# ANNUAL PROGRESS REPORT

# FISH RESEARCH PROJECT
# OREGON

PROJECT TITLE: Scale Analysis

PROJECT NUMBER: F-144-R-4

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## CONTENTS

**SUMMARY**

**Objectives for FY 1992**

1. Identify the rearing origin of coho salmon (wild, hatchery yearling, or hatchery accelerated) spawning in Oregon coastal streams and at hatchery broodstock collection facilities.

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 and Nestucca River tributaries.

4. Provide scale analysis support to other research and management projects.

5. Maintain scale archives.

**Accomplishments in FY 1992**

We completed all objectives.

**Findings in FY 1992**

We identified the rearing origin of 1,718 coastal coho salmon returning to spawning grounds and traps in 1991. Ocean Salmon Management personnel used the data to determine if the escapement estimates for natural coho salmon needed to be adjusted to exclude stray hatchery fish. Although hatchery coho salmon were found on the spawning grounds of all systems containing hatcheries, adjustments to natural fish counts were not necessary in any basin in 1991. We also read 425 scales from juvenile coho salmon collected by the Salmonid Habitat Project. After identifying the age of the juvenile fish, we returned raw data to the project for further analysis.

We read scales from 1,700 fall chinook salmon that returned to spawning grounds of seven coastal index rivers. In 1991, the average age composition for index rivers was 3.9% age 2, 9.5% age 3, 46.2% age 4, 34.1% age 5, 5.8% age 6, and 0.5% age 7. These data were used by managers to assess the current status of coastal fall chinook stocks. We also read scales from a subsample of 663 fall chinook salmon from the Rogue River in 1991 and found that the expanded age composition was 5.1% age 2, 11.9% age 3, 65.1% age 4, 16.5% age 5, and 1.4% age 6.

We aged scales from 267 chum salmon returning to Tillamook Bay in 1991 and found that the age composition was 10.9% age 3, 84.6% age 4, and 4.5% age 5. In addition, we read 146 chum salmon scales sampled in the Nehalem basin and found 28.8% age 3, 58.9% age 4, and 12.3% age 5.

We read scales from a sample of rainbow trout from Spencer Creek in the Klamath River, and found that juvenile trout may migrate from the creek into the Klamath River at age 0+, 1+, or 2+. Most of the adult trout started

spawning at age 3 and the oldest fish in our collection reached 8 years of age.

We filed 276 collections of scales in the scale archives and entered them in our catalog database.

## 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 1991, we analyzed scales for the Native Trout Project, the Rogue Basin Evaluation Project, Salmonid Habitat Project, and the North Coast Fish District.

Prior to 1988, we analyzed rearing origin 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).

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 from the 1991 return year. Data from previous years are reported by Nicholas and Hankin (1988), Lewis et al. (1989), Borgerson (1989), and Borgerson (1992).

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 (Cramer 1987; Borgerson 1992).

The age composition of chum salmon from Tillamook Bay tributaries has been monitored informally for several years. While we analyzed scales from chum salmon that returned in 1991 only, we also report the age composition for several recent years for comparison.

## METHODS

All of the scales that we analyzed were collected by others. We provided diagrams showing location of the key scale area (Nicholas and Van Dyke 1982) and sampling procedures 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.

All scales were analyzed by visual interpretation by experienced personnel. Most collections were read by two people with disagreements resolved during a joint, third reading. When time or training did not allow for two people to each read a collection, the scales were read twice by one person who also made a third reading if first and second readings were different. Initial readings were 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 final readings.

Fish age was determined by counting winter annuli. We identified annuli as bands of closely spaced circuli with broken circuli and occasionally small areas of resorption. For chinook and chum salmon that returned 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. In the case of fishes capable of living past spawning, such as trout (Oncorhynchus spp.), a spawning check may accompany the annulus. We identified a spawning check as having narrowed circuli with a lot of resorption along the perimeter of the check (Figure 1).

Rearing origin was identified for coho salmon as hatchery yearling, hatchery accelerated, 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 any fish that formed its scales in the natural environment, so progeny of hatchery strays and hatchery stock planted as fry or that emerged in a stream from an artificial hatchbox could be classified as wild. The scale pattern of a wild coho salmon is typified by having a very apparent freshwater annulus containing very narrow and often broken circuli near the center of the scale, followed by very wide "spring" circuli ending at a vague ocean entrance check. A hatchery yearling scale pattern usually has a vague freshwater annulus that is relatively far from the center of the scale, "spring" circuli spacing may not be noticeably wider than previous circuli, and the ocean entrance check is often strong. A hatchery accelerated scale pattern has no freshwater annulus and very wide circuli spacing throughout the freshwater zone. 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 the analysis of all scales were entered into a microcomputer and stored in a database format. In all basins except the Rogue, all carcasses encountered on surveys were scale sampled. Because of the large numbers of fish found in the Rogue River basin, carcasses were subsampled so age composition data for Rogue River fall chinook salmon were summarized by week time periods and expanded by the weekly sampling rates. We used contingency tables to test for statistical differences between age compositions of chum salmon populations.

## REARING ORIGINS OF COHO SALMON

Appendix Table A contains scale classifications from the spawning ground collections of 1991. We were most concerned with the occurrence of hatchery accelerated fish from the private hatchery in Yaquina Bay in natural spawning areas of the Salmon, Siletz, Yaquina, and Alsea rivers. (The private hatchery

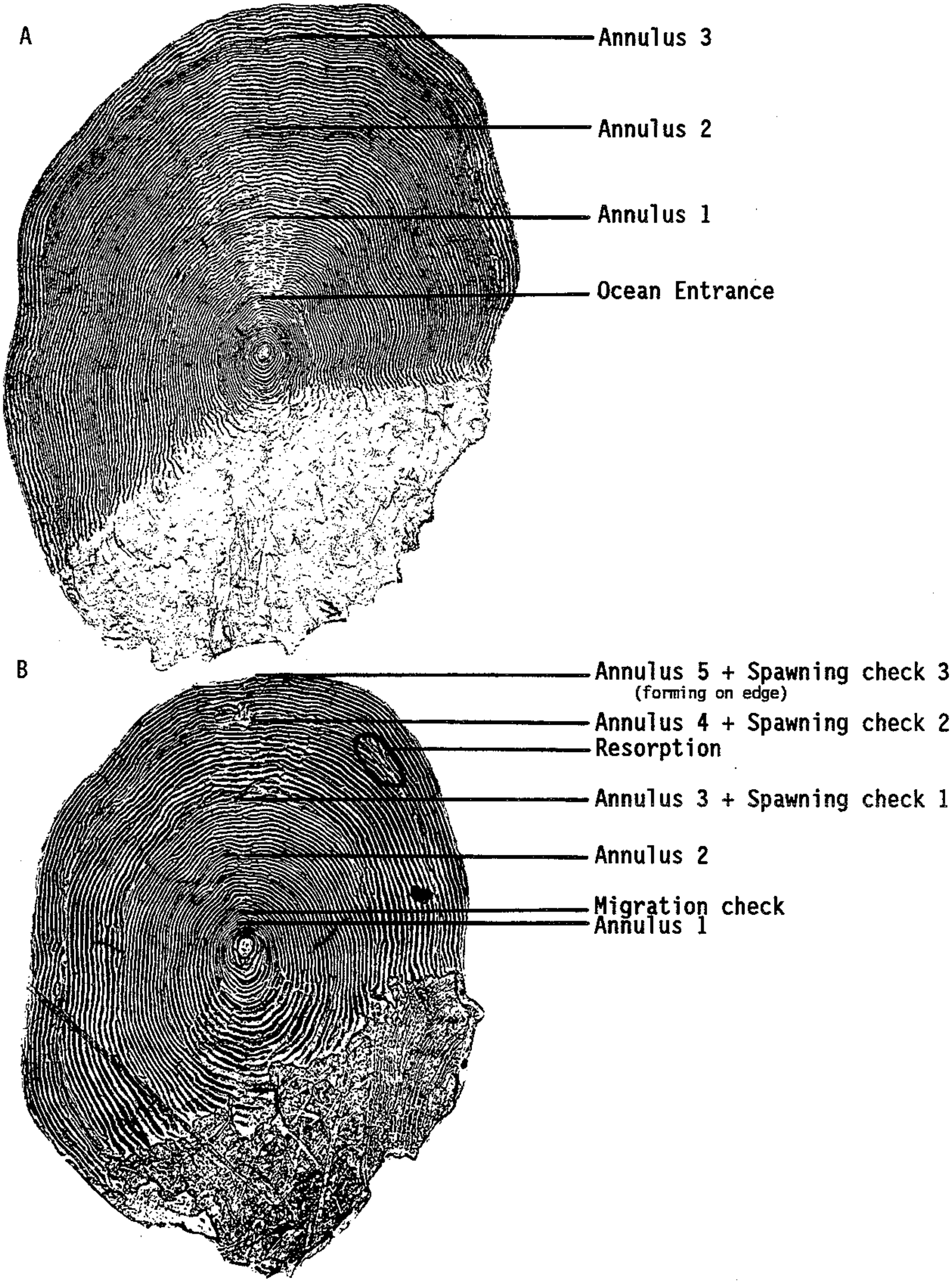


Figure 1. Examples of features interpreted on scales. Scale A is from an age 4 fall chinook salmon from the Alsea River. Scale B is from an age 5 rainbow trout from Spencer Creek, a tributary to the Klamath River.

in Yaquina Bay released its last coho salmon in 1990 so there should be no further returns of private hatchery fish after 1991.) In other areas, hatchery fish are most likely strays from local public hatcheries. In a few locations, hatchery juveniles were released into natural areas so returning adults with hatchery scale patterns are not considered strays.

Data on rearing origin of coho salmon from spawning grounds were supplied to Ocean Salmon Management personnel to use in adjusting natural fish counts. Cooney and Jacobs (1993) describe how counts of natural coho salmon are adjusted using scale data. Based on their criteria, counts of natural coho salmon did not need to be adjusted in 1991.

## AGE COMPOSITION OF CHINOOK SALMON

A summary of the age composition of fall chinook salmon from seven index rivers is given in Table 1. We also computed the average length at age for each index river (Table 2). There were no outstanding deviations in mean lengths in comparison to data from previous years.

We also received scales from non-index rivers (Table 3). In most cases the sample sizes are too small to produce meaningful results, however, enough samples were provided from eight populations of chinook salmon to obtain basic age composition data (Table 4). The large collection from the Rogue River is part of ongoing management of chinook salmon stocks in the basin. The low abundance of age 2 and age 3 fish in 1991 was used to predict low abundance of age 3 and age 4 fish available to ocean fisheries during 1992.

## AGE COMPOSITION OF CHUM SALMON

The 1991 age composition of chum salmon from Tillamook Bay tributaries is similar to historical age compositions (Table 5). We also read scales from the Nehalem River at the request of North Coast Fish District personnel. They observed an increase in abundance of chum salmon in tributaries to the North Fork of the Nehalem River and suspected that the fish were age 3, private hatchery strays from a large release in 1989 (personal communication, 1 March 1992 with R.C. Buckman, Oregon Department of Fish and Wildlife, Seaside, Oregon). They also sent scales from Foley Creek, a mainstem tributary that is the traditional spawning area for wild chum salmon in the Nehalem basin (Table 5). The age composition of chum salmon in North Fork Nehalem River tributaries differed significantly from the age composition of chum salmon from both Tillamook Bay and Foley Creek ($P < 0.05$). The age composition of chum salmon in Foley Creek was not significantly different from the age composition of chum salmon in Tillamook Bay ($P > 0.05$).

Table 1. Age composition of fall chinook salmon stocks from seven index rivers for 1991. The combined age composition for the years 1986-1990 is given for comparison.

| Basin, year | Percent of spawners | | | | | | Number of scales aged |
|---|---|---|---|---|---|---|---|
| | Age 2 | Age 3 | Age 4 | Age 5 | Age 6 | Age 7 | |
| Nehalem | | | | | | | |
| 1991 | -- | 8.6 | 25.7 | 45.7 | 15.7 | 4.3 | 70 |
| 1986-90 | 0.9 | 5.6 | 26.5 | 58.3 | 8.5 | 0.1 | 763 |
| Wilson | | | | | | | |
| 1991 | 0.8 | 9.4 | 21.9 | 46.1 | 19.5 | 2.3 | 128 |
| 1986-90 | 0.2 | 2.6 | 24.5 | 59.0 | 13.8 | -- | 1,312 |
| Salmon | | | | | | | |
| 1991 | 1.5 | 11.0 | 26.3 | 53.3 | 7.3 | 0.7 | 137 |
| 1986-90 | 2.1 | 11.7 | 31.6 | 46.9 | 7.7 | -- | 2,089 |
| Siletz | | | | | | | |
| 1991 | 1.0 | 5.1 | 18.2 | 56.6 | 17.7 | 0.5 | 198 |
| 1986-90 | 1.2 | 4.8 | 26.9 | 51.7 | 15.2 | 0.2 | 650 |
| Siuslaw | | | | | | | |
| 1991 | 2.4 | 10.3 | 40.7 | 43.1 | 3.2 | 0.3 | 341 |
| 1986-90 | 4.6 | 12.9 | 40.9 | 38.0 | 3.6 | -- | 2,202 |
| Coquille | | | | | | | |
| 1991 | 6.9 | 11.4 | 60.7 | 20.0 | 0.9 | -- | 649 |
| 1986-90 | 3.3 | 16.2 | 41.2 | 36.7 | 2.7 | -- | 1,094 |
| Chetco | | | | | | | |
| 1991 | 5.1 | 5.6 | 75.7 | 13.6 | -- | -- | 177 |
| 1986-90 | 11.3 | 14.6 | 53.3 | 19.2 | 1.5 | -- | 733 |
| Index rivers combined | | | | | | | |
| 1991 | 3.9 | 9.5 | 46.2 | 34.1 | 5.8 | 0.5 | 1,700 |
| 1986-90 | 3.2 | 10.4 | 35.1 | 44.2 | 7.1 | 0 | 8,843 |

Table 2. Means and standard deviations for length at age of fall chinook salmon stocks from seven index rivers for 1991. Averaged data from 1986-1990 is given for comparison.

| | 1991 | | | 1986-1990 | | |
|---|---|---|---|---|---|---|
| Basin, age | Average length | Standard deviation | Number | Average length | Standard deviation | Number |
| Nehalem | | | | | | |
| Age 2 | 66.0 | 7.8 | 4 | 41.4 | 4.0 | 6 |
| Age 3 | 68.8 | 6.9 | 9 | 61.8 | 7.7 | 42 |
| Age 4 | 81.6 | 7.9 | 28 | 76.2 | 5.7 | 203 |
| Age 5 | 87.4 | 4.3 | 8 | 83.5 | 8.2 | 442 |
| Age 6 | 85.5 | 4.5 | 2 | 84.9 | 4.7 | 64 |
| | | | | 78.0 | 0 | 1 |
| Wilson | | | | | | |
| Age 2 | 49.0 | -- | 1 | 36.0 | 4.0 | 2 |
| Age 3 | 63.1 | 2.1 | 12 | 60.6 | 8.8 | 32 |
| Age 4 | 74.9 | 6.1 | 28 | 77.4 | 6.8 | 313 |
| Age 5 | 84.6 | 4.8 | 59 | 85.6 | 6.8 | 762 |
| Age 6 | 88.3 | 3.5 | 25 | 91.1 | 7.4 | 179 |
| Age 7 | 84.0 | 2.4 | 3 | -- | -- | 0 |
| Salmon | | | | | | |
| Age 2 | 39.3 | 2.3 | 2 | 42.8 | 3.8 | 42 |
| Age 3 | 59.5 | 3.5 | 15 | 62.2 | 4.9 | 241 |
| Age 4 | 74.5 | 5.2 | 36 | 75.5 | 4.9 | 638 |
| Age 5 | 81.8 | 5.5 | 73 | 84.1 | 4.8 | 956 |
| Age 6 | 85.2 | 3.8 | 10 | 88.1 | 4.6 | 156 |
| Age 7 | 87.5 | 0 | 1 | -- | -- | 0 |
| Siletz | | | | | | |
| Age 2 | 40.5 | 0.1 | 2 | 38.3 | 1.9 | 8 |
| Age 3 | 59.8 | 4.2 | 10 | 59.5 | 4.8 | 31 |
| Age 4 | 75.2 | 6.1 | 36 | 74.4 | 5.8 | 174 |
| Age 5 | 82.1 | 5.7 | 113 | 83.7 | 6.1 | 336 |
| Age 6 | 84.9 | 4.8 | 34 | 86.9 | 7.6 | 98 |
| Age 7 | 88.5 | -- | 1 | 85.0 | 0 | 1 |
| Siuslaw | | | | | | |
| Age 2 | 48.1 | 13.0 | 8 | 43.1 | 7.7 | 100 |
| Age 3 | 61.3 | 6.6 | 35 | 62.1 | 6.4 | 285 |
| Age 4 | 76.8 | 7.1 | 135 | 76.2 | 6.0 | 899 |
| Age 5 | 82.1 | 5.5 | 145 | 82.4 | 5.2 | 832 |
| Age 6 | 83.0 | 4.0 | 10 | 85.9 | 5.4 | 80 |
| Age 7 | 85.0 | -- | 1 | -- | -- | 0 |

Table 2. Continued.

| Basin, age | 1991 Average length | 1991 Standard deviation | 1991 Number | 1986-1990 Average length | 1986-1990 Standard deviation | 1986-1990 Number |
|---|---|---|---|---|---|---|
| Coquille | | | | | | |
| Age 2 | 40.9 | 6.0 | 45 | 40.0 | 3.5 | 35 |
| Age 3 | 65.2 | 6.7 | 73 | 60.3 | 7.3 | 177 |
| Age 4 | 74.1 | 5.3 | 394 | 74.5 | 6.1 | 448 |
| Age 5 | 80.3 | 6.0 | 129 | 79.8 | 5.2 | 401 |
| Age 6 | 81.7 | 5.8 | 6 | 81.8 | 5.9 | 29 |
| Chetco | | | | | | |
| Age 2 | 39.8 | 3.6 | 9 | 42.3 | 4.3 | 83 |
| Age 3 | 58.7 | 4.0 | 9 | 58.0 | 5.4 | 107 |
| Age 4 | 72.0 | 5.2 | 134 | 71.5 | 5.8 | 390 |
| Age 5 | 78.4 | 5.2 | 24 | 79.1 | 6.3 | 141 |
| Age 6 | -- | -- | 0 | 81.2 | 4.8 | 11 |

Table 3. Locations and sample sizes of chinook salmon scale collections from non-index rivers in 1991. SGS = spawning ground surveys.

| River | Run | Source | Sample size |
|---|---|---|---|
| Lower Columbia tributaries | Fall | SGS | 6 |
| Necanicum | Fall | SGS | 4 |
| Nehalem | Summer | SGS | 231 |
| Tillamook Bay | Spring | Creel | 109 |
| Tillamook Bay | Fall | Creel | 20 |
| Trask | Fall | SGS | 3 |
| Tillamook | Fall | SGS | 5 |
| Nestucca | Fall | Hatchery | 65 |
| Nestucca | Spring | Hatchery | 120 |
| Siletz | Spring | Trap, Creel, SGS | 64 |
| Alsea | Fall | Creel | 19 |
| Umpqua | Fall | SGS | 2 |
| Coos | Fall | SGS | 5 |
| Floras | Fall | SGS | 8 |
| Euchre | Fall | SGS | 1 |
| Rogue | Fall | SGS | 696 |
| Rogue | Fall | Huntley Park Seining | 163 |
| Hunter | Fall | SGS | 3 |
| Pistol | Fall | SGS | 3 |
| Winchuck | Fall | SGS, STEP broodstock | 49 |

Table 4. Age composition of miscellaneous chinook salmon stocks in 1991.

| Basin, year | Run | Percent of spawners Age 2 | Age 3 | Age 4 | Age 5 | Age 6 | Number of scales aged |
|---|---|---|---|---|---|---|---|
| Nehalem | Summer | 3.5 | 20.4 | 53.5 | 21.7 | 0.9 | 226 |
| Tillamook | Spring | 0.9 | 13.1 | 48.6 | 29.9 | 7.5 | 107 |
| Nestucca | Spring | 1.9 | 12.4 | 78.1 | 7.6 | 0 | 105 |
| Nestucca | Fall | 0 | 31.7 | 25.0 | 33.3 | 10.0 | 60 |
| Siletz | Spring | 3.2 | 54.8 | 30.7 | 8.1 | 3.2 | 62 |
| Rogue, Huntley Park | Fall | 15.5 | 23.0 | 54.7 | 6.8 | 0.0 | 161 |
| Rogue, SGS | Fall | 5.1 | 11.9 | 65.1 | 16.5 | 1.4 | 663 |
| Winchuck | Fall | 6.2 | 16.7 | 64.6 | 12.5 | 0.0 | 48 |

Table 5. Age composition of chum salmon from Tillamook Bay and Nehalem Bay tributaries in 1991. The age composition from other recent years is given for comparison.

| Location | Year | Percent age composition Age 3 | Age 4 | Age 5 | Sample number | 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 | Borgerson 1991 |
| Tillamook Bay | 1990 | 21.5 | 75.3 | 3.2 | 158 | Borgerson 1991 |
| Tillamook Bay | 1991 | 10.9 | 84.6 | 4.5 | 267 | |
| North Fork Nehalem | 1991 | 42.7 | 45.3 | 12.0 | 75 | |
| Foley Creek | 1991 | 14.1 | 73.2 | 12.7 | 71 | |

## AGE COMPOSITION AND SPAWNING HISTORY OF TROUT

We read scales from a sample of redband-type rainbow trout (Oncorhynchus mykiss) that inhabit the Klamath River, but make spawning migrations into Spencer Creek. The most common life history exhibited by Spencer Creek rainbow trout was one in which the fish migrated from the creek into the Klamath River as a yearling and returned to spawn for the first time at age 3. Juvenile age at migration ranged from 0+ (fry) to 3 years. Age of first spawning ranged from 2 to 4 years and total ages of fish in the spawning population ranged from 2 to 8 years (Table 6). Last year we read scales from Spring Creek, a spawning tributary for rainbow trout in Upper Klamath Lake. In contrast to the Spring Creek population, the Spencer Creek population tends to be a little younger at first spawning and at total age.

Table 6. Age composition, spawning history, and average length of rainbow trout sampled in Spencer Creek, Klamath River, during April in 1989, 1990, and 1991. All fish sampled were on a spawning run.

| Year, age | Number | Percent of sample | Number with previous spawning checks | Length, cm | | |
|---|---|---|---|---|---|---|
| | | | | Mean | Standard deviation | Range |
| 2 | 8 | 8.1 | 0 | 17.7 | 1.6 | 15.8-22.0 |
| 3 | 20 | 20.2 | 4 | 22.1 | 4.4 | 14.0-30.7 |
| 4 | 25 | 25.2 | 16 | 27.5 | 3.4 | 20.8-35.3 |
| 5 | 21 | 21.2 | 21 | 37.2 | 7.0 | 26.7-48.9 |
| 6 | 18 | 18.2 | 18 | 41.9 | 7.0 | 27.1-52.2 |
| 7 | 6 | 6.1 | 6 | 50.6 | 5.8 | 40.4-56.2 |
| 8 | 1 | 1.0 | 1 | 53.1 | -- | -- |
| Total | 99 | 100.0 | | | | |

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## APPENDIX TABLE A

**Stock Composition of Coho Salmon Sampled on Spawning Grounds in 1991**

Appendix Table A. Stock Composition of Coho Salmon Sampled on Spawning Grounds in 1991.

| Time period | Hatchery yearling No. | Hatchery yearling % | Wild No. | Wild % | Hatchery accelerated No. | Hatchery accelerated % | Jacks (No.) | Regenerated (No.) |
|---|---|---|---|---|---|---|---|---|
| | | | | NECANICUM RIVER | | | | |
| 11/01-11/15 | 0 | -- | 3 | 100 | 0 | -- | 0 | 0 |
| 11/16-11/30 | 0 | -- | 1 | 100 | 0 | -- | 0 | 0 |
| 12/01-12/15 | 1 | 100 | 0 | -- | 0 | -- | 0 | 0 |
| 12/16-12/31 | 0 | -- | 4 | 100 | 0 | -- | 0 | 1 |
| TOTAL | 1 | 11.1 | 8 | 88.9 | 0 | -- | 0 | 1 |
| | | | | ELK CREEK | | | | |
| 11/16-11/30 | 0 | -- | | | 0 | -- | 0 | 0 |
| 12/01-12/15 | 0 | -- | 1 | 100 | 0 | -- | 0 | 0 |
| 12/16-12/31 | 0 | -- | 2 | 100 | 0 | -- | 0 | 0 |
| 01/01-01/15 | 0 | -- | 0 | -- | 0 | -- | 0 | 0 |
| 01/16-01/31 | 0 | -- | 1 | 100 | 0 | -- | 0 | 0 |
| TOTAL | 0 | -- | 4 | 100 | 0 | -- | 0 | 0 |
| | | | | ARCH CAPE CREEK | | | | |
| 11/16-11/30 | 1 | 100 | 0 | -- | 0 | -- | 0 | 0 |
| 12/01-12/15 | 0 | -- | 0 | -- | 0 | -- | 0 | 0 |
| 12/16-12/31 | 1 | 33.3 | 2 | 66.7 | 0 | -- | 0 | 0 |
| TOTAL | 2 | 50.0 | 2 | 50.0 | 0 | -- | 0 | 0 |
| | | | | MAINSTEM NEHALEM RIVER | | | | |
| 11/01-11/15 | 1 | 50.0 | 1 | 50.0 | 0 | -- | 0 | 1 |
| 11/16-11/30 | 1 | 16.7 | 5 | 83.3 | 0 | -- | 0 | 0 |
| 12/01-12/15 | 12 | 41.4 | 17 | 58.6 | 0 | -- | 0 | 5 |
| 12/16-12/31 | 5 | 20.0 | 20 | 80.0 | 0 | -- | 0 | 1 |
| 01/01-01/15 | 1 | 33.3 | 2 | 66.7 | 0 | -- | 0 | 0 |
| 01/16-01/31 | 0 | -- | 1 | 100 | 0 | -- | 0 | 0 |
| TOTAL | 20 | 30.3 | 46 | 69.7 | 0 | -- | 0 | 7 |

Appendix Table A. Continued.

| Time period | Hatchery yearling No. | Hatchery yearling % | Wild No. | Wild % | Hatchery accelerated No. | Hatchery accelerated % | Jacks (No.) | Regenerated (No.) |
|---|---|---|---|---|---|---|---|---|
| | | | | NORTH FORK NEHALEM RIVER | | | | |
| 10/16-10/31 | 3 | 100 | 0 | -- | 0 | -- | 0 | 1 |
| 11/01-11/15 | 42 | 95.4 | 2 | 4.6 | 0 | -- | 4 | 3 |
| 11/16-11/30 | 29 | 85.7 | 5 | 14.3 | 0 | -- | 0 | 4 |
| 12/01-12/15 | 18 | 78.3 | 5 | 21.7 | 0 | -- | 0 | 2 |
| 12/16-12/31 | 1 | 33.3 | 2 | 66.7 | 0 | -- | 0 | 0 |
| TOTAL | 93 | 86.1 | 15 | 13.9 | 0 | -- | 4 | 10 |
| | | | | MIAMI RIVER | | | | |
| 11/16-11/30 | 2 | 100 | 0 | -- | 0 | -- | 0 | 0 |
| 12/01-12/15 | 0 | -- | 1 | 100 | 0 | -- | 1 | 0 |
| TOTAL | 2 | 66.7 | 1 | 33.3 | 0 | -- | 1 | 0 |
| | | | | KILCHIS RIVER | | | | |
| 11/16-11/30 | 5 | 83.3 | 1 | 16.7 | 0 | -- | 0 | 0 |
| 12/01-12/15 | 0 | -- | 0 | -- | 0 | -- | 0 | 0 |
| 12/15-12/31 | 1 | 100 | 0 | -- | 0 | -- | 0 | 0 |
| TOTAL | 6 | 85.7 | 1 | 14.3 | 0 | -- | 0 | 0 |
| | | | | TRASK RIVER | | | | |
| 10/16-10/31 | 1 | 66.7 | 2 | 33.3 | 0 | -- | 1 | 0 |
| 11/01-11/15 | 0 | -- | 1 | 100 | 0 | -- | 0 | 0 |
| 11/16-11/30 | 2 | 40.0 | 3 | 60.0 | 0 | -- | 0 | 1 |
| 12/01-12/15 | 1 | 20.0 | 4 | 80.0 | 0 | -- | 0 | 0 |
| TOTAL | 4 | 28.6 | 10 | 71.4 | 0 | -- | 1 | 1 |

Appendix Table A. Continued.

| Time period | Hatchery yearling No. | Hatchery yearling % | Wild No. | Wild % | Hatchery accelerated No. | Hatchery accelerated % | Jacks (No.) | Regen-erated (No.) |
|---|---|---|---|---|---|---|---|---|
| | | | | WILSON RIVER | | | | |
| 12/01-12/15 | 1 | 33.3 | 2 | 66.7 | 0 | -- | 0 | 0 |
| 12/16-12/31 | 0 | -- | 1 | 100 | 0 | -- | 0 | 0 |
| TOTAL | 1 | 25.0 | 3 | 75.0 | 0 | -- | 0 | 0 |
| | | | | TILLAMOOK RIVER | | | | |
| 11/15-11/30 | 1 | 100 | 0 | -- | 0 | -- | 0 | 0 |
| 12/01-12/15 | 0 | -- | 0 | -- | 0 | -- | 0 | 0 |
| 12/16-12/31 | 0 | -- | 1 | 100 | 0 | -- | 0 | 0 |
| TOTAL | 1 | 50.0 | 1 | 50.0 | 0 | -- | 0 | 0 |
| | | | | NESTUCCA RIVER | | | | |
| 11/01-11/15 | 1 | 100 | 0 | -- | 0 | -- | 0 | 0 |
| 11/16-11/30 | 0 | -- | 0 | -- | 0 | -- | 0 | 0 |
| 12/01-12/15 | 0 | -- | 4 | 100 | 0 | -- | 0 | 3 |
| 12/16-12/31 | 0 | -- | 0 | -- | 0 | -- | 0 | 1 |
| TOTAL | 1 | 20.0 | 4 | 80.0 | 0 | -- | 0 | 4 |
| | | | | SALMON RIVER | | | | |
| 10/16-10/31 | 0 | -- | 1 | 100 | 0 | -- | 0 | 0 |
| 11/01-11/15 | 22 | 84.6 | 3 | 11.5 | 1 | 3.9 | 1 | 2 |
| 11/16-11/30 | 16 | 80.0 | 4 | 20.0 | 0 | -- | 2 | 0 |
| 12/01-12/15 | 9 | 75.0 | 2 | 16.7 | 1 | 8.3 | 1 | 2 |
| 12/16-12/31 | 3 | 75.0 | 1 | 25.0 | 0 | -- | 0 | 0 |
| TOTAL | 50 | 79.4 | 11 | 17.4 | 2 | 3.2 | 4 | 4 |
| | | | | DEVIL'S LAKE | | | | |
| 12/16-12/31 | 0 | -- | 8 | 100 | 0 | -- | 0 | 0 |
| 01/01-01/15 | 1 | 20.0 | 4 | 80.0 | 0 | -- | 0 | 1 |
| 01/16-01/31 | 0 | -- | 2 | 100 | 0 | -- | 0 | 0 |
| TOTAL | 1 | 6.7 | 14 | 93.3 | 0 | -- | 0 | 1 |

Appendix Table A. Continued.

| Time period | Hatchery yearling No. | Hatchery yearling % | Wild No. | Wild % | Hatchery accelerated No. | Hatchery accelerated % | Jacks (No.) | Regenerated (No.) |
|---|---|---|---|---|---|---|---|---|
| | | | | SILETZ RIVER | | | | |
| 11/01-11/15 | 19 | 90.5 | 2 | 9.5 | 0 | -- | 1 | 2 |
| 11/16-11/30 | 17 | 77.3 | 4 | 18.2 | 1 | 4.5 | 2 | 1 |
| 12/01-12/15 | 11 | 84.6 | 2 | 15.4 | 0 | -- | 0 | 1 |
| 12/16-12/31 | 0 | | 5 | 100 | 0 | -- | 0 | 1 |
| 01/01-01/15 | 0 | | 1 | 100 | 0 | -- | 0 | 0 |
| TOTAL | 47 | 75.8 | 14 | 22.6 | 1 | 1.6 | 3 | 5 |
| | | | | ROCK CREEK, SILETZ RIVER | | | | |
| 10/16-10/31 | 2 | 100 | 0 | -- | 0 | -- | 0 | 0 |
| 11/01-11/15 | 23 | 53.5 | 20 | 46.5 | 0 | -- | 1 | 0 |
| 11/16-11/30 | 24 | 96.0 | 1 | 4.0 | 0 | -- | 1 | 4 |
| 12/01-12/15 | 9 | 90.0 | 1 | 10.0 | 0 | | 0 | 1 |
| TOTAL | 58 | 72.5 | 22 | 27.5 | 0 | -- | 0 | 0 |
| | | | | MAINSTEM YAQUINA RIVER | | | | |
| 11/01-11/15 | 0 | -- | 2 | 100 | 0 | -- | 0 | 0 |
| 11/16-11/30 | 1 | 33.3 | 1 | 33.3 | 1 | 33.3 | 0 | 0 |
| 12/01-12/15 | 2 | 28.57 | 4 | 57.1 | 1 | 14.3 | 0 | 0 |
| 12/16-12/31 | 0 | -- | 0 | -- | 1 | 100 | 0 | 0 |
| TOTAL | 3 | 23.1 | 7 | 53.8 | 3 | 23.1 | 0 | 0 |
| | | | | BIG ELK CREEK, YAQUINA RIVER | | | | |
| 12/01-12/15 | 0 | -- | 3 | 100 | 0 | -- | 0 | 1 |
| 12/16-12/31 | 0 | -- | 0 | -- | 0 | -- | 0 | 0 |
| 01/01-01/15 | 0 | -- | 0 | -- | 0 | -- | 0 | 2 |
| TOTAL | 0 | -- | 3 | 100 | 0 | -- | 0 | 3 |

Appendix Table A. Continued.

| Time period | Hatchery yearling | | Wild | | Hatchery accelerated | | Jacks | Regen-erated |
|---|---|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % | (No.) | (No.) |
| **NORTH FORK BEAVER CREEK** | | | | | | | | |
| 12/16-12/31 | 0 | -- | 0 | -- | 0 | -- | 1 | 1 |
| 01/01-01/15 | 0 | -- | 0 | -- | 0 | -- | 0 | 0 |
| 01/16-01/31 | 0 | -- | 2 | 100 | 0 | -- | 0 | 0 |
| TOTAL | 0 | -- | 2 | 100 | 0 | -- | 1 | 1 |
| **MAINSTEM ALSEA RIVER** | | | | | | | | |
| 12/01-12/15 | 0 | -- | 1 | 100 | 0 | -- | 0 | 0 |
| **DRIFT CREEK, ALSEA RIVER** | | | | | | | | |
| 12/01-12/15 | 0 | -- | 0 | -- | 0 | -- | 0 | 1 |
| 12/16-12/31 | 0 | -- | 1 | 100 | 0 | -- | 1 | 1 |
| 01/01-01/15 | 0 | -- | 5 | 100 | 0 | -- | 0 | 0 |
| 01/16-01/31 | 0 | -- | 1 | 100 | 0 | -- | 0 | 0 |
| TOTAL | 0 | -- | 7 | 100 | 0 | -- | 1 | 2 |
| **FIVE RIVERS, ALSEA RIVER** | | | | | | | | |
| 10/16-10/31 | 0 | -- | 1 | 100 | 0 | -- | 0 | 0 |
| 11/01-11/15 | 1 | 50.0 | 1 | 50.0 | 0 | -- | 0 | 0 |
| 11/16-11/30 | 1 | 50.0 | 1 | 50.0 | 0 | -- | 0 | 0 |
| 12/01-12/15 | 0 | -- | 1 | 100 | 0 | -- | 0 | 0 |
| 12/16-12/31 | 0 | -- | 1 | 100 | 0 | -- | 0 | 0 |
| 01/01-01/15 | 0 | -- | 0 | | 0 | -- | 0 | 0 |
| 01/16-01/31 | 0 | -- | 0 | | 0 | -- | 0 | 0 |
| 02/01-02/15 | 0 | -- | 2 | 100 | 0 | -- | 0 | 0 |
| TOTAL | 2 | 22.2 | 7 | 77.8 | 0 | -- | 0 | 0 |

Appendix Table A. Continued.

| Time period | Hatchery yearling No. | Hatchery yearling % | Wild No. | Wild % | Hatchery accelerated No. | Hatchery accelerated % | Jacks (No.) | Regen-erated (No.) |
|---|---|---|---|---|---|---|---|---|
| | | | | MAINSTEM SIUSLAW RIVER | | | | |
| 11/01-11/15 | 0 | -- | 2 | 100 | 0 | -- | 0 | 0 |
| 11/16-11/30 | 1 | 100 | 0 | -- | 0 | -- | 0 | 0 |
| 12/01-12/15 | 1 | 10.0 | 9 | 90.0 | 0 | -- | 0 | 1 |
| 12/16-12/31 | 0 | -- | 3 | 100 | 0 | -- | 1 | 0 |
| 01/01-01/15 | 0 | -- | 0 | -- | 0 | -- | 0 | 0 |
| 01/16-01/31 | 1 | 16.7 | 5 | 83.3 | 0 | -- | 0 | 0 |
| TOTAL | 3 | 15.0 | 17 | 85.0 | 0 | -- | 1 | 1 |
| | | | | NORTH FORK SIUSLAW RIVER | | | | |
| 01/01-01/15 | 0 | -- | 1 | 100 | 0 | -- | 0 | 0 |
| | | | | LAKE CREEK, SIUSLAW RIVER | | | | |
| 11/01-11/15 | 3 | 75.0 | 1 | 25.0 | 0 | -- | 0 | 0 |
| 11/16-11/30 | 0 | | 0 | -- | 0 | -- | 0 | 0 |
| 12/01-12/15 | 0 | | 5 | 100 | 0 | -- | 0 | 1 |
| 12/16-12/31 | 0 | | 3 | 100 | 0 | -- | 0 | 0 |
| 01/01-01/15 | 2 | 50.0 | 2 | 50.0 | 0 | -- | 1 | 0 |
| 01/16-01/31 | 8 | 80.0 | 2 | 20.0 | 0 | -- | 0 | 0 |
| 02/01-02/15 | 21 | 77.8 | 6 | 22.2 | 0 | -- | 1 | 1 |
| 02/16-02/29 | 4 | 100 | 0 | -- | 0 | -- | 1 | 0 |
| TOTAL | 38 | 65.5 | 20 | 34.5 | 0 | -- | 3 | 2 |
| | | | | SILTCOOS LAKE | | | | |
| 11/16-11/30 | 0 | -- | 1 | 100 | 0 | -- | 0 | 0 |
| 12/01-12/15 | 2 | 10.0 | 18 | 90.0 | 0 | -- | 0 | 2 |
| 12/16-12/31 | 0 | -- | 30 | 100 | 0 | -- | 2 | 2 |
| 01/01-01/15 | 0 | -- | 9 | 90.0 | 1 | 10.0 | 0 | 0 |
| 01/16-01/31 | 0 | -- | 22 | 100 | 0 | -- | 0 | 5 |
| 02/01-02/15 | 0 | -- | 26 | 100 | 0 | -- | 0 | 2 |
| TOTAL | 2 | 1.8 | 106 | 97.3 | 1 | 0.9 | 2 | 11 |

Appendix Table A. Continued.

| Time period | Hatchery yearling No. | Hatchery yearling % | Wild No. | Wild % | Hatchery accelerated No. | Hatchery accelerated % | Jacks (No.) | Regen-erated (No.) |
|---|---|---|---|---|---|---|---|---|
| **TAHKENITCH LAKE** | | | | | | | | |
| 12/01-12/15 | 0 | -- | 40 | 100 | 0 | -- | 4 | 0 |
| 12/16-12/31 | 0 | -- | 52 | 100 | 0 | -- | 2 | 4 |
| 01/01-01/15 | 0 | -- | 2 | 100 | 0 | -- | 0 | 0 |
| 01/16-01/31 | 0 | -- | 0 | -- | 0 | -- | 0 | 0 |
| 02/01-02/15 | 0 | -- | 11 | 100 | 0 | -- | 0 | 3 |
| TOTAL | 0 | -- | 105 | 100 | 0 | -- | 6 | 7 |
| **SMITH RIVER, UMPQUA RIVER** | | | | | | | | |
| 12/01-12/15 | 1 | 11.1 | 8 | 88.9 | 0 | -- | 0 | 1 |
| 12/16-12/31 | 0 | -- | 2 | 100 | 0 | -- | 0 | 1 |
| TOTAL | 1 | 9.1 | 10 | 90.9 | 0 | -- | 0 | 2 |
| **SOUTH FORK UMPQUA RIVER** | | | | | | | | |
| 11/16-11/30 | 2 | 100 | 0 | -- | 0 | -- | 0 | 0 |
| 12/01-12/15 | 7 | 50.0 | 7 | 50.0 | 0 | -- | 0 | 0 |
| 12/16-12/31 | 1 | 25.0 | 3 | 75.0 | 0 | -- | 0 | 0 |
| 01/01-01/15 | 0 | -- | 1 | 100 | 0 | -- | 0 | 0 |
| TOTAL | 10 | 47.6 | 11 | 52.4 | 0 | -- | 0 | 0 |
| **NORTH AND SOUTH TENMILE LAKES** | | | | | | | | |
| 12/01-12/15 | 0 | -- | 2 | 100 | 0 | -- | 0 | 0 |
| 12/16-12/31 | 1 | 2.8 | 35 | 97.2 | 0 | -- | 0 | 3 |
| 01/01-01/15 | 1 | 5.0 | 19 | 95.0 | 0 | -- | 0 | 1 |
| TOTAL | 2 | 3.4 | 56 | 96.6 | 0 | -- | 0 | 4 |
| **MAINSTEM COOS RIVER** | | | | | | | | |
| 12/16-12/31 | 2 | 66.7 | 1 | 33.3 | 0 | -- | 2 | 1 |
| 01/01-01/15 | 0 | -- | 0 | -- | 0 | -- | 0 | 0 |
| 01/16-01/31 | 0 | -- | 2 | 100 | 0 | -- | 1 | 0 |
| 02/01-02/15 | 0 | -- | 0 | -- | 0 | -- | 1 | 0 |
| TOTAL | 2 | 40.0 | 3 | 60.0 | 0 | -- | 4 | 1 |

Appendix Table A. Continued.

| Time period | Hatchery yearling No. | Hatchery yearling % | Wild No. | Wild % | Hatchery accelerated No. | Hatchery accelerated % | Jacks (No.) | Regenerated (No.) |
|---|---|---|---|---|---|---|---|---|
| | | | | MILLICOMA RIVER, COOS RIVER | | | | |
| 12/01-12/15 | 0 | -- | 2 | 100 | 0 | -- | 0 | 0 |
| 12/16-12/31 | 0 | -- | 4 | 100 | 0 | -- | 0 | 0 |
| 01/01-01/15 | 1 | 25.0 | 3 | 75.0 | 0 | -- | 0 | 0 |
| TOTAL | 1 | 10.0 | 9 | 90.0 | 0 | -- | 0 | 0 |
| | | | | SOUTH FORK COOS RIVER | | | | |
| 12/01-12/15 | 1 | 25.0 | 3 | 75.0 | 0 | -- | 0 | 0 |
| 12/16-12/31 | 0 | -- | 0 | -- | 0 | -- | 0 | 0 |
| 01/01-01/15 | 1 | 100 | 0 | -- | 0 | -- | 0 | 0 |
| 01/16-01/31 | 1 | 50.0 | 1 | 50.0 | 0 | -- | 0 | 0 |
| TOTAL | 3 | 42.9 | 4 | 57.1 | 0 | -- | 0 | 0 |
| | | | | MAINSTEM COQUILLE RIVER | | | | |
| 11/16-11/30 | 0 | -- | 2 | 100 | 0 | -- | 0 | 0 |
| 12/01-12/15 | 0 | -- | 8 | 100 | 0 | -- | 1 | 0 |
| 12/16-12/31 | 2 | 16.7 | 10 | 83.3 | 0 | -- | 0 | 0 |
| 01/01-01/15 | 0 | -- | 1 | 100 | 0 | -- | 0 | 0 |
| 01/16-01/31 | 0 | -- | 4 | 100 | 0 | -- | 0 | 0 |
| TOTAL | 2 | 7.4 | 25 | 92.6 | 0 | -- | 1 | 0 |
| | | | | MIDDLE FORK COQUILLE RIVER | | | | |
| 12/01-12/15 | 1 | 50.0 | 1 | 50.0 | 0 | -- | 0 | 0 |
| 12/16-12/31 | 0 | -- | 2 | 100 | 0 | -- | 0 | 0 |
| 01/01-01/15 | 0 | -- | 1 | 100 | 0 | -- | 0 | 1 |
| 01/16-01/31 | 0 | -- | 1 | 100 | 0 | -- | 0 | 0 |
| TOTAL | 1 | 20.0 | 4 | 80.0 | 0 | -- | 0 | 1 |

Appendix Table A. Continued.

| Time period | Hatchery yearling | | Wild | | Hatchery accelerated | | Jacks (No.) | Regenerated (No.) |
|---|---|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % | | |
| **SOUTH FORK COQUILLE RIVER** | | | | | | | | |
| 12/01-12/15 | 1 | 100 | 0 | -- | 0 | -- | 0 | 0 |
| 12/16-12/31 | 0 | -- | 3 | 100 | 0 | -- | 0 | 2 |
| 01/01-01/15 | 0 | -- | 1 | 100 | 0 | -- | 0 | 0 |
| 01/16-01/31 | 0 | -- | 0 | -- | 0 | -- | 0 | 0 |
| TOTAL | 1 | 20.0 | 4 | 80.0 | 0 | -- | 0 | 2 |
| **EAST FORK COQUILLE RIVER** | | | | | | | | |
| 12/16-12/31 | 0 | -- | 1 | 100 | 0 | -- | 0 | 0 |