

**Freeze Brand Marking of Steelhead Trout and Chinook Salmon  
Juveniles for Water Budget Studies: Idaho**

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**by**

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## TABLE OF CONTENTS

	<u>Page</u>
ABSTRACT . . . . .	1
INTRODUCTION . . . . .	2
METHODS. . . . .	3
RESULTS. . . . .	3
DISCUSSION . . . . .	4
LITERATURE CITED . . . . .	6

## L I S T O F T A B L E S

Table 1. Freeze brand data for steelhead trout and chinook salmon Juveniles marked at Idaho hatcheries for the Water Budget Center - Downstream Smolt Monitoring Studles, 1985 outmigration . . . . .	5
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## ABSTRACT

During the fall of 1984 and spring of 1985, 362,428 chinook salmon (Oncorhynchus tshawytscha) and steel head trout (Salmo gairdneri) juveniles were freeze branded for Water Budget Center - Downstream Smolt Monitoring Studies. Of these, 106,361 fish received a coded wire tag. Release of the freeze brand groups began March 20, 1985 and were completed by June 4, 1985. After brand loss and mortality, there were 133,025 spring chinook, 25,600 summer chinook, 33,850 fall chinook, 65,125 A-run steelhead, and 62,400 B-run steelhead released with brands.

## INTRODUCTION

Under terms of contract with the Bonneville Power Administration (BPA), 362,428 hatchery-reared chinook salmon and steel head trout juveniles were freeze branded for the 1985 outmigration. These branded fish were indicators of various release groups followed by the water budget monitoring program to determine travel time in the lower Snake River and the Columbia River to McNary Dam.

## METHODS

Branding operations were conducted in a mobile fish marking unit that accommodates eight work stations (Duke 1980). The marking procedure followed cold branding methods described by Raymond (1974). During an average eight hour workday, 25,000 to 40,000 fish were branded. Freeze brands in the fall of 1984 were applied using branding boxes on loan from the Idaho Cooperative Fishery Research Unit (ICFRU). These boxes consisted of a one liter stainless steel cup set in a 3/4 inch plywood box lined with one inch of Styrofoam. Two fittings were located on opposite sides of the box to accept the branding rods. In the spring of 1985, branding was performed using new boxes fabricated of aluminum insulated with one inch of urethane foam. The volume of the new boxes was increased to 5.5 liters. The inner walls funneled down to concentrate the liquid nitrogen around the bases of the branding rods, two of which protrude from opposite sides of the box.

## RESULTS

Ten different groups of fish were marked at five state and federal hatcheries in Idaho during the fall of 1984 and spring of 1985 for the 1985 release (Table 1). These groups included: 163,574 spring chinook from McCall Hatchery (Sawtooth release), Rapid River Hatchery and Dworshak National Fish Hatchery; 25,653 summer chinook from McCall Hatchery; 40,054 fall chinook from Hagerman National Fish Hatchery; 66,061 A-run steelhead trout from Hagerman National and Niagara Springs Fish hatcheries; 67,086 B-run steelhead trout from Hagerman National and Dworshak National Fish hatcheries.

All steel head trout branding was conducted in the spring of 1985, three to five weeks prior to release. Brand retention values for steel head ranged from 90% at Dworshak National Fish Hatchery to 99% at Niagara Springs and Hagerman National Fish hatcheries.

With the exception of the chinook salmon marked at McCall Fish Hatchery in the fall of 1984, all chinook were branded in the spring of 1985, one to three weeks prior to release. Brand retention values for chinook ranged from 60% at Dworshak National Fish Hatchery to 100% at McCall Hatchery. The lower retention values were observed on fish branded in the spring of 1985 with the quality check taken within one week of marking. From subsequent observation of these fish at downstream smolt monitoring traps and at the Lower Granite Dam collection facility, actual brand retention was assumed to have been closer to the 100% found on chinook salmon branded in the fall of 1984.

Due to the low retention values experienced in the chinook groups marked in the spring, concern was focused on the efficiency of the freeze brand boxes used. Preliminary testing of the new boxes indicated they maintain a temperature several degrees colder than the old ICFRU boxes. The average temperature of the new boxes at the brand face was -53 C. A greater variance in temperature was found between

types of branding tools (solid core brass rod vs. hollow core copper rod) and brand face character than was found between the old and new branding boxes. The major advantage of the new branding boxes is the increased liquid nitrogen volume (5.5 liters), which allows for approximately four hours of marking before requiring refill.

## DISCUSSION

Fish mortalities attributable to the marking operations were minimal in all instances, seldom exceeding what would be expected from fish which were handled but not branded.

The problem of brand retention experienced with the spring-marked chinook salmon is possibly due to the pre-smolt physiological condition of the fish at the time of marking. It is believed that this condition delayed the brand setting process several days. To avoid this problem in the future, spring branding of chinook salmon should be conducted three to four weeks prior to release to assure a good readable brand on the outmigrating fish.

Table 1. Freeze brand data for steelhead trout and chinook salmon juveniles marked at Idaho hatcheries for the Water Budget Center - Downstream Smolt Monitoring Studies, 1985 outmigration.

Sp.	Hatchery (Release site)	Brand	Branding dates (Release dates)	Number branded	% brand retention	Number <sup>a</sup> released
CH-1	McCall (Sawtooth)	RD"R"-1 & CWT	10/30-11/2/84 (3/25&29/85)	40,654	99	39,875
CH-2	McCall (S.F. Salmon R.)	RD"R"-3 & CWT	11/5&6/84 (4/1&4/85)	25,653	100	25,600
CH-1	Rapid River (Rapid River)	LD"R"-1	3/7/85 (3/25-4/11/85)	41,230	83 <sup>b</sup>	34,225
CH-1	Rapid River (Hells Canyon)	LD"R"-3	3/8/85 (3/20/85)	43,160	83 <sup>b</sup>	35,825
ST-A	Hagerman NFH (Sawtooth)	RD"Y"-1	3/19/85 (4/9/85)	35,566	99	35,125
ST-B	Hagerman NFH (E.F. Salmon R.)	RD"Y" -3	3/20/85 (4/17/85)	32,406	99	31,775
ST-A	Niagara Springs (Hells Canyon)	LD"Y"-1	3/21&22/85 (4/29-5/1/85)	30,495	99	30,000
CH-1	Dworshak NFH (N.F. Clearwater R.)	RD"R"-2	3/27/85 (4/3/85)	38,530	60 <sup>b</sup>	23,100
ST-B	Dworshak NFH (Clearwater R.)	LD"Y" -2	3/29/85 (4/29/85)	34,680	90	30,625
CH-3	Hagerman NFH (Snake River)	LD"R"-4 & CWT	5/29-31/85 (6/4/85)	40,054	86 <sup>b</sup>	33,850

<sup>a</sup>Includes mortalities.

<sup>b</sup>Retention check taken within seven days and brands were not set.

## LITERATURE CITED

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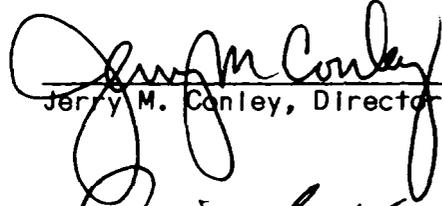
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