4	Bowery Guard Station bridge upstream to confluence of the South Fork and West Fork of the East Fork Salmon River Stratum length = 8,075
Herd Creek	
Stratum 0	East Pass Creek from confluence of Taylor Creek downstream to confluence of Herd Creek Stratum length = 3,000 m
Stratum 1	Confluence of West Fork and East Fork Herd Creek downstream to Lake Creek confluence Stratum length = 5,500 m
Stratum 2	Lake Creek confluence downstream to the confluence with East Fork Salmon River Stratum length = 8,600 m

South Fork Salmon River

Stratum 1	Headwaters downstream to Rice Creek confluence Stratum length = 8,695 m
Stratum 2	Rice Creek confluence downstream to Warm Lake turnoff (1 km below Bear Creek confluence) Stratum length = 9,656 m
Stratum 3	Warm Lake turnoff (1 km downstream from Bear Creek confluence) to IDFG weir Stratum length = 8,208 m

Curtis Creek

Stratum 1	South Fork Salmon River upstream to first major confluence Stratum length = 2,626 m

Valley Creek

Stratum 1	East Fork Valley Creek confluence downstream to diversion (VC-6) just downstream of FS Road 029 crossing Stratum length = 10,854 m
Stratum 2	Diversion (VC-6) just downstream of FS Road 029 crossing downstream to Stanley Lake Creek bridge Stratum length = 14,032 m
Stratum 3	Stanley Lake Creek bridge downstream to the confluence with Salmon River Stratum length = 8,308 m
Stratum 4	Trap Creek: from confluence with Valley Creek upstream to confluence of Meadow Creek Stratum length = 3,620 m
Stratum 5	Elk Creek: from confluence with Valley Creek upstream to upper end of Elk Meadow Stratum length = 10,500 m
Stratum 6	Stanley Lake Creek: from confluence with Valley Creek upstream to fish barrier on Stanley Lake Stratum length = 4,450 m

West Fork Yankee Fork Salmon River

Stratum 0	Cabin Creek confluence upstream ~4 km Stratum length = 4,141 m
Stratum 1	Downstream end of narrow and deep canyon upstream to confluence of Cabin Creek Stratum length = 6,955 m
Stratum 2	Confluence of Yankee Fork Salmon River upstream to downstream end of narrow and deep canyon Stratum length = 4,613 m

APPENDIX B

Table B1[a]. Overall densities (fish/100m^2) of chinook salmon parr observed while snorkeling by habitat type and stratum during 1997. The "All Habitats" column is a weighted mean based on the amount of each habitat type present. Percent habitat type present was determined by habitat surveys conducted in 1993 and 1995. Six tributaries of the Salmon River were sampled: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), South Fork Salmon River (SFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF). NS = not snorkeled, NP = habitat type not present

Stream	Stratum	Pool	Riffle	Run	Pocket water	All Habitats
BVC	3	4.24	0.74	0.12	NP	0.00
	4	0.36	0.00	0.10	NP	0.02
	5	0.00	0.00	0.00	NP	0.00
	6	0.00	0.00	0.00	NP	0.00
EFSR	1	0.00	0.00	0.00	NP	0.00
	2	0.00	0.00	NS	NP	0.00
	3	NS	NS	NS	NS	NS
	4	NS	NS	NS	NS	NS
HC	0	NS	NS	NS	NS	NS
	1	NS	NS	NS	NS	NS
	2	7.50	0.00	0.00	NP	0.00
SFSR	2	4.49	0.99	3.21	NP	2.84
	3	0.23	0.00	0.17	1.06	2.56
	C[b]	2.75	0.00	0.57	NP	0.06
VC	1	NS	NS	NS	NS	NS
	2	3.67	0.34	0.06	NP	0.00
	3	0.00	0.25	0.09	NP	0.48
	5	NS	NS	NS	NS	NS
	6[c]	NP	0.00	NP	0.00	NS
WFYF	0	0.00	0.00	0.00	NP	NS
	1	7.01	0.00	0.57	NP	0.00
	2	0.00	NP	0.00	NP	0.00

[a] snorkeling effort was reduced in 1998, 1999, and 2000. No data is presented for these years.
[b] Curtis Creek is a major tributary to SFSR.
[c] Stanley Lake Creek confluence to the outlet of Stanley Lake.

Table B2. Overall densities (fish/100m^2) of chinook salmon parr observed while snorkeling by habitat type and stratum during 1996. The "All Habitats" column is a weighted mean based on the amount of each habitat type present. Percent habitat type present was determined by habitat surveys conducted in 1993 and 1995. Six tributaries of the Salmon River were sampled: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), South Fork Salmon River (SFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF). NS = not snorkeled, NP = habitat type not present

Stream	Stratum	Pool	Riffle	Run	Pocket water	All Habitats
BVC	3	0.00	0.00	0.00	NP	0.00
	4	0.00	0.00	0.03	NP	0.02
	5	0.00	0.00	NA	NP	0.00
	6	0.00	0.00	0.00	NP	0.00
EFSR	1	0.00	0.00	0.00	NP	0.00
	2	NA	0.00	0.00	NP	0.00
	3	NS	NS	NS	NS	NS
	4	NS	NS	NS	NS	NS
HC	0	NS	NS	NS	NS	NS
	1	0.00	0.00	0.00	NP	0.00
	2	0.00	0.00	NP	NP	0.00
SFSR	2	4.74	3.33	0.97	NP	2.84
	3	1.55	1.21	1.67	4.49	2.56
	C[a]	0.29	0.00	0.07	0.00	0.06
VC	1	0.00	NP	0.00	0.00	0.00
	2	0.00	0.00	0.00	NP	0.00
	3	0.37	0.00	0.77	NP	0.48
	5	NS	NS	NS	NS	NS
	6[b]	NS	NS	NS	NS	NS
WFYF	0	NS	NS	NS	NS	NS
	1	0.00	0.00	0.00	NP	0.00
	2	0.00	NP	0.00	NP	0.00

[a] Curtis Creek is a major tributary to the South Fork Salmon River.
[b] Stanley Lake Creek confluence to the outlet of Stanley Lake.

Table B3. Overall densities (fish/100m^2) of chinook salmon parr observed during snorkeling within each stratum by habitat type and site during 1995. The "By habitat" column is a weighted mean based on the amount of each habitat type present. Six tributaries of the Salmon River were sampled: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), South Fork Salmon River (SFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF). NA = Not available

Stream	Stratum	Pool	Riffle	Run	Pocket water	By habitat	By site
BVC	3	0.3	0.1	0.4	NA	0.3	0.3
	4	0.2	0.1	0.1	NA	0.1	0.1
	5	0.0	0.0	0.0	NA	0.0	0.0
	6	0.2	0.0	0.0	NA	0.1	0.1
	7	0.0	0.0	0.0	NA	0.0	0.0
EFSR	1	0.3	0.9	0.2	NA	0.5	0.5
	2	0.0	0.0	0.0	NA	0.0	0.0
	3	0.0	0.0	0.0	NA	0.0	0.0
	4	0.0	0.0	0.0	NA	0.0	0.0
HC	0	0.0	0.0	0.0	NA	0.0	0.0
	1	0.1	0.0	0.3	NA	0.1	0.1
	2	0.2	0.2	0.2	NA	0.2	0.2
SFSR	2	0.9	0.7	0.1	NA	0.5	0.6
	3	2.8	2.3	1.8	2.5	2.3	2.5
	C[a]	0.2	0.0	0.0	NA	0.0[b]	0.1
VC	1	0.0	0.0	0.0	NA	0.0	0.0
	2	0.0	0.0	0.0	NA	0.0	0.0
	3	0.0[c]	0.1	0.2	0.1	0.1	0.1
	5	0.0	0.0	0.0	NA	0.0	0.0
	6[d]	0.0	0.0	0.0	NA	0.0	0.0
WFYF	0	0.0	0.0	0.0	NA	0.0	0.0
	1	3.9	0.5	1.4	NA	1.1	2.4
	2	6.9	1.6	3.3	NA	3.7	3.6

[a] Curtis Creek is a major tributary to the South Fork Salmon River.
[b] actual density is 0.04 fish/100 m^2.
[c] actual density is 0.02 fish/100 m^2.
[d] Stanley Lake Creek confluence to the outlet of Stanley Lake.

Table B4. Overall densities (fish/100m^2) of chinook salmon parr observed during snorkeling within each stratum by habitat type and site during 1994. The "By habitat" column is a weighted mean based on the amount of each habitat type present. Six tributaries of the the Salmon River were sampled: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), South Fork Salmon River (SFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF). NA = Not available

Stream	Stratum	Pool	Riffle	Run	Pocket water	By habitat	By site
BVC	3	14.3	4.3	7.6	NA	8.8	9.7
	4	6.1	3.9	5.2	NA	5.0	5.6
	5	11.6	8.7	8.6	NA	9.5	11.0
	6	58.3	19.6	88.9	NA	45.7	52.1
	7	13.1	11.5	0.0	NA	7.8	11.0
EFSR	1	15.9	1.2	5.8	NA	4.4	7.7
	2	7.5	6.0	0.3	NA	1.0	2.1
	3	0.0	0.0	0.0	NA	0.0	0.0
	4	0.0	0.0	0.0	NA	0.0	0.0
HC	0	NA	NA	NA	NA	NA	151.8
	1	112.8	10.5	12.4	NA	35.9	67.1
	2	71.3	5.1	32.5	NA	35.8	39.8
SFSR	2	58.3	13.1	20.4	NA	29.2	38.4
	3	101.9	12.1	66.9	69.1	67.9	71.1
	C[a]	181.3	8.7	156.5	NA	61.4	157.6
VC	1	35.7	3.9	12.4	NA	18.4	22.4
	2	85.9	10.0	50.0	NA	42.4	60.0
	3	47.3	15.7	25.8	11.1	23.5	27.2
	5[b]	35.2	3.1	6.8	NA	6.8	16.8
	6[c]	10.8	0.5	1.6	NA	1.4	5.5
WFYF	0	0.0	0.0	0.0	NA	0.0	0.0
	1	15.6	2.2	22.6	NA	10.1	10.6
	2	25.8	1.1	10.0	NA	11.2	13.1

[a] Curtis Creek is a major tributary to the South Fork Salmon River.
[b] Elk Creek confluence to a point 3030 meters upstream.
[c] Stanley Lake Creek confluence to the outlet of Stanley Lake.

Table B5. Overall densities (fish/100m^2) of chinook salmon parr observed during snorkeling within each stratum by habitat type and site during 1993. The "By habitat" column is a weighted mean based on the amount of each habitat type present. Six tributaries of the the Salmon River were sampled: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), South Fork Salmon River (SFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF). NA = not available, NS = not surveyed

Stream	Stratum	Pool	Riffle	Run	Pocket water	By habitat	By site
BVC	3	2.2	0.5	0.7	NA	1.2	1.3
	4	1.7	0.0	1.6	NA	1.1	1.7
	5	0.0	0.0	0.0	NA	0.0	0.0
	6	0.0	0.0	0.0	NA	0.0	0.0
	7	0.0	0.0	0.0	NA	0.0	0.0
EFSR	1	0.0	0.0	0.0	NA	0.0	0.0
	2	0.7	0.0	0.0	NA	0.1	0.2
	3	0.0	0.0	0.0	NA	0.0	0.0
	4	0.0	0.0	0.0	NA	0.0	0.0
HC	0	NS	NS	NS	NS	NS	NS
	1	0.0	0.0	0.0	NA	0.0	0.0
	2	2.7	0.1	0.0	NA	0.7	1.1
SFSR	2	8.4	0.5	3.5	NA	3.9	5.2
	3	7.9	3.3	1.5	1.8	2.9	4.4
	C[a]	30.0	0.0	0.4	NA	4.9	13.3
VC	1	0.0	0.0	0.0	0.0	0.0	0.0
	2	3.1	0.0	2.2	NA	1.5	2.1
	3	0.6	0.0	0.8	NA	0.5	0.6
	5	0.0	0.0	0.0	NA	0.0	0.0
	6	NS	NS	NS	NS	NS	NS
WFYF	0	0.0	0.0	0.0	NA	0.0	0.0
	1	0.0	0.0	0.0	NA	0.0	0.0
	2	0.3	0.2	0.0	NA	0.2	0.2

[a] Curtis Creek is a major tributary to the South Fork Salmon River.

Table B6. Overall densities (fish/100m^2) of chinook salmon parr observed during snorkeling within each stratum by habitat type and site during 1992. The "By habitat" column is a weighted mean based on the amount of each habitat type present. Six tributaries of the the Salmon River were sampled: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), South Fork Salmon River (SFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF). NA = not available, NS = not surveyed

Stream	Stratum	Pool	Riffle	Run	Pocket water	By habitat	By site
BVC	3	NA	NA	NA	NA	NA	0.1
	4	NA	NA	NA	NA	NA	3.4
	5	NA	NA	NA	NA	NA	2.5
	6	NA	NA	NA	NA	NA	15.1
	7	NA	NA	NA	NA	NA	27.3
EFSR	1	NS	NS	NS	NS	NS	NS
	2	NS	NS	NS	NS	NS	NS
	3	NS	NS	NS	NS	NS	NS
	4	NS	NS	NS	NS	NS	NS
HC	0	NS	NS	NS	NS	NS	NS
	1	7.8	0.0	NA	NA	3.0	5.8
	2	33.0	9.9	29.0	NA	19.9	27.8
SFSR	2	3.4	0.2	1.0	NA	1.4	2.2
	3	9.4	4.5	3.5	0.9	3.5	6.7
	C[a]	NA	NA	NA	NA	NA	0.7
VC	1	0.0	0.0	0.0	0.0	0.0	0.0
	2	7.0	1.1	7.5	NA	4.8	6.1
	3	7.8	0.4	6.1	NA	4.3	5.7
	5	NS	NS	NS	NS	NS	NS
	6	NS	NS	NS	NS	NS	NS
WFYF	0	NS	NS	NS	NS	NS	NS
	1	15.6	2.2	22.6	NA	10.1	10.6
	2	25.8	1.1	10.0	NA	11.2	13.1

[a] Curtis Creek is a major tributary to the South Fork Salmon River.

APPENDIX C

Table C1. Summary of fish densities (fish/100m^2) for species encountered during snorkeling activities conducted in 1999 on six tributaries of the Salmon River: East Fork Salmon River (EFSR), Herd Creek (HC), West Fork Yankee Fork Salmon River (WFYF), Valley Creek (VC), Bear Valley Creek (BVC), and South Fork Salmon River (SFSR). Fish densities are presented by species and size groups (mm).

		Steelhead Trout				Cutthroat Trout			Brook Trout			Bull Trout		
Stream	Stratum	<80	80-160	160-230	>230	<80	80-160	>160	<90	90-170	>170	<90	90-170	>170
EFSR	ZIEGLER	0.00	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	FOX	0.00	0.00	0.00	0.00	0.00	0.47	0.08	0.00	0.00	0.00	0.00	0.00	0.00
	1	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00
	2	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HC	0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
WFYF	0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	1	0.00	0.00	0.00	0.00	0.00	0.12	0.36	0.00	0.00	0.00	0.00	0.00	0.00
	2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
VC	1	0.00	0.00	0.00	0.00	0.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2, 3.2	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.07	0.00	0.00	0.00
	2, 3.3	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.74	0.00	0.00	0.00	0.00
	3	0.00	0.00	0.29	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BVC	2, A	0.00	0.00	0.00	0.00	0.19	0.00	0.04	0.12	0.00	0.00	0.00	0.04	0.00
	2, B	0.00	0.04	0.11	0.00	0.00	0.00	0.26	0.04	0.00	0.00	0.07	0.00	0.11
	3	0.00	0.00	0.08	0.00	0.31	0.46	0.23	0.08	0.69	0.15	0.00	0.15	0.00
	5	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00
	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37	0.25	0.00	0.00	0.00	0.00
	9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SFSR	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	STOLLE 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.00	0.00	0.00	0.00	0.00
	STOLLE 2	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00

NS- not snorkeled by ISS

Table C1 (cont.). Summary of fish densities (fish/100m^2) for species encountered during snorkeling activities conducted in 1999 on six tributaries of the Salmon River: East Fork Salmon River (EFSR), Herd Creek (HC), West Fork Yankee Fork Salmon River (WFYF), Valley Creek (VC), Bear Valley Creek (BVC), and South Fork Salmon River (SFSR). Fish densities are presented by species and size groups (mm).

		Whitefish			Suckers					
Stream	Stratum	<90	90-170	>170	<80	80-160	>160	Dace	Sculpin	Redside Shiner
EFSR	ZIEGLER	0.00	0.48	0.48	0.00	0.00	0.00	NO	NO	NO
	FOX	0.08	0.79	1.50	0.00	0.00	0.00	NO	NO	NO
	1	0.28	0.41	3.73	0.00	0.00	0.00	NO	NO	NO
	2	0.00	0.00	1.15	0.00	0.00	0.00	NO	NO	NO
HC	0	NS	NS	NS	NS	NS	NS	NS	NS	NS
	1	NS	NS	NS	NS	NS	NS	NS	NS	NS
	2	NS	NS	NS	NS	NS	NS	NS	NS	NS
WFYF	0	NS	NS	NS	NS	NS	NS	NS	NS	NS
	1	0.00	0.00	0.00	0.00	0.00	0.00	NO	NO	NO
	2	NS	NS	NS	NS	NS	NS	NS	NS	NS
VC	1	0.00	0.00	0.37	0.00	0.00	0.00	NO	NO	NO
	2, 3.2	0.07	0.00	0.00	0.13	0.07	0.00	NO	P	NO
	2, 3.3	4.00	0.00	0.63	0.21	0.00	0.00	NO	P	NO
	3	0.07	0.00	3.79	0.00	0.00	0.00	NO	NO	NO
BVC	2, A	2.09	0.00	0.46	0.04	0.04	0.00	NO	NO	NO
	2, B	3.85	0.07	2.24	0.07	0.00	0.00	NO	NO	NO
	3	2.39	1.00	0.77	0.08	0.08	0.08	NO	P	NO
	5	0.28	0.43	2.28	0.00	0.07	0.00	NO	NO	NO
	7	0.00	0.37	0.12	0.00	0.00	0.00	NO	P	NO
	9	0.00	0.00	0.00	0.00	0.00	0.00	NO	NO	NO
SFSR	2	0.00	0.00	0.16	0.00	0.00	0.00	NO	P	NO
	STOLLE 1	0.00	0.08	0.79	0.00	0.00	0.00	NO	P	NO
	STOLLE 2	0.00	0.17	0.08	0.00	0.00	0.00	NO	NO	NO

P- indicates this genus was observed, NO indicates not observed
NS- not snorkeled by ISS

Table C2. Summary of fish densities (fish/100m^2) for species encountered during snorkeling activities conducted in 2000 on six tributaries of the Salmon River: East Fork Salmon River (EFSR), Herd Creek (HC), West Fork Yankee Fork Salmon River (WFYF), Valley Creek (VC), Bear Valley Creek (BVC), and South Fork Salmon River (SFSR). Fish densities are presented by species and size groups (mm).

		Steelhead Trout				Cutthroat Trout			Brook Trout			Bull Trout		
Stream	Stratum	<80	80-160	160-230	>230	<80	80-160	>160	<90	90-170	>170	<90	90-170	>170
EFSR	ZIEGLER	0.00	0.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	FOX	0.00	0.08	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.08	0.00
	1	0.00	0.00	0.50	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.84
	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HC	0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
WFYF	0	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
VC	1	0.00	0.00	0.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.42
	2, 3.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2, 3.3	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3	0.00	0.19	0.05	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00
BVC	2, A	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
	2, B	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00
	3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.00
	5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.00	0.00
	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.07	0.10	0.00	0.00	0.19
	9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SFSR	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	STOLLE 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	STOLLE 2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

NS- not snorkeled by ISS

Table C2 (cont.). Summary of fish densities (fish/100m^2) for species encountered during snorkeling activities conducted in 2000 on six tributaries of the Salmon River: East Fork Salmon River (EFSR), Herd Creek (HC), West Fork Yankee Fork Salmon River (WFYF), Valley Creek (VC), Bear Valley Creek (BVC), and South Fork Salmon River (SFSR). Fish densities are presented by species and size groups (mm).

		Whitefish			Suckers					
Stream	Stratum	<90	90-170	>170	<80	80-160	>160	Dace	Sculpin	Redside Shiner
EFSR	ZIEGLER	0.00	0.95	0.48	0.00	0.00	0.00	NO	NO	NO
	FOX	0.16	0.88	2.24	0.00	0.00	0.00	NO	P	NO
	1	0.00	0.00	4.18	0.00	0.00	0.00	NO	NO	NO
	2	0.00	0.00	2.46	0.00	0.00	0.00	NO	NO	NO
HC	0	NS	NS	NS	NS	NS	NS	NS	NS	NS
	1	NS	NS	NS	NS	NS	NS	NS	NS	NS
	2	NS	NS	NS	NS	NS	NS	NS	NS	NS
WFYF	0	NS	NS	NS	NS	NS	NS	NS	NS	NS
	1	NS	NS	NS	NS	NS	NS	NS	NS	NS
	2	NS	NS	NS	NS	NS	NS	NS	NS	NS
VC	1	3.18	0.42	23.3	0.00	0.00	0.00	NO	P	NO
	2, 3.2	0.08	0.00	0.00	0.00	0.00	0.00	NO	NO	NO
	2, 3.3	0.13	0.00	0.00	0.00	0.00	0.00	NO	NO	NO
	3	0.0	0.01	0.05	0.00	0.00	0.00	NO	NO	NO
BVC	2, A	2.98	0.06	0.34	0.00	0.00	0.00	NO	P	NO
	2, B	3.47	0.00	0.26	0.00	0.00	0.00	NO	NO	NO
	3	2.21	0.06	0.00	0.00	0.00	0.00	NO	NO	NO
	5	1.16	0.00	1.67	0.00	0.00	0.00	NO	NO	NO
	7	0.00	0.19	0.39	0.00	0.00	0.00	NO	P	NO
	9	0.00	0.00	0.00	0.00	0.00	0.00	NO	NO	NO
SFSR	2	0.00	0.00	0.00	0.00	0.00	0.00	NO	NO	NO
	STOLLE 1	0.00	0.00	0.20	0.00	0.00	0.00	NO	P	NO
	STOLLE 2	0.18	0.00	0.00	0.00	0.00	0.00	NO	P	NO

P- indicates this genus was observed, NO indicates not observed
NS- not snorkeled by ISS

APPENDIX D

Appendix D. Summary of stream length, chinook salmon redds counted, live chinook salmon adults observed, chinook salmon carcasses sampled, and redds per kilometer in four tributaries of the Salmon River: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), Valley Creek (VC), and the Yankee Fork Salmon River (YFSR). Multiple Ground counts were conducted between mid August and the beginning of October, 1992 through 2000.

Year	Stream Length (km)	Redds Counted	Live Adults	Carcasses Counted	Redds Per Kilometer
			BVC		
2000	35.7	59	110	28	1.65
1999	35.7	26	12	17	0.73
1998	35.7	64	24	19	1.79
1997	35.7	30	27	6	0.84
1996	35.7	12	12	4	0.34
1995	35.7	3	1	0	0.08
1994	35.7	4	1	1	0.11
1993	35.7	138	8	84	3.87
1992	35.7	26	22	10	0.73
			EFSR		
2000	27.0	2	1	0	0.07
1999	27.0	8	5	1	0.30
1998	27.0	21	13	2	0.78
1997	27.0	0	0	1	0.00
1996	27.0	2	0	0	0.07
1995	27.0	0	0	0	0.00
1994	27.0	5	3	0	0.19
1993	27.0	19	19	2	0.70
1992	27.0	1	1	1	0.04
			HC		
2000	17.1	3	2	0	0.18
1999	17.1	3	2	0	0.18
1998	17.1	10	7	0	0.58
1997	17.1	14	17	8	0.82
1996	17.1	0	0	0	0.00
1995	17.1	0	0	0	0.00
1994	17.1	4	3	0	0.23
1993	17.1	43	57	13	2.51
1992	14.1	3	4	0	0.21

Appendix D (cont.). Summary of stream length, chinook salmon redds counted, live chinook salmon adults observed, chinook salmon carcasses sampled, and redds per kilometer in four tributaries of the Salmon River: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), Valley Creek (VC), and the Yankee Fork Salmon River (YFSR). Multiple Ground counts were conducted between mid August and the beginning of October, 1992 through 2000.

Year	Stream Length (km)	Redds Counted	Live Adults	Carcasses Counted	Redds Per Kilometer
			VC		
2000	33.2	23	66	13	0.69
1999	33.2	18	14	6	0.54
1998	33.2	33	19	13	0.99
1997	33.2	5	11	6	0.15
1996	48.7	1	0	1	0.02
1995	48.7	0	0	0	0.00
1994	43.7	4	2	2	0.09
1993	52.3	73	21	39	1.40
1992	33.2	7	15	11	0.21
			WFYF		
2000	11.6	4	0	0	0.34
1999	11.6	0	0	0	0.00
1998	11.6	12	4	0	1.03
1997	11.6	6	9	0	0.52
1996	11.6	7	5	1	0.60
1995	11.6	0	1	0	0.00
1994	11.6	9	3	1	0.78
1993	11.6	14	5	0	1.21
1992	11.6	6	6	0	0.52