

# IDAHO DEPARTMENT OF FISH & GAME

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EVALUATION OF TRANSPLANTING SNAKE RIVER  
STEELHEAD TROUT TO THE PAHSIMEROI RIVER, 1980

Period Covered: 1 July 1979 to 30 June 1980

by

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EVALUATION OF TRANSPLANTING SNAKE RIVER  
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ABSTRACT

A steelhead smolt released in the Pahsimeroi in mid-April was captured on the high seas 700 miles west of Vancouver Island by a Japanese research vessel in mid-July. The fish was 300 mm (11 3/4 in) long and provided the first insight on where Idaho stocks may be rearing in the ocean environment.

Final returns of 1977 released feed experiment steelhead, although low in numbers due to drought caused losses, indicated benefits for smolts fed Oregon Moist Pellets as a final diet (30 days) versus dry feed diet control fish. A replicate experiment was conducted on 1980 released smolts.

Anglers harvested an unprecedented 66% of the 1979-80 Pahsimeroi adult steelhead run in the Salmon River.

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## INTRODUCTION

The Niagara Springs Steelhead Hatchery and Pahsimeroi Steelhead Collection Facility operations are 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.

This project was initiated in 1966, with the release of the first steelhead smolts 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.

## OPERATIONS AND RESEARCH - 1980

### Delivery of Fish

Approximately 1,098,000 steelhead juveniles were transported in 52 truck-loads from Niagara Springs Hatchery and released into the Pahsimeroi River between 17 March and 1 May 1980. All fish were released directly into the Pahsimeroi River near the adult weir site. All fish were progeny from adult steelhead that returned to the Pahsimeroi station in the spring of 1979.

### Hatchery Final Diet Experiment

Between 4 and 17 April 1980, we released two groups of approximately 52,000 smolts each, marked with an adipose fin clip and carrying coded wire tags, into the Pahsimeroi River. One group represented the standard hatchery product from the Niagara Springs Hatchery and were reared from fingerling to smolt on dry diet feed. This group averaged 234 mm (9.2 in) in length at delivery and carried the binary code 10/21/57. The other group was given identical treatment except that for the last 30 days prior to delivery they were fed Oregon Moist Pellet feed. This group averaged 226 mm (8.9 in) at delivery and carried wire code 10/21/56.

This experimental release was a replicate of a 1977 experiment to test the efficacy of OMP as a final diet for increasing smolt to adult returns. Results of the experiment will be complete with the return of 2-ocean adults in the spring of 1983.

### Marked Fish Recoveries

#### Hatchery Feeding - Smolt Behavior Experiment

In April 1977, three marked groups of steelhead smolts were released in the Pahsimeroi as an experiment to test the results of feeding Oregon Moist Pellets as final diet on the returns of adults. Returns of 2-ocean adults were complete in the spring of 1980 (Table 1).

Table 1. Coded wire tag adult returns of 1977 released Pahsimeroi steelhead smolts to the Pahsimeroi River trap.

Experiment group:	OMP-30 days code 10/2/34	OMP-14 days code 10/2/35	Control -dry code 10/2/36
No. released	52,000	54,000	51,000
No. tags ret.	15	8	7
Ret. percent	.028	.015	.014

Unfortunately, because of the extreme drought-related loss of downstream migrating smolts in 1977 (estimated at 99%), the number of returns was very low. The ratios however, indicate benefits for those smolts fed OMP for 30 days prior to release. The 14-day group showed no significant benefits over the control group.

The 1980 smolt release experiment was a replicate of the 30-day versus control segment of this 1977 effort.

Improved survival to the ocean for spring 1980 migrants should lead to adequate tag returns to evaluate the experiment in 1982 and 1983.

#### Homing Research

In the spring of 1977, a small number of adult steelhead that entered the facilities at Dworshak National Fish Hatchery on the Clearwater River carried fin clips that indicated possible Niagara Springs-Pahsimeroi origin. The 1974 smolt release from Niagara-Pahsimeroi were reared from Dworshak fingerlings delivered in October 1973, and speculation arose concerning early imprinting and its effect on homing behavior.

To investigate that phenomena, four groups of coded wire tagged smolts were released in the Pahsimeroi River in April 1978. One group consisted of smolts hatched and reared at Niagara Springs Hatchery from eggs taken at Dworshak NFH in the spring of 1977. A second group of smolts were reared from steelhead fry hatched and raised to 343/kg (156/lb) at Dworshak NFH and delivered to Niagara Springs in October 1977. A third group of smolts were Pahsimeroi-origin Niagara-reared steel head to serve as experimental controls. A fourth group of smolts, hatched and reared at Dworshak NFH, were transported from that hatchery and released directly in the Pahsimeroi River in April 1978.

These releases will compare adult returns to the Pahsimeroi from:

Niagara-reared Dworshak-origin smolts from eggs.

Niagara-reared Dworshak-origin smolts from 4-month reared Dworshak fry.

Niagara-reared Pahsimeroi-origin smolts (control).

Dworshak-reared Dworshak-origin smolts.

The three groups of fish reared at Niagara Springs (egg origin, fry origin, and controls) were marked with coded wire tags in October 1977. Tags were applied to approximately 40,000 fish from each group.

In the winter of 1977-78, a severe disease outbreak at Niagara Springs caused high mortality among all fish on the station. The loss among the experimental groups that had been handled and stressed during the coded wire tagging operation was higher than the untagged fish on the station and ran as high as 39%. Growth of the tagged fish was retarded compared to unhandled fish and upon delivery to the Pahsimeroi in April, all three groups averaged approximately 32/kg (14.5/lb) and 150 mm (5.9 in) total length. These three Niagara-reared groups, while directly comparable with each other, were not as large or healthy as the normal annual product from Niagara Springs Hatchery. A large portion of these fish were below the 170 mm (6.7 in) minimum length necessary for good emigration and adult returns may be low. Symptoms of Furunculosis and Red-throat diseases were present in the smolts at release.

The smolts delivered to the Pahsimeroi directly from Dworshak NFH were in good health and averaged 19/kg (8.5/lb) and 177 mm (7.0 in) total length.

The difference in the size and health between the Dworshak and Pahsimeroi smolts will be considered when evaluating the results of the experiment.

In the spring of 1980, four 1-ocean adult steelhead carrying wire tag code 10/3/47 (control group) returned to the Pahsimeroi weir. Also, ten 1-ocean adult steelhead with code 10/3/49 returned to the Pahsimeroi station. These fish were the Clearwater B-stock fish reared to smolt size at Dworshak National Fish Hatchery and trucked to the Pahsimeroi River and released. One 1-ocean adult from this release was also collected at the Dworshak NFH trap on the Clearwater River in the spring of 1980. Most adults from this release are expected to return as 2-ocean fish in the spring of 1981.

#### Contribution Estimates

The returns of coded wire tagged steelhead from the 1977 smolt releases allowed the first estimates of contribution to the various fisheries impacting Idaho fish migrating up the Columbia River. These estimates are based on tag retrieval sampling programs by lower river agencies, plus tag returns to the Pahsimeroi station. Estimates for the 1977 release of Pahsimeroi steelhead were made as part of the Columbia Basin Salmon and Steelhead Identification and Modeling project (Duke 1980), and appear as follows:

Table 2. Estimated contributions to specific fisheries and returns to the hatchery of summer steelhead released in the Pahsimeroi River in 1977.

	Columbia River sport fishery	Zone 6 Gillnet (Indian fishery)	Idaho sport fishery	Hatchery return	Total
Total:	641	118	249	272	1,280
Percent:	50.1	9.2	19.5	21.2	100

Due to extreme loss of 1977 migrating smolts, these estimates are based on relatively small numbers of tag returns.

Also, these estimates are to be considered preliminary at this time. Some fish may yet return as older fish and some tags may be returned as they belatedly clear the recovery agency's system.

#### Ocean Smolt Recovery

On 14 July 1980, a Niagara Springs reared steelhead juvenile was collected in an ocean surface drift gill net placed by the Japanese research vessel, Oshoro Maru 1,126 km (700 mi) west of northern Vancouver Island at 50° 30'N 145° W. Dr. William Percy, a fisheries oceanographer from Oregon State University collecting gut samples from salmonid fishes, recognized the adipose clip signal and subsequently carried the snout of the fish to an Oregon recovery lab. The extracted wire tag carried a 10/21/57 code, indicating it was smolt released in the Pahsimeroi River between 4 and 17 April. It was 300 mm (11.8 in) in length when captured. This is the first documented recovery of an Idaho origin juvenile steel head at sea, and provides the first insight on where our stocks may be rearing in the ocean environment.

#### Adult Returns

##### 1977 Release - 1976 Brood Year

The survival of 1977 steel head smolts from the Salmon River was the lowest ever recorded since downriver agencies have been monitoring these fish at Snake and Columbia River dams. It is estimated that only 1% of the smolts survived to the ocean. This was a direct result of the lack of a spring freshet due to extremely low snowpack and precipitation during the winter-spring of 1976-77.

We released 1,448,000 Niagara-reared steelhead smolts in the Pahsimeroi River in March and April of 1977. In the spring of 1979, I classified 195 1-ocean adult steelhead returns to the weir as being from this release.

In the spring of 1980, I classified an additional 97 2-ocean adults as returnees from this smolt release, for a total estimated adult return to the weir of 292 (.020%) for this smolt release; the smallest return since initiation of the project.

##### 1978 Release - 1977 Brood Year

In the spring of 1978, we released 1,226,000 Niagara-reared steelhead smolts in the Pahsimeroi River. I classified 1,523 fish that returned to the Pashimeroi weir in 1980 as 1-ocean returns from this release. Additional returns of 2-ocean adults are expected in 1981.

#### Jaw Tag Recoveries

On 16 October 1979, Idaho Fish and Game Senior Fishery Research Biologist, Steve Pettit, caught, tagged and released a 76-cm (3-in) male hatchery steelhead in the lower Clearwater River, approximately 8 km (5 mi) above its mouth. This fish, bearing jaw tag number Z666, entered the Pahsimeroi trap in April 1980.

As has been noted from past tag returns, Pahsimeroi-bound steel head commonly enter the Clearwater River in the fall and contribute to the sport fishery there.

Seventy-five steelhead that returned to the Pahsimeroi weir in the spring of 1980 carried jaw tags applied by National Marine Fisheries Service personnel at Lower Granite and Little Goose Dams in the fall of 1979. These fish were part of an evaluation of the smolt transportation program on the Snake and Columbia Rivers. Of 56 coded wire tags retrieved from the snouts of these fish, 51 were from transported fish and 5 were from control fish (fish that migrated downstream through all the dams). The NMFS report an average 4.8:1 benefit ratio for steelhead smolts transported in 1978 versus controls.

#### Steelhead Angler Harvest - 1979-80 Run

Water flows in the Salmon River drainage during the fall of 1979 were extremely low. River volume was lower than during the 1977 "drought", although it did not receive the notoriety of that year. The steelhead run over the Snake River dams and into the Salmon and Clearwater Rivers was delayed and due to the low counts a conservative season of one steelhead per day, one in possession and three for the fall season was set for the Salmon River. Also, to protect Middle Fork and South Fork Salmon River wild steelhead stocks, all fish 71 cm (28 in) or larger had to be released unharmed back to the water.

Because the Pahsimeroi 1979-80 run consisted almost exclusively of 1-ocean returns (94%) averaging 61-66 cm (24-26 in) in length, this length limit was an effective way to allow anglers to keep hatchery fish while releasing wild fish. In more normal years, unaffected by the impact of the high smolt loss of 1977, a 71-cm (28-in) limit would cause anglers to release substantial numbers of 2-ocean hatchery fish.

As the fall 1979 season progressed, dam counts, check stations and field observations revealed that the hatchery steelhead run into the Salmon River was adequate to support a spring fishery with a more normal 2, 2 and 6 fish bag, possession and season limit, respectively. The 28-inch size limit was retained to protect wild fish.

Due to an unusually long cold spring, the Salmon River remained low and clear through the entire month of March and fishing pressure was intense in the upper Salmon River area. Seventy-one percent of the 1979-80 steelhead fishery effort and 70% of the harvest in the upper Salmon occurred in the spring; approximately the reverse of most years when fall harvest predominates. This intense spring fishery led to the highest estimated harvest level on the Pahsimeroi run to date; 66%. The data collected at the North Fork check station is shown in Table 3.

#### Fall 1980 Steelhead Sport Fishery

During October and November of 1980, we monitored the steelhead sport fishery on the upper Salmon River by the use of the North Fork check station and by jet boat below the end of the road from North Fork. Angler pressure during this period set an all time high record through the station and the continued low hours per fish rate substantiated lower dam counts and observations indicating an ample hatchery-origin steelhead run heading for the Pahsimeroi.

Data from the check station and jet boat fishery below the Middle Fork are shown in Table 4.

Table 3. Summary of data collected at the steelhead angler check station operated near North Fork, Idaho, fall 1979 and spring 1980.

Date	Anglers	Hours	Steel head			Hrs/fi sh	Percent hatchery
			Kept	Rel .	Total		
10/6-7	210	904	3	0	3	301	0
10/13-14	128	652	14	6	20	33	64
10/20-21	79	1,073	13	2	15	72	73
10/27-28	105	948	20	5	25	38	75
11/3-4	92	1,026	46	5	51	20	67
11/10-11	157	764	45	14	59	13	92
11/17-18	175	971	30	18	48	20	77
Subtotal	946	6,338	171	50	221	29	75
3/8-9	323	2,339	80	10	90	26	75
3/15-16	297	2,428	67	14	81	30	67
3/22-23	297	2,068	59	14	73	28	77
3/29-30	285	2,618	51	12	63	42	67
Subtotal	1,202	9,453	257	50	307	31	72
Grand total	2,148	15,791	428	100	528	30	73

Table 4. Steelhead angler data collected at the North Fork check station and in the jet boat fishery on the Salmon River, fall 1980.

Dates	Anglers	Hours	North Fork Check Station Fall, 1980 Steel head			Hrs/fi sh	Percent hatchery
			Kept	Rel .	Total		
9/27-28	236	1353	35	7	42	32	52
10/4-5	211	1412	38	3	41	34	76
10/11-12	275	2162	111	45	156	14	79
10/18-19	220	1329	91	58	149	9	90
10/25-26	355	2615	171	57	228	11.5	80
11/1-2	333	1868	134	56	190	10	81
11/8-9*	243	1633	28	25	53	31	65
11/15-16	277	1400	89	18	107	13	77
11/22-23	<u>151</u>	<u>693</u>	<u>32</u>	18	50	14	83
Totals	2301	14165	729	287	1016	14	78
Jet Boat Fishery Fall, 1980							
10/4-6	9	58	1	0	1	58	--
10/12-14	32	126	14	4	18	7	19
10/17-19	15	58	8	5	13	4.5	70
10/23-24	61	382	30	5	35	11	49
10/29-30	28	248	22	7	29	8.5	43
11/2	31	283	25	4	29	8	50
11/8*	5	30	1	0	1	30	--
11/15	<u>15</u>	<u>48</u>	<u>6</u>	<u>0</u>	<u>6</u>	<u>8</u>	<u>66</u>
Totals	196	1233	107	25	132	9	47

\*Muddy Water

Table 5. Releases, returns, marks used, etc. of the Niagara Springs-Pahsimeroi River steelhead relocation program, 1974-1980.

Brood year Year released	Number steelhead released	Number marked	Marks used	No. adults returned to weir as:			Total brood year to weir	Marked adult returns	Total weir count (year)	Est. sport harvest (fish-year)
				1-year ocean	2-year ocean	3-year ocean				
1973 1974	1,607,000 (Clear-water race)	20,000 20,000 20,000	LVAd(Mar.) RVAd(Apr.) RV (May)	(79%) 395 (1976)	(15%) 74 (1977)	(6%) 28 (1978)	497	LVAd 3 RVAd 1 RV 11	1,504 (1977)	(est.) 1,603-52% (76-77)
1974 1975	1,331,000	20,000 20,000 20,000	LVAd(Mar.) RVAd(Apr.) RV (May)	(72%) 1,395 (1977)	(28%) 533 (1978)	0 (1979)	1,928	LVAd 10 RVAd 17 RV 30	2,803 (1978)	(est.) 4,200-60% (77-78)
1975 1976	1,610,000	25,000 25,000 25,000 25,000	LVAd(OMP) RVAd(dry) RV(OMP/dry) LV (large)	(49%) 2,242 (1978)	(51%) 2,306 (1979)	0 (1980)	4,548	LVAd 118 RVAd 60 RV 72 LV 303	2,501 (1979)	(est.) 450-15% (Spring 1979)
1976 1977	1,448,000	54,000 52,000 51,000 15,000	CWT(OMP-14) CWT(OMP-30) CWT(Dry) CWT(Trans.)	(67%) 195 (1979)	(33%) 97 (1980)	(1981)	292	OMP-14 8 OMP-30 15 Dry 7 Trans. 0	1,620 (1980)	(est.) 3,140-66% (79-80)
1977 1978	1,266,000	24,300 20,900 31,300 34,200	CWT(D.eggs) CWT(D.fry) CWT(Control) CWT(D.smolts)	1,523 (1980)	(1981)	(1982)		D. eggs 0 D. fry 0 Control 4 D.smolts 10	(1981)	
1978 1979	1,372,000	57,500 61,700	CWT(March) CWT(May)	(1981)	(1982)	(1983)		March rel. May rel.	(1982)	
1979 1980	1,098,000	52,600 52,500	CWT(OMP-30) CWT(Control)	(1982)	(1983)	(1984)		OMP-30 Control	(1983)	



Success (catch rate) for the anglers fishing the wilderness river canyon via jet boat was higher than for bank anglers in the roaded area. Most of these anglers were fishing with professional guides.

Bank anglers released 28% of their catch and jet boat anglers released 19% of their catch. The considerably lower percent of hatchery fish in the catch of the jet boat fishery (47%) reflects the contribution of wild fish, primarily Middle Fork stocks. The entire jet boat effort occurs downstream from the confluence of the Middle Fork with the main Salmon River.

Total hatchery harvest estimates and contribution will be made after the sport fishery and the return of the run to the Pahsimeroi weir in the spring of 1981.

#### Pending Research

Vibriosis, a disease of anadromous salmonids occurring in the ocean environment, and caused by the bacterium Vibrio anguillarum, has been postulated as a factor affecting survival.

A test conducted by researchers on 1976 brood year steel head at the Mad River hatchery in northern California demonstrated a 19.3% increase in survival for vaccinated fish over controls (D. Amend, R. Antipa and T. Kerstetter 1980).

Similar tests conducted on 1975 and 1976 brood-year North Umpqua River summer steelhead by Oregon Department of Fish and Wildlife researchers, did not demonstrate benefits for vaccinated smolts as defined by numbers of returning adults past the Winchester Ladder (R. L. Garrison, N. Rosintreter-Peterson 1980).

To test the efficacy of Vibriosis vaccination on adult returns of the long-migrating Pahsimeroi stock, two 50,000 fish lots of 1980 brood-year steelhead at Niagara Springs were marked with adipose clips and coded wire tags in late October 1980. One of these groups will be vaccinated against Vibrio anuillarum prior to release in the spring of 1980. The other group will serve as a control and will be treated, handled and released in an identical manner except that the Vibrio bacterium will not be applied. Results of the test will be determined by recovery of wire tagged adults back to the hatchery in 1983 and 1984, and from coded wire tags collected in the various downriver fisheries.

LITERATURE CITED

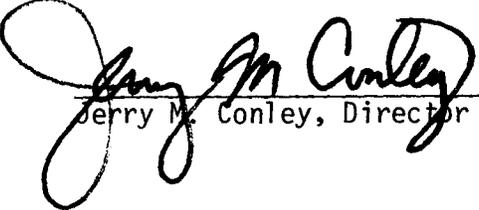
- Amend, Donald F., Antipa, Ross, Kerstetter, T.H. 1980. Increase in Ocean Survival of Freely Migrating Steelheads Vaccinated Against Vibrio anguillarum. In: Transactions of the American Fisheries Society Vol. 109:287-289.
- Garrison, R.L. and Rosintreter-Peterson, N. 1979. Federal Aid Progress Report - Fisheries 1979. Oregon Department of Fish and Wildlife AFS-73-2, Job 4.
- Duke, Rodney. 1980 Columbia Basin Salmon and Steelhead Identification and Modeling. Idaho Department of Fish and Game Report.

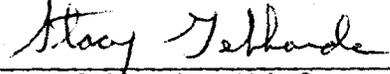
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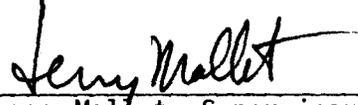
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