

IDAHO FISH & GAME DEPARTMENT

John R. Woodworth, Director

FEDERAL AID TO FISH RESTORATION

SALMON AND STEELHEAD INVESTIGATIONS

Annual Completion Report

Project F 49-R-9



Jobs IIIa and IIIb

Chinook Salmon Pond Rearing Studies
and
Evaluation of Survival of Pond-Reared Chinook Salmon

March 1, 1970 to February 28, 1971

By

Melvin Reingold
Senior Fishery Research Biologist
Salmon, Idaho

June, 1971

SH
167
S17
R4533
1971

TABLE OF CONTENTS

	<u>Page</u>
ABSTRACT	1
RECOMMENDATIONS	3
OBJECTIVES	3
TECHNIQUES USED.....	3
Facilities	3
FINDINGS	4
1968 Year-Class Chinook Salmon.....	4
1969 Year-Class Chinook Salmon	9
Adult Returns - 1968 Release.....	11
LITERATURE CITED	12

LIST OF FIGURES

- Figure 1. Schematic representation of the Decker Flat experimental chinook rearing pond and associated structure and facilities 5
- Figure 2, The Salmon Region construction crew reshaped the pond bottom to allow almost complete drainage8
- Figure 3. On December 18, 1970, at -20⁰ F. the pond remained at summer levels with 10 inches of ice cover. An experimental aeration system maintained a few open patches. Dissolved oxygen remained at saturation..... 8

JOB COMPLETION REPORT

RESEARCH PROJECT STATEMENT

State of Idaho Name: SALMON AND STEELHEAD INVESTIGATIONS

Project No. F 49-R-9 Titles: Chinook Salmon Pond Rearing Studies

Job Nos. IIIa & IIIb And Evaluation of Survival of Pond-
Reared Chinook Salmon

Period Covered: March 1, 1970 to February 28, 1971

ABSTRACT

We stocked some 160,000 spring chinook salmon fingerlings (Salmon River race, 1968 year class) in the Decker Flat experimental rearing pond near Stanley, Idaho, in July, 1969. We fed the fish dry pelleted feed until falling water temperatures ended feeding response, The pond iced over in November.

In February, 1970, routine tests disclosed fatally low dissolved oxygen levels in the pond under the ice cover. We suffered a 100 percent mortality of the chinook in the pond,

Several modifications to the pond system, accomplished in August, 1970, should allow a continual water supply to the pond all winter and prevent future oxygen depletion situations, A test lot of 50,000 1969 year class chinook remain under the ice at the close of the 1970-71 project season.

We found three right-ventral fin-clipped adult salmon at check stations during July, 1970, These stations checked 20 percent of the

sport catch which indicates 15 marked fish entered the sport harvest.

We released 4,900 right-ventral fin-clipped smolts from Decker Flat pond in the spring of 1968. Intensive spawning ground survey work on the upper Salmon River and Valley Creek disclosed no marked fish among 630 carcasses inspected.

Author:

Melvin Reingold
Senior Fishery Research Biologist

RECOMMENDATIONS;

We recommend continuance of this project until we can evaluate at least four smolt--adult cycles,

We should continue to explore various methods of preventing midwinter dissolved oxygen deficiencies,

We should maintain intensive efforts to locate marked returning adult salmon by spawning ground surveys, field checks and check statistics,

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 the fisheries and to evaluate returns to the rearing pond,,

TECHNIQUES USED

Facilities

The Decker Flat pond and associated facilities remain basically the same as described in the 1968 and 1969 progress reports, In the summer of 1970, the Salmon Region construction crew breached the north bank, installed a culvert with head valve and excavated a drain channel

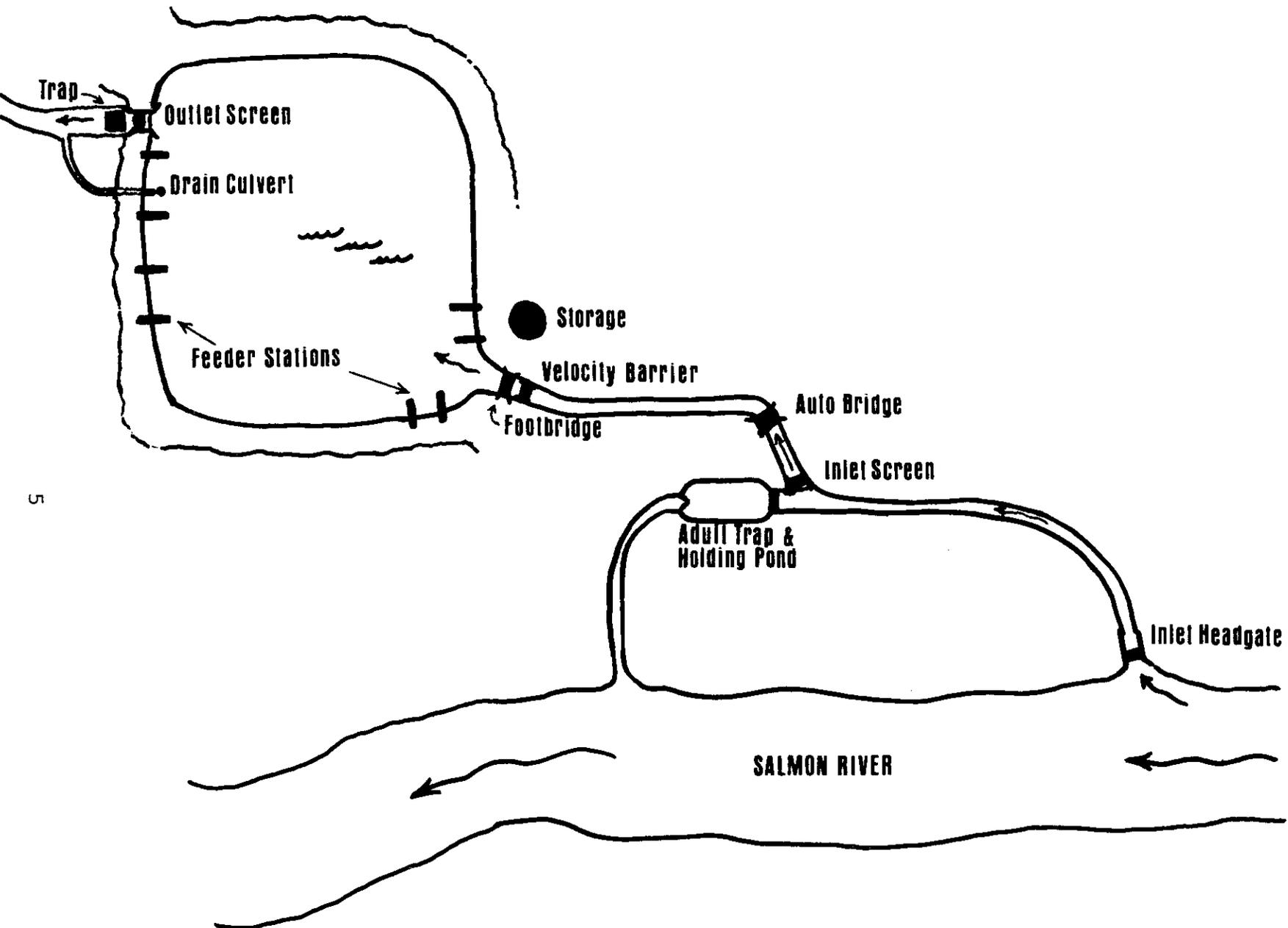
from the culvert to the main outlet channel. The construction:- crew scraped and reshaped the pond bottom to allow almost complete drain-age and installed a wider velocity barrier in the inlet channel, They also cleaned the inlet channel of accumulated sand and silt. I have diagrammed the basic system in Figure 1. The adult salmon trap and holding pond remains from an earlier Columbia River project egg-taking facility. We do not presently operate this facility,

FINDINGS

1968 Year-Class Chinook Salmon

A detailed description of the background on the 1968 year-class chinook from egg acquisition to planting and winter ice-ap appears la the 1968-69 progress report (Reingold, 1970), Briefly. 160,000- Salmon River stock chinook salmon juveniles remained in the pond as ice formed in November- 1969. The water level stabilized at approximately three feet.

On February 18, 1970, 20 inches of ice covered 16 inches of water, Routine tests on the pond disclosed dissolved oxygen levels as low as 1-2 ppm. A putrid odor emanated from the water welling up through the test holes., I suspected at this time chat we suffered total mortality of fish in the pond. This proved to be the case when we set up the outlet trap and monitored the emigration from the pond in late April, Only 20 fish emerged from the pond and after the ice cover disintegrated, we observed dead chinook throughout the pond in



5

Figure 1. Schematic representation of the Decker Flat experimental chinook rearing pond and associated structure and facilities.

under 10 inches of ice.

We will maintain a close watch during the winter of 1970-71 and adjust water flows and chop restrictive ice formations in an attempt to maintain a full 6-foot depth in the pond, As of December 24, 1970, temperatures exceeding $-30^{\circ} F_a$ did not stop inlet flow or cause any undue problems, Brent Nyborg, Conservation Officer at Stanley, checked the pond periodically and chopped ice from some of the inlet structures on occasion. I have also removed built up ice deposits and adjusted water flows this winter,

Due to the reshaping work performed in the summer of 1970, we can now drain the pond almost completely and scrape accumulated feed and detritus from the pond bottom after each rearing cycle, This should lower the decomposition oxygen demand in the pond (Figure 2). Waste material will be piled, dried and leveled on nonflooding ground: to prevent pollution.,

Also, I installed an experimental ice melting aeration system on the pond consisting of two air compressors hooked to some 300 feet of weighted perforated hose.

On December 18, 1970. the pond had a 10-inch ice cover except for several small holes over the aerator hose perforations While the aerators will not keep the pond ice free in winter they may hasten spring breakup by maintaining areas of open water (Figure 3)



Figure 2. The Salmon Region construction crew reshaped the pond bottom to allow almost complete drainage.



Figure 3. On December 18, 1970, at -20° F the pond remained at summer levels with 10 inches of ice cover. An experimental aeration system maintained a few open patches. Dissolved oxygen remained at saturation.

1969 Year-Class Chinook Salmon

Due to the construction work during the summer of 1970, we did not rear any fish in the pond. However, to avoid a blank year in our program, we utilized one .6 acre rearing pond at the Hayden Creek Experimental Research Station to rear some 200,000 chinook juveniles. In late September and early October, 190, after we completed the Decker Flat pond modifications and filled the pond, we transported some 50,000 chinook juveniles from Hayden Creek to Decker Pond. All these chinook carried a right-ventral fin-clips The chinook averaged 148 millimeters fork length and 13 per pound when placed in the pond.

Attempts to feed the chinook in the pond elicited no response. Water temperature minimums reached 36' F, in early October, The lack of visible fish or any feeding activity in the pond indicated that the chinook entered a winter dormant state by mid-October,

Near the same time, we released some 50,000 chinook directly in the Salmon River near Decker Pond. Twenty-five thousand (25,000) of these fish carried a right-ventral adipose fin-clip, Returning marked adult fish from these two groups may give us comparative survival of springtime pond vs, autumn river released fish, Comparison of catches of the two lots of marked smolts at Ice Harbor Dam will add to knowledge of emigration rates and survival..

Because we remain unsure of our capability to keep water flowing to the pond all winter, we placed only 50,000 of the 200,000 chinook at

Hayden Creek in Decker Pond and released another 50,000 in the Salmon River near the pond as mentioned, We released the remaining 100,000 chinook from the rearing pond at Hayden Creek into the Lemhi River, This release may provide us with another comparison of smolt-to-adult survival as pond vs. upper river vs, lower river releases. Some 25,000 of these fish carried an adipose clip,

We monitored the downstream movement of the chinook released in the Lemhi River via a trap some 20 miles downstream from the release site and found that a majority of these fish emigrated from the Lemhi River prior to December 1, 1970, Biologists on the lower Salmon and Snake Rivers reported large chinook smolts caught in traps and by steel-head anglers as far downstream as Asotin, Washington, as of December 15, 1970.

The fact that these fish emigrated as far as the Snake River by mid-December may be beneficial to their survival to the ocean. In effect, they retain a "head start" over spring released chinook and may avoid serious dissolved nitrogen problems encountered in the lower Snake River during spring runoff, Also, winter conditions are shorter and less severe in the lower river and may contribute to increased growth and survival. We will conduct intensive surveys to search for returning marked adults in future years. Federal agencies conducting downstream migrant trapping studies at lower dam sites will also watch for these fish,

In summary, as of December 31, 1970, some 56,000 year-class 1969 chinook juveniles remain under the ice in the Decker Flat experimental rearing pond. We will monitor their survival in April-May, 1971. The success of the overwintering capabilities of the pond depends on whether we can maintain a water supply to the pond through extreme and lengthy winter time air temperatures (a low of -61° F. is on record).

Adult Returns - 1968 Release

During the summer of 1970, we visually inspected over 1,600 chinook salmon carcasses in the upper Salmon River drainage, 1,053 at check stations and 630 on spawning ground survey. We found three adult fish with right-ventral fin-clips. In the spring of 1968, we released 4,900 chinook smolts from Decker Flat pond that carried this clip. These three adults are apparently returnees from that smolt release.

We observed the three marked adults at salmon harvest check stations operated under a separate research project (F 18-R). We established that during 1970, we saw 20 percent of the upper Salmon River chinook harvest at these stations. If we use this percentage to expand the three observed marks, an indicated 15 marked (RV) fish entered the sport catch, Intensive spawning ground surveys on the upper Salmon River and Valley Creek disclosed no right-ventral fin-clipped carcasses.

LITERATURE CITED:

Reingold, Melvin. 1970 Salmon and steelhead investigations. DJ-49-R-8, Job No. 4 (1968-1969), 9 pp.

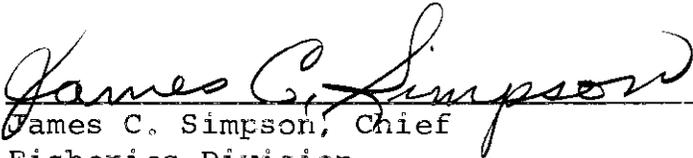
Submitted by:

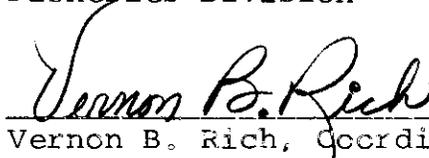
Melvin Reingold
Senior Fishery Research Biologist

Approved by

IDAHO FISH AND GAME DEPARTMENT


Robert L. Salter, Acting Director


James C. Simpson, Chief
Fisheries Division


Vernon B. Rich, Coordinator
Federal Aid