

IDAHO

FISH & GAME DEPARTMENT

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FEDERAL AID IN FISH AND WILDLIFE RESTORATION

JOB COMPLETION REPORT Project

F 49-R-8



SALMON AND STEELHEAD INVESTIGATIONS

Job No. 4. Chinook Salmon Pond Rearing Studies

Period Covered: March 1, 1969 to February 28, 1970

By

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Boise, Idaho
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TABLE OF CONTENTS

	Page
ABSTRACT	
RECOMMENDATIONS	2
TECHNIQUES USED	2
Facilities	2
FINDINGS	2
1967 Year-Class Chinook Salmon	2
1968 Year-Class Chinook Salmon	4
1969 Year-Class Salmon	8
Adult Returns 1969	8
Adult Returns 1970.....	8
LITERATURE CITED	8

LIST OF FIGURES

Figure 1. An inclined screen collection system allowed a 100 percent count of the chinook salmon smolts emigrating from the pond. For large numbers of emigrants, pound counts were made and the fish were weighed in the galvanized can and scale	3
Figure 2. The trap was monitored on a 24-hour basis and the smolts were counted and/or weighed out as the trap box filled . . .	3
Figure 3. A screen box was used to hold fish for marking. Of the total emigration of 26,100 chinook, some 71 percent were given a right ventral fin clip. The 1968 year-class chinook were marked prior to planting in the pond in July, 1969.....	5
Figure 4. As fall 1969 drew to a close, the fish in the pond averaged 20 millimeters fork length and 25 per pound. Body condition was excellent and some specimens were as large as 180 millimeters fork length	5

LIST OF TABLES

Table 1. Weekly emigration counts of 196; year-class chinook salmon smolts from Decker Fiat salmon rearing pond, spring, 1969 . . .	6
Table 2. Length frequency distribution of 1967 and 1968 year-class chinook salmon juveniles stocked in Decker Fiat pond. The 1967 year-class fish were released in April, 1969, The 1968 year-class fish were	

JOB COMPLETION REPORT
RESEARCH PROJECT STATEMENT

State of Idaho

Name: SALMON AND STEELHEAD
INVESTIGATIONS

Project No. F-49-R-8

Title: Chinook Salmon Pond
Rearing Studies

Job No. 4

Period Covered: March 1, 1969 to February 28, 1970

ABSTRACT:

I stocked 180,000 spring chinook salmon of the 1967 year class from Marion Forks Hatchery, Salem, Oregon in the Decker Flat five—acre experimental chinook rearing pond near Stanley, Idaho, in July, 1968. They were fed pelleted dry feed through the summer of 1968.

In the spring of 1969 only 15 percent of these (26,100) were counted out of the pond after wintering under a heavy ice cover for five months. The condition factor of the survivors was low and I believed the low survival over winter was due to the inability of the Oregon stock fish to adapt to the duration and severity of the winter conditions in the pond.

Approximately 159,000 Salmon River stock spring chinook salmon fingerlings (1968 year class) were stocked in the pond in July, 1969 and fed until the pond iced up in November. Survival and emigration of these chinook will be measured in 1970.

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RECOMMENDATIONS:

The pond rearing study should be continued until returns of adults can be evaluated.

An intensive effort should be made to locate marked fish during spawning ground carcass counts.

OBJECTIVES:

To maintain a pond and related water control structures for experimental rearing of chinook salmon.

To monitor the physical-chemical parameters of the pond environment.

To determine growth and survival of artificially fed chinook salmon in the pond.

To measure the contribution of pond-reared chinook salmon to downstream river fisheries and to evaluate returns to the rearing pond.

TECHNIQUES USED:

Facilities

A gravel pit pond located approximately 10 miles south of Stanley, Idaho, on the upper Salmon River was enlarged to approximately five surface acres. Concrete inlet and outlet water control gates were installed in 1966. Electric self-cleaning rotary drum screens were installed at both the inlet and outlet and a metal dry feed storage shed was erected in 1967. Four Nielsen automatic fish feeders were installed on 26-foot long piers near the inlet ditch mouth in 1968. Four additional feeder platforms were added on the north shore in 1969 and additional feeders will be mounted and wired in 1970. A velocity barrier was installed in the inlet channel in 1969 to prevent the chinook from swimming up the inlet stream.

The water supply to the pond is from both ground seepage and a diversion from the Salmon River. During the spring, summer and fall months when water to the pond is being drawn from the Salmon River, the pond depth is maintained at approximately six feet. During winter months when Salmon River water cannot be diverted to the pond, ground seepage maintains a water depth in the pond of approximately three feet. Thick ice and snow covers the pond from the middle of November to mid-April.

An inclined screen migrant trap strained the entire outlet flow of the pond and captured 100 percent of the emigrants (Figures 1 and 2).

FINDINGS:

1967 Year-Class Chinook Salmon

The background on the 1967 year-class chinook including: (1) egg acquisition, (2) loss of the Salmon River stock, (3) replacement with Oregon stock, and (4) planting and winter ice-up is described in detail in the 1968-69 progress report (Reingold, 1969).

The pond was ice covered from November 18, 1968, to the third week of April, 1969. Maximum ice thickness reached 24 inches over 10 inches of water during the winter. Dissolved oxygen levels remained at or near saturation during this winter. Dissolved

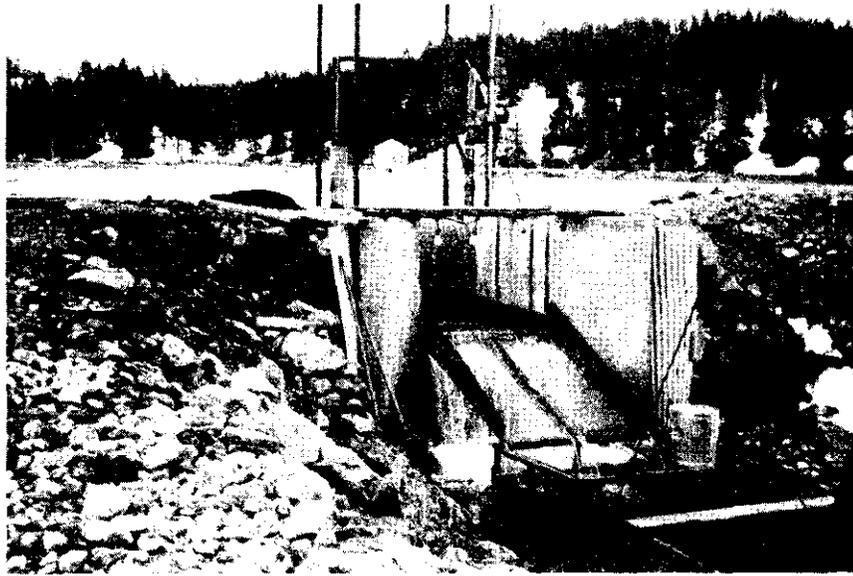


Figure 1. An inclined screen collection system allowed a 100 percent count of the chinook salmon smolts emigrating from the pond. For large numbers of emigrants, pound counts were made and the fish were weighed in the galvanized can and scale.



Figure 2. The trap was monitored on a 24-hour basis and the smolts were counted and/or weighed out as the trap box filled.

oxygen levels remained at or near saturation during this entire period.

On April 21, 1969, the trap system was installed in the pond outlet structure and the outlet screen was raised to allow fish to leave the pond. The inlet screen was left in place. Salmon River water was diverted into the pond to increase the outlet flow.

On the first night of operation over 5,000 chinook entered the trap. Numbers of emigrants remained high throughout the remaining days of April and by April 30, approximately 14,800 chinook had left the pond. The emigration rate diminished slowly during May and an additional 9,800 smolts left the pond. The trap was maintained until June 12, and another 1,490 chinook emigrated during this time (Table I). Of the total emigration of 26,100 chinook, 18,570 (71 percent) were given a right-ventral fin clip (Figure 3).

Survival from planting in the pond to emigration was low (15 percent) compared to the 65 percent survival realized on the 1967 year class. There was no difference in the handling or rearing operations between the two years. The pond was tended at least every other day. There was no apparent escape or significant predation. The only major difference was that the 1966 year-class chinook were Salmon River stock while the 1967 year-class fish were Santiam River stock from Oregon. The body condition of the first 1967 year-class emigrants in April averaged a poor 0.71. The body condition of the 1966 year-class Salmon River stock chinook counted out in 1968 averaged 0.99 (very good condition). Santiam River chinook may not be able to cope with the severity and duration of the Idaho winter or some unobservable factor caused the fish loss.

The drained pond was treated with rotenone on June 19, 1969. An accurate visual count of remaining smolts was hampered by moss, but I estimated less than 500 fish were left in the pond when treated.

When the fish were planted in July, 1968, the average size was 60 millimeters fork length. The average size of the emigrants in the spring of 1969 was 102 millimeters fork length (Table 2). The condition factor of the chinook was low when the pond first thawed in April; however, the fish improved in body condition as spring advanced.

1968 Year-Class Chinook Salmon

In August and September, 1968, approximately 157,000 chinook salmon eggs taken at Decker Flat weir were transported to the Hayden Creek incubation facilities. Survival to fry stage was 70 percent. An additional 50,000 Decker Flat spring chinook were received at Hayden Creek from the Mackay Hatchery in January, 1969. These fish were reared at the Hayden Creek Station until June 24, 1969.

Over June 25, 26, and 27, 1969, approximately 160,000 of these chinook were stocked in the Decker Flat pond. At the time of planting, the fish averaged approximately 98 millimeters fork length and 45 per pound. All 160,000 fish were given a right-ventral fin clip prior to planting them in the pond.

A local resident was hired to maintain the screens and the water level in the pond, harass or destroy predacious birds on the pond, fill the four automatic feeders and oversee the facility in general during the summer and fall of 1968. Approximately 9,650 pounds of Idaho Dry Diet fish feed at a cost of \$695 were fed from June to early November. Feeding response appeared to be excellent as the chinook learned

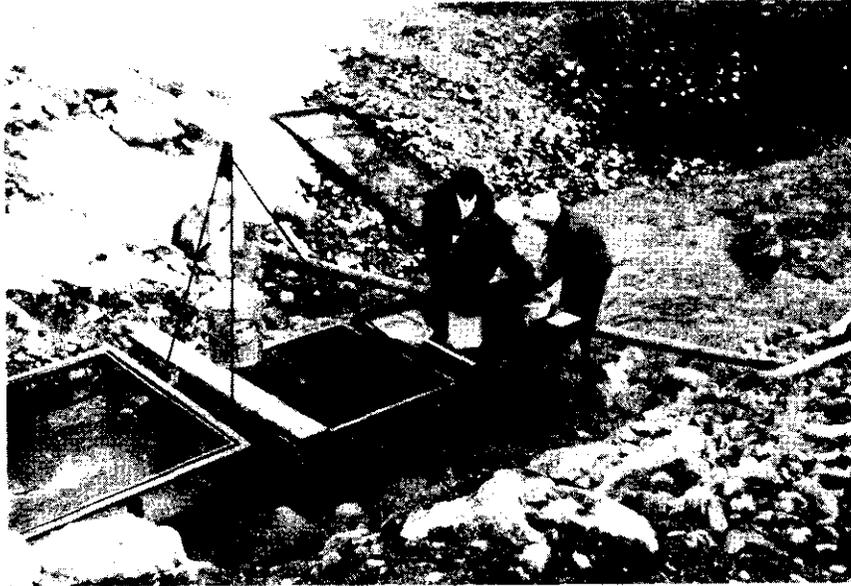


Figure 3. A screen box was used to hold fish for marking. Of the total emigration of 26,100 chinook, some 71 per cent were given a right ventral fin clip. The 1968 year class chinook were marked prior to planting in the pond in July, 1969.

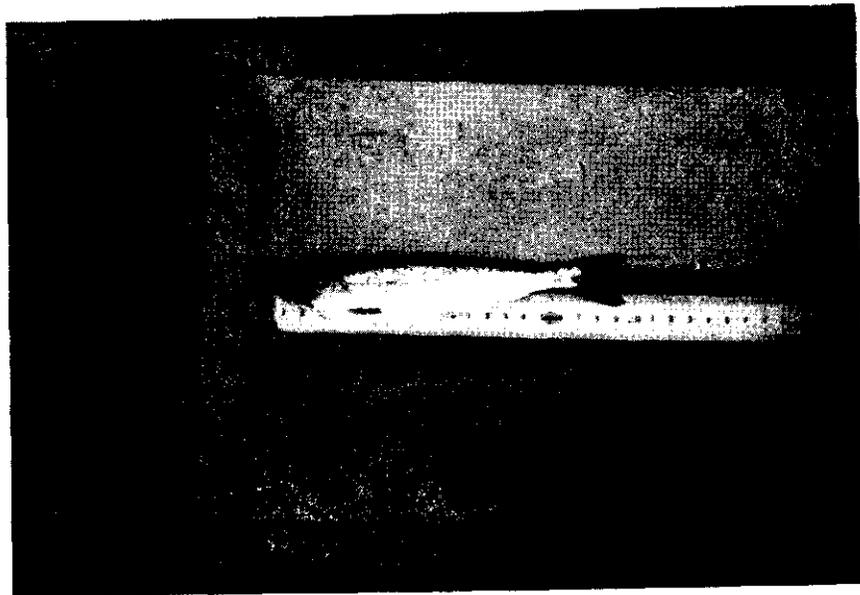


Figure 4. As fall 1969 drew to a close, the fish in the pond averaged 120 millimeters fork length and 25 per pound. Body condition was excellent and some specimens were as large as 180 millimeters fork length.

to "home" on the automatic feeders four times daily.

Table 1. Weekly emigration counts of 1967 year-class chinook salmon smolts from Decker Flat salmon rearing pond, spring, 1969.

	<u>APRIL</u>	<u>MAY</u>	<u>JUNE</u>
Week of:			
1 - 7		5,285	1,239
8 - 15		2,616	251
16 - 23	7,346	1,024	
24 - 31	7,454	885	
Total Planted In Pond:			180,000
Fall Release:			2,000
Overwintering Pond Population (est.):			178,000
Total Spring Emigration:			26,100
Percent Survival:			15%
Right-Ventral Fin Clip:			18,570

On August 22, 1969, a seine was used to collect a sample of chinook from the pond. Average size was 99 millimeters fork length. Another sample collected on October 10, 1969 showed the chinook averaging 120 millimeters fork length and 25 per pound. Body condition was excellent and some fish as large as 180 millimeters fork length were found (Figure 4).

As in 1967 and 1968, a decline in feeding response was evident as the water temperatures dropped in late fall. Feed amounts were adjusted down as temperatures fell in accordance with established hatchery feeding charts. On October 24, the automatic feeders were disconnected. The pond tender hand-broadcasted feed during the few remaining periods when the water temperature rose above 36°F. and feeding response was evident..

Table 2. Length frequency distribution of 1967 and 1968 year-class chinook salmon juveniles stocked in Decker Flat pond. The 1967 year-class fish were released in April, 1969. The 1968 year-class fish were last measured in October, 1969, and will be released from the pond in the spring of 1970.

Size Class Milli- meters Fork length	1967 YEAR-CLASS						1968 YEAR-CLASS			
	July 1968		Sept. 1968		April 1969		June 1969		October 1969	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
30-39	1	1					20	3		
40-49	34	24					20	3		
50	72	51					4	.5		
60	25	18	1	1	3	1	4	.5		
70	6	4	2	1	9	3	22	3		
80	3	2	15	12	22	7	66	9	1	1
90			27	22	37	13	214	30	26	9
100			43	36	82	28	259	37	39	13
110			19	17	91	32	87	12	66	23
120			9	7	40	14	15	2	59	21
130			5	4	2	1			41	14
140					1	1			23	8
150									18	6
160									9	3
170									3	1
180									3	1
Totals	141	100	121	100	287	100	711	100	287	100

A complete ice cover formed on the pond on November 18, 1969, (exact same date as in 1968). A check on December 16, 1969, showed approximately one to two inches of ice on the pond. One small open lead had formed near the south shore and a few salmon were observed swimming in the open area, They appeared to be in excellent condition.

The survival to emigration of these chinook will be monitored in the spring of 1970.

1969 Year-Class Salmon

In August and September, 1969, approximately 300,000 chinook salmon eggs taken at Decker Flat weir for the 1970 pond rearing cycle were transferred to the Hayden Creek incubation facilities. As of December 1, 1969 some 286,000 (95 percent) chinook fry remained on hand at the station. These fish will be stocked in Decker Flat pond in June, 1970.

Adult Returns, 1969

The return of a few "jack" salmon from the 1968 release was possible in the summer of 1969. Checks for fin-clipped fish were made at the Decker Flat adult holding pond, on the annual spawning ground surveys and in the sport catch along the Salmon River. No marked jacks were encountered in 1969.

Adult Returns, 1970

The return of some adult chinook spawners from the 1968 release and "jack" salmon from the 1969 release is possible in 1970. Intensified spawning ground carcass checks will be made in the Decker Flat area and local tributary streams, and intensive effort will be made to check as many salmon possible in the sport catch and at adult holding ponds in the Salmon River drainage.

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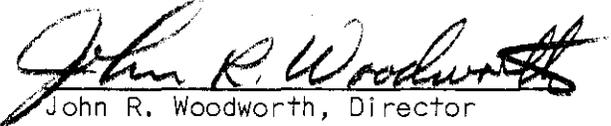
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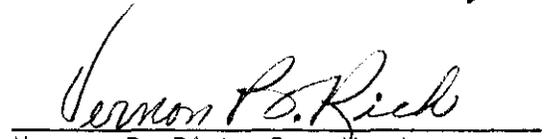
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