ANADROMOUS FISH HATCHERY EVALUATIONS - IDAHO

Period Covered: October 1, 1991 to September 30, 1992

By

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ABSTRACT

This annual report (October 1, 1991 - September 30, 1992) includes all 1992 chinook salmon Oncorhynchus tshawytscha returns, fall 1991-spring 1992 steelhead trout O. mykiss returns and all juvenile releases for the 1992 emigration except for fry and fingerlings released in spring or summer of 1991. Information presented herein generally supersedes that included in previous reports.

Idaho's Lower Snake River Compensation Plan (LSRCP) goals are to return 8,000 summer chinook salmon, 40,560 spring chinook salmon and 39,120 summer steelhead trout to Idaho. In 1992, an estimated 3,300 summer chinook salmon and 21,900 spring chinook salmon of hatchery and wild/natural origin returned to the project area, i.e. crossed Lower Granite Dam (LGR) located approximately 64 km from the Idaho border. The 1991-92 steelhead trout count over LGR totaled 99,056 and consisted of 15,812 wild A-run, 69,725 hatchery A-run, 1,510 wild B-run, and 12, 011 hatchery B-run.

Estimated adult returns of LSRCP origin in 1992 were; 2,100 summer chinook salmon of McCall Fish Hatchery (FH) origin, 207-282 spring chinook salmon of Sawtooth FH origin plus an unknown number of adult returns from Clearwater FH satellites, and 13,054 summer steelhead trout. McCall FH' s summer chinook salmon rack return of 2,848 fish represents an all time high and was reminiscent of returns in the mid-1980s. Dworshak National Fish Hatchery (NFH) experienced its second consecutive poor run; only 369 spring chinook salmon were trapped in 1992 following a return of 165 fish in 1991. Sport and tribal fishermen harvested 214 chinook salmon from the Clearwater River. Sawtooth FH trapped 387 spring chinook salmon in 1992 compared to 566 in 1991; this represents the lowest rack return to Sawtooth FH since 1983 (366). Sixty-five adult spring chinook salmon returned to the East Fork Salmon River trap in 1992 compared to 62 fish in 1991. The three Clearwater FH satellites trapped a combined total of 537 adult spring chinook salmon in 1992, a substantial increase from the 71 fish trapped in 1991. Hatchery fish comprised the bulk of the rack returns, although the exact proportion of hatchery and natural fish returning to the racks is unknown. Returns to the Dworshak NFH rack are almost exclusively of hatchery origin.

Rack returns to non-LSRCP Idaho hatcheries, Kooskia NFH, Pahsimeroi FH, and Rapid River FH, accounted for 441 summer chinook and 2,800 spring chinook salmon. Sport and tribal fishermen harvested an estimated 1,450 spring chinook salmon in the Rapid River fishery in 1992. Approximately 15,500 summer and spring chinook salmon which crossed LGR can be attributed to natural escapement and other non-Idaho hatcheries in the basin, or to prespawn mortality.

Smolt (i.e. release)-to-adult return rates for brood year (BY) 1987 Idaho LSRCP chinook salmon, based on marked fish returns, varied from 0.002% for Dworshak NFH and East Fork Salmon River fish to 0.004% for McCall FH and Sawtooth FH fish. Sawtooth FH and Dworshak NFH estimates represent combined fall presmolt and spring smolt releases. McCall FH estimates are for spring smolt releases only. The minimum return rate necessary for replacement is approximately 0.05%.

An estimated 13,054 summer steelhead trout of LSRCP origin returned to Idaho in the 1991-92 run, including 11,056 A-run and 1,998 B-run fish. LSRCP

facilities trapped 1,730 A-run and 156 B-run summer steelhead trout in the 1991-92 run year, a five-fold increase over the 1990-91 trap counts. These returns included 42 and 45 wild/natural A-run and B-run fish, respectively. Sport anglers harvested an estimated 8,203 A-run and 1,647 B-run summer steelhead
trout. The pooled smolt (release)-to-adult survival rate for LSRCP A-run steelhead trout was 0. 11% and varied from 0.04 to 0.20% for coded-wire tag groups. The SAR estimate for the only coded-wire tagged LSRCP B-run group, for which returns were complete in 1992, was 0.03%

Idaho LSRCP facilities released 7,419,500 smolts, and 834,400 presmolts for the 1992 emigration. Summer chinook salmon releases totalled 901,500 smolts. Spring chinook salmon releases included about 3,000,000 smolts and 834,000 presmolts. Steelhead trout releases included 1,850,000 A-run smolts and 1,760,000 B-run smolts.

Several recently initiated experiments are ongoing under the Hatchery Evaluation Study. We are using McCall FH to attempt to quantify the effect of coded-wire tagging procedures on the survival of summer chinook salmon. The effect of raceway rearing density on smolt-to-smolt (release to lower Snake River dams) and smolt-to-adult survival of spring chinook salmon is being evaluated at Sawtooth FH. The effects of smolt size at release on survival rates, and sex and age structure of adult A-run steelhead trout returns is being investigated using fish reared at Hagerman NFH.

Newly initiated research includes the testing for the effects of natural rearing conditions on spring chinook salmon and acclimation on summer steelhead trout. We plan to investigate the effects of overhead cover, in-raceway baffles, cryptic raceway backgrounds, and possibly predator avoidance training on the survival of spring chinook salmon. In 1992 (and 1993), we acclimated summer steelhead trout smolts in Sawtooth FH raceways for about 21 d prior to release.

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INTRODUCTION

The purpose of Lower Snake River Compensation Plan (LSRCP) is to compensate for anadromous fish losses caused by construction and operation of the four lower Snake River hydroelectric dams (Ice Harbor, Lower Monumental, Little Goose [LGO, and Lower Granite (LGR] dams) built between 1962 and 1975. In 1976, the US Fish and Wildlife Service (USFWS) was authorized to administer the operation and maintenance funding for the LSRCP hatchery program, the primary compensation tool.

The authorized compensation strategy specifies the use of hatcheries to produce and release large numbers of juvenile anadromous salmonids to meet the adult return goals, namely to return 8,000 summer chinook salmon Oncorhynchus tshawytscha, 50,700 spring chinook salmon, 18,300 fall chinook salmon and 55,100 steelhead trout O. mykiss to the Snake River basin. Idaho has the bulk of the program with adult return goals of 8,000 summer chinook salmon, 40,560 spring chinook salmon, and 39,121 steelhead trout. To support the program, Idaho Department of Fish and Game (IDFG) and the USFWS currently operate six hatcheries and five satellite facilities: McCall Fish Hatchery (FH) and South Fork Salmon River Trap; Dworshak National Fish Hatchery (NFH); Clearwater FH, Red River, Crooked River and Powell satellite facilities; Sawtooth FH, East Fork Salmon River Trap, Hagerman NFH, and Magic Valley Steelhead Hatchery (Figure 1). The Powell satellite facility was first operated in 1989. Clearwater FH, the final hatchery authorized under the LSRCP, became operational in 1992. Clearwater FH will assume the role previously filled, in part, by Dworshak NFH. Proposed production guidelines for the LSRCP program are presented in Table 1.

The purpose of the LSRCP Hatchery Evaluation Study (HES) is to determine hatchery operations, practices, and procedures which will best contribute to LSRCP program and Idaho Department of Fish and Game (IDFG) anadromous fisheries goals. A central objective of this project is to measure the achievements of the hatchery program in relation to established compensation goals. A secondary major objective of the project is to evaluate the potential of new hatchery methods to contribute to meeting program goals.

OBJECTIVES

1. Evaluate Idaho LSRCP's hatchery program in relation to the mitigation goals.

    1.1 Document the LSRCP fish rearing and release activities in Idaho and resulting adult returns.

    1.2 Document adult returns of LSRCP fish to the project area above LGR: a) hatchery rack, b) sport fishery, c) natural spawning escapement, and to Columbia River and ocean fisheries.

2. Identify and evaluate fish rearing and release strategies potentially beneficial to improving adult returns to the LSRCP project area in Idaho.

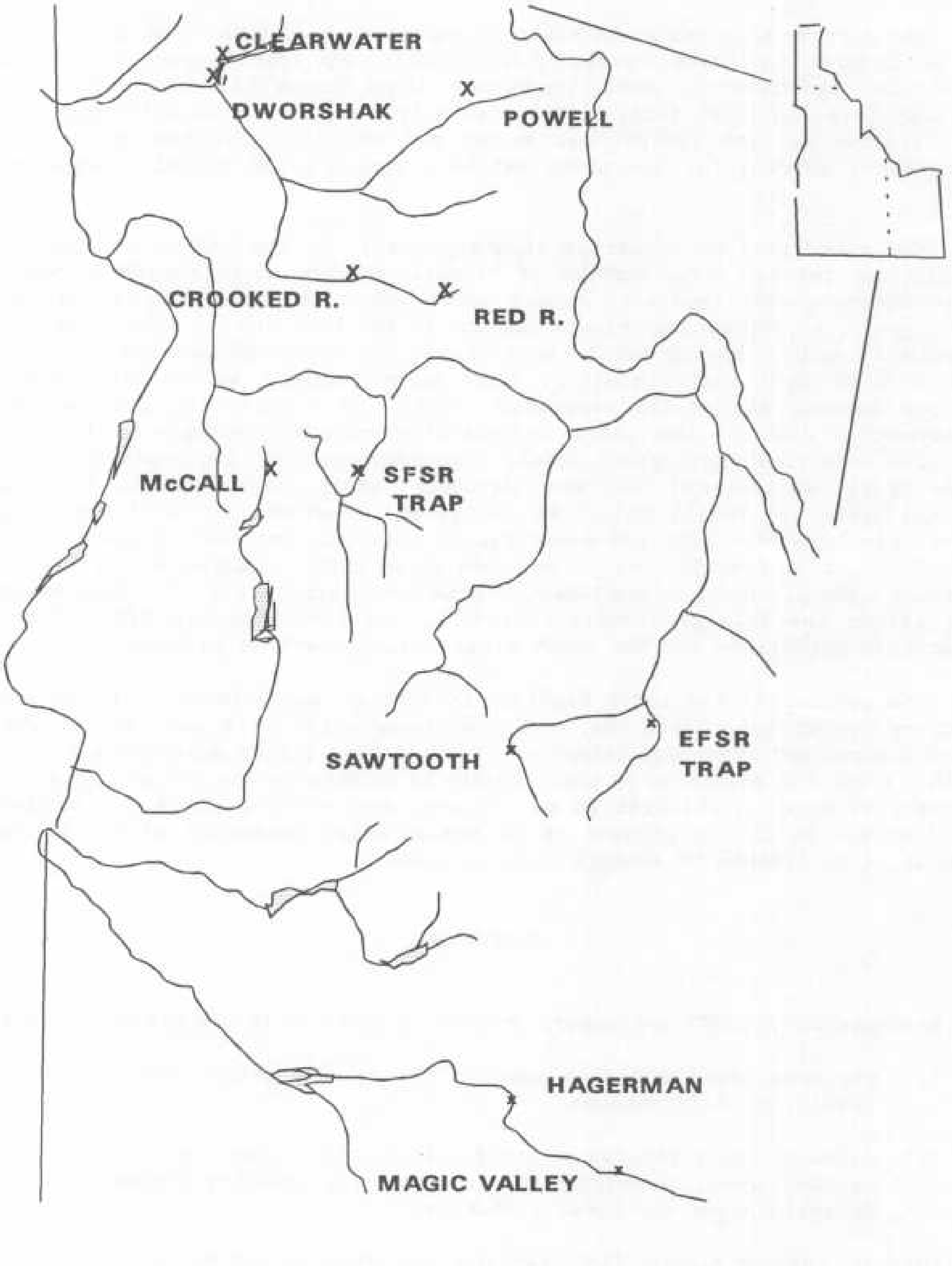

Figure 1. Location of Idaho LSRCP facilities.

Table 1. Lower Snake River Compensation Plan hatchery production targets and adult return goals. Original production design plans in parentheses.

Facility	Number of Pounds	X	fpp	=	Number of smolts	X	SAR %'	=	Number of adults
			Summer Chinook Salmon						
MCCALL	50,000		20		1,000,000		0.80		8,000
			Spring Chinook Salmon						
DWORSHAK	90,000		20		1,800,000		0.51		9,135
	70,000		20		1,400,000		0.65		
	{70,000		15		1,050,000		0.87)		
CLEARWATER	91,300		25		2,282,500		0.52		11,915
			20		1,826,000		0.65		
			(15		1,369,500		0.87)		
Red River	15,000		20		300,000		0.65	1,950	
			25		375,000		0.52		
Crooked R.	40,000		20		800,000		0.65		5,200
			25		1,000,000		0.52		
Powell	15,000		20		300,000		0.65		1,950
			25		375,000		0.52		
	(14,942		15		224,138		0.87)		
SAWTOOTH	149,000		15		2,235,000		0.87		19,445
Sawtooth	102,333		20		2,046,660		0.65		13,355
			(15		1,534,995		0.87)		
East Fork	46,667		20		933,340		0.65		6,090
			(15		700,000		0.87)		
			Steelhead Trout						
CLEARWATER	350,000		5		1,750,000		0.82		14,000
			(8		2,800,000		0.50)		
HAGERMAN	340,000		5		1,700,000		0.80		13,600
			(8		2,720,000		0.50)		
MAGIC VALLEY	349,800		5		1,749,000		0.67		11,660
	291,500		(8		2,332,000		0.50)		

' Smolt-to-adult return rate

2.1 Relate existing knowledge of the effectiveness of past and current procedures to the LSRCP hatchery program in Idaho.

2.2 Identify critical uncertainties regarding rearing and release strategies.

2.3 Conduct controlled experimentation to test priority hatchery-related variables.

The purpose of Objective 1 is to document all facets of hatchery operation pertinent to rearing, release, and returns and synthesize this information into a bank of existing knowledge. Under Objective 2, this information is used to determine successful and unsuccessful techniques, to identify information gaps to be addressed through research, and to suggest and evaluate alternative hatchery rearing and release strategies.

METHODS

Documentation - Objective 1 Chinook Salmon

and Steelhead Trout

Hatchery Operations-Hatchery operations were documented from written and oral communication with hatchery personnel. Written documents include "Run" and "Brood year" reports, monthly summaries, stocking slips and memoranda pertinent to trapping, spawning, rearing and release operations. Personal communications through formal and informal meetings provided additional information. Documentation included: numbers of fish on hand, size and weight, strain, health; tagging or marking of experimental groups; numbers and site of release; numbers, age, sex trapped and spawned, and egg take. The reporting period, October 1, 1991 to September 30, 1992, includes all BY 1990 chinook salmon and BY 1991 steelhead trout juvenile releases (except for fry and fingerlings released in spring and summer of 1991), and all adult returns, i.e. run year 1992 chinook salmon returns and run year 1991-92 steelhead trout returns.

Migration Conditions-Snake River flow during smolt migration is a major factor affecting survival of Idaho's anadromous fish. Therefore, we document flow conditions and evaluate emigration survival indices (passive integrated transponders (PIT) tag detections) and smolt-to-adult survival rates with these conditions in mind. River flows during emigration periods for brood year returns completed in 1992 are of particular interest for this reporting period. Specifically, flow conditions for smolts of chinook salmon brood year (BY) 1987 and steelhead trout BY 1988, emigrating in 1989, are briefly discussed. (A small percentage of BY 1988 B-run steelhead trout will be at large until 1993). We also report flow conditions for the 1992 emigration period, i.e. for BY 1990 chinook salmon and BY 1991 steelhead trout smolts. We obtained flow data from Fish Passage Center (FPC) reports and by personal communication with other IDFG biologists.

Two periods were defined to summarize flows at LGR. The "peak" period, April 15-May 5, is defined as the period of time during which 50% of the emigration of yearling chinook salmon occurs. The "extended" period, April 20-May 30, includes most of the known migration of wild and natural yearling chinook salmon (Petrosky 1991).

Migration "Survival" and Timing-Detection (interrogation) rates of PIT tagged juvenile salmonids at lower Snake River dams serve as survival indices. These detection rates allow for comparison of the relative survival of fish from various groups of hatchery and natural juveniles arriving at various dams. Our estimates are based on cumulative unique, first occurrence detections of fish at LGR, LGO, and McNary (MCN) dams. Fish that are detected at any of these dams are survivors to LGR. These estimates are minimum survival estimates for several reasons: 1) an unknown (but we believe small) amount of mortality of PIT tagged fish may go undetected in-hatchery despite the fact that we scan the mortalities, 2) not all fish pass through detectors at the dams, 3) a certain percentage of pit tags fail (approximately 2%, R. Kiefer, IDFG, personal communication) or are lost between tagging and arrival at detection sites, 4) some fish arrive while detection gear is not being operated, and 5) mortality occurs between dams. Typically, fish are PIT tagged to monitor survival (detection) and timing of specific experimental groups or groups representative of production releases. We have not yet attempted to analyze migration timing data.

Hatchery fish destined to emigrate in 1992 were tagged by the IDFG Marking Section. We used the PIT tag files generated by the Marking Section (IDFG) to submit the appropriate information to the PIT-tag Information System (PTAGIS) database maintained by the Pacific States Marine Fisheries Commmission (PSMFC) in Portland, Oregon. We retrieve data from PTAGIS by modem for analysis.

Fisheries Contribution-The Coded-wire Tag (CWT) lab in Lewiston processed CWT information involving Idaho tag groups and tag codes which appear in fisheries (Idaho, Columbia River, ocean) and at hatchery racks. The Harvest Monitoring Project (HMP), reported under a separate cover, estimates the contribution of LSRCP fish to Idaho sport fisheries. The HES incorporates CWT information and HMP results to help identify the fate of LSRCP fish and total returns to Idaho. The HES coordinates with management to identify marking needs of all LSRCP studies. Evaluation of mark groups is discussed within the body of the report. Because CWTs will likely remain a major evaluation tool for some time to come, research and management cooperate to use CWTs for as many purposes as possible.

Smolt-to-Adult Survival Rates-The use of smolt-to-adult survival (return) rate (SAR) estimates requires certain qualification. First, the term smolt may not be entirely accurate because we do not know the physiological state of juveniles at release. Therefore, smolt-to-adult actually represents release-toadult but the use of the term smolt is consistent throughout the Columbia River Basin.

Secondly, smolt (release)-to-adult survival rates for non-CWTed chinook salmon and steelhead trout could be underestimated from CWT returns because CWTed fish may not return as well as unmarked hatchery fish (K. Ball, IDFG, unpublished data). Therefore, CWT estimates tend to represent minimum return rates in this report. All Idaho chinook salmon that are CWTed have their adipose fin excised, (CWT/AD). All CWTed steelhead trout are adipose clipped and pelvic (ventral) fin clipped, (CWT/AD/V). All other hatchery steelhead trout (except fry or *fingerling* releases) are adipose clipped (AD).

We present two estimates of smolt-to-adult survival rate for spring and summer chinook salmon, which we believe bound the actual survival rate. Our first estimate, which we regard as a minimum estimate, is the ratio of CWTed fish recovered at hatchery racks, and in some cases spawning grounds, to the number of CWTed fish released.

Our second SAR estimate, which is an overestimate of the survival of hatchery fish, incorporates three assumptions; 1) all adult chinook salmon rack returns result from hatchery releases, 2) salmon and steelhead trout fingerling and fry releases do not contribute to adult returns and 3) all adipose clipped fish from which no CWT was recovered were from the hatchery at whose rack they were recovered and had lost their tags. The estimate is calculated as the ratio of the total rack return to the total number of smolts released.

Steelhead trout smolt-to-adult survival estimates and a detailed analysis of 1991-1992 steelhead trout returns from LSRCP facilities are provided by the Harvest Monitor Project. (K. Ball, IDFG, In press). SARs for steelhead trout returns completed in the 1991-92 run are reported here as in the Harvest Monitor Project report. These SARs are based on estimates of returns to hatchery racks, fisheries, and escapement.

Chinook Salmon

Scale Pattern Analysis-As in past years, we provided chinook salmon scale impressions to the Oregon Department of Fish and Wildlife which is taking the lead in building a computer model to differentiate chinook salmon stocks, primarily hatchery versus wild, based on scale pattern analysis {SPA). We enlisted the help of hatchery and management personnel, and tribal biologists to collect scales from hatchery rack returns and from natural/wild spawner carcasses. Scale collection methods were standardized to reduce sampling variability. When possible, scales were taken from the left side of the fish, two to three scale rows above the lateral line, along a diagonal between the posterior *insertion* of the dorsal fin and the anterior insertion of the anal fin (as per MacLellan 1987). We attempted to press four of the best scales sampled. Scales were pressed at 230°F for 70 seconds at 10,000 psi.

Aging of Hatchery Returns-We used two methods (referred to as A and C in previous annual reports) to estimate age composition of hatchery returns to McCall and Sawtooth FHs. Method A is the traditional hatchery method of using length cutoff points to partition the run into age groups. Typically, chinook salmon are classified into age groups according to the following fork length criteria:

	3_2	4_2	5_2
McCall FH	<66cm	67-94	>94cm
Sawtooth FH	<66cm	67-82	>82cm
Clearwater FH	<64cm	65-82	>82cm

This method does not account for overlap of age groups or variable growth rates between years. We used only Method A for Clearwater Fish Hatchery satellite returns because CWT data were inadequate at this time.

In Method C we used known-age CWT returns from the current run year to estimate the numbers of three-, four-, and five-year olds in the run. We simply applied the age distribution (proportions) defined by the CWT retrievals to the total population of fish trapped to derive the estimate. This estimate assumes there is no size (age) selective mortality associated with CWTs and survival of CWTd fish does not vary among brood years.

Sex Ratios of Hatchery Returns-We used documentation provided by hatchery personnel to calculate sex ratios of adult returns to LSRCP facilities. Sex ratios were calculated for total returns both including and excluding jacks (three-year-old males) and for specific age groups where appropriate.

Experimentation - Objective 2

Chinook Salmon

Marking/handling Experiment - McCall Fish Hatchery: Summer Chinook Salmon -A long term experiment is underway to evaluate the effects of CWTing procedures on the survival of hatchery chinook salmon in Idaho. Testing began with BY 1988 fish and is scheduled to continue for BY 1989 and BY 1990 fish (See Appendix D in Cannamela 1992 for Experimental Design). Control and test groups, one of each, consist of fish passively marked with oxytetracycline (OTC)-laced feed and fish marked according to the usual CWTing procedure, respectively. BY 1991 CWTed fish will be used to check retention of the OTC mark. Approximately 310,500 CWTed fish in Pond 1 were fed OTC-laced feed (25-35 g/100 lb of fish) in July 1992. We will determine the percent retention of the OTC mark by examining the vertebrae of a sample of these CWT/OTC marked adults when they return (1994-96). We typically examine the vertebrae of smolts before release to determine if the OTC marking procedure was effective.

Rearing Density Experiment - Sawtooth Fish Hatchery: Spring Chinook Salmon -At Sawtooth FH, we are evaluating the effects of rearing densities on smolt-tosmolt (release to LGR) and smolt-to-adult survival of spring chinook salmon. (See Appendix D in Cannamela 1992 for experimental design.) The design will be similar for all brood years with the notable exception that the BY 1989 fish will be tested from the time of outside ponding while the BY 1990 and BY 1991 fish were separated into control and treatment groups when placed into inside vats.

Also, PIT tag numbers may be adjusted for BYs 1990 and 1991 releases if BY 1989 detections at Lower Snake River dams indicate more or fewer tags are needed to meet statistical requirements. Brood year 1991 fish were released in fall 1992 to avoid a potential problem of insufficient water supply to maintain the fish through the winter.

Steelhead Trout

Size at Release Experiment - Hagerman National Fish Hatchery-Experimentation at Hagerman NFH is aimed at determining the optimum smolt size at release to maximize adult returns for Idaho hatchery steelhead trout. The experiment will include BY 1990 and BY 1991 A-run steelhead trout. The target sizes to be compared are 2.5-3. 0 fish/lb (fpp) (261-252 mm FL, test group) and 4.0-4.5 fpp (229-220 mm FL, control group) (See Appendix D in Cannamela 1992 for Experimental Design). CWTs and PIT tags will be used to evaluate adult returns and survival to LGR, respectively. We are also conducting a literature search to document the potential effects of smolt size on adult return variables for both chinook salmon and steelhead trout.

RESULTS

Summary of Releases and Returns

Idaho LSRCP hatchery facilities released 901,500 summer chinook salmon, 3,739, 100 spring chinook salmon, and 3,613,300 summer steelhead trout juveniles during the reporting period October 1, 1991 to September 30, 1992 (Table 2). All summer chinook salmon were released as smolts. Spring chinook salmon releases consisted of 2,904,700 smolts and 834,440 fall presmolts. Steelhead trout releases consisted of 1,969,400 A-run smolts and 1,644,000 B-run smolts (Table 2).

Chinook salmon counts at LGR in 1992 were 3,309 summer chinook salmon and 21,924 spring chinook salmon (U.S. Army Corp. of Engineers or FPC). Adult chinook salmon returns to Idaho LSRCP hatchery racks, including hatchery and naturally-produced fish totalled 2,848 summer chinook salmon and 1,358 spring chinook salmon (Table 3). About 100 summer chinook salmon were harvested from the South Fork Salmon River by Shoshone-Bannock tribal members in 1992. Nez Perce tribal members and sport anglers harvested an estimated 160 and 54 spring chinook salmon from the Clearwater River, respectively (Jones and Miller 1992). An additional 441 summer chinook salmon (Pahsimeroi and Rapid River FHs) and 2,778 spring chinook salmon adults (Kooskia NFH and Rapid River FH) returned to non-LSRCP Idaho hatcheries. Tribal and sport anglers harvested about 909 and 533 spring chinook salmon from Rapid River, respectively, in 1992 (K. Ball, IDFG, personal communication). Those fish crossing LGR and not accounted for at Idaho facilities or in fisheries represents natural escapement, fish returning to non-Idaho hatcheries, and prespawning mortalities and strays.

Table 2. LSRCP releases for October 1, 1991 to September 30, 1992 (1992 emigration). Smolt release goals in parentheses.

	Sumner Chinook Salmon			Spring Chinook Salmon			Steelhead Trout			
	Smolt	Presmolt	Fry	Smolt	Presmolt	Fry	Smolt A	Presmolt A	Smolt B	Presmolt B
McCall	901,500 (1,000,000)									
Dworshak				1,564,199[a] (1,400,000)						
Clearwater					832,941					
Red River				207,400[c]	354,713					
Crooked River				200,530[b]	119,856					
Powell				214,311[c]	358,372					
Sawtooth				1,263,864 (2,980,000)	1,496					
East Fork Salmon R.				76,614						
Hagerman							850,189 (1,700,000)		602,869[d]	
Magic Valley							1,119,200 (1,749,000)		1,041,057	
Total	901,500			2,904,677	834,437		1,969,389		1,643,926	
Grand Total		901,500			3,739,114			3,613,315		

	Chinook Salmon		Steelhead Trout	
	Smolts	Presmolts	Smolts	Presmolts
	3,806,177	834,437	3,613,315	0
	Chinook Salmon and Steelhead Trout Smolts		Chinook Salmon and Steelhead Trout Presmolts	
	7.419,492		834.437	

[a] 'Includes releases to CFH satellites.
[b] Smolts from Kooskia NFH.
[c] From Dworshak NFH; included in Dworshak NFH releases.
[d] 572,074 8-run fingerlings sent to Dworshak NFH in August 1991.

Table 3. Distribution of LSRCP returns above Lower Granite Dam (LGR) for the period October 1, 1991 to September 30, 1992. Rack returns include an unknown number of naturally produced fish, especially in the case of chinook salmon.

	Total Over LGR	Rack Returns: Total	Rack Returns: Estimated Natural Fish[a]	Facility	Harvest	Escapement and Prespawn Mort[b]
Total Spring and Summer Chinook salmon	24,399					
Summer Chinook Salmon	3,309[c]	3,289			100	-80
		2,848		McCall	100[d]	
		310		Rapid River		
		131		Pahsimeroi		
Idaho LSRCP SuCk		2,848				
Spring Chinook Salmon	21,924[c]	5,396			1,831	14,697
		369		Dworshak	214[e]	
		312		Kooskia		
				Clearwater		
		39		Red R.		
		228		Crooked R.		
		270		Powell		
		387		Sawtooth		
		65		East Fork		
		2,466		Rapid R.	1,442[f]	
		829		Lookingglass (OR)	175[g]	
		89		Big Canyon		
		431		Imnaha (OR)		
Idaho LSRCP SpCk		989				

Table 3 continued.

	Total Over LGR	Rack Returns Total	Rack Returns Estimated Natural Fish'	Facility	Harvest	Escapement and Prespawn Mort[b]
Total A- and B-run						
Steelhead trout	99,058	NA[h]				
Hatchery	81,736					
Wild	17,322					
A-run Steelhead trout	85,537					
Hatchery	69,725					
Wild	15,812					
				Hagerman/MVSH		
		1,705	44	Sawtooth		
		0	0	East Fork		
		1,727	39	Pahsimeroi		
		1,714		Hells Canyon		
		111	111	Rapid River		
				Oregon Hatcheries		
B-run Steelhead trout	13,521					
Hatchery	12,011					
Wild	1,510					
				Hagerman/MVSH		
		156	45	East Fork		
		0	0	Pahsimeroi		
		3,700	0	Dworshak		
		0	0	Kooskia		
		32	32	Powell		

[a]Unknown for chinook salmon.
[b]Does not include hatchery and natural chinook salmon counted in the rack return and released above racks.
[c]Spring and summer chinook salmon LGR counts were *over*- and underestimated, respectively.
[d]Tribal harvest.
[e]Total includes tribal and sport harvests of 160 and 54 fish, respectively.
[f]Total includes tribal and sport harvests of 909 and 533 fish, respectively.
[g]Tribal harvest.
[h] Harvest estimates and Oregon rack returns are currently unavailable; therefore, other estimates not provided.

Approximately 99,058 adult summer steelhead trout including 17,322 wild and 81,736 hatchery fish crossed LGR in the 1991-92 counting period (Table 3). An estimated 1,772 LSRCP-produced steelhead trout adults (1,661 A-run and 111 B-run adults) returned to *hatchery* racks in Idaho during the 1991-92 reporting period. LSRCP rack returns i.e. Sawtooth FH and East Fork Salmon River weirs, included 44 A-run and 45 B-run fish or wild or natural origin. Sport anglers harvested an estimated 8,203 A-run, and 1,647 B-run summer steelhead trout, respectively (K. Ball, IDFG, In press). A total of 7,284 summer steelhead trout (including wild fish) returned to other Idaho hatchery racks.

Documentation/Evaluation: Chinook Salmon

McCall Fish Hatchery

Rearing, Marking, Releases-McCall FH released 901,500 BY 1990 summer chinook salmon at approximately 24 fpp between March 24-27, 1992 (Appendix A, Table 1). All fish were released into the South Fork Salmon River at Knox Bridge approximately 0.5 km upstream of the weir site. About 36% and 50% of these fish were marked with CWT/AD and OTC, respectively. The remaining 14% were released unmarked.

BY 1990 represented the last of three cohorts being used to determine the effects of CWTing on the survival of chinook salmon (see Appendix D, Cannamela 1992 for Experimental Design). The control group was marked by feeding TM-100-laced (oxytetracycline) feed at the rate of 25-35 g/100 lb of fish per day for 14 d beginning in July 1991. CWTed fish marked under the US-Canada Pacific Salmon Treaty to assess ocean fisheries contribution will also serve as the test group for the experiment. The test group was CWTed in October 1991. The control and test groups also included groups of 250 PIT tags each to provide survival and travel time estimates of smolts to LGR. Freeze branded fish are used by the FPC to assess various parameters of smolt migration including survival, health, and migration timing.

BY 1990 fish were generally in excellent health with little in-hatchery loss due to disease or marking. However, bacterial kidney disease (BKD) prevalence in pre-release smolts, tested by the florescent antibody technique (FAT), was about 22% (D. Munson, IDFG, unpublished). This unusually high BKD prevalence may be related to several days of harassment and predation by otters prior to testing. Three otters entered pond 2 in February 1992; two were immediately captured, but one remained at large for several days. Mortality due to predation was not known. BKD prevalence was three times higher in Pond 2 {33%), the pond subjected to most of the otter attacks, than in Pond 1 (10%). An unknown number of fish died shortly after the attacks, possibly due to stress related factors. We are uncertain what effect, if any, the attacks will have on the smolts that survived the incident.

The mesenteric fat index for BY 1990 juveniles was between 3 and 4 (D. Munson, IDFG, unpublished). We speculate that the amount of mesenteric fat, an indicator of stored energy, may influence the post-release survival of hatchery fish.

Two 14-d gallamycin (erythromycin) feedings, one each in May and September may have reduced BKD prevalence from levels noted for previous brood years. Green egg-to-smolt (release) survival for BY 1990 fish was 81%.

There were 607,665 BY 1991 chinook salmon fry on hand at McCall FH as of February 1993. These fish were in excellent health. Survival from green egg to smolt (March 9, 1993) was 86%.

Adult Returns-A record high total of 2,848 adult summer chinook salmon was trapped at the South Fork Salmon River (SR) trap between June 3 and September 4, 1992. Age composition of the entire run based on the hatchery length-at-age criteria was 205 jacks, 1 three-year-old female, 1,486 four-year-old males, 1,143 four-year-old females, 35 five-year-old males, and 7 five-year-old females (Table 4). We estimated that the hatchery component comprised from 67% to 95% of the 1992 South Fork SR rack, depending on the method used. Our best guess is about 85% ± 5%.

The 1992 run arrived earlier than normal and may reflect the fish's response to low spring flows and associated higher water temperatures. The first fish arrived on June 5. Usually fish begin to enter the trap from mid- to late-June (G. McPherson, IDFG, personal communication). Fish released above the weir to spawn naturally included 125 jacks (61% of all jacks captured), 983 four- and five-year-old males (65%), and 723 females (63%). Of these, 7 jacks and 200 four- and five-year-old males and females (1:1 sex ratio) were outplanted (trucked) into the Stolle Meadows section of the river as part of the Idaho Supplementation Studies (ISS) to enhance natural production in that area.

Green-egg take from 325 females was 1,428,819 for an average fecundity of 4,396 eggs/female. Eggs from these females were fertilized with milt from 330 males (includes 30 jacks), at approximately a 1:1 pairing ratio (adult male:female). Green egg-to-eyed egg survival for these BY 1992 fish was 85.4%.

A total of 652 adipose clipped adult summer chinook salmon returned to the rack in 1992. CWTs were retrieved from 601 of these fish (92.2%), including 373 males and 228 females (Appendix C Table 1). Male CWT returns included 39 three-year olds (one was a Sawtooth FH release) and 334 four-year olds (one was a Lookingglass FH release, and 9 were tagged at Columbia River mile 141). Female CWT returns included 226 four-year olds (12 were tagged at Columbia River mile 141) and 2 five-year olds. The fish tagged at Columbia River mile 141, though of unknown origin, are assumed to have originated from McCall FH or natural production in the South Fork SR. No adults of known (CWT) McCall FH origin were recovered at other racks in the basin.

Nez Perce tribal biologists recovered 18 ad-clipped chinook salmon from spawning areas between the South Fork SR weir and Phoebe Creek, a distance of about 30 km (P. Kucera, NPT fisheries, personal communication). Of these, 16 CWTs, all from BY 1988 fish of McCall FH origin, were recovered from 6 males, 5 females, and 5 fish of undetermined sex (Appendix C Table 1).

Table 4. Summary of 1992 summer chinook salmon returns to the South Fork Salmon River trap, including naturally produced fish. Numbers are those reported by hatchery personnel based on hatchery aging criteria. Percent of run by sex in parentheses.

	Males				Females			
BY/Age	Trapped	Released	Spawned	Morts	Trapped	Released	Spawned	Morts
89/3	205(11.9)	125[d]	30		1(0.1)			
88/4	1,486(86.1)				1,143(99.3)			
87/5	35(2.0)	983[ad]	300[a]	15[b]	7(0.6)	723[bd]	325[a]	103[a]
	1,697[c]				1,151			

Total trapped: 2,848

Trapping period: 3 June - 4 September

Egg take: 1,428,819

[a] Includes four- and five-year olds
[b] includes three-, four-, and five-year olds
[c] Total adjusted for fish that were mis-sexed at the trap
[d] 100 adult males, 100 females, and 7 jacks were outplanted in Stolle Meadows

Returns of BY 1987 summer chinook salmon were completed in 1992. SARs from release to rack ranged from 0.0022-0.0048% for six companion CWT groups (Appendix B Table 1). The pooled SAR was 0.0041%. Based on hatchery aging criteria, 448 BY 1987 fish were trapped from 1990-92. Based on the assumption that all returning adults were of hatchery origin the theoretical maximum SAR for BY 1987 fish was 0.047%.

Forty-four (23.4%) of 188 BY 1987 adults tested positive for BKD by the FAT; 25 (56. 8%) of these "positive" fish were categorized as heavy positive (McPherson 1990). No other diseases, (IHN, IPN) were detected in the 1987 brood fish.

The 1992 adult returns included fish from the first (BY 1988) and second (BY 1989) groups of fish in the Marking/handling experiment. We removed, cleaned, and mounted vertebrae from fish that potentially harbor the OTC mark. Our subsample included 300 BY 1988 and six BY 1989 fish, respectively. Based on length, the BY 1988 subsample consisted of 80 and 220 three- and four-year olds, respectively. We will report the final BY 1988 results in 1993 when returns from this brood year are completed.

Dworshak National Fish Hatchery

Information pertaining to the LSRCP program at Dworshak NFH is reported in a separate report (Jones and Miller 1992). We include selected information in this report for comparative purposes.

Rearing, Marking, Releases-Information pertaining to the rearing, marking and release of spring chinook salmon at Dworshak NFH is presented in Appendix A, Table 2 of this report and in Jones and Miller (1992).

Adult Returns-The return of 369 adult spring chinook salmon to DNFH in 1992 represents the fourth lowest rack return on record {Jones and Miller 1992). The run included an estimated 22 three-year old, 286 four-year old, 40 five-year old, and 21 unmeasured fish (age unknown).

The estimated smolt-to-adult return rate of all BY 1987 CWT fish was 0.0018% and ranged from 0.0000-0.0031% for six CWT groups (CWT fish were also freeze branded.). The combined SAR (CWT) estimates for three groups of fall released and three groups of spring released chinook salmon juveniles were 0.0010% and 0.0025%, respectively. The SAR estimate under the assumption that all returns were of Dworshak NFH origin was 0. 0077% (Jones and Miller 1992).

Clearwater Anadromous Fish Hatchery

About 80 wild spring chinook salmon juveniles are being reared at Clearwater FH as part of a pilot captive brood stock program. These fish were trapped in the Selway River in spring 1992. Other fish on hand include spring chinook salmon fry from Powell FH (458,000), Red River FH (21,000), and fish from Oregon's Lookingglass FH (400,000, Rapid River FH stock).

Table 5. Clearwater Fish Hatchery satellite releases of BY 1990 spring chinook salmon (1992 emigration)(DNFH = Dworshak National Fish Hatchery and KNFH = Kooskia National Fish Hatchery).

	Transfer					Release		
Satellite	Stock	From (Hatchery)	Number	Date	Size (fpp)	Number Released	Date	Size (fpp)
Red River	Red R.	DNFH	355,165	6/91	135.0	354,713	10/23/91	31.3
	DNFH	DNFH	207,519	3/16-18/92	18.7	207,400	04/07/92	18.4
Crooked River[a]	Crooked R.	DNFH	578,361	6/91	74.0	119,856	10/16/91	38.5
	KNFH	KNFH	200,530	9/16-18/91		200,530	10/16/91	21.4
Powell	Powell	DNFH	359,402	6/91	148.0	358,372	10/24/91	30.6
	DNFH	DNFH	150,854	3/16/92	19.9	150,854	04/08/92	19.0
	DNFH	DNFH	63,457	4/06/92	18.7	63,457	04/08/92	18.7

[a] Release includes a combination of fish that survived the clogged intake accident and those trucked from Kooskia NFH in September.

Table 6. Summary of 1992 spring chinook salmon returns to the Red River satellite, including naturally produced fish. Numbers are those reported by hatchery personnel based on hatchery aging criteria. Percent of run by sex in parentheses.

	Males				Females			
BY/Age	Trapped	Released	Spawned	Morts	Trapped	Released	Spawned	Morts
89/3	5(21.7)	4	1	0	0(0.0)	0	0	0
88/4	17(73.9)	11	6	0	14(87.5)	9	5	0
87/5	1(4.4)	1	0	0	2(12.5)	1	1	0
	23	16	7	0	16	10	6	0

Total trapped: 39

Trapping period: 18 May - 16 September

Egg take: 22,860

REDRTN92

Table 7. Summary of 1992 spring chinook salmon returns to the Crooked River satellite, including naturally produced fish. Numbers are those reported by hatchery personnel based on hatchery aging criteria. Percent of run by sex in parentheses.

	Males				Females			
BY/Age	Trapped	Released	Spawned	Morts	Trapped	Released	Spawned	Morts
89/3	13(10.1)	11	0	2	0(0.0)	0	0	0
88/4	112(86.8)	106	0	6	91(96.8)	87	0	4
87/5	4(3.1)	4	0	0	3(3.2)	3	0	0
	134[a]	121	0	8	94	90	0	4

Total trapped: 228

Trapping period: 18 March - 21 September

Egg take: 0

[a]Lengths for five males not included in the age categories, but included in the total, were unknown.

Table 8. Summary of 1992 spring chinook salmon returns to the Powell satellite, including naturally produced fish. Numbers are those reported by hatchery personnel based on hatchery aging criteria. Percent of run by sex in parentheses.

	Males				Females			
BY/Age	Trapped	Released	Spawned	Morts	Trapped	Released	Spawned	Morts
89/3	6(4.4)	0	5	1	0(0.0)	0	0	0
88/4	118(86.1)	0	109	9	131(98.5)	0	126	5
87/5	13(9.5)	0	13	0	2(1.5)	0	2	0
	137	0	127	10	133	0	128	5

Total trapped: 270

Trapping period: 25 May - 17 September Egg

take: 521,000

POWRTN92

Rearing, Marking, Releases-Clearwater FH satellites released about 1,000,000 chinook salmon presmolts in fall 1992 (Table 5 and Appendix A Table 3). An additional 422,000 fish were released from Red River FH and Powell FH ponds in April 1992.

Adult Returns-Five hundred thirty-seven adult spring chinook salmon returned to the Clearwater FH satellites in 1992, including 39 at Red River, 228 at Crooked River, and 270 at Powell (tables 6, 7, and 8).

Red River Satellite (Clearwater FH)

Rearing, Marking, Release-Approximately 355,000 presmolts and 207,400 smolts were released from the Red River facility for the 1992 emigration (Table 5 and Appendix A Table 3).

Adult Returns-Thirty-nine adult spring chinook salmon were trapped between May 18 and September 16, 1992, including 23 (59%) males and 16 (41%) females (Table 6). Sixteen males (69.6%) and 10 (62.5%) females were released above the weir to spawn naturally. These returns resulted from combined presmolt and smolt releases of about 993, 000 between 1988 and 1991, and from natural production. No pre-spawning mortality occurred for fish kept for hatchery production.

A total of 22,860 eggs stripped from six females (3,810 eggs/female) were fertilized with milt from seven males in approximately a 1:1 ratio. About 96% of these, or 21,937 eggs survived to eye-up stage. The resulting juveniles will be early-reared at Clearwater FH and returned to Red River satellite in June 1993 for supplementation (ISS) releases in October 1993.

Crooked River Satellite (Clearwater FH)

Rearing, Marking, Releases-Approximately 320,000 spring chinook salmon presmolts were released from the Crooked River satellite in October 1991 (Table 5 and Appendix A Table 3). No smolt releases were made in Crooked River in spring 1992.

Adult Returns-Two hundred twenty-eight spring chinook salmon adults were trapped between March 18 and September 21, 1992 (Table 7). Of these, 134 (59%) were males (13 three-year olds; 112 four-year olds; 4 five-year olds) and 94 (41%) were females (91 four-year olds; 3 five-year olds). These adult returns resulted from combined fry, presmolt, and smolt releases totalling 1,240,000 between 1988 and 1991, and from natural production (Appendix B Table 3).

Powell Satellite (Clearwater FH)

Rearing, Marking, Releases-Powell satellite released 350,000 spring chinook salmon presmolts in October 1991 (Table 5 and Appendix A Table 3). Spring releases included acclimated and unacclimated (direct release) groups that totalled 240, 000.

Adult Returns-Two hundred seventy spring chinook salmon adults were trapped between May 25 and September 17, 1992. Of these, 137 (51%) were males (6 three year-olds; 118 four year-olds; 13 five year-olds) and 133 (49%) were females (131 four year-olds; 2 five year-olds) {Table 8). We did not install the weir (Lochsa River at Powell) for *chinook* salmon in 1992. We considered all adult salmon fish entering Walton Creek (i.e. the Powell trap) to be of hatchery origin because they did so volitionally. None of the fish trapped at Walton Creek were released to spawn naturally. We considered fish migrating beyond Walton Creek to be of natural origin. The 1992 returns to the Powell facility resulted from combined presmolt and smolt releases of about 1,460,000 between 1988 and 1991 (Appendix B Table 3).

Approximately 521,000 eggs stripped from 128 females (4,070 eggs/females) were fertilized with milt from 127 males in a 1:1 pairing. Of these, 473,108 (90.8%) survived to eye-up stage. Juveniles resulting from these eggs are scheduled for release as smolts in 1994.

Sawtooth Fish Hatchery

Rearing, Marking, Releases-Sawtooth FH released 1,340,478 BY 1990 spring chinook salmon smolts in spring 1992 including 1,263,864 Sawtooth FH stock and 76,614 East Fork SR stock fish (Table 2 and Appendix A Table 4). About 1,500 PIT tagged Sawtooth FH stock (BY 1990) presmolts were released in fall 1991. Sawtooth FH also reared and released 303,801 Rapid River FH stock spring chinook salmon presmolts for release into the Yankee Fork Salmon River (Appendix A Table 4). (An additional 50,480 Rapid River spring chinook salmon fingerlings were released directly to the Yankee Fork dredge ponds from Rapid River FH.)

Fish released directly from Sawtooth FH to the Salmon River were allowed to emigrate volitionally from March 9-13. Fish remaining in raceways on March 13 were then forced out in the usual manner.

About 32% of the BY 1990 Sawtooth FH stock fish were marked (CWT/AD) for the ongoing rearing density study (Appendix A Table 4). The CWT fish will provide smolt-to-adult return rate and fisheries contribution information. The rearing density experiment was designed in conjunction with the Idaho Fisheries Research Office and is being run simultaneously at Sawtooth FH and Dworshak NFH. The BY 1990 fish represent the second of three brood years to be tested.

About 52% of the Sawtooth FH stock fish (BY 1990) were marked with a left ventral fin clip (LV) to provide for recognition of these fish upon return as adults. Some of these LVed fish also bore freeze brands or PIT tags. Virtually all of the BY 1990 East Fork SR satellite fish were marked (CWT/AD or AD only) (Appendix A Table 4).

Prior to 1991, Sawtooth FH chinook salmon were usually marked in the fall. However, CWTing (and adipose clipping) of BY 1990 fish occurred in June 1991.

Fish not marked in June were fin-clipped (left ventral) between September 17-20, 1991. At this same time, a group of about 1,500 fish was PIT tagged and released.

BY 1990 fish were generally in good health throughout the rearing cycle. Green egg-to-smolt survival for BY 1990 Sawtooth FH stock chinook salmon was about 85%. BY 1990 fish were given two 21-d oral erythromycin treatments, one each in March and May 1991. BKD was present in four of six fish, tested by the ELISA method, in February 1992 (D. Munson, IDFG, unpublished).

About 80% of the BY 1991 Sawtooth FH stock chinook salmon, including fish for ISS, were released in fall of 1992 as a precautionary measure (Appendix A Table 4). Water flows in the upper Salmon River were the lowest on record in 1992. Fish were released to avoid the possibility of inadequate water supply at the hatchery during the winter. Sawtooth FH stock high BKD fish, some of the Sawtooth FH fish bound for the upper Salmon River under the ISS, and all of East Fork SR stock fish were retained at the hatchery for release in spring 1993.

Adult Returns-A total of 387 spring chinook salmon were trapped at Sawtooth FH between May 28 and September 8, 1992 (Table 9). Of these, 222 (57.0%) were males (26 three-year olds; 153 four-year olds; 43 five-year olds) and 165 (43%) were females (3 three-year olds; 79 four-year olds; 83 five-year olds)(Table 9). Twelve jacks (46% of the all jacks trapped), 77 four- and five-year-old males (39%), and 56 four- and five-year-old females (35%) were released above the weir to spawn naturally (Table 9). (Note that these are the numbers reported by hatchery personnel based on historical length-at-age criteria.)

A new spawning protocol was implemented in 1992 to make the best use, genetically, of the limited number of gametes available in this year's run. Eggs from each female spawned were divided evenly among two buckets. Eggs in each bucket were then fertilized with the milt from different individual males. Approximately 468,297 green eggs stripped from 104 females (4,503 eggs/female) were fertilized with the milt from 133 males (including 14 jacks). Out of necessity, a shortage of ripe males on a particular spawning day, some males were used twice. These green eggs yielded 423,600 eyed eggs (90.5% eye-up) (Coonts 1992). Prespawning mortality of ponded fish was 2.1% and included 2 males (1.5%) and 3 females (2.8%).

CWTs were recovered from 24 of 33 ad-clipped fish that returned to the Sawtooth FH rack (Appendix D Table 2). Of these, one was an East Fork Salmon River release (a four year-old female) and two (a four year-old male and a five year-old female) were tagged at Columbia River mile 141. As previously mentioned, an additional fish which had been released at Sawtooth FH (a three year-old male) was recovered at the South Fork SR weir (Appendix C Table 1). The remaining 21 recoveries, all of Sawtooth FH origin included: 1 three year-old male, 9 four year-old males, 2 five year-old males, 7 four year-old females, and 2 five-year old females (Appendix C Table 2). Therefore, the age composition of these 21 fish of known Sawtooth FH origin was 4.8% age three, 76.2% age four, and 19.0% age five. CWTed fish (all 24) made up 6.2% of the 1992 chinook salmon rack returns to Sawtooth FH. Discounting the East Fork Salmon River fish that was trapped at the Sawtooth FH weir, the Sawtooth FH fish that strayed to the South Fork SR trap represents 4.3% (1/23) or 4.8% (1/21) of the Sawtooth FH CWT

Table 9. Summary of 1992 spring chinook salmon returns to the Sawtooth FH trap, including naturally produced fish. Numbers are those reported by hatchery personnel based on hatchery aging criteria. Percent of run by sex in parentheses.

	Males				Females			
BY/Age	Trapped	Released	Spawned	Morts	Trapped	Released	Spawned	Morts
89/3	26(11.7)	12	14	0	3(1.8)	0	3	0
88/4	153(68.9)	58	93	2	79(47.9)	25	53	1
87/5	43(19.4)	19	24	0	83(50.3)	31	48[a]	2
	222	89	131	2	165	56	104	3

Total trapped: 387

Trapping period: 28 May - 8 September

Egg take: 468,297

'Two additional females were unused.

SAWRTN92

returns, depending on whether or not the fish tagged on the Columbia were of Sawtooth FH origin.

Two BY 1987 fall released fish, distinguished by right ventral clips (RV), returned to Sawtooth FH in 1992. Both were females.

The combined final return rates (SAR) from release to the rack for CWTed and RVed BY 1987 Sawtooth FH spring chinook salmon was 0.0040% (Appendix B Table 4). Marked fall released fish, including CWTed and RVed fish, returned at a rate of 0.0037%. CWTed and RVed fall released fish returned at rates of 0.0020% and 0.0052%, respectively. Spring released fish, for which only CWT estimates exist, returned at a rate of 0.0054%. The estimated SAR under the assumption that all fish trapped at the Sawtooth FH rack were of Sawtooth FH origin was 0.0240%.

East Fork Salmon River (Sawtooth FH)

Rearing, Marking, Releases-All of the BY 1990 East Fork SR stock spring chinook salmon, about 76,600, were released as smolts at the East Fork SR satellite site (Table 2 and Appendix A Table 4). These smolts resulted from 106,000 green eggs taken in 1990, a 72% green egg-to-smolt survival. Rearing conditions, disease treatments, and marking schedules for East Fork SR satellite fish paralleled that of Sawtooth FH stock chinook salmon.

Adult Returns-A total of 65 spring chinook salmon was trapped at the East Fork SR site between June 1 and September 8, 1992 (Table 10). Of these, 52 (80%) were males and 13 (20%) were females. Green egg take from seven females totalled 30,500 (4,356 eggs per female). These eggs were fertilized with the milt from 18 males; eggs from each female were split into three equal parts and fertilized with the milt of a different male in a 3:1 pairing. Green egg-to-eyed egg survival for BY 1990 eggs was 92.4%. Thirty-four males (65%) and six females (46%) were released above the weir.

A CWT was retrieved from the only ad-clipped fish that returned to the East Fork SR trap in 1992. The fish was a four year-old female. An additional four-year-old female of East Fork SR origin returned to the Sawtooth FH rack.

Adult returns were completed for BY 1987 in 1992; no CWTed fish from that brood year returned in 1992. In total, one BY 1987 chinook salmon returned to the rack from the single group of 59,529 CWTed smolts released in spring 1989 (SAR = 0.0017%) (Appendix B Table 5). The maximum estimated SAR for the East Fork SR BY 1987 was 0. 019%. The two BY 1988 release groups (CWT) of about 47,000 smolts have produced one return each thus far, yielding an incomplete SAR of 0.0021% for each group.

Table 10. Summary of 1992 spring chinook salmon returns to the East Fork Salmon River satellite, including naturally produced fish. Numbers are those reported by hatchery personnel based on hatchery aging criteria. Percent of run by sex in parentheses.

	Males				Females			
BY/Age	Trapped	Released	Spawned	Morts	Trapped	Released	Spawned	Morts
89/3	14(26.9)	9	5	0	1(7.7)	0	1	0
88/4	22(42.3)	17	5	0	5(38.5)	3	2	0
87/5	16(30.8)	8	8	0	7(53.8)	3	4	0
	52	34	18	0	13	6	7	0

Total trapped: 65

Trapping period: June 1 - September 8

Egg take: 30,494

EFRTN92

Fisheries Contribution - Idaho

Shoshone-Bannock tribal members harvested about 100 summer chinook salmon from the South Fork SR in 1992. The harvest consisted of an estimated 71 hatchery and 29 natural fish (K. Kutchins, Shoshone-Bannock Tribe, personal communications).

Nez Perce tribal members and sport anglers harvested an estimated 160 and 54 spring chinook salmon, respectively, from the North Fork and mainstem Clearwater River fishery in 1992 (Jones and Miller 1992; K. Ball, IDFG, unpublished). An additional 144 fish were caught and released by sport anglers. The estimated age composition of the 198 fish caught in the sport fishery was 18.7% (37) jacks and 81.3% (161) "adults", i.e four and five-year olds. We assume that most of these fish were of Dworshak NFH origin because six out of seven (85.7%) CWTs recovered from snouts of 10 adipose clipped fish bore Dworshak NFH codes. The other CWT recovered bore a National Marine Fisheries Services tag code indicating that the fish had been tagged at a downriver site. We estimated that about 90% of the fish caught in the 1990 Clearwater River fishery were of hatchery origin (Cannamela 1992). About 30% of the fish caught by sport anglers bore adipose fin clips (K. Ball, IDFG, personal communication).

Documentation/Evaluation: Steelhead Trout

Hagerman National Fish Hatchery (Hagerman NFH)

Rearing, Marking, Releases-Hagerman NFH released 850,200 A-run (Sawtooth FH and Pahsimeroi FH stock) and 602,900 B-run (Dworshak NFH and East Fork SR stock) steelhead trout smolts to Salmon River sites between April 6-22, 1992 (Appendix A Table 5). BY 1991 fish were marked for several purposes including size at release and acclimation studies. Acclimation studies were initiated in 1992 to assess to effects of " acclimating" fish at Sawtooth FH on survival. Fish were trucked to Sawtooth FH and placed in raceways about 3 weeks prior to release. Both A-Run and B-Run smolt releases contained PIT tagged groups to provide migration timing and survival evaluations.

Magic Valley Steelhead Hatchery

Rearing, Marking, Releases-Magic Valley Steelhead Hatchery (SH) released 1,119, 200A-run (Oxbow FH and Pahsimeroi FH stock) and 1,041,100 B-run (East Fork SR and Dworshak NFH stock) steelhead trout smolts between April 6-25, 1992 (Appendix A Table 6). A-run fish at Magic Valley SH were predominately of Oxbow FH stock due to egg shortages at Pahsimeroi and Sawtooth FHs. Both releases included CWT and PIT tagged groups.

BY 1991 fish were rated in good to excellent health throughout the rearing cycle (M. Baer, M. Graham, J. Rankin, IDFG, unpublished). Fish health personnel detected IHN in East Fork SR stock Bs in July 1991. IHN and IPN were present at low titres in Pahsimeroi FH As. These diseases had no detectable negative impacts on fish health or quality.

All fish were held off feed for varying lengths of time in each month from September 1991 up to and including February 1992 to keep them on schedule to reach the target size at release of 4.5 fpp (220 mm). Fish were held off feed for periods that varied from several to 21 d.

1990-91 Adult Steelhead Trout Returns

Sawtooth Fish Hatchery Weir-A total of 1,705 A-run steelhead trout was trapped at the Sawtooth FH weir between March 5 and April 30, including 1,206 {70.7%) males and 497 (29.1%) females (Table 11)(Alsager 1992). The hatchery-origin portion of the return included 1,180 (75.7%) males and 479 (24.3%) females. The natural (unmarked) portion of the rack return included 26 (59%) males and 18 (41%) females. Hatchery personnel released 497 males and 175 females upstream of the weir; all unmarked fish trapped at the weir are considered to be of natural origin and are released. Naturally produced fish comprised 2.6% of the Sawtooth FH rack return. A total of 1,406,360 eggs was taken from 307 females (mean = 4,581 eggs per female). These eggs were fertilized with the milt from 362 males in approximately a 2:1 pairing. Milt from two males was added simultaneously to the eggs of one female. Green egg-to-eyed egg survival for these BY 1992 steelhead trout eggs was 84.1% producing 1,182,500 eyed eggs.

Returns to the Sawtooth FH weir in 1991-92 resulted from 1989 (2-ocean) and 1990 (1-ocean) releases of Hagerman-reared fish and Magic Valley SH-reared fish and from natural production (Tables 11 & 12 and Appendix B Tables 6 & 7).

The estimated SAR for three CWTed A-run steelhead trout groups (Hagerman NFH BY 1988) released at the Sawtooth FH weir was 0.07%, ranging from 0.04-0.09%. The pooled SAR estimate for three CWTed A-run groups (Magic Valley SH, BY 1988) released to the Little Salmon River was 0.16%, and ranged from 0.11-0.20%. Approximately 8,203 A-run steelhead trout of LSRCP origin were harvested in the 1991-1992 season (K. Ball, IDFG, personal communication).

East Fork Salmon River Weir-Adult returns to the East Fork Salmon River weir totaled 156 B-run steelhead trout, including 91 males (58.3%) and 65 females (41.7%) trapped between March 18 and May 4, 1992 {Table 12) (Alsager 1992). The hatchery-produced (marked) portion of the rack return consisted of 68 (61.3%) males and 43 (38. 7%) females. The naturally-produced (unmarked) portion of the rack return, which comprised 28.8% of the total rack return, consisted of 23 (51.1%) males and 22 (48.9%) females. All of the unmarked fish were released above the weir along with an additional 13 and six marked males and females, respectively. About 151,00 green eggs taken from 37 females (mean = 4,075 eggs/female) were fertilized with the sperm of 53 males in 2:1 pairings. Milt from two males was added simultaneously to the eggs of one female. Green egg-toeyed egg survival was 89.7% producing 135,200 eyed eggs.

Table 11. Summary of 1992 A-run steelhead trout returns to the Sawtooth Fish Hatchery weir, including naturally produced fish. Numbers are those reported by hatchery personnel based on hatchery aging criteria. Percent of run by sex in parentheses.

	Males				Females			
BY	Trapped	Released	Spawned	Morts	Trapped	Released	Spawned	Morts
90	NA				NA			
89	NA				NA			
	1,206[a]	497	362	6[b]	499[c]	175	307	5[d]

Total trapped: 1,705

Trapping period: 5 March - 30 April

Egg take: 1,406,360

[a]- includes 26 wild fish
[b] - an additional 341 fish were killed but not spawned
[c]- includes 18 wild fish
[d] - an additional 12 fish were killed but not spawned
* - 1,022 kelts were given to the public

SWSTHRTN.92

Table 12. Summary of 1992 B-run steelhead trout returns to the East Fork Salmon River weir including naturally produced fish. Numbers are those reported by hatchery personnel based on hatchery aging criteria. Percent of run by sex in parentheses.

	Males				Females			
BY	Trapped	Released	Spawned	Morts	Trapped	Released	Spawned	Morts
90	NA				NA			
89	NA				NA			
	91[a]	38	53	0	65[b]	28	37	0

Total trapped: 156

Trapping period: 18 March - 4 May Egg

take: 150,790

[a] - includes 23 wild fish
[b] - includes 22 wild fish
*- 90 kelts were given to the

EFSTHRTN

East Fork SR B-run returns resulted from 1988, 1989, and 1990 releases of Hagerman NFH-reared smolts and 1989 and 1990 releases of Magic Valley NFH-reared smolts (Appendix B, Tables 6 & 7). Hagerman NFH releases included one CWT group in 1988 and three in 1989. Magic Valley SH releases included three CWT groups in 1989 and seven in 1990.

The SAR estimate for the 1988 release at the East Fork SR weir (including fisheries) was 0.031% (K. Ball, IDFG, personal communication). Sport anglers harvested about 1, 647 B-run steelhead in the 1991-92 season.

Migration Conditions (1989 and 1992 Emigration Years)

Flows at LGR in 1989 (emigration year for BY 1987 chinook salmon and BY 1988 steelhead trout, return years 1990-92) were poor to fair for both the "peak" (April 15 - May 5) and "extended" (April 20 - May 30) migration periods; flows during these periods averaged 93.6 kcfs and 87.2 kcfs, respectively (Table 13). Flows 585 kcfs are considered extremely detrimental to emigrating juvenile salmonids (CBFWA 1991, Andrus 1991). The Columbia Basin Fish and Wildlife Authority (CBFWA 1991) has recommended flows of 140 kcfs for the April 15 - June 15 period and the State of Idaho has proposed mainstem reservoir drawdown as a means to achieve an equivalent water velocity (Andrus 1991) in years with low and average snow packs.

Flows at LGR during the 1992 mid-April to mid-May migration period were the lowest since 1977 providing extremely poor juvenile emigration conditions. Flows at LGR for the peak and extended periods averaged 54.2 kcfs and 57.3 kcfs, respectively.

Migration Survival and Timing

PIT tag detection rates (minimum survival estimates) from release site to LGR for various LSRCP and Idaho Power Company (IPC) hatchery release groups of chinook salmon varied from 2.1% (fall-released Sawtooth FH spring chinook salmon) to 57.3% (Dworshak NFH spring-released spring chinook salmon that were reared at low densities)(Figure 2 and Appendix E). Detection rates of fish in the rearing density experiments at both Dworshak NFH and Sawtooth FH varied inversely with rearing density.

Detection rates for hatchery steelhead trout juveniles varied from about 35% to 67% (Figure 3). Detection rates were similar for "large" and "regular" sized Hagerman NFH reared smolts released at the Sawtooth FH weir. Acclimated regular sized steelhead trout were detected at lower rates than any of the groups assessed. Acclimation for these fish consisted of 21 d in Sawtooth FH raceways prior to release at the weir.

We will present a detailed analysis of 1991 and 1992 PIT tag data in a separate Research Bulletin.

Table 13. Snake River mean daily flow at Lower Granite Dam during the "peak" and "extended" spring chinook salmon smolt migration periods, 1977-92.

Year	"Peak" (04/15-05/05)	"Extended" (04/20-05/30)
1977	39.1	40.2
1978	85.4	95.8
1979	64.8	89.9
1980	87.5	102.9
1981	76.2	86.7
1982	116.8	131.6
1983	85.6	111.3
1984	121.9	146.1
1985	86.9	87.2
1986	93.4	105.7
1987	59.0	62.4
1988	55.1	64.2
1989	93.6	87.2
1990	63.8	66.4
1991	44.0	79.8
1992	54.2	57.3

Emigration conditions associated with flows at Lower Granite Dam are as follow:
<85 KCFS = poor
85-100 = fair
110-120 = good
120+= excellent

LWGFLOWS.TBL

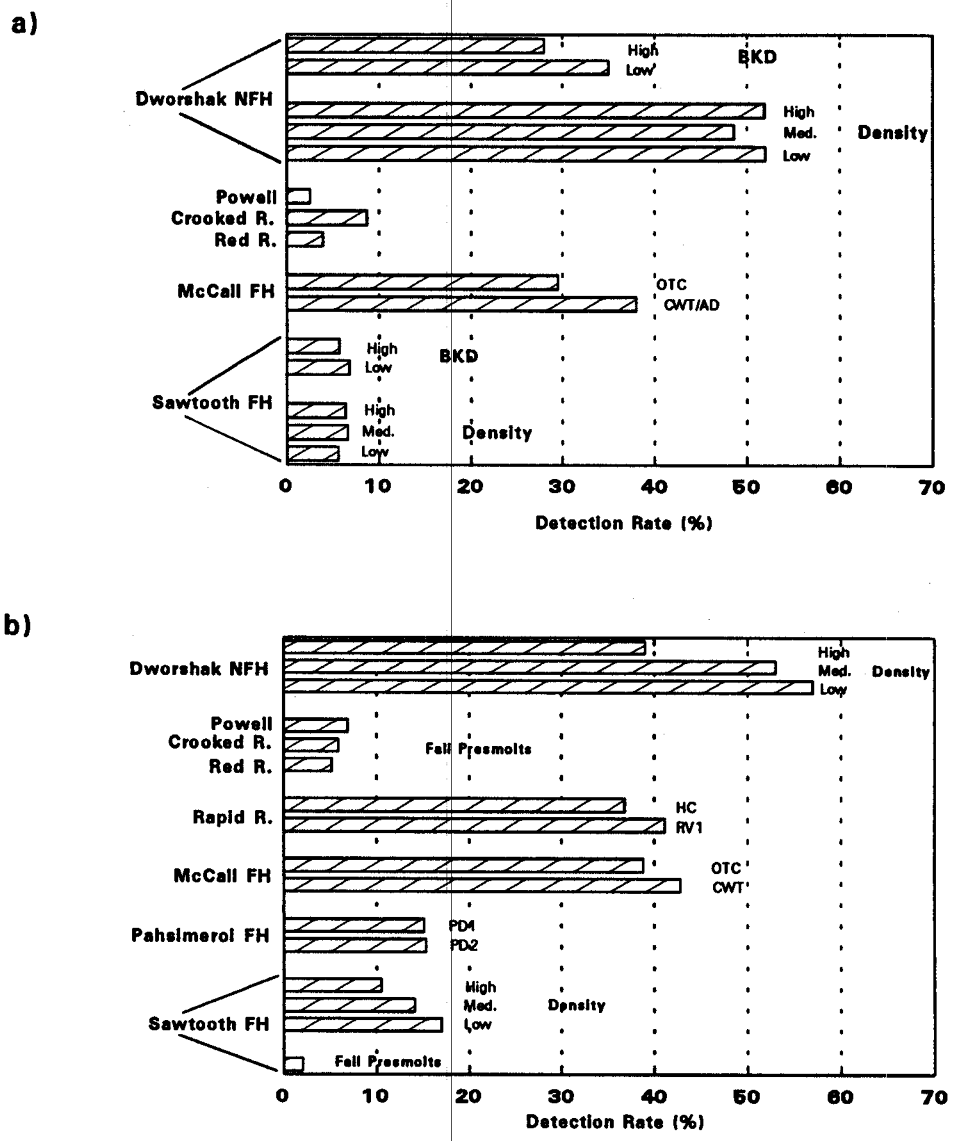

Figure 2. Detection rates at Lower Granite, Little Goose, and McNary dams (cumulative) of PIT tagged hatchery chinook salmon in the 1991 (a) and the 1992 (b) emigrations.

a)

b)

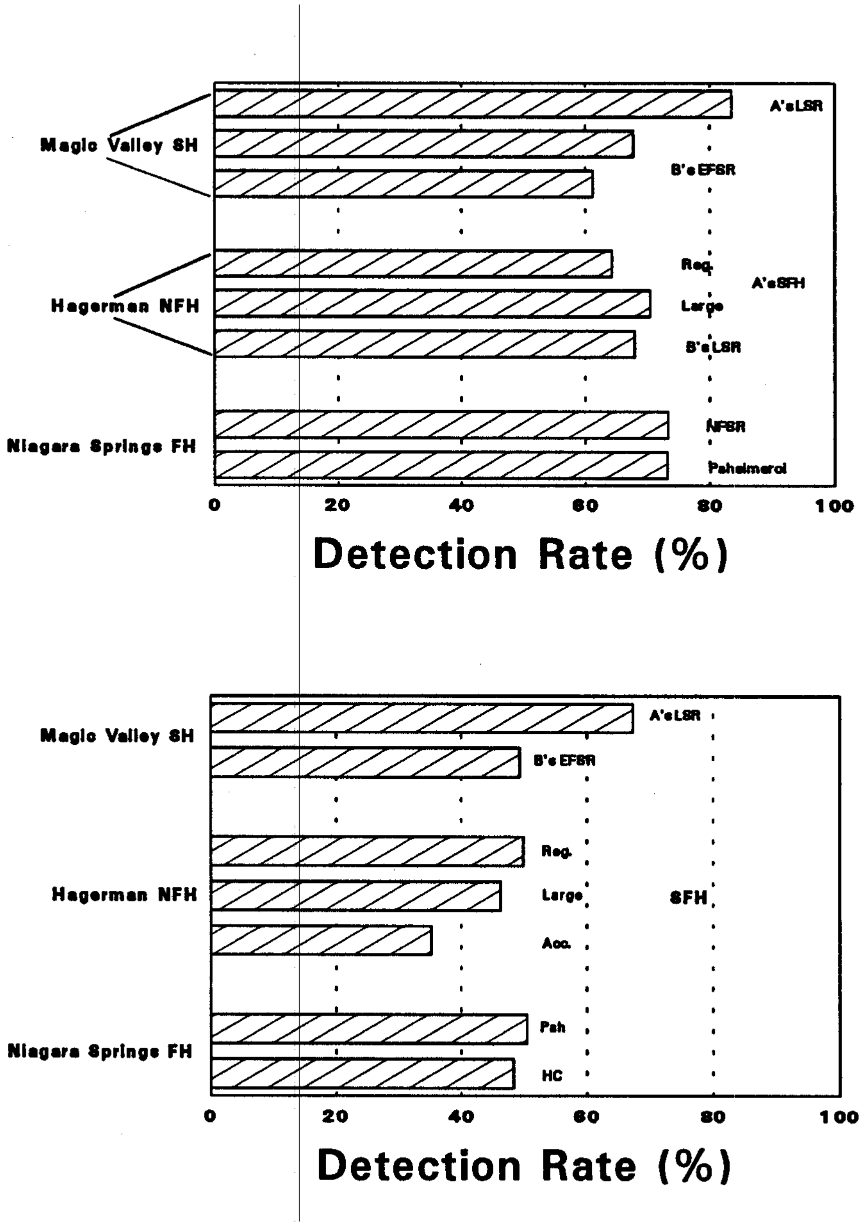

Figure 3. Detection rates at Lower Granite, Little Goose, and McNary dams (cumulative) of PIT-tagged hatchery steelhead trout in the 1991 (a) and the 1992 (b) migrations.

Scale Pattern Analysis

We pressed approximately 320 known hatchery, 65 known wild, and 80 unknown origin scales and provided copies of some of these samples to the Oregon Department of Fish and Wildlife (ODFW) personnel in Corvallis. We are awaiting results of their analysis.

Age of Hatchery Returns-Chinook Salmon

Age distribution estimates of McCall and Sawtooth FHs adult chinook salmon returns varied somewhat among the two different aging methods used (figures 4 and 5 and Appendix E).

At the McCall FH rack, 2 of 38 (5.3%) known three-year-old fish of McCall FH origin would have been misclassified as four-year olds based on hatchery aging criteria. None would have been misclassified as five-year olds. Of the 553 known four-year-old fish, 22 { 4.0%) and 1 (0.2%) would have been misclassified as three and five-year olds, respectively. Of two known five-year-old fish, both (100%) would have been misclassified as four-year-old fish. Therefore, if the CWT returns accurately represent age composition of the 1992 run, aging based on length slightly overestimates three- and five-year olds and slightly underestimates four-year olds.

At the Sawtooth FH rack, 1 of 2 known three-year-old fish would have been misclassified as a four-year old based on hatchery aging criteria. Two of 16 known four-year-old fish (12.5%) would have been misclassified as three-year olds; all four known five-year-old fish would have been classified correctly. Aging based on length tended to underestimate three- and four-year olds and overestimate five-year olds relative to the CWT-based estimate. However, the small sample size (22) of CWT returns limits the usefulness of this comparison.

Sex Ratios of Hatchery Returns-Chinook Salmon

Sex ratios (male:female) for 1992 adult chinook salmon returns to hatchery racks varied from 1.0:1 - 3.2:1 for estimates excluding jacks (Table 14). Sex ratios (male:female) for four- and five year-old chinook salmon at the East Fork Salmon River trap have ranged from 2.3:1 (1991) to 3.4:1 (1990). Comparative sex ratios for other facilities, while showing some variability, have tended to approximate a 1:1 ratio.

Experimentation - Objective 2

The second major objective of the LSRCP HES is to identify and test rearing and release strategies deemed likely to improve adult returns to Idaho. Adult returns are incomplete for fish designated for experimentation purposes.

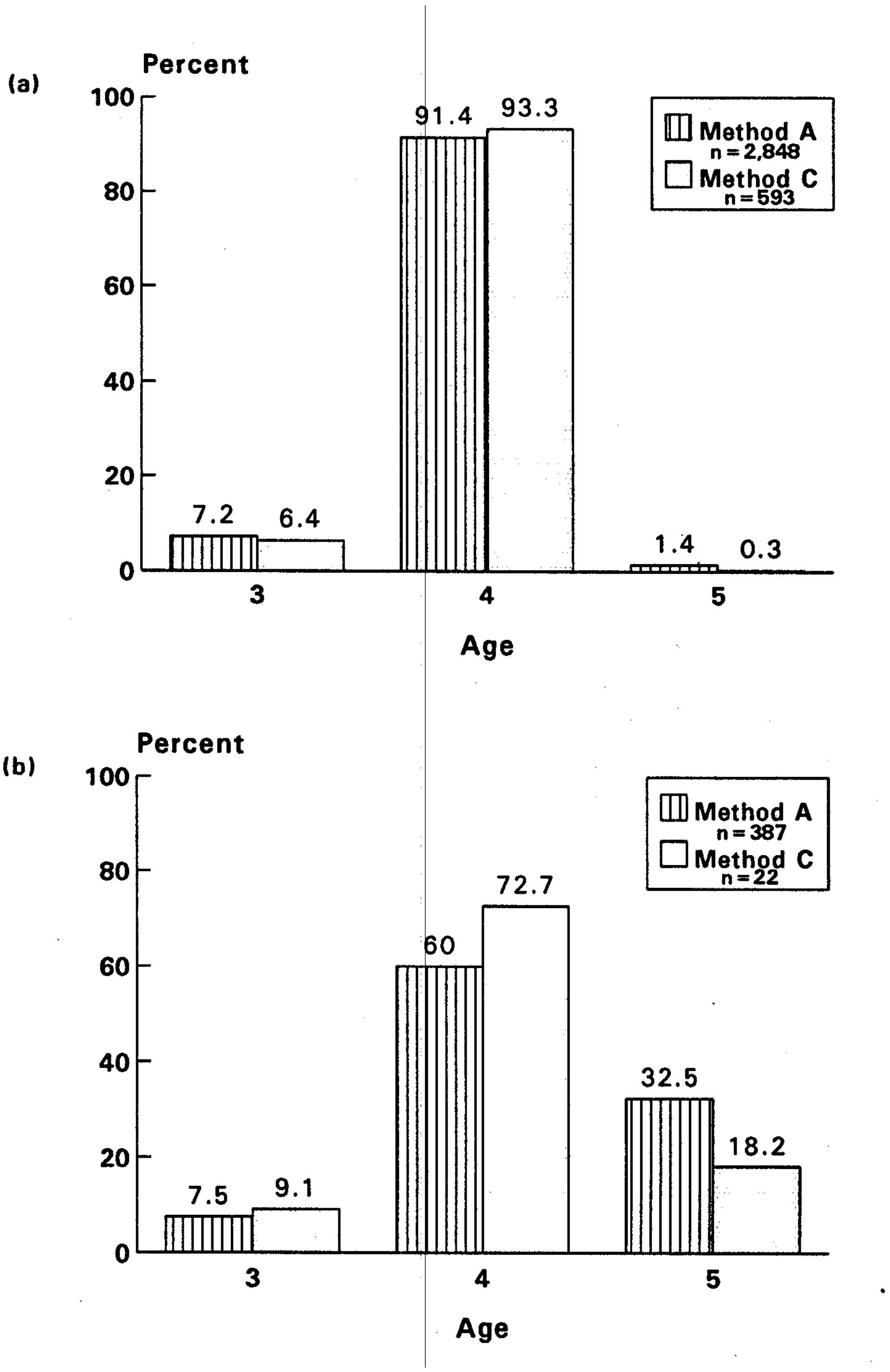

Figure 4. Age breakdown of summer and spring chinook salmon returning to the South Fork Salmon River a) and Sawtooth Fish Hatchery (b), respectively, in 1992. Method A is based on the length frequency histograms given in the hatchery run reports; method C, on known-age data from 1992 CWT recoveries.

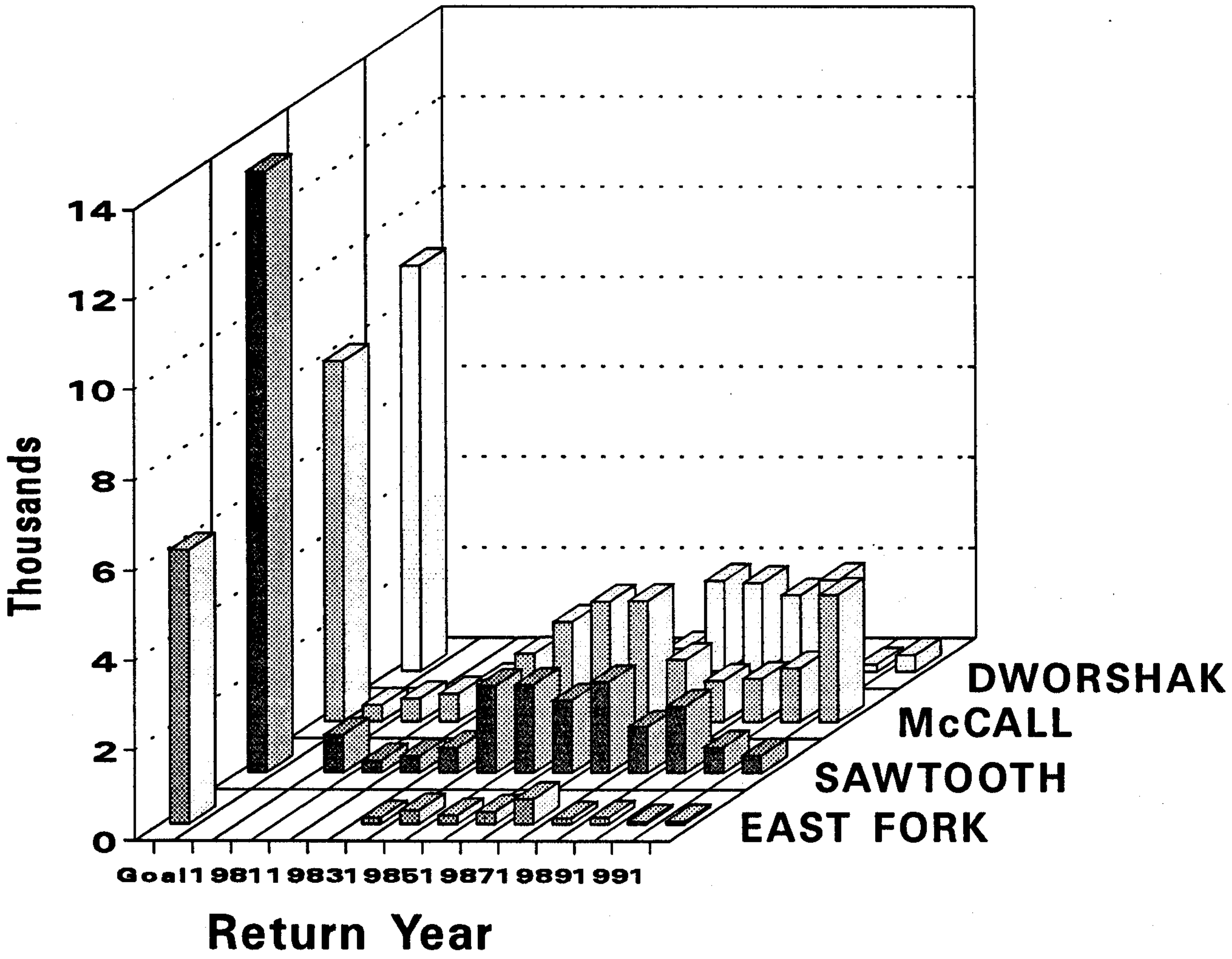

Figure 5. Adult chinook salmon returns from Idaho LSRCP releases in relation to program goals.

Table 14. Sex ratios (male:female) of 1992 adult chinook salmon returns to Idaho hatchery racks - based on hatchery estimates. (Females value adjusted to 1; therefore, 1.5 represents a M:F ratio of 1.5:1) Values from 1991 returns are in parentheses.

	M:F ratio (by age category)			
Facility	Four- and five-year olds	All ages	Four-year olds	Five-year olds
McCall FH	1.3 (0.7)	1.5 (4.2)	1.3	5.0
DNFH/KNFH		1.0 (0.9)[a]		
Red River	1.1 (1.4)	1.4 (1.6)	1.2	0.5
Crooked River	1.2 (2.6)	1.4 (3.0)	1.2	1.3
Powell	1.0 (4.2)	1.0 (5.6)	0.9	6.5
Sawtooth	1.2 (0.9)	1.3 (1.1)	1.9	0.5
East Fork	3.2 (2.3)	4.0 (2.6)	4.4	2.3

[a]658 out of 681 returns to Dworshak NFH/Kooskia NFH were sexed.

Selected intermediate results, e.g. PIT tag detection rates, number of vertebrae sampled and processed, number of returns from density groups, may be reported herein prior to the return of adults from experimental groups. For the most part, however, results of ongoing experimentation will be reported in the form of progress reports as the data become available. A final report will summarize results of the completed experiment. In the meantime, we continued to collect, analyze (as is appropriate), and catalogue data from the various experiments in progress.

DISCUSSION

Adult Returns in Relation to LSRCP Goals-Chinook Salmon

Returns from LSRCP hatchery programs remained well below the specified program goals in 1992 (Figures 5 and 6). We do not expect to attain the smolt-to-adult survival rates necessary to achieve the program goals until and unless migration conditions in the lower Snake and Columbia rivers improve substantially.

Returns to LSRCP hatcheries in 1992, other than McCall FH, were not dramatically different from those of 1991. Summer chinook salmon returns to the South Fork SR trap reached an all time high in 1992 and reflected the relative strength of the BY 1988 year class; 821 jacks were trapped in 1991. The hatchery component dominated the 1991 and 1992 returns to the South Fork SR rack. The BY 1988 fish accounted for 64-90% of the 1992 rack return.

The reason for the relative success of the BY 1988 McCall FH fish (SARs around 0.23%, compared to 0.004% for BY 1987), with one return year remaining, is speculative. Improved fish health of BY 1988 fish, compared to that of the BY 1987 fish, may account for some of the difference in survival between these two cohorts, particularly in view of the fact that flow conditions at LGR were more favorable in 1989 than in 1990. The strictly qualitative nature of fish health data at this point limits the strength of our conclusions.

Poor flow conditions that prevailed in 1990 may have dampened the potential benefits of slight improvements in fish health (and SARs) reported for BY 1988 fish at Sawtooth FH, East Fork SR, and Dworshak NFH facilities. Brood year 1988 SARs improved slightly (Sawtooth FH and East Fork SR) to several-fold (Dworshak NFH) over those of BY 1987. However, these improved SARs were not enough to substantially increases 1992 rack returns. Adult chinook salmon return numbers at the East Fork Salmon River were unchanged from 1991, Sawtooth FH returns were down slightly, continuing the downward trend begun in 1990, and Dworshak NFH returns rebounded slightly from a very poor return in 1991. (By comparison, summer chinook salmon returns to Pahsimeroi hatchery declined precipitously in 1992 while spring chinook salmon returns to Rapid River FH were up from 1991 to numbers consistent with 1989 and 1990 returns.) Brood year 88 chinook salmon from McCall and Rapid River FHs shared similar success in returning adults while other stocks seemed to struggle.

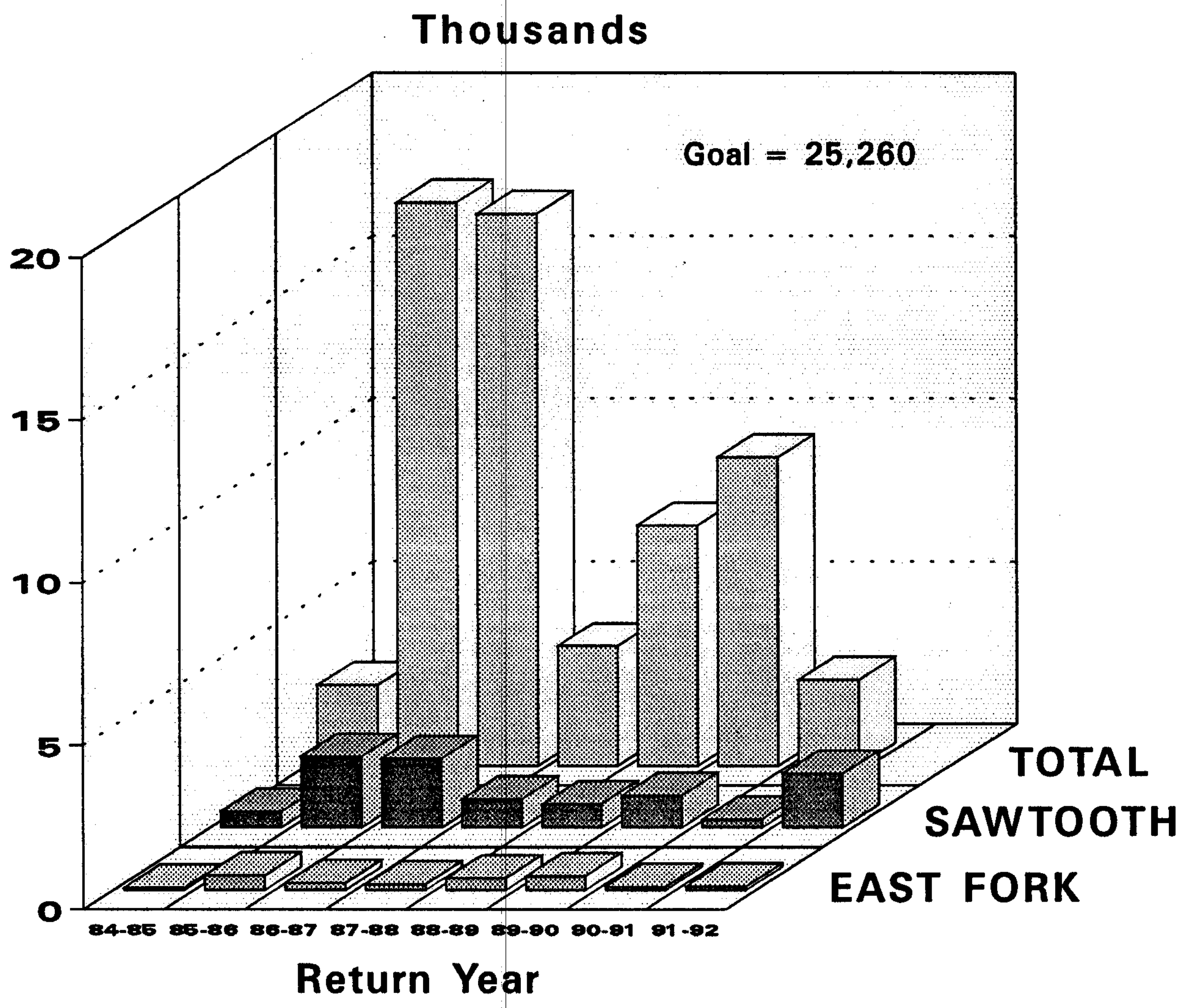

Figure 6. Adult steelhead trout returns from Idaho LSRCP releases in relation to program goals. Total includes sport harvest of LSRCP steelhead trout.

Smolt-to-adult Survival Rates-Chinook Salmon

Smolt-to-adult return rates for BY 1987 hatchery spring and summer chinook salmon were below replacement levels and the lowest on record for Idaho LSRCP (and IPC) hatchery fish (Figures 7-9). We suggest relatively poor fish health of BY 1987 chinook salmon throughout the state contributed to, but was not the sole cause of, the poor survival of this cohort. Chronic BKD was the predominate health characteristic common to BY 1987 chinook salmon (McPherson, 1990, 1991; Levendofske et al. 1991, Levendofske et al. 1992; Alsager 1990, Rogers 1989). Erythromycin was not fed to BY 1987 chinook salmon.

Marking probably exacerbated the existent fish health problems for BY 1987 chinook salmon. Hatchery managers noted an inordinate amount of mortality immediately following marking (CWTing, freeze branding); dead and moribund fish showed signs of BKD. Differential mortality (immediate and latent) between marked and unmarked fish may explain the disparity between CWT and "maximum" SAR estimates; observed for this cohort. In all cases (McCall FH, Dworshak NFH, and Sawtooth FH) maximum SAR estimates were much greater (4-11 fold) than CWT estimates (figures 7-9). Returns from natural production can explain some but not all of this discrepancy.

The relatively low SARs observed for BY 1987 spring chinook salmon from other locations in the Snake River Basin suggest that factors other than fish health contributed to the relatively poor returns from this cohort. ODFW noted relatively low SARs, 0.06% and 0.13%, respectively, for spring chinook salmon from the Lookingglass FH (Rapid River stock) and Imnaha facilities (R. Carmichael, ODFW, personal communication). Factors common to Snake River Basin chinook salmon, such as in-river and ocean conditions (Lawson 1993), undoubtedly affect year class strength. Quantifying the relative importance of factors affecting year class strength remains a problem.

Limitations to Our Analyses - Chinook Salmon

At this point, the accuracy and utility of our evaluations is limited by our ability to effectively categorize adult returns according to age and origin. Our methods of determining age and origin of adult returns, CWT extrapolations and hatchery aging (length) criteria, allow for error in our estimates. Estimating the age composition and hatchery contribution to the run from CWT data relies on the assumption that our CWT sample is representative of the run. CWT data does provide accurate aging of the fish that are sampled but may not represent the age distribution of the run, particularly in cases of small sample sizes. In situations where differential survival exists between marked and unmarked fish, as we proposed was the case for the BY 1987 chinook salmon, CWT data misrepresents the hatchery:natural composition of the run. The aging criteria used by hatcheries is static, not allowing for variation in length-at-age caused by environmental factors.

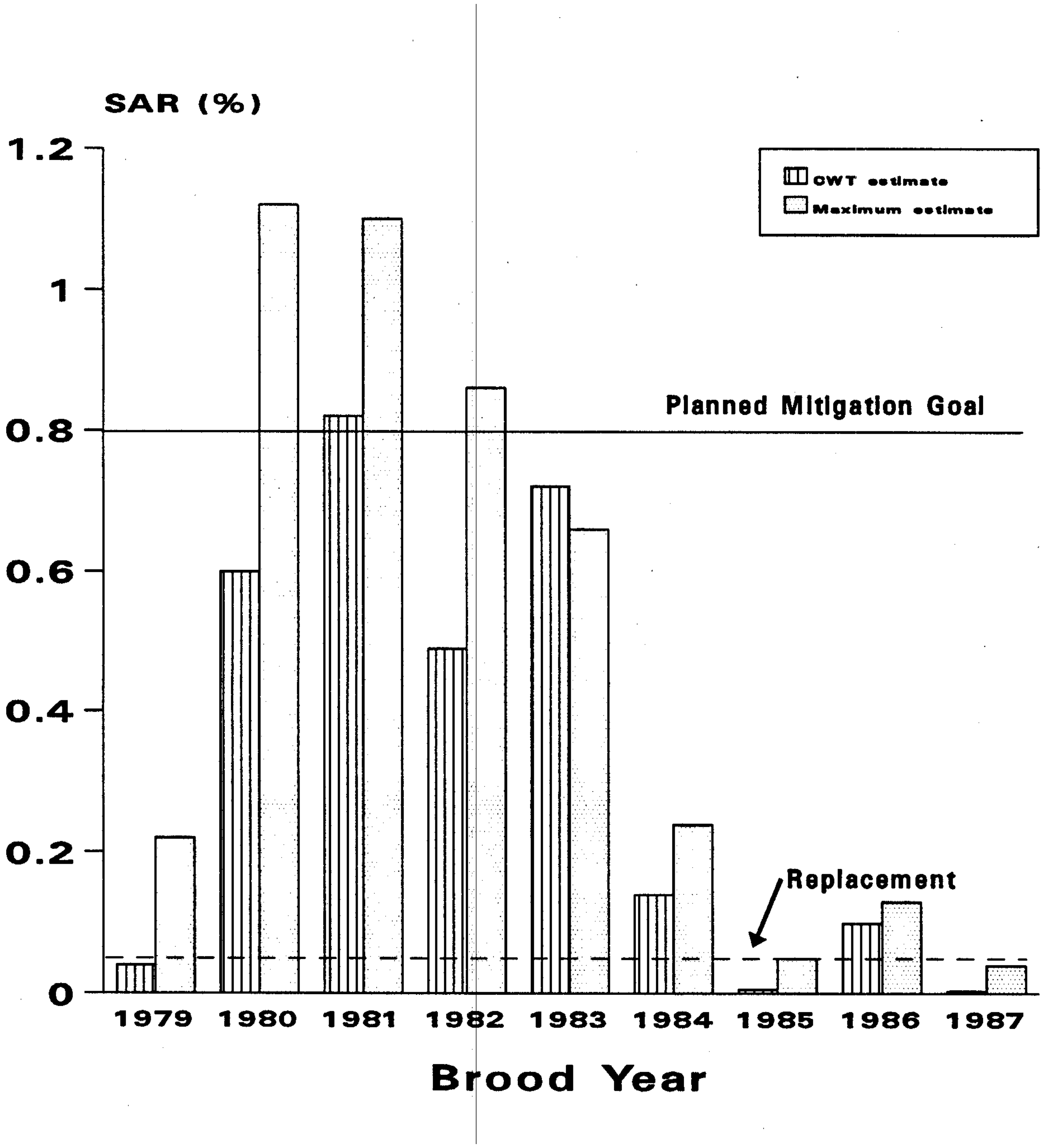

Figure 7. Smolt-to-adult survival rates for McCall Fish Hatchery summer chinook salmon based on coded-wire tags and total or maximum estimates.

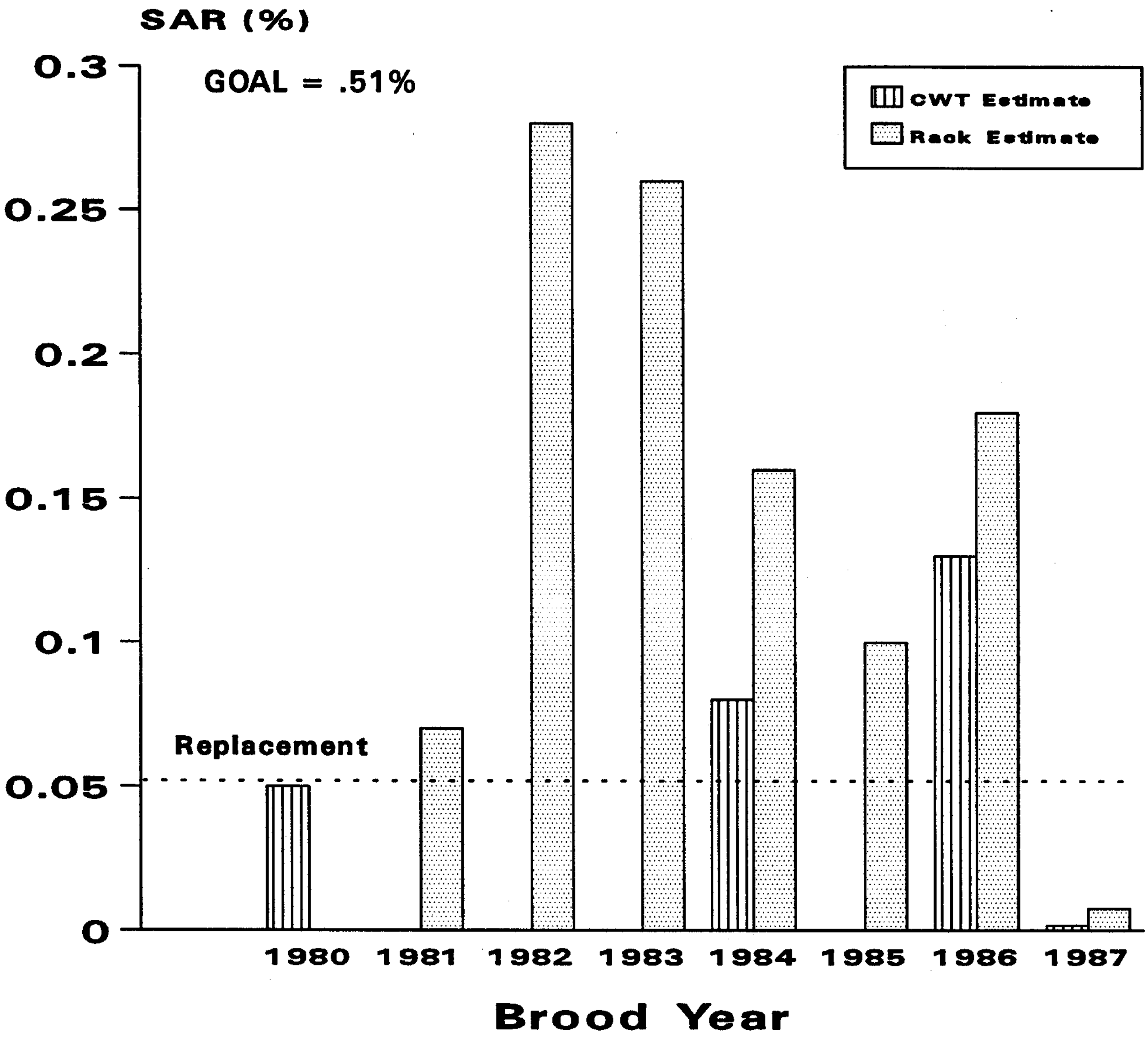

Figure 8. Smolt-to-adult survival rates for Dworshak National Fish Hatchery spring chinook salmon based on coded-wire tags and total or maximum estimates.

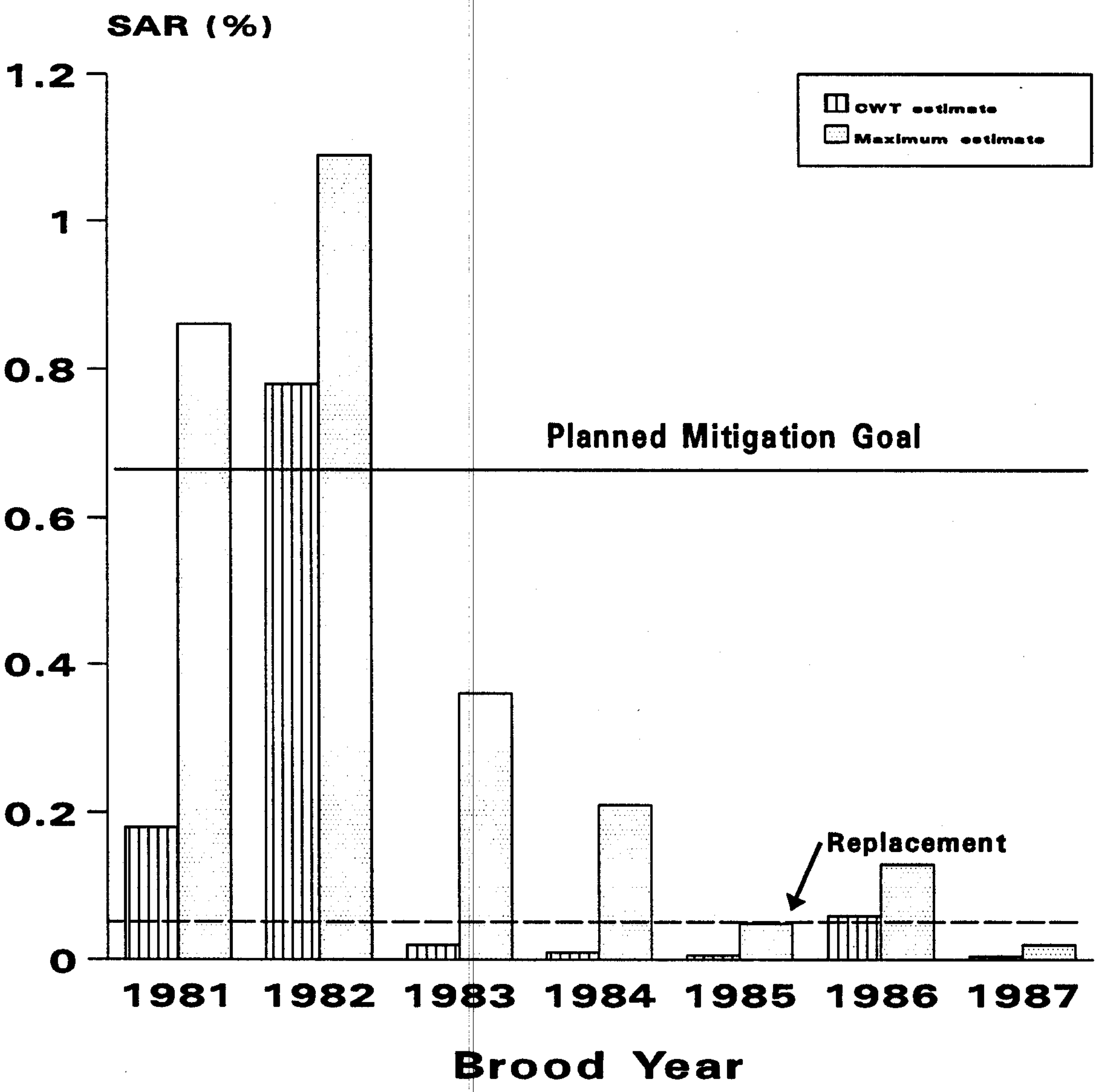

Figure 9. Smolt-to-adult survival rates for Sawtooth Fish Hatchery spring chinook salmon based on coded-wire tags and total or maximum estimates.

We intend to improve the accuracy of our estimates by augmenting CWT and length-frequency data with scale reading data. We will collect and read scales from adult chinook salmon to determine age and origin, at least until the time when all returning adults of hatchery origin are marked, about 1996.

Dworshak NFH represents the best comparison of CWTed and unmarked adult return rates. We are confident, based on scale pattern analysis, CWT data, and the fact that there are few sources of naturally produced adults that could return to the Dworshak NFH rack or the North Fork Clearwater River, that chinook salmon returning to these locations are predominately of hatchery (Dworshak NFH) origin. In this respect, Dworshak NFH fish provide some clues as to the effect of marking on the survival of a particular year class.

Our ability to evaluate fry and fingerling releases is limited because these fish are not differentially marked, if marked at all. Fortunately, most fry and fingerling releases occur in areas that will not complicate our evaluation of smolt and presmolt releases. Also, fry and fingerling releases comprise a small part of Idaho's hatchery programs. ISS designs include plans to monitor the success of fingerling outplanting strategies.

Fall versus Spring Releases - Chinook Salmon

We are unable to draw solid conclusions about the effectiveness of fall release strategies because of inconsistencies in the results of fall releases. Overall, for BY 1987 fish, fall released spring chinook salmon presmolts produced lower release-to-adult return rates than did spring released smolts (Sawtooth FH and Dworshak NFH). But, SARs for Sawtooth FH ventral clipped fall released fish equalled those of spring released CWTed fish (0.0052% v. 0.0054%). Fall-released CWTed chinook salmon from Sawtooth FH survived to adults at less than one-half that rate (0.0020%), suggesting that this difference can be attributed to the type of mark applied. These data are complicated by the unexpected finding that Sawtooth FH fall-released fish (CWT and RV groups) fared better than did Dworshak NFH fall and spring releases (CWT groups only). Notably, these comparisons are limited by the fact that these SAR estimates are derived from a total of six and nine CWT and RV returns, respectively. Fall released BY 1986 spring chinook salmon from Sawtooth FH marked with a ventral (left) clip had SARs equal to those of their spring released CWTed counterparts (Cannamela and Kruse-Malle 1993). Fall released BY 1985 fish from Sawtooth FH (LV clip) survived at about one-half the rate of spring released (CWTed) fish (Cannamela 1992). As in the case of BY 1987 data, BY 1985 data were limited by the small number of returns providing the estimates.

I see two reasons to continue using the fall release strategy: we still do not understand the potential for fall releases to produce adults and fall releases may be necessary to maintain an important life history feature of the species. Downstream movement (migration) in late summer through late fall is a well documented life history characteristic of anadromous and non-anadromous salmonids alike (Harris 1973; Kiefer 1993; Leitzinger et al. 1993; RASP 1992). As such, hatchery operations should provide for the preservation of this portion of the population (Hard et al. 1992, Steward and Bjornn 1990). One way to achieve this goal might be to provide hatchery reared fish the opportunity to leave the hatchery volitionally. This hatchery practice might provide two benefits. First, the fall emigrant portion of the population might be preserved and secondly, survival rates of fall released (volitional) might increase (Segarich 1989).

Scale Pattern Analysis - Chinook Salmon

Our sample sizes are still small for most wild populations, and samples have not been collected from some populations. We anticipate having to collect scales for several years in order to reach the preferred "training" population size of 200 specified by ODFW (Lisa Borgerson, ODFW, personal communication). The effort to mark most of our BY 1991 hatchery chinook salmon will provide "knowns" for both hatchery- and naturally-produced fish. We hope that scale pattern analyses will improve our estimates of run composition (hatchery versus natural) and age structure.

Sex Ratios of Hatchery and Wild Steelhead Trout

Sex ratios of hatchery (marked) versus naturally-produced (unmarked) adult steelhead trout have differed over the past few years. Sex ratios (male:female) for A-run hatchery fish trapped at Sawtooth FH have ranged from 2.3:1 (1990) to 4.7:1 (1991) while those of natural steelhead trout varied from 0.9:1 (1990) to 2:1 (1991). Sex ratios for B-run fish trapped at the East Fork SR weir varied from 1.6:1 (1992) to 3.1:1 (1991) for hatchery fish and from 0.5:1 {1990) to 1.3:1 (1991). The predominance of males in the hatchery runs remains unexplained. Sampling of hatchery steelhead trout smolts in 1992, for a different purpose (C. Contor, IDFG, unpublished data), revealed about a 1:1 ratio in the juveniles. The sex ratio of fish in the spring fishery parallels that of the rack returns (K. Ball, IDFG, personal communication). We have yet to examine the catch data for the fall fishery to determine if differential catch (or keep) rates exist. We also have not determined if age structure of the returns could account for this phenomenon.

Proportion of Hatchery and Natural Steelhead Trout in the East Fork SR and Sawtooth FH Runs

The natural component of B-run steelhead trout at the East Fork SR weir and A-run steelhead trout at the Sawtooth FH weir have increased and decreased, respectively, over the past 3 years. (We did not look at earlier data.) Natural B-run fish comprised 5.5%, 17.6%, and 28.8% of the East Fork SR rack in 1990, 1991, and 1992, respectively. Natural A-run fish comprised 7.6%, 4.6%, and 2.6% of the Sawtooth FH rack in 1990, 1991 and 1992, respectively.

Possible causes of these "trends" include numbers of fish released, smolt-to-adult return rates, and random variation. We will continue to monitor these data and conduct the appropriate analyses as directed by management.

RECOMMENDATIONS

1. Define the relationship between key factors, particularly fish health and flows, and survival of hatchery fish. Developing a smolt quality indicator that accurately describes fish health, "quality", and physiological condition is vital to evaluating hatchery practices.

2. Develop comprehensive spawning guidelines, including contingencies for atypical returns to make the best use of genetic resources.

3. Continue monitoring and evaluation of fall release strategies for chinook salmon presmolts with particular emphasis on volitional releases.

4. Develop the framework to investigate trends in steelhead trout sex ratios and age structure to determine possible causes of sex ratio disparities.

ACKNOWLEDGEMENTS

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APPENDICES

APPENDIX A

Releases of chinook salmon and steelhead trout from LSRCP facilities, October 1, 1990 through September 30, 1992.

Appendix A. Table 1. Release data for McCall Fish Hatchery summer chinook salmon for the reporting period October 1, 1991 to September 30, 1992. (Production fish include fish which shed CWTs.)

Mark	Release site Date	Number released	Number per pound	Purpose/Funding
Summer Chinook Salmon				
McCall Fish Hatchery				
BY '90 S.F.	Salmon R.	@ Knox Bridge		
None	3/24-27/92	17,260	23.8	Production
10/34/46	3/24-27/92	21,427	23.8	Eval. & Contrib., Mark-Handling Exp: Test/USCAN
10/34/47	3/24-27/92	21,353	23.8	Eval. & Contrib., Mark-Handling Exp: Test/USCAN
10/34/48	3/24-27/92	20,807	23.8	Eval. & Contrib., Mark-Handling Exp: Test/USCAN
w/RA-7U-1		(21,724)		Freeze Brands for Fish Passage Center
10/34/49	3/24-27/92	21,229	23.8	Eval. & Contrib., Mark-Handling Exp: Test/USCAN
PIT		(250)		Migration Survival and Timing : Test
10/34/50	3/24-27/92	21,397	23.8	Eval. & Contrib., Mark-Handling Exp: Test/USCAN
w/ LD-7U-1		(21,397)		Freeze Brands for Fish Passage Center
10/34/51	3/24-27/92	20,520	23.8	Eval. & Contrib., Mark-Handling Exp: Test/USCAN
w/ RA-7U-3		(20,520)		Freeze Brands for Fish Passage Center
10/34/52	3/24-27/92	21,253	23.8	Eval. & Contrib., Mark-Handling Exp: Test/USCAN
10/34/53	3/24-27/92	21,558	23.8	Eval. & Contrib., Mark-Handling Exp: Test/USCAN
10/34/54	3/24-27/92	22,003	23.8	Eval. & Contrib., Mark-Handling Exp: Test/USCAN
10/34/55	3/24-27/92	21,997	23.8	Eval. & Contrib., Mark-Handling Exp: Test/USCAN
10/34/56	3/24-27/92	21,973	23.8	Eval. & Contrib., Mark-Handling Exp: Test/USCAN
10/34/57	3/24-27/92	21,430	23.8	Eval. & Contrib., Mark-Handling Exp: Test/USCAN
10/34/58	3/24-27/92	21,302	23.8	Eval. & Contrib., Mark-Handling Exp: Test/USCAN
10/34/59	3/24-27/92	21,694	23.8	Eval. & Contrib., Mark-Handling Exp: Test/USCAN
10/34/60	3/24-27/92	22,150	23.8	Eval. & Contrib., Mark-Handling Exp: Test/USCAN
TM-100	3/24-27/92	450,750	23.8	Evaluation & Contribution, Mark-Handling: Control-Pond 1/LSRCP
PIT		(250)		Migration Survival and Timing : Control/LSRCP
RV	3/24/92	111,397	23.8	Stock Recognition-Pond 2/LSRCP
Total		901,500		
CWT Totals		322,093		marked October 1991
OTC		450,750		marked July 1991

MCREL92

Appendix A. Table 2. Release data for Dworshak NFH spring chinook salmon for the reporting period October 1, 1991 to September 30, 1992. (Production fish include fish which shed CWTs.)

Mark	Release site Date	Number released	Number per pound	Purpose/Funding
BY '90	N.F. Clearwater			
None	4/16/92	526,675	NA	Production
5/26/47	4/16/92	14,895	14.7	Density Exp. - Low/USCAN (RCWY 1)
5/26/48	4/16/92	15,571	15.0	Density Exp. - Low/USCAN (RCWY 2)
5/26/49	4/16/92	15,879	15.3	Density Exp. - Low/USCAN (RCWY 3)
5/26/50	4/16/92	14,558	14.7	Density Exp. - Low/USCAN (RCWY 4)
5/26/51	4/16/92	16,555	14.3	Density Exp. - Low/USCAN (RCWY 5)
5/26/52	4/16/92	15,661	14.8	Density Exp. - Low/USCAN (RCWY 6)
5/26/53	4/16/92	16,181	15.1	Density Exp. - Low/USCAN (RCWY 7)
5/26/54	4/16/92	15,734	14.3	Density Exp. - Low/USCAN (RCWY 9)
5/26/55	4/16/92	16,403	14.6	Density Exp. - Low/USCAN (RCWY 8)
5/26/40	4/16/92	29,238	15.1	Density Exp. - Med./USCAN (RCWY 15)
5/26/41	4/16/92	28,153	14.4	Density Exp. - Med./USCAN (RCWY 14)
5/26/42	4/16/92	25,309	14.7	Density Exp. - Med./USCAN (RCWY 13)
5/26/43	4/16/92	31,284	16.2	Density Exp. - Med./USCAN (RCWY 12)
5/26/44	4/16/92	27,984	15.4	Density Exp. - Med./USCAN (RCWY 11)
5/26/45	4/16/92	27,625	14.5	Density Exp. - Med./USCAN (RCWY 10)
5/26/37	4/16/92	36,179	16.1	Density Exp. - High/USCAN (RCWY 26)
5/26/38	4/16/92	42,519	17.3	Density Exp. - High/USCAN (RCWY 30)
5/26/39	4/16/92	42,966	16.4	Density Exp. - High/USCAN (RCWY 29)
Total		959,639		
CWT Total		432,694		
BY '90	Red River			
RV Clip	4/7/92	149,605	18.6	Origin Recognition/Acc. Spr. Rel.(3/16/92)-DNFH Stock
5/26/32	4/7/92	57,795	18.6	Evaluation/Acc. Spr. Rel. (3/16/92)-DNFH Stock

DWREL92

Appendix A Table 2 continued.

Mark	Release site / Date	Number released	Number per pound	Purpose/Funding
BY 90	Powell			
RV Clip	4/8/92	89,924	19.9	Origin Recog./Acc. Spr. Rel. (3/16/92)-DNFH Stock
5/26/33	4/8/92	60,930	19.9	Acclimated Spring Release (3/16/92)-DNFH Stock
RV Clip	4/8/92	2,949	18.7	origin Recog./Direct Spr. Rel. (White Sands Cr.)
5/26/35	4/8/92	60,580	18.7	Evaluation/Direct Spring Release (White Sands Cr.)
Total		428,694		
BY 90	Eldorado Creek			
None	3/18/92	127,075	21.2	Production
5/26/34	3/18/92	55,925	21.2	Evaluation
BY 90	Papoose Creek			
None	3/17/92	8,602	21.0	Production (from KNFH)
5/22/06	3/17/92	64,171	21.0	Evaluation (from KNFH)/LSRCP

DWREL92

Appendix A. Table 3. Release data for Red River, Crooked River, and Powell facilities (Clearwater Fish Hatchery) spring chinook salmon for the reporting period October 1, 1991 to September 30, 1992. (Production fish include fish which shed CWTs.)

Mark	Release site Date	Number released	Number per pound	Purpose/Funding
Clearwater Anadromous Fish Hatchery				
Red River Facility				
BY '90	Red River			
LV Clip	10/23/91	354,713	31.3	Origin Recogition/LSRCP
PIT		(700)		Migration Survival and Timing
RV Clip	4/7/92	149,605	18.6	Origin Recog./Acc. Spr. Rel. (3/16/92) - DNFH Stock
5/26/32	4/7/92	57,795	18.6	Evaluation/Acc. Spr. Rel. (3/16/92) - DNFH Stock
Total (Fall)		354,713		
Total (Spring)		207,400		
Crooked River Facility				
BY '90	Crooked River			
LV Clip	10/16/91	198,203	38.5	Origin Recognition (from KNFH) - North Pond/LSRCP
RV Clip	10/16/91	2,327	38.5	Origin Recognition (from KNFH) - South Pond/LSRCP
RV Clip	10/16/91	119,856	38.5	Origin Recognition (from KNFH) - South Pond/LSRCP
PIT		(492)		Migration Survival and Timing
Total		320,386		

SATREL.92

Appendix A. Table 3. continued

Mark	Release site Date	Number released	Number per pound	Purpose/Funding
Powell Facility				
BY '90	Powell Ponds/White Sands Cr.			
None	10/24/91	1,946	30.6	Production
10/29/42	10/24/91	9,927	30.6	Evaluation & Contribution/LSRCP (from DNFH)
10/40/02	10/24/91	53,008	30.6	Evaluation & Contribution/LSRCP (from DNFH)
LV Clip	10/24/91	293,491	30.6	Evaluation & Contribution/LSRCP (from DNFH)
PIT		(700)		Migration Survival and Timing
RV Clip	4/8/92	89,924	19.9	Origin Recog./Acc. Spr. Rel (3/16/92)-DNFH Stock
5/26/33	4/8/92	60,930	19.9	Acclimated Spring Release (3/16/92)-DNFH Stock
RV Clip	4/8/92	2,949	18.7	Direct Spring Release (White Sands Cr.)
5/26/35	4/8/92	60,580	18.7	Evaluation/Direct Spr. Rel. (White Sands Cr.)
Total {Fall)		358,372		
Total (Spring)		214,383		

Appendix A. Table 4. Release data for Sawtooth Fish Hatchery and East Fork satellite spring chinook salmon for the reporting period October 1, 1991 to September 30, 1992. (September 1991 releases are included to maintain the continuity of Brood Year 1990.)

SUMMARY

Hatchery: Sawtooth   Brood year: 1990   Total hatchery release 1,644,279

Release site	Total released	Identifying marks	Number of fish	Percent
Sawtooth Fish Hatchery (weir site)	1,263,864	CWT/AD clip	397,517	31.5
		CWT/AD clip/PIT	7,196	0.6
		AD clip[a]	12,698	1.0
		unmarked	190,108	15.0
		LV clip	593,688	47.0
		LV clip/PIT	1,486	0.1
		LV clip/FB	61,171	4.8
East Fork	76,614	CWT/AD clip	73,044	95.3
		AD clip[a]	3,570	4.7
Yankee Fork	303,801	RV clip	303,801	
		unmarked	50,480[b]	

[a] AD clip includes fish which were AD clipped only and/or CWT/AD clip fish which lost tags. [b] Direct release; not included in total hatchery release.

Appendix A. Table 4. Sawtooth (continued)

DETAILS

Hatchery: Sawtooth Brood year: 1990

Raceway number	Stock ID	Identifying marks: Type	Code	Number*	Total number released/rcwys	Release date	Release location	Marking Purpose
1A	E.F.	CWT/AD	104006	46,804	57,559	03/30-31/92	E.F. Sal. R.	Evaluation/contribution
		AD clip		2,288				
		CWT/AD	104213	8,072				
		AD clip		395				
2A	E.F.	CWT/AD	104006	3,795	19,055	03/30-31/92	E.F. Sal R.	Evaluation/contribution
		AD clip		185				
		CWT/AD	104310	7,113				
		AD clip		348				
		CWT/AD	104313	7,260				
		AD clip		354				
3A	SAW	CWT/AD	104154	14,351	34,213	03/09-13/92	Sal. R. @ Saw.	Rearing density exp. - low
		AD clip		1,248				
		CWT/AD	104155	13,803				
		AD clip		1,269				
		CWT/AD/PIT		794				
		unmarked		2,748				
4A	SAW	CWT/AD	104003	53,360	70,837	03/09-13/92	Sal. R. @ Saw.	Rearing density exp. - medium
		AD clip		1,031				
		CWT/AD/PIT		795				
		unmarked		15,651				
5A	SAW	CWT/AD	104009	51,206	103,488	03/09-13/92	Sal. R. @ Saw.	Rearing density exp. - high
		AD clip		937				
		CWT/AD/PIT		800				
		unmarked		50,545				
6A	SAW	CWT/AD	104156	14,779	32,182	03/09-13/92	Sal. R. @ Saw.	Rearing density exp. - low
		AD clip		310				
		CWT/AD/PIT		793				
		CWT/AD	104157	15,990				
		AD clip		310				
7A	SAW	CWT/AD	104004	51,943	63,341	03/09-13/92	Sal. R. @ Saw.	Rearing density exp. - medium
		AD clip		533				
		CWT/AD/PIT		794				
		unmarked		10,071				

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Appendix A. Table 4. Sawtooth details (continued)

Raceway number	Stock ID	Identifying marks Type	Code	Number*	Total number released/rcwys	Release date	Release location	Marking Purpose
8A	SAW	CWT/AD	104010	49,731	102,114	03/09-13/92	Sal. R. @ Saw.	Rearing density exp. - high
		AD clip		2,549				
		CWT/AD/PIT		835				
		unmarked		48,999				
9A	SAW	CWT/AD	104158	15,498	32,936	03/09-13/92	Sal. R. @ Saw.	Rearing density exp. - low
		AD clip		165				
		CWT/AD/PIT		796				
		CWT/AD	104159	16,312				
		AD clip		165				
10A	SAW	CWT/AD	104005	51,642	64,494	03/09-13/92	Sal. R. @ Saw.	Rearing density exp. medium
		AD clip		1,317				
		CWT/AD/PIT		794				
		unmarked		10,741				
11A	SAW	CWT/AD	104011	48,902	103,914	03/09-13/92	Sal. R. @Saw.	Rearing density exp. - high
		AD clip		2,864				
		CWT/AD/PIT		795				
		unmarked		51,353				
12A	SAW	LV clip		31,491	31,985	09/20/91	Sal. R. @ Saw.	Fall release evaluation
		LV clip/PIT		494				
13A	SAW	LV clip		63,094	63,588	09/20/91	Sal. R.@ Saw.	Fall release evaluation
		LV clip/PIT		494				
14A	SAW	LV clip		56,587	57,085	09/20/91	Sal. R. @ Saw.	Fall release evaluation
		LV clip/PIT		498				
1B	SAW	LV clip		52,316	52,316	03/09/92	Sal. R. 2 Saw.	High BKD segregation
2B	SAW	LV clip		43,605	43,605	03/09/92	Sal. R. 2 Saw.	High BKD segregation
3B	SAW	LV clip		66,053	66,053	03/09/92	Sal. R. @ Saw.	High BKD segregation
4B	SAW	LV clip		62,275	62,275	03/09/92	Sal. R. @ Saw.	High BKD segregation
58	SAW	LV clip		33,839	54,283	03/09/92	Sal. R. @ Saw.	High BKD segregation
		LV/FB LAT-3		20,444				
6B	SAW	LV clip		58,091	58,091	03/09/92	Sal. R. @ Saw.	High BKD segregation

Appendix A. Table 4. Sawtooth details (continued)

Raceway number	Stock ID	Identifying marks Type	Code	Number*	Total number released/rcwys	Release date	Release location	Marking Purpose
7B	SAW	LV clip LV/FB	LAT-2	38,046 20,532	58,578	03/09/92	Sal. R. I Saw.	High BKD segregation
8B	SAW	LV clip		49,438	49,438	03/09/92	Sal. R. @ Saw.	High BKD segregation
9B	SAW	LV clip LV/FB	LAT-1	38,853 20,195	59,048	03/09/92	Sal. R. I Saw.	High BKD segregation
10B-14B	Rapid River	RV		303,801	303,801	09/26-27/91	Yankee Fork (5 Mi.& 10 Mi.Cr.)	Fall Release
Direct Release		unmarked		50,480	354,300	06/18/91	Yankee Fork (dredge ponds)	Fingerling release

Appendix A. Table 5. Release data for Hagerman National Fish Hatchery summer steelhead for the reporting period October 1, 1991 to September 30, 1992. (Production fish include fish which shed CWTs.)

Mark	Release site Date	Number released	Number per pound	Purpose/Funding
BY '91	Sawtooth Weir - A's			
None	4/10-13/92	471,545	NA	Production
10/15/30	4/10-13/92	53,463	2.8	Size at release - Large (RCWY 73-77)
PIT		(497)		Migration Survival and Timing
10/40/07	4/10-13/92	45,646	4.5	Size at release - Regular (RCWY 78-80)
PIT		(501)		Migration Survival and Timing
10/44/21	4/10-13/92	17,955	4.8	Acclimation release (3/17/92; RCWY71)
10/44/22	4/10-13/92	18,336	5.0	Acclimation release (3/18/92; RCWY72)
10/44/23	4/10-13/92	19,341	5.1	Acclimation release (3/19/92; RCWY81)
PIT		497	4.9	Migration Survival and Timing
Total		626,783		
CWT Total		154,741		
BY '91	Pahsimeroi Ponds - A's			
None	3/25-27/92	223,406	4.5	Production
BY '91	Little Salmon River at Warm Springs Bridge - B's			
None	4/14-22/92	245,308	4.7	Production
10/44/07	4/14-22/92	18,386	5.1	Evaluation & Contribution/LSRCP
10/44/08	4/14-22/92	19,450	4.8	Evaluation & Contribution/LSRCP
10/44/09	4/14-22/92	17,390	4.5	Evaluation & Contribution/LSRCP
Total		300,534		
CWT Total		55,260		
BY '91	East Fork Trap - B's			
None	4/6-9/92	302,335	4.8	Production

HGREL92

Appendix A. Table 6. Release data for Magic Valley Steelhead Hatchery summer steelhead for the reporting period October 1, 1991 to September 30, 1992. (Production fish include fish which shed CWTs.)

Mark	Release site Date	Number released	Number per pound	Purpose/Funding
	Magic Valley Steelhead Hatchery - A's			
BY '91	Salmon River at Sawtooth			
None	3/23-24/92	117,300	5.0	Production (Pahsimeroi A's)
BY '91	Little Salmon River at Stinky Spr.			
None	4/14-21/92	415,009	4.3	Production (Oxbow A's)
10/44/15	4/14-21/92	21,091	4.3	Evaluation & Contribution
PIT		(100)		Migration Survival and Timing/LSRCP
Total		436,100		
BY '91	Little Salmon River at Hazard Creek			
None	4/17-25/92	521,973	4.0	Production {Oxbow A's)
10/44/16	4/17-25/92	22,223	3.9	Evaluation & Contribution/LSRCP
PIT		(100)		Migration Survival and Timing
10/44/17	4/17-25/92	21,604	4.0	Evaluation & Contribution
PIT		(100)		Migration Survival and Timing/LSRCP
Total		565,800		

MAGREL92

Appendix A. Table 7. continued

Mark	Release site Date	Number released	Number per pound	Purpose/Funding
Magic Valley Steelhead Hatchery - B's				
BY '91	East Fork Salmon River			
None	4/6-14/92	912,918	4.5	Production (Dworshak B's)
None	4/6-14/92	63,979	4.3	Production (East Fork Salmon R. B's)
10/44/18	4/6-14/92	21,771	4.4	Evaluation & Contribution
PIT		(100)		Migration Survival and Timing/LSRCP (Dworshak B's)
10/44/19	4/6-14/92	21,568	4.5	Evaluation & Contribution
PIT		(100)		Migration Survival and Timing
10/44/20	4/6-14/92	20,821	4.3	Evaluation & Contribution
PIT		(100)		Migration Survival and Timing/LSRCP (East Fork Salmon R. B's)
Total		1,041,057		

APPENDIX B

Adult returns of marked and unmarked groups of LSRCP-produced chinook salmon and steelhead trout, October 1, 1990 through September 30, 1992.

Appendix B. Table 1. Marked and unmarked groups of McCall summer chinook returning in 1992.

Mark	Release site Date	Number released	Number per pound	Purpose/Funding	Rack Returns 1-Oc	2-Oc	3-Oc	Total returns	Percent
BY '87	South Fork Salmon River								
None	3/20-23/89	667,482	19.6	Production					
10/31/41	3/20-23/89	46,406	20.8	Evaluation & Contribution/USCAN	0	2	0	2	0.0043
10/31/42	3/20-23/89	46,241	20.8	Evaluation & Contribution/USCAN	0	2	0	2	0.0043
10/31/43	3/20-23/89	46,405	20.8	Evaluation & Contribution/USCAN	1	0	0	1	0.0022
10/31/44	3/20-23/89	44,348	20.8	Evaluation & Contribution/USCAN	0	0	2	2	0.0045
10/31/45	3/20-23/89	43,026	20.8	Evaluation & Contribution/USCAN	1	1	0	2	0.0046
10/31/46	3/20-23/89	41,330	20.8	Evaluation & Contribution/USCAN	0	2	0	2	0.0048
w/RAR-1,2,3				Migration Timing/FPC					
RA R-4	3/20-23/89	9,179	20.8	Migration Timing/FPC					
PIT	3/20-23/89	2,978	20.8	Migration Timing & Survival/LSRCP					
Total		947,395							
CWT Total		265,756							
BY '87	East Fork South Fork Salmon River								
None	5/16/88	201,004	466.5	Fry Release					
BY '87	Johnson Creek								
None	5/31/88	259,236	625.1	Fry Release					
BY '87	Sand Creek								
None	5/9/88	87,800	200.0	Fry Release					
BY '87	Cabin Creek								
None	5/10/88	101,942	186.7	Fry Release					

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Appendix B. Table 1. continued

Mark	Release site Date	Number released	Number per pound	Purpose/Funding	Rack Returns 1-Oc	Rack Returns 2-Oc	Rack Returns 3-Oc	Total returns	Percent
BY 88	South Fork Salmon River								
None	3/16-22/90	195,975	21.0	Production					
10/30/34	3/16-22/90	251,100	21.0	Evaluation & Contribution, Mark-Handling: Test/USCAN	161	459		620	0.25
10/30/38	3/21/90	62,225	21.0	Evaluation & Contribution, Mark-Handling: Test/USCAN	42	95		137	0.22
w/ LDT-4	3/21/90	(21,100)	21.0	Migration Timing/FPC					
w/ LDT-3	3/21/90	(20,875)	21.0	Migration Timing/FPC					
w/ LDT-1	3/21/90	(20,200)	21.0	Migration Timing/FPC					
TM-100	3/16/90	523,250	20.5	Marking-Handling Exp.: Control					
Total		1,032,550							
CWT Total		313,325							
BY 88	East Fork South Fork Salmon River								
None	5/30/89	201,100	365.0	Fry Release					
BY 88	Johnson Creek								
None	5/08/89	95,483	409.8	Fry Release					
None	5/31/89	100,300	316.9	Fry Release					
None	8/09/89	145,000	45.4	Fingerling Release					
None	8/10/89	145,000	53.7	Fingerling Release					
Total		485,783							
BY 88	Sand Creek								
None	5/08/89	105,000	409.8	Fry Release					

MCRELRTN.92

Appendix B. Table 1. continued

Mark	Release site Date	Number released	Number per pound	Purpose/Funding	Rack Returns 1-Oc	2-Oc	3-Oc	Total returns	Percent
BY '89	South Fork Salmon River								
None	3/18-21/91	34,319	23.9	Production					
10/34/31	3/18-21/91	21,502	23.9	Evaluation & Contribution, Mark-Handling: Test/USCAN	3			3	0.01
10/34/32	3/18-21/91	21,810	23.9	Evaluation & Contribution, Mark-Handling: Test/USCAN	2			2	0.01
10/34/33	3/18-21/91	20,700	23.9	Evaluation & Contribution, Mark-Handling: Test/USCAN	1			1	0.0048
10/34/34	3/18-21/91	20,807	23.9	Evaluation & Contribution, Mark-Handling: Test/USCAN	2			2	0.01
10/34/35	3/18-21/91	21,463	23.9	Evaluation & Contribution, Mark-Handling: Test/USCAN	0			0	0.0
w/ RD->O-1		(20,122)							
10/34/36	3/18-21/91	22,608	23.9	Evaluation & Contribution, Mark-Handling: Test/USCAN	2			2	0.01
w/ RA->O-1		(22,261)		FPC					
w/ LA->O-1		(347)		FPC					
10/34/37	3/18-21/91	21,620	23.9	Evaluation & Contribution, Mark-Handling: Test/USCAN	2			2	0.01
10/34/38	3/18-21/91	21,331	23.9	Evaluation & Contribution, Mark-Handling: Test/USCAN	6			6	0.03
10/34/39	3/18-21/91	21,253	23.9	Evaluation & Contribution, Mark-Handling: Test/USCAN	4			4	0.02
10/34/40	3/18-21/91	21,443	23.9	Evaluation & Contribution, Mark-Handling: Test/USCAN	3			3	0.01
10/34/41	3/18-21/91	21,501	23.9	Evaluation & Contribution, Mark-Handling: Test/USCAN	3			3	0.01
10/34/42	3/18-21/91	21,406	23.9	Evaluation & Contribution, Mark-Handling: Test/USCAN	1			1	0.0047
10/34/43	3/18-21/91	21,527	23.9	Evaluation & Contribution, Mark-Handling: Test/USCAN	2			2	0.01
PIT		(200)		Migration Survival and Timing : Test					
10/34/44	3/18-21/91	21,442	23.9	Evaluation & Contribution, Mark-Handling: Test/USCAN	3			3	0.01

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Appendix B. Table 1. continued

Mark	Release site Date	Number released	Number per pound	Purpose/Funding	Rack Returns 1-Oc	2-Oc	3-Oc	Total returns	Percent
BY '89	South Fork Salmon River (cont.)								
10/34/45	3/18-21/91	19,387	23.9	Evaluation & Contribution, Mark-Handling: Test/USCAN	4			4	0.02
w/ LA->0-1		(20,097)		FPC					
LA->0-1	3/18-21/91	710	23.9	(CWT/FB fish which shed tags)					
TM-100	3/18-21/91	353,771	23.9	Evaluation & Contribution, Mark-Handling: Control/USCAN					
PIT		(200)		Migration Survival and Timing : Control					
Total		708,600							
CWT Total		319,800							

Appendix B. Table 2. Marked and unmarked groups of Dworshak National Fish Hatchery spring chinook salmon returning in 1992.

Mark	Release site / Date	Number released	Number per pound	Purpose/Funding	Returns Year 1-Cc	2-Cc	3-Oc	Total returns	Percent
BY '87	North Fork Clearwater River								
5/40/10 w/RDR-1	9/28/88	63,776 (19,318)	33.1	Fall Release Evaluation Migration Timing	0	1	0	1	0.0016
5/40/11 w/RDR-2	9/28/88	63,961 (18,802)	33.1	Fall Release Evaluation Migration Timing	1	0	0	1	0.0016
5/40/12 w/RDR-3	9/28/88	64,363 (18,737)	33.1	Fall Release Evaluation Migration Timing	0	0	0	0	0.0000
None	3/30/89	988,524	18.3	Production					
5/40/13 w/RA7H-1	3/30/89	63,555 (19,087)	18.3	Spring Release Eval. & Contrib. Migration Timing	0	1	1	2	0.0030
5/40/14 w/RD7H-1	3/30/89	66,380 (19,545)	18.3	Spring Release Eval. & Contrib. Migration Timing	0	1	1	2	0.0030
5/40/15 w/RD7H-3	3/30/89	66,947 {20,084)	18.3	Spring Release Eval. & Contrib. Migration Timing	0	0	1	1	0.0015
RD LT-1	1989	30,503	18.3	NMFS Photoperiod Test: Spring Release					
RD LX-1	1989	34,795	18.3	NMFS Photoperiod Control: Spring Release					
Total		1,442,804							
CWT Total		388,982							
BY '87	Crooked River								
None	3/27-30/89	199,690	20.0	Production					
BY '87	Eldorado Creek								
None	3/28-29/89	209,950	24.7	Production					

DWRELRTN.92

Appendix B. Table 2. continued

Mark	Release site Date	Number released	Number per pound	Purpose/Funding	Returns Year 1-Oc	2-Oc	3-Oc	Total returns	Percent
BY '87	White Sands Creek (Powell)								
None	3/27-29/89	200,639	19.8	Production	ND		0		
None	3/27/89	102,660	23.6	Production	ND		0		
5/19/42	3/29/89	21,609	20.0	Evaluation and Contribution	ND		0		
5/19/43	3/29/89	21,148	20.0	Evaluation and Contribution	ND		0		
5/19/44	3/29/89	19,953	20.0	Evaluation and Contribution	ND		0		
Total		366,009							
CWT Total		62,710							
BY '88	North Fork Clearwater River								
5/40/16	3/30/89	61,613	76.9	Age 0	0	0			
w/RDH-1		(19,992)							
5/40/17	3/30/89	66,107	76.9	Age 0	0	0			
w/RAH-1		(20,716)							
5/40/18	3/30/89	67,946	76.9	Age 0	0	0			
w/RDH-2		(21,051)							
None	4/4-5/90	780,679	ND	Production					
5/21/62	4/5/90	67,624	18.4	Contribution Medicated Feed	7	18		25	0.037
5/21/63	4/5/90	67,262	17.7	Contribution Medicated Feed	4	8		12	0.018
5/22/05	4/5/90	65,686	18.8	Contribution No Erythromycin	3	8_2		11	0.017
5/22/60	4/4/90	25,369	17.2	USFWSBKD Study (Low)	3	3_1		6	0.024
5/22/61	4/4/90	25,483	18.6	USFWSBKD Study (Low)	7	4_1		11	0.043
5/22/62	4/4/90	25,685	15.6	USFWSBKD Study (Low)	7	13_1		20	0.078
5/22/63	4/4/90	22,645	16.8	USFW BKD Study (High)	0	2		2	0.009
5/23/05	4/4/90	24,801	15.7	USFWSBKD Study (High)	2	0		2	0.008
5/23/06	4/4/90	24,582	18.2	USFWSBKD Study (High)	3	5		8	0.033
23/29/30	4/5/90	64,522	18.4	NMFSPhotoperiod, Erythro Feed in some fish	6	11		17	0.026
23/29/31	4/5/90	57,089	18.0	NMFSPhotoperiod, Erythro Feed in some fish	6	12_1		18	0.032

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Appendix B. Table 2. continued

Mark	Release site Date	Number released	Number per pound	Purpose/Funding	Returns Year 1-0c 2-Oc 3-Oc	Total returns	Percent
PIT	4/23/90	985	ND	Migration Timing & Survival: Yearling			
PIT	4/23/90	478	ND	Migration Timing & Survival: Zero Age			
PIT	4/5/90	1,016	ND	Migration Timing & Survival: Yearling			
PIT	ND	763	ND	Pascho-Low BKD progeny			
PIT	ND	767	ND	Pascho-Low BKD progeny			
PIT	ND	745	ND	Pascho-Low BKD progeny			
PIT	ND	1,504	ND	Pascho-High BKD progeny			
PIT	ND	1,525	ND	Pascho-High BKD progeny			
PIT	ND	1,510	ND	Pascho-High BKD progeny			
PIT	11/28/89	342	ND	NMFS Adv. Photo Period Study			
PIT	11/28/89	340	ND	NMFS Adv. Photo Period Study			
PIT	11/28/89	341	ND	NMFS Adv. Photo Period Study			
PIT	11/29/89	340	ND	NMFS Control Adv. Photoperiod			
PIT	11/29/89	340	ND	NMFS Control Adv. Photoperiod			
PIT	11/29/89	340	ND	NMFS Control Adv. Photoperiod			
PIT	3/26/90	1,021	ND	NMFS High Temp+Photoperiod Advance			
PIT	3/26/90	1,040	ND	NMFS Delayed Release			
PIT	3/27/90	1,011	ND	Zero Age-TC			
Totals		1,449,572					
CWT Totals		666,414					
BY '88	Crooked River						
None	3/90	300,407	ND	Production (KNFH-reared)			
BY '88	Eldorado Creek						
None	3/90	256,883	ND	Production			

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Appendix B. Table 2. continued

Mark	Release site Date	Number released	Number per pound	Purpose/Funding	Returns Year 1-Oc	2-Oc	3-Cc	Total returns	Percent
BY '88	White Sands Creek (Powell)								
None	3/90	236,019	ND	Production					
BY '88	Powell								
None	3/90	53,287	ND	Production (KNFH)					
BY '88	Papoose Creek								
None	3/90	50,095	ND	Production (KNFH)					
BY '88	Clear Creek								
None	3/90	403,701	ND	Production (KNFH)					
BY '89	North Fork Clearwater River								
None	4/3-4/91	415,821	20.6	Production					
5/24/31	4/4/91	15,683	18.4	Dens. Exp.-Low/USCAN (RCWY1)					
5/24/32	4/4/91	15,710	18.4	Dens. Exp.-Low/USCAN (RCWY2)					
5/24/33	4/4/91	15,587	21.3	Dens. Exp.-Low/USCAN (RCWY3)					
5/24/34	4/4/91	15,881	18.6	Dens. Exp.-Low/USCAN (RCWY4)					
5/24/35	4/4/91	16,720	20.9	Dens. Exp.-Low/USCAN (RCWY5)					
5/24/36	4/4/91	16,669	21.3	Dens. Exp.-Low/USCAN (RCWY6)					
5/24/37	4/4/91	16,715	21.4	Dens. Exp.-Low/USCAN (RCWY7)					
5/24/38	4/4/91	16,611	20.3	Dens. Exp.-Low/USCAN (RCWY8)					
5/24/39	4/4/91	15,842	19.8	Dens. Exp.-Low/USCAN (RCWY9)					
5/24/40	4/4/91	33,553	20.7	Dens. Exp.-Med./USCAN (RCWY 10)					
5/24/41	4/4/91	33,145	21.5	Dens. Exp.-Med./USCAN (RCWY 11)					
5/24/42	4/4/91	32,742	22.5	Dens. Exp.-Med./USCAN (RCWY 12)					
5/24/43	4/4/91	31,527	21.0	Dens. Exp.-Med./USCAN (RCWY 13)					
5/24/44	4/4/91	33,010	22.5	Dens. Exp.-Med./USCAN (RCWY 14)					
5/24/45	4/4/91	32,903	19.7	Dens. Exp.-Med./USCAN (RCWY 15)					
5/24/46	4/4/91	46,402	22.7	Dens. Exp.-High/USCAN (RCWY 26)					
5/24/47	4/4/91	47,668	22.4	Dens. Exp.-High/USCAN (RCWY 27)					

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Appendix B. Table 2. continued

Mark	Release site Date	Number released	Number per pound	Purpose/Funding	Returns Year 1-Oc	2-Oc	3-Oc	Total returns	Percent
BY '89		North Fork Clearwater River (cont.)							
10/30/25	4/4/91	52,664	23.5	Dens. Exp.-High/USCAN (RCWY 28)					
5/25/08	4/4/91	38,836	21.7	USFWS BKD Study-Low (RCWY 16)					
5/25/09	4/4/91	37,471	22.6	USFWS BKD Study-Low (RCWY 17)					
5/25/10	4/4/91	38,244	22.5	USFWS BKD Study-Low (RCWY 18)					
5/25/12	4/4/91	23,832	18.6	USFWS BKD Study-High (RCWY 19)					
5/25/13	4/4/91	23,193	17.5	USFWS BKD Study-High (RCWY 20)					
5/25/14	4/4/91	28,455	18.5	USFWS BKD Study-High (RCWY 21)					
Total		1,094,884							
CWT Total		679,063							
PIT		4,500		USFWS BKD Study-High (RCWY)					
PIT		2,250		USFWS BKD Study-Low (RCWY)					
PIT		1,500		Density Exp.-Low/USCAN (RCWY)					
PIT		1,500		Density Exp.-Med./USCAN (RCWY)					
PIT		1,500		Density Exp.-High/USCAN (RCWY)					
BY '89	Red River								
None	3/25/91	63,004	21.6	Production					
BY '89	Eldorado Creek								
None	3/25-26/91	199,456	21.4	Production					
BY '89	Papoose Creek								
None	3/25-26/91	70,000	21.8	Production					

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Appendix B. Table 3. All marked and unmarked groups of Red River, Crooked River, and Powell facility (Clearwater Fish Hatchery) spring chinook salmon returning in 1992.

Release site Mark	date	Number released	Number per pound	Purpose/Funding	Returns Year 1-Oc	 2-Oc	 3-Oc	Total returns	Percent
Red River facility									
BY '87	Red River								
None	10/12/88	236,825	25.0	Production					
10/40/02	10/12/88	54,375	NA	Fall Release Evaluation	0	0	0	0	0.000
w/LDR-1		(18,696)		FPC					
w/LDR-2		(23,865)		FPC					
w/LDR-3		(13,429)		FPC					
Total		291,200							
BY '88	Red River								
None	10/89	240,510	35.0	Production					
BY '89	Red River								
None	3/25-27/91	124,071	24.5	Spring release from Kooskia					
None	3/25/91	63,004	21.6	Spring release from Dworshak					
None	10/23/90	210,501	27.9	Production					
10/43/04	10/23/90	20,675	27.9	Evaluation & Contribution/LSRCP					
10/43/05	10/23/90	21,276	27.9	Evaluation & Contribution/LSRCP					
10/43/06	10/23/90	20,548	27.9	Evaluation & Contribution/LSRCP					
PIT	10/23/90	800	27.9	Migration Survival and Timing/LSRCP					
Total (Fall)		273,800							
Total (Spring)		187,075							

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Appendix B. Table 3. continued

Mark	Release site date	Number released	Number per pound	Purpose/Funding	Returns Year 1-Oc	2-Oc	3-Oc	Total returns	Percent
Powell Facility									
BY '88	Walton Creek								
None	10/89	314,480	18.0	Production					
BY '89	Powell								
None	3/11-22/91	180,764	23.6	Spring release from Kooskia					
None	10/23/90	244,558	27.4	Production					
10/43/01	10/23/90	20,970	27.4	Evaluation & Contribution/LSRCP	0				
10/43/02	10/23/90	21,547	27.4	Evaluation & Contribution/LSRCP	0				
10/43/03	10/23/90	19,830	27.4	Evaluation & Contribution/LSRCP	0				
PIT	10/23/90	800	27.4	Migration Survival and Timing/LSRCP					
Total (Fall)		307,705							
Total (Spring)		180,764							
Crooked River									
BY '87	Crooked River								
None	NA	200,100	NA	Production (fry release)					
None	NA	199,690	NA	Production (smolt release)					
BY '88	Crooked River								
None	NA	201,824	NA	Production (fry release)					

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Appendix B Table 3 continued.

Mark	Release site date	Number released	Number per pound	Purpose/Funding	Returns Year 1-Oc	Returns Year 2-Cc	Returns Year 3-Cc	Total returns	Percent
BY '89	Crooked River								
None	10/17/90	274,141	27.0	Production					
10/43/07	10/17/90	21,220	27.0	Evaluation & Contribution/LSRCP	0				
10/43/08	10/17/90	21,713	27.0	Evaluation & Contribution/LSRCP	0				
10/43/09	10/17/90	21,213	27.0	Evaluation & Contribution/LSRCP	0				
PIT	10/17/90	800	NA	Migration Survival and Timing/LSRCP					
Total		339,087							

Appendix B. Table 4. All marked and unmarked groups of Sawtooth Fish Hatchery spring chinook salmon returning in 1991.

Mark	Release site Date	Number released	Number per pound	Purpose/Funding	Returns 1-0c	Returns 2-0c	Returns 3-0c	Total returns	Percent
BY 87	Sawtooth Fish Hatchery								
None	10/12/88	665,380	20.4	Production					
10/29/35	10/12/88	49,700	20.4	Fall Release Evaluation	0	0	0	0	0.000
10/31/38	10/12/88	50,275	20.4	Fall Release Evaluation	0	1	1	2	0.004
10/31/39	10/12/88	50,400	20.4	Fall Release Evaluation	0	0	1	1	0.002
RV	10/12/88	172,543	20.4	Fall Release Evaluation	0	7	2	9	0.005
PIT	3/15-21/89	2,697	20.4	Fall Release Evaluation - Migration Survival					
None	3/15-21/89	942,587	22.0	Production Spring Release					
10/31/40	3/15-21/89	48,475	22.0	Spring Release Evaluation	0	1	1	2	0.004
10/40/48	3/15-21/89	50,635	22.0	Spring Release Evaluation	0	2	0	2	0.004
10/40/51	3/15-21/89	49,805	22.0	Spring Release Evaluation	0	3	1	4	0.008
PIT	3/15-21/89	3,051	22.0	Spring Release Evaluation - Migration Survival	1	0	0	1	0.033
PIT	3/15-21/89	7,047	22.0	USFWS BKD Study	0			0	0.000
Total		2,092,595							
CWT Total		299,290							
BY 87	Yankee Fork Salmon River								
None	3/22/89	198,200	24.0	Production Spring Release					
BY 88	Sawtooth Fish Hatchery								
None	10/12/89	303,600	34.9	Fall Release					
10/32/22	10/12/89	45,275	34.9	Fall Release Evaluation/USCAN	0	1		1	0.002
10/32/23	10/12/89	46,525	34.9	Fall Release Evaluation/USCAN	0	0		0	0.000
None	3/17-20/90	1,232,243	23.0	Production Spring Release					
10/32/20	3/17/90	47,500	23.0	Rearing Density - Test/USCAN	0	3		3	0.006
10/32/21	3/17/90	50,305	23.0	Time of Marking-Aug./USCAN	0	7		7	0.014

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Appendix B. Table 4. continued

Mark	Release site Date	Number released	Number per pound	Purpose/Funding	Returns 1-0c	2-0c	3-Oc	Total returns	Percent
BY '88	Sawtooth Fish Hatchery (cont.)								
10/32/24	3/17/90	51,700	23.0	Time of Marking-Oct./USCAN	0	1		1	0.002
10/40/08	3/17/90	51,125	23.0	Time of Marking-June/USCAN	0	4		4	0.008
LA-T1	3/17/90	19,875	23.0	Migration Timing/FPC					
LA-T3	3/17/90	18,675	23.0	Migration Timing/FPC					
LA-T4	3/17/90	18,775	23.0	Migration Timing/FPC					
PIT	3/17/90	10,002	23.0	USFWS BKD Study					
Total		1,895,600							
CWT Total		292,430							
FB total		53,325							
BY '88	Yankee Fork Salmon River								
None	3/20/90	200,800	21.0	Production					
BY '88	Upper Salmon River								
None	5/26/90	126,000	178.0	Fry Release					
None	8/16/90	2,000	25.0	Fry Release					
BY '88	Yankee Fork Salmon River								
None	5/24/90	125,000	178.0	Fry Release					
BY '88	Yankee Fork Ponds								
None	7/20/90	50,000	111.0						

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Appendix B. Table 4. continued

Mark	Release site Date	Number released	Number per pound	Purpose/Funding	Returns 1-0c	Returns 2-0c	Returns 3-Oc	Total returns	Percent
BY '88	Alturas Lake Creek								
None	6/27/90	51,000	74.0	Fingerling Release					
BY '88	Pole Creek								
None	5/25/90	71,500	178.0	Fry Release					
BY '88	Smiley Creek								
None	5/25/90	71,500	178.0	Fry Release					
BY '89	Sawtooth Fish Hatchery								
None	3/8-13/91	142,961	25.6	Production					
None	3/8-13/91	119,193	24.5	High BKD Progeny					
PIT	3/8-13/91	2,231	24.5	USFWS BKD Study - High (RCWY 5)					
PIT	3/8-13/91	1,798	24.5	USFWS BKD Study - Low (RCWY 3)					
None	3/8-13/91	73,426	31.5	Density Exp. - High/USCAN (RCWY 4)					
10/34/16	3/8-13/91	21,662	31.5	Density Exp. - High/USCAN (RCWY 4)	0				
10/34/17	3/8-13/91	21,772	31.5	Density Exp. - High/USCAN (RCWY 4)	1			1	0.005
10/34/18	3/8-13/91	20,710	31.5	Density Exp. - High/USCAN (RCWY 4,11)	0				
10/34/28	3/8-13/91	21,179	28.7	Density Exp. - High/USCAN (RCWY 11)	0				
10/34/29	3/8-13/91	22,448	28.7	Density Exp. - High/USCAN (RCWY 11)	0				
10/34/30	3/8-13/91	22,103	28.7	Density Exp. - High/USCAN (RCWY 11)	0				

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Appendix B. Table 4. continued

Mark	Release site Date	Number released	Number per pound	Purpose/Funding	Returns 1-0c	Returns 2-0c	Returns 3-0c	Total returns	Percent
PIT	3/8-13/91	1,600	28.7	Density Exp. - High/USCAN (RCWY 4,11)	0				
None	3/8-13/91	17,419	24.8	Density Exp. - Med/USCAN (RCWY 10)	0				
10/34/25	3/8-13/91	22,100	24.8	Density Exp. - Med/USCAN (RCWY 10)	0				
10/34/26	3/8-13/91	14,779	24.8	Density Exp. - Med/USCAN (RCWY 10)	0				
10/34/27	3/8-13/91	11,597	24.8	Density Exp. - Med/USCAN (RCWY 10)	0				
10/34/19	3/8-13/91	21,276	24.4	Density Exp. - Med/USCAN (RCWY 6)	0				
10/34/20	3/8-13/91	21,235	24.4	Density Exp. - Med/USCAN (RCWY 6)	0				
10/34/21	3/8-13/91	10,586	24.4	Density Exp. - Med/USCAN (RCWY 6)	0				
10/34/22	3/8-13/91	17,062	26.0	Density Exp. - Med/USCAN (RCWY 9)	0				
10/34/23	3/8-13/91	22,018	26.0	Density Exp. - Med/USCAN (RCWY 9)	0				
10/34/24	3/8-13/91	19,928	26.0	Density Exp. - Med/USCAN (RCWY 9)	1			1	0.005
PIT	3/8-13/91	2,400	26.0	Density Exp. - Med/USCAN (RCWY 6,9,10)	0				
None	3/8-13/91	52,116	22.3	Density Exp. - Low/USCAN (RCWY 7)	0				
10/41/30	3/8-13/91	14,908	22.3	Density Exp. - Low/USCAN (RCWY 7)	0				
10/41/31	3/8-13/91	13,942	22.3	Density Exp. - Low/USCAN (RCWY 7)	0				
10/42/11	3/8-13/91	14,311	25.5	Density Exp. - Low/USCAN (RCWY 12)	0				
10/42/12	3/8-13/91	14,993	25.5	Density Exp. - Low/USCAN (RCWY 12)	0				
10/42/17	3/8-13/91	11,908	21.8	Density Exp. - Low/USCAN (RCWY 8)	0				

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Appendix B. Table 4. continued

Mark	Release site Date	Number released	Number per pound	Purpose/Funding	Returns 1-0c	Returns 2-0c	Returns 3-0c	Total returns	Percent
10/42/18	3/8-13/91	17,500	21.8	Density Exp. - Low/USCAN (RCWY 8)	0				
PIT	3/8-13/91	2,400	21.8	Density Exp. - Low/USCAN (RCWY 7,8,12)	0				
Total		650,600							
CWT Total		378,017							
Density	HIGH	129,874							
	MED	160,581							
	LOW	87,562							
	Total	387,017							
BY '89	Yankee Fork Salmon River								
None	10/10/90	491,300	45.0	Production (Rapid River stock)					

Appendix B. Table 5. All marked and unmarked groups of East Fork Salmon River Facility (Sawtooth Fish Hatchery) spring chinook salmon returning in 1992.

Mark	Release site date	Number released	Number per pound	Purpose/Funding	Returns Year 1-Oc	2-Oc	3-Oc	Total returns	Percent
BY '87	E.F. Salmon R.								
None	3/20/89	245,771	23.3	Production					
10/30/35	3/20/89	59,529	23.3	Evaluation and Contribution	1	0	0	1	0.0017
BY '88	E.F. Salmon R.								
None	3/20/90	419,950	22.3	Production					
10/32/11	3/20/90	47,225	22.3	Rearing, Density-Control/USCAN	0	1		1	0.0021
10/32/12	3/21/90	47,425	22.3	Rearing, Density-Test/USCAN	0	1		1	0.0021
None	6/21/89	88,000	78.0	Fingerling Release					
Totals		602,600							
BY '89	E.F. Salmon R.								
None	3/5/91	98,300	30.7	Production					

EFRELRTN.92

Appendix B. Table 6. All marked and unmarked groups of Hagerman National Fish Hatchery summer steelhead trout returning in 1991-92.

Mark	Release site Date	Number released	Number per pound	Purpose/Funding	Rack Rtns.	% to Rack	% to Est. Harv.	Rack & Harv.
Hagerman National Fish Hatchery - A's								
BY '88	Sawtooth Weir							
None	1989	590,334	4.9	Production				
10/41/38	1989	14,718	4.9	Evaluation & Contribution/LSRCP	0	4		
10/41/39	1989	14,585	4.9	Evaluation & Contribution/LSRCP	0	0		
10/41/40	1989	16,914	4.9	Evaluation & Contribution/LSRCP	1	5		
Total		636,551						
BY '89	Sawtooth Weir							
None	4/5/90	255,859	4.4	Evaluation & Contribution/LSRCP				
10/42/14	4/5/90	14,597	4.4	Evaluation & Contribution/LSRCP				
10/42/15	4/5/90	15,482	4.4	Evaluation & Contribution/LSRCP				
10/42/16	4/5/90	15,218	4.4	Evaluation & Contribution/LSRCP				
Total		301,156						
BY '89	Salmon River (Shoup Br.)							
None	4/12/90	154,418	4.7	Evaluation & Contribution/LSRCP				
10/42/27	4/12/90	15,528	4.7	Evaluation & Contribution/LSRCP				
10/42/28	4/12/90	15,196	4.7	Evaluation & Contribution/LSRCP				
10/42/29	4/12/90	15,104	4.7	Evaluation & Contribution/LSRCP				
Total		200,246						
BY '89	Salmon River (Ellis Br.)							
None	4/11/90	200,295	4.4	Production				

HGRELRTN.92

Appendix B. Table 6. continued

Mark	Release site Date	Number released	Number per pound	Purpose/Funding	Rack Rtns.	% to Rack	% to Est. Harv.	Rack & Harv.
BY '89	Salmon River (North Fork Ramp)							
None	4/20/90	199,602	4.3	Production				
BY '89	Little Salmon River (Hazard Creek)							
None	4/30/90	80,465	4.2	Production				
BY '90	Sawtooth Weir							
None	4/12-15/91	864,138	2.9	Production				
10/43/33	4/12-15/91	21,050	2.9	Size at release - Large (RCWY 71-75)				
10/43/34	4/12-15/91	20,129	2.9	Size at release - Large (RCWY 71-75)				
10/43/35	4/12-15/91	12,066	2.6	Size at release - Large (RCWY 71-75)				
PIT	4/12-15/91	489	2.9	Size at release - Large (RCWY 71-75)				
10/43/36	4/12-15/91	21,775	4.5	Size at release - Regular (RCWY 76-80)				
10/43/37	4/12-15/91	20,318	4.5	Size at release - Regular (RCWY 76-80)				
10/43/38	4/12-15/91	19,338	4.4	Size at release - Regular (RCWY 76-80)				
PIT	4/12-15/91	496	4.4	Size at release - Regular (RCWY 76-80)				
Total		979,799		(Sawtooth and Pahsimeroi stock)				
BY '90	Upper Salmon River at Hell Roaring							
None	10/5/90	97,515	46.9	Excess Fingerling Plant				
None	10/17/90	87,573	33.6	Excess Fingerling Plant				

HGRELRTN.92

Appendix B. Table 6. continued

Mark	Release site Date	Number released	Number per pound	Purpose/Funding	Rack Rtns.	% to Rack	% to Est. Harv.	Rack & Harv.
BY '90	Upper Salmon River at Matty Hanson T.O.							
None	10/10/90	119,819	39.8	Excess Fingerling Plant				
Hagerman National Fish Hatchery - B's								
BY '87	East Fork Salmon River							
None	1988	251,832	5.0	Production	2	6		
10/29/38	1988	51,732	5.0	Evaluation & Contribution/LSRCP	4	12		
BY '88	East Fork Salmon River							
None	1989	393,007	5.0	Production				
10/41/32	1989	14,939	5.0	Evaluation & Contribution/LSRCP	0	0		
10/41/33	1989	14,911	5.0	Evaluation & Contribution/LSRCP	0	0		
10/41/34	1989	13,719	5.0	Evaluation & Contribution/LSRCP	1	1		
Total		436,576						
BY '88	South Fork Clearwater River (Crooked River)							
None	4/24/90	83,431	5.0	Production				
BY '88	South Fork Clearwater River (Mill Creek)							
None	4/24/90	60,372	4.9	Production				
BY '88	Newsome Creek							
None	4/24-5/1/90	103,273	5.0	Production				

HGRELRTN.92

Appendix B. Table 6. continued

Mark	Release site Date	Number released	Number per pound	Purpose/Funding	Rack Rtns.	% to Rack	% to Est. Harv.	Rack & Harv.
BY '88	Eldorado Creek							
None	5/1-3/89	109,480	4.9	Production				
BY '88	Clear Creek							
None	1989	3,997	5.0	Production				
10/41/35	1989	15,294	5.0	Evaluation & Contribution/LSRCP				
10/41/36	1989	15,482	5.0	Evaluation & Contribution/LSRCP				
10/41/37	1989	14,374	5.0	Evaluation & Contribution/LSRCP				
Totals		49,147						
BY '90	Little Salmon River at Hazard Creek							
None	10/23-25/90	120,323	22.5	Excess Fingerling Plant				
None	4/17-29/91	398,165	4.0-4.5	Production				
10/43/32	4/22/91	19,831	4.4	Evaluation & Contribution/LSRCP				
10/43/39	4/12-19/91	19,813	4.4	Evaluation & Contribution/LSRCP				
10/43/40	4/17/91	18,877	4.5	Evaluation & Contribution/LSRCP				
PIT	4/24/91	424	4.5	Migration and Timing				
Total		577,433		(All DNFH stock)				
BY '90	East Fork Salmon River							
None	9/5-7/90	229,473	32.8	Excess Fingerling Plant (below E.F. trap)				
None	9/5-7/90	311,260	32.8	Excess Fingerling Plant (above E.F. trap)				
Total		540,733						

HGRELRTN.92

Appendix B. Table 7. All marked and unmarked groups of Magic Valley Steelhead Hatchery summer steelhead trout returning in 1991-92.

Release site Mark	Date	Number released	Number per pound	Rack Purpose/Funding	Rtns.	% to Rack	% to Est. Harv.	Rack @ Harv.
Magic Valley Steelhead Hatchery - A's								
BY '88	Sawtooth Weir							
None	4/10-19/89	854,768	4.44	Production				
PIT	4/10-19/89	2,832	4.44	Water Budget Migration				
BY '88	Slate Creek							
None	4/24-27/89	300,600	4.14	Production				
BY '88	Yankee Fork Salmon River							
None	4/17-21/89	104,400	4.33	Production				
BY '88	Hazard Creek							
None	4/19-26/89	402,032	4.23	Production				
10/41/41	4/19-26/89	15,033	4.23	Evaluation and Contribution/LSRCP				
10/41/42	4/19-26/89	15,010	4.23	Evaluation and Contribution/LSRCP				
10/41/43	4/19-26/89	15,770	4.23	Evaluation and Contribution/LSRCP				
PIT	4/19-26/89	3,059	4.23	Water Budget Migration				
Total		450,904						
BY '88	Hammer Creek							
None	4/28-29/89	136,000	4.04	Production				

MAGRELRT.92

Appendix B. Table 7. continued

Mark	Release site / Date	Number released	Number per pound	Purpose/Funding	Rack Rtns.	% to Rack	% to Est. Harv.	Rack Harv.
Magic Valley - A's								
BY '89	Sawtooth Weir							
None	4/13/90	1,159,080	4.2	Production				
10/42/59	4/13/90	39,620	4.2	Evaluation and Contribution/LSRCP				
w/LA-1		(39,620)		Migration Survival and Timing				
BY '90	Sawtooth Weir							
None	4/9-19/91	364,700	3.9	Production (Pahsimeroi A's)				
BY '90	Pahsimeroi River at Hatchery							
None	4/18-19/91	135,100	3.8	Production (Pahsimeroi A's)				
BY '90	Salmon River Shoup Br.							
None	4/9-19-91	97,800	3.9	Production (Pahsimeroi A's)				
BY '90	Hammer Creek							
None	4/22-25/91	186,300	3.9	Production (Pahsimeroi A's)				
BY '90	Little Salmon River at Hazard Creek							
None	4/22-27/91	242,703	3.6	Production (Pahsimeroi A's)				
10/43/17	4/22-27/91	21,809	3.6	Evaluation & Contribution/LSRCP				
10/43/18	4/22-27/91	22,704	3.6	Evaluation & Contribution/LSRCP				
10/43/19	4/22-27/91	21,484	3.6	Evaluation & Contribution/LSRCP				
PIT	4/22-27/91	1,600	3.6	Migration Survival and Timing/LSRCP				
Total		310,300						

MAGRELRT.92

Appendix B. Table 7. continued

Mark	Release site Date	Number released	Number per pound	Rack Purpose/Funding	Rtns.	% to Rack	% to Est. Harv.	Rack @ Harv.
Magic Valley - B's								
BY '88	East Fork Salmon River							
None	4/15-19/89	306,313	4.48	Production				
10/41/44	4/15-19/89	15,611	4.48	Evaluation and Contribution/LSRCP				
10/41/45	4/15-19/89	14,133	4.48	Evaluation and Contribution/LSRCP				
10/41/46	4/15-19/89	14,321	4.48	Evaluation and Contribution/LSRCP				
PIT	4/15-19/89	2,922	4.48	Migration Survival and Timing				
Total		353,300						
BY '89	East Fork Salmon River							
None	4/14/90	792,129	4.6	Production				
10/40/58	4/14/90	40,905	4.6	ID, RA-1				
w/RA-1		(40,905)		Migration Timing and Survival				
10/42/36	4/16/90	15,474	4.6	Eval. and Contrib./LSRCP (EF stock)				
10/42/37	4/16/90	15,971	4.6	Eval. and Contrib./LSRCP (EF stock)				
10/42/38	4/16/90	14,958	4.6	Eval. and Contrib./LSRCP (EF stock)				
10/42/33	4/18/90	14,964	4.6	Eval. and Contrib./LSRCP (DNFH stock)				
10/42/34	4/18/90	15,157	4.6	Eval. and Contrib./LSRCP (DNFH stock)				
10/42/35	4/18/90	14,642	4.6	Eval. and Contrib./LSRCP (DNFH stock)				
Total		924,200						
BY '89	Slate Creek							
None	9/11/89	162,900	60.2					

MAGRELRT.92

APPENDIX C

Summary of 1992 CWT returns to McCall and Sawtooth fish hatcheries.

Appendix C. Table 1. 1992 McCall Fish Hatchery CWT returns. (Rack returns unless otherwise noted.)

	<660		670-940		>950		
BY 87 5-yr olds							
Tag code	M	F	M	F	M	F	
103141 - 103143	0	0	0	0	0	0	
103144	0	0	0	2	0	0	
103145 - 103146	0	0	0	0	0	0	
BY 88 4-yr olds							
	<660		670-940		>950		
Tag code	M	F	M	F	M	F	
74739	0	0	1	0	0	0	Lookingglass (Oregon) release
103034	0	0	4	2	0	0	NPT below weir; plus 1 male length NA and 4 fish sex NA
103034	15	2	260	170	0	1	
103038	1	0	48	41	0	0	
103038	0	0	1	2	0	0	NPT below weir; plus 1 female length NA and 1 fish sex NA
232433	0	0	3	1	0	0	NMFS trans. study; Col. R. mile 141
232434	0	0	5	10	0	0	NMFS trans. study; Col. R. mile 141
232435	0	0	1	1	0	0	NMFS trans. study; Col. R. mile 141

MCCWT92

Appendix C. Table 1. continued

BY 89 3-yr olds

	<660		670-940		>950		
	M	F	M	F	M	F	
103417	0	0	1	0	0	0	Sawtooth release
103431	3	0	0	0	0	0	
103432	1	0	1	0	0	0	
103433	1	0	0	0	0	0	
103434	2	0	0	0	0	0	
103435	0	0	0	0	0	0	
103436	2	0	0	0	0	0	
103437	2	0	0	0	0	0	
103438	5	0	1	0	0	0	
103439	4	0	0	0	0	0	
103440	3	0	0	0	0	0	
103441	3	0	0	0	0	0	
103442	1	0	0	0	0	0	
103443	2	0	0	0	0	0	
103444	3	0	0	0	0	0	
103445	4	0	0	0	0	0	

MCCWT92

Appendix C. Table 2. 1992 Sawtooth Fish Hatchery CWT returns. (Rack returns unless otherwise noted.)

BY 87 5-yr olds

	<650		650-820		>820		
Tag code	M	F	M	F	M	F	
102935	0	0	0	0	0	0	
103138	0	0	0	0	1	0	
103139	0	0	0	0	0	1	
103140	0	0	0	0	1	0	
104048	0	0	0	0	0	0	
104051	0	0	0	0	0	1	
232251	0	0	0	0	0	1	NMFS trans. study; Col. R. mile 141

BY 88 4-yr olds

	<650		650-820		>820		
Tag code	M	F	M	F	M	F	
103212	0	0	0	1	0	0	East Fork **release**
103220	0	0	3	0	0	0	
103221	2	0	3	2	0	0	
103222	0	0	0	1	0	0	
103223	0	0	0	0	0	0	
103224	0	0	0	1	0	0	
104008	0	0	1	3	0	0	
232434	0	0	1	0	0	0	NMFS trans. study; Col. R. mile 141

SAWCWT92

Appendix C. Table 2. continued

BY 89 3-yr olds

Tag code		<650		650-820		>820	
		M	F	M	F	M	F
103416	- 103423[a]	0	0	0	0	0	0
103424		1	0	0	0	0	0
103425	- 103430	0	0	0	0	0	0
104130		0	0	0	0	0	0
104131		0	0	0	0	0	0
104211		0	0	0	0	0	0
104212		0	0	0	0	0	0
104217		0	0	0	0	0	0
104218		0	0	0	0	0	0

[a]One fish released from Sawtooth Fish Hatchery, tag code 10/34/17, returned to the South Fork weir.

APPENDIX D

Age breakdown of 1992 chinook salmon returns
to McCall and Sawtooth fish hatcheries.

Appendix D. Table 1. Age breakdown of 1992 summer chinook salmon returns to McCall Fish Hatchery (SFSR) using two estimation techniques. The percentage of fish in each age group is given in parentheses.

	BY/Age		
	89/3	88/4	87/5
Method A[a]			
Males and females	206(7.2)	2629(91.4)	42(1.4)
Males	205(11.9)	1486(86.1)	35(2.0)
Females	1(0.1)	1143(99.3)	7(0.6)
Method C[b]			
Males and females	184(6.4)	2684(93.3)	9(0.3)
Males	178(10.3)	1548(89.7)	0(0.0)
Females	0(0.0)	1141(99.1)	10(0.9)

[a] Based on length only, as in hatchery run report

[b]Based on 1992 known length-at-age data (CWT)

Note: Under each age category in method C, the estimated number of males and females may not add to the combined number of males and females due to rounding errors.

MCAGEAC

Appendix D. Table 2. Age breakdown of 1992 spring chinook salmon returns to Sawtooth Fish Hatchery (USR) using two estimation techniques. The percentage of fish in each age group is given in parentheses.

	BY/Age		
	89/3	88/4	87/5
Method A[a]			
Males and females	29(7.5)	232(60.0)	126{32.5)
Males	26(11.7)	153(68.9)	43(19.4)
Females	3(1.8)	79(47.9)	83(50.3)
	35(9.1)	281(72.7)	71(18.2)
Method C[b]			
Males and females			
Males	18(8.3)	167(75.0)	37(16.7)
Females	0(0.0)	128(77.8)	37(22.2)

[a]Based on length only, as in hatchery run report

[b]Based on 1992 known length-at-age data (CWT)

Note: Under each age category in method C, the estimated number of males and females may not add to the combined number of males and females due to rounding errors.

SAWAGEAC

APPENDIX E

Summary of 1992 PIT-tag data for chinook salmon and steelhead trout of LSRCP and natural/wild origin.

Appendix E. Table 1. Summary of migration year 1992 PIT tag interrogations for chinook salmon and steelhead trout from Idaho hatcheries.

File Name	Rel. Site	Rel. Date	No. Tag.	No. Rel.	LGR No.	LGR %	LGO No.	LGO %	MCN No.	MCN %	TOTAL No.	TOTAL %	Ave. Trav Time days	Comment
						No/% Detected								
McCall Fish Hatchery -		Summe	Chinook											
DAC91283.MCM	KNOXB	3/23	250	250	66	26.4	27	10.8	14	5.6	107	42.8	42.1	CWT/ad
DAC91283.MCT	KNOXB	3/23	250	250	59	23.6	24	9.6	14	5.6	97	38.8	44.3	OTC-mkd
						25.5		8.2		4.3		38.0	36.8	
Rapid River Spring Chinook - Spring Chinook														
DAC91297.1HC	HCD	3/17	300	279	71		23		12		106			Hell'sC
DAC91297.RV1	RAPH	3/17	300	268	64	23.4	36	13.4	15	5.6	115	42.9	41.1	RapR.H.
Dworshak National Fish Hatchery - Spring Chinook														
High Density:														
RCD92052.D26	DWOR	4/16	200	200	64	32.0	13	6.5	3	1.5	80	40.0	19.9	Rcwy26
RCD92052.D29	DWOR	4/16	200	200	40	20.0	23	11.5	8	4.0	71	35.5	20.4	Rcwy29
RCD92052.D30	DWOR	4/16	200	200	51	25.5	19	9.5	13	6.5	83	41.5	19.8	Rcwy30
TOTAL			600	600							234	39.0		
Medium Density:														
RCD92051.D10	DWOR	4/16	200	200	72	36.0	26	13.0	19	9.5	117	58.5	22.4	Rcwyl0
RCD92052.11D	DWOR	4/16	200	200	66	33.0	21	10.5	12	6.0	99	49.5	20.9	Rcwy11
RCD92052.D12	DWOR	4/16	200	200	55	27.5	29	14.5	16	8.0	100	50.0	21.2	Rcwy12
TOTAL			600	600							316	52.7		
Low Density:														
RCD92051.DR7	DWOR	4/16	200	200	67	33.5	26	13.0	20	10.0	113	56.5	25.0	Rcwy 7
RCD92051.DR8	DWOR	4/16	200	200	78	39.0	21	10.5	19	9.5	118	59.0	22.2	Rcwy 8
RCD92051.DR9	DWOR	4/16	200	200	73	36.5	26	13.0	14	7.0	113	56.5	21.9	Rcwy 9
TOTAL			600	600							344	57.3		

WP92PITS

Appendix E. Table 1. 1992 PIT tag interrogations (cont.)

					No/% Detected								Ave.	
File Name	Rel.	Rel.	No.	No.	LGR		LGO		MC		TOTAL		Trav	Comment
	Site	Date	Tag.	Rel.	No.	%	No.	%	No.	N	No.	%	Time days	
Sawtooth Fish Hatchery -		Spring Chinook												
High Density:														
DAC91262.11A	SAWT	3/09	319	319	22	6.9	9	2.8	5	1.6	36	11.3	46.3	Rcwy11
DAC91262.A11	SAWT	3/09	475	475	33	6.9	21	4.4	5	1.1	59	12.4	48.7	Rcwy11
Rcwy 11 Total			794	794							95	12.0		
DAC91263.8A	SAWT	3/09	486	486	31	6.4	12	2.5	6	1.2	49	10.1		Rcwy 8
DAC91263.A08	SAWT	3/09	274	274	19	6.9	4	1.5	5	1.8	28	10.2	46.5	Rcwy 8
DAC91266.8A	SAWT	3/09	50	50	1	2.0	0	0.0	1	2.0	2	4.0	36.8	Rcwy 8
Rcwy 8 Total			810	810							79	9.8		
DAC91264.5A	SAWT	3/09	522	522	28	5.4	10	1.9	9	1.7	47	9.0	45.9	Rcwy 5
DAC91264.A5	SAWT	3/09	287	287	16	5.6	13	4.5	4	1.4	33	11.5	44.8	Rcwy 5
Rcwy 5 Total			809	809							80	9.9		
TOTAL - High Density			2413	2413							254	10.5		
Medium Density														
DAC91263.10A	SAWT	3/09	439	439	46	10.5	20	4.6	7	1.6	73	16.6	45.9	Rcwyl0
DAC91263.A10	SAWT	3/09	361	361	24	6.6	16	4.4	11	3.0	51	14.1	45.9	Rcwyl0
Rcwy 10 Total			800	800							124	15.5		
DAC91264.07A	SAWT	3/09	481	481	44	9.1	15	3.1	4	0.8	63	13.1	46.8	Rcwy 7
DAC91264.A07	SAWT	3/09	318	318	25	7.9	16	5.0	6	1.9	47	14.8	49.1	Rcwy 7
Rcwy 7 Total			799	799							110	13.8		
DAC91265.04A	SAWT	3/09	129	129	10	7.8	3	2.3	3	2.3	16	12.4	51.0	Rcwy 4
DAC91265.4A	SAWT	3/09	76	76	9	11.8	2	2.6	2	2.6	13	17.1	45.3	Rcwy 4
DAC91265.A4	SAWT	3/09	595	595	42	7.1	24	4.0	11	1.8	77	12.9	45.8	Rcwy 4
Rcwy 4 Total			800	800							106	13.3		
TOTAL - Medium Density			2399	2399							340	14.2		
Low Density:														
DAC91263.09A	SAWT	3/09	619	619	62	10.0	34	5.5	13	2.1	109	17.6	45.9	Rcwy 9
DAC91263.A09	SAWT	3/09	183	183	15	8.2	9	4.9	10	5.5	34	18.6	46.6	Rcwy 9
Rcwy 9 Total			802	802							143	17.8		
DAC91264.6A	SAWT	3/09	460	460	37	8.0	18	3.9	16	3.5	71	15.4	44.0	Rcwy 6
DAC91264.A06	SAWT	3/09	340	340	38	11.2	14	4.1	4	1.2	56	16.5	48.0	Rcwy 6
Rcwy 6 Total			800	800							127	15.9		
DAC91265.3A	SAWT	3/09	495	495	53	10.7	25	5.1	22	4.4	100	20.2	46.8	Rcwy 3
DAC91265.A3	SAWT	3/09	305	305	21	6.9	7	2.3	7	2.3	35	11.5	48.7	Rcwy 3
Rcwy 3 Total			800	800							135	16.9		
TOTAL - Low Density			2402	2402							405	16.9		

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Appendix E. Table 1. 1992 PIT tag interrogations (cont.)

File Name	Rel. Site	Rel. Date	No. Tag.	No. Rel.	No/% Detected: LGR No.	LGR %	LGO No.	LGO %	MCN No.	MCN %	TOTAL No.	TOTAL %	Ave. Trav Time days	Comment
Sawtooth Fish Hatchery (cont):														
Fall Releases:														
DAC91262.12A	SAWT	9/19	225	225	5	2.2	0	0.0	0	0.0	5	2.2	220	Rcwy12
DAC91262.AI2	SAWT	9/19	275	275	3	1.1	1	0.4	0	0.0	4	1.5	221	Rcwy12
DAC91262.13A	SAWT	9/19	234	234	5	2.1	0	0.0	2	0.9	7	3.0	227	Rcwy13
DAC91262.A13	SAWT	9/19	264	264	4	1.5	0	0.0	0	0.0	4	1.5	228	Rcwy13
DAC91262.14A	SAWT	9/19	309	309	4	1.3	2	0.6	0	0.0	6	1.9	221	Rcwy14
DAC91262.A14	SAWT	9/19	189	189	2	1.1	0	0.0	3	1.6	5	2.6	221	Rcwy14
TOTAL			1496	1496							31	2.1		
Clearwater Fish Hatchery - Spring Chinook														
Satellite Hatchery Releases														
DAC91291.RED	REDP	10/23	174	174	5	2.9	6	3.4	1	0.6	12	6.9	215	Red R.
DAC91291.RR1	REDP	10/23	526	526	14	2.7	6	1.1	4	0.8	24	4.6	205	Red R.
TOTAL			700	700							36	5.14		
DAC91256.35B	CROTP	10/16	185	185	8	4.3	2	1.1	1	0.5	11	5.9	203	Cro.R.
DAC91256.D35	CROTP	10/16	307	307	10	3.3	5	1.6	3	1.0	18	5.9	209	Cro.R.
TOTAL			492	492							29	5.9		
DAC91296.POW	POWP	10/23	700	700	23	3.3	15	2.1	10	1.4	48	6.9	195	Pow.R.
						11.2		2.6		1.3		15.1		
Pahsimeroi Fish Hatchery - Spring Chinook														
KB91318.PD1	PAHR	3/14	152	152	17		4		2		23		42.3	Pond 1
KB91318.PD2	PAHR	3/14	150	150	16	10.7	4	2.7	3	2.0	23	15.3	43.1	Pond 2

Appendix E. Table 1. 1992 PIT tag interrogations (cont.)

File Name	Rel. Site	Rel. Date	No. Tag.	No. Rel.	LGR No.	LGR %	LGO No.	LGO %	MCN No.	MCN %	TOTAL No.	TOTAL %	Ave. Tray Time days	Comment
							No/% Detected							
Magic Valley Steelhead		Hatchery - Steelhead												
Snake River A's														
DAC92064.M01	LSALR	4/14	100	100	47	47.0	13	13.0	1	1.0	61	61.0	25.4	SnakeRA
DAC92064.M04	LSALR	4/21	100	100	61	61.0	9	9.0	1	1.0	71	71.0	19.3	SnakeRA
DAC92064.M07	LSALR	4/21	100	100	56	56.0	12	12.0	2	2.0	70	70.0	22.4	SnakeRA
TOTAL - Snake River A's			300	300							202	67.3		
Dworshak B's														
DAC92064.M09	SALEF	4/10	100	100	33	33.0	7	7.0	0	0.0	40	40.0	35.7	Dwor B
DAC92064.M11	SALEF	4/10	100	100	47	47.0	8	8.0	0	0.0	55	55.0	34.4	Dwor B
DAC92064.M14	SALEF	4/10	100	100	42	42.0	10	10.0	1	1.0	53	53.0	36.1	Dwor B
TOTAL - Dwor. B's			300	300							148	49.3		
Hagerman National Fish		Hatchery - Steelhead												
Sawtooth Regular A's														
DAC92065.79h	SAWTP	4/10	47	46	26	56.5	3	6.5	0	0.0	29	63.0	34.9	Reg. A
DAC92065.80H	SAWTP	4/10	33	33	10	30.3	3	9.1	1	3.0	14	42.4	30.4	Reg. A
DAC92065.H78	SAWTP	4/10	167	166	68	41.0	9	5.4	0	0.0	77	46.4	30.6	Reg. A
DAC92065.H79	SAWTP	4/10	120	119	51	42.9	9	7.6	2	1.7	62	52.1	31.7	Reg. A
DAC92065.H80	SAWTP	4/13	134	134	60	44.8	6	4.5	2	1.5	68	50.7	30.2	Reg. A
TOTAL - Reg A's			501	498							250	50.2		
Sawtooth Large A's														
DAC92065.H73	SAWTP	4/10	100	99	38	38.4	3	3.0	0	0.0	41	41.4	33.5	LargeA
DAC92065.H74	SAWTP	4/10	100	97	39	40.2	3	3.1	1	1.0	43	44.3	31.4	LargeA
DAC92065.H75	SAWTP	4/10	100	99	44	44.4	7	7.1	2	2.0	53	53.5	37.9	LargeA
DAC92065.H76	SAWTP	4/10	100	96	47	49.0	2	2.1	0	0.0	49	51.0	40.4	LargeA
DAC92065.H77	SAWTP	4/13	101	99	42	42.4	2	2.0	1	1.0	46	46.5	37.8	LargeA
TOTAL - Large A's			501	490							232	47.3		
Acclimation - Regular														
DAC92066.H91	SAWTP	4/10	100	98	33	33.7	7	7.1	1	1.0	41	41.8	39.9	Acc-Reg
DAC92066.H92	SAWTP	4/10	100	98	30	30.6	5	5.1	0	0.0	35	35.7	41.2	Acc-Reg
DAC92066.H93	SAWTP	4/10	100	100	37	37.0	2	2.0	0	0.0	39	39.0	47.0	Acc-Reg
DAC92066.H94	SAWTP	4/10	100	98	22	22.4	3	3.1	0	0.0	25	25.5	44.0	Acc-Reg
DAC92066.H95	SAWTP	4/10	100	97	34	35.1	2	2.1	0	0.0	36	37.1	52.8	Acc-Reg
TOTAL - Acc-Reg.			500	491							176	35.8		

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Appendix E. Table 1. 1992 PIT tag interrogations (cont.)

File Name	Rel. Site	Rel. Date	No. Tag.	No. Rel.	LGR No.	LGR %	LGO No.	LGO %	MCN No.	MCN %	TOTAL No.	TOTAL %	Ave. Trav Time days	Comment
					No/% Detected									
Niagara Springs Fish Hatchery - Steelhead														
Pahsimeroi Release:														
RCD92063.01N	PARS	3/30	100	100	47	47.0	5	5.0	0	0.0	52	52.0	37.7	Pahsim
RCD92063.02N	PARS	3/30	100	100	48	48.0	2	2.0	0	0.0	50	50.0	36.3	Pahsim
RCD92063.03N	PAHS	3/30	100	100	45	45.0	7	7.0	0	0.0	52	52.0	39.0	Pahsim
RCD92063.04N	PARS	3/30	100	100	30	30.0	7	7.0	0	0.0	37	37.0	40.1	Pahsim
RCD92063.05N	PARS	3/30	100	100	53	53.0	8	8.0	1	1.0	62	62.0	38.5	Pahsim
RCD92063.06N	PARS	3/30	100	100	42	42.0	8	8.0	0	0.0	50	50.0	43.6	Pahsim
TOTAL - Pahsim.			600	600							303	50.5		
Hell's Canyon Dam Release:														
RCD92063.12N	HCD	4/18	100	99	40	40.4	3	3.0	2	2.0	45	45.5	28.0	HCDam
RCD92063.13N	HCD	4/18	100	100	37	37.0	6	6.0	0	0.0	43	43.0	32.5	HCDam
RCD92063.14N	HCD	4/18	100	100	49	49.0	7	7.0	1	1.0	57	57.0	35.1	HCDam
TOTAL - HCDam			300	299							145	48.5		

Appendix E. Table 2. Summary of migration year 1992 PIT tag interrogations for Idaho naturally-produced chinook salmon

File Name	No. Tag.	No. Rel.	LGR No.	LGR %	LGO No.	LGO %	MCN No.	MCN %	TOTAL No.	TOTAL %	Ave. Trav Time days	Comment
			No/% Detected									
Bear Valley Cr. Rel:	1042	1042	69	66.0	25	2.4	8	0.8	102	9.8		
Elk Creek Release:	462	462	36	7.8	19	4.1	9	1.9	64	13.9		
Cape Horn Creek Release:	209	209	19	9.1	3	1.4	5	2.4	27	12.9		
Marsh Creek Release:	981	981	67	6.8	19	1.9	11	1.1	97	9.9		
Big Creek Release:	998	998	57	5.7	20	2.0	11	1.1	88	8.8		
Sulphur Creek Release:	210	210	24	11.4	9	4.3	2	1.0	35	16.7		
Chamberlain Creek Release:	338	338	13	3.8	7	2.1	6	1.8	26	7.7		
West Fork Chamb. Cr. Rel:	1057	1057	47	4.4	15	1.4	8	0.8	70	6.6		
Herd Creek Release:	307	307	17	5.5	12	3.9	3	1.0	32	10.4		
Valley Creek Release:	969	969	34	3.5	20	2.1	7	0.7	61	6.3		
East Fork Sal. R. Release:	669	669	33	4.9	16	2.4	15	2.2	64	9.6		
South Fork Sal. R. Release:	1027	1027	81	7.9	32	3.1	11	1.1	124	12.1		
Secesh River Release:	1012	1012	40	4.0	11	1.1	4	0.4	55	5.4		

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Appendix E. Table 2. continued

File Name	Rel. Site	Rel. Date	No. Tag.	No. Rel.	No/% Detected LGR No.	LGR %	LGO No.	LGO %	MCN No.	MCN %	TOTAL No.	TOTAL %	Ave. *Trav* Time days	Comment
Bear Valley Creek Release:														
SA90214.BV1	BEARV	8/02	28	28	4	14.3	3	10.7	0	0.0	7	25.0		
SA90214.BV2	BEARV	8/02	23	23	4	17.4	3	13.0	0	0.0	7	30.4		
SA90215.BV1	BEARV	8/03	87	87	8	9.2	7	8.1	0	0.0	15	17.2		
SA90215.BV2	BEARV	8/03	35	35	3	8.6	3	8.7	1	2.9	7	20.0		
SA90216.BV1	BEARV	8/04	44	44	4	9.1	3	6.8	0	0.0	7	15.9		
SA90216.BV2	BEARV	8/05	93	93	19	20.4	5	5.4	1	1.1	25	26.9		
SA90217.BV1	BEARV	8/05	43	43	2	4.7	0	0.0	0	0.0	2	4.7		
TOTAL - Bear Valley Creek			353	353							70	19.8		
Elk Creek Release:														
SA90217.EC1	ELKC	8/05	103	103	18	17.5	7	6.8	2	1.9	27	26.2		
SA90218.EC1	ELKC	8/06	25	25	1	4.0	0	0.0	0	0.0	1	4.0		
SA90218.EC3	ELKC	8/06	57	57	3	5.3	4	7.0	0	0.0	7	12.3		
SA90219.EC1	ELKC	8/07	63	63	10	15.9	3	4.8	0	0.0	13	20.6		
TOTAL - Elk Creek			248	248							48	19.4		
Cape Horn Creek Release:														
SA90223.CH1	CAPEH	8/12	143	143	22	15.4	7	4.9	1	0.7	30	21.0		
SA90224.CH1	CAPEH	8/12	21	21	3	14.3	2	9.5	0	0.0	5	23.8		
TOTAL - Cape Horn Creek			164	164							35	21.3		
Marsh Creek Release:														
SA90223.MC1	MARSC	8/11	51	51	3	5.9	1	2.0	1	2.0	5	9.8		
SA90223.MC2	MARSC	8/ll	52	52	5	9.6	0	0.0	0	0.0	5	9.6		
SA90223.MC3	MARSC	8/ll	84	84	3	3.6	8	9.5	1	1.2	12	14.3		
SA90224.MC1	MARSC	8/12	26	26	4	15.4	2	7.7	0	0.0	6	23.1		
SA90224.MC2	MARSC	8/12	440	440	35	8.0	9	2.1	5	1.1	49	11.1		
SA90225.MC2	MARSC	8/13	208	208	9	4.3	9	4.3	0	0.0	18	8.7		
TOTAL - Marsh Creek			861	861							95	11.0		

Appendix E. Table 2. continued

File Name	Rel. Site	Rel. Date	No. Tag.	No. Rel.	LGR No.	LGR %	LGO No.	LGO %	MCN No.	MCN %	TOTAL No.	TOTAL %	Ave. Trav Time days	Comment
					No/% Detected									
Big Creek Release:														
SA90234.BC1	BIGC	8/23	221	221	21	9.5	9	4.1	1	0.5	31	14.0		
SA90234.BC2	BIGC	8/23	140	140	9	6.4	3	2.1	0	0.0	12	8.6		
SA90234.BC3	BIGC	8/23	107	107	12	11.2	5	4.7	0	0.0	17	15.9		
SA90235.BC1	BIGC	8/23	121	121	17	14.1	5	4.1	0	0.0	22	18.2		
SA90235.BC2	BIGC	8/23	65	65	1	1.5	0	0.0	0	0.0	1	1.54		
SA90235.BC3	BIGC	8/23	73	73	7	9.6	4	5.5	1	1.4	12	16.4		
TOTAL - Big Creek Release			727	727							95	13.1		
Valley Creek Release:														
SA90220.VC1	VALEC	8/09	89	89	2	2.3	2	2.3	1	1.1	5	5.6		
SA90221.VC1	VALEC	8/09	236	236	11	4.7	2	0.9	1	0.4	14	5.9		
SA90221.VC2	VALEC	8/09	314	314	12	3.8	10	3.2	1	0.3	23	7.3		
SA90222.VC1	VALEC	8/10	160	160	8	5.0	2	1.3	1	0.6	11	6.9		
TOTAL - Valley Cr. Release			799	799							53	6.6		
East Fork Sal. R. Release:														
SA90227.EF2	EFSR	8/16	175	175	9	5.1	2	1.1	0	0.0	11	6.3		
SA90228.EF1	EFSR	8/16	23	23	1	4.4	0	0.0	0	0.0	1	4.4		
SA90228.EF2	EFSR	8/16	27	27	1	3.7	2	7.4	0	0.0	3	11.1		
SA90228.EF3	EFSR	8/16	308	308	7	2.3	10	3.3	6	2.0	23	7.5		
TOTAL - SalREF Release			533	533							38	7.1		
South Fork Sal. R. Release:														
SA90231.SF1	SFSR	8/20	181	181	12	6.6	11	6.1	1	0.6	24	13.3		
SA90231.SF2	SFSR	8/20	331	331	41	12.4	10	3.0	2	0.6	53	16.0		
SA90232.SF1	SFSR	8/20	362	362	27	7.5	13	3.6	2	0.6	42	11.6		
SA90232.SF2	SFSR	8/20	118	118	18	15.3	4	3.4	2	1.7	24	20.3		
TOTAL - SalSF Release			992	992							143	14.4		

Appendix E. Table 2. continued

File Name	Rel. Site	Rel. Date	No. Tag.	No. Rel.	No/% Detected LGR No.	LGR %	LGO No.	LGO %	MCN No.	MCN %	TOTAL No.	TOTAL %	Ave. Trav Time days	Comment
Secesh River Release:														
SA90238.SE1	SECER	8/27	96	96	7	7.3	0	0.0	0	0.0	7	7.3		
SA90238.SE2	SECER	8/26	404	404	25	6.2	9	2.2	1	0.3	35	8.7		
SA90238.SE3	SECER	8/26	186	186	10	5.4	4	2.2	0	0.0	14	7.5		
SA90239.SE1	SECER	8/27	201	201	15	7.5	1	0.5	1	0.5	17	8.5		
SA90239.SE2	SECER	8/27	99	99	12	12.1	5	5.1	0	0.0	17	17.2		
TOTAL - Secesh River Rel.			986	986							90	9.1		

File Name	No. Tag.	No. Rel.	No/% Detected LGR No.	LGR %	LGO No.	LGO %	MCN No.	MCN %	TOTAL No.	TOTAL %	Ave. Trav Time days	Comment
Bear Valley Cr. Rel:	1042	1042	69	66.0	25	2.4	8	0.8	102	9.8		
Elk Creek Release:	462	462	36	7.8	19	4.1	9	1.9	64	13.9		
Cape Horn Creek Release:	209	209	19	9.1	3	1.4	5	2.4	27	12.9		
Marsh Creek Release:	981	981	67	6.8	19	1.9	11	1.1	97	9.9		
Big Creek Release:	998	998	57	5.7	20	2.0	11	1.1	88	8.8		
Sulphur Creek Release:	210	210	24	11.4	9	4.3	2	1.0	35	16.7		
Chamberlain Creek Release:	338	338	13	3.8	7	2.1	6	1.8	26	7.7		

Appendix E. Table 2. continued

File Name	No. Tag.	No. Rel.	LGR No.	LGR %	LGO No.	LGO %	MCN No.	MCN %	TOTAL No.	TOTAL %	Ave. Trav Time days
West Fork Chamb. Cr. Rel:	1057	1057	47	4.4	15	1.4	8	0.8	70	6.6	
Herd Creek Release:	307	307	17	5.5	12	3.9	3	1.0	32	10.4	
Valley Creek Release:	969	969	34	3.5	20	2.1	7	0.7	61	6.3	
East Fork Sal. R. Release:	669	669	33	4.9	16	2.4	15	2.2	64	9.6	
South Fork Sal. R. Release:	1027	1027	81	7.9	32	3.1	11	1.1	124	12.1	
Secesh River Release:	1012	1012	40	4.0	11	1.1	4	0.4	55	5.4	

Submitted by:

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