

IDAHO FISH & GAME DEPARTMENT

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Evaluation of Transplanting
Snake River Steelhead Trout to
the Pahsimeroi River, 1970.

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EVALUATION OF TRANSPLANTING SNAKE RIVER STEELHEAD TROUT TO THE PAHSIMEROI RIVER--1970

ABSTRACT :

During the spring of 1970, approximately 1,622,000 hatchery-reared Snake River juvenile steelhead trout were trucked to the Pahsimeroi River from Niagara Springs Hatchery. Estimates from mark and recovery sampling indicated that some 1.2 million smolts (75 percent of those planted) left the Pahsimeroi River between March and December, 1970. Other evidence indicates that a greater percentage may have emigrated. Over eighty percent of the total smolt delivery consisted of progeny from adult steelhead that returned to the Pahsimeroi Weir in 1969.

In the spring of 1970, some 401 adult steelhead from the 1968 smolt releases and 107 adults from the 1967 smolt releases returned to the Pahsimeroi Weir. These fish yielded **approximately** 1,622,000 eggs for hatching and rearing and release as smolts in the spring of 1971.

Anglers harvested an estimated 424 adult hatchery steelhead during the 1969-1970 fish year from the upper Salmon River (**above** the South Fork). This indicates a hatchery run into the upper Salmon River area of 932 fish of which 45 percent were harvested and 55 percent returned to the Pahsimeroi River.

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RECOMMENDATIONS:

Marking studies initiated in 1970 to determine the relation between smolt release area and adult return success should continue in 1971.

Eggs and progeny from steelhead adults that return to the Pahsimeroi River from prior smolt releases should receive priority over all other stock at Niagara Springs for replanting in the Pahsimeroi River.

Delivery of smolts from Niagara Springs to the Pahsimeroi should fall between April 1 and May 15 if transportation equipment availability allows it.

OBJECTIVES:

The continuing purpose of this project remains to evaluate the success of transplanting the Snake River steelhead runs, blocked by Idaho Power Company dams, to the Pahsimeroi River.

INTRODUCTION :

The Pahsimeroi facilities and the background on the project are described in previous project reports (Reingold, 1968, 1969, 1970).

Briefly, Snake River race steelhead eggs, spawned at Idaho Power Company's Hells Canyon Dam fish facilities or obtained from adult steelhead returning to the Pahsimeroi River from prior smolt releases, are hatched and reared in one year to "smolt size" at Niagara Springs Hatchery, then transported to the Pahsimeroi River near Challis, Idaho. This is part of a program to relocate steelhead and salmon stocks from the Snake River to the Salmon River. The Idaho Fish and Game Department operates the facilities and Idaho Power Company finances the project.

TECHNIQUES USED:

Enumeration Facilities - Adult

The adult steelhead trapping and spawning facilities remain basically the same as described in previous project reports (Reingold, 1969, 1970).

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 rearing. Approximately one year later the "smolts" are trucked back to the Pahsimeroi River.

Adult lengths, sex, scale samples and mark determinations are made immediately after the fish are spawned. Personnel note arrival dates of fish entering the facilities.

Enumeration Facilities - Juveniles

The downstream migrant enumeration facilities remain unchanged from past years. I used the same trap, located on an irrigation screen bypass pipe at Burststed Lane, approximately 11 river miles downstream from the release site near the acclimation ponds.

A similar trap system on another screen bypass some two miles further upstream provided additional information in 1970. However, we used this trap only for a 17-day period in May, 1970 and stopped due to overcrowding of fish.

Delivery of Fish

Approximately 1,622,000 steelhead smolts were hauled to the Pahsimeroi River from Niagara Springs Hatchery in 57 truck loads between March 2 and May 12, 1970. Some 1,574,000 were released near the acclimation ponds 15 river miles above the mouth of the Pahsimeroi. This group included 25,000 fish marked with a right-ventral adipose fin clip.

The remaining 34,000 smolts were released near the upstream trapping facilities, about three river miles from the mouth of the Pahsimeroi. This group included 25,000 fish marked with a right ventral fin clip. We will compare survival of upper and lower river releases of marked fish in 1972.

FINDINGS:

Downstream Migration

We marked steelhead smolts collected in the Burststed Lane trap with opercle punches and again released the marked fish two river miles back upstream, as in past years. During 1970, we marked 5,757 fish and recaptured 95, for an average trap capture rate of 1.65 percent. This compares with 1.68 in 1967; 1.31 in 1968; and 1.64 in 1969. We changed marks weekly in 1970 and derived the estimates of emigrants from weekly efficiency recapture rates (Table 1).

Since 1967, we estimated numbers of smolts emigrating from the Pahsimeroi by mark and recapture sampling at the Burststed Lane trap. Projected estimates are from relatively small numbers of fish compared to total delivery, (generally 5-10,000 per season), and necessarily so. To approach high levels of statistical confidence would require handling huge numbers of fish, entail large trapping systems and greatly increased manpower. We feel that a general picture of the migration pattern is sufficient to allow us to determine any handling or rearing procedure changes that would fit into the relatively tight hatchery and delivery routines.

The estimated number of spring and fall emigrants presented here and in previous annual reports should be viewed as representing only a general picture of the emigration. Size of migrating smolts and timing of emigration as determined at the Burststed trap most likely represents an accurate picture of these factors.

Table 1. Burstedt Lane trapping, marking and recapture data and estimated smolt emigration figures, 1970.

Mark * Used	No. Fish Marked & Released	No. of Marks Collected	Time Period Used	Percent Trap Efficiency	Hatchery Steelhead Collected	Estimated Smolt Emigration
#1	525	20	3/8-15	3.8	841	22,100
#2	418	10	3/16-23	2.4	612	25,500
#3	536	5	3/24-31	.9	1,120	124,400
#4	493	13	4/1-7	2.6	1,487	57,200
#5	465	11	4/8-15	2.3	1,142	49,700
#6	506	10	4/16-23	2.0	1,475	73,800
#7	390	7	4/24-30	1.8	1,086	60,300
#8 & 3	550	7	5/1-7	1.3	1,498	115,200
#9 & 16	900	5	5/8-15	.6	1,866	311,000
#10 & 4	446	2	5/16-23	.4	332	83,000
#11	250	1	5/24-31	.4	914	228,500
#12	203	3	6/1-7	1.5	266	17,700
#13	75	1	6/8-15	1.3	148	11,400
-	0	0	6/16-30	1.3(est.)	76	5,900
-	0	0	7/1-11/30	1.65(av.)	418	25,300
	<u>5,757</u>	<u>95</u>		<u>1.65(av.)</u>	<u>13,281</u>	<u>1,211,000</u>

*Opercle punches made with modified paper punches--location of punch varied weekly.

It appears that a higher percentage of the total smolt delivery left the Pahsimeroi between March and July, 1970 than in any past year since the program began. The estimate of emigrants passing the Burstedt Lane trap exceeds 1,200,000 smolts (Table 1). However, other evidence indicates this estimate may be on the low side.

From May 4 to May 20 we operated another trap some two to three river miles above the Burstedt Lane trap. This trap, located on a very large irrigation ditch screen bypass, collected over 27,000 fish during that 17-day period. During that same period, the Burstedt trap collected approximately 3,500 fish. We ceased using this upper trap after May 20, due to excessive smolt injury and mortalities due to crowding. However, mark and recapture work during the 17-day period indicated some 635,000 fish passed this trap between May 4 and 20.

In comparison, smolt emigration figures derived from Burstedt Lane trap mark and recapture estimates during this same period (May 4 to 20) indicated approximately 535,000 smolts passed that trap, some 100,000 smolts less than we estimated passed the upstream system.

In past years, the percent of the total smolt delivery emigrating in the fall ranged from 7 to 29 percent. In 1970, only two percent of the total delivery emigrated after June 30 (Table 1). The 1970 smolt deliveries consisted of over 80 percent progeny from steelhead adults that returned to the Pahsimeroi in 1969. Prior to 1970, all smolts delivered came from eggs obtained from steelhead returning to the Oxbow facilities on the Snake River. Only spring emigrating steelhead smolts from the Pahsimeroi deliveries survive to return as adults. Progeny from adult returnees to the Pahsimeroi station may show a propensity toward spring emigration.

In past years, huge masses of over-summering steelhead smolts remained in the Pahsimeroi prior to emigrating in the fall. Trout anglers fishing the Pahsimeroi continually commented on the extreme abundance of these fish. Field checks found masses of steelhead inhabiting almost every available niche and pool in the river. In 1970, project personnel noted that anglers commented on the relative scarcity of over-summering steelhead smolts as compared with past years. Field checks confirmed the relative lack of observable steelhead smolts in the river. It appears that the majority of the smolts delivered to the Pahsimeroi in 1970 emigrated from the river prior to June 30. I suspect that the estimates derived from the Burstedt Lane trapping facility are on the low side of the statistical estimate.

National Marine Fisheries Service personnel conducting downstream migrant studies at lower damsites reported the greatest number of hatchery steelhead observed at these dams since 1968. They estimated some 750,000 Pahsimeroi-released smolts passed Ice Harbor Dam in April, May and June, 1970, (Howard Raymond, personal correspondence). The N.M.F.S. biologists, however, also estimated that 50 percent of all Salmon River emigrants died prior to reaching Ice Harbor. They also estimated that 90 percent perished before reaching the ocean at the mouth of the Columbia. They named supersaturation of dissolved nitrogen gas in the Columbia and Snake rivers as the primary cause. It appears that although we realized good emigration from the Pahsimeroi and Salmon rivers, we probably realized somewhere around 10 percent survival to the ocean. This should be reflected in returns to the Pahsimeroi in 1972.

The National Marine Fisheries Service downstream migrant trapping records at Ice Harbor for the spring of 1970 show 389 RV clips and 334 RVAD clips recorded. It appears that the marked fish emigrated from the Pahsimeroi with about equal success.

Size and Timing of Emigrants

Steelhead smolts collected in the Burstedt Lane trap ranged from 130 mm to 280 mm and averaged 186 mm total length. Work done in past years on the Pahsimeroi showed that most actively emigrating Niagara Springs steelhead smolts exceed 170 mm total length (Reingold, 1967, 1968, 1969). Niagara Springs Hatchery personnel remain aware of these findings and strive to produce the largest smolt possible during the hatchery production period.

Comparison of steelhead emigration patterns since the project began shows that maximum emigration occurs each year between April 1 and May 15. This held true again in 1970 (Table 1). Delivery of smolts should remain geared to this schedule as closely as possible with larger grade fish delivered first to allow maximum growth on the smaller grades prior to delivery. Delivery schedules are often dictated by availability of trucks and at times fall outside the optimum delivery period, due to this reason.

Adult Returns

1967 Release:

In 1969, a total of 798 adult steelhead from the 1967 release returned to the Pahsimeroi station (Reingold, 1970). Ninety-nine percent (795 fish) of these measured less than 27 inches total length. In 1970, 107 adults larger than 27 inches total length, returned to the trap. I classified these fish as two-ocean adults from the 1967 smolt release. This indicates a ratio of 89 percent one-ocean fish (795) to 11 percent two-ocean fish (107). Records of steelhead length measurements from Oxbow Dam indicate a natural run ratio of 90:10 (Figure 1).

The 1967 release of some 1,292,000 smolts resulted in a total return of 905 adults to the station. The contribution of hatchery fish to the sport catch is discussed in another part of this report.

1968 Release:

In 1970, some 401 adult steelhead less than 27 inches total length returned to the Pahsimeroi facilities. These adults are returning from the 1968 release of 1,484,000 smolts in the Pahsimeroi River. We anticipated a larger number of returning adults based on the return success of the 1968 release. However, in 1968, the presence of supersaturated levels of dissolved nitrogen first appeared below newly constructed dams in the Snake and Columbia rivers. Federal agencies estimated that in 1968, approximately 55 percent of all downstream migrating smolts perished before reaching the ocean.

Marked Adult Returnees

1967 Release:

We recorded a combined 1969-1970 fish year total of 39 right-ventral adipose clipped adults from the 1967 smolt release. Some 97,000 smolts carried this fin clip upon release (Table 2).

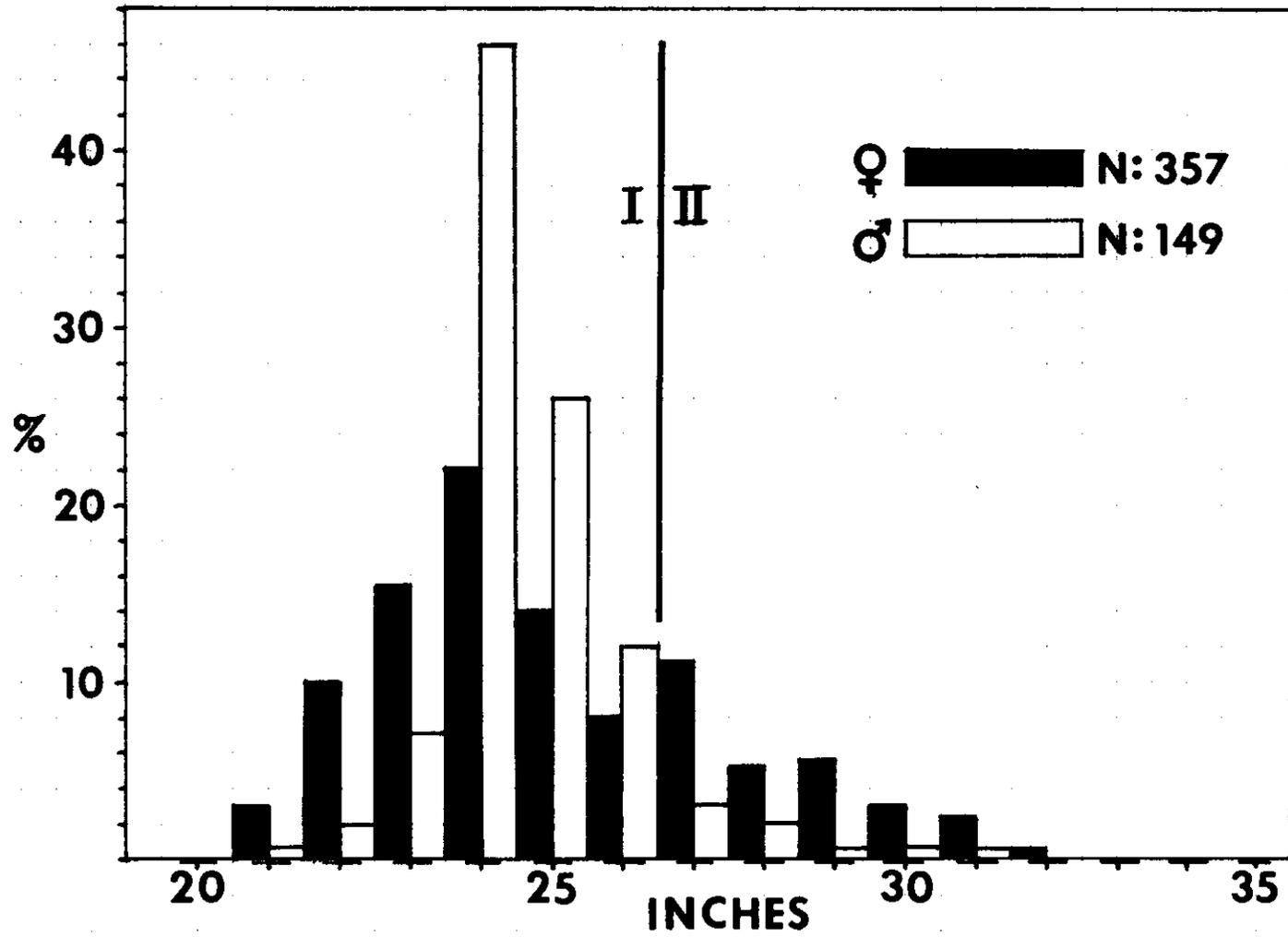


Figure 1. Length frequency and age classification of the 1970 hatchery steelhead run returning to the Pahsimeroi adult facilities. Group one fish (I) represent adults from the 1968 smolt releases. Group two fish (II) represent adults from the 1967 smolt releases.

1968 Release:

In 1970, we recorded 13 right-ventral adipose and 11 right-ventral fin clipped adults returning to the station. In 1968, we held a group of 25,000 RVAD clipped smolts in one acclimation pond for 26 days prior to release into the Pahsimeroi, and released another group of 25,000 RV clipped smolts directly in the river near the pond upon delivery. We hoped to determine if the difference in holding time in Pahsimeroi River water would reflect in numbers of adults returning to the station. We also recorded 5RVAD and 7RV clipped fish at our sport catch check station. The combined hatchery return and sport catch returns totaled 18 fish from each group. It appears that holding smolts in the acclimation ponds prior to release into the river yields no greater returns than delivering smolts directly into the stream.

Estimate of 1970 Total Run and Sport Harvest

In the fall of 1969 and the spring of 1970, the Idaho Fish and Game Department operated a steelhead harvest check station near North Fork, Idaho. Data from this station and the 1969 statewide harvest estimates (Keating, 1970), enabled me to estimate the total hatchery run and harvest above the South Fork of the Salmon River (Salmon River section 3). Field checks show very little harvest of hatchery fish below this point.

An estimated 932 hatchery origin steelhead entered Salmon River section 4. Of this number, an estimated 424 fish (45 percent) were taken by anglers and 508 fish returned to the Pahsimeroi weir (Table 3). Above the Middle Fork of the Salmon River, the hatchery stock fish provided over 22 percent of the total steelhead harvest. Below the Middle Fork (section 4 only), hatchery fish contributed some **six** percent of the sport catch.

LITERATURE CITED:

- Reingold, Melvin. 1967, 1968, 1969, 1970. Idaho Fish and Game Annual Reports, Evaluation of transplanting mid-Snake River steelhead to the Pahsimeroi River.
- Keating, James. 1970. Annual survey of the salmon and steelhead sport fishery harvest in Idaho, 1969. Idaho Fish and Game report. 11 pp.

Table 2. Summary of releases, returns, and egg take of the Pahsimeroi-Snake River steelhead relocation project since its inception in 1965.

Brood Year	Year Released	Number of Fish Released	Number Marked	Mark Used	No. Adults Returned as:		Total Adult Return	Total Marked Adults	Number of Eggs Taken
					One-Ocean Fish	Two-Ocean Fish			
1965	1966	65,500	24,000	RVAD	- (1968)	0 (1969)	-	-	-
1966	1967	1,292,000	97,000	RVAD	(89%) 798 (1969)	(11%) 107 (1970)	905	39 RVAD	1,620,000 (1969)
1967	1968	1,484,000	25,000	RV	401 (1970)	(1971)		11 RV	1,662,000 (1970)
			25,000	RVAD				13 RVAD	
1968	1969	1,645,000	25,000	RV	(1971)	(1972)			
			25,000	RVAD					
1969	1970	1,622,000	25,000	RV	(1972)	(1973)			
			25,000	RVAD					

Table 3. Estimates of the total hatchery run and harvest for the 1969-70 fish year in the main Salmon River above the South Fork.

Estimated Hatchery Run Entering S.R. <u>4</u> ^{1/}	932
Hatchery Harvest S.R. 4	174
Hatchery Escapement S.R. 4	758
Hatchery Harvest S.R. <u>5</u> ^{2/}	222
Hatchery Escapement S.R. 5	536
Hatchery Harvest S.R. <u>6</u> ^{3/}	28
Pahsimeroi Weir Count	508
Percent of Run Harvested in Sections 4, 5, and 6	45%
Percent of Run Returning to Weir	55%

1/ S.R. 4 - Main Salmon River from the South Fork to the Middle Fork.

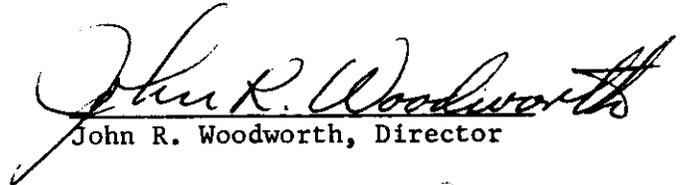
2/ S.R. 5 - Main Salmon River from the Middle Fork to the North Fork.

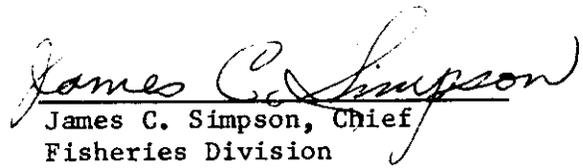
3/ S.R. 6 - Main Salmon River from the North Fork to the East Fork.

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