

FISHERY RESEARCH



EVALUATION OF THE HATCHERY-WILD COMPOSITION OF IDAHO SALMON AND STEELHEAD HARVEST

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Lower Snake River Fish and Wildlife Compensation Plan
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ABSTRACT

Steelhead trout Oncorhynchus mykiss and chinook salmon O. tshawytscha fisheries in Idaho are monitored to assess hatchery contribution, distribution, and return rates. Coded-wire tags (CWT) are retrieved from fish harvested by anglers and harvest rates calculated by month and river section.

During the fall 1990 and spring 1991 steelhead seasons, 18,512 anglers were interviewed and 2,240 adult steelhead examined, which was 12.2% of the total steelhead harvest. We retrieved 123 CWTs from 35 different tag groups. The total estimated harvest for the 1990-91 season was 18,301 hatchery and 27 wild-natural fish, of which an estimated 1,724 were produced by the Lower Snake River Compensation Plan (LSRCP). An additional 935 fish returned to hatchery racks or to off-site release locations. Adult returns were severely reduced by poor survival during both downstream migration of juveniles and upstream migration of adults.

The estimated total return of A-strain adults from 1,195,745 smolts released at Sawtooth Hatchery in 1988 was 3,712 (0.31%), and 76% of the return was harvested. An estimated 1,053 (0.22%) B-strain adults returned from 485,100 smolts released into the East Fork Salmon River in 1987.

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INTRODUCTION

Chinook salmon and steelhead trout are raised in Idaho Department of Fish and Game hatcheries to mitigate for losses caused by the construction of hydroelectric dams. Adults returning to hatcheries in the Salmon River and Clearwater River basins commingle with each other and with wild stocks. In the Snake River, fish destined for Idaho also commingle with adults returning to Oregon and Washington streams.

The main purpose of this project is to determine the composition of the anadromous fish harvest in the Idaho fishery and to estimate the adult harvest contribution from juveniles produced in LSRCP hatcheries. Contribution to the Idaho fishery is one of the measures of performance of LSRCP fish.

Harvest management of steelhead in Idaho is directed toward harvest of hatchery fish and protection of wild and naturally-produced fish. Currently, wild stocks are below escapement goals, and protection is necessary to perpetuate these fish over the long run. Beginning in 1984, all hatchery-produced steelhead smolts released in Idaho rivers and streams had their adipose fins excised before release so returning adults could be selectively harvested.

In the fall 1990 and spring 1991 seasons, all age groups of hatchery steelhead returning to Idaho were marked by adipose fin clips, and regulations stated "only steelhead with a missing adipose fin (as evidenced by a healed scar) may be kept." Consequently, the harvest of any wild (unmarked) steelhead was illegal. Table 1 lists the fall and spring regulations.

Representative groups of steelhead are marked with CWT prior to release. Anglers are interviewed and fish snouts are retrieved in all major harvest areas to recover these tags from the fishery. Information is collected and used to estimate timing, straying, exploitation, harvest distribution, and relative abundance of wild and hatchery stocks. Total harvested numbers are estimated by a statewide harvest survey, and the harvest contribution for each hatchery program is derived from tag recoveries.

Harvest opportunity was not allowed for chinook salmon in Idaho during 1991, so this report pertains only to steelhead.

OBJECTIVES

The first objective is to identify in the Idaho sport fishery the number and proportion of the harvest that is produced by LSRCP hatcheries.

The second objective is to determine the spawning escapement of LSRCP stocks in Idaho.

Table 1. Steelhead season dates, bag limits and special restrictions for the Clearwater, Salmon and Snake rivers, 1990-91.

<u>River and Sections</u>	<u>Fall Season Dates</u>	<u>Bag Limits^a</u>	<u>Special Restrictions</u>
Clearwater River (03) ^b	Sept 1 - Dec 31	1, 1,	
Clearwater River (03 - 07) ^{cd}	Oct 15 - Dec 31	2, 3,	
Salmon River (10 - 18)	Sept 1 - Dec 31	1, 1,	Only steelhead 31" or under with a healed adipose fin clip may be kept.
Salmon River (19 - 20)	Sept 1 - Dec 31	1, 1,	
Snake River (01)	Sept 1 - Dec 31	1, 1,	
<u>River and Sections</u>	<u>Spring Season Dates</u>	<u>Bag Limits^a</u>	<u>Special Restrictions</u>
Clearwater River (03) ^b	Jan 1 - Apr 30	1, 1, 2	
Clearwater River (03 - 07) ^c	Jan 1 - Apr 30	2, 4, 10	
Salmon River (10 - 14)	Jan 1 - Mar 31	1, 1, 2	
Salmon River (15 - 18)	Jan 1 - Apr 30	1, 1, 2	Only steelhead 31" or under with a healed adipose fin clip may be kept.
Salmon River (19 - 20)	Jan 1 - Apr 30	1, 1, 2	
Snake River (01)	Jan 1 - Apr 30	1, 1, 2	

^a Bag limits denotes daily, possession and season totals.

^b Section 03 includes only that portion from its mouth upstream to Memorial Bridge of Highway 12 at Lewiston.

^c Section 03 includes that portion from Memorial Bridge upstream to mouth of Clear Creek.

D Catch and release fishery from Sept. 1 through Oct. 14.

DESCRIPTION OF STUDY AREA

There are three major river systems in Idaho where steelhead are harvested: the Snake, Clearwater, and Salmon rivers (Figure 1; Table 2). All of Idaho's steelhead harvest areas are included in this study, except the upper Snake (section 02) and Boise rivers (section 28). These two sections are excluded because no steelhead produced by the LSRCP are harvested there. Steelhead are blocked from reaching the Boise River by dams on the Snake River. However, a portion of the fish returning to Hells Canyon Dam are transplanted and released there for harvest through Idaho Power Company's mitigation program.

METHODS

Creel Survey

Angler interviews were conducted at check stations and from jet boats and roving vehicles. Angler interview schedules were designed to observe maximum numbers of harvested fish. Techniques were tailored to sportsman access and harvest methods. For example, on the Clearwater River, a major portion of the fall and winter harvest is taken by boat fishermen, so survey efforts concentrate on interviewing boat anglers. In late spring, the density of boats in a small area is so high it is prohibitive to sample anglers on the water; therefore, survey efforts are divided between major boat ramps. In the roadless area of the Salmon River, almost all of the angler access is by boat, but most of the fishing effort is from shore. Anglers are contacted by census clerks in jet boats or at check stations located at major egress points.

During angler interviews, data are collected on the number of anglers and hours fished, number of fish kept or released, wild or hatchery origin of fish kept or released, fork length of fish kept, and date and river section where fish were caught. Observed fish are inspected for tags and fin clips. Snouts are removed from all fish with abnormalities of their left ventral fins for CWT retrieval, except when anglers desire to keep their fish intact.

Water conditions during the fall season are usually conducive to harvest and the interview schedule can be followed. During the spring season, high turbid flows can reduce harvest to near zero. Anglers are not interviewed during periods of very low harvest.

Interview Schedule

Lower Snake River (01) - by jet boat with Washington Department of Wildlife personnel and at boat ramps on alternating weekends for ten weekends during the fall and six weekends during the spring season.

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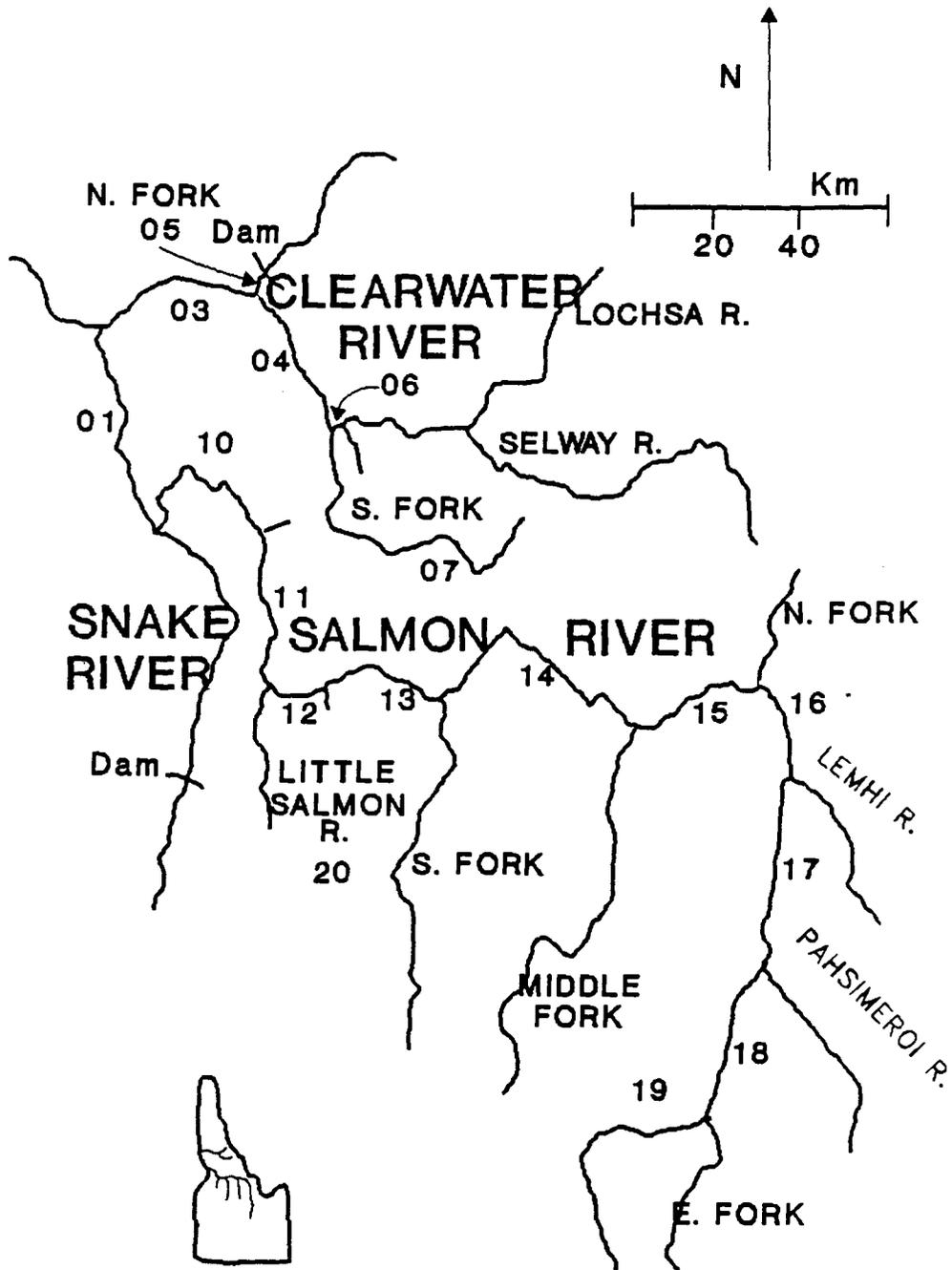


Figure 1. Map of steelhead harvest areas in Idaho.

Table 2. River location codes for Idaho's anadromous fisheries.

<u>River Section</u>	<u>Location Code</u>
Snake River, below Salmon River	01
Snake River, above Salmon River	02
Clearwater River, below Orofino Bridge	03
Clearwater River, above Orofino Bridge	04
North Fork Clearwater River	05
Middle Fork Clearwater River	06
South Fork Clearwater River	07
Selway River	08
Lochsa River	09
Salmon River, below Whitebird Creek	10
Salmon River, Whitebird Creek to Little Salmon	11
Salmon River, Little Salmon to Vinegar Creek	12
Salmon River, Vinegar Creek to South Fork	13
Salmon River, South Fork to Middle Fork	14
Salmon River, Middle Fork to North Fork	15
Salmon River, North Fork to Lemhi River	16
Salmon River, Lemhi River to Pahsimeroi River	17
Salmon River, Pahsimeroi River to East Fork	18
Salmon River, above East Fork	19
Little Salmon River	20
South Fork Salmon River	21
Middle Fork Salmon River	22
North Fork Salmon River	23
Lemhi River	24
Pahsimeroi River	25
East Fork Salmon River	26
Snake River, Oxbow	27
Boise River	28

Lower Clearwater and North Fork Clearwater rivers (03 and 05) - by roving vehicle one day each week and by jet boat three days each week for 15 weeks in the fall and 10 weeks in the spring season. Interview from boat ramps for the last six weeks of the spring season.

Upper Clearwater, Middle Fork, and South Fork Clearwater River (04, 06, and 07) - by roving vehicle on the Upper and Middle Fork Clearwater in the fall and on all three rivers in the spring, weekends, for eight weeks in the fall and 10 weeks in the spring.

Salmon River (10) - by jet boat six weekends in the fall and five weekends in the spring season.

Salmon River (11) - by roving vehicle two weekdays and two weekend days for 10 weeks in the fall and eight weeks in the spring season.

Salmon River (12 and 13) - by a check station at the old lumber mill site near Riggins for 10 weekends in the fall and eight weekends in the spring season.

Salmon River (14 and 15) - by a check station near North Fork for 10 weekends in the fall and eight weekends in the spring season.

Salmon River (16) - by roving vehicle for six weekends in the fall and six weekends in the spring season.

Salmon River (17) - by roving vehicle for six weekends in the fall and six weekends in the spring season.

Salmon River (18) - by roving vehicle for six weekends in the spring season.

Salmon River (19) - by roving vehicle for six weekends in the spring season.

Salmon River (20) - by roving vehicle for six weekends in the spring season.

Data Analysis

Harvest estimates for each river section were obtained from statewide telephone survey results (McArthur 1992). Beginning with the fall 1990 season, that portion of the Clearwater River up to the Memorial Bridge of Highway 12 at Lewiston was designated river section 03 during the September 1 to October 15 harvest period. Previously, harvest from this section of the Clearwater River had been included with river section 01 (Ball 1992).

The number of fish checked for marks from each river section, divided by the harvest estimate, yields the sampling rate for each river section by month. Harvested fish that were not seen during the interviews were not included when expressing the proportion of the estimated harvest that was marked.

During angler interviews, hatchery-wild proportions were recorded for fish kept and for total catch, including released fish when their origin could be determined. The harvest of hatchery fish is the product of the hatchery proportion observed in anglers' creels and the estimated harvest from statewide surveys by month. Seasonal estimates of reported hatchery fish harvest are the summation of monthly estimates. Hatchery harvest estimates for months when harvest was low and no fish were checked were calculated using the hatchery proportion calculated from the last month that data were available. These methods were applied during winter when fish movement was minimal and the proportion of hatchery fish in the harvest was constant. Harvest estimates of various CWT groups were calculated by dividing the number of tags recovered by the sampling rate expressed as a decimal and then rounded to whole numbers. Tag group harvest rates were calculated by dividing the estimated harvest of the group by the release group size. Harvest estimates for unmarked groups were calculated using harvest rates from representative mark groups or companion groups.

Hatchery returns were classified by strain (A or B) and ocean-age using length frequencies of previous known-age CWT returns. Marked returns to hatchery racks were subtracted from total returns by strain and ocean-age. Total harvest of unmarked groups was assumed to parallel the performance of unmarked hatchery rack returns. Where more than one unmarked group returned to a release site, the estimates of harvest and hatchery returns were calculated on the total of the unmarked fish and assumed to apply equally to each group.

Total returns of marked groups are the summation of harvest estimates and hatchery rack returns. However, in 1990-91, returns of some marked groups were insufficient to produce viable estimates. For Sawtooth and the East Fork releases, the average exploitation rate from all marked returns from the previous two years was assumed to approximate the current returns. Returns from Shoup Bridge and North Fork releases were estimated from returns of marked releases from Niagara Springs Hatchery fish released at Shoup Bridge. Exploitation was assumed to be the same for all groups. One-ocean returns from Little Salmon, Slate Creek and Hammer Creek releases were calculated from tag group 10/41/42 released in the Little Salmon River. Two-ocean returns to the Little Salmon River, Slate Creek, and Hammer Creek were calculated from tag group 10/40/49 also released in the Little Salmon River. Yankee Fork returns were assumed to be synonymous with Sawtooth returns from each respective age group.

Exploitation rates are the harvest estimates divided by the sum of the harvest estimates and the number of fish that returned to the hatchery. No attempts were made to include mortality from causes other than angler harvest.

RESULTS

During the fall 1990 and spring 1991 seasons, we interviewed 18,512 anglers that had harvested 2,399 hatchery and 2 wild fish (Tables 3-17). We physically examined 2,240 hatchery fish for marks and removed 174 snouts from fish with clipped left ventral fins for retrieval of CWT (Table 18).

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Table 3. Steelhead fishery interview data (unexpanded) from lower Snake River (01), September 1990 - January 1991.

<u>Dates</u>	<u>No. Anglers</u>	<u>Total Hours Fished</u>	<u>Steelhead Hatchery</u>	<u>Kept Wild</u>	<u>Steelhead Hatchery</u>	<u>Released Wild</u>	<u>Total</u>	<u>Hours/ Fish</u>	<u>Percent Hatchery</u>
September	132	531	7	0	0	7	14	38	50
October	440	1,608	22	0	2	7	31	52	77
November	469	1,766	36	0	8	13	57	31	77
December	63	233	10	0	1	1	12	19	92
Fall total	1,104	4,138	75	0	11	28	114		
Average								36	75
January	4	10	1	0	0	0	1	10	100
Spring total	4	10	1	0	0	0	1		
Average								10	100
Total	1,108	4,148	76	0	11	28	115		
Average								36	76

Table 4. Steelhead fishery interview data (unexpanded) from lower Clearwater River (03) and North Fork Clearwater River (05), September 1990 - April 1991.

<u>Dates</u>	<u>No. Anglers</u>	<u>Total Hours Fished</u>	<u>Steelhead Hatchery</u>	<u>Kept Wild</u>	<u>Steelhead Hatchery</u>	<u>Released Wild</u>	<u>Total</u>	<u>Hours/ Fish</u>	<u>Percent Hatchery</u>
September	161	641	9	0	8	9	26	25	65
October	1,171	5,102	192	0	15	43	250	20	83
November	1,884	8,088	266	0	8,	69	343	24	80
December	1,064	3,616	274	0	20	50	344	11	85
Fall total	4,280	17,447	741	0	51	171	963		
Average								18	82
January	1,277	4,718	203	0	33	33	269	18	88
February	1,879	8,264	197	0	17	32	246	34	87
March	2,121	12,110	333	0	54	70	457	26	85
April	73	419	9	0	0	2	11	38	82
Spring total	5,350	25,511	742	0	104	137	983		
Average								26	86
Total	9,630	42,958	1,483	0	155	308	1,946		
Average								22	84

Table 5. Steelhead fishery interview data (unexpanded) from upper Clearwater River (04) and Middle Fork Clearwater River (06), October 1990 - April 1991.

<u>Dates</u>	<u>No. Anglers</u>	<u>Total Hours Fished</u>	<u>Steelhead Hatchery</u>	<u>Kept Wild</u>	<u>Steelhead Hatchery</u>	<u>Released Wild</u>	<u>Total</u>	<u>Hours/Fish</u>	<u>Percent Hatchery</u>
October	41	198	8	0	0	2	10	20	80
November	147	808	20	0	5	10	35	23	71
December	29	119	1	0	0	0	1	119	100
Fall total	217	1,125	29	0	5	12	46		
Average								24	74
February	56	202	5	0	0	3	8	25	63
March	482	2,070	69	2	16	29	116	18	73
April	18	103	0	0	0	1	1	103	0
Spring total	556	2,375	74	2	16	33	125		
Average								19	72
Total	773	3,500	103	2	21	45	171		
Average								20	73

Table 6. Steelhead fishery interview data (unexpanded) from South Fork Clearwater River (07), November 1990 - April 1991.

<u>Dates</u>	<u>No. Anglers</u>	<u>Total Hours Fished</u>	<u>Steelhead Hatchery</u>	<u>Kept Wild</u>	<u>Steelhead Hatchery</u>	<u>Released Wild</u>	<u>Total</u>	<u>Hours/ Fish</u>	<u>Percent Hatchery</u>
November	3	14	0	0	0	0	0	0	0
Fall total	3	14	0	0	0	0	0		
Average								0	0
February	18	45	3	0	0	0	3	15	100
March	379	1,246	36	0	1	15	52	24	71
April	11	29	0	0	0	0	0	0	0
Spring total	408	1,320	39	0	1	15	55		
Average								24	73
Total	411	1,334	39	0	1	15	55		
Average								24	73

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Table 8. Steelhead fishery interview data (unexpanded) from Salmon River Section 11, October 1990 - March 1991.

<u>Dates</u>	<u>No. Anglers</u>	<u>Total Hours Fished</u>	<u>Steelhead Hatchery</u>	<u>Kept Wild</u>	<u>Steelhead Hatchery</u>	<u>Released Wild</u>	<u>Total</u>	<u>Hours/ Fish</u>	<u>Percent Hatchery</u>
October	263	1,169	19	0	4	30	53	22	43
November	324	1,176	40	0	7	27	74	16	64
December	23	35	1	0	3	3	7	5	57
Fall total	610	2,380	60	0	14	60	134		
Average								18	55
February	94	375	6	0	1	3	10	38	70
March	21	50	0	0	0	0	0	0	0
Spring total	115	425	6	0	1	3	10		
Average								43	70
Total	725	2,805	66	0	15	63	144		
Average								19	56

Table 9. Steelhead fishery interview data (unexpanded) from Salmon River Section 12, October 1990 - March 1991.

<u>Dates</u>	<u>No. Anglers</u>	<u>Total Hours Fished</u>	<u>Steelhead Hatchery</u>	<u>Kept Wild</u>	<u>Steelhead Hatchery</u>	<u>Released Wild</u>	<u>Total</u>	<u>Hours/Fish</u>	<u>Percent Hatchery</u>
October	117	871	13	0	7	13	33	26	61
November	191	1,446	34	0	11	47	92	16	49
Fall total	308	2,317	47	0	18	60	125		
Average								19	52
March	244	1,079	4	0	5	17	26	42	35
Spring total	244	1,079	4	0	5	17	26		
Average								42	35
Total	552	3,396	51	0	23	77	151		
Average								22	49

Table 10. Steelhead fishery interview data (unexpanded) from Salmon River Section 13, October 1990 - March 1991.

<u>Dates</u>	<u>No. Anglers</u>	<u>Total Hours Fished</u>	<u>Steelhead Hatchery</u>	<u>Kept Wild</u>	<u>Steelhead Hatchery</u>	<u>Released Wild</u>	<u>Total</u>	<u>Hours/ Fish</u>	<u>Percent Hatchery</u>
October	81	945	8	0	0	22	30	32	27
November	70	926	7	0	2	27	36	26	25
Fall total	151	1,871	15	0	2	49	66		
Average								28	26
March	74	1,009	9	0	0	51	60	17	15
Spring total	74	1,009	9	0	0	51	60		
Average								17	15
Total	225	2,880	24	0	2	100	126		
Average								23	21

Table 11. Steelhead fishery interview data (unexpanded) from Salmon River Section 14, October 1990 - March 1991.

<u>Dates</u>	<u>No. Anglers</u>	<u>Total Hours Fished</u>	<u>Steelhead Hatchery</u>	<u>Kept Wild</u>	<u>Steelhead Hatchery</u>	<u>Released Wild</u>	<u>Total</u>	<u>Hours/ Fish</u>	<u>Percent Hatchery</u>
October	86	1,713	15	0	1	37	53	32	30
November	189	3,414	40	0	11	96	147	23	35
Fall total	275	5,127	55	0	12	133	200		
Average								26	34
February	1	8	0	0	0	0	0	0	0
March	213	3,500	20	0	10	171	201	17	15
Spring total	214	3,508	20	0	10	171	201		
Average								17	15
Total	489	8,635	75	0	22	304	401		
Average								22	24

Table 12. Steelhead fishery interview data (unexpanded) from Salmon River Section 15, October 1990 - April 1991.

<u>Dates</u>	<u>No. Anglers</u>	<u>Total Hours Fished</u>	<u>Steelhead Hatchery</u>	<u>Kept Wild</u>	<u>Steelhead Hatchery</u>	<u>Released Wild</u>	<u>Total</u>	<u>Hours/ Fish</u>	<u>Percent Hatchery</u>
October	301	2,984	17	0	6	28	51	59	45
November	436	4,645	55	0	48	44	147	32	70
Fall total	737	7,629	72	0	54	72	198		
Average								39	64
February	1	1	0	0	0	0	0	0	0
March	1,328	12,521	205	0	459	244	908	14	73
April	62	486	6	0	15	2	23	21	91
Spring total	1,391	13,008	211	0	474	246	931		
Average								14	74
Total	2,128	20,637	283	0	528	318	1,129		
Average								18	72

Table 13. Steelhead fishery interview data (unexpanded) from Salmon River Section 16, October 1990 - April 1991.

<u>Dates</u>	<u>No. Anglers</u>	<u>Total Hours Fished</u>	<u>Steelhead Hatchery</u>	<u>Kept Wild</u>	<u>Steelhead Hatchery</u>	<u>Released Wild</u>	<u>Total</u>	<u>Hours/ Fish</u>	<u>Percent Hatchery</u>
October	41	149	3	0	0	1	4	37	75
November	109	318	11	0	3	7	21	15	67
Fall total	150	467	14	0	3	8	25		
Average								19	68
February	17	45	0	0	0	0	0	0	0
March	291	1,014	10	0	3	8	21	48	62
April	98	489	2	0	0	3	5	98	40
Spring total	406	1,548	12	0	3	11	26		
Average								60	58
Total	556	2,015	26	0	6	19	51		
Average								40	63

Table 14. Steelhead fishery interview data (unexpanded) from Salmon River Section 17, October 1990 - April 1991.

<u>Dates</u>	<u>No. Anglers</u>	<u>Total Hours Fished</u>	<u>Steelhead Hatchery</u>	<u>Kept Wild</u>	<u>Steelhead Hatchery</u>	<u>Released Wild</u>	<u>Total</u>	<u>Hours/ Fish</u>	<u>Percent Hatchery</u>
October	6	25	0	0	0	0	0	0	0
November	22	31	0	0	0	0	0	0	0
Fall total	28	56	0	0	0	0	0		
Average								0	0
February	15	37	1	0	0	1	2	19	50
March	237	872	7	0	2	0	9	97	100
April	222	1,341	21	0	23	13	57	24	77
Spring total	474	2,250	29	0	25	14	68		
Average								33	79
Total	502	2,306	29	0	25	14	68		
Average								34	79

Table 15. Steelhead fishery interview data (unexpanded) from Salmon River Section 18, March - April 1991.

<u>Dates</u>	<u>No. Anglers</u>	<u>Total Hours Fished</u>	<u>Steelhead Hatchery</u>	<u>Kept Wild</u>	<u>Steelhead Hatchery</u>	<u>Released Wild</u>	<u>Total</u>	<u>Hours/ Fish</u>	<u>Percent Hatchery</u>
March	69	272	1	0	3	0	4	68	100
April	205	1,380	21	0	68	6	95	15	94
Spring total	274	1,652	22	0	71	6	99		
Average								17	94

Table 16. Steelhead fishery interview data (unexpanded) from Salmon River Section 19, March - April 1991.

<u>Dates</u>	<u>No. Anglers</u>	<u>Total Hours Fished</u>	<u>Steelhead Hatchery</u>	<u>Kept Wild</u>	<u>Steelhead Hatchery</u>	<u>Released Wild</u>	<u>Total</u>	<u>Hours/ Fish</u>	<u>Percent Hatchery</u>
March	8	22	0	0	0	0	0	0	0
April	271	1,104	16	0	45	10	71	16	86
Spring total	279	1,126	16	0	45	10	71		
Average								16	86

Table 17. Steelhead fishery interview data (unexpanded) from Little Salmon River, Section 20, February - April 1991.

<u>Dates</u>	<u>No. Anglers</u>	<u>Total Hours Fished</u>	<u>Steelhead Hatchery</u>	<u>Kept Wild</u>	<u>Steelhead Hatchery</u>	<u>Released Wild</u>	<u>Total</u>	<u>Hours/ Fish</u>	<u>Percent Hatchery</u>
February	1	3	0	0	0	0	0	0	0
March	298	970	36	0	19	1	56	17	98
April	201	685	33	0	34	4	71	10	94
Spring total	500	1,658	69	0	53	5	127		
Average								13	96

Table 18. Proportion of estimated harvest by river section that was examined for marks, 1990-91.

River Section	No. Fish Checked	Estimated Harvest ^a	Sample Rate %
01	73	968	7.
03 & 05	1,413	11,392	12.
04 & 06	102	1,270	8.
07	39	311	12.
10	27	521	5.
11	60	506	11.
12	48	200	24.
13	21	162	13.
14	70	626	11.
15	265	1,173	22.
16	20	312	6.
17	26	210	12.
18	7	183	3.
19	14	320	4.
20	55	174	31.
Total	2,240	18,328	
Average			12.

2

^aData from statewide telephone survey (McArthur 1992).

The composition of the hatchery steelhead harvest by river section and season is compiled in Table 19. All river sections are included except 02 and 28 (Table 2). Total harvest for river sections listed was 18,328 steelhead, of which an estimated 27 fish were of wild/natural origin and were illegally possessed.

From anglers' creels, we recovered 123 CWT. The overall proportion of tags recovered from the number of fish checked for marks was 5.5% (Table 18). CWT were recovered from 35 mark groups. The number of tags recovered, the estimated harvest of tag code groups by month and river section, and the total estimated harvest of tag code groups for the fall and spring seasons are listed in Appendix A. Of the 35 tag groups that yielded CWT, 25 were from releases in Idaho (Appendices A, B, and C). There were 66 additional CWT from 19 tag groups that returned to hatchery racks, but were not recovered from the fishery.

CWT were also recovered from eight Washington tag groups and two Oregon tag groups. Five Washington tag groups were released from Lyons Ferry Hatchery, two from the Touchet River, and one from the Tucannon River. One Oregon tag group was released at Little Sheep Creek and the other from Wallowa Hatchery (Appendices A and D).

Estimates of total returns of LSRCP-reared fish are summarized in Table 20. All Idaho returns from the LSRCP program that returned in 1990-91 were from releases in the Salmon River drainage. However, they were also recovered from the fishery in the Snake and Clearwater rivers. The total estimated return of adult steelhead to Idaho in 1990-91 from the LSRCP program, which includes harvest by Idaho anglers, hatchery returns, and off-site escapement was 2,659. Contribution to Idaho's total hatchery steelhead harvest (except sections 02 and 28) in 1990-91 was 1,724.

Adult steelhead returning to Sawtooth Hatchery and the Yankee Fork Salmon River were exploited at 77%. East Fork Salmon River returns were exploited at 57%. In the Little Salmon River, and for off-site releases at Deer Creek, French Creek, and Hammer Creek, exploitation is not quantified, but is assumed to be 50% (Table 20).

DISCUSSION

The number of adult steelhead that passed McNary Dam on the Columbia River in 1990 was the lowest in the last eight years (Table 21). Of the 95,100 fish that passed McNary Dam, 34.3% were unaccounted for at Priest Rapids and Ice Harbor dams. The 54,700 adults that passed Ice Harbor Dam were only 36.2% of the previous year's numbers.

Table 19. Estimated number of hatchery steelhead harvested in the lower Snake, Clearwater and Salmon rivers during the 1990-91 seasons.

River Section	Fall Season - 1990			Spring Season - 1991			Total Harvest
	Estimated	Percent	No.	Estimated	Percent	No.	Total Harvest
			Hatchery	Harvest ^a	Hatchery	Hatchery	Hatchery
Snake 01	754	100	754	214	100	214	968
<u>Clearwater R.</u>							
03 & 05	6,7	100	6,743	4,649	100	4,649	11,392
04 & 06	239	100	239	1,031	97	1,000	1,243
07	0	--	0	311	100	311	311
Clwtr. Total	6,982		6,982	5,991		5,964	12,946
Average		100			99.5		
<u>Salmon River</u>							
10	414	100	414	107	0	107 ^b	521
11	331	100	331	175	100	175	506
12	83	100	83	117	100	117	200
13	74	100	74	88	100	88	162
14	422	100	422	204	100	204	626
15	405	100	405	768	100	768	1,173
16	147	100	147	165	100	165	312
17	74	0	74 ^b	136	100	136	210
18	27	--	27 ^b	146	100	146	183

statewide surveys.

^bAssumed to be of hatchery origin.

Table 20. Summary of 1990-91 harvest estimates and hatchery returns of steelhead produced by LSRCP hatcheries.

Release Year	Strain and Ocean-Aae	No. of Fish Released	Release Site	Hatchery Rearing	Marks	Estimated Number of Fish		
						Harvested	Hatchery Return'	Total
1989	A-I	14,718	Sawtooth	HNFH ^b	CWT 10/41/38	4	0	4
1989	A-I	14,584	Sawtooth	HNFH ^b	CWT 10/41/39	0	0	0
1989	A-I	16,914	Sawtooth	HNFH	CWT 10/41/40	5	1	6
1989	A-I	590,335	Sawtooth	HNFH	None	288	86	374
1989	A-I	2,838	Sawtooth	MVSH'	PIT	1	0	1
1989	A-I	854,462	Sawtooth	MVSH	None	421	126	547
1989	A-I	104,400	Yankee Fork	MVSH	None	80	24	104
1989	A-I	3,058	Little Salmon R.	MVSH	PIT	1	1	2
1989	A-I	15,209	Little Salmon R.	MVSH	CWT 10/41/41	0	0	0
1989	A-I	15,154	Little Salmon R.	MVSH	CWT 10/41/42	3	3	6
1989	A-I	15,927	Little Salmon R.	MUSH	CWT 10/41/43	0	0	0
1989	A-I	401,052	Little Salmon R.	MUSH	None	79	79	158
1989	A-I	300,600	Slate Creek	MVSH	None	60	60	120
1989	A-I	136,000	Hammer Creek	MVSH	None	27	27	54
	Subtotal	2,485,251				969	407	1,376
1988	A-II	51,925	Sawtooth	HNFH	CWT 10/29/39	10	0	10
1988	A-II	1,143,820	Sawtooth	HNFH	None	121	36	157
1988	A-II	176,000	Yankee Fork	MVSH	None	11	3	14
1988	A-II	147,500	Shoup Bridge	MUSH	None	74	77	151
1988	A-II	253,100	North Fork	MVSH	None	127	132	259
1988	A-II	162,800	Panther Creek	MUSH	None	82	86	168
1988	A-II	100,000	French Creek	MVSH	None	8	8	16
1988	A-II	52,300	Little Salmon R.	MVSH	CWT 10/40/49	4	4	8
1988	A-II	648,952	Little Salmon R.	MUSH	None	50	50	100
1988	A-II	50,050	Slate Creek	HNFH	CWT 10/40/50	0	0	0
1988	A-II	675	Slate Creek	HNFH	None	0	0	0
1988	A-II	346,100	Slate Creek	MUSH	None	26	26	52

Table 20. Continued.

Release Year	Strain and Ocean-Age	No. of Fish Released Release Site		Hatchery Rearing	Marks	Estimated Number of Fish		
						Harvested	Hatchery Return'	Total
1988	A-II	87,200	Hammer Creek	MVSH	None	7	7	14
	Subtotal	3,220,422				520	429	949
1989	B-I	15,624	E. Fk. Salmon	MVSH	CWT 10/41/44	3	2	5
1989	B-I	14,126	R.	MVSH	CWT 10/41/45	1	1	2
1989	B-I	14,314	R.	MVSH	CWT 10/41/46	1	1	2
1989	B-I	2,930	R.	MVSH	PIT	0	0	0
1989	8-I	306,306	R.	MVSH	None	19	14	33
1989	B-I	14,939	R.	HNFH	CWT 10/41/32	0	0	0
1989	B-I	14,911	R.	HNFH	CWT 10/41/33	0	0	0
1989	B-I	13,719	R.	HNFH	CWT 10/41/34	1	1	2
1989	B-I	393,007	E. Fk. Salmon	HNFH	None	24	18	42
	Subtotal	789,876				49	37	86
1988	B-II	51,732	R.	HNFH	CWT 10/29/38	6	2	8
1988	B-II	251,825	E. Fk. Salmon	HNFH	None	180	60	240
	Subtotal	303,557				186	62	248
1987	B-III	24,150	E. Fk. Salmon R.	HNFH	CWT 10/29/49	0	0	0
1987	B-III	460,919	E. Fk. Salmon R.	HNFH	None	0	0	0
1987	B-III	1,721	Slate Creek	HNFH	None	0	0	0
1987	B-III	48,019	Slate Creek	HNFH	CWT 10/29/26	0	0	0
	Subtotal	534,809				0	0	0

Includes off-site escapement.

° HNFH = Hagerman National Steelhead Hatchery.

MVSH = Magic Valley Steelhead Hatchery.

Table 21. Difference between the number of steelhead passing McNary Dam that can be accounted for upriver at Ice Harbor and Priest Rapids dams, 1983-90^a.

Year	No. of Fish (000's)				Difference
	McNary Dam	Ice Harbor Dam	Priest Rapids Dam	Ice Harbor + Priest Rapids Total	
1983	125.2	88.5	31.1	119.6	5.6 (4.5%
1984	135.5	94.0	26.0	120.0	15.5 (11.4%
1985	188.2	128.8	34.5	163.3	24.9 (13.2%
1986	193.5	144.3	22.4	166.7	26.8 (13.9%
1987	148.8	74.5	14.0	88.5	60.3 (40.5%
1988	151.8	99.7	10.2	109.9	41.9 (27.6%
1989	170.5	151.1	10.7	161.8	8.7 (5.1%
1990	95.1	54.7	7.8	62.5	32.6 (34.3%

^aTotals from Army Corps of Engineers annual fish passage reports.

Harvest of Sawtooth Hatchery Releases

Returns of steelhead released from Sawtooth Hatchery in 1988 are now complete. From a total release of 1,195,745 smolts, I estimated a return of 3,545 adults after one-ocean year and 167 after two-ocean years. The total return of 3,712 was 0.31% of the number released, and 76% of the adult returns were harvested (Ball 1992; Table 20). The low rate of return was primarily a function of low flows during outmigration and also poor upstream survival (Ball 1992)

Adult returns from the 1989 smolt releases have returned after their first-ocean year. From 1,493,851 smolts released, 932 (0.06%) returned to the fishery and Sawtooth Hatchery (Table 20). These returns were impacted by poor migration conditions during outmigration and while returning as adults.

Harvest of East Fork Salmon River Releases

Adult returns from 485,100 B-strain smolts released in 1987 were reported by Ball (1992). No additional fish returned after three-ocean years so the total return is 1,053 adults (0.22%).

From 303,564 smolts released in 1988, we estimated that 288 returned after one-ocean year and 248 returned after two-ocean years (Ball 1992; Table 20). The total return to date is 536 (0.18%) adults.

There were 789,876 smolts released into the East Fork in 1989, and we estimated that 86 returned after one-ocean year.

Harvest of Little Salmon River Releases

Adult returns from 701,300 A-strain smolts released in 1988 are now complete. We estimated that 1,770 returned after one-ocean year and 108 after two-ocean years. The total return of 1,878 (0.27%) includes an estimated 50% escapement past the fishery.

From the 1989 release of 450,400 smolts, we estimated that 166 adults returned after one-ocean year, of which 50% were harvested and the remainder escaped.

Harvest of Slate Creek Releases

There were no three-ocean recoveries from 1987 releases of B-strain fish into Slate Creek. The only recoveries from the fishery for these marked releases

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were after two-ocean years (Ball 1992). Larger numbers of marked fish will have to be released to facilitate harvest estimates.

From 396,825 A-strain smolts released into Slate Creek in 1988, an estimated 588 adults returned after one-ocean year and 52 after two-ocean years. The total return of 640 adults was 0.16%.

Off-site Releases

Off-site releases (smolt releases into the river or in tributaries without means or attempts to collect spawning adults) is a technique employed to distribute the harvest and put more hatchery fish into anglers' creels. Lower Salmon River harvest areas are corridors for all fish destined upriver, but are unable to sustain a viable fishery after upriver fish have passed.

Releases into Slate Creek and Hammer Creek during 1989 did not contain any CWTs, so harvest performance was not ascertained. Adult returns were estimated from the performance of Little Salmon River marked groups. In 1988, releases into Yankee Fork Salmon River, Panther Creek, French Creek and near the mouth of the North Fork were also without representative mark groups. Adult returns were estimated from marked groups released nearby.

In 1988, the first marked group for in-river release evaluation was released at Shoup Bridge, about eight kilometers upstream of the city of Salmon. There were 37,900 CWT fish released (10/28/19 and 10/29/27). After two-ocean years, an estimated 46 fish were harvested - 27 in 1989-1990 and 19 in 1990-1991 (Ball 1992; Appendix A). The return rate for this group (0.12% without any estimates for escapement) is comparable to other groups of A-strain fish released the same year. The harvest distribution was also comparable to returns from Pahasimeroi Hatchery releases. Half of the estimated harvest was taken from section 15; one fish from this release group was trapped at the Pahasimeroi Hatchery in 1990 (Ball 1992).

Although no marked fish were included in the in-river release at North Fork, there has been a notable increase in both effort and harvest at this release site and in the downstream vicinity. Harvest has continued about three weeks later than it did before releases were initiated at this site. The apparent success here is probably due to the large, deep pool that begins just upstream of the release site and extends about two kilometers downstream.

Sources of Error

The primary sources of error involved in the harvest estimates were discussed by Ball (1986), and the quality control of adipose clipping was discussed by Ball (1989).

Left ventral fin clips, which are used to identify the presence of CWT, regenerate but leave the fin deformed. Since there is a high proportion of hatchery fish with deformed fins from their life in the hatchery, we attempt to take snouts from all fish with deformed left ventral fins. Although we take additional snouts with these methods, we should not be missing very many CWT. Spot checks at hatcheries with portable coded-wire detectors confirm that our methods are detecting greater than 98% of the CWT.

The number of marked fish in each release group and the number of groups released each depends on many factors, but generally are adjusted to produce adequate adult returns under average conditions. Several consecutive low water years and poor migration survival of both juveniles migrating downstream and adults returning upstream resulted in the poorest steelhead run in the Salmon River since 1979-80 (McArthur 1992). Consequently, the chance of recovering marked fish is very low and the accuracy of return information is diminished. Harvest patterns, exploitation rates, age at return and other reasonably stable statistics are very aberrant in the 1990-91 return data. Conclusions based on this year by itself would be inaccurate.

It is impossible to predict when poor migration conditions will occur and mark more fish to compensate for poor survival. In 1990-91, several groups would have to have been 100% marked before release to produce reliable results. The reasoning to mark enough fish with average return expectations is sound, but may not produce sufficient results in very low return years.

Straying

Adult steelhead returning to Idaho rivers in the fall are several months away from spawning and commonly wander into streams other than where they were released. It is not unusual for these wandering fish to spend time in one or more rivers that are not their natal drainage. Adults observed or harvested during the wandering phase should not be considered strays. The majority of them would eventually return to their natal stream, hatchery, or release site.

In 1991, there were 767 CWT recovered from hatchery steelhead at hatchery racks in Idaho. Smolts are marked by National Marine Fisheries Service (NMFS) personnel during outmigration and are from throughout the Snake River drainage. In 1991, four NMFS-tagged fish returned to Idaho hatchery racks, two to Dworshak National Fish Hatchery, and two to the Pahsimeroi Fish Hatchery.

There were three strays of Washington's fish that came in to Dworshak Hatchery. Two were from releases in the Touchet River (63/02/50 and 63/49/47) and one (63/50/14) was from a Lyons Ferry release. One fish was trapped at Dworshak Hatchery from a release by Oregon into the Umatilla River (07/38/57). From the remaining 759 recoveries of CWT from Idaho mark groups, eight were from releases at Kooskia National Fish Hatchery or at Crooked River in the South Fork Clearwater River drainage and were recovered at Dworshak Hatchery. In the pure sense, these fish could be considered strays from their release site. In

reality, they were trapped because of the close proximity of the adult trap to the main Clearwater River (Ball 1992).

If the remaining 751 fish are considered to be a good indication of straying, then they were very successful in returning to their respective release sites. Only two fish (0.3%) were recovered elsewhere. One A-strain fish released at the Pahsimeroi Hatchery returned to Sawtooth Hatchery, and one B-strain fish from the East Fork Salmon River returned to the Pahsimeroi Hatchery. This is within the range of straying rates (0.2-0.6%) reported since 1985 (Ball 1986, 1988, 1989, 1990, 1992). Furthermore, there is very little variation between years and no change over time in the years we have been calculating straying rates.

RECOMMENDATIONS

Continue to include CWT in each major smolt release that are representative in size, time of release, and fish health.

Install an adult counting weir on the Little Salmon River to evaluate adult returns and improve accuracy of adult return estimates of Lower Salmon River releases.

Increase the size of CWT groups from Slate Creek to 80,000 for two consecutive years to evaluate harvest performance.

Evaluate rate of return, contribution to the sport fishery and distribution of adults returning from off-site releases.

Set up check stations in Salmon River sections 17 and 18 to improve manpower efficiency and to increase the number of fish checked.

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APPENDICES

Appendix A. Coded wire tag recoveries and fin clips identified September 1990 - April 1991; harvest estimates by month and river section; and total harvest estimates for the 1990-91 season.

<u>TAG CODE - 05/17/11</u>		<u>RELEASE SITE - N. Fk. Clearwater R.</u>						<u>NUMBER RELEASED - 15,414</u>				
<u>River Section</u>	<u>No. Tags</u>	<u>September</u>		<u>October</u>		<u>November</u>		<u>December</u>		<u>No. Tags</u>	<u>Sample Rate</u>	<u>Est. Harv.</u>
		<u>Sample</u>	<u>Est.</u>	<u>No. Tags</u>	<u>Sample</u>	<u>Est.</u>	<u>No. Tags</u>	<u>Sample</u>	<u>Est.</u>			
01												
03/05									3	0.126		24
04/06												
07												
10												
11												
12												
13												
14												
15												
16												
17												
<u>River Section</u>	<u>No. Tags</u>	<u>January</u>		<u>February</u>		<u>March</u>		<u>April</u>		<u>1990-91</u>		
		<u>Sample</u>	<u>Est.</u>	<u>No. Tags</u>	<u>Sample</u>	<u>Est.</u>	<u>No. Tags</u>	<u>Sample</u>	<u>Est.</u>	<u>No. Tags</u>	<u>Est.</u>	
01												
03/05				1	0.156	6	3	0.155	19	7	49	
04/06												
07												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
Total estimated harvest											49	

Appendix A. Continued.

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TAG CODE - 05/17/12 RELEASE SITE - N. Fk. Clearwater R. NUMBER RELEASED - 15,539

<u>River Section</u>	<u>No. Tags</u>	<u>September</u>		<u>October</u>			<u>November</u>			<u>December</u>					
		<u>Sample</u>	<u>Est.</u>	<u>No. Tags</u>	<u>Sample</u>	<u>Est.</u>	<u>Harv.</u>	<u>No. Tags</u>	<u>Sample</u>	<u>Est.</u>	<u>Harv.</u>	<u>No. Tags</u>	<u>Sample</u>	<u>Est.</u>	<u>Harv.</u>
01															
03/05				1	0.114	9	1	0.087	5	2	0.126	16			
04/06															
07															
10															
11															
12															
13															
14															
15															
16															
17															

38

<u>River Section</u>	<u>No. Tags</u>	<u>January</u>			<u>February</u>			<u>March</u>			<u>April</u>			<u>1990-91</u>		
		<u>Sample</u>	<u>Est.</u>	<u>Harv.</u>	<u>No. Tags</u>	<u>Sample</u>	<u>Est.</u>	<u>Harv.</u>	<u>No. Tags</u>	<u>Sample</u>	<u>Est.</u>	<u>Harv.</u>	<u>Tags</u>	<u>Rate</u>	<u>Harv.</u>	<u>Tags</u>
01																
03/05	1	0.199	5	3	0.156	19	1	0.155	6					9		60
04/06																
07																
10																
11																
12																
13																
14																
15																
16																
17																
18																
19																
20																

Total estimated harvest

60

Appendix A. Continued.

TAG CODE - 05/17/13 RELEASE SITE -N.Fk. Clearwater R. NUMBER RELEASED - 15.424

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River Section	No. Tags	September		No. Tags	October		No. Tags	November		December		
		Sample Rate	Est. Harv.		Sample Rate	Est. Harv.		Sample Rate	Est. Harv.	Sample Rate	Est. Harv.	
01												
03/05										1	0.126	8
04/06												
07												
10												
11												
12												
13												
14												
15												
16												
17												

39

River Section	No. Tags	January		No. Tags	February		No. Tags	March		April		1990-91	
		Sample Rate	Est. Harv.		Sample Rate	Est. Harv.		Sample Rate	Est. Harv.	Sample Rate	Est. Harv.	No. Tags	Est. Harv.
01													
03/05				1	0.156	6					2		14
04/06													
07													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													

Total estimated harvest

Appendix A. Continued.

9091 LSRCP

TAG CODE - 05/17/14 RELEASE SITE - N.Fk. Clearwater R. NUMBER RELEASED - 12,948

River Section	Tags	September		Tags	October		Tags	November		Tags	December	
		No. Sample	Est. Harv.									
01												
03/05										1	0.126	8
04/06												
07												
10												
11												
12												
13												
14												
15												
16												
17												

40

River Section	Tags	January		Tags	February		Tags	March		Tags	April		1990-91	
		No. Sample	Est. Harv.	No. Est.	Harv.									
01														
03/05							5	0.155	32				6	40
04/06														
07														
10														
11														
12														
13														
14														
15														
16														
17														
18														
19														
20														

Total estimated harvest

40

Appendix A. Continued.

TAG CODE - 05/17/39RELEASE SITE - N.Fk. Clearwater R.NUMBER RELEASED - 12,886

<u>River Section</u>	<u>September</u>			<u>October</u>			<u>November</u>			<u>December</u>			
	<u>Tags</u>	<u>Sample</u>	<u>Est. Harv.</u>	<u>Tags</u>	<u>Sample</u>	<u>Est. Harv.</u>	<u>Tags</u>	<u>Sample</u>	<u>Est. Harv.</u>	<u>Tags</u>	<u>Sample</u>	<u>Est. Harv.</u>	
01													
03/05							1	0.087	11	1	0.126	8	
04/06													
07													
10													
11													
12													
13													
14													
15													
16													
17													
<u>River Section</u>	<u>January</u>			<u>February</u>			<u>March</u>			<u>April</u>		<u>1990-91</u>	
<u>Tags</u>	<u>Sample</u>	<u>Est. Harv.</u>	<u>Tags</u>	<u>Sample</u>	<u>Est. Harv.</u>	<u>Tags</u>	<u>Sample</u>	<u>Est. Harv.</u>	<u>Tags</u>	<u>Sample</u>	<u>Est. Harv.</u>	<u>Tags</u>	<u>Harv.</u>
01													
03/05				2	0.156	13	2	0.155	13			6	45
04/06													
07													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													

Total estimated harvest**45**

Appendix A. Continued.

TAG CODE - 05/18/34RELEASE SITE Clear CreekNUMBER RELEASED - 21,025

<u>River Section</u>	<u>September</u>			<u>October</u>			<u>November</u>			<u>December</u>		
	<u>No. Tags</u>	<u>Sample Rate</u>	<u>Est. Harv.</u>	<u>No. Tags</u>	<u>Sample Rate</u>	<u>Est. Harv.</u>	<u>No. Tags</u>	<u>Sample Rate</u>	<u>Est. Harv.</u>	<u>No. Tags</u>	<u>Sample Rate</u>	<u>Est. Harv.</u>
01												
03/05							1	0.087	11			
04/06												
07												
10												
11												
12												
13												
14												
15												
16												
17												
<u>River Section</u>	<u>January</u>			<u>February</u>			<u>March</u>			<u>April</u>		<u>1990-91</u>
	<u>No. Tags</u>	<u>Sample Rate</u>	<u>Est. Harv.</u>	<u>No. Tags</u>	<u>Sample Rate</u>	<u>Est. Harv.</u>	<u>No. Tags</u>	<u>Sample Rate</u>	<u>Est. Harv.</u>	<u>No. Tags</u>	<u>Sample Rate</u>	<u>No. Est.</u>
03/05												1 11
04/06												
07												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

Total estimated harvest

11

Appendix A. Continued.

TAG CODE - 05/18/49 RELEASE SITE - N. Fk. Clearwater R. NUMBER RELEASED - 16,604

River Section	No. Tags	September		No. Tags	October		No. Tags	November		No. Tags	December	
		Sample Rate	Est. Harv.									

01												
03/05				1	0.114	9	1	0.087	11			
04/06												
07												
10												
11												
12												
13												
14												
15												
16												
17												

River Section	No. Tags	January		No. Tags	February		No. Tags	March		No. Tags	April		1990-91	
		Sample Rate	Est. Harv.	No. Tags	Est. Harv.									

01														
03/05												2		20
04/06														
07														
10														
11														
12														
13														
14														
15														
16														
17														
18														
19														
20														

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44

Appendix A. Continued.

AG CODE - 05/18/50 RELEASE SITE - N. Fk. Clearwater R. NUMBER RELEASED -, 19,796

River Section	Tags	September		Tags	October		Tags	November		Tags	December	
		No. Sample	Est. Harv.									
01												
03/05							1	0.087	11	1	0.126	8
04/06												
07												
10												
11												
12												
13												
14												
15												
16												
17												

River Section	Tags	January		Tags	February		Tags	March		Tags	April		1990-91	
		No. Sample	Est. Harv.	No. Sample	Est. Harv.									
01														
03/05										2	0.016	125	4	144
04/06														
07														
10														
11														
12														
13														
14														
15														
16														
17														
18														
19														
20														

Total estimated harvest

144

9091LSRCP

45

Appendix A. Continued.

<u>TAG CODE -05/18/51</u>		SITE - N. Fk. Clearwater					R.	<u>NUMBER RELEASED - 19.873</u>				
		<u>September</u>							<u>September</u>			
		Sample Est.		Sample Est.		No.	Sample Est.		Sample Est.			
		Rate	Harv.	Rate	Harv.	Tags	Rate	Harv.	Rate	Harv.		
01												
03/05				5	0.114	44	4	0.087	46	5	0.126	40
04/06												
07												
10												
11												
12												
13												
14												
15												
16												
17												
		<u>January</u>		<u>February</u>		<u>March</u>		<u>April</u>		<u>1990-91</u>		
River Section	Taos	No.	Sample Est.	No.	Sample Est.	No.	Sample Est.	No.	Sample Est.	No.	Est.	
			Rate	Harv.	Rate	Harv.	Rate	Harv.	Rate	Harv.	Tags	
01												
03/05		4	0.199	20	3	0.156	19	1	0.155	6	22 175	
04/06												
07												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
Total estimated harvest											175	

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Appendix A. Continued.

TAG CODE - 05/18/52

RELEASE SITE - N. Fk. Clearwater R.

NUMBER RELEASED - 19.843

River Section	No. Tags	September		October		November		December				
		Sample Rate	Est. Harv.									
01						1	0.097	10				
03/05				5	0.114	44	1	0.087	11	1	0.126	8
04/06												
07												
10												
11												
12												
13												
14												
15												
16												
17												

River Section	No. Tags	January		February		March		April		1990-91	
		Sample Rate	Est. Harv.	Tags	Harv.						
01											
03/05	2	0.199	10	1						11	89
04/06											
07											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Total estimated harvest

89

9091LSRCP

Appendix A. Continued.

TAG CODE - 05/18/54

RELEASE SITE - N. Fk. Clearwater R.

NUMBER RELEASED -21,056

River Section	No. Tags	September		No. Tags	October		No. Tags	November		No. Tags	December	
		Sample Rate	Est. Harv.									
01										1	0.064	16
03/05				2	0.114	18	2	0.087	23	1	0.126	8
04/06												
07												
10												
11												
12												
13												
14												
15												
16												
17												

49

River Section	No. Tags	January		No. Tags	February		No. Tags	March		No. Tags	April		1990-91	
		Sample Rate	Est. Harv.	Tags	Est.									
01													1	16
03/05				2	0.156	13	1	0.155	6				8	68
04/06														
07														
10														
11														
12														
13														
14														
15														
16														
17														
18														
19														
20														

Total estimated harvest

84

Appendix A. Continued.

TAG CODE - 05/20/41 RELEASE SITE - N. Fk. Clearwater R. NUMBER RELEASED - 20,603

9091LSRCP

River Section	Tags	September		October		November		December	
		No.	Sample Est.	No.	Sample Est.	No.	Sample Est.	No.	Sample Est.
		Rate	Harv.	Tags	Rate	Harv.	Tags	Rate	Harv.
01									
03/05									
04/06									
07									
10									
11									
12									
13									
14									
15									
16									
17									

50

River Section	Tags	January		February		March		April		1990-91	
		No.	Sample Est.	No.	Sample Est.	No.	Sample Est.	No.	Sample Est.	No.	Est.
		Rate	Harv.	Tags	Rate	Harv.	Tags	Rate	Harv.	Tags	Harv.
01											
03/05	1	0.199	5							1	5
04/06											
07											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Total estimated harvest

5

Appendix A. Continued.

TAG CODE - 07/40/34 RELEASE SITE - Little Sheep Creek NUMBER RELEASED - 27,545

River Section	Tags	September		October		November		December	
		No. Sample	Est. Harv.						
01				1	.085	12			
03/05									
04/06									
07									
10									
11									
12									
13									
14									
15									
16									
17									

River Section	Tags	January		February		March		April		1990-91	
		No. Sample	Est. Harv.	No. Est.							
01										1	12
03/05											
04/06											
07											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

Total estimated harvest

12

9091LSRCP

52

Appendix A. Continued.

TAG CODE - 10/29/27 RELEASE SITE - Shoup Bridge NUMBER RELEASED - 9.200

River Section	Tags	September		October		November		December	
		No.	Sample Est.	No.	Sample Est.	No.	Sample Est.	No.	Sample Est.
01									
03/05									
04/06									
07									
10									
11									
12									
13									
14						1	0.198	5	
15									
16									
17									

River Section	Tags	January		February		March		April		1990-91	
		No.	Sample Est.	No.	Sample Est.	No.	Sample Est.	No.	Sample Est.	No.	Est.
01											
03/05											
04/06											
07											
10											
11											
12											
13											
14											
15										1	5
16											
17											
18											
19											
20											
Total estimated harvest											5

9091LSRCP

54

9091LSRCP

Appendix A Continued

TAG CODE - 10/29/28 RELEASE SITE - N. Fk. Clearwater R. NUMBER RELEASED - 8,153

River Section	No. Tags	September		No. Tags	October		No. Tags	November		No. Tags	December	
		Sample Rate	Est. Harv.									
01												
03/05				2	0.114	18	2	0.087	23	1	0.126	8
04/06												
07												
10												
11												
12												
13												
14												
15												
16												
17												

55

River Section	No. Tags	January		No. Tags	February		No. Tags	March		No. Tags	April		1990-91	
		Sample Rate	Est. Harv.	No. Tags	Est. Harv.									
01														
03/05	1	0.199	5	1	0.156	6					7			6
04/06														
07														
10														
11														
12														
13														
14														
15														
16														
17														
18														
19														
20														

Total estimated harvest

60

Appendix A. Continued.

9091LSRCP

TAG CODE - 10/29/39 RELEASE SITE - Sawtooth NUMBER RELEASED - 51,925

River Section	Tags	September		October		November		December	
		No. Sample	Est. Harv.						

01									
03/05									
04/06									
07									
10									
11									
12									
13									
14				1	0.125	8			
15									
16									
17									

58

River Section	Tags	January		February		March		April		1990-91
		No. Sample	Est. Harv.							

01										
03/05										
04/06										
07										
10										
11										
12										
13										
14										
15						1	0.469	2		
16									2	10
17										
18										
19										
20										

Total estimated harvest 10

Appendix A. Continued.

9091LSRCP

TAG CODE - 10/40/49 RELEASE SITE - Little Salmon River NUMBER RELEASED - 52,300

River Section	Tags	September		Tags	October		Tags	November		Tags	December	
		No. Sample	Est. Harv.									
01												
03/05												
04/06												
07												
10												
11												
12				1	0.351	3	1	0.696	1			
13												
14												
15												
16												
17												

59

River Section	Tags	January		Tags	February		Tags	March		Tags	April		1990-91	
		No. Sample	Est. Harv.	No. Est.	Harv.									
01														
03/05														
04/06														
07														
10														
11														
12														
13													2	4
14														
15														
16														
17														
18														
19														
20														

Total estimated harvest 4

Appendix A. Continued.

9091LSRCP

TAG CODE - 10/41/40 RELEASE SITE - Sawtooth NUMBER RELEASED - 16,914

River Section	No. Tags	September		No. Tags	October		No. Tags	November		No. Tags	December	
		Sample Est.	Harv.									
01												
03/05												
04/06												
07												
10							1	0.211		5		
11												
12												
13												
14												
15												
16												
17												

61

River Section	No. Tags	January		No. Tags	February		No. Tags	March		No. Tags	April		1990-91	
		Sample Est.	Harv.	No. Tags	Harv.									
01														
03/05														
04/06														
07														
10														
11											1			5
12														
13														
14														
15														
16														
17														
18														
19														
20														

Total estimated harvest

5

Appendix A. Continued.

TAG CODE - 10/41/42 RELEASE SITE - Little Salmon River NUMBER RELEASED - 15,154

9091ISRCP

River Section	Tags	September		October		November		December	
		No. Sample	Est. Harv.						
01									
03/05									
04/06									
07									
10									
11									
12									
13									
14									
15									
16									

62

River Section	Tags	January		February		March		April		1990-91	
		No. Sample	Est. Harv.	No. Est.	Harv.						
01											
03/05											
04/06											
07											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20						1	0.397	3		1	3

Total estimated harvest

Appendix A. Continued.

9091LSRCP

TAG CODE - 63/49/42 RELEASE SITE - Tucannon River NUMBER RELEASED - 20,110

River Section	No. Tags	September		No. Tags	October		No. Tags	November		December	
		Sample Rate	Est. Harv.		Sample Rate	Est. Harv.		Sample Rate	Est. Harv.	Sample Rate	Est. Harv.
01											
03/05				1	0.114	9					
04/06											
07											
10											
11											
12											
13											
14											
15											
16											
17											

65

River Section	No. Tags	January		No. Tags	February		No. Tags	March		April		1990-91	
		Sample Rate	Est. Harv.		Sample Rate	Est. Harv.		Sample Rate	Est. Harv.	Sample Rate	Est. Harv.	No. Tags	Est. Harv.
01													
03/05											1		9
04/06													
07													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													

Total estimated harvest

9

Appendix A. Continued.

TAG CODE - 63/49/49 RELEASE SITE - Touchet River NUMBER RELEASED - 19,681

9091LSRCP

River Section	Taos	September			October			November			December		
		No. Sample	Est. Harv.	Tags	No. Sample	Est. Harv.	Tags	No. Sample	Est. Harv.	Tags	No. Sample	Est. Harv.	
01													
03/05				1	0.114	9							
04/06													
07													
10													
11													
12													
13													
14													
15													
16													
17													

67

River Section	Taos	January			February			March			April		1990-91	
		No. Sample	Est. Harv.	Tags	No. Sample	Est. Harv.	Tags	No. Sample	Est. Harv.	Tags	Rate	Harv.	Taos	Est.
01														
03/05														
04/06													1	9
07														
10														
11														
12														
13														
14														
15														
16														
17														
18														
19														
20														

Total estimated harvest

Appendix A. Continued.

TAG CODE - 63/50/19		RELEASE SITE - Lyons Ferry Hatchery						NUMBER RELEASED - 25.025			
River Section	No. Tags	September		October		November		December			
		Sample Rate	Est. Harv.	No. Tags	Sample Rate	Est. Harv.	No. Tags	Sample Rate	Est. Harv.	No. Tags	Sample Rate
01											
03/05				1	0.114	9					
04/06											
07											
10											
11											
12											
13											
14											
15											
16											
17											
River Section	No. Tags	January		February		March		April		1990-91	
		Sample Rate	Est. Harv.	No. Tags	Sample Rate	Est. Harv.	No. Tags	Sample Rate	Est. Harv.	No. Tags	Est. Harv.
01											
03/05										1	9
04/06											
07											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

9091LSRCP

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Appendix B. Steelhead groups returning to the Salmon River, 1990-91.

<u>Strain</u>	<u>Age</u>	<u>No. of Fish</u>	<u>Release Site</u>	<u>Hatchery Rearing</u>	<u>Marks</u>
A	I	14,718	Sawtooth	HNFH ^a	CWT 10/41/38
A	I	14,584	Sawtooth	HNFH	CWT 10/41/39
A	I	16,914	Sawtooth	HNFH	CWT 10/41/40
A	I	590,335	Sawtooth	HNFH	None
A	I	2,838	Sawtooth	MVSH ^b	PIT
A	I	854,462	Sawtooth	MVSH	None
A	I	104,400	Yankee Fork	MVSH	None
A	I	14,465	Pahsimeroi	NSPR ^o	CWT 10/41/50
A	I	13,334	Pahsimeroi	NSPR	CWT 10/41/51
A	I	13,107	Pahsimeroi	NSPR	CWT 10/41/52
A	I	5,393	Pahsimeroi	NSPR	CWT 10/41/53
A	I	462,001	Pahsimeroi	NSPR	None
A	I	13,400	Shoup Bridge	NSPR	CWT 10/41/47
A	I	13,900	Shoup Bridge	NSPR	CWT 10/41/48
A	I	15,947	Shoup Bridge	NSPR	CWT 10/41/49
A	I	166,453	Shoup Bridge	NSPR	None
A	I	208,500	North Fork	NSPR	None
A	I	3,058	Little Salmon R.	MVSH	PIT
A	I	15,209	Little Salmon R.	MVSH	CWT 10/41/41
A	I	15,154	Little Salmon R.	MVSH	CWT 10/41/42
A	I	15,927	Little Salmon R.	MVSH	CWT 10/41/43
A	I	401,052	Little Salmon R.	MVSH	None
A	I	300,600	Slate Creek	MVSH	None
A	I	7,200	Hammer Creek	NSPR	None

Appendix B. Continued.

<u>Strain</u>	<u>Age</u>	<u>No. of Fish</u>	<u>Release Site</u>	<u>Hatchery Rearing</u>	<u>Marks</u>
A	I	136,000	Hammer Creek	MVSH	None
	Total	3,418,951			
A	II	51,925	Sawtooth	HNFH	CWT 10/29/39
A	II	1,143,820	Sawtooth	HNFH	None
A	II	176,000	Yankee Fork	MVSH	None
A	II	633,431	Pahsimeroi	NSPR	None
A	II	32,369	Pahsimeroi	NSPR	CWT 10/29/55
A	II	28,700	Shoup Bridge	NSPR	CWT 10/28/19
A	II	65,600	Shoup Bridge	NSPR	None
A	II	9,200	Shoup Bridge	NSPR	CWT 10/29/27
A	II	147,500	Shoup Bridge	MVSH	None
A	II	253,100	North Fork	MVSH	Norse
A	II	102,800	Panther Creek	NSPR	None
A	II	162,800	Panther Creek	MVSH	None
A	II	100,000	French Creek	MVSH	None
A	II	87,200	Hammer Creek	MVSH	None
A	II	648,952	Little Salmon	MVSH	None
A	II	52,300	Little Salmon	MVSH	CWT 10/40/49
A	II	675	Slate Creek	HNFH	None
A	II	50,050	Slate Creek	HNFH	CWT 10/40/50
A	II	346,100	Slate Creek	MVSH	None
	Total	4,092,522			
B	I	14,939	East Fork	HNFH	CWT 10/41/32
B	I	14,911	East Fork	HNFH	CWT 10/41/33
B	I	13,719	East Fork	HNFH	CWT 10/41/34

Appendix B. Continued.

Strain	Age	No. of Fish	Release Site	Hatchery Rearing	Marks
B	I	393,007	East Fork	HNFH	None
B	I	15,624	East Fork	MVSH	CWT 10/41/44
B	I	14,126	East Fork	MVSH	CWT 10/41/45
B	I	14,314	East Fork	MVSH	CWT 10/41/46
B	I	2,930	East Fork	MVSH	PIT
B	I	306,306	East Fork	MVSH	None
	Total	789,876			
B	II	251,825	East Fork	HNFH	None
B	II	51,732	East Fork	HNFH	CWT 10/29/38
	Total	303,557			
B	III	24,150	East Fork	HNFH	CWT 10/29/49
B	III	460,919	East Fork	HNFH	None
B	III	48,019	Slate Creek	HNFH	CWT 10/29/26
B	III	1,721	Slate Creek	HNFH	None
	Total	534,809			

^a HNFH = Hagerman National Fish Hatchery.

^b MVSH = Magic Valley Steelhead Hatchery.

^c NSPR = Niagara Springs Fish Hatchery.

Appendix C. Steelhead groups returning to the Clearwater River, 1990-91.

<u>Strain</u>	<u>Age</u>	<u>No. of Fish</u>	<u>Release Site</u>	<u>Hatchery Rearing</u>	<u>Marks</u>
B	I	15,294	Clear Creek	HNFH ^a	CWT 10/41/35
B	I	15,482	Clear Creek	HNFH	CWT 10/41/36
B	I	14,375	Clear Creek	HNFH	CWT 10/41/37
B	I	3,996	Clear Creek	HNFH	None
B	I	208,201	Clear Creek	DNFH ^b	None
B	I	109,898	Crooked River	DNFH	None
B	I	109,480	Eldorado Creek	DNFH	None
B	I	16,912	North Fork	DNFH	CWT 05/18/37
B	I	17,789	North Fork	DNFH	CWT 05/18/38
B	I	20,339	North Fork	DNFH	CWT 05/19/45
B	I	19,894	North Fork	DNFH	CWT 05/19/46
B	I	18,869	North Fork	DNFH	CWT 05/19/47
B	I	20,603	North Fork	DNFH	CWT 05/20/41
B	I	20,782	North Fork	DNFH	CWT 05/20/42
B	I	20,497	North Fork	DNFH	CWT 05/20/43
B	I	918,215	North Fork	DNFH	None
B	I	103,273	Newsome Creek	HNFH	None
B	I	143,803	South Fork	HNFH	None
Total		1,797,702			
B	II	1,210,738	North Fork	DNFH	None
B	II	15,425	North Fork	DNFH	CWT 05/17/11
B	II	15,550	North Fork	DNFH	CWT 05/17/12
B	II	15,425	North Fork	DNFH	CWT 05/17/13
B	II	12,950	North Fork	DNFH	CWT 05/17/14

Appendix C. Continued.

<u>Strain</u>	<u>Age</u>	<u>No. of Fish</u>	<u>Release Site</u>	<u>Hatchery Rearing</u>	<u>Marks</u>
B	II	12,900	North Fork	DNFH	CWT 05/17/39
B	II	14,325	North Fork	DNFH	CWT 05/18/46
B	II	16,600	North Fork	DNFH	CWT 05/18/49
B	II	19,800	North Fork	DNFH	CWT 05/18/50
B	II	19,875	North Fork	DNFH	CWT 05/18/51
B	II	19,850	North Fork	DNFH	CWT 05/18/52
B	II	18,850	North Fork	DNFH	CWT 05/18/53
B	II	21,050	North Fork	DNFH	CWT 05/18/54
B	II	8,150	North Fork	DNFH	CWT 10/29/28
B	II	8,025	North Fork	DNFH	CWT 10/29/29
B	II	56,885	American River	DNFH	None
B	II	201,325	Crooked River	DNFH	None
B	II	190,708	Newsome Creek	DNFH	None
B	II	165,055	South Fork	DNFH	None
B	II	254,898	Clear Creek	DNFH	None
B	II	200,425	Lolo Creek	DNFH	None
B	II	200,806	Eldorado Creek	DNFH	None
Total		2,699,615			
B	III	41,527	American River	DNFH	None
B	III	21,025	Clear Creek	DNFH	CWT 05/18/34
B	III	19,425	Clear Creek	DNFH	CWT 05/18/35
B	III	116,100	Clear Creek	DNFH	None
B	III	19,675	Clearwater River	DNFH	CWT 05/18/36
B	III	18,825	Clearwater River	DNFH	CWT 10/29/31
B	III	20,625	Clearwater River	DNFH	CWT 10/29/32

Appendix C. Continued.

<u>Strain</u>	<u>Age</u>	<u>No. of Fish</u>	<u>Release Site</u>	<u>Hatchery Rearing</u>	<u>Marks</u>
B	III	19,050	Clearwater River	DNFH	CWT 10/29/33
B	III	1,128,425	Clearwater River	DNFH	None
B	III	26,125	Crooked River	DNFH	CWT 10/29/40
B	III	24,025	Crooked River	DNFH	CWT 10/29/41
B	III	150,025	Crooked River	DNFH	None
B	III	202,857	Newsome Creek	DNFH	None
B	III	298,070	South Fork	DNFH	None
Total		2,105,779			

^a HNFH = Hagerman National Fish Hatchery.

^b DNFH = Dworshak National Fish Hatchery.

Appendix D. Miscellaneous coded wire tag steelhead groups that were recovered by Idaho anglers in 1990-91.

Strain	Age	No. of Fish	Release Site	Agency	Marks
A	I	47,352	Lyons Ferry Hatchery	WDW ^a	CWT 63/01/32
A	I	51,152	Lyons Ferry Hatchery	WDW	CWT63/55/08
A	II	27,442	Wallowa Hatchery	ODFW ^b	CWT 07/40/28
A	II	27,545	Little Sheep Creek	ODFW	CWT07/40/34
A	II	20,110	Tucannon River	WDW	CWT 63/49/42
A	II	20,001	Touchet River	WDW	OW 63/49/47
A	II	19,681	Touchet River	WDW	CWT 63/49/49
A	II	25,123	Lyons Ferry Hatchery	WDW	CWT/50/13
A	II	25,317	Lyons Ferry Hatchery	WDW	CWT /50/16
A	II	25,025	Lyons Ferry Hatchery	WDW	CWT63/50/19
A	II	4,732	Columbia R. @ RM 141	NMFS	CWT 23/20/24
A	II	7,049	Snake R. @ Texas Rapids	NMFS	CWT 23/23/45

^a W = Washington Department of Wildlife.

^b ODFW = Oregon Department of Fish and Wildlife.

Submitted by:

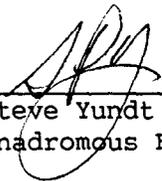
Kent Ball
Senior Fishery Research Biologist

Approved by:

IDAHO DEPARTMENT OF FISH AND GAME



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