

IDAHO FISH & GAME DEPARTMENT

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Evaluation of Transplanting Snake River
Steelhead Trout to the Pahsimeroi River, 1972

by

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EVALUATION OF TRANSPLANTING SNAKE RIVER STEELHEAD TROUT TO THE PAHSIMEROI RIVER, 1972

ABSTRACT:

In the spring of 1972, a total of 4,904 adult steelhead trout, from 1969 and 1970 smolt releases, returned to the Pahsimeroi River steelhead collection station. These fish yielded over 11,000,000 eggs, part of which will be hatched and reared for the 1973 program.

Returns of fin-clipped fish indicate higher smolt to adult survival for smolts released at the adult trap 3.5 river miles from the mouth, than smolts released near the acclimation ponds 15 river miles from the mouth.

Over 80 percent of the 1972 smolt release were progeny from the 1971 adult returns. Field observations indicated most emigrated from the Pahsimeroi by July. The entire 1972 smolt delivery was released in the Pahsimeroi River at the adult trap site.

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RECOMMENDATIONS :

Continue inspection of returning adults in the sport catch and at weirs to aid in the evaluation of mark and release programs.

The Pahsimeroi River adult diversion weir should be replaced or modified because adult steelhead can pass through the widely spaced bars.

Deliver smolts from Niagara Springs to the Pahsimeroi River between arch 25 and May 5 if transportation equipment is available.

OBJECTIVES:

To monitor the migration rates and adult returns of steelhead reared at Niagara Springs Hatchery and released in the Pahsimeroi River.

To evaluate returns to the Pahsimeroi River of transplanted Snake River stocks of steelhead trout.

INTRODUCTION :

The Pahsimeroi facilities and the background on the project are described in previous project reports (Reingold 1968-1971).

Snake River race steelhead eggs are obtained from adult steelhead returning to the Pahsimeroi River (from prior smolt releases) or at Idaho Power Company's Hells Canyon Dam fish facilities. The young are hatched and reared for one year to "smolt size" at Niagara Springs Hatchery. Smolts are trucked to and released in the Pahsimeroi River near Challis, Idaho. This is part of Idaho Power Company's obligation to relocate steelhead and salmon stocks from the Snake River to the Salmon River because of inundation and blockage of their ancestral migration routes and spawning beds by Hells Canyon Dam.

TECHNIQUES USED:

Enumeration Facilities - Adult

The adult steelhead trapping and spawning facilities remain basically the same as described in previous project reports.

Adult steelhead arriving at the weir are held in concrete pens until ripe. Project personnel take the spawn, incubate the eggs to the advanced-eyed stage and ship the eggs to Niagara Springs for hatching and rearing. Approximately one year later, the "smolts" are trucked back to the Pahsimeroi River and released to begin their seaward migration.

We measure and sex adults immediately after the fish are spawned. Personnel note arrival dates of fish entering the facilities and check arriving fish for fin clips. Spawned-out steelhead carcasses are given to the public on a first-come, first-served basis.

Enumeration Facilities - Juveniles

The downstream migrant enumeration facilities remained unchanged in 1972 from past years. I used the same trap, located on an irrigation bypass pipe at Burstedt Lane, approximately 11 river miles downstream from the release site near the acclimation ponds. Tom Levendofske, Hatchery Superintendent, operated the trap and recorded catches.

Delivery of Fish

Approximately 1,555,000 steelhead juveniles were hauled to the Pahsimeroi River from Niagara Springs Hatchery in 47 truck loads between March 7 and May 11, 1972. All smolts were released directly into the river near the adult steelhead weir site approximately 3.5 river miles above the mouth of the Pahsimeroi.

Two-Year Rearing Program

Approximately 175,000 steelhead that were reared for an additional year in one acclimation pond were released directly into the Pahsimeroi on April 4.

These 1970 brood year fish were placed in the pond in the spring of 1971, at 131 millimeters average length and 23 per pound. Prior studies on the Pahsimeroi indicated that these smaller fish would not leave the Pahsimeroi if re-released in the stream so we decided to rear these fish for the additional year.

Upon release, these fish average 203 millimeters total length and 4.6 per

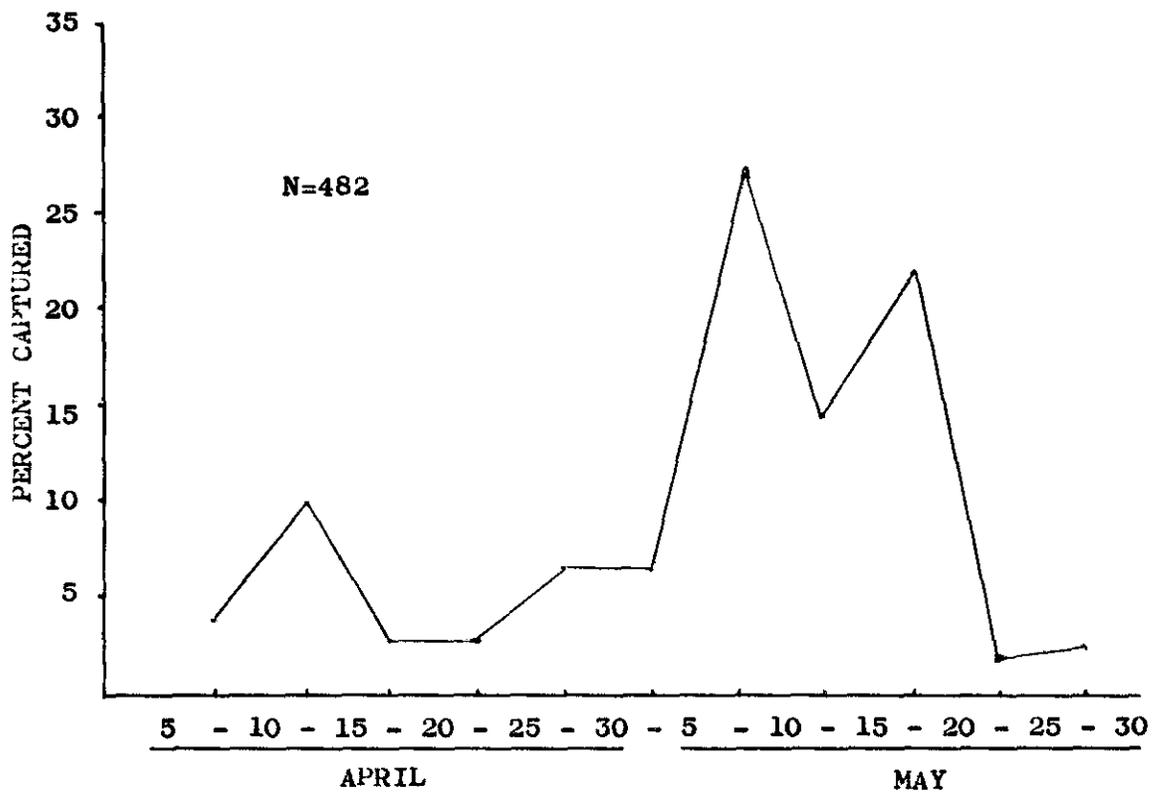


Figure 1. Timing of Burstedt Lane trap catches of 1970 brood year steelhead smolts released from the acclimation pond on April 4, 1972.

pound. Approximately 47,500 were marked with left ventral-adipose fin clips.

Trapping Operations

We placed the Burstedt Lane screen bypass trap into operation just prior to releasing the steelhead from the pond to monitor the general timing of their downstream migration. We did not conduct mark and recovery work to estimate total numbers of emigrants. The emigration timing of this group is shown in Figure 1. Peak migration occurred between May 1 and May 25, with 73 percent of the total trap catch occurring in this period. The greatest number of smolts were collected in the trap between May 5 and May 10, about one month after release from the pond some 11 river miles upstream.

FINDINGS :

Downstream Migration

In past years, deliveries of Niagara Springs reared smolts were released into the Pahsimeroi River at the acclimation ponds approximately 15 river miles upstream from its mouth. In 1970, we also released a group of marked smolts near the adult steelhead trap, about 3.5 river miles above the mouth, to determine if the difference in river release area (acclimation time) would reflect in numbers of adults returning to the station.

As described in detail in the 1971 progress report, numbers of marked adults in the fall 1971 sport catch indicated a higher return of lower river released fish than upper river released. Based on this data, we released the 1972 smolt delivery at the lower station (Figure 2). There were no fish released above Burstedt Lane in 1972 other than the 175,000 pond reared 1970 brood-year smolts described earlier in this report. We did not conduct any mark and recovery work to estimate out-migration numbers of the 1971 brood year steelhead released at the lower site.

My observations made from a canoe in the summer of 1972, indicate that few smolts summered between Burstedt Lane and the mouth of the Pahsimeroi. It appeared

that nearly all of the 1972 delivery of smolts from Niagara Springs migrated downstream prior to the first part of July.

Of the total delivery of 1,555,000 steelhead smolts, 1,273,000 (82 percent) were progeny of adults that returned to the Pahsimeroi in 1971 from prior smolt releases and 282,000 (18 percent) were obtained as eggs at Hells Canyon Dam on the Snake River in 1971.

Adult Returns - 1972

1969 Release:

In 1971, 647 one-ocean adult steelhead returned to the Pahsimeroi weir. In 1972, 162 two-ocean steelhead (27 inches total length or longer) returned to the station. Both these groups of adults were from the 1969 smolt release of 1968 brood year steelhead reared at Niagara Springs. Of a total 1969 release of 1,645,000 fish, we obtained a return to the station of 809 adults; .049 percent. This does not include hatchery fish taken in the sport fishery.

1970 Release:

Some 4,578 adult steelhead entered the upstream migrant trap between February 21 and June 2, 1972. Of these, 1,701 (37 percent) were males and 2,877 (63 percent) were females. A sample of 967 fish measured at the station included 96.7 percent one-ocean fish and 3.3 percent two-ocean fish.

In addition, station personnel removed 326 dead one-ocean steelhead adults from the upstream face of the diversion weir. These smaller fish obviously passed through the weir dividers on their upstream migration. This brought the total steelhead count to 4,904 fish.

Based on the 967 fish sample, we classified 162 as two-ocean fish from the 1969 smolt release and 4,742 as one-ocean fish from the 1970 smolt release (Figure 3).

On May 15, from an airplane, we counted 30 steelhead redds in the 12 river miles between the diversion weir and the Dowton Lane bridge. A portion of the steelhead that passed through the weir spawned in the river. The weir bars are

too widely spaced and too flexible and should be replaced or modified to prevent adults from passing through in the future.

Parked Adult Returnees:

1969 Release:

In 1971 and 1972, a total of 52 right ventral and 24 right ventral-adipose clipped adults returned to the weir from the 1969 smolt releases.

In the spring of 1969, we held 25,000 RV-AD clipped smelts in an acclimation pond for 30 days and released 25,000 RV clipped smolts directly in the river adjacent to the acclimation pond. This was a repeat of a 1968 marking experiment.

The smolts held in the acclimation pond returned as adults at a rate less than half (24 counted) that of adult returns (52 counted) from smolts planted directly in the river (Table 1).

1970 Release:

In 1970, we released one group of 25,000 smolts marked with a right ventral-adipose fin clip in the Pahsimeroi River about 15 river miles above the mouth. A second group of 25,000 smolts, marked with a right ventral clip, was released near the adult steelhead trap about 3.5 river miles above the mouth, to determine if a lower release site would increase numbers of adults returning to the station.

We felt release of smolts lower in the river may benefit smolt survival by reducing losses in irrigation ditches, by predation and by delay, and would reduce concentrations of non-migrants summering in the Pahsimeroi.

In the spring of 1972, we counted 300 marked steelhead from the 1971 release at the Pahsimeroi station. Of these, 188 (63 percent) carried a right ventral fin clip and 112 (37 percent) had right ventral-adipose clips (Table 1). Smolts released in the lower river returned in greater numbers (188) than smolts released in the upper river (112). Returns of marked two-ocean adult steelhead in 1973 are not likely to change the ratio significantly.

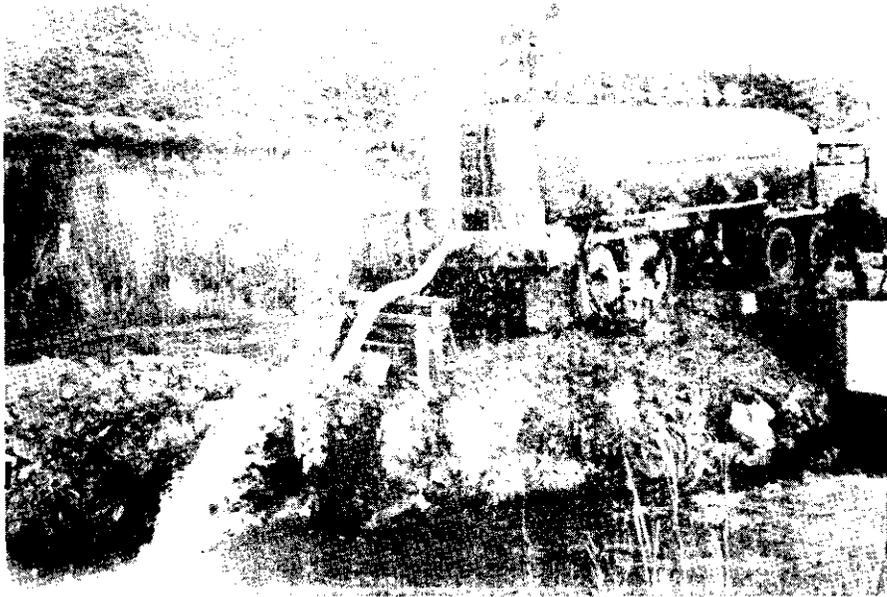


Figure 2. The 1973 smolt delivery was released at the adult trap site. Marked 1973 returning adults showed a higher return for lower river releases over upper river.



Figure 3. Over 4,700 1970-release smolts returned to the Pahsimeroi station as adults in the spring of 1972.

It appears that the three and one-half mile trip down the Pahsimeroi resulted in adequate acclimation to instill a homing imprint in returning adults. It also appears that steelhead smolts released 15 river miles up the Pahsimeroi have lower survival than those released closer to the mouth.

Catch and Release Study

Field work in the upper Salmon River drainage indicates that wild steelhead stocks are down in numbers from past years. Problems at dams, nitrogen disease, habitat damage and fishing pressure (sport, commercial and Indian) are major contributing factors. A selective fishery on steelhead returning to Idaho hatcheries could possibly help to reduce pressure on wild stocks.

In the spring of 1972, we initiated a project to evaluate the survival of steelhead hooked and released by anglers. We transported 20 female and 20 male adult steelhead from the Pahsimeroi adult holding pens, approximately 50 miles down the main Salmon River. We played 10 females and 10 males to exhaustion on the end of a rod and reel and marked each fish on the right opercle with a conductor's punch.

We also released 10 males and 10 females directly into the Salmon River at the same site without playing them. We marked these fish with a left opercle punch. We selected only green (unripe) females for the experiment.

Pahsimeroi station personnel inspected every adult steelhead which entered the trap for the opercle punches applied to the study fish.

Of the 40 fish marked in the experiment, only 9 returned to the adult trap. Of these only one was from the played group while eight of the unplayed group returned. The one fish from the played group was a male played and released one week prior. Of the eight unplayed fish, five were females and three males. Thirty-one fish never returned to the weir.

The dates of releases and arrivals at the weir are as follows:

<u>Release Date</u>	<u>Return Date</u>	<u>Sex</u>	<u>Mark</u>
4/20	4/28	F	L
4/21	4/28	M	R
4/20	5/1	F	L
4/20	5/1	F	L
4/21	5/1	M	L
4/20	5/4	F	L
4/20	5/4	F	L
4/21	5/4	M	L
4/21	5/4	M	L

Although the played-unplayed return ratio of 1 : 8 is statistically significant, we plan to repeat the study with greater numbers of fish in the spring of 1973.

Dorsal Fin Deformity Recognition

If the average angler is to be expected to release wild fish and retain hatchery origin steelhead in a selective fishery, he must be able to discern between the two. Most hatchery origin steelhead have a deformity of the dorsal fin to some degree.

In the spring of 1972, we inspected 363 Niagara Springs origin steelhead spawners at the Pahsimeroi adult trap to determine the degree of dorsal fin deformity. I classified the fins into three classes:

Class I - strongly deformed, easily recognizable.

Class II - moderately deformed, probably recognizable with education.

Class III - slight deformity or none, not recognizable.

We classified the 363 inspected fish as follows:

Class I - 198 (55%) Class II
- 101 (29%) Class III - 64 (
16%) Total checked - 363 (
100%)

It appears that, with education, most anglers would recognize somewhere around 84 percent of the Niagara Springs hatchery origin steelhead caught.

The first steps of a public program to educate anglers to recognize hatchery

Brood Year Release Year	Number of Fish Released	Number Marked	Mark Used	Number Adults Returned as:		Total Adults to Weir	Total Brood Year to Weir	Est. Sport Catch	Est. Total Run	Marked Adults to Weir	Number of Eggs Taken at Weir
				One Yr. Ocean	Two Yr. Ocean						
1965 1966	65,000	24,000	RVAd	- (1968)	0 (1969)	-	-	(brood year)	(brood year)	(brood year)	-
1966 1967	1,292,000	97,000	RVAd (pond)	(89%) 798 (1969)	(11%) 107 (1970)	798 (1969)	(100%) 905 (1966)	590 (39%)	1,495	39 RVAd	1,620,000 (1969)
1967 1968	1,484,000	25,000 25,000	RV (river) RVAd (pond)	(86%) 401 (1970)	(14%) 66 (1971)	508 (1970)	(100%) 467 (1967)	390 (45%)	857	15 RV 15 RVAd	1,662,000 (1970)
1968 1969	1,645,000	25,000 25,000	RV (river) RVAd (pond)	(80%) 647 (1971)	(20%) 162 (1972)	713 (1971)	(100%) 809 (1968)	650 (48%)	1,459	52 RV 24 RVAd	1,758,000 (1971)
1969 1970	1,622,000	25,000 25,000	RV (low. Riv.) RVAd (up. Riv.)	4,742 (1972)	(1973)	4,904 (1972)		2,900 (1-ocean only)	→ 1-ocean only →	188 RV 112 RVAd	11,081,000 (1972)
1970 1971	1,442,000	50,000 50,000	RV (Low. Riv.) RVAd (up. Riv.)	(1973)	(1974)						
1971 1972	1,555,000	0	-	(1974)	(1975)						

Table 1. Summary of releases, returns, and egg take of the Pahsimeroi--Snake River steelhead relocation project since its inception in 1965. The first second generation Pahsimeroi River returnees returned to the station in the spring of 1972.

fish was initiated in the fall of 1972, via news releases, posters at steelhead check stations and personal contact by Department personnel.

At a steelhead angler check station operated near North Fork, Idaho, in October, 1972, we asked anglers to identify their catch as hatchery origin or wild. Of 215 steelhead, wild and hatchery, anglers identified 108 (50 percent) correctly. Most anglers mis-identifying fish failed to notice the deformed fin or didn't know what to look for.

Estimate of the 1972 Run and Sport Harvest

In the fall of 1971 and the spring of 1972, Idaho Fish and Game Department personnel operated steelhead harvest check stations near North Fork and Riggins, Idaho. Data from these stations and 1971 state-wide steelhead harvest estimates (Mallet, 1972) enables me to estimate the total hatchery run and sport harvest in the Salmon River.

An estimated 8,000 hatchery-origin steelhead adults entered the main Salmon River. Of this number, an estimated 2,800-3,000 (35-40 percent) were taken by anglers in the fall of 1971 and spring of 1972, and 4,900 (60-65 percent) returned to the Pahsimeroi station. Above the Middle Fork of the Salmon River, hatchery-origin fish provided 77 percent of the total steelhead harvest. Below the Middle Fork (Section 4 only), hatchery fish contributed approximately 37 percent of the sport catch. Below the South Fork (Section 3 only) hatchery fish comprised approximately 34 percent of the angler's bag of steelhead.

From check station records, the 1971 state-wide steelhead harvest figures, and field data collected by conservation officers, it appears that hatchery steelhead contributed around 54 percent of the Salmon River 1971-72 steelhead harvest. The number of steelhead harvested in the spring of 1972 was quite low due to a shortened fishing season and poor water conditions. Only 23 steelhead were checked through the North Fork station and 54 steelhead checked through the Riggins station between February 19 and March 12, 1972. This compares with 660

steelhead through the North Fork station and 331 through the Riggins station in the fall of 1971. Of 557 steelhead inspected at the North Fork check station in the fall of 1971, 20 bore right ventral fin clips and 12 had right ventral-adipose clips. Some 5.7 percent of the steelhead in the sport fishery had fin clips (32) and 6.4 percent of the steelhead returning to the weir had clips (313).

At our check station at North Fork, hatchery origin steelhead contributed from 17 to 22 percent of the inspected sport catch in 1969, 1970 and the spring of 1971. In the fall of 1971 and spring of 1972, over 60 percent of the steel-head caught in Salmon River Sections 4 and 5 combined were of hatchery origin. This high ratio was reflected in a run of nearly 5,000 fish back to the Pahsimeroi in the spring of 1972.

In the fall of 1972, hatchery-origin steelhead comprised approximately 32 percent of the steelhead sport catch; about one-half that of 1971. Hours per fish (an index of effort) was also approximately twice that of the previous season; 18 hours per fish versus 9 in 1971. If these figures are indicators of run size, and proportionally reflect the fishable population available to the angler, they may indicate a returning run back to the Pahsimeroi in 1973 of about half that in 1972.

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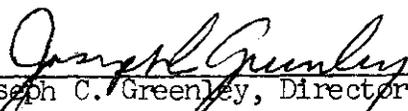
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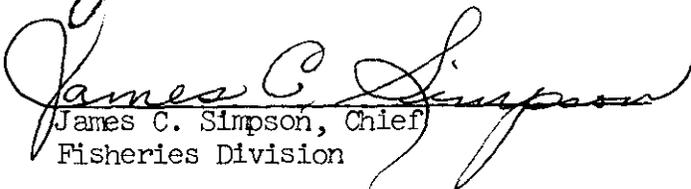
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