

# IDAHO FISH & GAME DEPARTMENT

John R. Woodworth, Director

Annual Report

EXPERIMENTAL REARING OF STEELHEAD  
TROUT AT HAYDEN CREEK REARING PONDS



U. S. National Marine Service P. L. 88-909 Projects:

Project 1-1-D-5 (Rearing)

Project 1-51-C, Segment 1 (Construction)

By  
Melvin Reingold  
Senior Fishery Research Biologist

December, 1970

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## SUMMARY OF PRODUCTION:

In November, 1969, the Hayden Creek rearing ponds received some 217,000 steelhead fingerlings hatched and reared at the station in 1969. Approximately 189,000 fish (87 percent) survived to May, 1970.

Over 90 percent of these steelhead showed the silvery sheen, slimness of body and firmness of flesh characteristic of smoltification. These steelhead averaged 159 mm total length and 50 percent measured 160 mm or larger. A total of 55,300 smolts received a left ventral fin clip upon release (Table 1), (Figure 1).

We used 32,091 pounds of Idaho Dry Diet pelleted feed at a cost of \$2,564 to rear 16,906 pounds of steelhead trout; a conversion rate of 1.89 pounds of food per pound of fish (Table 1).

On June 30, 1970, the Hayden Creek raceways held some 300,000 brood-year 1970 steelhead fry for the 1970-1971 pond rearing cycle.

### ADULT RETURNS:

#### 1967 Smolt Release:

In April and May, 1969, a total of 48 adult steelhead entered the Hayden Creek fish ladder and trap. These 12 female and 36 male fish represented one-ocean Clearwater River stock returnees from the 1967 release of smolts from Hayden Creek. In April and May, 1970, another 46 two-ocean adults (7 males and 39 females) from this same smolt release returned to the station. This brought the total return of 1966 brood-year smolts to 94 adult steelhead; 51 females and 43 males. Five of these fish carried left ventral fin clips that we applied to 22,800 fish upon their release as smolts in 1967. The females yielded some 40,600 eggs in 1969 and 212,900 eggs in 1970. These eggs contributed to the 1969 and 1970 pond rearing cycles of steelhead fingerlings. Eggs from Dworshak Hatchery and Lemhi Weir adult steelhead also contributed to the 1969 and 1970 rearing cycles (Table 2).

#### 1968 Smolt Release:

We anticipated substantial returns of adult Snake River race steelhead to Hayden Creek in 1970, from a 340,000 smolt release in 1968. However, only eight adults from this release returned to the station (Table 2). Severe dissolved nitrogen gas problems encountered in the lower Snake and Columbia rivers by both upstream and downstream migrants from 1968 through 1970 caused unestimatable losses on Idaho anadromous stocks. Group "A" steelhead, primarily Snake River and upper Salmon River stock, suffered the maximum exposure to these conditions.

### GENERAL POND REARING OPERATIONS:

During the weigh-out of 1969 brood year steelhead from the ponds, we counted the number of non-smolt fish, or "runts", observed by the fin clippers. We classified



Figure 1. Station personnel weighed out the 1969-1970 production of steelhead from the Hayden Creek rearing ponds. Locally hired women fin-clipped some 55,000 smolts at the release trap. May, 1970.

Table 1. Summary of steelhead production, Hayden Creek rearing ponds,  
July 1, 1969 to June 30, 1970.

	<u>South</u>	<u>North</u>
INPUT: November 24, 1969 (fingerlings)	105,600	112,900
OUTPUT: May 1, 1970 (smolts)	98,000	91,000
REARING CYCLE SURVIVAL:	93%	81%
COMBINED:		87%
Total Pounds Feed Used:		32,091
Total Pounds Fish Produced:		16,906
Feed Cost:		\$2,564
Cost Per Pound of Fish:		\$15.2
Conversion Rate:		1.89
Total Release of Steelhead:		109,400
Percent Displaying Smolt Characteristics:		90%
Average Size of Smolts:		159mm T.L.
Percent of Smolts Over 160mm:		50%
Total Release of Steelhead Over 160mm		85,500

these fish by their size, thinness of body, lack of silvery sheen and generally poor physical condition. These fish look notably different from the healthy majority of smolt-like steelhead and measured almost entirely under 110 millimeters total length. In a 55,300 fish sample (over one-quarter of the total release) we classified 5,020 fish, or nine percent, as runts. In separate random samples at the release box, we found that 320 (or 10 percent) out of 3,117 fish less than 110 millimeters were "runts", (Table 3). It appears that we can expect approximately 10 percent stunted fish produced by each pond rearing cycle. Our smolt release figures probably should not include this group.

During the 1969-1970 pond rearing period, we increased the number of automatic feeders from eight to fifteen. We felt this contributed to better feed utilization and more uniform size range of the steelhead in the ponds. SCUBA observations during the pond rearing cycle disclosed very little or no waste feed on the pond bottoms under the feeders.

#### MISCELLANEOUS OPERATIONS:

##### Size Sampling:

In previous years, we used a drag seine to collect periodic samples of steelhead in the ponds to compute feed schedules and monitor growth rates. We found that this method caused mortalities and injury by crowding, abrasion, and mixing dense algae with the fish in the net bag. In 1969, we experimented with a six by six foot suspended dip net. We lowered the net beneath the pond surface on the end of a 12-foot lever, threw feed over the net and raised the unit after steelhead accumulated over the net. The unit readily collects 500 fish per dip.

Comparison with seine samples showed the dip net sample averaging slightly larger fish. We feel, however, that the speed, convenience (one-man operation) and reduction of mortalities and injuries in the collected sample is worth the slight error involved. We found this sample error small enough that it caused no appreciable over-adjustment of feeder settings. We plan to continue sampling with this device in future operations but will make final average size determinations at the outlet structure upon release.

##### Aeration Tests:

During September and October, 1969, we installed two 450 gallon-per-minute spray aerators in the hatchery spring pond to raise dissolved oxygen levels. The aerators had no appreciable effect on D. O. levels so we removed them in November, 1969 (Table 5).

#### CONSTRUCTION AND IMPROVEMENTS:

The Salmon construction crew built and installed seven additional feeder platforms and mounted seven Nielson Automatic Dry Feeders during the 1969-1970 fiscal period. Underground wiring replaced several power poles around the pond perimeter. An additional ten circular fry feeders mounted on the raceway divider doubled the number of these units at the station. Better starter feed distribution and less fry crowding resulted.

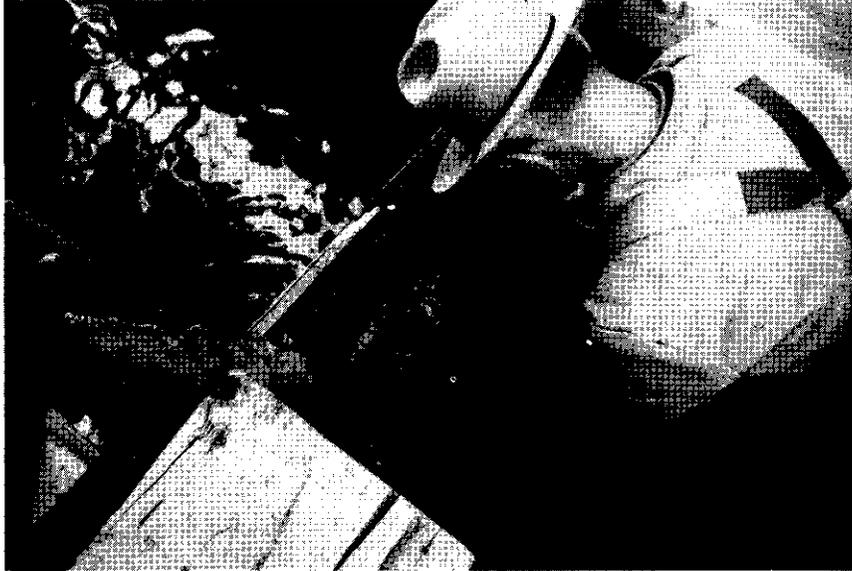


Figure 2. Station personnel graded steelhead fingerlings into two size groups prior to ponding in November, 1969.



Figure 3. The two .6-acre rearing ponds produced some 16,900 pounds of steelhead through the 1969-70 rearing cycle.

Table 2. Summary of steelhead releases and adult returns to Hayden Creek Research Station, Lemhi River, Lemhi, Idaho.

Brood Year	Year Released	Number Juveniles Released	Number Marked	Mark Used	River Race	Number Adults Returned As:	
						One-Ocean Fish	Two-Ocean Fish
1966	1967	180,000	22,800	LV	Clearwater	48 (1969)	46 (1970)
1967	1968	340,000	12,000-11,700	LV-LVad	Snake <sup>1/</sup>	8 (1970)	-- (1971)
1968	1969	87,500	26,700-20,000	LV+"L"-brand	Clearwater	-- (1971)	-- (1972)
1969	1970	187,400	55,000	LV	Clwtr., Lem., '70 Ret.	-- (1972)	-- (1973)

<sup>1/</sup> Snake River steelhead stocks are predominantly one-ocean fish; Clearwater stocks predominantly two-ocean. We expect few returns in 1971.

Table 3. Length frequency of steelhead smolts released from the Hayden Creek rearing ponds, May, 1970.

Total Length (mm)	Number of Fish Measured in Each Size Range in 13 Random Samples													Total		
	Sample No.	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>			<u>13</u>
70	1	1	13	0	0	2	0	5	1	6	0	9	7	45	10%	Nonsmolts
80	4	10	16	2	4	0	1	13	4	7	17	21	13	112		
90	7	9	12	3	2	2	0	13	9	7	14	20	16	141		
100	3	14	6	12	4	4	0	27	11	9	12	12	16	130		
110	13	28	13	7	1	8	4	19	14	20	19	10	19	175	90%	Steelhead displaying smolt characteristics
120	12	21	14	9	3	18	3	34	21	25	18	16	39	232		
130	27	37	27	22	12	34	10	26	41	38	40	25	39	378		
140	27	37	40	28	26	47	26	42	47	31	44	40	31	466		
150	38	47	30	26	20	53	29	38	63	39	33	45	53	514		
160	38	36	42	43	34	45	17	29	56	31	33	41	32	477		
170	33	21	31	26	33	32	18	14	35	25	34	34	44	380		
180	21	19	15	17	26	16	15	14	25	26	19	33	27	273		
190	27	18	24	12	30	12	18	11	15	11	12	34	23	255		
200	19	15	13	10	49	9	18	8	7	4	12	26	24	214		
210	8	9	5	9	38	8	9	7	2	1	9	17	22	144		
220	7	1	9	6	20	4	3	6	2	1	2	2	8	71		
230	5	3	5	2	11	0	5	1	0	0	1	2	0	35		
240	1	0	1	2	5	0	3	2	0	0	0	0	1	14		
250	0	0	0	1	1	0	0	1	0	0	0	0	0	3		
260	0	0	0	2	1	0	0	0	0	0	0	0	0	3		
270	0	0	0	0	2	0	0	1	0	0	0	0	0	3		

Total of Samples: 4,065

Average Length 110 - 270 mm Group: 159 millimeters T. L.

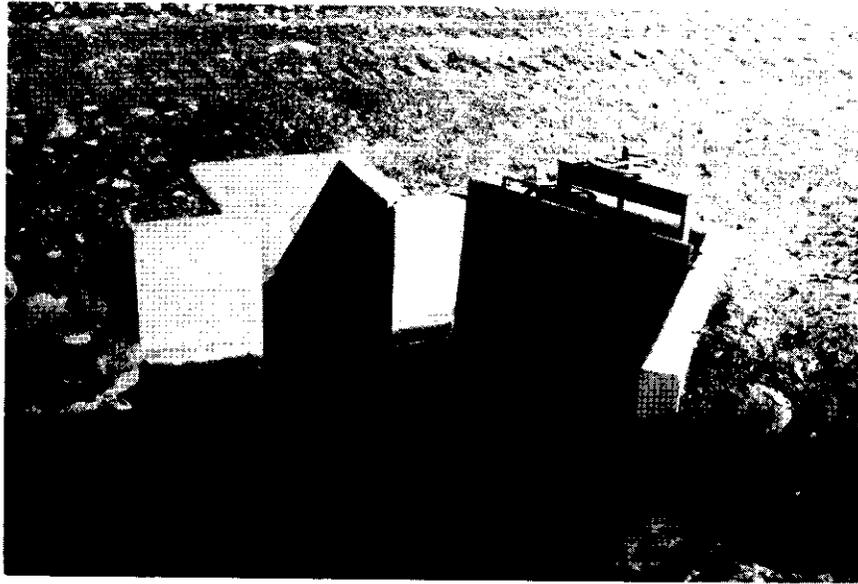


Figure 4. A new headgate structure allows more precise control of water flows to the station and provides a diversion outlet for leaves and debris moving down Hayden Creek.

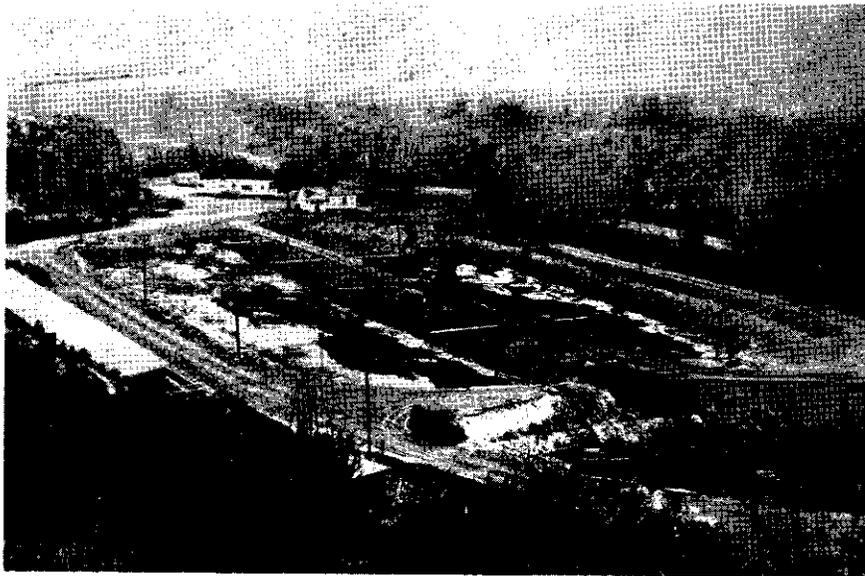


Figure 5. The construction of a driveway down the center strip between the ponds vastly eased and simplified maintenance and feeding operations.

Table 4. Summary of growth rates of 1969 brood-year steelhead, Hayden Creek rearing ponds, November 30, 1970 to April 30, 1970.

Dates	Average Weights and Lengths			
	North Pond		South Pond	
	Fish/lb.	T. L. mm.	Fish/lb.	T. L. mm.
November 30	102	72 <sup>1/</sup>	80	77 <sup>1/</sup>
December 31	62	83	57	86
January 31	33	107	26.5	115
February 28	25	114	18	130
March 31	16	140	12	151
April 30	9.4	160	8.8	169

<sup>1/</sup> Station personnel graded the steelhead prior to ponding in November, 1969. The South pond received the larger grade fish.

Table 5. Results of aeration tests, Hayden Creek Research Station spring pond, November, 1969. Two 450 g.p.m. spray aerators failed to raise dissolved oxygen levels significantly.

HAYDEN CREEK SPRING POND

Dissolved Oxygen Levels

October 1969	Parts Per Million			Incubator House
	Above Aerators	At Aerators	Below Aerators	
1			4	
2			4	
3	5	5	5	
4	5	5	5	
6	5	5	4	5
8			4	
9	4	5	4	4
13	4	5	5	5
17	5	5	5	5
20	4	5	4	5
24	6	5	5	5
27	4	5	5	5
31	5	4	5	5
Average:	4.7	4.9	4.5	4.9

The Salmon construction crew also constructed a new Hayden Creek inlet head-gate. This new system allows more accurate control of water flow to the station facilities and provides a diversion outlet for accumulated leaves and detritus coming downstream (Figure 4).

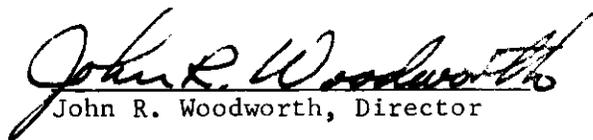
Grading of the pond perimeters and hauling and filling with topping material now allows the center feeders to be serviced by vehicle. This contributes to ease of maintenance and cuts down on manual handling of sacks of feed (Figure 5).

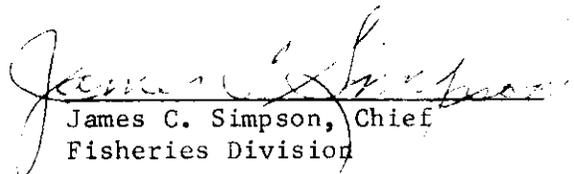
New topping material on drive areas, removal of overhead wires and conscientious ground keeping by station personnel resulted in considerable improvement in the appearance of the station. Construction of a prefabricated metal building for feed storage-shop-office use is underway at this date (December, 1970).

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STATE OF IDAHO  
Fish and Game Department  
John R. Woodworth, Director

Annual Project Closing Report  
REINTRODUCTION OF SALMON INTO PORTIONS  
OF THE CLEARWATER RIVER DRAINAGE  
July 1, 1969 to June 30, 1970

Project No. 160.5BI

Contract No. 14-17-0001-2046

Columbia River Fisheries Development Program

December, 1970

## REINTRODUCTION OF SPRING-RUN AND SUMMER-RUN CHINOOK INTO THE SELWAY RIVER, CLEARWATER RIVER DRAINAGE

### Abstract:

Spring chinook eyed egg plants in the Selway River drainage during 1969 totaled 1,488,816.

A total of 1,125,136 eyed spring chinook eggs from the Salmon River drainage and Lower Columbia River were planted in the Indian Creek hatching channel on the Upper Selway River.

Approximately 363,680 eyed spring chinook eggs were received from the U. S. Bureau of Commercial Fisheries and planted in Running Creek hatching channel on the Upper Selway River and Fenn hatching channel on the Lower Selway River. Indian Creek hatching channel had about 405,682 emergent fry and was the only channel from which fry were enumerated.

### Report of Progress

#### Project Phase A: Taking and Eyeing Eggs

Spring chinook salmon were trapped and held for egg-taking at two stations in the Salmon River drainage during the 1969 run. In addition, surplus chinook from Rapid River Hatchery on the Little Salmon River were transported to the Stolle Meadows holding pond and McCall Hatchery where they were held and spawned. Green eggs taken at all four stations were transferred to Mackay State Hatchery where they were incubated to the eyed stage. A large, undetermined loss of adults occurred prior to egg-taking, particularly at McCall and Stolle Meadows. There were 498,707 eyed eggs obtained from the 581,688 green eggs taken, an eye-up of 85.7 percent (Table 1).

#### Project Phase B: Planting Eyed Eggs

Two shipments of eyed chinook salmon eggs were received from the State Hatchery at Mackay during September, 1969, and planted in Indian Creek hatching channel. The first shipment on September 17 contained 294,672 eyed eggs, and the second shipment on September 30 contained 204,035 eyed eggs. The second shipment had an unexplained mortality of about 80 percent upon arrival at the channel, and subsequent checks revealed close to 100 percent mortality for this shipment. The eggs in the second shipment were mostly from Stolle Meadows holding pond.

On October 13, 1969, approximately 242,453 spring chinook eyed eggs were planted in Running Creek hatching channel and 121,227 in Fenn hatching channel. On October 15, 1969, approximately 626,429 spring chinook eyed eggs were planted in Indian Creek hatching channel. Both shipments of spring chinook eyed eggs, a total of 990,109, were received from Carson National Fish Hatchery via the Bureau of Commercial Fisheries.

Spring chinook eyed eggs planted in the Selway River drainage during 1969 totaled 1,488,816.

Table 1. Holding and egg-taking record for spring chinook in the Salmon River drainage, 1969.

Holding Pond	Number Males	Number Females	Eggs per Female	Gross Egg-Take	Eyed Eggs	Percent Eye-Up
Stolle Meadows	33	46	3,090	142,140	123,482	86.9
Decker Flat	55	92	2,214	203,700	176,232	86.5
Bear Valley	30	41	5,302	217,392	194,040	89.3
Rapid River	-	-	-	<u>18,456</u>	<u>4,953</u>	<u>26.8</u>
TOTALS				581,688	498,707	85.7

Project Phase C: Observing Success of Hatching, Emergence, and Out-Migration of Fry

During an extended temperature drop in late November, 1969, the headgate opening at the Indian Creek hatching channel froze and the flow into the channel was partially interrupted. An emergency trip to the channel was made and intragravel flow adjusted. No damage to the eyed eggs was suspected. On March 25, another emergency trip to the channel was made to determine if any mortality had occurred when the headgate dropped, cutting off most of the flow of water. No dead alevins were found, although many healthy ones were observed; therefore, it is believed the flow was sufficient to sustain life.

Traps were installed at Indian Creek hatching channel on April 17, 1970, but no fry were enumerated until May 13. This late emergence was attributed to the early cold weather in the fall of 1969 which reduced development of sac fry.

A trap tender was stationed at Indian Creek during fry emergence but was derelict in his duties and allowed violent fluctuations in water flows through the channel. The consequences from these fluctuations could not be determined. The tender was assisted at times by personnel from the Magruder Ranger District. A total of 375,682 out-migrating fry were counted from the channel with an estimated 30,000 fry remaining in the channel when trapping was terminated on July 14, 1970. The total of 405,682 emergent fry is 44.0 percent of the 921,101 live eyed eggs planted in 1969.

Spring chinook fry were distributed from Indian Creek hatching channel to other sites in the Upper Selway River drainage (Table 2). Fry distribution was intended to distribute returning adults over a larger and more widespread spawning area.

Running Creek hatching channel was checked periodically to insure proper flows and numerous sac fry were found in the intragravel environment.

Fenn hatching channel appeared to have high survival until the spring run-off when water backed into the mouth of the channel creating a pond. Heavy siltation occurred during this period and a large loss of sac fry is suspected. This channel most likely will not be used in the future.

Table 2. Indian Creek hatching channel-spring chinook fry transplants, 1969.

Release Dates	Water	Release Sites	Number of fry
May 20	Selway River	Magruder R. S.	25,800
June 3	Deep Creek	At Scimitar Creek	15,280
June 3	Deep Creek	At Hell's Half Bridge	16,160
June 10	Selway River	Beaver Point	15,825
June 10	White Cap Creek	Paradise G. S.	15,300
June 24	Storm Creek	Storm Creek Flat	76,160
June 24	White Cap Creek	Cooper Flat	76,160
June 24	Selway River	Beaver Point	13,680
June 24	Selway River	Magruder R. S.	13,680
May-June	Selway River	At Channel	<u>107,637</u>
		Approximate Total	375,682

REINTRODUCTION OF COHO SALMON  
INTO THE CLEARWATER RIVER DRAINAGE

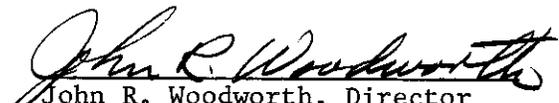
Abstract

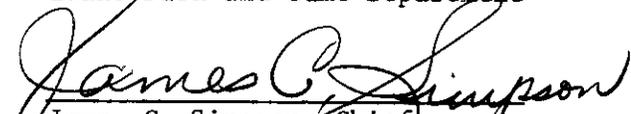
This project was inactive during the year.

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