

# FRED Reports

DEER MOUNTAIN HATCHERY  
COHO SALMON  
1979 BROOD STOCK  
EVALUATION REPORT  
BY  
Carol Denton  
Number 26



**Alaska Department of Fish & Game**  
Division of Fisheries Rehabilitation,  
Enhancement and Development

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#### ABSTRACT

Coho salmon (*Oncorhynchus kisutch*) from Ketchikan Creek brood-stock were reared at Deer Mountain Hatchery and released back into Ketchikan Creek in a series of four brood years. This report examines rearing, survival, and return data for the 1979 brood year, and rearing and age 1.0 return data for the 1980 brood year.

Overall survival for the 1979 brood was 3.58%. There was no significant difference in rate of return or size at return between the two rearing treatment groups: inside vs outside rearing.

Age 1.0 returns from the 1980 brood show an 800% greater return from the early (mid-May) release group than from the late (mid-June) release group. Total survival can be assessed after adults return in 1983.

KEY WORDS: Coho salmon, "*Oncorhynchus kisutch*," Ketchikan Creek, Deer Mountain Hatchery.

## INTRODUCTION

Coho salmon (*Oncorhynchus kisutch*) have been artificially propagated at Deer Mountain Hatchery, Ketchikan, Alaska during most of its nearly 30 years of operation. The main goal of the early program was to stock fry in various local watersheds (Bakewell, Smugglers Cove, Whipple Creek); releases into Ketchikan Creek were a minor part of hatchery production.

The first coho salmon eggs incubated at Deer Mountain were from the Soos River in Washington (brood year 1954). Releases from this lot, plus subsequent releases of fry from local sources (Ward Creek, Ketchikan Creek, Reflection Lake), have yielded the present Ketchikan Creek stock (Roppel 1982).

In the early seventies, under the direction of the Alaska Department of Fish and Game (ADF&G), the program shifted to emphasize in-hatchery culture techniques. The building was renovated in 1978. Fiberglass, Swedish-style tanks were installed both inside and outside of the building to increase rearing space. A 4-year program was begun to enhance the Ketchikan Creek stock and, at the same time, to assess some cultural and evaluation procedures. Brood-stock was taken from the creek in 1977, 1978, 1979, and 1980, and fry were released back into the creek in 1979, 1980, 1981, and 1982.

Evaluation of these releases has been through implantation and recovery of coded-wire tags (CWT). Returns to the commercial fishery and to the hatchery have been monitored each year since 1979.

Following the 1983 returns, a final evaluation report for this program will be written. This report will focus on the 1982 returns of 1979 and 1980 brood year coho salmon. Data for return years 1979-1983 will be incorporated into the final report.

## LOT HISTORY, 1979 BROOD

A series of 10 egg takes at Deer Mountain Hatchery provided 156,550 coho salmon eggs. The first egg take was on 8 November and the final one on 7 December 1979. Fifty-six females were fully spawned and eight were partially spawned. Fifty-two males were used. At least one male per female was used on all but two occasions. For the two largest egg takes, the ratio was 1:1.7, males to females.

Fertilization, water hardening and disinfecting followed standard hatchery procedures. Eggs were seeded into Heath trays at approximately 7,800 eggs per tray.

Formalin solution (1:6,000) was infused through the stacks by the pump method, twice weekly, beginning 4 December and continuing until the eggs were picked. The eggs were shocked and picked at approximately 250 T.U.'s; fry were ponded at approximately 650 T.U.'s. The standard OMP-2 diet was fed throughout rearing.

The entire lot was split into two experimental groups after the first 7 months of rearing. These were designated "reared inside" and "reared outside". The outside group (67,316 fish) was moved to three 4.9 x 4.9m outside ponds in mid-to-late October 1980. The inside group (11,897 fish) remained in two 1.8 x 1.8m tanks inside, until January 1981 when they were moved to four 2.0 x 2.0m tanks sheltered beside the hatchery building. The specific variable in this study was photoperiod. The outside group was subjected to natural light only. The inside group received artificial light controlled by an automatic timer that was set to mimic the natural photoperiod. The tanks, to which this group was moved in January, were covered by a wooden roof, and several incandescent lights augmented natural light during working hours.

Table 1 summarizes weights, lengths, and rearing densities for the entire rearing phase.

An outbreak of furunculosis in July 1980 was treated with a 15-day course of TM-50. High mortality during this period was the major cause of the low overall survival of this brood year (43%).

Size of fry at release was nearly identical for the two groups. Differences in rearing densities existed at times, and that effect may mask any effect of inside vs outside rearing.

At approximately 12g average weight, all inside-reared fry and approximately 26% of the outside-reared fry were coded-wire tagged in early February 1981. All 1979 brood coho salmon were released into Ketchikan Creek on 1 June 1981 by removing the screens in the bottom of the tanks and flushing them down the drains. At time of release, the inside-reared group consisted of 7,903 fry (CWT 4-19-16), and the outside group consisted of 59,645 fry (CWT 4-20-41). Table 2 gives the numerical history of the lot, including survival rates to various stages.

#### LOT HISTORY, 1980 BROOD

A series of four egg takes, beginning 22 October and ending 28 November 1980 produced 259,787 eggs. Ninety-nine females were fully spawned and four partially spawned. Only 45 males were used, a ratio of 1:2.2 (males to females). For the largest egg take the ratio was 1:3.2; for all other egg takes the ratio was close to 1:1.

The eggs were water hardened and disinfected in Heath trays to minimize handling.

A 2 p.p.m solution of malachite green was flushed through the Heath tray stacks for a 1-hour period twice a week from 2 November until shocking.

Survivals to ponding are in Table 2.

The standard OMP-2 diet was fed throughout rearing. One 52,500 group of fry was released into Ward Lake after approximately 8 months of rearing (11/23/81). Approximately half of these fry were coded-wire tagged prior to release (CWT 4-21-48). This was the first release of a 4-year enhancement program; a separate report will be submitted.

Table 1. Comparative sizes and rearing densities,  
1979 and 1980 brood Deer Mountain Hatchery coho salmon<sup>a/</sup>.

Group	Brood Year 1979			Group	Brood Year 1980		
	Weight <sup>b/</sup> (g)	Length (cm)	Density <sup>c/</sup> (kg/m <sup>3</sup> )		Weight <sup>b/</sup> (g)	Length (cm)	Density <sup>c/</sup> (kg/m <sup>3</sup> )
mid April					0.5	3.7	6.9
early May					0.7	4.0	9.2
early July	0.7	4.0	4.4		2.1	5.5	22.2
early September	3.3	6.1	10.8		7.1	8.2	26.3
early October	7.6	8.5	19.0		9.6	9.0	37.9
mid November	in 10.0	9.2	23.5	*	13.2	10.2	27.6
	out 9.8	9.2	12.4				
early December	in 10.0	9.5	26.0	early	12.7	10.1	27.9
	out 10.1	9.3	12.6	late	12.7	10.1	26.5
early February	in 12.7	10.2	8.7	early	13.8	10.6	27.9
	out 11.9	10.0	13.6	late	14.0	10.6	28.1
early March	in 12.8	10.2	8.5	early	16.4	10.8	33.0
	out 13.2	10.4	14.8	late	16.4	10.8	34.0
mid April	in 15.4	10.9	17.0	early	18.4	11.2	36.6
	out 15.0	11.0	10.1	late	18.3	11.3	36.4
early May	in 16.4	11.2	12.1	* early	17.0	11.7	30.9
	out 15.9	11.3	14.4				
early June	* in 12.8	11.8	14.6	* late	16.8	11.8	30.6
	* out 17.5	11.9	19.8				

\* Release

<sup>a/</sup> Data grouped for comparison where samples were less than one week apart, in subsequent years.

<sup>b/</sup> Weights, lengths, and densities are simple, non-weighted averages of all tanks sampled.

<sup>c/</sup> Densities based on .76m water depth in all tanks.

Table 2. Incubation and survival data, Deer Mountain coho salmon, 1979 and 1980 broods.

---

	<u>1979</u>	<u>1980</u>
Egg Takes		
females used <sup>a/</sup>	60	101
males used	52	45
number of eggs	156,550	259,787
Fecundity	2,609	2,572
Incubation		
number per tray green	7,828	8,281
number per tray eyed	7,418	6,871
total eyed eggs	139,907	<sup>b/</sup>
dates shocked	3/13 to 2/19	12/2 to 1/24
dates ponded	5/6 to 5/31	3/19 to 4/30
Survivals (%)		
green-egg to eyed-egg	89	<sup>c/</sup>
eyed-egg to fry	93	88
fry to release	52	95.5
green-egg to release	43	84
Number released	67,548	217,809

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<sup>a/</sup> Partially spawned females are counted as  $\frac{1}{2}$ , for this table.

<sup>b/</sup> Eyed egg count in hatchery records is in error; less than number ponded.

<sup>c/</sup> Numbers given in hatchery records do not balance (fewer fry ponded than were released). For this report, number ponded = number released plus total morts during rearing. Using this figure, however, number ponded is greater than number of eyed-eggs seeded. Ignoring the eyed-egg count, green egg to swim-up fry survival was apparently 88 per cent.

Two test groups were designated within the Ketchikan Creek release lot to assess effects of release timing: early (early May) vs. late (early June). Similar treatment and rearing densities prevailed for each group. Size at release was similar for both groups because the earlier-ponded fish comprised the early release group. Nineteen per cent of each release group were coded-wire tagged. The early-release group of 82,332 fish (CWT 4-21-7) was released into Ketchikan Creek through the tank drains on 10 May 1982. The late-release group of 82,941 fish (CWT 4-21-6) was similarly released on 1 June 1982.

Rearing and release data are summarized in Tables 1 and 2.

## EVALUATION OF 1982 RETURNS

### Commercial Fishery

#### Methods:

The Alaska Department of Fish and Game Stock Separation Project assumed responsibility for all coded-wire tag (CWT) recovery in the commercial fishery in 1982. Their samplers were stationed at all major fish buying stations throughout Southeastern Alaska. The Fisheries Rehabilitation, Enhancement and Development (FRED) Division Tag Lab in Juneau removed and read all CWTs recovered, compiled results, and calculated contribution rates to the fishery for each tag code. A method developed by Fritz Funk (1983) was used to calculate contribution rates for the 1982 return year.

The tag lab reported data by sampling strata. These strata differed for each of the three gear types. Because there is no way to separate data into more exclusive strata, all data in this report are grouped into the most inclusive strata - those used to report troll catches. These are 2 week time strata and four major geographic divisions of Southeast Alaska (Tables 3 and 4 and Figure 1).

#### Results & Discussion:

Port samplers observed 24.3% of all coho salmon landed in the commercial fishery in 1982. This included 29.8% of the troll catch, 11.7% of the gillnet catch, and 17.7% of the seine catch.

A total of 1,867 adult (1979 brood) Deer Mountain coho salmon were taken in the commercial fishery in 1982. Table 5 summarizes these data by tag code and by total returns. It is evident that there are no substantial differences between tag code groups in the timing and location of interceptions. The only apparent difference is the recovery of CWT 4-20-41 in the NIN area. However, the expanded figure of 108 fish is based on 3 actual recoveries. Also, the apparent discrepancy between per cent of each tag group caught in the SIN area is based on only one 4-19-16 recovered vs two 4-20-41. Small numbers of recovered tags may preclude valid conclusions.

Table 3. 1982 Statistical weeks in the scope of this report.

---

<u>Week</u>	<u>From</u>		<u>To</u>
20	May 9	-	May 15
21	May 16	-	May 22
22	May 23	-	May 29
23	May 30	-	June 05
24	June 06	-	June 12
25	June 13	-	June 19
26	June 20	-	June 26
27	June 27	-	July 3
28	July 4	-	July 10
29	July 11	-	July 17
30	July 18	-	July 24
31	July 25	-	July 31
32	Aug 1	-	Aug 7
33	Aug 8	-	Aug 14
34	Aug 15	-	Aug 21
35	Aug 22	-	Aug 28
36	Aug 29	-	Sept 4
37	Sept 5	-	Sept 11
38	Sept 12	-	Sept 18
39	Sept 19	-	Sept 25
40	Sept 26	-	Oct 2
41	Oct 3	-	Oct 9
42	Oct 10	-	Oct 16
43	Oct 17	-	Oct 23
44	Oct 24	-	Oct 30
45	Oct 31	-	Nov 6
46	Nov 7	-	Nov 13
47	Nov 14	-	Nov 20
48	Nov 21	-	Nov 27
49	Nov 28	-	Dec 4
50	Dec 5	-	Dec 11
51	Dec 12	-	Dec 18
52	Dec 19	-	Dec 25
53	Dec 26	-	Dec 31

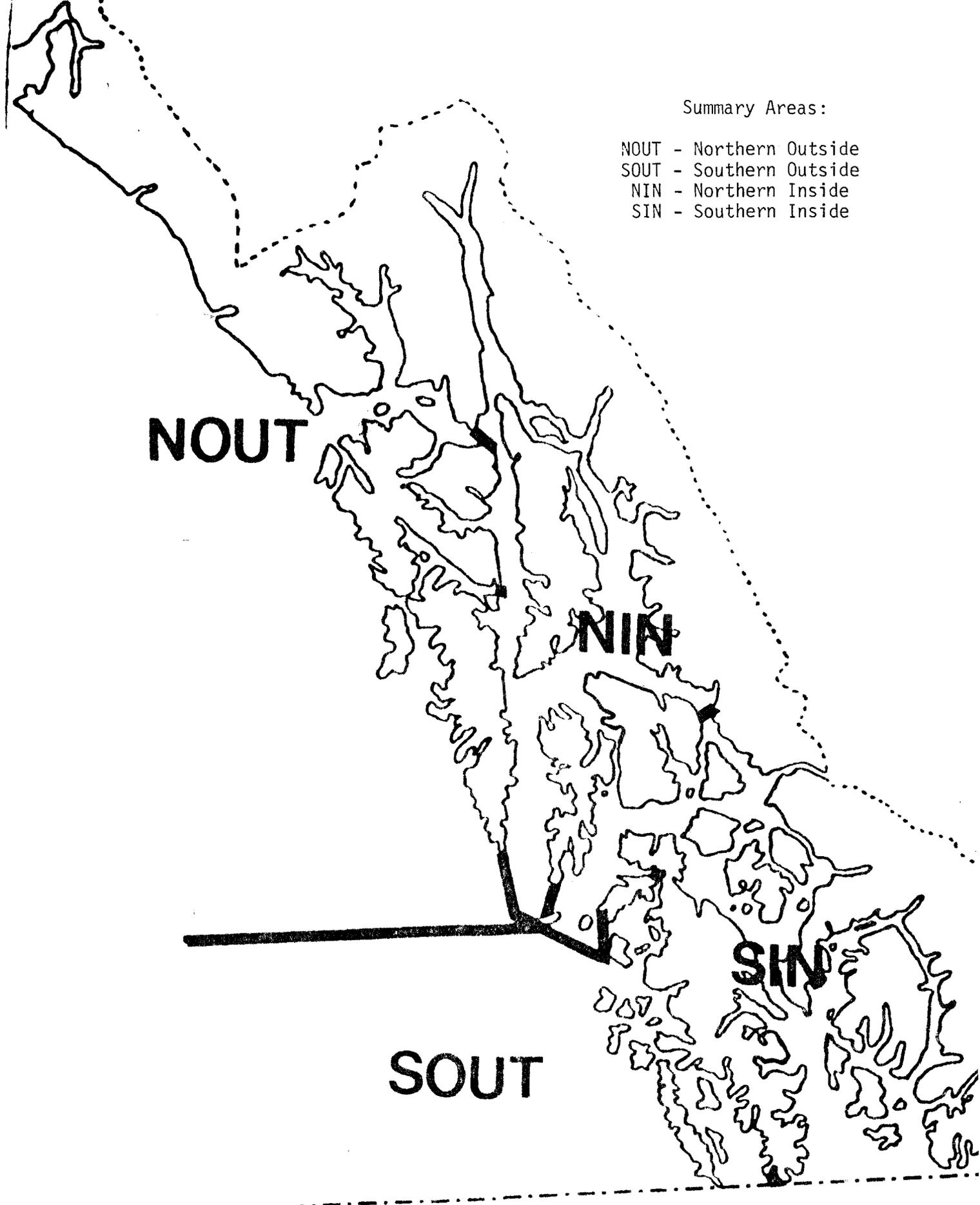
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Table 4. Summary areas used for contribution estimates of coded wire tagged salmon stocks to Southeastern Alaska fisheries.

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<u>SUMMARY AREA</u>	<u>FISHING DISTRICTS</u>
Northern Outside	113, 114, 116, 154, 157, 189, 181, 183, 550, 513
Southern Outside	103, 104, 152, 150, 504, 510, 512
Northern Inside	109, 110, 111, 112, 115
Southern Inside	101, 102, 105, 106, 107, 108
Other	multiple catch areas not falling within one of the other 4 summary areas

---



Summary Areas:

- NOUT - Northern Outside
- SOUT - Southern Outside
- NIN - Northern Inside
- SIN - Southern Inside

Figure 1. Summary areas of fishing districts, Southeast Alaska.

Table 5. Recovery in the 1982 Southeast Alaska Commercial Fishery of 1979 brood Deer Mountain Hatchery coho salmon, by CWT code and summary area<sup>a/</sup>.

Statistical Weeks	AREA						TOTAL	% <sup>b/</sup>
	NOUT	SOUT	NIN	SIN	OTHER			
25-26								
4-19-16				3			3	1.2
4-20-41						1	1	0.1
Combined				3		1	4	0.2
27-28								
4-19-16						1-Canada		
4-20-41								
Combined								
29-30								
4-19-16	8	6		11			25	10.2
4-20-41	34		12	105	2		153	9.4
Combined	42	6	12	116	2		178	9.5
31-32								
4-19-16	4			3			7	2.9
4-20-41	34			13			47	2.9
Combined	38			16			54	2.9
33-34								
4-19-16	24	28		30			82	33.6
4-20-41	184	42	96	221	2 (& 1 Canada)		545	33.6
Combined	208	70	96	251	2		627	33.6
35-36								
4-19-16	40			73			113	46.3
4-20-21	380	69		308	4		761	46.9
Combined	420	69		381	4		874	46.8
37-38								
4-19-16				14			14	5.7
4-20-21				115			115	7.1
Combined				129			129	6.9
39-40								
4-19-16								
4-20-21						1	1	0.1
Combined						1	1	0.1

-continued-

Table 5. continued

Statistical Weeks	AREA					TOTAL
	NOUT	SOUT	NIN	SIN	OTHER	
<b>TOTALS</b>						
4-19-16	76	34		134		244
<u>c/</u>	31.1	13.9		54.9		
4-20-21	632	111	108	762	10	1623
<u>b/</u>	38.9	6.8	6.7	47.0	0.6	
Combined	708	145	108	896	10	1867
<u>a/</u>	37.9	7.8	5.8	48.0	0.5	

a/ Expanded numbers total for all gear types.

b/ Per cent of tag code total recovered in each time period.

c/ Per cent of tag code total recovered in each area.

It is not surprising that nearly half of all interceptions occurred in the southern inside area (SIN), because it is the area into which Ketchikan Creek drains. The large number of interceptions - nearly 38% of the total - in northern outside (NOUT) waters is less expected and probably reflects (1) the large geographical area included in NOUT and (2) intense fishing pressure in some parts of the NOUT area.

Average fork length of intercepted adults in the two groups was identical: 64.0 cm.

Canadian fisheries reported the recovery of two 4-20-41 tags from the Prince Rupert area during weeks 28 and 34. Expanded numbers are unavailable.

### Hatchery Returns

#### Methods:

The adult holding pond at the hatchery was seined at least once a week from early October through late December 1982 to determine the number of ripe females present. A Floy brand anchor tag was attached through the base of the dorsal fin the first time each adult was handled during the early run. This was our only way to assess run timing because the hatchery does not have adequate escape-proof adult holding facilities.

Females were checked for ripeness each time they were handled; ripe and near ripe females were put into locked pens adjacent to the holding pond. Green females were released back into the holding pond. Males were put in locked pens if an egg take was expected within a few days - otherwise, they were returned into the pond.

Each time the pond was seined numbers were read from all previously implanted Floy tags. Jacks (age 1.0) were killed and processed the first time they were seined from the holding pond.

Anchor tags were not applied to coho salmon entering the pond after the hatchery's brood stock requirements had been met. Rather, these fish were processed when first handled.

All coho salmon were processed as follows:

1. Adipose-clipped fish: Killed; length (mm) and weight (kg) data and scale sample taken. Head removed for coded-wire tag retrieval.
2. Non-adipose-clipped fish: If not used for egg take, length and scale sample taken from live fish; released into stream above holding pond barrier. Fish used for egg takes were killed and the same data collected.

All fish handled were inspected for missing or deformed pectoral and pelvic fins.

Length, weight, and run timing data were tested for significant differences between tag code groups using the t test at  $P < .05$ .

No weir was in place during the 1982 coho salmon run; entry into the hatchery holding pond was voluntary. Therefore, it cannot be assumed that all hatchery-produced coho salmon in the escapement entered the holding pond. Also, because Ketchikan Creek supports a natural population of coho salmon, it is unreasonable to expect that all fish entering the holding pond were hatchery-produced.

For these reasons, expanded numbers from CWT retrieval are used for evaluation. Total number of coho salmon entering the holding pond is presented only as a matter of interest.

#### Results and Discussion:

A total of 1,177 coho salmon entered the hatchery holding pond in 1982; 41% were age 1.1 adults. Expanded tag returns indicate that the hatchery contributed 1,106 coho salmon to the escapement (Tables 6 and 7).

The peak of jack returns occurred approximately 3 weeks earlier than the peak of adult returns. Run timing differences between tag codes of the same age classes were not significant.

No significant size difference existed between adults of the two 1979 brood treatment groups (Table 8). Returns of the group reared inside (CWT 4-19-16) had more than twice the incidence of missing fins.

Lengths of jacks returning to the hatchery was significantly different for the two release timing groups. Individuals from the early-release group averaged approximately 27 mm longer than the late-release group (Table 9). They were also 0.1 kg heavier - not a significant difference. The early-release group had a much higher incidence of missing fins. Condition of fins at release was not noted for either 1979 or 1980 brood cohos. This should be done for future releases, in conjunction with the tag retention check on 500 fish.

Per cent escapement of adults (age 1.1) was nearly identical for both tag groups, 0.79% for 4-19-16 and 0.80% for 4-20-41. Return of jacks showed a much greater discrepancy between tag groups, with the early release group showing 0.6% return and the late release group showing 0.07% return. Whether this is indicative of overall survival or differences in age at return is unknown at this time.

The use of anchor tags as markers to assess run timing proved helpful. Data from 37 females indicates that an average of 7.1 days elapses between first arrival at the holding pond and ripeness, with a standard deviation of 5.3 days. Allowing for the frequency of seining the pond, this means that females arrive at the hatchery an average of approximately 10 days before they are ready to spawn.

Table 6. Run timing of adult (age 1.1) coho salmon, Deer Mountain Hatchery, 1982.

Statistical Week	Tag Code 4-19-16		Tag Code 4-20-41	
	Actual	Expanded <sup>a/</sup>	Actual	Expanded <sup>a/</sup>
42	8	10	13	61
43	2	2	2	9
44	0	0	1	5
45	13	16	5	23
46	6	7	7	33
47	5	6	9	42
48	9	11	20	94
49	3	4	5	23
50	5	6	26	122
51			11	52
52			3	14
Totals	51	62	102	478
$\bar{x}$ Week of Return		46		47
Median Week of Return		46		48

<sup>a/</sup> Expanded marks is,

$$\text{marks recovered} \times \left( \frac{\text{total released}}{\text{marked release}} \right) \times \left( \frac{\text{tag retention rate of age class at release}}{\text{tag retention rate of age class at rack}} \right)$$

For tag code 4-19-16 the equation becomes,

$$\text{marks recovered} \left( \frac{7903}{6480} \right) \left( \frac{81.668}{81.818} \right) = \text{expanded marks.}$$

$$\text{Expansion factor} = 1.21737$$

For tag code 4-20-41 the equation becomes,

$$\text{marks recovered} \left( \frac{59,645}{12,672} \right) \left( \frac{81.668}{81.818} \right) = \text{expanded marks.}$$

$$\text{Expansion factor} = 4.69822$$

Table 7. Run timing of age 1.0 coho salmon, Deer Mountain Hatchery, 1982.

Statistical Week	Tag Code 4-21-6		Tag Code 4-21-7	
	Actual	Expanded <sup>a/</sup>	Actual	Expanded <sup>a/</sup>
42	2	11	41	231
43	2	11	7	39
44	1	6	7	39
45	2	11	11	62
46	0	0	5	28
47	0	0	5	28
48	2	11	5	28
49	2	11	5	28
50	0	0	2	11
51	<u>0</u>	<u>0</u>	<u>2</u>	<u>11</u>
Totals	11	61	90	505
$\bar{x}$ Week of Return	45		44	
Median Week of Return	45		43	

<sup>a/</sup> Expanded marks is,

$$\text{marks recovered} \times \left( \frac{\text{total released}}{\text{marked release}} \right) \times \left( \frac{\text{tag retention rate of age class at release}}{\text{tag retention rate of age class at rack}} \right)$$

For tag code 4-21-6 the equation becomes,

$$\text{marks recovered} \left( \frac{82941}{15913} \right) \left( \frac{95.61}{88.60} \right) = \text{expanded marks.}$$

$$\text{Expansion factor} = 5.62453$$

For tag code 4-21-7 the equation becomes,

$$\text{marks recovered} \left( \frac{82332}{15777} \right) \left( \frac{95.61}{88.60} \right) = \text{expanded marks.}$$

$$\text{Expansion factor} = 5.63137$$

Table 8. Biological Data, Adult (age 1.1) coho salmon,  
Deer Mountain Hatchery, 1982.

---

	Reared Inside Tag Code 4-19-16	Reared Outside Tag Code 4-20-41
Sample size	51	102
Females	23	43
Males	28	59
Average MEFT length (cm)	59.4	61.7
Females	60.6	62.8
Males	58.4	61.0
Average weight (kg)	2.91	3.27
Females	3.01	3.35
Males	2.82	3.21
One missing fin (%)	28 (54.9)	21 (20.6)
Females (%)	13 (56.5)	9 (20.9)
Males (%)	15 (53.6)	12 (20.3)
Two missing fins (%)	2 (3.9)	3 (2.9)
Females (%)	2 (8.7)	2 (4.7)
Males (%)	0	1 (1.7)

---

Table 9. Biological data, age 1.0 coho salmon, Deer Mountain Hatchery, 1982.

	Early Release Tag Code 4-21-6	Late Release Tag Code 4-21-7
Sample size	90	11
Average MEFT Length, cm (SD)	31.5 (2.4)	28.8 (2.3)
Average weight, kg (SD)	0.44 ( 0.11)	0.34 ( 0.10)
One missing fin (%)	29.5	9.1
Two missing fins (%)	3.3	0.0
Per cent return	0.61	0.07

Anchor tagging also gave us an indication of what per cent of females do not remain available to the hatchery, given the present physical set-up. Nearly half (47%) of anchor-tagged females were never retrieved for spawning or tag recovery. Possible reasons include natural wandering and poaching. Hatchery brood-stock needs at this time do not require more secure holding conditions. However, the loss of coded-wire tag data should be prevented in the future.

The hatchery's 1982 brood-stock requirements were met with three egg takes; 34 females and 37 males were spawned, producing 88,750 eggs.

### Summary

Returns of 1979 brood year coho salmon show no significant difference between size of adults (age 1.1) and survival of the two experimental groups (inside vs outside rearing). Although this experiment was short-term and not carefully controlled, it implies that in future studies portions of the same experimental group could be reared in both inside and outside tanks. The difference in missing pectoral and pelvic fins on returning fish of the two groups cannot be ignored, but seems to be of secondary importance; survival and size at return are of primary importance.

Table 10 summarizes survival of the 1979 brood. Total return was 3.58%, with 77% fishery interception.

Differential returns of jacks from the two release timing groups of the 1980 brood cannot be interpreted at this time. Jacks from the early release group had an 800% greater return than from the late release group.

Given the present requirements of the Deer Mountain coho salmon program, the evaluation we obtained was adequate. The results point out weaknesses that need to be corrected, if we ever expand the coho salmon program.

Table 10. Summary of 1979 brood Deer Mountain coho salmon returns to commercial harvest and escapement.

Tag Code	Total Release	Return Year	Commercial Catch	Escapement	Total Return	% Return
4-19-16 Reared Inside	7,903	1981	0	4	4	0.05
		1982	<u>244</u>	<u>62</u>	<u>306</u>	<u>3.87</u>
		Total	244	66	310	3.92
4-20-41 Reared Outside	59,645	1981	0	5	5	0.01
		1982	<u>1,623</u>	<u>478</u>	<u>2,101</u>	<u>3.52</u>
		Total	1,623	483	2,106	3.52
Combined Total	67,548		1,867	549	2,416	3.58

#### REFERENCES

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