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Scale Analysis

ANNUAL PROGRESS REPORT

FISH RESEARCH PROJECT
OREGON

PROJECT TITLE: Scale Analysis

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CONTENTS

SUMMARY

Objectives for FY 1995

1. Identify the rearing origin of coho salmon (wild or hatchery) spawning in Oregon coastal streams.
2. Determine the age composition and length at age of chinook salmon in Oregon coastal index streams.
3. Determine the age composition of chum salmon spawning in Tillamook Bay tributaries.
4. Provide scale analysis support to other research and management projects.
5. Maintain scale archives.

Accomplishments in FY 1995

We accomplished all objectives.

Findings in FY 1995

We identified the rearing origin of 1,187 coastal coho salmon returning to spawning grounds in 1994. Ocean Salmon Management personnel will use the data to exclude stray hatchery fish from the escapement estimates for wild coho salmon. We also read scales from an additional 70 coho salmon from various sources.

We read scales from 1,468 fall chinook salmon that returned to spawning grounds of seven coastal index rivers. In 1994, the combined age composition for fish from the seven index rivers was 1.6% age-2, 3.1% age-3, 54.8% age-4, 36.5% age-5, and 4.0% age-6. Managers used these data to evaluate the status of coastal fall chinook salmon stocks. We also read scales from a subsample of 672 fall chinook salmon from the Rogue River in 1994 and found that the age composition was 6.8% age-2, 9.5% age-3, 72.9% age-4, and 10.8% age-5.

Analysis of scales from 157 chum salmon returning to Tillamook Bay in 1994 showed that the age composition was 22.9% age-3, 69.4% age-4 and 14.7% age-5.

Under the fourth objective, we read scales from: (1) chinook and coho salmon in the Hood River for the Pelton Ladder Evaluation Project, (2) spring chinook salmon in the John Day River for Columbia River Management, (3) spring chinook salmon from the Grande Ronde and Imnaha rivers for the Northeast Oregon Research Program, (4) fall chinook salmon from the ocean and Tillamook Bay for Ocean Salmon Management, (5) bull trout for the Native Trout Project, and (6) miscellaneous trout from two districts in the Central Region.

We filed 351 collections of scales in the scale archives.

INTRODUCTION

The Scale Analysis Project determines the rearing origin (hatchery or wild) of coho salmon (*Oncorhynchus kisutch*) and the age composition of coastal chinook (*O. tshawytscha*) and chum salmon (*O. keta*). We also provide scale reading assistance to other projects. In 1995, we analyzed scales for the Pelton Ladder Evaluation Project, Northeast Oregon Research Program, Ocean Salmon Management Program, the Native Trout Reasearch Project, and the Ochoco and Deschutes Fish districts.

Before 1988, we analyzed the scales of coho salmon from the spawning grounds of the Lincoln District and Coos Bay basin to identify strays from private hatcheries. In 1988, we began analyzing coho salmon scales from all coastal spawning grounds to identify strays from public and private hatcheries (Borgerson 1989). Currently no private hatcheries are releasing coho salmon, so all hatchery strays are from public hatcheries.

Since 1986, we have monitored the age composition and mean length at maturity of fall chinook salmon from the Nehalem, Wilson, Salmon, Siletz, Siuslaw, Coquille, and Chetco rivers. In this report we present data for the 1994 return year. Data for previous years are reported by Nicholas and Hankin (1988), Lewis et al. (1989), and Borgerson (1994).

We also received chinook salmon scales from other coastal rivers including the Rogue River. Fall chinook salmon from the Rogue River have been sampled for age composition in previous years (Borgerson 1994).

We analyzed scales from chum salmon returning to Tillamook Bay tributaries in 1994. For comparison, we included data for other years in which age composition was monitored informally.

METHODS

Most of the scales that we analyzed were collected by others. We provided each collector with a diagram showing location of the key scale area (Nicholas and Van Dyke 1982) and a sampling procedure so that all collections were sampled by the same methods.

We received most scale samples in individual envelopes; a few were sent to us already mounted on gummed tape or glass slides. We mounted all scales that we received in envelopes on gummed cards and made acetate impressions using a heat press. All data recorded on the individual scale envelopes were either transcribed onto our scale reading form or entered directly into a computer database.

Experienced personnel determined rearing origin and age by visual interpretation of the scale pattern. Two people read most collections and resolved disagreements during a joint, third reading. When time or training did not allow for each of two people to read a collection, one person read the scales twice, and if the two readings were different, that person read them a third time. The first reading was made without knowledge of field data, such as length or date, so that the reading was based only on information provided by the scale pattern and was not biased by conflicting field data. Field data were taken into consideration for the final reading.

Fish age was determined by counting winter annuli. We identified annuli as bands of closely spaced circuli with broken circuli and occasional, small areas of resorption. For chinook and chum salmon returning to fresh water to spawn, total age equaled the count of annuli plus one. For fish sampled during the summer, we may have added a "+" to the age to denote that a significant amount of growth had occurred since the last annulus. A spawning check may accompany the annulus of fishes capable of living past spawning, such as trout (*Oncorhynchus* spp.). We identified a spawning check as narrowed circuli with a lot of resorption along the perimeter of the check (Figure 1).

We identified the rearing origin of coho salmon as hatchery or wild. Scale patterns vary by hatchery or wild stock so known-origin reference collections were studied to ensure the most accurate classification. We defined a wild fish as a fish that formed its scales in the natural environment; progeny of hatchery strays and hatchery stock planted as fry or that emerged in a stream from an artificial hatchbox were also classified as wild.

The scale pattern of a wild coho salmon typically has an obvious freshwater annulus of very narrow, often broken circuli near the center of the scale, followed by very wide "spring" circuli ending at a vague ocean entrance check. A hatchery scale pattern usually has a vague freshwater annulus relatively far from the center of the scale, "spring" circuli spacing that may not be noticeably wider than previous circuli, and an ocean entrance check that is often strong. Hatchery fish are usually larger than wild fish at ocean entrance and that is reflected on the scale pattern by greater distances from the center of the scale to the freshwater annulus and the ocean entrance check, and by higher circuli counts to those features.

Data from visual interpretation of scales were entered into a microcomputer and stored in a database. In all basins except the Rogue River, surveyors took scale samples from all carcasses encountered. Because of the large number of fish found in the Rogue River basin, carcasses were subsampled. Therefore age composition data for Rogue River fall chinook salmon were summarized by the week and expanded by the weekly sampling rates.

REARING ORIGINS OF COHO SALMON

The **APPENDIX** contains scale classifications from the coastal spawning ground collections of 1994. We supplied data on rearing origin of coho salmon from spawning grounds to Ocean Salmon Management personnel for use in adjusting wild fish counts. Jacobs and Cooney (1994) describe the adjustment of counts of wild coho salmon using scale data. Based on their criteria wild fish counts were adjusted to exclude hatchery strays in the Salmon, South Umpqua, Coos, and Coquille rivers and Lake Creek in the Siuslaw River basin. Our data show high percentages of hatchery fish in several other areas, but these areas were probably in the vicinity of a hatchery and did not meet the criteria to be considered a spawning index for wild coho salmon.

Table 1 contains a list of coho scales from miscellaneous sources and locations that were also read during the past year. Some of these scales were sampled incidentally during spawning surveys or trapping operations for other species and were of marginal interest to the collectors. Other scale samples were collected for a specific reason and results have been reported back to the collectors.

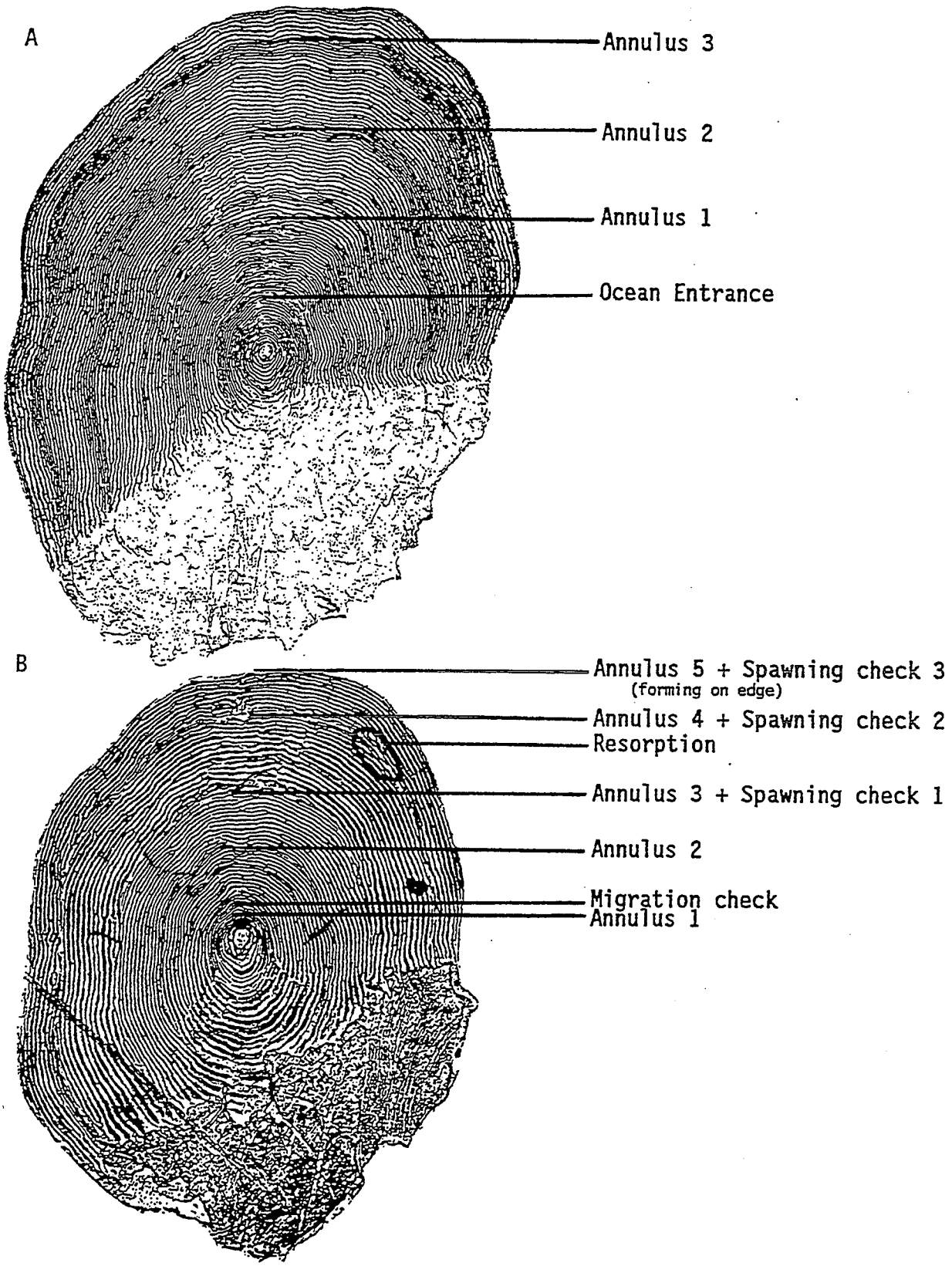

Figure 1. Examples of features interpreted on scales. Scale A is from an age-4 fall chinook salmon from the Alsea River. Scale B is from an age-5 rainbow trout from Spencer Creek, a tributary to the Klamath River.

Table 1. Miscellaneous scale collections from coho salmon returning in 1994-94. Scales were received from the ODFW, the Bureau of Land Management (BLM), and the United States Forest Service (USFS). SGS = spawning ground surveys.

River	Source	Collecting Agency	Number
Sandy	SGS	ODFW	15
Clackamas	SGS	BLM	23
Lewis & Clark	SGS	ODFW	14
Nehalem	Misc. spot checks	ODFW	3
Kilchis	Misc. spot checks	ODFW	1
Salmon	Creel	ODFW	10
Alsea	Misc. SGS	ODFW	1
Siuslaw	Misc. SGS	ODFW	1
Umpqua	Misc. SGS	ODFW/Volunteers	2
Coquille	Misc. SGS	Volunteers	1

AGE COMPOSITION OF CHINOOK SALMON

Table 2 is a summary of the age composition of fall chinook salmon from seven index rivers. There were significant differences between the age compositions in 1994 and previous years in the Nehalem, Salmon, Siletz, Siuslaw, and Coquille rivers ($p<0.05$). The differences are probably related to the poor representation of age-3 fish from the 1991 brood. We computed the average length at age for each index river (Table 3). Mean lengths at age were significantly smaller for age-4 from Salmon and Siuslaw rivers and age-5 fish from Nehalem, Wilson, Salmon, and Siuslaw rivers in 1994 compared to average lengths from past years. Possibly the ocean conditions that caused poor survival of age-3 fish also affected growth of the older fish.

We also received scales from non-index rivers (Table 4). In most cases the sample sizes were too small to produce meaningful results, however, enough samples were provided from some groups of chinook salmon to obtain basic age composition data (Table 5). The large collection from the Rogue and Applegate rivers is part of the ongoing management of chinook salmon stocks in the Rogue River basin. These data are used to predict the number of fall chinook salmon from the Rogue River that can contribute to ocean fisheries in the next summer (STT 1994).

Table 2. Age composition of fall chinook salmon stocks from seven index rivers, 1994. The combined age composition for 1986-1993 is given for comparison.

Basin, year	Percentage of spawners						Number of scales aged
	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	
Nehalem							
1994	0.9	0.9	44.2	51.3	2.7	--	113
1986-93	1.0	6.2	30.5	53.9	7.8	0.4	1,363
Wilson							
1994	--	--	31.8	56.5	11.8	--	85
1986-93	0.3	3.5	29.0	54.2	13.0	0.1	2,131
Salmon							
1994	--	2.6	45.7	47.8	3.9	--	230
1986-93	1.2	10.8	30.5	48.7	8.6	0.1	2,420
Siletz							
1994	--	1.3	29.7	59.7	9.3	--	236
1986-93	1.2	4.7	24.7	55.3	13.8	0.2	1,225
Siuslaw							
1994	2.3	2.5	71.9	20.8	2.5	--	520
1986-93	3.7	11.8	39.6	41.2	3.6	<0.1	3,244
Coquille							
1994	1.0	6.5	62.2	29.4	1.0	--	201
1986-93	4.1	14.6	48.2	31.5	1.7	--	2,402
Chetco							
1994	9.6	12.0	63.9	14.5	--	--	83
1986-93	9.1	16.7	56.1	16.9	1.2	--	1,163
Index rivers combined							
1994	1.6	3.1	54.8	36.5	4.0	--	1,468
1986-93	2.87	10.1	37.1	43.3	6.6	0.1	13,948

Table 3. Means and standard deviations for length at age of fall chinook salmon stocks from seven coastal index rivers for 1994. Averaged data from 1986-1993 are given for comparison. MEPS = Mid-eye to posterior scale

Basin, age	MEPS Length (cm), 1994 Mean	Standard deviation	Number aged	MEPS Length (cm), 1986-1993 Mean	Standard deviation	Number aged
Nehalem						
Age 2	40.5	0.0	1	44.6	8.4	14
Age 3	--	--	0	61.8	6.6	87
Age 4	74.7	4.3	46	75.8	5.5	409
Age 5	80.7	3.8	57	83.2	5.3	777
Age 6	84.3	2.1	3	85.3	5.1	103
Age 7	--	--	0	85.4	5.3	5
Wilson						
Age 2	--	--	0	40.1	4.5	11
Age 3	--	--	0	61.3	7.3	84
Age 4	74.9	5.4	27	77.0	6.2	656
Age 5	81.3	4.2	48	84.9	6.4	1,203
Age 6	83.1	2.7	10	89.2	7.0	287
Age 7	--	--	0	87.5	4.7	5
Salmon						
Age 2	--	--	0	41.5	3.6	27
Age 3	60.0	7.3	6	61.7	4.7	242
Age 4	73.8	4.7	105	75.1	5.0	682
Age 5	80.2	4.6	110	83.5	5.0	1,112
Age 6	82.8	4.6	9	87.4	5.0	183
Age 7	--	--	0	84.8	2.8	2
Siletz						
Age 2	--	--	0	39.9	3.1	15
Age 3	60.0	3.2	3	60.4	5.9	63
Age 4	77.6	5.5	70	74.4	5.5	311
Age 5	82.6	4.4	139	82.5	5.7	694
Age 6	81.2	4.6	22	85.8	6.3	170
Age 7	--	--	0	85.4	2.0	4
Siuslaw						
Age 2	42.9	3.3	11	42.4	6.1	169
Age 3	67.7	5.0	13	61.6	6.3	444
Age 4	75.0	3.8	374	75.8	6.0	1,540
Age 5	79.7	3.9	108	81.8	5.3	1,511
Age 6	81.9	5.1	13	84.8	5.6	133
Age 7	--	--	0	85.0	0.0	1

Table 3. Continued.

Basin, age	MEPS Length (cm), 1994 Mean	Standard deviation	Number aged	MEPS Length (cm), 1986-1993 Mean	Standard deviation	Number aged
Coquille						
Age 2	38.3	1.3	2	40.9	5.1	109
Age 3	64.0	5.6	12	62.9	7.9	351
Age 4	74.6	4.8	122	75.0	5.9	1,180
Age 5	78.6	4.4	52	79.9	5.2	759
Age 6	76.5	2.5	2	81.8	5.5	40
Chetco						
Age 2	43.5	4.3	8	41.6	4.4	106
Age 3	62.0	6.2	10	57.6	6.0	193
Age 4	71.0	4.9	53	71.6	5.8	649
Age 5	78.7	4.2	12	79.3	6.0	194
Age 6	--	--	0	83.1	6.3	14

Table 4. Sampling locations and sample sizes of chinook salmon scale collections from coastal, non-index rivers, 1994. SGS = spawning ground surveys.

River	Run	Source	Sample size
Necanicum	Fall	SGS	22
Ecola	Fall	SGS	1
Tillamool Bay	Fall	Creel	416
Ocean off Tillamook	Fall	Commercial landings	133
Trask	Fall	SGS	1
Salmon	Fall	Creel	177
Salmon	Fall	Hatchery	78
Yaquina	Fall	SGS	5
Alsea	Fall	SGS	7
Coos	Fall	SGS	4
Floras	Fall	SGS	34
Euchre	Fall	SGS	6
Rogue and Applegate	Fall	SGS	683
Lower Rogue	Fall	SGS	1
Hunter	Fall	SGS	13
Pistol	Fall	SGS	41
Winchuck	Fall	SGS	17

Table 5. Age composition of miscellaneous coastal chinook salmon stocks, 1994.

Basin	Run	Percentage of spawners at age: 2	3	4	5	6	Scales read
Salmon R. Hatchery	Fall broodstock	0	0	58.1	40.5	1.4	74
Salmon River Creel	Fall	4.0	1.2	34.7	50.9	9.2	173
Floras	Fall	0	6.1	48.5	45.4	0	33
Rogue and Applegate	Fall	6.8	9.5	72.9	10.8	0	672
Pistol	Fall	31.6	21.1	23.7	21.1	2.6	38

AGE COMPOSITION OF CHUM SALMON

In 1994 the age composition of chum salmon from Tillamook Bay tributaries was more similar to historical age compositions than in 1992 and 1993 (Table 6). In 1994, as in previous years, the chum salmon population in the Nehalem River was very similar to the Tillamook Bay population in age composition. In 1994 we received enough scales from the Yaquina River to determine the age composition. The Yaquina population also had a high percentage of age-4 fish but was lower in age-3 fish than the Nehalem or Tillamook Bay populations.

Table 6. Age composition of chum salmon from Tillamook Bay tributaries, 1994. The age composition from other recent years is given for comparison.

Location	Year	Percentage of spawners Age 3	Age 4	Age 5	Age 6	Number of scales aged	Source
Tillamook Bay	1978	25	72	3	--	239	Sams 1980
Tillamook Bay	1979	50	45	5	--	113	Sams 1980
Tillamook Bay	1982	20.4	78.4	1.1	--	88	McGie 1983
Tillamook Bay	1983	24.4	39.0	36.6	--	41	McGie 1984
Tillamook Bay	1989	7.9	27.0	65.1	--	126	
Tillamook Bay	1990	21.5	75.3	3.2	--	158	
Tillamook Bay	1991	10.9	84.6	4.5	--	267	
Tillamook Bay	1992	0.0	86.3	13.7	--	255	
Tillamook Bay	1993	7.1	38.1	54.8	--	126	
Tillamook Bay	1994	15.9	69.4	14.7	--	157	
Nehalem	1994	22.9	57.1	14.3	5.7	35	
Yaquina	1994	2.6	87.2	10.2	--	39	

MISCELLANEOUS SCALE COLLECTIONS

At the request of other projects we analyzed scales from a variety of species from around the state (Table 7). Scale data were reported back to the projects for incorporation into their analyses. We read scales from: (1) spring and fall chinook salmon and coho salmon in the Hood River for the Pelton Ladder Evaluation Project, (2) spring chinook salmon in the John Day River for Columbia River Management, (3) spring chinook salmon from the Grande Ronde and Imnaha rivers for the Northeast Oregon Research Program, (4) fall chinook salmon from the ocean and Tillamook Bay for Ocean Salmon Management, (5) bull trout (*Salvelinus confluentus*) for the Native Trout Project, and (6) miscellaneous trout from two districts in the Central Region.

Table 7. Miscellaneous scale collections analyzed 1994-95.

Location	Species	Number
Hood River	Spring chinook salmon (juveniles)	473
Hood River	Fall chinook salmon	20
Hood River	Coho salmon	55
John Day River	Spring chinook salmon	173
Lookingglass Hatchery	Spring chinook salmon	21
Pacific Ocean	Fall chinook salmon	136
Tillamook Bay	Fall chinook salmon	455
Long Creek	Bull trout	43
Walton Lake	Brook trout (*Salvelinus fontinalis*)	7
Muskrat Lake	Misc. trout	11

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APPENDIX

Rearing Origin of Coho Salmon Sampled on Coastal Spawning Grounds in 1994-95.

Appendix. Rearing origin of coho salmon sampled on spawning grounds in 1994-95. (H) or (HRS) following a basin name indicates that a hatchery or major hatchery release site is located within the basin.

Survey name	Survey number	Hatchery No.	Hatchery %	Wild No.	Wild %	Jacks (No.)	Regen-erated (No.)
			NECANICUM RIVER				
BEERMAN	26198001	1	33.3	2	66.7	0	0
DIEHL	26205301	3	100	0	--	0	0
WARNER	26234001	0	--	1	100	0	1
TOTAL		4	57.1	3	42.9	0	1
			ECOLA CREEK				
NORTH FORK	26183002	0	--	0	--	0	1
WEST FORK	16182002	1	33.3	2	66.7	0	0
TOTAL		1	33.3	2	66.7	0	1
			MAINSTEM NEHALEM RIVER				
W. HUMBUG	15985001	0	--	1	100	0	0
HUMBUG	25975001	1	50.0	1	50.0	0	0
STANLEY	26006001	0	--	1	100	0	0
FISHHAWK	26051001	1	100	0	--	0	0
LUNDGREN	26061001	0	--	1	100	0	0
TOTAL		2	33.3	4	66.7	0	0
			NORTH FORK NEHALEM RIVER (H)				
N.F. SUPP.	--------	1	100	0	--	0	0
COAL	15840002	1	100	0	--	0	0
BIG RACKHEAP	15848001	1	100	0	--	0	1
BOYKIN	15854001	1	100	0	--	0	0
SOAPSTONE	25864001	27	87.1	4	12.9	0	1
NORTH FORK	25881003	1	100	0	--	0	0
NORTH FORK	25881501	3	100	0	--	0	0
TOTAL		35	89.7	4	10.3	0	2

Appendix. Continued.

Survey name	Survey number	Hatchery No.	Hatchery %	Wild No.	Wild %	Jacks (No.)	Regen-erated (No.)
			KILCHIS RIVER				
NORTH FORK	25763001	1	100	0	--	0	0
LITTLE S.F.	15733001	0	--	1	100	0	0
TOTAL		1	50.0	1	50.0	0	0
			WILSON RIVER				
CEDAR	15679001	0	--	1	100	0	0
UP. CEDAR & A	15679301	0	--	1	100	0	0
ELK	25703001	0	--	2	100	0	0
SOUTH FORK	25705001	0	--	1	100	0	0
TOTAL		0	--	5	100	0	0
			TRASK RIVER (H)				
BEAR	25584001	8	80.0	2	20.0	0	0
CLEAR 2	25623001	1	50.0	1	50.0	0	0
M.F. OF N.F.	25627002	0	--	1	100	0	0
EDWARDS	15612001	17	81.0	4	19.0	1	0
JOYCE	25614001	1	100	0	--	0	0
TOTAL		27	77.1	8	22.9	1	0
			TILLAMOOK RIVER				
TILLAMOOK	15564001	1	100	0	--	1	2
SIMMONS	15565002	0	--	1	100	0	0
BEWLEY	25559002	0	--	3	100	0	0
FAWCET	25563003	1	100	0	--	0	0
TOTAL		2	33.3	4	66.7	1	2
			SAND LAKE				
SAND	25535001	1	33.3	2	66.7	0	0
			NESTUCCA RIVER				
EAST	15474003	0	--	1	100	0	0

Appendix. Continued.

Survey name	Survey number	Hatchery No.	Hatchery %	Wild No.	Wild %	Jacks (No.)	Regen-erated (No.)
		SALMON RIVER (H)					
PRAIRIE	--------	1	100	0	--	0	0
SALMON	15272003	7	100	0	--	0	0
DEER 1	15282001	45	97.8	1	2.2	5	1
HATCHERY AREA	15287002	10	90.9	1	9.1	2	0
HATCH.-PANTHER	15289001	26	89.7	3	10.3	1	1
PANTH.-SLICK RK.	15295001	1	100	0	--	0	0
LOWER BEAR	15296001	78	90.7	8	9.3	1	2
MIDDLE BEAR	15296002	42	80.8	10	19.2	3	0
SLICK ROCK	15298001	5	100	0	--	0	0
TROUT	15299001	16	80.0	4	20.0	1	0
WIDOW-DEER 2	15309002	10	100	0	--	0	1
DEER 2-PRAIRIE	15310001	2	100	0	--	0	0
PRAIR.-LIT. SAL.	15315001	8	88.9	1	11.1	0	1
LIT. SAL.-G	15323001	2	100	0	--	0	0
PANTHER	25292001	10	100	0	--	0	0
N. F. PANTHER	25293001	1	100	0	--	0	0
UPPER BEAR	25296003	20	90.9	2	19.1	0	0
UPPER TROUT	25299701	1	100	0	--	0	0
TOTAL		285	90.5	30	9.5	13	6
		DEVIL'S LAKE					
ROCK	15263003	1	25.0	3	75.0	0	0
UPPER ROCK	25263004	1	16.7	5	83.3	0	0
TOTAL		2	20.0	8	80.0	0	0
		SILETZ RIVER (HRS)					
EUCHRE	15105001	1	100	0	--	0	0
SUNSHINE	15065001	3	100	0	--	0	0
SAM	25131502	2	66.7	1	33.3	0	0
CERINE	25148002	1	100	0	--	0	0
4TH OF JULY	25168002	0	--	1	100	0	0
BIG ROCK	15134001	1	100	0	--	0	0
TOTAL		8	80.0	2	20.0	0	0

Appendix. Continued.

Survey name	Survey number	Hatchery No.	Hatchery %	Wild No.	Wild %	Jacks (No.)	Regenerated (No.)
		MAINSTEM YAQUINA RIVER					
UPPER MILL	14953702	1	16.7	5	83.3	0	1
HORSE	15046002	0	--	2	100	0	0
BUTTERMILK	25035001	0	--	1	100	0	0
TOTAL		1	11.1	8	88.9	0	1
		ELK CREEK, YAQUINA RIVER					
SPOUT	24976002	0	--	1	100	1	0
		N. FORK BEAVER CREEK					
NORTH FORK	14924003	0	--	1	100	0	0
		DRIFT CREEK, ALSEA RIVER					
HORSE	14646002	0	--	1	100	0	0
NETTLE	14652001	0	--	2	100	0	0
TOTAL		0	--	3	100	0	0
		FIVE RIVERS, ALSEA RIVER					
LOBSTER	14744002	1	50.0	1	50.0	0	0
BUCK	14758001	1	100	0	--	0	0
S. FK. LOBSTER	24745002	0	--	1	100	0	0
HONEY GROVE	24838003	0	--	0	--	0	1
TOTAL		2	50.0	2	50.0	0	1
		SUTTON LAKE					
BAILEY	24490002	0	--	1	100	1	0

Appendix. Continued.

Survey name	Survey number	Hatchery No.	Hatchery %	Wild No.	Wild %	Jacks (No.)	Regen-erated (No.)
			MAINSTEM SIUSLAW RIVER				
THOMPSON TRAP	--------	0	--	0	--	2	0
ESMOND	14349001	1	100	0	--	0	0
BILLIE	14016001	0	--	1	100	0	0
NORTH FORK	14026002	0	--	1	100	0	0
TOTAL		1	33.3	2	66.7	2	0
			LAKE CREEK, SIUSLAW RIVER (HRS)				
N. FK. FISH	--------	1	100	0	--	0	0
LOWER NELSON	14193001	2	100	0	--	0	0
UPPER NELSON	14197002	1	100	0	--	0	0
GREENLEAF	14203001	2	50.0	2	50.0	1	1
FAWN	24181302	0	--	1	100	1	0
FISH	24207001	11	57.9	8	42.1	12	2
FISH	24207002	5	41.7	7	58.3	4	1
LETZ	24439002	0	--	1	100	0	0
TOTAL		22	53.7	19	46.3	18	4
			SILTCOOS LAKE				
HENDERSON	13995001	1	100	0	--	0	0
NORTH PRONG	13997001	1	16.7	5	83.3	1	0
MAPLE	13998001	0	--	3	100	0	0
ALDER	13965002	0	--	4	100	2	0
FIDDLE	13974005	0	--	9	100	1	0
TOTAL		2	8.7	21	91.3	4	0
			TAHKENITCH LAKE				
FIVEMILE	13957002	0	--	47	100	7	0
LEITEL	13949002	1	0.8	127	99.2	18	2
TOTAL		1	0.6	174	99.4	25	2

Appendix. Continued.

Survey name	Survey number	Hatchery No.	Hatchery %	Wild No.	Wild %	Jacks (No.)	Regen-erated (No.)
			MAINSTEM UMPQUA RIVER				
CASEKNIFE	--------	0	--	1	100	0	0
FRITZPATRICK	--------	0	--	3	100	0	1
LITTLE WOLF	--------	0	--	1	100	0	0
SCHOLFIELD	12402002	1	25.0	3	75.0	0	1
DEAN	22624001	0	--	1	100	1	0
LITTLE WOLF	22857005	0	--	1	100	0	0
LITTLE WOLF	22857701	0	--	1	100	0	0
RADER	22863001	0	--	4	100	0	0
SAND	--------	0	--	1	100	0	0
BRUSH	22723001	0	--	3	100	0	0
GASSY	--------	0	--	1	100	0	0
COON	22967002	0	--	1	100	0	0
TOTAL		1	4.5	21	95.5	1	2
			SMITH RIVER, UMPQUA RIVER				
COON	--------	0	--	3	100	1	0
JOHNSON	--------	0	--	1	100	0	0
LITTLE S. FK.	12504002	0	--	5	100	1	0
SULPHUR	22452001	0	--	1	100	0	0
PERKINS	22482001	0	--	1	100	0	0
SPENCER	22487001	0	--	3	100	0	0
RUSSEL	22525001	0	--	1	100	0	0
HALFWAY	22549001	0	--	2	100	0	0
PEARL	22574001	1	100	0	--	0	0
BEAVER	22504001	0	--	0	--	0	1
TOTAL		1	5.6	17	94.4	2	1
			NORTH FORK UMPQUA RIVER (H)				
FRENCH	43722001	2	50.0	2	50.0	3	0
FRENCH	43722002	3	100	0	--	0	0
ROCK	43728001	1	100	0	--	0	0
HARRINGTON	43739001	0	--	1	100	0	0
TOTAL		6	66.7	3	33.3	3	0

Appendix. Continued.

Survey name	Survey number	Hatchery No.	Hatchery %	Wild No.	Wild %	Jacks (No.)	Regen-erated (No.)
			SOUTH FORK UMPQUA RIVER (HRS)				
COW	--------	2	66.7	1	33.3	0	0
WHITEHORSE	--------	4	100	0	--	0	0
CATTLE	--------	0	--	1	100	0	0
HOGUM	--------	0	--	1	100	0	0
RIFFLE	--------	0	--	1	100	0	0
WHITEHORSE	--------	0	--	6	100	0	0
NORTH MYRTLE	13115001	2	100	0	--	0	0
WINDY	22300001	0	--	1	100	1	0
STARVOUT	23333501	0	--	3	100	0	0
STARVEOUT	23333502	1	50.0	1	50.0	0	0
STOUTS	23475001	1	50.0	1	50.0	0	0
TOTAL		10	38.5	16	61.5	1	0
			NORTH AND SOUTH TENMILE LAKES				
BIG	12379006	0	--	1	100	0	0
JOHNSON	12357003	0	--	5	100	0	0
HATCHERY	12357201	0	--	4	100	0	0
TOTAL		0	--	10	100	0	0
			MAINSTEM COOS RIVER (HRS)				
LARSON	12320002	0	--	8	100	0	0
PALOUSE	12324002	0	--	12	100	0	0
LARSON	22320002	2	33.3	4	66.7	3	0
WILSON	22137002	0	--	0	--	1	0
TOTAL		2	7.7	24	92.3	4	0
			SOUTH FORK COOS RIVER				
MINK	--------	1	20.0	4	80.0	0	0
DANIELS	12158002	1	50.0	1	50.0	0	0
SOUTH FORK	12177002	0	--	1	100	0	0
DANIELS	22158002	1	16.7	5	83.3	0	0
TIOGA	22196001	0	--	40	100	0	4
BOTTOM	22200002	0	--	8	100	0	0
CEDAR TRIB. C	22205001	0	--	1	100	1	0
WILLIAMS	22219001	0	--	2	100	0	0
TOTAL		3	4.4	62	95.4	1	4

Appendix. Continued.

Survey name	Survey number	Hatchery No.	Hatchery %	Wild No.	Wild %	Jacks (No.)	Regen-erated (No.)
		MILLICOMA RIVER, COOS RIVER					
WEST FORK	--------	0	--	1	100	0	0
MARLOW	12242001	0	--	4	100	0	0
MARLOW	22242005	0	--	1	100	0	0
GLENN	22246001	0	--	2	100	1	0
EAST FORK	22265002	0	--	2	100	0	0
DEER	22293001	0	--	17	100	0	1
ELK	22297001	0	--	2	100	0	0
ELK	22297002	1	12.5	7	87.5	0	0
PANTHER	22301001	0	--	3	100	0	0
WEST FORK	22306001	0	--	4	100	0	0
TOTAL		1	2.3	43	97.7	1	1
		NORTH FORK COQUILLE RIVER					
CHERRY A	12001003	0	--	12	100	0	0
MIDDLE D	12008001	0	--	14	100	0	1
ALDER	12015002	0	--	7	100	0	0
N. FK., UP. A	12041002	0	--	4	100	0	0
SANDY	21772504	0	--	1	100	0	0
JOHNS	21946001	0	--	1	100	0	0
CHERRY	22001001	0	--	7	100	0	2
HUDSON	22036001	0	--	7	100	0	0
NORTH FORK	22037002	0	--	8	100	0	0
NORTH FORK	22045002	0	--	3	100	0	0
TOTAL		0	--	64	100	0	3
		EAST FORK COQUILLE RIVER					
STEEL	11957002	0	--	2	100	0	0
WEEKLY	21949001	0	--	1	100	0	0
ELK	21951001	0	--	2	100	1	0
TOTAL		0		5	100	1	0

Appendix. Continued.

Survey name	Survey number	Hatchery No.	Hatchery %	Wild No.	Wild %	Jacks (No.)	Regen-erated (No.)
			MIDDLE FORK COQUILLE RIVER				
SLATER	11782001	1	16.7	5	83.3	0	0
BIG	21740003	0	--	3	100	0	0
BIG	21748001	0	--	1	100	0	0
SANDY	21772504	0	--	6	100	0	0
SLIDE	21774001	0	--	2	100	0	0
DEMENT	21831001	0	--	4	100	0	0
MIDDLE FORK	11755002	0	--	0	--	1	0
TOTAL		1	405	21	95.4	1	0
			SOUTH FORK COQUILLE RIVER				
LOWER SALMON	11849001	0	--	1	100	0	1
UPPER SALMON	11853702	0	--	4	100	0	1
WILDCAT	21705001	0	--	1	100	0	0
TOTAL		0	--	6	100	0	2

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