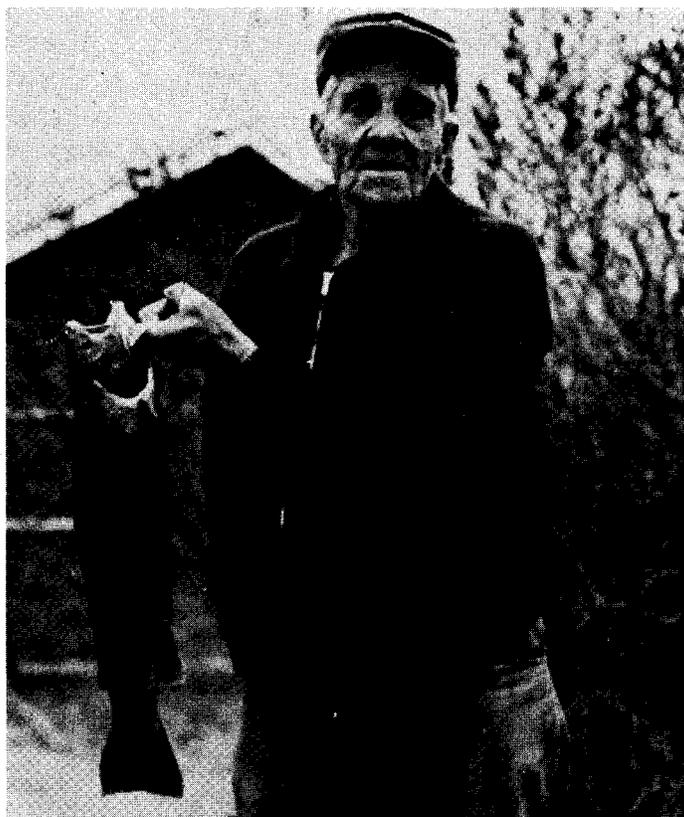




Idaho Power

**EVALUATION OF TRANSPLANTING
SNAKE RIVER STEELHEAD TROUT TO THE PAHSIMEROI
RIVER, 1983 Idaho Power Company Project IPC-26
Period Covered: July 1982 to June 1983**



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ABSTRACT

Feeding steelhead smolts on Oregon Moist Pellet for the first 30 days of rearing did not produce significantly more returning adults than a comparison group fed entirely on dry diet.

From 1,098,000 steelhead smolts released into the Pahsimeroi River in 1980, 1.18% returned as adults to the Salmon River. Anglers harvested 9,118 adults and 3,802 returned to the weir. The exploitation rate of 70% on the 1979 brood year fish was the highest ever recorded.

In 1983, a census was initiated for the Salmon River spring steelhead fishery between North Fork and the Pahsimeroi River. Excellent water conditions allowed anglers to harvest 1,492 fish in 55,925 hours of effort, and 93% of the catch was of hatchery origin.

After hatchery egg requirements were met, unspawned adults were stocked to supplement natural populations in the upper Salmon River drainage. Unfed fry and advanced fingerlings were also stocked. In 1983, these distributions included 2,583 adults, 1,559,250 fry and 78,423 advanced fingerlings.

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INTRODUCTION

The Niagara Springs Steelhead Hatchery and Pahsimeroi Steelhead Collection Facility operations are part of Idaho Power Company's program to relocate steelhead and chinook salmon stocks from the Snake River to the Salmon River. Relocation was required after inundation and blockage of their ancestral migration routes and spawning beds by Hells Canyon Dam.

This project was initiated in 1966, with the release of the first steelhead smolts into the Pahsimeroi River from fish trapped at the base of Hells Canyon Dam. Present project plans are to obtain steelhead eggs from adults returning to the Pahsimeroi station from prior smolt releases, incubate the eggs to the advanced eyed stage and ship them to Niagara Springs Hatchery near Wendell, Idaho, for hatching.

The steelhead fry are placed in raceways at Niagara Springs Hatchery and reared until the following spring when they are trucked back to the Pahsimeroi River and released as seaward-bound smolts.

OBJECTIVES

To monitor and document the effectiveness of the Niagara Springs-Pahsimeroi River steelhead trout mitigation program, including:

1. Survival to adult of fish reared and released; and
2. The distribution and harvest of program fish in the various fisheries.

To investigate methods for optimizing the harvest of Niagara Springs-Pahsimeroi River steelhead while giving proper protection for wild stocks.

To evaluate in the field, the results of experimental hatchery rearing techniques.

OPERATIONS AND RESEARCH - 1983

Smolt Delivery

General Production

Between April 4 and May 5, 1983, 496,140 steelhead juveniles were transported from Niagara Springs Hatchery to the Pahsimeroi River.

These fish were all progeny of A-stock adults that returned to the Pahsimeroi adult collection facility in 1982. The juvenile fish were all released directly into the Pahsimeroi River near the adult weir.

The average size of the juvenile fish from Niagara Springs was 237 mm total length. On April 8, we measured a sample of 254 juveniles as they were delivered. They ranged in size from 120 to 360 mm and averaged 243 mm (Fig. 1). Only 7.5% of the fish sampled were less than 170 mm. Reingold (1974) reported that smolts from Niagara Springs should be at least 170 mm in order to ensure adequate downstream emigration.

In addition to the production from Niagara Springs Hatchery, juvenile steelhead were released into the Pahsimeroi River from Hagerman National Fish Hatchery and Magic Valley Steelhead Hatchery. These fish were raised under a pilot rearing program of the Lower Snake River Fish and Wildlife Compensation Plan. Between March 28 and 31, Hagerman National Fish Hatchery released 84,194 fish that averaged 250 mm total length. Magic Valley Steelhead Hatchery released 40,681 fish on April 18 and 19 that averaged 235 mm total length. Total production released into the Pahsimeroi River in 1983 was 621,015 fish.

Marked Smolts

No juveniles were marked prior to their release in 1983. Adult returns from the three different hatchery releases will be indistinguishable from each other.

Marked Adult Recoveries

Final Diet Experiment

In 1980, two marked groups of steelhead smolts were released to test the efficacy of feeding Oregon Moist Pellet for 30 days prior to release. One group was representative of the standard hatchery product at Niagara Springs Hatchery. They were reared on the standard dry diet and released at an average size of 234 mm carrying coded wire tags numbered 10/21/57. The second group was fed the standard dry diet until 30 days prior to delivery, when they were switched to Oregon Moist Pellet. This group averaged 226 mm when released and carried coded wire tags numbered 10/21/56.

The proportion of tags recovered from all sources was 0.41% for the marked group fed only dry diet and 0.48% for the group switched to Oregon Moist Pellet for the last 30 days (Table 1). The difference is not significant.

Table 1. Summary of coded wire tag recoveries from steel head smolts in the Niagara Springs Hatchery diet test, 1979 brood year.

Recovery Location	1981-1982		1982-1983		Total	
	Data code		Data code		Data code	
	10/21/57	10/21/56	10/21/57	10/21/56	10/21/57	10/21/56
Columbia R. sport		1	4	4	4	5
Deschutes River			7	10	7	10
Columbia R. Indian	7	2	15	2	22	4
Ocean	1	2	1	1	2	3
Idaho sport	6	3	55	73	61	76
Miscellaneous		1	4	1	4	2
Hatchery return	<u>29</u>	<u>33</u>	<u>79</u>	<u>109</u>	<u>108</u>	<u>142</u>
Total	43	42	165	200	208	242
No. smolts released					50,325	49,900
% recovered (all sources)					0.41	0.48

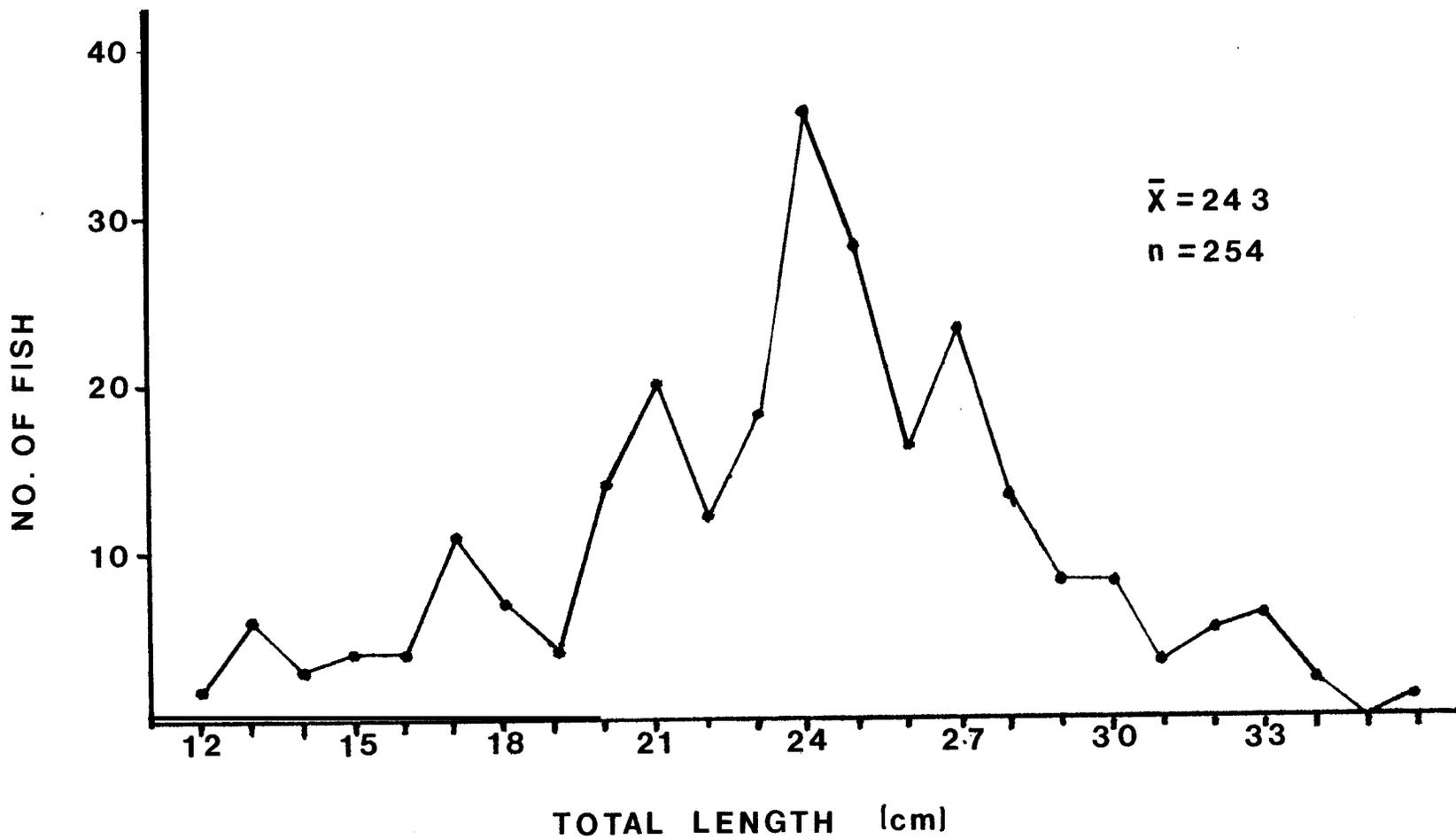


Figure 1. Length frequency of steelhead smolts delivered to the Pahsimeroi River from Niagara Springs Steelhead Hatchery, 1983.

Smolt survival to Lower Granite Dam was estimated to be 47.2% of the control group and 54% of the group fed Oregon Moist Pellet. The proportion of adult recoveries as a function of the estimated number of smolts past Lower Granite Dam was very similar for both groups.

Vibrio Vaccination

In the spring of 1981, three groups of smolts were released to test vaccination with bivalent Vibrio bacterin. The vaccine contained LS 174 and MSC 175 antigen and was applied at approximately 0.5 ml of bacterin media per fish using the spray or shower methods described by Garrison (1977).

Coded wire tags were implanted into all three groups, and their adipose fins were excised prior to release. The test group (Vibrio) of 37,550 smolts was tagged with tag code 10/22/41. A second group of 37,950 smolts (placebo) were tagged with tag code 10/22/42 and treated identically to the test group, except that no bacterin was applied. A third group of 38,400 smolts was implanted with tag code 10/22/43. These fish are representative of the standard hatchery product from Niagara Springs and provide the control group. All three groups averaged 210-220 mm when released (Reingold 1982).

Coded wire tag recoveries in 1982-83 from the group treated with Vibrio vaccine was 0.40% compared to 0.19% for the placebo group and 0.28 for the control (Table 2). At this time, it appears that the Vibrio vaccine may have some merit, but it is too premature to make definite conclusions. The experiment was repeated in 1982 and adult returns will not be complete from this group until 1985.

A- Versus B-Strain

On April 1, 1981, two groups of steelhead reared at Hagerman National Fish Hatchery were released into the Pahsimeroi River to test the performance of A- and B-strain fish released in the upper Salmon River. The 52,300 A-strain smolts were from eggs taken at the Pahsimeroi facility in 1980. This group had the adipose fins clipped, and coded wire tags 10/22/39 were implanted prior to release. The A-strain smolts averaged 237 mm when released (Reingold 1982). The 39,200 B-strain smolts were from eggs taken at Dworshak National Fish Hatchery in 1980. They were implanted with coded wires 10/22/40 and had the adipose fins clipped before release. The B-strain fish averaged 201 mm when released.

Table 2. Coded wire tag recoveries from steelhead smolts released in the Pahsimeroi River in 1981 after being treated with Vibrio vaccine (10/22/41), a placebo (10/22/42) and a control group (10/22/43).

Recovery Location	Tag code			Total
	10/22/41	10/22/42	10/22/43	
Indian gill	3	2	6	11
Deschutes River	10	2	5	17
Idaho sport fishery	35	16	17	68
Hatchery return	102	52	78	232
Miscellaneous	1		1	2
Total	151	72	107	330
No. smolts released	37,550	37,950	38,400	113,900
% recaptured	0.40	0.19	0.28	0.29
Experiment	Vibrio	Placebo	Control	

Since the proportion of A-strain steelhead that spend one winter in the ocean is much greater than B-strain, complete returns are necessary before they can be compared. Coded wire tag recoveries after one ocean year are recorded in Table 3.

The returns of these A-strain fish from Hagerman National Fish Hatchery are comparable to the Niagara Springs A-strain fish and released as a control for the Vibrio experiment (Table 2). Fish from Hagerman Hatchery were recovered at 0.24% and fish from Niagara Springs at 0.28%. The fish from Hagerman averaged 237 mm when released, and the fish from Niagara Springs were about 215 mm. After one year in the ocean, there appears to be little difference in returns from the same A-strain fish reared at two separate hatcheries.

The first release of B-strain steelhead into the Pahsimeroi River was in 1974 (Reingold 1975). Advanced fingerlings were transported from Dworshak National Fish Hatchery to Niagara Springs Hatchery in October, 1973, where they were reared until being transported to the Pahsimeroi River in the spring of 1974. Extremely high flows in the spring of 1974 provided poor downstream migration conditions (Raymond et al. 1975). The total adult return to the hatchery in 1974 was only 0.03% (Table 4). This was the lowest return rate to the Pahsimeroi since the inception of the program. The age at return was different than was expected and several adults returned to Dworshak National Fish Hatchery.

In 1978, Reingold attempted to compare the transfer of three groups of B-strain steelhead from the Clearwater River drainage to the Salmon River drainage. Eggs and fry from Dworshak National Fish Hatchery were reared to smolt size at Niagara Springs and then hauled to the Pahsimeroi River. Smolts reared at Dworshak National Fish Hatchery were hauled directly to the Pahsimeroi River (Reingold 1979). The eggs and fry did not survive well enough to complete the experiment. The group hauled from Dworshak National Fish Hatchery to the Pahsimeroi River returned to the weir at 0.22% (Table 4).

Beginning in 1979 and continuing in 1980, the Idaho Cooperative Fishery Unit conducted research on cold conditioning of B-strain steelhead reared at Hagerman National Fish Hatchery and released in the ponds at the upper Pahsimeroi station. These fish were from eggs taken at Dworshak National Fish Hatchery and reared for one year before release in the ponds (BJornn and Ringe 1984). The 1979 release (which consisted of several individual test groups) returned to the weir at 0.22% (Table 4).

Dorsal Fin Deformity Recognition

The monitoring of dorsal fin deformity at the Pahsimeroi Hatchery began in 1972. Adults were inspected and classified as easily recognizable, moderately deformed, or with slight or no deformity. Because of the high incidence of dorsal fin deformity and the ability

Table 3. Coded wire tag recoveries from A-strain and B-strain steel head smolts released into the Pahsimeroi River, 1981.

Recover Location	Tag code	
	10/22/39 (A)	10/22/40 (B)
Indian gill nets- Lower Columbia	6	0
Deschutes River	4	0
Idaho sport fishery	22	3
Pahsimeroi Hatchery	94	6
Miscellaneous	1	0
Total	127	9
No. smolts returned	52,300	39,200
% return	0.24	0.02

Table 4. Summary of B-strain steel head smolt releases into Pahsimeroi River and adult returns to the weir.

Year released	No. of smolts	Histor	Adult hatchery returns			Total	
			1-Year ocean	2-Year ocean	3-Year ocean		
1974	1,607,00	Transferred from Dworshak to Niagara Springs Hatchery-October	395 (79%)	74 (15%)	28 (6%)	497	0.03
1978	45,200	Reared at Niagara Springs		4		4	0.01
1978	34,200	Reared at Dworshak & hauled to Pahsimeroi River	10 (13%)	60 (79%)	6 (8%)	76	0.22
1979	157,700	Reared at Hagerman & hauled to Pahsimeroi ponds. ICFU cold-conditioning tests.	7 (2%)	327 (94%)	15 (4%)	349	0.22
1980	106,900	Reared at Hagerman & hauled to Pahsimeroi ponds. ICFU cold-conditioning tests.	39	376	(1984)		
1981	39,200	Reared at Hagerman from Dworshak eggs.	6	(1984)	(1985)		
1982	58,281	Reared at Hagerman. Egg source was adults	(1984)	(1985)	(1986)		

of most anglers to recognize hatchery fish by the deformity, it has been possible to estimate the number of hatchery fish caught or released from the Salmon River. Although this methodology has been adequate, it is based upon subjective evaluation.

Since 1979, we have been measuring the height of dorsal fins. Fishing regulations that require anglers to release fish with dorsal fins longer than 57 mm have now been established. Reingold (1980) measured dorsal fins of known A-strain hatchery fish and found that 96% were shorter than 57 mm. However, only about half of the B-strain fish of hatchery origin have dorsal fins less than 57 mm (Ball 1984).

In 1983, we measured large samples of both A- and B-strain adults to assess what proportions had dorsal fins longer than 57 mm. Since Oregon has recently established regulations that require release of steelhead with dorsal fins greater than 50 mm, we also calculated that proportion.

The dorsal fins we measured in 1983 were mostly from hatchery fish that spent two winters in the ocean. Of 369 A-strain fish measured, we found that 6 (1.6%) had dorsal fins more than 57 mm long and a total of 23 (6.2%) had fins more than 50 mm. We measured 216 dorsal fins from B-strain adults and found that 95 (44%) had dorsal fins more than 57 mm long and a total of 127 (59%) had fins more than 50 mm.

Dorsal fin regulations of either 50 or 57 mm allow sufficient harvest of A-strain steelhead, but such regulations result in B-strain adults being underharvested. We observed that of the few A-strain fish that have dorsal fins in excess of 57 mm, most have normal dorsal fins. However, it is not at all uncommon to find B-strain adults with deformed dorsals that exceed 57 mm. Anglers that support harvest restrictions to protect wild steelhead are usually disgruntled when they have to release a known hatchery fish of large size.

In order to allow identification of all hatchery steelhead from Idaho, smolts released in 1984 and thereafter will have their adipose fins clipped.

Adult Returns

1980 Release - 1979 Brood Year

In the spring of 1980, 1,098,000 A-strain smolts were delivered to the Pahsimeroi River from Niagara Springs Steelhead Hatchery. From this release, 1,011 1-ocean (27%) and 2,791 2-ocean (73%) adults returned to the Pahsimeroi weir (Table 5). The return of 2-ocean adults was the largest number of 2-ocean returnees since the beginning of the program. The proportion of returnees from each age group is highly dependent on the degree of downstream harvest and different water conditions during the return years.

Table 5. Adult returns of A-strain steelhead to the Pahsimeroi Hatchery and to the Salmon River and estimated sport harvest and percent return to the Salmon River.

Brood year	Smolts released	Year released	Adult hatchery returns			Total %	Estimated Salmon River sport harvest (exploitation)	Estimated total return to Salmon River	Smolt to adult % to Salmon R.
			1-Ocean	2-Ocean	Total				
1974	1,331,000	1975	1,395	533	1,928	0.14	2,310(55%)	4,258	0.32
1975	1,610,000	1976	3,343	2,306 ^a	4,548	0.28	3,816(46%)	8,364	0.52
1976	1,448,000	1977	91	97 ^b	292	0.02	151(34%)	443	0.03
1977	1,266,000	1978	1,527	524	2,047	0.16	2,140(51%)	4,187	0.33
1978	1,372,000	1979	2,967	2,081	5,048	0.37	4,730(48%)	9,778	0.71
1979	1,098,000	1980	1,011	2,791	3,802	0.35	9,118(70%)	12,970	1.18
1980	862,500	1981	1,860						
1981	1,055,984	1982							
1982	621,015	1983							

^a Elevated 2-ocean returns due to closed fishing season in fall 1978.

^b Estimated high loss of 1977 outmigrants due to severe drought.

The percentage return to the Salmon River of 1.18% is the highest return rate since the beginning of the program. The estimated harvest of 9,118 adults from the 1980 release is also the largest since the program began (Table 5).

1981 Release - 1980 Brood Year

In the spring of 1981, 862,500 smolts were released into the Pahsimeroi River from Niagara Springs Steelhead Hatchery. In 1983, 1,860 adults returned to the adult collection facility after one year in the ocean (Table 5). Two-ocean fish will return to the facility in 1984.

Salmon River Harvest Estimates

1981-82

Partridge and Pollard (1983) reported an estimated 9,765 steelhead harvested from the Salmon River in 1981-82. The preliminary harvest estimate was 9,412 (Ball 1984).

Estimates of hatchery fish harvested were derived by using proportions of hatchery fish in the catch reported by Bowler and Lindland (1983) for sections 1 through 3 and the North Fork check station for sections 4 and 5 (Ball 1984). Data for the spring season from sections 1 through 3 were not available, so the proportion of hatchery fish caught in the fall was assumed to be identical for the spring.

The estimated harvest of hatchery fish from the Salmon River in 1981-82 was 6,904 steelhead. In the spring of 1982, 3,444 hatchery steelhead returned to the Pahsimeroi weir. The total estimated return of hatchery fish to the Salmon River was 10,348 and the exploitation rate was 67%. Returns from B-strain steelhead released in 1979 (327 2-ocean) and 1980 (39 1-ocean) were included in the hatchery return (Table 4). A total of 366 B-strain fish were recorded in 1982, which was 11% of the return.

1982-83

The estimated fall harvest in 1982 was 8,691 (Partridge and Pollard 1983). Their estimate was derived from questionnaires sent to a sample of steelhead permit buyers. In the spring of 1983, a sample of steelhead permit buyers was surveyed by telephone shortly after the spring season. Future plans include a telephone survey after each fall

and spring fishery to produce more accurate and timely results. The estimated harvest for the spring of 1983 was 4,557 (Pollard 1985).

Total estimated harvest for 1982-83 was 13,248. This was a 36% increase from the 1981-82 estimate and is the largest harvest in the last several years. Water conditions were very good during the fall and exceptional in the spring season.

The estimated harvest of hatchery fish in 1982-83 was 11,737. This estimate was calculated using the proportion of hatchery fish in the catch reported by Bowler and Lindland (1983) for the lower river sections and the North Fork check station for sections 4 and 5 (Ball 1984). We also conducted a census to gather data from section 6 in the spring.

Fishing regulations to protect Salmon River wild steelhead were implemented in 1982-83. From Vinegar Creek upstream, all steelhead with dorsal fins longer than 57 mm had to be immediately released back to the river. Consequently, there were large numbers of fish released. For the fall season, the number of fish caught and released is not available for the Salmon River, but Partridge and Pollard (1983) estimated that 14,153 steelhead were caught and released in all Idaho rivers in 1982. For the spring of 1983, the estimated number of fish released for the Salmon River is available from the telephone survey. The number of fish released (7,241) exceeded the estimated 4,557 fish harvest (Pollard 1985).

In the spring of 1983, 5,008 hatchery fish returned to the Pahsimeroi weir. The total estimated return of hatchery fish to the Salmon River was 16,745 and the exploitation rate was 70%.

Salmon River Fishery, Sections 4 and 5

1982-83

We operated the steelhead check station at North Fork to monitor the fishery in sections 4 and 5 of the Salmon River (Fig. 2). This check station has been operated in the same manner since 1969. Check station operators run the station from noon to dark on Saturdays and Sundays. We collect information on the number of anglers, hours fished, fish caught and kept or released, and we inspect the catch to look for marked fish and classify those of hatchery origin.

During the fall 1982 and spring 1983 seasons, we interviewed 6,436 anglers who fished 63,160 hours to catch 2,561 steelhead, of which 1,868 were kept (Table 6). Effort was up 83% from 1981-82, which was the previous high since 1971-72. Hatchery fish made up 96% of the harvest.

Table 6. Steel head angler data collected at the North Fork check station, fall, 1982, and spring, 1983.

Fall, 1982							
Dates	No. anglers	No. hours	No. steel head			Hrs/fish	Percent hatchery
			Kept	Released	Total		
9/18-19	278	1,616	56	20	76	21	96
9/25-26	328	2,239	65	8	73	31	94
10/2-3	398	2,514	122	36	158	17	96
10/9-10	546	3,642	221	71	292	13	98
10/16-17	466	3,332	108	29	137	24	96
10/23-24	488	4,484	192	51	243	19	97
10/30-31	381	3,848	176	39	215	18	98
11/6-7	470	4,610	266	88	354	13	96
11/13-14	360	3,534	117	48	165	21	97
11/20-21	<u>230</u>	<u>1,947</u>	<u>81</u>	<u>25</u>	<u>106</u>	<u>18</u>	<u>97</u>
Sub-totals & averages	3,945	31,766	1,404	415	1,819	18	97
Spring, 1983							
2/19-20	260	1,548	23	27	50	31	96
2/26-27	510	4,356	221	100	321	14	98
3/5-6	467	4,573	37	39	66	69	97
3/12-13	417	3,821	38	7	45	85	97
3/19-20	337	2,723	79	30	109	25	94
3/26-27	331	2,726	46	58	104	26	85
4/2-3	169	1,647	20	27	47	35	75
Sub-totals & averages	<u>2,491</u>	<u>21,394</u>	<u>464</u>	<u>278</u>	<u>742</u>	<u>29</u>	<u>94</u>
Totals & averages	6,436	53,160	1,868	693	2,561	21	96

Spring Census North Fork to Ellis

We initiated a creel census in 1983 to evaluate the contribution of hatchery steelhead in the spring fishery between North Fork and the mouth of the Pahsimeroi River (Fig. 2). Prior to 1980, only small numbers of steelhead were being harvested from this river reach. The maximum harvest estimate for section 6 (Salmon city to the mouth of the Pahsimeroi River) was only 219 (Ortmann 1975). In the 1981 and 1982 spring seasons, we observed a developing fishery between North Fork and Ellis. The estimated contribution of hatchery fish caught in these years from this upstream river reach was projected from North Fork check station results. Steelhead arrived early in the fall of 1982, and the fall fishery results indicated that we could expect a significant harvest between North Fork and the Pahsimeroi River during the spring season.

Weather permitting, the spring season usually begins in late February when enough ice thaws to allow fishing and extends into early April. In 1983, the spring season opened January 1 and ran until April 3. The bag limit was two per day, two in possession and eight for the season.

Highway 93 borders the Salmon River between North Fork and Salmon. However, there are several areas where the river is not visible from the highway. Anglers in boats often float through these areas to fish.

We began the census on February 21 and ran it for six weeks until the end of the season. The six weeks were divided into three two-week intervals. Four weekdays and two weekend days were selected at random for census days during each interval. On each census day, a clerk interviewed anglers to ascertain the number of hours fished, number of fish caught and released and fishing method (boat or shore). All fish checked were measured, sexed and examined for marks and eroded dorsal fins. Additional information was collected on the number of fishermen per vehicle and the number of fishermen on the river between 1200 and 1300 hours. Census clerks alternated direction on successive days.

On each census day we counted shore anglers, vehicles, boats and boat anglers from a single engine aircraft flying at low speed and low altitude. The count began at 1200 at the mouth of the Pahsimeroi River and terminated at North Fork at about 1300 hours. Early in the season, individual anglers were enumerated. As fishing pressure increased, it became necessary to count only vehicles and boats. Counts were stratified by three river sections: North Fork to Salmon (5B); Salmon to Iron Creek (6A); and, Iron Creek to the Pahsimeroi River mouth (6B).

For the entire six weeks, we calculated the average proportion of anglers who were fishing and were subject to being counted between 1200 and 1300 hours, the average number of anglers per vehicle and the average number of anglers per boat. Aerial counts were corrected to depict the total number of shore and boat anglers per census day by river section.

**SALMON AND STEELHEAD CATCH LOCATION
Reference Map**

Anglers:

Please use this map and the river section description list on the reverse side to record on your permit your salmon and steelhead catches by designated section. Use the river section or tributary name shown on the map. Examples: "Salmon - 5" for catches from main Salmon River between the Middle Fork and Lamhi River; "Upper Clearwater" for catches between the North Fork and the South Fork. Use tributary names when applicable.

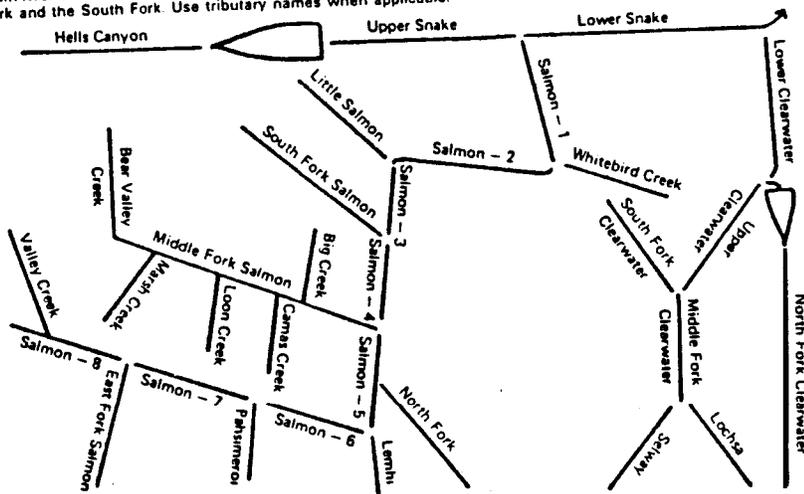


Figure 2. Steelhead catch location map, showing statistical sections for Salmon River.

The average length of a spring steelhead fishing day was calculated from North Fork check station results for 1980, 1981 and 1982. The majority of anglers encountering this check station have completed their fishing day, so the total recorded hours divided by the total number of anglers' interviewed, provided an estimate of 6.1 hours per angling day. We did not attempt to differentiate between the length of shore and boat fishing days in the calculations.

The estimated effort is the product of the average number of anglers counted, times the average number of hours per fishing day, times the number of weekdays or weekend days per interval. Estimated harvest is the estimated hours of effort, divided by the average catch rate per interval in hours per fish. Hatchery contribution is the estimated harvest times the proportion of fish observed with eroded dorsal fins.

Water conditions were excellent in the spring of 1983. We estimated that anglers fished 55,925 hours for steelhead between North Fork and Ellis and caught 1,492 fish (Table 7). Section 6B supported 69% of the effort and harvest. Effort increased in all sections as the season progressed. The average catch rate was 37 hours per fish and was stable through all three intervals.

Hatchery fish made up 93% of the catch (Table 7). It is unlikely that significant numbers of wild fish would have passed upriver prior to the census period. Therefore, we conclude that the estimated wild fish escapement to the upper Salmon River drainage above Ellis was less than 500 fish in 1982-83.

Results from the statewide harvest survey are lower than the harvest estimate from the census. Pollard (1985) reported an estimated harvest of 1,138 fish for section 6 compared to 1,492 from the census.

Resident Rainbow Trout

Resident rainbow trout migrating upstream in the lower Pahsimeroi River are diverted by the weir into the adult steelhead collection facility. As the adult steelhead are sorted, resident rainbow are passed back to the Pahsimeroi River above the weir. Actual numbers have not been enumerated, but several hundred resident rainbow have been diverted by the weir in some years. There appears to be a trend toward fewer rainbow returning now than in the late 1960's and early 1970's (Tom Levendofsky, pers. comm.).

Wild rainbow trout are caught from the Salmon River during the summer months, but nothing is known of their life history. There appears to be a declining trend in the fishery that corresponds to the decline in numbers at the Pahsimeroi weir. It was hypothesized that the Pahsimeroi River could be the spawning area for Salmon River rainbow. And, this stock of rainbow could be useful for future consideration as a brood stock.

Table 7. Estimated effort and harvest, spring 1983 steel head fishery, North Fork to Pahsimeroi River.

	North Fork to Lemhi River Section 5B	Lemhi River to Iron Creek Section 6A	Iron Creek to Pahsimeroi River Section 6B	Totals & averages
Feb. 20-March				
Angler hours	2,214	1,763	5,496	9,473
Fish caught	58	46	144	248
% hatchery	100	100	100	100
No. hatchery fish	58	46	144	248
			Hours/fish	38
March 7-March 20				
Angler hours	3,691	3,477	14,530	21,698
Fish caught	96	91	378	565
% hatchery	100	100	95	96
No. hatchery fish	96	91	358	545
			Hours/fish	38
March 21-April 3				
Angler hours	3,056	3,349	18,349	24,754
Fish caught	84	92	503	679
% hatchery	80	60	95	88
No. hatchery fish	67	55	476	598
			Hours/fish	36
Totals				
Angler hours	8,961	8,589	38,375	55,925
Fish caught	238	229	1,025	1,492
No. hatchery fish	221	192	978	1,391
Average				
% hatchery	93	84	95	93
Hours/fish	38	38	37	37

Because the fish had to be handled at the hatchery, it was decided to attach a Jaw tag prior to release to monitor migration patterns. We hoped to tag 300 resident rainbow, but only 78 entered the trap in 1983. Monel jaw tags were attached, and then the fish were measured before release upstream of the weir. The size range was from 210 to 489 mm and they averaged 377 mm (Table 8). The majority of the fish (95%) were tagged between March 4 and 25. The remainder entered the trap in mid-June and were tagged on June 16.

Six tags were recovered in 1983. Two fish tagged on March 7 were recovered from the Salmon River fishery downstream and within two miles of the Pahsimeroi River mouth on March 13 and 24. One fish tagged on March 15 was recaptured from the Pahsimeroi River about four miles above the weir on May 29. During the early summer, three tags were recovered from the Salmon River downstream from the Pahsimeroi, but the tags were lost before the numbers were reported. Because no other jaw tags were out in the Salmon River, we assume they were from the Pahsimeroi River.

It appears that soon after spawning in the Pahsimeroi River, resident rainbow return to the Salmon River. The recaptures were all about 400 mm except one which was 360 mm, so some fish could have been repeat spawners.

The resident rainbow spawning in the Pahsimeroi River have potential as a brood stock for the Salmon River. Further life history studies are desirable and recommended, but beyond the scope of this project. Spawning gravels in the Pahsimeroi River are very high quality and could potentially produce significant recruitment to the Salmon River. The size at maturity is especially desirable to the fishermen. No other Salmon River tributary is known to produce large numbers of fish in the Salmon River in excess of 400 mm.

Di stri buti on of Adul t Steel head

After enough adults have been spawned to supply eggs to Niagara Springs and other smolt rearing hatcheries, the remaining adults are used to enhance naturally spawning runs in the Salmon River drainage.

Small streams or sites where access is limited are usually stocked with unfed fry. As soon as the yolk sacks are absorbed, fry are taken directly from the incubators and transported to the receiving stream by truck, backpack, motorcycle, or horse. The extent of this program depends on the availability of incubation space. In 1983, 16 streams received 1,559,250 fry (Table 9). An additional 78,423 were held until fall and released as fingerlings.

After all incubation space was full, the adults remaining were held until the females were ripe and then hauled to streams with spawning potential. We dispersed 2,583 adults to seven streams, all in the upper Salmon River drainage (Table 9).

Table 8. Length frequency of resident rainbow trout tagged and released from the Pahsimeroi River adult collection facility, 1983.

Total length (cm)	No. fish
210-219	-
220-229	-
230-239	1
240-249	-
250-259	-
260-269	-
270-279	2
280-289	-
290-299	-
300-309	-
310-319	6
320-329	3
330-339	2
340-349	2
350-359	4
360-369	8
370-379	5
380-389	6
390-399	4
400-409	5
410-419	2
420-429	5
430-439	6
440-449	3
450-459	2
460-469	-
470-479	3
480-489	<u>2</u>
Total	78

Average size = 377 mm.

Table 9. Adult, fry and fingerling steelhead distributed into the upper Salmon River drainage from the Pahsimeroi Hatchery, 1983.

<u>Adult distribution (A-strain)</u>			
<u>Stream</u>	No. females	No. males	Total
Pahsimeroi River	175	150	325
Lemhi River	365	354	719
No. Fork Salmon River	100	100	200
Panther Creek	200	179	379
Sheep Creek	100	100	200
Valley Creek	90	60	150
Yankee Fork Salmon River	<u>300</u>	<u>280</u>	<u>610</u>
Subtotal	1,360	1,223	2,583

<u>Fry distribution</u>			
<u>Stream</u>	<u>Strain</u>	<u>Date</u>	<u>No. of fish</u>
Slate Creek	A	4/21	25,000
Squaw Creek	A	4/21	85,000
Morgan Creek	A	4/21	113,220
Pahsimeroi River	A	4/25	167,790
No. Fork Iron Creek	A	4/29	50,000
Iron Creek	A	4/29	105,240
Bia Sprinas Creek	A	5/2	<u>305,000</u>
Subtotal			851,250
Owl Creek	B	5/25	20,000
Pine Creek	B	5/25	30,000
Indian Creek	B	5/25	50,000
Herd Creek	B	5/26 & 6/8	150,000
W. Fork Yankee Fork	B	5/31	100,000
E. Fork Salmon River	B	6/2 & 6/4	218,000
Sheep Creek	B	6/13	24,000
Hughes Creek	B	6/13	<u>26,000</u>
Subtotal	B		708,000

<u>Fingerling distribution</u>			
<u>Stream</u>	<u>Strain</u>	<u>Date</u>	<u>No. of fish</u>
Basin Creek	A	9/7	20,703
W. Fork Yankee Fork	A	9/7 & 9/8	<u>57,720</u>
Subtotal			78,423

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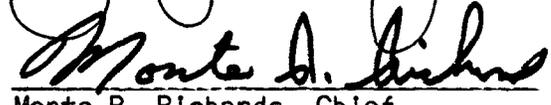
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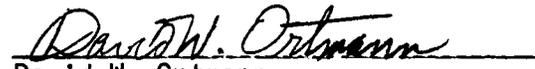
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