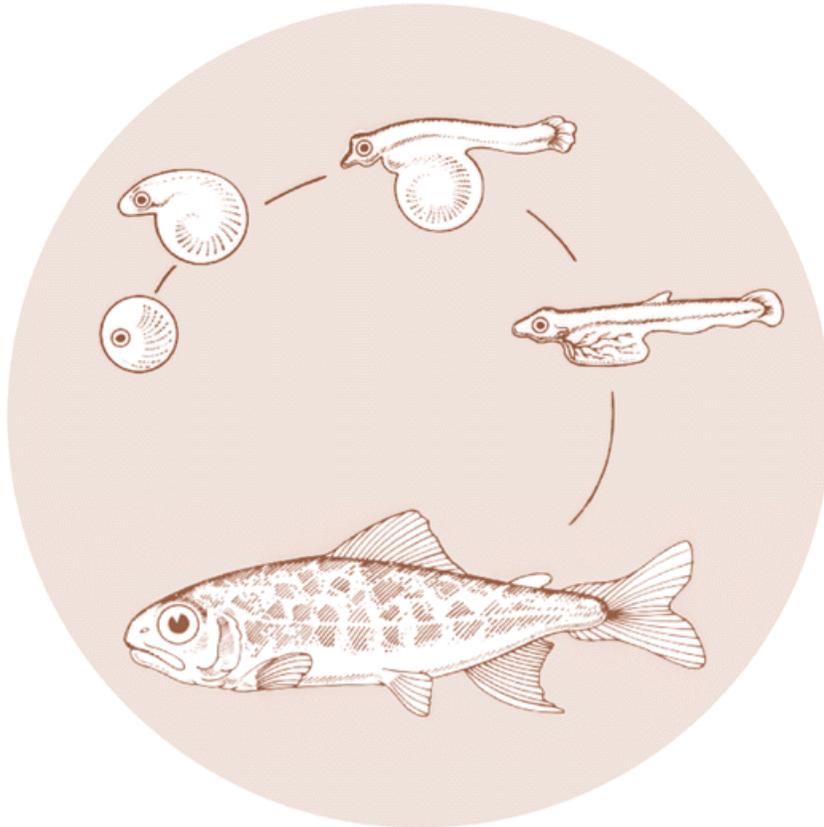


May 1994

# MINTHORN SPRINGS CREEK SUMMER JUVENILE RELEASE & ADULT COLLECTION FACILITY

Annual Report 1993



DOE/BP-17622-8



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**MINTHORN SPRINGS CREEK SUMMER JUVENILE RELEASE &  
ADULT COLLECTION FACILITY**

ANNUAL REPORT 1993

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Confederated Tribes of the Umatilla Indian Reservation  
Department of Natural Resources  
Fisheries Program

Prepared for:

U. S. Department of Energy  
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## ABSTRACT

The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) and Oregon Department of Fish and Wildlife (ODFW) are cooperating in a joint effort to enhance steelhead and re-establish salmon runs in the Umatilla River Basin. As an integral part of this program, Bonifer and Minthorn Acclimation Facilities are operated for holding and spawning summer steelhead (*Oncorhynchus mykiss*), fall chinook (*O. tshawytscha*) and coho salmon (*O. kisutch*) and acclimation and release of juvenile salmon and steelhead.

In 1993, 110,289 summer steelhead were acclimated and released at Bonifer. At Minthorn, 47,979 summer steelhead were acclimated and released.

A total of 125 unmarked and 91 marked summer steelhead were collected for broodstock at Three Mile Dam from November 23, 1992 through May 11, 1993 and held at Minthorn. Utilizing a 3 x 3 spawning matrix, a total of 255,441 green eggs were taken from 49 females. The eggs were transferred to Umatilla Hatchery for incubation, rearing, and later release into the Umatilla River.

A total of 347 fall chinook salmon were also collected for broodstock at Three Mile Dam and held at Minthorn. Using a 1:1 spawning ratio, a total of 352,320 green eggs were taken from 87 females. They were also transferred to Umatilla Hatchery for incubation, rearing, and later release into the Umatilla River.

Coho salmon were collected at Three Mile Dam and held and spawned at Minthorn for the first time. A total of 580 fish were collected and an estimated 676,171 green eggs were taken from 287 females. They were transferred to Umatilla and Irrigon Hatcheries for eyeing and then were transferred to Cascade Hatchery for final incubation, rearing, and later release into the Umatilla River.

Personnel from the ODFW Eastern Oregon Fish Pathology Laboratory in La Grande took samples of tissues and reproductive fluids from Umatilla River summer steelhead, fall chinook and coho salmon broodstock for monitoring and evaluation purposes. Cell culture assays for replicating agents, including infectious hematopoietic necrosis virus and infectious pancreatic necrosis virus, on all spawned fish were negative. Blood smears were taken on spawned fall chinook and coho salmon to test for bacterial kidney disease and all had low or negative antigen levels. One hundred fifty-eight fall chinook salmon were sampled for erythrocytic inclusion body syndrome and were negative for inclusions.

Regularly scheduled maintenance of pumps, equipment and facilities was performed in 1993. Routine facility maintenance work consisted mostly of weed abatement and maintenance of the electric fence at Bonifer.

The progress of outmigration for juvenile releases was monitored at the Westland Canal fish trapping facility by CTUIR and ODFW personnel. High spring flows in 1993

allowed the facility to operate in the bypass mode until June 14. From then, until the close of the trap on July 29, low numbers of juveniles were captured, indicating the majority of fish volitionally migrated downstream prior to the trap being opened.

Coded-wire tag recovery information was accessed to determine the contribution of Umatilla River releases to the ocean, Columbia River and Umatilla River fisheries. Total estimated adult survival rates for summer steelhead have ranged from 0.04 to 0.97%. Survival rates to the Umatilla River have ranged from 0.03 to 0.72%. Total estimated adult coho survival rates have ranged from 0.16 to 4.47%. Survival rates to the Umatilla River have ranged from 0.02 to 0.99%. Total estimated survival rates (through age-6, preliminary data) for spring chinook yearlings released in the spring have ranged from 0.28 to 0.95%. Survival rates to the Umatilla River have ranged from 0.24 to 0.77%. The total estimated adult survival rate for spring chinook released in the fall of 1988 was 0.09%, while escapement to the Umatilla River was 0.08%. Total estimated survival rates (through age-7, preliminary data) for fall chinook yearling releases have ranged from 0.08 to 3.21%. Umatilla River survival rates have ranged from 0.00 to 0.89%. Total estimated survival rates (through age-7, preliminary data) for fall chinook subyearling spring releases have ranged from 0.50 to 0.87%. Umatilla River survival rates have ranged from 0.00 to less than 0.01%. The total estimated adult survival rate for fall chinook subyearlings released in the fall of 1985 was 0.67%. Escapement to the Umatilla River was less than 0.01%.

## ACKNOWLEDGEMENTS

This project was funded by Bonneville Power Administration (BPA). The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) thank Jerry Bauer, Jay Marcotte and other BPA personnel for their assistance. Thanks are extended to Ray Hill, Jack Hurst, Randy Winters, Warren Groberg, Sam Onjukka and other Oregon Department of Fish and Wildlife (ODFW) personnel for providing assistance in the spawning of summer steelhead, fall chinook and coho salmon and for monitoring the fish for the presence of fish pathogens. Bill Duke (ODFW) assisted in the collection and transport of salmon and steelhead broodstock and the collection of data at Three Mile Dam and Westland Canal. Dennis Issac and Bill Murray (ODFW) retrieved and decoded coded-wire tags from adult fish snouts and Bob Becker (ODFW) supervised and coordinated fish transfers to the acclimation facilities. Thanks go to Mike Hayes, Shannon Focher, and Art Schaub (ODFW) for sharing their data collected from juveniles prior to release. We thank landowners Rosemary and Wes Gladow and Richard Kaye for their cooperation and Union Pacific Railroad for providing access to the acclimation facilities.

Thanks go to the CTUIR staff for their cooperation and contributions to this report. Brian Zimmerman, Brian Conner, Larry Cowapoo, Vern Spencer and Louis Case collected much of the data from adults returning to Three Mile Dam and migration data for juvenile salmonids captured at the Westland Canal fish trapping facility and assisted in the collection and transport of salmon and steelhead broodstock. Paul Kissner and Melvin Farrow collected much of the data and snouts from spawning ground surveys. Other biologists and technicians assisted in field sampling. Joe Richards provided the administration of the agreement and Julie Burke and Celeste Reves provided secretarial services. Gary James provided technical oversight and critical review of this report and Jed Volkman and Brian Zimmerman also provided critical review.

Thanks go to Mike McCloud and Dave McKay for the long hours and weekends spent running the acclimation facilities and for collecting much of the data.

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## INTRODUCTION

### Background

The Umatilla River Basin historically supported large runs of anadromous salmonids, including summer steelhead (*Oncorhynchus mykiss*), fall and spring chinook salmon (*O. tshawytscha*) and coho salmon (*O. kisutch*). The runs of chinook and coho salmon were essentially eliminated in the early 1900's. The losses have generally been attributed to the development of hydroelectric dams and to forestry, agriculture and irrigation practices. The single indigenous naturally spawning anadromous stock left in the Umatilla River Basin is a run of approximately 1,000 to 3,000 summer steelhead (Figure 1). This steelhead run was supplemented with stocks from Washington (Skamania) and Idaho (Oxbow) from 1967 through 1970 (Table 1). Fish of Umatilla River origin were used in 1975 and from 1981 to the present. Run composition has varied from 6.7% hatchery fish in 1987-88 (the first season that fin-clipped fish were differentiated), to 34.8% in the 1990-91 season. The natural run in 1990-91 however, was one of the lowest on record. Returns of hatchery steelhead have ranged from 166 adults in 1987-88 to 616 adults in 1992-93 (Figure 1). Runs of coho and chinook salmon have been rebuilt using various stocks (Tables 2, 3 and 4).

A comprehensive plan developed by the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) and Oregon Department of Fish and Wildlife (ODFW) was implemented to enhance steelhead and re-establish salmon runs in the Umatilla River Basin. Among the initial steps in the plan was construction of two acclimation facilities (Bonifer Pond and Minthorn Springs) on the Umatilla Indian Reservation. Both facilities were constructed and are operated under the Fish and Wildlife Program of the Northwest Power Planning Council, and are funded by Bonneville Power Administration (BPA).

### Facility Descriptions and Operations

The Bonifer Pond Facility (Bonifer) is located adjacent to Meacham Creek at rivermile (RM) 2 (Figure 2). The pond spills into Boston Canyon Creek which flows approximately 20 yards before entering Meacham Creek. Meacham Creek flows into the Umatilla River at RM 79. The facility consists of a 1.75-acre earthen pond and concrete outlet water control structure which also functions as a fish trap. The pond holds approximately 4.5 acre-feet of water and is fed by three springs that originate from 1/8 to 1/2 mile away. Operations began in 1984.

The Minthorn Springs Facility (Minthorn) is located approximately four miles east of Mission, Oregon (Figure 2). The facility is located on Minthorn Springs Creek which is formed from the inflow of several springheads located immediately south of the Umatilla River. The creek is approximately one mile long, with the facility located near the mouth at Umatilla RM 63.8. The facility includes two concrete raceways (120 x 12 feet), pump station, and concrete water control structure which also functions as a fish trap and summer steelhead broodstock holding area. Water through the brood holding area is supplied by

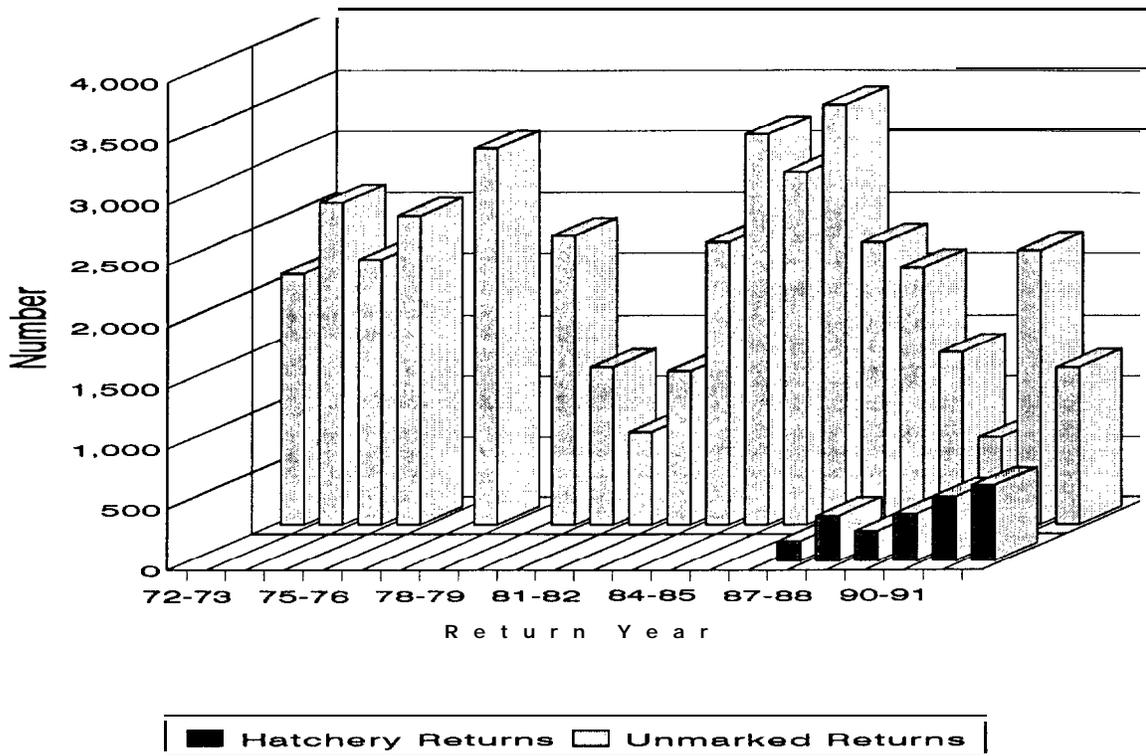


Figure. 1 Returns of wild and hatchery summer steelhead to Three Mile Dam on the Umatilla River, 1972-1993 (Return numbers from the fall of 1972 to the spring of 1987 are estimates, while return numbers beginning in the fall of 1987 are from actual counts).

Table 1. Hatchery releases of summer steelhead in the Umatilla River.

Year of Release	Hatchery	No. Released	No./lb.	Stock
1967	Gnat Creek	109,805	75.0	Skamania
1967	Oak Springs	238,020	117.0	Idaho (Oxbow)
1967	<b>Wallowa</b>	142,240	240.0	Idaho ( <b>Oxbow</b> )
1968	Gnat Creek	23,100	66.0	Skamania
1968	Gnat Creek	150,000	<b>Eggs</b>	Skamania
1969	Oak Springs	174,341	145.0	Skamania
1970	Carson	23,400	9.0	Skamania
1970	Carson	16,089	8.0	Skamania
1975	Wizard Falls	11,094	9.0	Umatilla River
1981	Oak Springs	17,558	6.0-9.0	Umatilla River
1981	Oak Springs	9,400	145.0	Umatilla River
1982	Oak Springs	59,494	7.0-8.0	Umatilla River
1982	Oak Springs	67,940	124.0	Umatilla River
1983	Oak Springs	60,500	11.0	Umatilla River
1983	Oak Springs	52,700	62.0	Umatilla River
1984	Oak Springs	57,939	6.5	Umatilla River
1984	Oak Springs	22,000	135.0	Umatilla River
1985	Oak Springs	53,850	7.0	Umatilla River
1985	Oak Springs	39,134	150.0	Umatilla River
1986	Oak Springs	54,137	8.4	Umatilla River
1987	Oak Springs	1,485	5.5	Umatilla River
1988	Oak Springs	95,290	<b>6.5-10.3</b>	Umatilla River
1988	Oak Springs	10,033	57.5	Umatilla River
1988	Irrigon	24,618	3200.0	Umatilla River
1989	Oak Springs	29,852	6.6	Umatilla River
1989	Oak Springs	29,586	5.6	Umatilla River
1989	Oak Springs	22,274	5.5	Umatilla River
1990	Oak Springs	29,522	7.7	Umatilla River
1990	Oak Springs	30,225	5.9	Umatilla River
1990	Oak Springs	29,446	5.5	Umatilla River
1991	Oak Springs	30,221	6.2	Umatilla River
1991	Oak Springs	29,325	8.7	Umatilla River
1991	Oak Springs	12,389	7.5	Umatilla River
1991	Oak Springs	3,998	12.5	Umatilla River
1992	Umatilla	19,977	5.8	Umatilla River
1992	Umatilla	47,458	5.8	Umatilla River
1992	Umatilla	64,550	5.0	Umatilla River
1992	Umatilla	67,419	5.5	Umatilla River
1992	Umatilla	5,443	5.8	Umatilla River
1993	Umatilla	44,824	4.5	Umatilla River
1993	Umatilla	47,979	5.6	Umatilla River
1993	Umatilla	65,465	6.1	Umatilla River

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Table 2. Hatchery releases of fall chinook salmon in the Umatilla River.

Year Of Release	Hatchery	No. Released	No./lb.	stock
1982	Bonneville	978,335	79.0	Tule
1982	Bonneville	2,828,835	92.0	Tule
1983	Bonneville	100,564	6.9	Bonneville URB
1984	Bonneville	228,412	8.6	Bonneville URB
1984	Bonneville	966,250	86.1	Bonneville URB
1986	Bonneville	3,223,172	92.3	Bonneville URB
1986	Bonneville	198,162	7.8	Bonneville URB
1985	Bonneville	61,000	16.2	Bonneville URB
1986	Irrigon	91,036	6.0	Bonneville URB
1986	Irrigon	116,779	4.7	Bonneville URB
1986	Irrigon	2,029,602	86.0	Bonneville URB
1986	Irrigon	36,574	11.6	Bonneville URB
1987	Irrigon	1,476,830	60.4	Priest Rapids URB
1987	Bonneville	109,143	8.1	Bonneville URB
1987	Bonneville	102,363	8.6	Bonneville URB
1987	Irrigon	2,000	20.0	Priest Rapids URB
1988	Irrigon	1,886,757	68.3	Priest Rapids URB
1988	Irrigon	1,429,250	93.1	Bonneville URB
1988	Irrigon	14,408	9.8	Priest Rapids URB
1988	Irrigon	79,681	8.6	Priest Rapids URB
1988	Bonneville	99,550	10.2	Bonneville URB
1988	Bonneville	100,791	8.8	Bonneville URB
1989	Bonneville	217,443	8.6	Bonneville URB
1989	Irrigon	2,393,710	66.6	Priest Rapids URB
1989	Irrigon	156,967	10.9-l 1.1	Priest Rapids URB
1990	Bonneville	255,614	8.2	Bonneville URB
1990	Bonneville	2,425,681	87.5	Bonneville URB
1990	Irrigon	629,800	82.4	Priest Rapids URB
1990	Irrigon	71864	9.2	Bonneville URB
1990	Irrigon	76,646	8.8	Bonneville URB
1991	Bonneville	194,847	7.8	Upriver Brights
1991	Irrigon	3,091,214	81.8	Upriver Brights
1991	Irrigon	2,774	194.0	Upriver Brights
1991	Irrigon	7,688	80.0	Upriver Brights
1991	Irrigon	79,672	80.6	Upriver Brights
1991	Irrigon	74,865	86.0	Upriver Brights
1992	Bonneville	122,639	7.7	Upriver Brights
1992	Bonneville	97,801	7.6	Upriver Brights
1992	Umatilla	2,678,343	55.2-70.6	Upriver Brights
1992	Umatilla	2,670	112.0	Upriver Brights
1992	Irrigon	604,389	53.4	Umatilla River
1992	Irrigon	6,167	62.8	Umatilla River
1993	Bonneville	134,837	9.1	Upriver Brights
1993	Umatilla	2,629,917	62.7	Upriver Brights /a
1993	Umatilla	29,681	96.6-l 42.0	Upriver Brights /a

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/a Bonneville and Umatilla River stock .

Table 3. Hatchery releases of spring chinook salmon in the Umatilla River.

Year of Release	Hatchery	No. Released	No./lb.	Stock
1986	Carson	99,970	22.8	Carson
1986	Irrigon	300,438	87.0	Carson
1986	Irrigon	75,000	15.0	Carson
1987	Carson	99,897	10.4	Carson
1987	oxbow	169,100	199.0	Carson
1988	Bonneville	1,196	21.4	Carson
1988	Carson	99,895	20.5	Carson
1988	Bonneville	297,377	<b>8.3</b> – 10.3	Carson
1988	Bonneville	75,767	11.1	Carson
1989	Bonneville	160,917	10.6	Carson
1989	Bonneville	164,603	12.0	Carson
1990	Carson	99,775	18.6	Carson
1990	Bonneville	231,772	9.0-9.6	Carson
1990	Bonneville	80,438	11.5	Carson
1990	Bonneville	77,998	13.4	Carson
1991	Carson	90,796	20.6	Carson
1991	Carson	5,937	16.9	Carson
1991	Bonneville	100,505	10.1	Carson /a
1991	Bonneville	96,152	11.8	Carson /a
1991	Bonneville	81,144	16.5	Carson
1991	Bonneville	78,480	16.8	Carson
1992	Carson	90,982	18.7	Carson
1992	Carson	5,272	18.7	Carson
1992	Bonneville	109,101	9.2	Carson /a
1992	Bonneville	98,928	8.5	Carson /a
1992	Umatilla	955,752	35.4	Carson
1992	Irrigon	294,458	32.5	Carson
1992	Bonneville	132,929	11.5	Carson
1992	Umatilla	101,416	19.4	Carson
1993	Bonneville	186,948	14.5	Carson
1993	Umatilla	208,782	8.3	Carson
1993	Carson	85,134	20.3	Carson
1993	Carson	10,952	20.0-20.5	Carson
1993	Umatilla	667,367	27.6	Carson
1993	Umatilla	460,809	19.9	Carson

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/a Carson via Lookingglass stock.

Table 4. Hatchery releases of coho salmon in the Umatilla River.

Year of Release	Hatchery	No. Released	No./lb.	Stock
1966	Little White Salmon	500,000	1312.0	Little White Salmon
1967	Little White Salmon	200,000	1087.0	Little White Salmon
1967	Cascade	<b>500,000</b>	<b>Eggs</b>	Tanner Creek
1968	Little White Salmon	750,000	<b>Eggs</b>	Little White Salmon
1969	Carson	200,040	23.0	Little White Salmon
1987	Cascade	948,549	13.5-14.0	Tanner Creek
1988	Cascade	996,433	16.6	Tanner Creek
1989	Cascade	753,637	17.6	Tanner Creek
1989	Cascade	233,269	17.2 - 19.1	Tanner Creek
1990	Cascade	796,842	14.7	Tanner Creek
1990	Cascade	192,086	11.2-13.5	Tanner Creek
1991	Cascade	152,974	15.4	Tanner Creek
1991	Cascade	228,293	16.5	Tanner Creek
1991	Cascade	221,385	16.6	Tanner Creek
1991	Cascade	143,054	16.4	Tanner Creek
1991	Cascade	209,923	17.1	Tanner Creek
1992	Cascade	489,165	15.7	Tanner Creek
1992	Cascade	472,221	15.5	Tanner Creek
1993	Cascade	437,884	17.5	Tanner Creek
1993	Cascade	454,794	17.6	Tanner Creek

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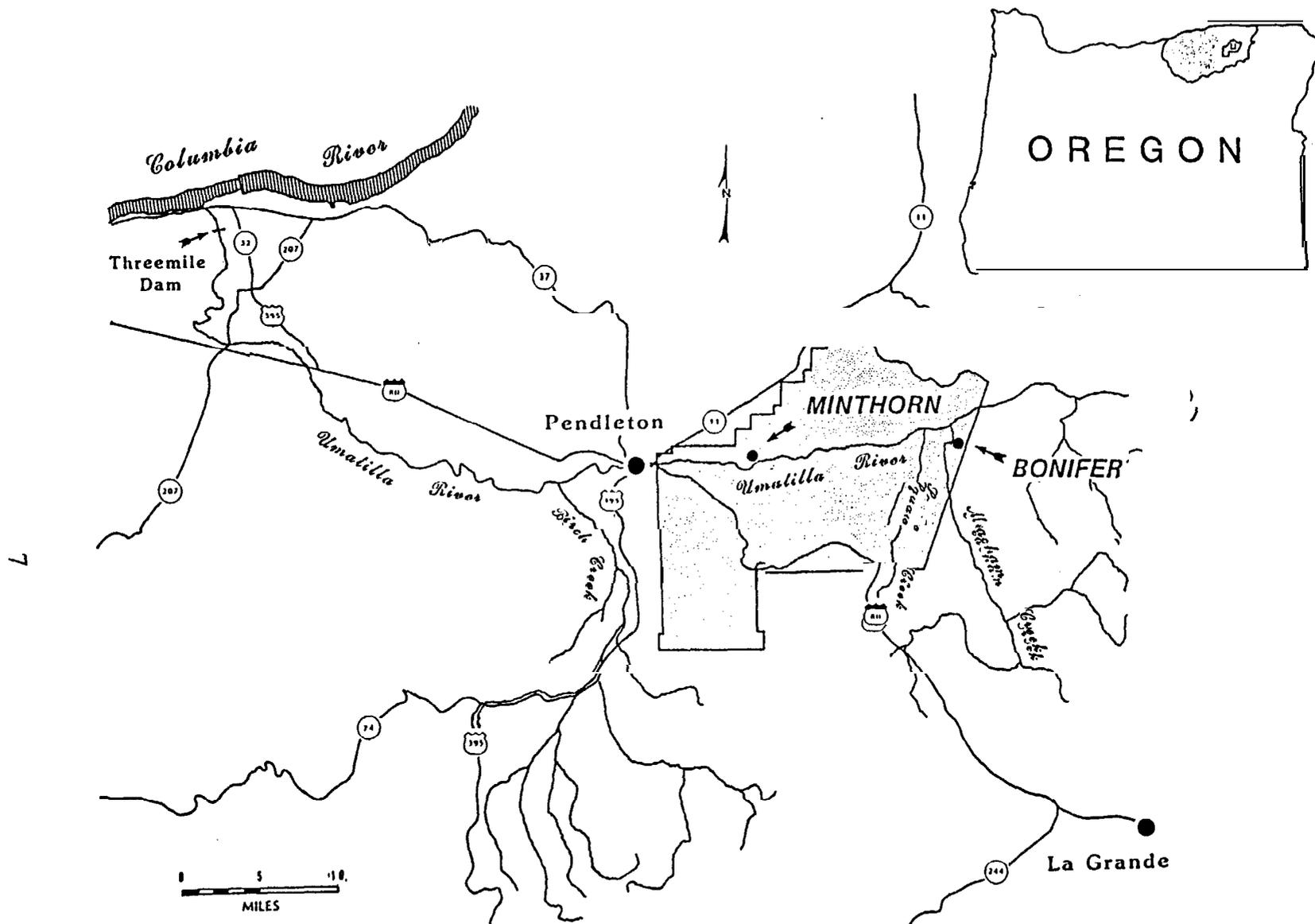


Figure 2. Confederated Tribes of the Umatilla Indian Reservation and Bonifer and Minthorn Acclimation Facilities.

gravity. Water supply to the raceways is pumped from the creek. Water depth is usually held at three feet with a single-pass water pumping rate of 800 gallons per minute through each raceway. Two valves control the effluent water to allow for either recycling of flows into the intake pond or discharge downstream of the intake and adult holding area. Minthorn was completed in 1985 and first operated in 1986.

The Bonifer and Minthorn acclimation facilities are operated by CTUIR in cooperation with ODFW. The facilities are used for holding and spawning summer steelhead, fall chinook and coho salmon and for acclimation and release of juvenile chinook and coho salmon and summer steelhead. The main goal of acclimation is to reduce stress from trucking prior to release and improve imprinting of juvenile salmonids in the Umatilla River. Juveniles are transported to the acclimation facilities primarily from Umatilla and Bonneville Hatcheries. This report details activities associated with operation, maintenance and evaluation of the Bonifer and Minthorn Acclimation Facilities in 1993.

### **Project Objectives**

The following specific project objectives for 1993 are part of overall objectives to operate, maintain and evaluate Bonifer and Minthorn acclimation facilities:

1. Acclimate and release groups of coded-wire tagged juvenile summer steelhead.
2. Monitor temperature, dissolved oxygen and flows daily during acclimation periods.
3. Monitor physical data and health of juveniles prior to release.
4. Operate, maintain and repair all equipment, buildings and grounds.
5. Monitor physical data of juveniles at downstream migrant traps and compare this data to data taken at release to give an indication of outmigration timing and size.
6. Collect a spectrum of the run of adult summer steelhead returning to the trap at Three Mile Dam and transport them to holding facilities.
7. Collect fall chinook salmon returning to the trap at Three Mile Dam and transport them to holding facilities.
8. Spawn summer steelhead and provide eggs to ODFW for rearing and later release in the Umatilla River.

9. Spawn fall chinook salmon and provide eggs to ODFW for rearing and later release in the Umatilla River.
10. Monitor adult mortality and fish spawned for physical data and disease analysis.
11. Collect data and snouts from coded-wire tagged fish and send the snouts to ODFW for tag retrieval and decoding.
12. Access coded-wire tag recovery information from the Pacific States Marine Fisheries Commission and other appropriate sources and determine the contribution of Umatilla River releases to the ocean, Columbia River and Umatilla River fisheries and survival to adulthood of all tagged groups of acclimated and control fish.

## MATERIALS AND METHODS

### Collection, Holding and Spawning of Summer Steelhead

Summer steelhead were collected for broodstock through the cooperative efforts of CTUIR and ODFW. Fish were collected in the adult trap at Three Mile Dam, located approximately four miles upstream from the mouth of the Umatilla River, during the period November 23, 1992 through May 11, 1993. The fish were transported to Minthorn by CTUIR and ODFW Trap and Haul personnel using 370 or 3,000 gallon fish liberation units.

To help maintain the genetic integrity of the hatchery population, the first priority for broodstock was to collect unmarked fish at a male to female ratio of 1:1 and at a rate of 10% of the total unmarked run by month. Due to a low run of unmarked steelhead through February, coded-wire tagged hatchery fish (adipose and left ventral clipped) were also collected beginning March 5 to insure meeting the broodstock goal of 130 adults (283,000 eggs). The collection rate for coded-wire tagged fish was 50% of the total coded-wire tagged run by month and at a male to female ratio of 1:1. A strong showing of unmarked steelhead in March and early April lessened the need to collect hatchery fish and only one hatchery female was collected after April 2.

Adults were differentially marked during each month in which they were collected. A single hole paper punch was used to punch one, two or three holes in either the right or left opercle of the fish. Fish collected in May were given a single punch on both sides of the fish.

Beginning in early February, 1993, broodstock were treated twice per week with formalin (Paracide-F, Argent Chemical Laboratories) at 1:6,000 for one hour to help control fungus. After spawning began, treatments were increased to three times per week through the end of the spawning season.

Beginning on March 30, 1993, broodstock were sorted weekly to determine maturation. Ripe fish were spawned by Umatilla Hatchery and CTUIR personnel using standard hatchery practices. A 3 x 3 spawning matrix was utilized whenever possible. Eggs from each family group were water hardened in iodophor (Argentyne, Argent Chemical Laboratories) at 75 ppm and transferred to Umatilla Hatchery for incubation, rearing and later release into the Umatilla River.

Fork and MEHP lengths were taken on spawned and sacrificed fish and prespawn mortalities. MEHP length was defined as the distance from the middle of the eye to the end of the hypural plate. Fin marks and opercle marks were recorded on all fish and snouts were collected from all coded-wire tagged fish. Scale samples were also collected from both hatchery and unmarked fish.

### **Collection, Holding and Spawning of Fall Chinook Salmon**

Fall chinook salmon were also collected at Three Mile Dam and transported to Minthorn for broodstock by Trap and Haul personnel. Fish were collected from October 1 to November 21, 1993, and were transported in a 3,000 gallon, aerated tanker.

The fish were held in the lower raceway which was covered with nylon netting to prevent fish from jumping out. They were treated twice per week with formalin at 1:6,000 for one hour.

From November 4 to November 23, 1993, the fish were sorted and spawned on five occasions by CTUIR and Umatilla Hatchery personnel. A spawning ratio of 1:1 was utilized, but after fertilization, the eggs from four females were pooled to form one family group. The eggs were water hardened in iodophor at 75 ppm and transferred to Umatilla Hatchery for incubation, rearing and later release into the Umatilla River.

After spawning was completed, all remaining fish were sacrificed. Lengths, weights and marks were recorded from all fish. Scale samples were taken and snouts were collected from coded-wire tagged fish.

### **Collection, Holding and Spawning of Coho Salmon**

Collection and spawning of coho salmon was not identified as a project objective in 1993. However, ODFW requested that CTUIR collect coho salmon broodstock from the Umatilla River because of projected egg shortages in the Columbia River basin. Coho salmon were collected at Three Mile Dam and transported to Minthorn for broodstock for the first time. Fish were collected from October 29 to December 17, 1993, and were transported by Trap and Haul personnel using 370 or 3,000 gallon fish liberation units.

The fish were held in the upper raceway which was covered with nylon netting to prevent fish from jumping out. Coho broodstock were treated twice per week with formalin at 1:6,000 for one hour during the last two weeks of spawning.

From November 4 to December 20, 1993, the fish were sorted and spawned on nine occasions by CTUIR and Umatilla and Irrigon Hatchery personnel. A spawning ratio of 1: 1 was utilized during the first six spawns, but after fertilization, the eggs from four females were pooled to form one family group. A shortage of males during the last three spawns necessitated the need to use spawning ratios of one male to two or three females. The eggs were water hardened in iodophor at 75 ppm and transferred to Umatilla and Irrigon Hatcheries for eyeing. The eggs were then transferred to Cascade Hatchery for final incubation, rearing and later release into the Umatilla River.

After spawning was completed, all remaining fish were sacrificed. Lengths and marks were recorded on all fish and snouts were collected from coded-wire tagged fish.

### **Disease Sampling of Summer Steelhead Broodstock**

All spawned adult steelhead were sampled for the presence of selected pathogens by ODFW Northeast Oregon Fish Pathology Laboratory (NOFPL) in La Grande for monitoring and evaluation purposes as part of the Fish Health Monitoring Program for BPA. All 98 spawned fish were sampled for replicating viral agents. The reproductive fluid (ovarian fluid from females or milt from males), pyloric caeca, kidney and spleen were sampled for infectious hematopoietic necrosis virus (IHNV) and infectious pancreatic necrosis virus (IPNV). Kidney smears from all spawned fish were also sampled for bacterial kidney disease (BKD).

Six steelhead that died during holding were frozen and subsequently sampled. Kidney smears were taken to test for BKD and samples of the lower intestine were examined for Ceratomyxa Shasta.

### **Disease Sampling of Fall Chinook Salmon Broodstock**

All 174 spawned fall chinook salmon were sampled for IHNV and IPNV. Kidney smears from all spawned fish were also sampled for BKD and 158 blood samples were taken to examine for erythrocytic inclusion body syndrome (EIBS).

### **Disease Sampling of Coho Salmon Broodstock**

Two hundred three spawned coho salmon were sampled for IHNV and IPNV. Samples for BKD and EIBS were not taken.

### **Adult Returns to Minthorn**

An adult V-trap was placed in the outlet water control structure at Minthorn in October, 1992, and was in operation through May, 1993. The trap was monitored daily and all adult returns were removed and marks and sex were recorded. The fish were then released back into Minthorn Springs Creek.

### **Adult Returns to Bonifer**

An adult V-trap was placed in the outlet water control structure at Bonifer in October, 1992, and was in operation through June, 1993. The trap was monitored daily and all adult returns were removed and marks and sex were recorded. The fish were then released into Meacham Creek adjacent to the facility.

### **Acclimation and Release of Juvenile Salmonids**

Juvenile summer steelhead were transported from Umatilla Hatchery to the acclimation facilities using 3,000 and 5,000 gallon fish liberation trucks. The fish were fed

3.0 mm Biomoist Feed (Bioproducts Inc., Warrenton, Oregon) twice each day at a rate of approximately 1% body weight per day (BWD). Mortalities were removed daily at both facilities. Transfer mortality was defined as all fish that died within five days of the last transfer date. ODFW pathology personnel were available to address specific disease problems.

The total number of fish at release was estimated using ODFW Fish Liberation Reports and acclimation mortality records. The number of fish reported as tagged was estimated using ODFW Coded-Wire Tagging Operation Summaries, ODFW hatchery and acclimation mortality records and tag retention sampling prior to release.

Using standard hatchery techniques, ODFW personnel sampled the fish prior to release for weight, length frequency, and descaling. Partial descaling was defined as loss of greater than 3.0% and less than 16.0% of the scales on at least one side of the fish. Severe descaling was defined as loss of greater than 16.0% of the scales on at least one side.

Temperature and D.O. measurements taken at the facilities during acclimation are reported in association with each particular acclimation. Temperatures were recorded hourly by automatic digital temperature recorders (Ryan TempMentors). Dissolved oxygen measurements were taken with a Hach portable D.O. meter.

### **Outmigration Monitoring**

Juvenile salmonids were collected at the Westland Canal trapping facility (RM 27) from June 14 to July 29, 1993. The trap is approximately 36 and 54 rivermiles downstream from Minthorn and Bonifer, respectively, and is operated by CTUIR and ODFW Trap and Haul personnel.

Juveniles were hauled to the mouth of the Umatilla River on 23 days during this period. The fish were loaded by dip net into 370 gallon fish liberation units and total pounds loaded was estimated by water displacement. On five occasions, weight samples were taken using standard hatchery practices to estimate the average size of the fish. The number of fish loaded was then calculated by multiplying the number of fish per pound by the number of pounds loaded. Species and fin marks were recorded on all fish sampled and lengths were recorded on a portion of them. Unclipped juvenile chinook salmon were passed through a tag detector to try and distinguish naturally produced juveniles from unmarked, body tagged hatchery fish.

### **Acclimation Research**

A research program was initiated in 1987. Control (non-acclimated) groups were released instream concurrent with test (acclimated) groups to determine the effects of acclimating juvenile salmon and summer steelhead prior to release in the Umatilla River

Basin. The last experiment was conducted in 1992 and adults from these releases are expected to return to the Umatilla River through 1995.

Snouts and associated biological data from coded-wire tagged adult salmonids were collected at Three Mile Dam and Minthorn. Snouts were also collected from Umatilla River creel and spawning ground surveys conducted through other CTUIR programs. Snouts were sent to ODFW for tag removal and decoding.

### **Adult Survival and Umatilla River Returns**

Data was accessed to compile adult survival and return information for all groups of coded-wire tagged fish released in the Umatilla River. Coded-wire tagged recoveries from 1983 through 1993 were retrieved from the Pacific States Marine Fisheries Commission (Ken Johnson, Regional Mark Processing Center). Additional Oregon and Washington freshwater recoveries from 1993 were obtained from ODFW (Charlie Corrarino) and the Washington Department of Fisheries (Susan Markey). Some data are incomplete and should be considered as such. All fish reported are included in this report. When no expanded coded-wire tagged recovery number was available, the observed number was used.

Expanded estimates of all recoveries in the ocean, Columbia River and Umatilla River are calculated. All age groups are used in the expansion estimates. However, subjacks were not included in estimates of fall chinook straying. In instances where untagged fish were not treated the same as tagged fish (e.g. untagged fish were reared at a different hatchery or were released at a different age than the tagged fish), these fish were not used in calculating expansions. Detailed information on recoveries is presented in Appendices A, B, C and D.

Exploitation rates were calculated for all representative release groups. Total exploitation rate is defined as all harvest and is divided into ocean commercial, Columbia River gillnet, ocean and freshwater sport, and ceremonial and subsistence treaty catches. Individual exploitation rates are calculated as a percent of the total exploitation rate.

## RESULTS AND DISCUSSION

### Facility Maintenance

Repair and maintenance were performed at both Bonifer and Minthorn in 1993. Routine maintenance work consisted mostly of weed abatement and maintenance of the electric fence at Bonifer.

### Collection, Holding and Spawning of Summer Steelhead

Ninety-one hatchery and 125 unmarked steelhead were collected for broodstock at Three Mile Dam and transported to Minthorn. Broodstock collected by month and associated opercle marks are listed in Appendix E. Coded-wire tagged hatchery fish were collected during part of the run to ensure meeting the broodstock goal of 130 adults, but due to a strong showing of unmarked fish in late March and early April, only three hatchery steelhead were spawned (Appendix F). All other hatchery fish were sacrificed for coded-wire tag recovery. Ten unmarked female and 4 unmarked male broodstock were not spawned.

A total of 49 females (47 unmarked and two hatchery) and 49 males (48 unmarked and one hatchery) were spawned (Table 5 and Appendix F). A 3 x 3 spawning matrix was utilized whenever possible and a total of 255,441 eggs were taken with a mean fecundity of 5,213.

Unmarked broodstock were selected throughout the run to provide a representative cross-section of the population (Figure 3). The percentage of fish that were trapped each month at Three Mile Dam that were eventually spawned is shown in Table 5 and Figure 4. The percentage of females spawned ranged from 66.7% for fish collected in April to 100.0% for fish collected in November, December, February and May. During November, December and May, only one female was collected each month. The percentage of males spawned ranged from 50.0% for fish collected in February to 100.0% for fish collected in November, December, and May, but only one male was collected in each of these months.

The percentage of fish collected each month that were spawned on individual spawn days is also shown in Table 5. Since there were only two females and two males collected for broodstock from November through January, it is difficult to determine whether there was a relationship between return timing and spawn timing. For fish collected from February through May, there did not seem to be a distinct correlation. Fish collected in February were spawned throughout the entire spawning season, fish collected in March were spawned on all but the initial spawn day and fish collected in April were spawned on all but the first two spawn days.

Total prespawn mortality of unmarked brood during the adult holding period was 8.8% (Table 5). In comparison, prespawn mortality at Minthorn has ranged from 7.6% in

Table 5. Summer steelhead broodstock collection, spawning and mortality in 1992-93. /a

Month Collected	No. of Unmarked Females Collected	Number of females spawned and eggs taken on individual spawn days										Total			Mortality							
		March 30		April 7		April 14		April 21		April 28		May 6		May 12		May 19		No.	%	Eggs	No.	%
		No.	Eggs	No.	Eggs	No.	Eggs	No.	Eggs	No.	Eggs	No.	Eggs	No.	Eggs							
November	1			1														1	100.0		0	0.0
December	1					1												1	100.0		0	0.0
January	/b																					
February	9	1		1		1		1		1				2		2		9	100.0		0	0.0
March	25 /d			2		4		3				4		4		2		19	76.0		1	4.0
April	24 /d					1		1		2		2		7		3		16 /c	66.7		2	8.3
May	1													1				1	100.0		0	0.0
Total	61	1	11,390	4	22,392	7	35,742	5	27,030	3	15,331	6	38,143	14	72,209	7	33,204	47	77.0	255,441	3	4.9

Month Collected	No. of Unmarked Males Collected	Number of males spawned on individual spawn days									Total		Mortality			
		March 30	April 7	April 14	April 21	April 28	May 6	May 12	May 19	No.	%	No.	%			
		November	1			1								1	100.0	0
December	1		1									1	100.0	0	0.0	
January	/b															
February	8 /g	1				1				1		1	4	50.0	2	25.0
March	27 /g		3	4	3	1	3	5	2			21 /e	77.8	3	11.1	
April	26			2	2	1	3	8	4			20 /f	76.9	3	11.5	
May	1									1		1	100.0	0	0.0	
Total	64	1	4	7	5	3	6	15	7			48	75.0	8	12.5	

Revised: 2/19/94

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/a All broodstock were collected at Three Mile Dam and transported to Minthorn Acclimation Facility.

The data does not include one hatchery male (collected in March and spawned on March 30) and two hatchery females (one collected in March and spawned on March 30 and one collected in May and spawned on May 12).

/b Only 10 unmarked fish were trapped at Three Mile Dam in January and no broodstock were collected.

/c Does not include one green female.

/d Five fish were released back into the Umatilla River after completion of spawning.

/e Does not include one male with bad milt.

/f Does not include three green males.

/g Two fish were released back into the Umatilla River after completion of spawning.

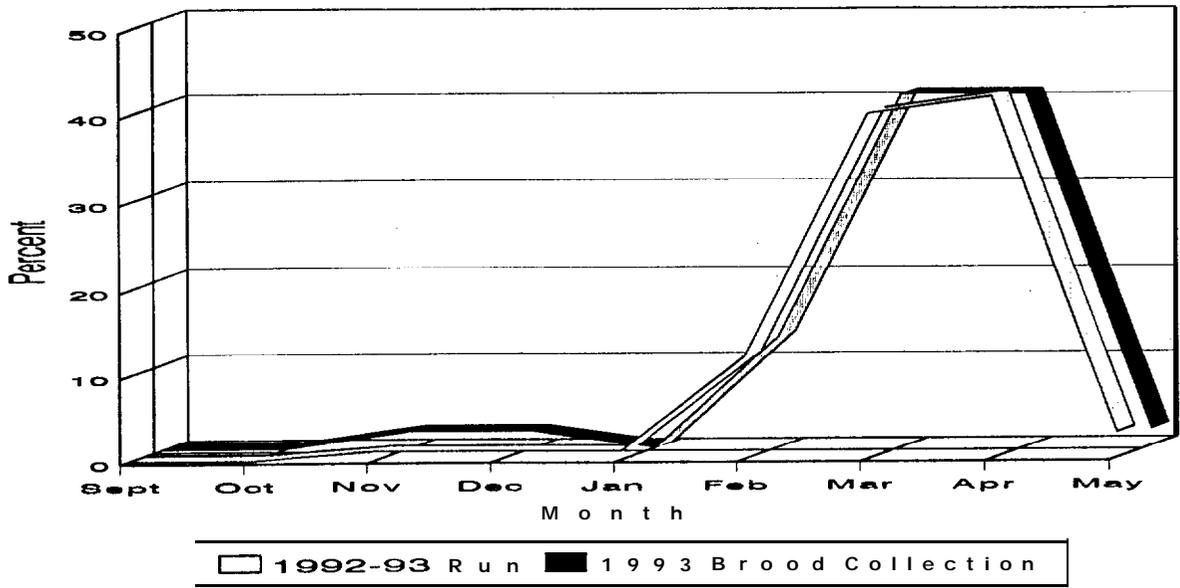


Figure 3. Return timing of summer steelhead to the Umatilla River in 1992-93 and percentage of 1993 summer steelhead broodstock collected by month.

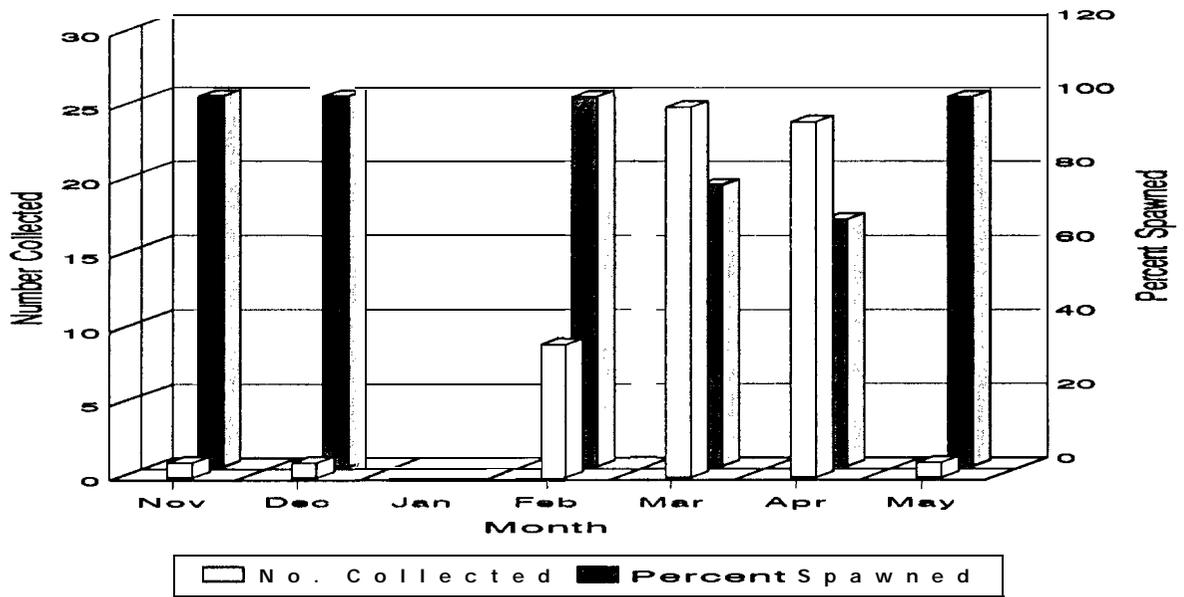


Figure 4. Percentage of unmarked female adult steelhead that were trapped each month at Three Mile Dam and held for broodstock at Minthorn Acclimation Facility that were eventually spawned (1992-93 return year).

1991-92 to 39.0% for previous brood years. Prespawn mortality was higher in males (12.5%) than it was in females (4.9%).

### Collection, Holding and Spawning of Fall Chinook Salmon

A total of 347 fall chinook salmon were captured at Three Mile Dam between October 1 and November 21, 1993 and transported to Minthorn (Table 6). This included 97 females and 250 males.

Total prespawn mortality was 30.3% (Table 6). This included 96 males (38.4%) and nine females (9.3%). This compares to 2.3 and 9.5% total prespawn mortality in 1991 and 1992, respectively. The broodstock holding period was three to four weeks longer in 1993 and this may have contributed to the increased mortality. Sixty-seven of the 96 males (69.8%) died during the last two days of holding. Using a 1:1 spawning ratio, a total of 87 females and 87 males were spawned (Table 6 and Appendix G). The mean fecundity was 4,050 and a total of 352,320 green eggs were taken. Spawning was terminated on November 23 because only one female remained and all remaining fish were sacrificed for snout and data recovery.

**Table 6.** Fall chinook salmon broodstock collection, spawning, and mortality in 1993.

No. Collected <sup>1a</sup>			No. Spawmed				Prespawm Mortality							
Males	Femaks	Total	Males	%	Females	%	Total	%	Males	%	Femaks	%	Total	%
250	97	347	67	<sup>1b</sup> 34.6	67	89.7	174	50.1	96	36.4	0	8.3	105	30.3
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<sup>1a</sup> Broodstock were collected from October 1 to November 21, 1993.  
 One female and 66 males were sacrificed after completion of spawning.  
<sup>1b</sup> Does not include one green male.

### Collection, Holding and Spawning of Coho Salmon

Coho salmon were collected at Three Mile Dam and held and spawned at Minthorn in 1993 for the first time. A total of 324 females and 256 males were collected (Table 7).

Total prespawm mortality was 15.5%. This included 54 males (21.1%) and 36 females (11.1%). A total of 287 females and 181 males were spawned (Table 7 and Appendix H). The mean fecundity was 2,356 and a total of 676,171 green eggs were taken. Spawning was completed on December 20. No females remained and all remaining males were sacrificed for snout and data recovery.

**Table 7.** Coho salmon broodstock collection, spawning, and mortality in 1993.

No. Collected <sup>/a</sup>			No. Spawned							Prespawn Mortality					
Males	Females	Total	Males	%	Females	%	Total	%	Males	%	Females	%	Total	%	
256	324	580	191 <sup>/b</sup>	70.7	287 <sup>/c</sup>	88.6	468	00.7	54	21.1	36	11.1	90	15.5	

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<sup>/a</sup> Broodstock were collected from October 29 to December 17, 1993.

17 males were sacrificed after completion of spawning.

<sup>/b</sup> Does not include two green males and two males with poor quality milt.

<sup>/c</sup> Does not include one overripe female.

### Disease Sampling of Summer Steelhead Broodstock

Cell culture assays for replicating agents, including IHNV and IPNV virus, on all spawned fish were negative (Table 8). Blood smears were taken to test for BKD and all fish had OD<sub>405</sub> readings of 0.047 or less, indicating very low or negative antigen levels.

Six mortalities were sampled. Spores of *C. shasta* were detected at a low level in one fish. The fish were also sampled for BKD and all had OD<sub>405</sub> readings of 0.088 or less, indicating very low or negative antigen levels.

### Disease Sampling of Fall Chinook Salmon Broodstock

Cell culture assays for replicating agents on all spawned fall chinook salmon were also screened and negative (Table 8). Blood smears were taken to test for BKD and all fish had OD<sub>405</sub> readings of 0.371 or less, indicating very low antigen levels. One hundred fifty-eight spawned fish were sampled for EIBS virus and were negative for inclusions.

### Disease Sampling of Coho Salmon Broodstock

Cell culture assays for replicating agents on all spawned coho salmon were negative (Table 8). Samples for BKD and EIBS were not taken.

### Adult Returns to Minthorn

A total of 616 hatchery summer steelhead returned to Three Mile Dam on the Umatilla River in 1992-93 and 454 were released upriver. Five hatchery and one unmarked steelhead were trapped at Minthorn. One other fish was observed in Minthorn Springs Creek just below the facility, but it is unknown whether it was marked or unmarked. Two redds were observed in Minthorn Springs Creek.

Table 8. Results of disease sampling of Umatilla River summer steelhead, fall chinook and coho salmon broodstock in 1993. /a

Species	Test	Incidence	Comments
<u>Summer Steelhead</u>			
Spawned	IHNV	0/98	
	IPNV	0/98	
	BKD	0/98	All fish had low OD405 readings (0.047 or less), indicating low or negative antigen levels
Mortality	BKD	0/6	All fish had low OD405 readings (0.088 or less), indicating low or negative antigen levels
	<u>Ceratomyxa shasta</u>	1/6	Low level of infection
<u>Fall Chinook</u>			
Spawned	IHNV	0/174	
	IPNV	0/174	
	EIBS	0/158	
	BKD	0/174	All fish had low OD405 readings (0.371 or less), indicating low or negative antigen levels
<u>Coho</u>			
Spawned	IHNV	0/203	
	IPNV	0/203	

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/a Data provided by ODFW Eastern Oregon Fish Pathology Laboratory.  
All broodstock were held and spawned at Minthorn Acclimation Facility.

### Adult Returns to Bonifer

Five hatchery summer steelhead were trapped at Bonifer. One other fish was observed in the outlet channel below the trap, but its origin is unknown. Throughout April and May, several fish were observed at the mouth of Boston Canyon Creek and in Boston Canyon Creek just below the channel.

## **Acclimation and Release of Juvenile Salmonids**

Fall chinook salmon have been released in the Umatilla River every year since 1982 and from acclimation facilities from 1983 to 1991 (Table 9). In 1982, this release was from Spring Creek tule stock (Table 2). Since then, all releases have been of upriver bright stock. Spring chinook salmon from Carson stock have been released since 1986 and from acclimation facilities from 1986 to 1992 (Tables 3 and 9). Summer steelhead of Skamania and Oxbow stocks were released from 1967 through 1970 (Table 1). In 1975, one release of Umatilla stock steelhead occurred and fish releases every year since 1981 have been from this stock. Summer steelhead have been released from acclimation facilities since 1984 (Table 10). Coho salmon have been released since 1987, and a portion have been acclimated when facilities and fish were available (Tables 4 and 10).

Three groups of acclimated summer steelhead (158,268 fish) were among the 5,465,373 salmon and steelhead released into the Umatilla River in 1993 (Table 11). No releases of non-acclimated summer steelhead occurred in 1993. No chinook or coho salmon were acclimated in 1993.

### **Acclimation at Minthorn**

#### Summer steelhead

An acclimation study in 1993 with juvenile summer steelhead was not possible. A control group was not available because of evaluations being conducted at Umatilla Hatchery.

A group of 47,979 summer steelhead was acclimated at Minthorn for 18 days and released on April 19, 1993, at 5.6/lb. (Table 11). Included were 29,092 coded-wire tagged fish (Appendix I) and 18,887 adipose clipped only fish. They were fed 0.90% BWD and total mortality was 1.04% (Table 12). Following release, fish congregated at the end of the outlet channel and an estimated 450 fish (89.3% of the total mortality) died as a result of suffocation. The mean temperature and D.O. during acclimation was 8.4 degrees C and 7.6 mg/l, respectively (Table 12).

The length frequency distribution for this group of fish is shown in Figure 5. The average length was 198 mm (Table 13). An estimated 56.0% of the fish were considered partially descaled at release and 3.5% were considered severely descaled (Table 13).

Table 9. Juvenile fall and spring chinook salmon releases in the Umatilla River Basin (1982-1993). [1]

Species	Fall Chinook				Spring Chinook		
	Lower Umatilla	Upper Umatilla	Bonifer	Minthorn	Lower Umatilla	Upper Umatilla	Bonifer
Year							
1962	3,807,171 (sy)[2]	0	0	0	0	0	0
1933	0	80,564 (y)	20,000 (y)	0	0	0	0
1984	966,250 (sy)[3]	175,104 (y)	53,308 (y)	0	0	0	0
1955	3,223,172 (sy)[3]	60,507 (y)	137,655 (y)	0	0	0	0
1966	2,029,602 (sy)[3]	0	51,000 (sy)[4] 115,779 (y)	91,036 (y)	0	300,438 (sy)	99,970 (y)
1967	1,476,830 (sy)[5]	0	102,363 (y)	111,143 (sy)[4] 35,574 (y)	0	169,100 (sy)	99,897 (y)
1988	3,316,007 (sy)[5&7]	79,681 (sy)[8]	99,550 (y)	115,199 (sy)[9]	156,312 (y)[7]	210,496 (y)[9]	107,427 (y)[9]
1989	2,393,710 (sy)	295,575 (y)	0	78,825 (sy)[8]	0	164,786 (y)[9]	160,734 (y)[9]
1990	0	255,614 (y)	0	71,864 (sy)[8]	99,775 (y)	195,425 (y)[9]	194,783 (y)[9]
1931	10,462 [11](sy)	194,847 (y)	0	79,672 (sy)	5,937 [11](y)	265,428 (y)[9]	181,649 (y)[9]
1992	7,837 [11](sy)	3,166,079 (sy)	0	0	5,272 [11](y)	1,674,465 (y)[12]	109,101 (y)
1993	29,631 [14](sy)	2,629,917 (sy)	0	0	10,952 [14](y)	480,864 (y)	0
		134,837 (y)				1,128,176 (y)[12]	

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- [1] y = yearling releases; sy = subyearling releases
- [2] Releases in 1982 were Tule stock; all others have been upriver brights.
- [3] Subyearlings released below Threemile Dam to avoid loss in irrigation diversions.
- [4] Subyearlings acclimated in summer and released as yearlings in fall.
- [5] Released at Steelhead Park near Hermisbn.
- [6] Includes yearling spring and approximately 2,000 subyearling fall releases.
- [7] Released below Westland Dam.
- [8] Released in the fall.
- [9] Includes yearling spring and subyearling fall releases.
- [10] 76,646 were released in the fall.
- [11] Passage evaluation releases at Threemile Dam.
- [12] Includes yearling spring and subyearling spring and fall releases.
- [13] Released at Barnhart (FM 42).
- [14] Passage evaluation releases.

Table 10. Juvenile steelhead and coho salmon releases in the Umatilla River Basin (1981-1993) [1].

Species	Summer Steelhead				Coho		
	Lower Umatilla	Upper Umatilla	Minthorn	Bonifer	Lower Umatilla	Upper Umatilla	Minthorn
Year							
1981	0	17,558 (y) 9,400 (sy)	0	0	0	0	0
1982	0	59,494 (y) 67,940 (sy)	0	0	0	0	0
1983	0	60,500 (y) 52,700 (sy)	0	0	0	0	0
1984	0	0	0	57,939 (y) 22,000 (sy)	0	0	0
1985	0	0	0	53,850 (y) 39,134 (sy)	0	0	0
1986	0	0	0	54,137 (y)	0	0	0
1987	0	1,485 (y)[2]	0	0	786,660 (y)[3]	0	161,889 (y)
1988	33,984 (y)[3]	40,790 [4&5]	30,549 (y)	0	996,433 (y)[3]	0	0
1989	0	29,586 (y)	29,852 (y)	22,274 (y)	0	829,607 (y)	157,299 (y)
1990	0	29,446 (y)	0	59,747 (y)	202,315 (y)	654,209 (y)	132,404 (y)
1991	3,998 [6](y)	29,325 (y)	0	42,610 (y)	0	802,655 (y)	152,974 (y)
1992	5,443 [6](y)	131,969 (y)	47,458 (y)	19,977 (y)	0	96,1386 (y)	0
1993	0	0	47,979 (y)	110,289 (y)	437,884 (y)	454,794 (y)	0

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- [1] y = yearling releases; sy = subyearling releases
- [2] Small release due to IHN & IPN problems in eggs.
- [3] Fish released below Westland Dam.
- [4] Includes both experimental control group and gradeouts from 88 brood year.
- [5] Does not include any unfed fry that were released.
- [6] Passage evaluation releases at Threemile Dam.

Table 11. Juvenile salmon and steelhead releases in the Umatilla River in 1993.

Species	Brood	Stock	Hatchery	Number	#/lb.	Location	In Facility	In River	Fish Mark	# Marked
Fall. Chin.	91	URB	□ ontwilk	134837	0.1	Uma. RM 735	-----	March 18	RV only Ad+CWT+RV	67735 47102
Fall. Chin.	92	URB	Umatilla	2629917	62.7	Uma. AM 73.5	- - - - -	May 2485	RV only Ad+CWT+RV LV only BT only BT + LV No Marks	19 12357 204642 141647 139931 139086 1654
Fall. Chin.	92	URB	Umatilla	5111	98.4	Uma. RM 0	-----	May 7	RV only	5111
Fall. Chin.	92	URB	Umatilla	10793	1175	Uma. RM3	- - - - -	April 7/May 18	RV only	10703
Fall. Chin.	92	URB	Umatilla	2575	95.5	Uma RM 148	- - - - -	May 12/13	RV only	2575
Fall. Chin.	92	URB	Umatilla	<u>11202</u>	142	Uma. RM 27.3	- - - - -	Mar 29/May 20	RV only	11202
Subtohl				2704435						
Spring Chin.	91	Carson	Bonneville	196946	145	Uma. RM 80	-----	March 22/23	RV only Ad+CWT	146075 30973
Spring Chin.	91	Carson	Umatilla	208782	6.3	Uma. RM 80	- - - - -	March 23/24	RV only Ad+CWT	124939 83843
Spring Chin.	91	Carson	Carson	65134	20.3	Uma. RM 89	- - - - -	April 9	RV only Ad+CWT	57205 27539
Spring Chin.	91	Carson	Carson	1626	20	Uma. RM 3	- - - - -	April 29	RV only Ad+CWT	1094 532
Spring Chin	91	Carson	Carson	9326	205	Uma. RM 27.3	- - - - -	April 15/28	RV only Ad+CWT	6276 3050
Spring Chin.	92	Carson	Umatilla	667367	27.6	Uma. RM 80	-----	June 1/2	LV only Ad+CWT	353736 313631
Spring Chin.	92	Carson	Umatilla	<u>460809</u>	19.9	Uma. RM 60	- - - - -	November 17	LV only Ad+CWT	10676.1 352026
Subtotal				16 10092						
Coho	91	TannerCreek	Cascade	437664	175	Uma. RM42	-----	April 5/7	Ad+CWT	55805
Coho	91	TannerCreek	Cascade	<u>454704</u>	17.6	Uma. RM 60	- - - - -	April 7/9	Ad+CWT	26273
Subtotal				892678						
Sum. Sthd.	92	Umatilla R.	Umatilla	44624	Larges 45	Bonifer (RM 2)	March31	April 16	Ad only Ad+CWT+LV	15398 29426
Sum. Sthd.	92	Umatilla R.	Umatilla	47979	Mediums 5.6	Minthorn RM(63)	April 1	April 19	Ad only Ad+CWT+LV	16667 29092
Sum. Sthd.	92	Umatilla R.	Umatilla	<u>65465</u>	Smalls 6.1	Bonifer (RM 2)	April 20	May 13	Ad only Ad+CWT+LV	31031 34434
Subtohl				156269						
TOTAL				<u>5465373</u>						

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Table 12. Food rations, mortalities, temperatures, and D.O. concentrations during acclimation of juvenile summer steelhead at Bonifer and Minthorn Acclimation Facilities in 1993.

Release Location	Release Date	Days Held	Food Fed (%/day)	Mortality			Temperature (C)			D.O. (mg/l)		
				5 Day	Total	%	Min.	Max	Mean	Min.	Max.	Mean
Minthorn	April 19	18	0.90	30	504 /a	1.04	6.1	13.3	8.4	6.2	9.0	7.6
Bonifer	April 18	18	0.78	3	224 /b	0.50	5.7	12.8	8.4	5.4	11.0	7.5
Bonifer	May 23	23	1.13	11	120 /c	0.18	6.8	16.5	10.1	6.0	10.5	8.4

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/a An estimated 450 suffocated at end or outlet channel after release.  
 /b An estimated 200 were left stranded in the pond after release.  
 /c An estimated 1m were left stranded in the pond after release.

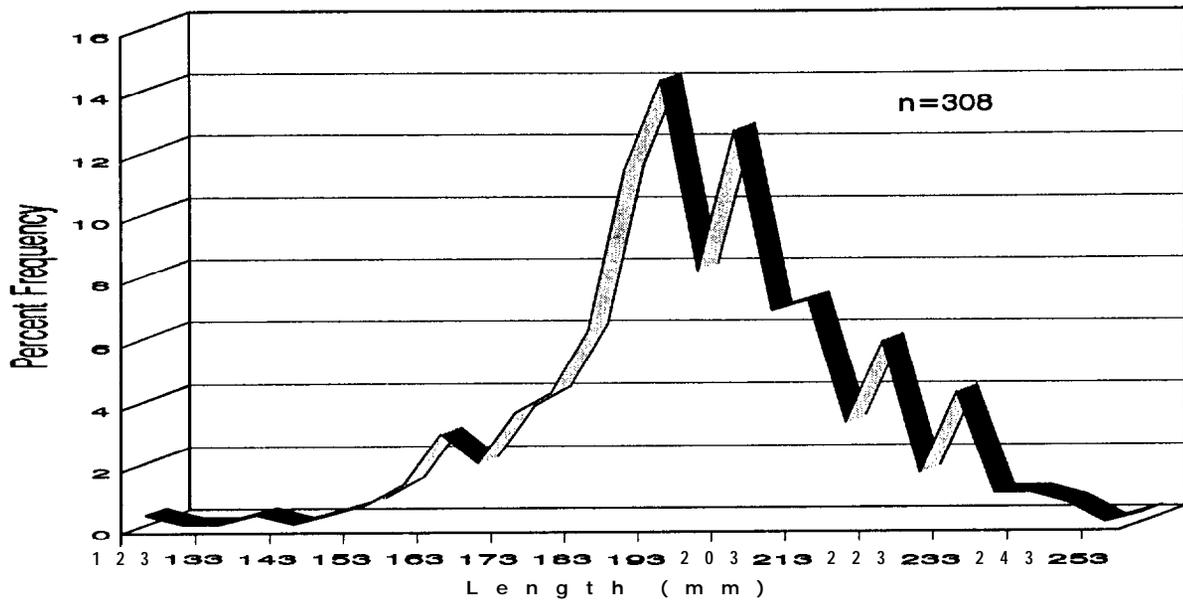


Figure 5. Length frequency distribution of juvenile summer steelhead released at Minthorn Acclimation Facility on 4/19/93.

**Table 13. Size and descaling data for juvenile summer steelhead released in the Umatilla River Basin in 1993.**

Release Location	Release Date	Days Held	No./lb.			Fork Ln. (mm)			Descaling (%)				
			Mean	Std.	n =	Mean	Std.	n =	Total	Partial	None	n =	
Minthorn	April	19	18	5.6	1.9	98	198	20	306	3.5	56.0	40.5	200
Bonifer	April	18	18	4.5	1.2	108	220	18	324	2.0	57.8	40.2	204
Bonifer	May23	23		6.1	2.1	110	200	20	299	8.0	29.7	62.3	199

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## Acclimation at Bonifer

### Summer steelhead

An estimated 44,824 fish at 4.5/lb. were released from Bonifer on April 18, 1993, after being acclimated for 18 days (Table 11). This included 29,426 coded-wire tagged fish (Appendix I) and 15,398 adipose clipped only fish. They were fed 0.78% BWD and total mortality was 0.50% (Table 12). An estimated 200 fish (89.3% of the total mortality) were left stranded in the pond after release. The mean temperature and D.O. was 8.5 degrees C and 7.5 mg/l, respectively (Table 12).

The length frequency distribution of this group, when compared to the group of fish released at Minthorn, is shifted to the right as would be expected due to their larger size at release (Figure 6). The average fork length was 220 mm (Table 13). The descaling index of this group of fish was similar to the group released at Minthorn (Table 13). An estimated 2.0 and 57.8% of the fish were considered severely and partially descaled, respectively.

A second group of summer steelhead (65,465 fish at 6.1/lb.) was released from Bonifer on May 23, 1993, after being acclimated for 23 days (Table 11). Included were an estimated 34,434 coded-wire tagged fish (Appendix I) and 31,031 adipose clipped only fish. They were fed 1.13% BWD and total mortality was 0.18% (Table 12). An estimated 100 fish (83.3% of the total mortality) were left stranded in the pond after release. The mean temperature and D.O. was 10.1 degrees C and 8.4 mg/l, respectively (Table 12).

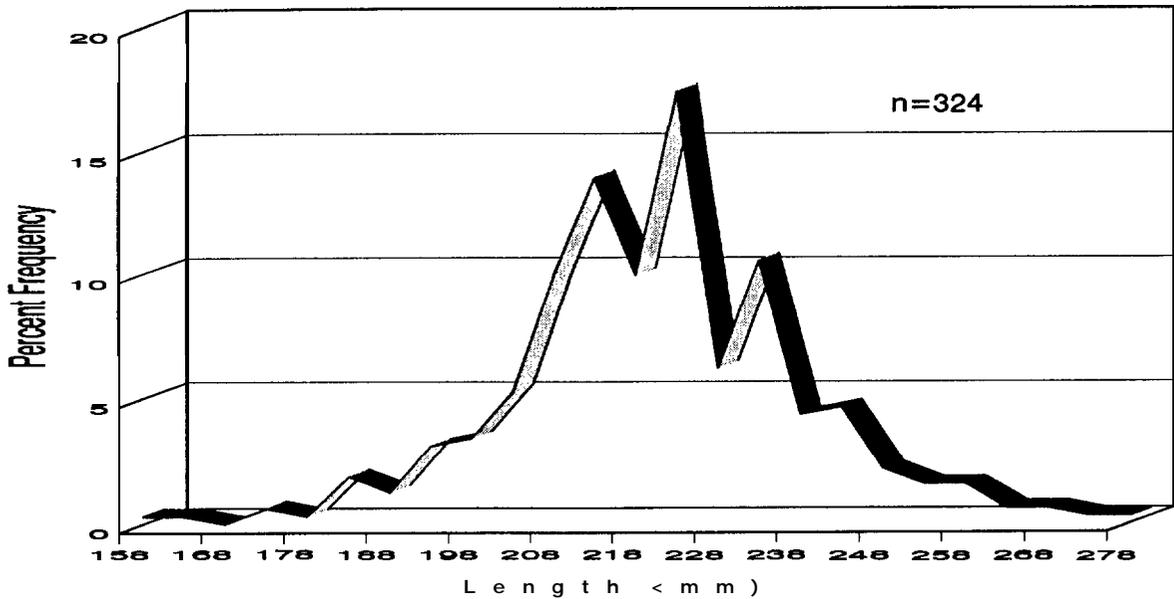


Figure 6. Length frequency distribution of juvenile summer steelhead released at Bonifer Acclimation Facility on 4/18/93.

The length frequency distribution of this group (Figure 7) is similar to that for the group of fish acclimated at Minthorn (Figure 5), despite a lower mean weight at release (6.1 versus 5.6/lb., respectively). The average fork length was 200 mm (Table 13). The percentage of fish with partial descaling (29.7%) was lower than the other two groups, but the percentage of severely descaled fish (8.0%) was higher (Table 13).

#### Direct Stream Releases

Groups of juvenile spring chinook, fall chinook and coho salmon were representively coded-wire tagged and released directly into the Umatilla River in 1993 (Table 11 and Appendices J, K and L, respectively). One group of yearling spring chinook salmon from Carson National Fish Hatchery, one group of yearling fall chinook salmon from Bonneville Hatchery, and three groups of coho salmon from Cascade Hatchery were coded-wire tagged for stock identification, while all other groups were tagged as part of the Umatilla Hatchery Monitoring and Evaluation Program.

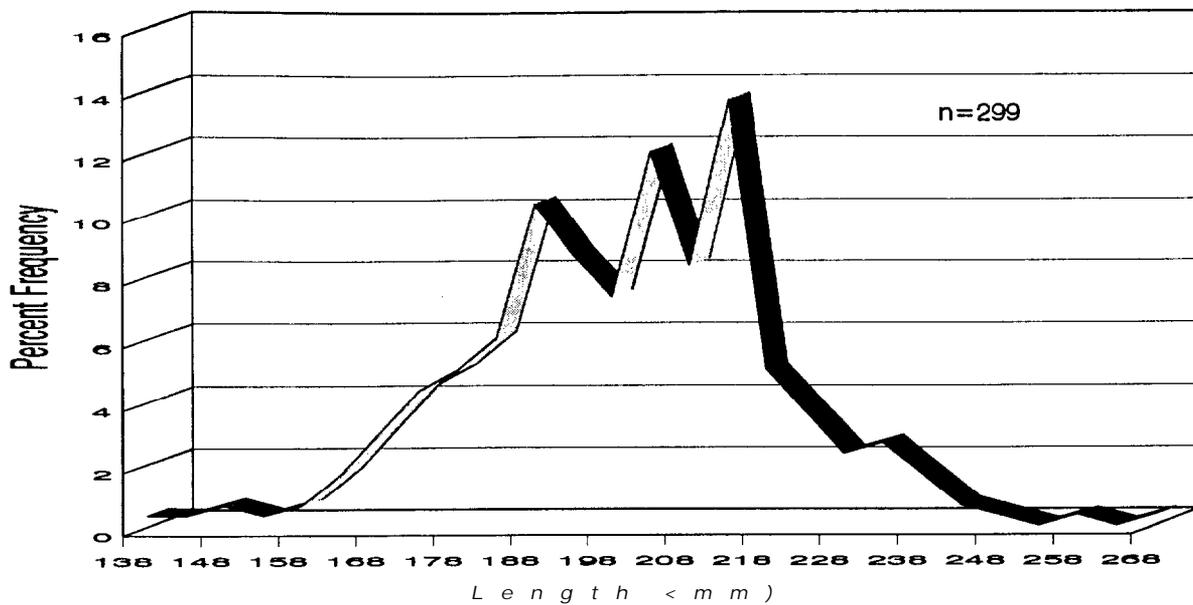


Figure 7. Length frequency distribution of juvenile summer steelhead released at Bonifer Acclimation Facility on 5/23/93.

### Outmigration Monitoring

The Westland Canal facility is operated in the fish bypass mode whenever water flow in the Umatilla River is forecast to exceed 150 cfs at Echo (RM 26) for 10 days (Zimmerman et. al. 1993). If the flow is projected to drop below this level within 10 days, the facility is operated for trapping and hauling. In 1993, high spring flows allowed the facility to operate in the bypass mode until June 14. Fish were then trapped until the close of the facility on July 29. Fish were hauled to the mouth of the Umatilla River on 23 days during this period and the total weight of fish hauled was estimated to be 3,228 lbs. (Table 14). Due to the low number of juvenile salmonids captured, fish were sampled on only five occasions (Appendix M). Species, marks and fork lengths were taken for comparison to release data to give an indication of outmigration timing and size. Naturally produced chinook and coho salmon and summer steelhead were also monitored.

A total of 1,424 fish were sampled. An estimated 85.1% were fall chinook salmon subyearling hatchery releases. Only one spring chinook salmon from a subyearling hatchery release (0.07%) and two hatchery summer steelhead (0.14%) were sampled. No coho or chinook salmon from hatchery yearling releases were sampled. Eight fish (0.56%) were believed to be naturally produced chinook and one fish (0.07%) was a bull trout (*Salvelinus*

Table 14. Estimated number of fish captured at the Westland Canal fish trapping facility in 1993 /a

Date	All Species /b			Salmonids													Total Salmonida	Hatchery Releases Only
				Hatchery Production					Natural Production									
	Lbs.	No./lb.	Number	Coho (Y)	Fall Chinook (Y)	Spring Chinook (Y)	Fall Chinook (SY)	spring Chinook (SY)	STS (Y)	STS (Y)	STS (SY)	Coho (Y)	Coho (SY)	Chinook	Bull Trout			
6/15	165	46.5	7673	0	0	0	7630	21	0	0	0	0	0	21	0	7672	7651	
6/16	166																	
6/17	115																	
6/18	164	38.8	6363	0	0	0	6271	0	0	0	0	0	0	0	18	6289	6271	
6/20	550																	
6/21	513																	
6/22	160	41.2	6592	0	0	0	6545	0	0	0	0	0	0	24	0	6569	6545	
6/23	116																	
6/24	75																	
6/25	94	36.6	3440	0	0	0	3263	0	15	0	0	0	0	59	0	3337	3278	
6/28	165																	
6/30	94																	
7/2	117																	
7/6	70																	
7/8	23																	
7/9	23																	
7/12	47																	
7/14	234	14.9	3487	0	0	0	300	0	17	0	0	0	0	33	0	350	317	
7/16	260																	
7/19	30																	
7/23	23																	
7/26	12																	
7/29	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total/c	3228	27555	0	0	0	24009	21	32	0	0	0	0	0	137	18	24217	24062	

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/a Y = yearling

SY = subyearling

Fish were hauled on 23 days, but sampled on only five days.

/b Includes non-game and warmwater game fish.

/c The fish totals are only for the days the fish were sampled.

confluentus). Two hundred fish (14.0%) were non-game and warm water species. The low number of juveniles trapped indicates the majority of the juveniles migrated volitionally downstream prior to the trap being opened.

## **Acclimation Research**

### Collection of snouts from coded-wire tagged fish

Snouts were collected from three adult and three subjack fall chinook salmon at Three Mile Dam in 1993 and from nine jack and 34 adult broodstock held at Minthorn. Additional snouts from two adults were collected from spawning ground surveys below Three Mile Dam. Snouts were collected from 11 spring chinook salmon jacks and 152 adults at Three Mile Dam and from 355 spring chinook adults and one jack during spawning ground and creel surveys conducted above Three Mile Dam. Snouts from 70 summer steelhead, 77 coho salmon adults and two coho jacks were also collected at Three Mile Dam. Sixteen snouts from adult coho were collected on spawning ground surveys conducted below Three Mile Dam and from 91 summer steelhead and 62 adult coho salmon broodstock held at Minthorn.

Snouts were collected at Three Mile Dam by Trap and Haul personnel, on spawning ground surveys by CTUIR Natural Production Monitoring and Evaluation personnel, and on creel surveys by other CTUIR and ODFW personnel. Snouts were delivered to ODFW in Clackamas, Oregon for code identification.

## **Adult Survival and Umatilla River Returns**

### Summer Steelhead

Since 1975, all Umatilla River summer steelhead releases have been from Umatilla River broodstock. The first coded-wire tagged releases were in April of 1988 (Table 15). An acclimated group was released from Minthorn while a control group was released into the Umatilla River near Minthorn.

The estimated recovery of adults from the acclimated release was higher than from the control release (0.71 versus 0.54%) despite the larger size of the non-acclimated group at release (Table 15 and Figure 8). Adult returns to the Umatilla River however, were only slightly higher from the acclimated release than from the control release (0.47 versus 0.41%, respectively) (Figure 9). An estimated 72.4% of the adults recovered from both releases were captured at Three Mile Dam on the Umatilla River and 20.5% were recovered in the Columbia River gillnet fishery (Appendix N). An estimated 6.2% were caught in the Columbia River sport fishery.

A second acclimation evaluation study was conducted at Minthorn in May of 1989 (Table 15). Although no apparent problems were encountered with these releases, (Lofy

Table 15 Liberation and survival information for summer steelhead released in the Umatilla River.

Brood Year	Number of Juveniles Released	Size at Release	Release Location	Date of Release	Number of Adults Recovered	% Survival
a7	30,549	7.4	Minthorn	Apr 88	217	0.71
87	64,741 /a	6.5	Nr. Minthorn	Apr 88	349	0.54
88	10,033 /b	57.5	Umatilla RM 23	Dec 88	NA	NA
88	52,126 /c	6.6	Minthorn	May 89	20	0.04
88	29,586	5.6	Nr. Minthorn	May 89	20	0.07
89	59,747 /d	5.9	Bonifer	May 90	553	0.93
89	29,446	5.5	Nr. Bade?	May 90	286	0.97
90	42,610 /e	6.2	Bonifer	May 91	239	0.56
90	33,323 /f	0.7	Nr. Bonifer	May 91	172	0.52

Revised: 2-13-94

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/a The number released includes 33,984 adipose clipped fish at 10.3/lb. released at Umatilla RM 23 in May

/b None of these fish were coded-wire tagged

/c The number released includes 22,274 adipose clipped fish at 5.5/lb. acclimated and released at Bonifer in May

/d The number released includes 29,522 adipose clipped fish at 7.7/lb. acclimated and released with the coded-wire tagged fish in May

/e The number released includes 12,389 adipose clipped fish at 7.5/lb. acclimated and released with the coded-wire tagged fish in May

/f The number released includes 3,998 adipose clipped fish at 12.5/lb. released at Umatilla RM 3 in April

et al. 1990), recoveries were poor. Estimated adult recoveries from the acclimated and control groups were 0.04 and 0.07%, respectively (Table 15 and Figure 8). An estimated 85.0% of all recoveries were from the Umatilla River and 15.0% were from the Columbia River sport fishery (Appendix N).

Summer steelhead releases in 1990 were also made in May (Table 15). An acclimated group was released from Bonifer and a control group was released into Meacham Creek concurrent with the acclimated group. Recoveries from the acclimated group (0.93%) were similar to the control group (0.97%), even though the control group was slightly larger at release (Table 15 and Figure 8). Umatilla River recoveries from the acclimated and control groups were also similar (0.72 versus 0.67%, respectively) (Figure 9). An estimated 74.7% of the recoveries from both releases were from the Umatilla River, while an estimated 16.4 and 8.8% of the recoveries were from the Columbia River gillnet and Columbia River sport fisheries, respectively (Appendix N).

A fourth acclimation study was conducted at Bonifer in May of 1991. Preliminary recoveries are similar for both the acclimated and control groups (0.56 and 0.52%, respectively), although the fish from the control group were significantly smaller at release

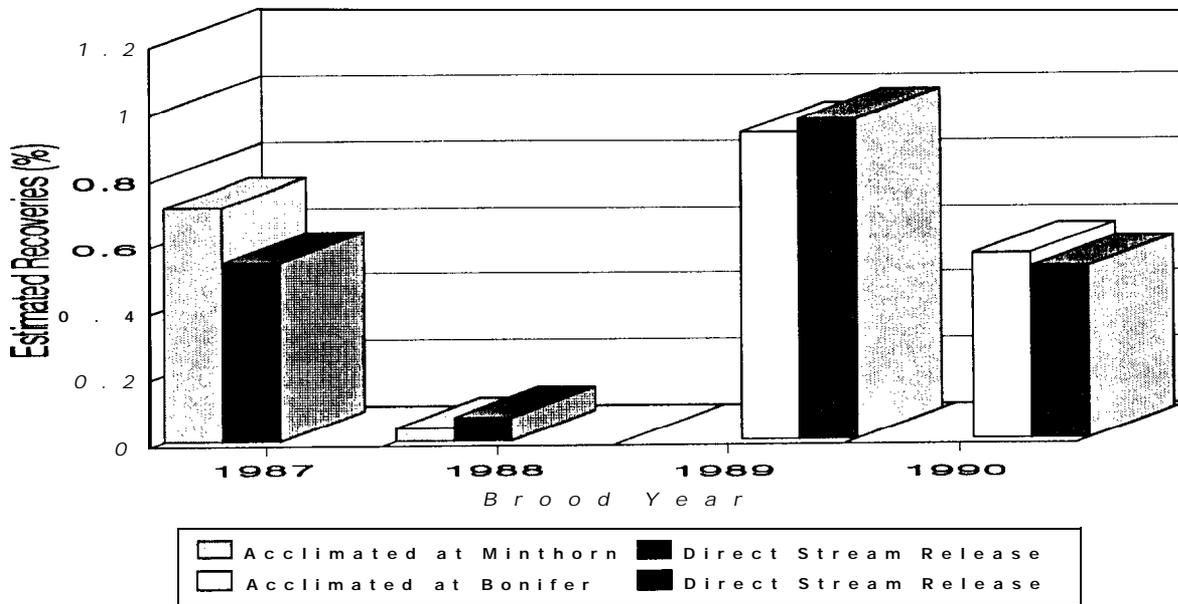


Figure 8. Estimated ocean and Columbia River Basin recoveries of adult summer steelhead from releases of acclimated and non-acclimated juveniles in the Umatilla River (1987-1990 brood years).

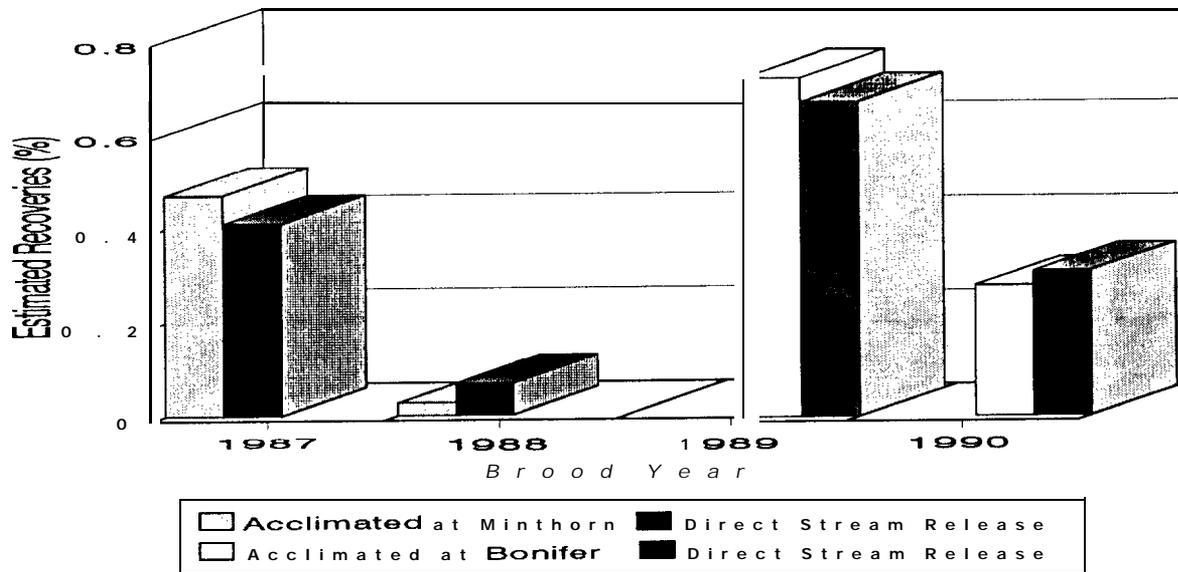


Figure 9. Estimated Umatilla River recoveries of adult summer steelhead from releases of acclimated and non-acclimated juveniles in the Umatilla River (1987-1990 brood years).

(Table 15 and Figure 8). Recoveries in the Umatilla River from the acclimated and control groups are also similar (0.28 and 0.31%, respectively) (Appendix N and Figure 9). An estimated 54.0% of the recoveries from both releases have been from the Umatilla River, while an estimated 29.9 and 16.1% of the recoveries have been from the Columbia River gillnet and Columbia River sport fisheries, respectively (Appendix N).

Results from the summer steelhead acclimation studies are inconclusive. Survival rates for both the acclimated and control groups in the 1989 study were poor, and survival rates for the acclimated and control groups were similar in both the 1990 and 1991 studies. The 1988 study however, suggests that acclimation may have provided a benefit in both total survival and Umatilla River escapement.

### Fall Chinook - Spring Creek Tule Stock

Releases in 1982 of fall chinook salmon in the Umatilla River were subyearlings from Spring Creek tule stock (Table 16). One group of fish was tagged by the National Marine Fisheries Service and reared at Spring Creek Hatchery and one group was tagged by ODFW and reared at Bonneville Hatchery (Appendix 0). All fish were from eggs collected at Spring Creek Hatchery. The Spring Creek Hatchery fish were released at 79.0/lb. at Umatilla RM 1.5 and 51.5. The Bonneville Hatchery fish were released at 92.0/lb. at Umatilla RM 1.5.

Total survival rates for the groups reared at Spring Creek and Bonneville Hatcheries were 0.53 and 0.46%, respectively (Table 16). These rates are at the lower end of the range experienced by Spring Creek Hatchery (0-2.1%), but higher than many other releases of Spring Creek tule stock released at other locations. Most fish were recovered as age-3 fish, similar to reports for fish from the 1978 and 1979 brood years released elsewhere (Howell et al. 1985) (Appendix B).

Total exploitation rate of Spring Creek tule stock was 99.0%. Individual exploitation rates for ocean commercial and Columbia River gillnet catches were 47.0 and 38.2%, respectively. Sport and treaty exploitation rates were 12.4 and 2.4%.

**Table 16. Liberation and survival information for fall chinook salmon (Spring Creek tule stock) released in the Umatilla River (1982).**

<b>Brood Year</b>	<b>Number of Juveniles Released</b>	<b>Size at Release</b>	<b>Release Location</b>	<b>Date of Release</b>	<b>Number of Adults Recovered</b>	<b>% Survival</b>
1981	970,336	79.0	Umatilla RM 1.5 & 51.5	Apr 82	5,159	0.53
1981	2,828,835	92.0	Umatilla RM 1.5	Apr 82	12,956	0.46

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### Fall Chinook - Bonneville Upriver Bright (URB) Stock

Yearling releases have been made in the upper Umatilla River (RM 56 to RM 87) and in Meacham Creek (RM 2 and RM 30) (Table 17). Releases in 1983 and 1984 were made in April. All other releases have been made in March. Fish have ranged in size from 5.0 to 10.2/lb..

The estimated total survival rates (through age-7) from yearling releases made from 1983 to 1988 (1981 to 1986 brood years) have ranged from 0.08 to 3.21% (Table 17). Recovery data for the 1987 and 1988 releases is incomplete. Preliminary survival rates are 2.29 and 2.86%, respectively. Survival rates to the Umatilla River have ranged from 0.00 to 0.89% (Appendix P).

Total exploitation of yearlings (through 1986 brood) is 84.8%. Individual exploitation rates for ocean commercial and Columbia River gillnet catches are 49.3 and 37.6%, respectively. Sport and treaty exploitation rates are 10.7 and 2.3%.

Prior to 1990, all spring subyearling releases were made near the mouth of the river because of potential for fish loss due to unscreened or partially screened irrigation diversions (Table 17). All groups were released in June. Fish ranged in size from 85.1 to 93.1/lb..

The estimated total survival rates (through age-7) from spring subyearling releases in 1984 and 1985 (1983 and 1984 brood years) were 0.78 and 0.87%, respectively (Table 17). Recovery data for the 1986 release is incomplete. The preliminary survival rate is 0.50%. Survival rates to the Umatilla River have ranged from 0.00 to 0.002% (Appendix Q).

Beginning in 1990, all spring subyearling releases have been in the upper Umatilla River (RM 42.5 to RM 79), other than a small number of non-tagged fish released at Three Mile Dam as part of ODFW juvenile passage evaluation studies (Table 17). An acclimation evaluation experiment was conducted in 1991. One group of fish was acclimated at Minthorn and a control group was released concurrently. All releases have been made in May and June. Fish have ranged in size from 53.4 to 87.5/lb..

Recovery data for the 1990 and 1991 releases (1989 and 1990 brood years) is incomplete. Preliminary survival rate for the 1990 release is 0.08% (Table 17) and survival rate to the Umatilla River is 0.01% (Appendix Q). Recoveries for the 1991 and 1992 releases include age-2 and age-3 fish only and are not discussed in this report.

Estimated total exploitation of spring subyearling releases (through 1989 brood) is 86.0%. Individual exploitation rates for ocean commercial and Columbia River gillnet catches are 40.7 and 55.4%, respectively. Sport and treaty exploitation rates are 3.5 and 0.4%.

Table 17. Liberation and survival information for fall chinook salmon (Bonneville URB and Umatilla River stock) released in the Umatilla River (1983– 1993).

Brood Year/Stock la	Number of Juveniles Released	Size at Release	Release Location	Date of Release	Number of Adults Recovered	% Survival
81 B	100,564	5.9	Bonifer & Meacham Cr.	Apr 83	168	0.17
02 B	228,412	8.6	Bonifer & Meacham Cr.	Apr 84	178	0.08
83 B	966,250	85.1	Umatilla RM 1.5	June 84	7,548	0.78
03 B	198,162	7.8	Umatilla RM 87 & Bonifer	Mar 85	1,566	0.79
04 B	3,223,172	92.3	Umatilla RM 1.5	June 85	27,999	0.87
84 B	51,000	16.2	Bonifer	Oct 85	340	0.67
84 B	206,615	5.0	Bonifer & Minthorn	Mar 86	6,509	3.15
85 B	2,029,602	86.0	Umatilla RM 1.5	June 86	10,159	0.50
05 B	35,574 /b	11.6	Minthorn	Oct 86	NA	NA
85 B	109,143	8.1	Minthorn	Mar 87	2,389	2.19
85 B	102,363	8.6	Bonifer	Mar 87	2,448	2.39
86 B	100,791	8.8	Minthorn	Mar 88	3,240	3.21
86 B	99,550	10.2	Bonifer	Mar 88	2,495	2.51
07 B	1,429,250 /b,c	93.1	Umatilla RM 9	June 88	NA	NA
87 B	217,443 /b	8.6	Umatilla RM 63 – 70	Mar 89	NA	NA
88 B	255,614 /b	a.2	Umatilla RM 70	Mar 90	NA	NA
89 B	2,425,681	87.5	Umatilla RM 70 – 79	May- June 90	2,046	0.08
89 B	71,863	9.2	Minthorn	Oct 90	35	0.05
09 B	76,646	0.8	Nr. Minthorn	Oct 90	9	0.01
89 B	194,847 lb	7.8	Umatilla RM 56 – 79	Mar 91	NA	NA
90 B	3,101,676 /d	73-82	Umatilla RM 70 – 79	May91	208	0.01
90 B	79,672	00.5	Minthorn	May91	23	0.03
90 B	74,065	86.0	Nr. Minthorn	May91	23	0.03
90 B	220,440	7.7	Umatilla RM 56 – 70	Mar 92		
91 B	2,681,1013 /e	55.2–70.6	Umatilla RM 42.5	May 92		
91 u	504,369 /b	53.4	Umatilla RM 42.5	May 92	NA	NA
91 u	5,167 /b	62.8	Umatilla RM 3	Apr- May 92	NA	NA
91 B	134,037	9.1	Umatilla RM 73.5	Mar 93		

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/a B = Bonneville URB stock; U = Umatilla River stock

/b These fish were not coded-wire tagged

/c To estimate adult contribution, these fish were included in the Priest Rapids URB stock subyearling release in 1988 (075007). Both stocks were reared at Irrigon Hatchery.

/d The number released includes 10,462 non-tagged fish at 80–194/lb. released at Umatilla RM 3 in April and May.

/e The number released includes 2,670 non-tagged fish at 112/lb. released at Umatilla RM 3 in April and May.

Subyearling fall releases have all occurred in October at either Bonifer or Minthorn acclimation facilities (Table 17). One acclimation evaluation experiment was conducted at Minthorn in 1990. Fish ranged in size from 8.8 to 16.2/lb..

The estimated total survival rate (through age-7) from the 1985 subyearling fall release (1984 brood year) was 0.67% (Table 17). Survival rate to the Umatilla River was 0.006% (Appendix Q). Recovery data for the 1990 acclimation evaluation releases is incomplete. Preliminary survival rates for the acclimated and non-acclimated groups are 0.05 and 0.01%, respectively. Survival rates to the Umatilla River are 0.007 and 0.001%.

Total exploitation of the subyearling fall releases (1984 and 1989 brood years) is 92.2%. Individual exploitation rates for ocean commercial and Columbia River gillnet catches are 40.0 and 56.3%, respectively. Sport and treaty exploitation rates are 2.8 and 0.8%.

Survivals (through age-7 fish) of the 1984 and 1985 subyearling spring releases (1983 and 1984 brood years) and the 1985 subyearling fall release (1984 brood year) were 0.78, 0.87, and 0.67%, respectively (Table 17). In comparison, survival of the same brood years released as yearlings in 1985 and 1986, were 0.79 and 3.15%, respectively. Although the survival rates of the 1983 brood subyearling and yearling releases are similar, data from the 1984 brood and preliminary data from subsequent brood years suggest that yearlings survive at a higher rate than either spring or fall subyearling releases.

Data from early releases (1986 brood and earlier) of yearling and subyearling fall chinook salmon show that most are recovered as age-4 fish (Appendix B), similar to results from this stock released elsewhere (Howell et al. 1985). Very few age-7 adults have been recovered.

#### Fall Chinook - Priest Rapids URB Stock

Releases of Priest Rapids URB stock were made from 1987 to 1990 (Table 18). Fish were released as subyearlings from spring through fall. Subyearling spring releases made from 1987 through 1989 all occurred in May in the lower Umatilla River. Releases in 1990 were made in the upper Umatilla River. Fish ranged in size from 60.4 to 82.4/lb..

The estimated total survival rate (through age-7) for the 1987 spring release (1986 brood year) is 0.81% (Table 18). Survival rate to the Umatilla River is 0.02% (Appendix R). Recovery data for the 1988 and 1989 releases (1987 and 1988 brood years) is incomplete. Preliminary total survival rates are 0.07 and 0.11%, respectively. Survival rates to the Umatilla River are 0.004 and 0.008%.

Total estimated exploitation of the subyearling spring releases (1986 through 1988 brood years) is 82.7%. Individual exploitation rates for ocean commercial and Columbia

**Table 18. Liberation and survival information for fall chinook salmon (Priest Rapids URB) released in the Umatilla River (1987– 1990).**

Brood Year	Number of Juveniles Released	Size at Release	Release Location	Date of Release	Number of Adults Recovered	% survival
86	1,476,830	60.4	Umatilla RM 1.5	May 87	11,990	0.81
86	2,000	20.0	Minthorn	July 87	5	0.25
87	3,316,007 <sup>1a</sup>	68.3	Umatilla RM 23	May 88	2,442	0.07
87	14,408	9.8	Minthorn	Nov 88	62	0.43
87	79,681	8.6	Nr. Minthorn	Nov 88	404	0.51
88	2,393,710	66.6	Umatilla RM 23	May 89	2,623	0.11
88	78,825	10.9	Minthorn	Oct 89	71	0.09
88	78,132	11.1	Nr. Minthorn	Oct 89	53	0.07
88	629,800 <sup>1b</sup>	82.4	Umatilla RM 70 – 79	May90	NA	NA

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<sup>1a</sup> The number released includes 1,429,250 Bonneville URB stock subyearlings released at 93.1/lb. in June at Umatilla RM 9.  
<sup>1b</sup> These fish were not coded-wire tagged

River gillnet catches are 53.7 and 40.4%, respectively. Sport and treaty exploitation rates are 5.1 and 0.8%.

One group of subyearling fish was acclimated at Minthorn and released in July, 1987 (Table 18). Due to low dissolved oxygen levels and pump failure (Lofy et al. 1988), very few juveniles were released and total recovery is estimated to be five adults.

Subyearling fall releases have occurred in October and November at, or near, Minthorn Acclimation Facility (Table 18). Fish ranged in size from 8.6 to 11.1/lb..

Two groups of fish (1987 brood) were released at Minthorn in November, 1988, as part of an acclimation evaluation study (Table 18). The acclimated group suffered severe losses due to *Ichthyonhthirius multifiliis* (Lofy 1989). Recovery data for these releases is incomplete. Estimated total survival rates (through age-6) for the acclimated and control groups are 0.43 and 0.51%, respectively. Survival rates to the Umatilla River are 0.01 and 0.07% (Appendix R).

A second acclimation experiment was conducted at Minthorn in October, 1989 (Table 18). Recovery data for these releases is also incomplete. Estimated total survival rates

(through age-5) for the acclimated and control groups are 0.09 and 0.07%, respectively. Survival rates to the Umatilla River are 0.02 and 0.01% (Appendix R).

Total estimated exploitation of the subyearling fall releases (1987 and 1988 brood years) is 78.2%. Individual exploitation rates for ocean commercial and Columbia River gillnet catches are 48.9 and 34.6%, respectively. Sport and treaty exploitation rates are 13.6 and 2.8%.

Recovery data (through age-7) shows the estimated adult recovery rate (0.81%) from the Priest Rapids URB stock subyearling spring release in 1987, is similar to adult recovery rates (at the same age) from Bonneville URB stock subyearling spring releases in 1984 and 1985 (0.78 and 0.87%, respectively), but higher than the recovery rate for the 1986 release (0.50%). The Priest Rapids fish were released at a larger size (60.4/lb) than the Bonneville groups (85.1 to 92.3/lb.) and they were released in May instead of June.

The total estimated exploitation rate of Priest Rapids URB subyearling spring releases (86.0%) is similar to the exploitation rate of Bonneville URB subyearling spring releases (82.7%).

#### Fall Chinook - Straying

Returning adults from juvenile URB stock fall chinook salmon releases in the Umatilla River have strayed above McNary Dam to Columbia and Snake River terminal locations (hatcheries, fish traps and spawning grounds). It is believed that straying is partially the result of low attraction flow at the mouth of the Umatilla River during the adult return season and, in the case of subyearling spring releases made from 1982 through 1989, lack of imprinting because they were released in the lower river (below RM 23).

Stray levels appear to be affected by age at release. When comparing estimated adult recoveries from the Umatilla River with recoveries above McNary Dam, the data indicates that releases of subyearlings have resulted in higher levels of adult straying than releases of yearling fish. Adult recoveries above McNary Dam have been the highest from subyearling spring releases (Bonneville and Priest Rapids URB stock) made from 1984 through 1991. An estimated 87.5% of the terminal recoveries from those releases have been from terminal locations above McNary Dam (Table 19). Adult recoveries above McNary Dam from subyearling fall releases (Bonneville and Priest Rapids URB stock) made from 1985 through 1990 has averaged 62.1%. Adult recoveries above McNary Dam from yearling releases (Bonneville URB stock) made from 1983 through 1988 have been the lowest and has averaged 38.0%.

Release location (upper versus lower river) also appears to affect stray levels. Prior to 1990, all subyearling spring releases were made in the lower Umatilla River. An estimated 8.2% of the terminal recoveries from those releases have been from the Umatilla River (Table 19). In comparison, Umatilla recoveries from the 1990 and 1991 subyearling

Table 19. Straying of adult fall chinook salmon from juvenile releases in the Umatilla River (1982-1991). /1

Brood Year	Number Released	Date of Release	Size at Release	Release Location	Estimated Adult Survival															
					Washington															
					Umatilla River No. %	Washington/2 No. %	Lyons Ferry Hatchery No. %	Snake River /3 No. %	Priest Rapids /4 No. %	Hanford Reach Spawning Grounds No. %	Wells Dam Hatchery No. %	Yakima River Spawning Grounds No. %								
<u>Subyearling spring releases (Tule stock)</u>																				
81	978,336	Apr 82	79.0	Uma. FM 1.5 & 51.5	0	0.0	0	0.0												
81	<u>2,828,835</u>	Apr 82	92.0	Umatilla RM 1.5	<u>0</u>	<u>0.0</u>	<u>111</u>	<u>100.0</u>	<u>83</u>	<u>75</u>			<u>28</u>	<u>25</u>						
	3,807,171				0	0.0	111	100.0	83	75			28	25						
<u>Subyearling spring releases (Bonneville UFB stock)</u>																				
83	966,250	June 84	85.1	Umatilla RM 1.5	0	0.0	1,648	100.0	133	8			60	4	1,456	88				
84	3,223,172	June 85	92.3	Umatilla RM 1.5	47	2.0	2,260	98.0	125	6			62	3	2,073	92				
85	2,029,602	June 86	66.0	Umatilla RM 1.5	0	0.0	2,106	100.0	417	20			126	6	1,562	74				
89	2,425,681	May-Jun 90	87.5	Umatilla RM 708 79	352	60.6	229	39.4	153	67	15	7			61	27				
90	3,101,676	May 91	81.8	Umatilla RM 70 & 79	107	93.0	8	7.0	8	100										
90	79,672	May 91	80.5	Minthorn	8	100.0	0	0.0												
90	<u>1,865</u>	May 91	86.0	Nr. Minthorn	<u>5</u>	<u>71.4</u>	<u>2</u>	<u>28.6</u>	<u>0</u>	<u>0</u>								<u>2</u>	<u>100</u>	
	11,900,918				519	7.7	6,253	923	836	13	15	0	248	4	5,152	82		2	0	
<u>Subyearling spring releases (Priest Rapids UFB stock)</u>																				
86	1,476,830	May 87	60.4	Umatilla RM 1.5	244	14.7	1,415	85.3	695	49	24	2	342	24	317	22	12	1	24	2
86	2,000	July 87	20.0	Minthorn	0	0.0	1	100.0	1	100										
87	1,886,757	May 88	68.3	Umatilla RM 23	251	60.8	162	33.2	76	47			76	47					10	6
88	<u>2,393,710</u>	May 89	66.6	Umatilla RM 23	<u>186</u>	<u>26.5</u>	<u>543</u>	<u>74.5</u>	<u>326</u>	<u>60</u>	<u>16</u>	<u>3</u>	<u>124</u>	<u>23</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>78</u>	<u>14</u>
	5,759,297				681	24.3	2,121	75.7	1,098	52	40	2	542	26	317	15	12	1	112	5
<u>Subyearling fall releases (Bonneville UFB stock)</u>																				
84	51,000	Oct 85	16.2	Bonifer	3	15.0	17	85.0	17	100										
89	71,863	Oct 90	9.2	Minthorn	3	75.0	1	25.0											1	100
89	<u>76,646</u>	Oct 90	8.8	Nr. Minthorn	<u>1</u>	<u>25.0</u>	<u>3</u>	<u>75.0</u>	<u>3</u>	<u>100</u>										
	199,508				7	25.0	21	75.0	20	95									1	5

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Table 19. (cont.)

Brd Year	Number Released	Date of Release	Size at Release	Release Location	Estimated Adult Survival													
					Umatilla River No.	Umatilla River %	WashingtonR No.	WashingtonR %	Lyons Ferry Hatchery No.	Lyons Ferry Hatchery %	Snake River /3 No.	Snake River /3 %	Priest Rapids /4 No.	Priest Rapids /4 %	Hanford Spawning No.	Reach Grounds %	Wells Dam Hatchery No.	Wells Dam Hatchery %
<b>Subyearling fall releases (Priest Rapids URB stock)</b>																		
87	14,408	Nov 88	9.6	Minthorn	2	3.4	57	96.6	48	84			10	18				
87	79,661	Nov 88	6.6	Nr. Minthorn	48	65.8	25	34.2	17	68	3	12	1	4			3	12
88	78,825	Oct 89	10.9	Minthorn	7	50.0	7	50.0	7	100								
88	<u>78,132</u>	Oct 89	11.1	Nr. Minthorn	<u>8</u>	<u>50.0</u>	<u>8</u>	<u>50.0</u>	<u>7</u>	<u>88</u>			<u>1</u>	<u>13</u>				
	251,046				<b>65</b>	<b>40.1</b>	<b>97</b>	<b>59.9</b>	<b>79</b>	<b>61</b>	<b>3</b>	<b>3</b>	<b>12</b>	<b>12</b>			<b>3</b>	<b>3</b>
<b>Yearling spring releases (Bonneville URB stock)</b>																		
81	100,564	April 83	5.9	Bonifer & Meacham Cr.	0	0.0	2	100.0	2	100								
62	226,412	April 84	6.6	Bonifer & Meacham Cr.	0	0.0	7	100.0	7	100								
83	196,162	Mar 85	7.8	Uma RM 87 & Bonifer	2	3.6	54	96.4	54	100								
84	206,815	Mar 86	5.0	Bonifer & Minthorn	126	34.5	239	65.5	105		44		2	1	131	55		
85	109,143	Mar 87	6.1	Minthorn	220	65.3	117	34.7	18	15	2	2	4	3	92	79		
85	102,363	Mar 87	6.6	Bonifer	130	64.0	73	36.0	73	100								
86	100,791	Mar 88	a.0	Minthorn	291	62.7	61	17.3	42	69	17	28			1	2		
86	<u>99,550</u>	Mar 88	10.2	Bonifer	<u>216</u>	<u>81.2</u>	<u>50</u>	<u>18.8</u>	<u>40</u>	<u>80</u>	<u>9</u>	<u>18</u>	<u>1</u>	<u>2</u>				
	1,145,800				<b>985</b>	<b>62.0</b>	<b>603</b>	<b>33.0</b>	<b>341</b>	<b>57</b>	<b>28</b>	<b>5</b>	<b>7</b>	<b>1</b>	<b>224</b>	<b>37</b>		

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- /1 Subjects are not included.
- /2 Estimated Washington recoveries above McNary Dam.
- /3 Estimated recoveries from Snake and Tucannon River spawning ground surveys and fish traps.
- /4 Estimated recoveries from Priest Rapids spawning channel and fish trap

spring releases made in the upper Umatilla River are 66.4%. This would suggest that releases made into the upper Umatilla River increase homing.

The data suggests that stock differences (lower versus upper river) affect straying. When comparing estimated adult recoveries from the Umatilla River with recoveries above McNary Dam, the data indicates that releases of Bonneville URB stock has generally resulted in higher stray rates than releases of Priest Rapids URB stock. Adult recoveries above McNary Dam from Bonneville URB stock subyearlings released in the spring of 1984 through 1986, and in 1990 and 1991, has averaged 92.3% (Table 19). Adult recoveries above McNary Dam from Priest Rapids URB stock subyearlings released in the spring of 1987 through 1989 has averaged 75.7%. Adult recoveries above McNary Dam from Bonneville and Priest Rapids URB stock subyearlings released in the fall have averaged 75.0 and 59.9%, respectively, but the total number of recoveries has been minimal (Table 19). All terminal area coded-wire tagged adult recoveries from Spring Creek tule stock were collected outside the Umatilla River. This again suggests that lower river stocks have a higher tendency to stray.

An estimated 72.9% of all adult strays recovered above McNary Dam from Umatilla River juvenile fall chinook releases (Bonneville and Priest Rapids URB stock) made from 1983 through the spring of 1991, have been recovered from Columbia River terminal locations (Table 19). An estimated 27.1% have been recovered from Snake River terminal locations.

Beginning in 1990, all releases of fall chinook salmon juveniles have been in the upper Umatilla River (RM 56 to RM 79) and all future releases will be in the upper river. Fall chinook salmon from Umatilla River broodstock have been released in the Umatilla River since 1992. Permanent adult fall chinook broodstock holding and spawning facilities, capable of meeting full Umatilla River production goals, are scheduled for completion at Three Mile Dam on the Umatilla River in 1995. All fall chinook juvenile releases in the Umatilla River will eventually be progeny of Umatilla River broodstock. Proposed acclimation facilities are scheduled for completion in 1994 through 1996 and will be used to acclimate juvenile fall chinook salmon prior to release. The Umatilla Basin Project will help to provide better attraction and fish passage flows in the Umatilla River. Phase I of the project is currently in operation and is an exchange of Columbia River water for water which is currently being taken directly from the Umatilla River for irrigation and provides some flow out the mouth of the river during the adult return season. Phase II, scheduled for completion in 1997, will be an exchange of Columbia River water for natural stream flow and McKay Reservoir storage water and will increase flow in the lower Umatilla River during the adult return and juvenile outmigration seasons.

### Spring Chinook

Beginning in 1988, spring chinook have been released in the Umatilla River as yearlings and subyearlings in the spring and fall. All releases have been from Carson stock.

Yearling releases have been made in the mainstem Umatilla River from RM 23 to RM 89 and in Meacham Creek at RM 2 (Table 20). In addition, a small number have been released at Three Mile Dam as part of ODFW passage evaluation studies. Releases have occurred from March through May and fish have ranged in size from 8.5 to 20.5/lb..

The estimated total survival rates (through age-6) from yearling releases made in 1988 and 1989 (1986 and 1987 brood years) are 0.78 and 0.31%, respectively (Table 20). Survival rates to the Umatilla River are 0.64 and 0.25% (Appendix S). Recovery data for the 1990 and 1991 releases is incomplete. Preliminary survival rates are 0.60 and 0.17%, respectively. Survival rates to the Umatilla River are 0.46 and 0.13%. An estimated 80.2% of all recoveries are from the Umatilla River, 17.7% are from Columbia River fisheries, and 2.2% are from terminal areas outside the Umatilla River. Recoveries for the 1992 and 1993 releases are not discussed in this report.

An acclimation evaluation study has been conducted with yearlings every year from 1988 through 1992 (Table 20). All test groups were acclimated at Bonifer, while all control groups were released in Meacham Creek (adjacent to Bonifer), or in the Umatilla River.

The 1988 and 1989 studies encountered several problems (Lofy 1989 and Lofy et al. 1990) which essentially eliminates any possible evaluation of acclimation. The 1990 study shows that the estimated survival rate (preliminary data) of the acclimated group is lower than the survival rate of the non-acclimated group (0.54 versus 0.67%) (Table 20 and Figure 10). Umatilla River recoveries from the acclimated group are also lower than from the control group (0.41 versus 0.50%) (Appendix S and Figure 11). The 1991 study shows that the estimated survival rate (preliminary data) of the acclimated group (0.21%) is higher than the survival rate of the non-acclimated group (0.13%) (Figure 10). Umatilla River recoveries from the acclimated group are also higher than from the non-acclimated group (0.18 versus 0.12%) (Figure 11).

Fall releases have been made in the mainstem Umatilla River (RM 89) and in Meacham Creek at RM 2 (Table 20). Releases have occurred in October and November and fish have ranged in size from 11.1 to 21.4/lb..

The estimated total survival rate (through age-6) from the 1988 fall release (1987 brood year) is 0.09% (Table 20). Survival rate to the Umatilla River is 0.08% (Appendix S). Recovery data for the 1989 and 1990 releases is incomplete. Preliminary survival rates are 0.08 and 0.01%, respectively. Survival rates to the Umatilla River are 0.06 and less than 0.01%. An estimated 80.8% of all recoveries are from the Umatilla River, 14.5% are from Columbia River fisheries, and 4.7% are from terminal areas outside the Umatilla River. Recoveries from the 1991 through 1993 releases are not discussed in this report.

Acclimation evaluation studies were conducted with fall releases every year from 1988 through 1991 (Table 20). All test groups were acclimated at Bonifer, while all control groups were released in Meacham Creek (adjacent to Bonifer), or in the Umatilla River.

Table 20. Liberation and survival information for spring chinook salmon released in the Umatilla River.

Brood Year	Number of Juveniles Released	Size at Release	Release Location	Date of Release	Number of Adults Recovered	% Survival
86	99,095 /a	20.5	Umatilla RM 23	Apr 86	NA	NA
86	106,231	10.1	Bonifer	Mar-Apr 86	1,006	0.95
86	191,146 /b	6.6	Umatilla RM 23 & 69	Apr 88	1,311	0.69
87	1,196	21.4	Bonifer	Nov 88	2	0.17
87	75,767	11.1	Umatilla RM 89	Nov 88	65	0.09
87	79,904	10.6	Bonifer	Mar-May 89	227	0.20
87	80,932	10.6	Nr. Bonifer	Mar89	269	0.33
86	80,750	12.0	Bonifer	Oct 89	75	0.09
88	03,853	12.0	Nr. Bonifer	Oct 89	63	0.08
88	99,775 /a	16.6	Umatilla RM 69	Apr 90	NA	NA
88	114,345	9.0	Bonifer	Mar90	616	0.54
88	117,427	9.6	Nr. Bonifer	Mar90	782	0.67
89	00,436	11.5	Bonifer	Oct 90	5	0.01
89	77,996	13.4	Nr. Bonifer	Oct 90	4	0.01
89	100,506	10.1	Bonifer	Mar91	215	0.21
89	96,151	11.6	Nr. Bonifer	Mar91	122	0.13
89	96,733	20.3	Umatilla RM 3 & 89	Apr-May 91	150	0.16
90	81,145	16.5	Bonifer	Nov 91	9	0.01
90	70,490	16.6	Nr. Bonifer	Nov 91	2	0.00
90	96,254	18.7	Umatilla RM 3 & 69	Apr 92	0	0.00
90	109,101	9.2	Bonifer	Apr 92	1	0.00
90	90,929	8.5	Nr. Bonifer	Apr 92	4	0.00

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/a None of these fish were coded-wire tagged.

/b The number released includes 69,266 non-tagged fish at 10.3/lb. released in the upper Umatilla River in May, 1968.

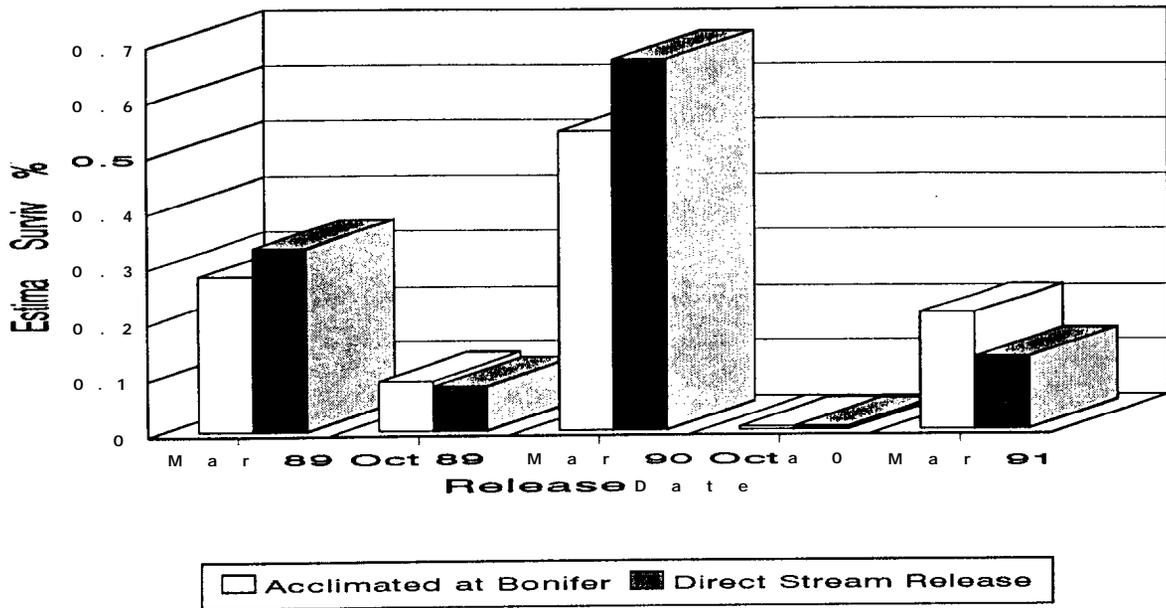


Figure 10. Estimated Columbia River Basin recoveries of adult spring chinook salmon from releases of acclimated and non-acclimated juveniles in the Umatilla River (1987-1989 brood years).

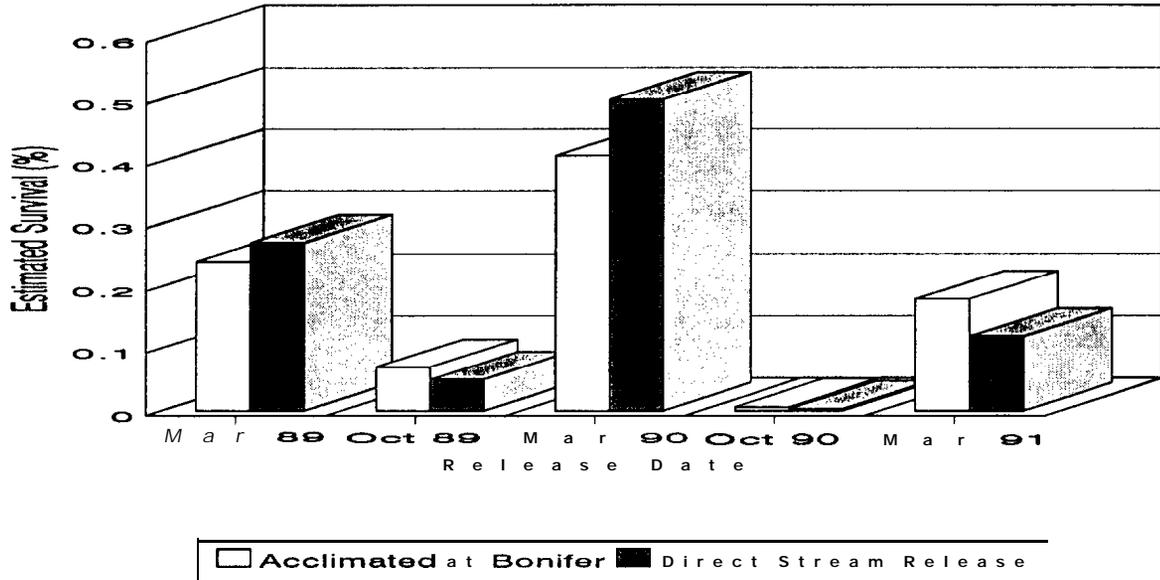


Figure 11. Estimated Umatilla River recoveries of adult spring chinook salmon from releases of acclimated and non-acclimated juveniles in the Umatilla River (1987-1989 brood years).

The 1988 study encountered disease problems (Lofy 1989) which essentially eliminates any possible evaluation of acclimation. The 1989 study shows that the estimated survival rates (preliminary data) of the acclimated and non-acclimated groups are similar (0.09 and 0.08%, respectively) (Table 20 and Figure 10). Umatilla River recoveries from both groups are also similar (0.07 and 0.05%) (Appendix S and Figure 11). Survival rates of the 1990 study have been poor and only an estimated nine adults have been recovered from both groups.

Spring releases of subyearlings began in 1992. The first recoveries are not expected until 1994.

Comparison of fall releases and yearling releases from the 1987 through 1989 broods shows that the survival rates of the yearling releases have been higher. The survival rates have been 1.6 to 21.0 times higher for yearlings and have averaged 7.6 times higher.

Results from spring chinook acclimation studies are inconclusive. The estimated survival rate of the acclimated group released in the spring of 1990 was lower than the survival rate of the control group. However, survival rates of the acclimated groups released in the fall of 1990 and spring of 1991 were similar to or higher than the survival rates of the control groups.

### Coho

Coho salmon have been released in the Umatilla River every year beginning in 1987 (Table 21). All fish have been released as yearlings in the spring and have been from Tanner Creek stock reared at Cascade Hatchery. Releases have been made in the mainstem Umatilla River from RM 42.5 to RM 70. Releases have occurred in March and April and fish have ranged in size from 11.2 to 19.1/lb..

The estimated total survival rates of releases made from 1987 through 1992 have ranged from 0.16 to 4.47% (Table 21). Survival rates to the Umatilla River have ranged from 0.02 to 0.99% (Appendix T). Recovery data for the 1993 release is incomplete and is not discussed in this report.

Total exploitation of coho (through 1990 brood) is 82.4%. Individual exploitation rates for ocean commercial and Columbia River gillnet catches are 30.9 and 24.8%, respectively. Sport and treaty exploitation rates are 42.7 and 1.6%.

Acclimation evaluation studies were conducted from 1989 through 1991 (Table 21). Test groups were acclimated at Minthorn, while control groups were released at Minthorn and in the Umatilla from RM 56 to RM 70.

The 1989 study shows that the estimated survival rate of the acclimated group was nearly twice that of the control group (1.06 versus 0.57%) (Table 21 and Figure 12).

Table 21. Liberation and survival information for coho salmon released in the Umatilla River. /a

Brood Year	Number of Juveniles Released	Size at Release	Release Location	Date of Release	Number of Adults Recovered	% Survival
85	948,549 la	13.5	Minthorn	Apr 87	15,256	1.61
86	996,433	15.7-17.3	Lower Umatilla R.	Mar-Apr 88	44,580	4.47
87	157,299	17.3-19.1	Minthorn	Mar 89	1,666	1.06
87	829,607	17.2	Nr. Minthorn	Mar 89	4,721	0.57
88	67,309	13.5	Minthorn	Mar 90	2,060	3.06
88	856,524 /b	13.3	Uma Rm 63-70	Mar 90	26,510	3.10
88	65,095	11.2	Minthorn	Apr 90	2,625	4.03
89	152,974	15.4	Minthorn	Mar 91	305	0.20
89	802,655	16.5-16.8	Uma Rm 56-70	Mar 91	1,274	0.16
90	96 1,386	15.5-15.7	Uma Rm 56-60	Mar 92	7,087	0.74
91	892,678	17.6	Uma Rm 42.5-60	Apr 93	48	0.01

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/1 Survival data for the 1991 brood includes age-2 fish only (1993 returns).

/a The number released includes 786,660 non-tagged fish at 14.0/lb. released at Umatilla RM 23 In April

/b The number released includes 594,527 non-tagged fish at 14.8/lb. released at Umatilla RM 70 in March and April, and 202,315 non-tagged fish at 14.5/lb. released at Umatilla RM 23 in March

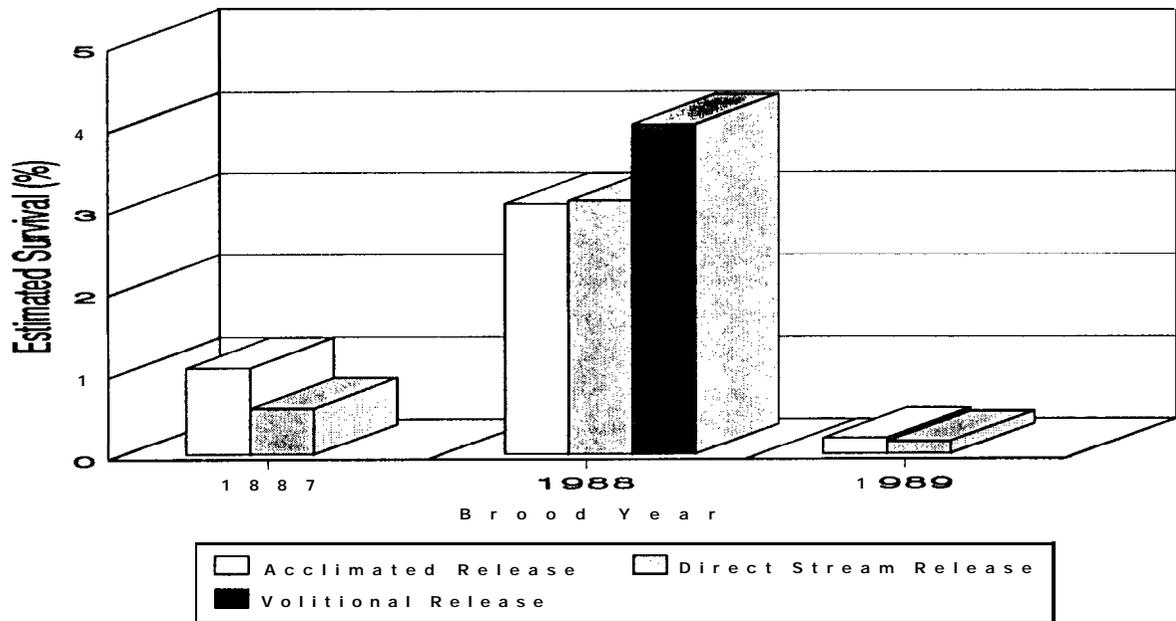


Figure 12. Estimated ocean and Columbia River Basin recoveries of adult coho salmon from releases of acclimated and non-acclimated juveniles in the Umatilla River (1987-1989 brood years).

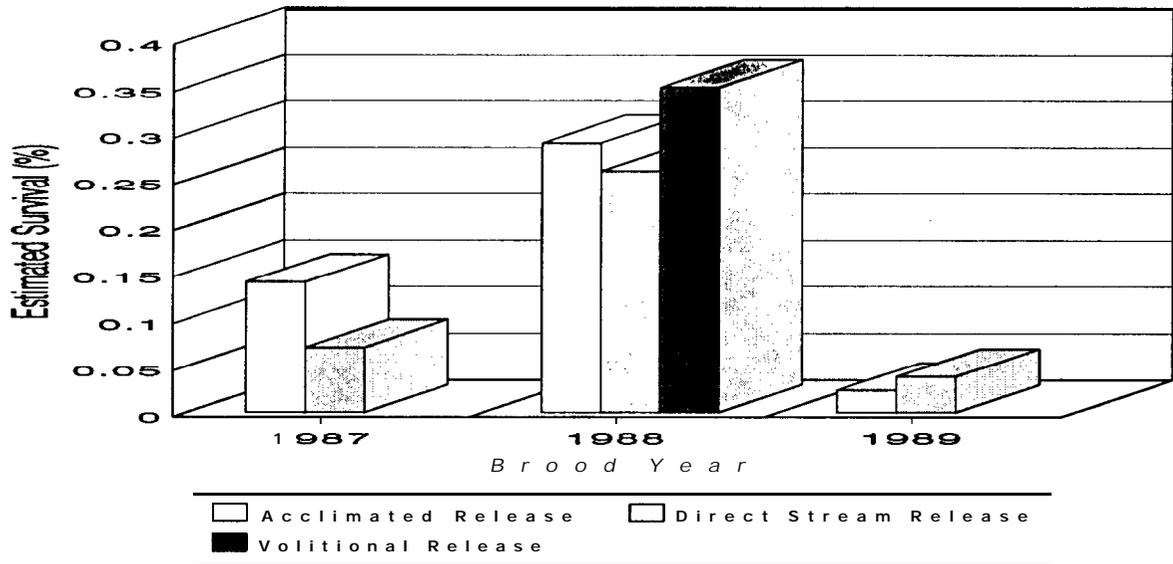


Figure 13. Estimated Umatilla River recoveries of adult coho salmon from releases of acclimated and non-acclimated juveniles in the Umatilla River (1987-1989 brood years).

Umatilla River recoveries from **the acclimated** group (0.14%) were twice that of the control group (0.07%) (Appendix T and Figure 13). Three groups of coho were released as part of the 1990 study (Table 21). One group was acclimated for 21 days and released in March, while a control group was released concurrently. A third group was given the opportunity to release volitionally (**Rowan** 1991). Few fish volitionally migrated from the pond and they were force released in April after being held for 36 days. Estimated survival rates for the test and control groups released concurrently were similar (3.06 and 3.10%, respectively) (Table 21 and Figure 12). Umatilla River recoveries were also similar for both groups (0.29 and 0.26%) (Appendix T and Figure 13). Total survival of the volitional release group was much higher (4.03%) (Figure 12). Umatilla River recoveries were also higher (0.35%) (Figure 13). However, it is difficult to know whether the increase in survival of the volitional group was a result of increased acclimation time, later release time, or larger size at release. The size of the volitional group (11.2/lb.) was larger than the size of the acclimated and control groups (13.5 and 13.3/lb., respectively). The estimated survival rates of both groups in the 1991 study were low. The estimated survival rate of the acclimated group (0.20%) was higher than the survival rate of the control group (0.16%) (Table 21 and Figure 12). Conversely, Umatilla River recoveries from the acclimated group (0.02%) were lower than recoveries from the control group (0.04%) (Appendix T and Figure 13).

Survival rates from the coho acclimation studies suggest that acclimation may provide a benefit in both total survival and Umatilla River escapement. However, other factors such as time and size at release may be more important than acclimation in increasing survival. Additional survival benefits from acclimation may be dependent upon releasing juveniles at the proper time and size. For example, the additional increase in survival realized from acclimation may be higher for coho released in April at 10/lb. than for fish released in March at 20/lb.

## Literature Cited

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- Zimmerman, B.C., and B. Duke. 1993. Umatilla River Basin Trap and Haul Program. Report submitted to Bonneville Power Administration, Project No. 88-022. 46 pp.

## **APPENDICES**

Appendix A. Liberation and survival information for summer steelhead released in the Umatilla River.

Brood	CWT Code	CWT Released	Total Released	Estimated Recoveries		Year Recovered	Age at Recovery	Oregon			Canada Net & Seine
				Number	%			Col. R. Gillnet	Col. R. spat	Umatilla River	
87	073859	9629	10187	24	0.24	89 90	2 3	6 6		18 26	
				32	0.33						
				Totals	56						
87	073660	9721	10075	34	0.35	89 90	2 3	14 21		20 26	
				47	0.48						
				Totals	81						
67	07386 1	9925	10287	37	0.37	89 90	2 3	10 12	3	27 20	
				35	0.35						
				Totals	72						
87	073856	9689	21940	37	0.36	89 90	2 3	13	11	26 23	2
				38	0.39						
				Totals	75						
87	073857	9455	21409	32	0.34	89 90 91	2 3 4	7		25 13 3 II	
				13	0.14						
				3	0.03						
				Totals	48						
87	073858	9448	21392	9	0.10	89 90	2 3		3	9 19	
				22	0.23						
				Totals	31						
88	074726	8784	17372	0	0.00	90 91	2 3		3	2	
				5	0.06						
				Totals	5						
88	074723	8789	17362	0	0.00	90 91	2 3			2	
				2	0.02						
				Totals	2						
88	074724	6784	17372	0	0.00	90 91	2 3			3	
				3	0.03						
				Totals	3						
88	074715	8800	9873	1	0.01	90 91	2 3			1 6	
				6	0.07						
				Totals	7						
88	074717	a791	9664	1	0.01	90 91	2 3			9	
				9	0.10						
				Totals	10						
88	074718	0778	9649	0	0.00	90 91	2 3				
				1	0.01						
				Totals	1						
89	076212	9331	20240	57	0.61	91 92	2 3	5 5	9	43 19	
				24	0.26						
				Totals	81						

Appendix A (cont.)

Brood	CWT Code	CWT Released	Total Released	Estimated Recoveries		Year Recovered	Age at Recovery	Oregon			Canada Net & Seine
				Number	%			Col. R. Gillnet	Col. R. Spat	Umatilla River	
a9	075213	9133	19811	63	0.69	91	2	5	2	56	
				<del>28</del>	<del>0.31</del>	92	3	2	26		
				Totals	91	1.00					
89	075214	9080	19696	45	0.50	91	2	7	6	32	
				<del>38</del>	<del>0.42</del>	92	3	15	23		
				Totals	a3	0.91					
a9	075215	9511	9830	67	0.70	91	2	9	5	53	
				<del>27</del>	<del>0.28</del>	92	3	9	2	16	
				Totals	94	0.99					
a9	0752 16	9525	9845	62	0.65	91	2	5	2	55	
				<del>39</del>	<del>0.41</del>	92	3	14	2	23	
				Totals	101	1.06					
a9	075217	9454	9771	56	0.59	91	2		25	31	
				<del>26</del>	<del>0.28</del>	92	3	14	12		
				Totals	a2	0.87					
90	075340	9835	14221	34	0.35	92	2	7	7	20	
				<del>16</del>	<del>0.16</del>	93	3	7	9		
				Totals	50	0.51					
90	076341	9819	14198	32	0.33	92	2	2	4	26	
				<del>18</del>	<del>0.18</del>	93	3	15	3		
				Totals	50	0.51					
90	075342	9814	14191	47	0.46	92	2	4	7	36	
				<del>18</del>	<del>0.18</del>	93	3	13	5		
				Totals	65	0.66					
90	076343	9432	11084	46	0.49	92	2	10	4	32	
				<del>8</del>	<del>0.08</del>	93	3	6	2		
				Totals	54	0.57					
90	076344	9467	11125	30	0.32	92	2	3	1	26	
				<del>10</del>	<del>0.11</del>	93	3	5	5		
				Totals	40	0.42					
90	075345	9458	11114	43	0.45	92	2	14		29	
				<del>9</del>	<del>0.10</del>	93	3	7	2		
				Totals	52	0.55					

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/1 includes one recovered at FWS Hatchery.

Appendix B. Liberation and survival information for fall chinook salmon released in the Umatilla River. /1

Br. Yr.	CWT Code	CWT Rel.	Total Rel.	Estimated Recoveries		Year Rec.	Age	Oregon															
				No.	%			Ocean			Freshwater												
								Com	Trawl	Spt	Col. R. Gillnet	Test Net Fishery	Spt	Hatch	Trap	Treaty Subsals	Spawn Ground						
81	050851	46707	306279	19	0.04	83	2				2	10											
				179	0.38	84	3	10			70											2	
				20	0.04	85	4				16												
				Totals	218	0.47																	
81	051057	102331	872057	53	0.05	83	2					8											
				459	0.45	84	3	28	1		161		3									9	
				50	0.05	85	4				39		1										
				8	0.01	86	5				5												
Totals	568	0.56																					
81	072663	102386	2828835	40	0.04	83	2					2											
				358	0.35	84	3	14			121		3									7	
				63	0.06	85	4			2	52				1								
				9	0.01	86	5									1							
Totals	470	0.46																					
81	072741	99570	100564	7	0.01	83	2					4								3			
				15	0.02	84	3				11				1							1	
				104	0.10	85	4	2		2	27		1		1	1	1	1	1	1	1	1	1
				40	0.04	86	5				27				1	1	1	1	1	1	1	1	1
Totals	166	0.17																					
82	072829	96448	228412	12	0.01	85	3	3															
				54	0.06	86	4	3			15												
				5	0.01	87	5																
				4	0.00	88	6				4												
Totals	75	0.08																					
83	073124	210441	966250	2	0.00	84	1																
				80	0.04	85	2				16												
				498	0.24	86	3	16			204												
				871	0.41	87	4	2			418		1	3			1	1	1	1	1	1	1
				192	0.09	88	5				115			1									
				1	0.00	89	6																
Totals	1644	0.78																					
83	073127	88306	198162	28	0.03	85	2					13											
				110	0.12	86	3	4			26												
				478	0.54	87	4	47		6	185		6									1	
				82	0.09	88	5	4			31												
				0	0.00	89	6																
Totals	698	0.79																					
84	073326	206758	3223172	29	0.01	86	2					13											
				358	0.17	87	3	12			129											2	
				850	0.41	88	4	9			511		2										
				536	0.26	89	5	8			239		2										1
				23	0.01	90	6				7												
Totals	1796	0.87																					
84	073162	30838	51000	18	0.06	87	3					4											
				83	0.27	88	4				38												
				98	0.32	89	5	8			56											2	
				7	0.02	90	6				7												
Totals	208	0.87																					

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Appendix B. (cont.)

CWT Code	Year Rec.	Washington							Calif. Ocean	Canada			Alaska		FWS	
		Ocean			Freshwater					Corn.	Seine	Spt.	Corn.	Spt.	Freshwater	
		Corn.	Spt.	Seine	Treaty Troll	Spt.	Hatch.	Trap							Spawn Ground	Hatch.
050851	63 64 65	6	7		4	3			77 4	3	4					
051057	63 84 85 86	24	32 17 6	2 2		12			6 187 4		5 4			SCNH 1		1 NDBypass
072663	83 84 85 86	14 2	21 11 6	1	5	6	2 2	3	7 170 4		S			SCNH 1		
072741	63 64 65 86				20				32 11		4		2 12 1			
072629	85 66 87 88	4	7 2				2		19 3	2	4		6			
073124	84 65 86 67 88 89	4 2	6 2		2	5 6	8 6 1	44 86 167	155 142 28	2 5 6 3	4		5 9 88 36	1 1		
073127	65 86 87 88 89	5 6	4 23		2 6	8 8	15 17 7		37 165 23	19	4		2 12			
073326	86 87 88 89 90	3 21 7			2	22 7 8	2 5 5	21 43 69	5	127 157 68 13	14 6 5 5	4 7	26 79 125 3	1 2	LWSH 1	
073162	87 88 89 90				2		3 7		9 30 20	4 2	4		6 3	1		

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Appendix B. (cont.)

Br. Yr.	CWT Code	CWT Rel.	Total Rel.	Estimated Recoveries		Year Rec.	Age	Oregon												
				No.	%			Ocean			Freshwater									
								Com	Trawl	Spt	Col. R. Gillnet	Test Net Fishery	Spt	Hatch	Trap	Treaty Subsels	Spawn Ground			
84	073327	88398	208815	123	0.14	88	2					29				70				
				319	0.38	87	3	5	14			93		5						
				1545	1.75	88	4	38	4			477	1	5		32				
				712	0.81	89	5	2	4			339				13				9
				82	0.09	90	6					35				1				
				1	0.00	91	7													
			Totals	2782	3.15															
85	073833	20838	197432	2	0.01	87	2													
				50	0.24	88	3					17								
				59	0.29	89	4					34								
				22	0.11	90	5													
				21	0.10	91	6													
			Totals	154	0.75															
85	073834	21335	198153	16	0.07	88	3								9					
				45	0.21	89	4					20								
				16	0.07	90	5					8								
				0	0.00	91	6													
			Totals	77	0.36															
85	073835	20890	197488	3	0.01	87	2													
				8	0.04	88	3	4		3										
				24	0.12	89	4					15								
				38	0.18	90	5					15								
				4	0.02	91	6													
			Totals	77	0.37															
85	073836	20170	198952	24	0.12	88	3	2				7			1					
				60	0.30	89	4					29								
				12	0.06	90	5					12								
				3	0.01	91	6					3								
			Totals	99	0.49															
85	073837	20882	187788	5	0.02	87	2													
				34	0.18	88	3					7								
				35	0.17	89	4					7								
				24	0.11	90	5					14								
				1	0.00	91	6													
			Totals	99	0.47															
85	073838	20815	208103	2	0.01	87	2													
				13	0.06	88	3					6								
				40	0.19	89	4					18								
				23	0.11	90	5					11								
				1	0.00	91	6													
			Totals	79	0.38															
85	073839	21659	208958	5	0.02	87	2					4								
				22	0.10	88	3	4				15								
				60	0.28	89	4					40								
				28	0.13	90	5					23								
				3	0.01	91	6													
			Totals	118	0.54															
85	073840	20269	207550	5	0.02	87	2													
				15	0.07	88	3	1				4								
				68	0.34	89	4					25								
				28	0.14	90	5					18								
				0	0.00	91	6													
			Totals	116	0.57															

Appendix B. (cont.)

CWT Code	Year Rec.	Washington								Calif. Ocean		Canada Ocean Net & Seine			Alaska Ocean		FWS Freshwater	
		Ocean				Freshwater				Com.	Spt.	Com.	Seine	Spt.	Com.	Spt.	Hatch.	Trap
		Com.	Spt.	Net & Seine	Treaty Troll	Spt.	Hatch.	Trap	Spawn Ground									
073327	86							3	6			5	9		1			
	87							8				25	68	38	9	2		
	88	89	28	2	10	18	24	17	21			680	1	8	49	1		
	89	12	9	1	69	14	20		35			196	4	6	49			
	90																	
	91							1				11		4	31			
073833	87														2			
	88				2			1	21			4	5					
	89							3				17			5			
	90							2				15			5			
	91								21									
073834	88							1				2		4				
	89				1							22			2			
	90											6			2			
	91																	
073835	87																	
	88							4										
	89							3				4			2			
	90		8					2				3			10			
	91											4						
073836	88											12			2			
	89							4	17			3	2		5			
	90																	
	91																	
073837	87												5					
	88							1	21			5						
	89							3	17			8						
	90							1				3			6			
	91							1										
073838	87												2					
	88					5		2										
	89							3				4			15			
	90							1				11						
	91														1			
073839	87							1										
	88											3						
	89						1	3	1 - Col. R. net @ P. R.			11			5			
	90							1				4						
	91											3						
073840	87							1						4				
	88							2										
	89							5				8						
	90							2				36			2			
	91														10			

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Appendix B. (cont.)

CWT Code	Year Rec.	Washington						Calif. Ocean	Canada			Alaska		FWS	
		Ocean			Freshwater				Com.	Seine	Spt.	Corn.	Spt.	Hatch.	Trap
		Corn.	Spt.	Seine	Troll	Spt.	Hatch.								
073841	88 89 90 91		1				2	21		1 3 3			2 5		
073042	88 89 90 91						5			7 9			1 8		
073823	87 88 89 90 91		3				1			39 8 4	5 4	4 7	1 6 10	2 1 1	
073024	87 88 89 90 91		4				10			6 24 19	2		1 13 9		
073025	67 88 89 90 91 92		8				2			31 22 4	2	4	7 10	1 1	
073626	07 88 89 90 91 92		2				5			31 9	3 3	4 4	2 1 10		
073627	07 88 89 90 91		6				5			31 13	2 2	4 4	10 5	1	1 42
073020	66 88 89 90 91		3				9			2 40 20 3	4 5 4		2 7 4	1 1	
073629	88 89 90 91		2				4			46 9 1	3	8	12 16	1	1

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Appendix B. (cont.)

CWT Code	Year Rec.	Washington							Calif. Ocean	Canada ocean Net & spt.			Alaska Ocean		FWS Freshwater	
		Ocean			Freshwater					Corn.	Seine	spt.	Corn.	Spt.	Hatch.	Trap
		Com.	Spt.	Seine	Troll	Spt.	Hatch.	Trap								
073830	67 88 89 90 91					3				6 28 18 3	6 6 4		4 6 27			
073831	88 89 90 91					5 1				31 21	8 6		a 10		1	
073832	67 88 as 90 91			5		7				1s 23 4	2 6	10	6 24 1			
073912	88 89 00 91 92									24 36 8	3 3		2 33		1	
073913	88 89 90 91 92									30 47 3	3 6 3	4 4	4 8 22 16		1	
073914	88 89 90 91 92								5	32 51 11	3 2		1 44 7		1	
073915	90 91 92															
073916	90 91 92															
074035	a9 90 91															
074036	88 89 90 91 92									3 301 41	25 6	4 4	4 61 24		1	











Appendix B. (cont.)

CWT Code	Year Rec.	Washington								Calif. Ocean	Canada ocean Net & Spt.	Alaska Ocean		Fws Freshwater	
		Ocean				Freshwater						Corn.	Spt.	Hatch.	Trap
		Corn.	Spt.	Net & Seine	Treaty Troll	Spt.	Hatch.	Trap	Spawn Ground						
075403	91 92 93						3		1		14		4		
075404	91 92 93				2 2		4		3		3 7				
075405	91 92 93		1						1						
075325	91 92 93										4				
075326	91 92 93										2				
075327	91 92 93		2						1						
075322	91 92 93														
075323	91 92 93														
075324	91 92 93														
075225	82 83														
075226	82 83														
075326	92 93														
075449	92 93						2								

Appendix S. (cont.)

Br. Yr.	CWT Code	CWT Rel.	Total Rel.	Estimated Recoveries		Year Rec.	Age	Oregon										
				NO.	%			Ocean			Freshwater							
								Com Trawl	Spt Gillnet	R. Test Net Fishery	Spt Hatch	Trap	Treaty Spawn Subs	Ground				
so	070016	4630 1	<del>9956</del> 1	1	0.00	92	2											
				<u>14</u>	0.03	93	3			10								1
			Totals	15	0.03													
90	075450	51614	52503	1	0.00	92	2											
				<u>10</u>	0.02	93	3			2		2						2
			Totals	11	0.02													
90	075451	52444	52664	8	0.02	92	2											
				<u>8</u>	0.02	03	3			5								2
			Totals	16	0.03													3
90	075563	26173	2646 1	0	0.00	92	2											
				3	0.01	93	3											3
			Totals	3	0.01													
SO	075601	24762	26565	0	0.00	92	2											
				<u>8</u>	0.03	93	3			7								1
			Totals	8	0.03													
90	075602	25476	26606	1	0.00	92	2											
				<u>10</u>	0.04	93	3	4				3						1
			Totals	11	0.04													3
90	075560	25720	25662	7	0.03	92	2											
				<u>1</u>	0.00	93	3			8								
			Totals	6	0.03													
90	075561	25425	25706	1	0.00	92	2											
				<u>8</u>	0.03	93	3			6								2
			Totals	9	0.04													
90	075562	22309	23295	1	0.00	92	2											
				5	0.02	93	3			3								2
			Totals	6	0.03													

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/1 The adult returns from the 1986-90 brood are incomplete.

Appendix B. (cont.)

CWT Code	Year Rec.	Washington							Calif. Ocean	Canada Ocean Net.6			Alaska Ocean		FWS Freshwater	
		Ocean				Freshwater				Corn.	Seine	Spt.	Corn.	Spt.	Hatch.	Trap
		Corn.	Spt.	Net & Seine	Treaty Troll	Spt.	Hatch.	Trap								
070016	92 93			3												
075450	92 93			4												
075451	92 93						3				3					
075563	92 93															
075601	92 93															
075602	92 93															
075560	92 93															1
075561	92 93														1	
075562	92 93															1

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Appendix C. Liberation and survival information for spring chinook salmon released in the Umatilla River.

Brood	CWT Coda	CWT Released	Total Released	Estimated Recoveries		Year Recov.	Age at Recov.	Oregon			
				Number	%			Hatch.	Col. R. Sport	Col. R. Gillnet	
86	074325	26640	35946	3	0.011	88	2	2	Bonn.	1	2
				8	0.030	89	3				
				177	0.664	90	4				
				65	0.244	91	5				
				Totals	253	0.950					
86	074326	25863	35148	0	0.000	88	2			26	3
				4	0.015	89	3				
				173	0.669	90	4				
				67	0.259	91	5				
				Totals	244	0.943					
86	074327	25853	35137	0	0.000	88	2			7	1
				4	0.015	89	3				
				166	0.642	90	4				
				74	0.286	91	5				
				Totals	244	0.944					
86	074328	26319	64142	1	0.004	88	2	1	Bonn.		
				6	0.023	89	3				
				125	0.475	90	4				
				40	0.152	91	5				
				Totals	172	0.654					
86	074329	25722	62991	2	0.008	88	2	2	Bonn.		
				4	0.016	89	3				
				80	0.311	90	4				
				38	0.148	91	5				
				Totals	124	0.482					
86	074330	26252	64013	0	0.000	88	2			1	4
				0	0.000	89	3				
				169	0.644	90	4				
				72	0.274	91	5				
				Totals	241	0.918					
87	074420	410	416	0	0.000	89	2				
				0	0.000	90	3				
				0	0.000	91	4				
				Totals	0	0.000					
87	074423	393	399	0	0.000	89	2				
				0	0.000	90	3				
				1	0.254	91	4				
				Totals	1	0.254					

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Appendix C (cont.)

CWT Code	Year Recov.	Oregon				Wash		Wash./Idaho Hatch. & Trao
		Test Net Fishery /1	Indian Ceremonial /1	Umatilla R. Fish Trap	Umatilla R. Spawn Surveys	Spat	Treaty Troll	
074325	88							1
	89			8				Cowlitz
	90		11	15	148			
	91		6	2	55			
074326	88			4				
	89							
	90		12	15	114	3	FW	
	91	1	8	10	29			
074327	88							
	89							
	90	1	17					7
	91		6					Tucannon
074326	88			6				
	89							
	90	1	11	9	102			
	91	1	6	12	21			
074329	88			4				
	89							
	90		15	16	46			2
	91	1	9	10	13			1-IDFG Hatch. 1 Hell Canyon trap
074330	88							
	89							
	90	2	11	17				1
	91	1	11	14				IDFG Hatch.
074420	a9							
	90							
	91							
074423	89							
	90							
	91							

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Appendix C (cont.)

Brood	CWT Code	CWT Released	Total Released	Estimated Recoveries		Year Recov.	Age at Recov.	Oregon		
				Number	%			Hatch.	Col. R. Sport	Col. F. Gillnet
87	074424	376	381	0	0.000	89	2			
				0	0.000	90	3			
				1	0.266	91	4			
				Totals	1	0.266				
87	074427	25987	26109	0	0.000	89	2			
				0	0.000	90	3			
				15	0.058	91	4			
				Totals	15	0.058				
87	074429	24070	24183	0	0.000	89	2			
				2	0.008	90	3			
				21	0.087	91	4			
				5	0.021	92	5			
				Totals	28	0.116				
87	074430	25356	25475	0	0.000	89	2			
				0	0.000	90	3			
				21	0.083	91	4			
				1	0.004	92	5			
				Totals	22	0.087				
87	074433	25427	26135	0	0.000	89	2			
				5	0.020	90	3			
				85	0.334	91	4			
				0	0.000	92	5			
				Totals	90	0.354				
87	074434	27004	27756	0	0.000	89	2			
				2	0.007	90	3			
				57	0.211	91	4			
				8	0.030	92	5			
				Totals	67	0.243				
87	074436	25386	28093	0	0.000	89	2			
				3	0.012	90	3			
				54	0.213	91	4			
				8	0.032	92	5			
				Totals	65	0.256				
87	074439	27585	28153	1	0.004	89	2	1	Boon	10
				0	0.000	90	3			
				76	0.276	91	4			
				12	0.044	92	5			
				Totals	89	0.323				

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Appendix C (cont.)

CWT Code	Year Recov.	Oregon				Wash.		Wash./Idaho Hatch. & Trap
		Test Net Fishery /1	Indian Ceremonial /1	Umatilla R. Fish Trap	Umatilla R. Spawn Surveys	Sport	Treaty Troll	
074424	89							
	90							
	91			1				
074427	89							
	90							
	91				8			
074429	89							
	90							
	91		3		13			
	92				5			
074430	89							
	90							
	91			8	13			
	92			1				
074433	89							
	90			5				
	91		11	19	55			
	92							
074434	89							
	90			2				
	91		9	23	25			
	92			3	5			
074436	89							
	90			3				
	91	1	11	13				
	92		2	1				
074439	89							
	90							
	91	1	10	23	42			
	92		2					

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Appendix C (cont.)

Brood	CWT Code	CWT Released	Total Released	Estimated Recoveries		Year Recov.	Age at Recov.	Oregon					
				Number	%			Hatch.	Col. F. sport	Col. R. Gillnet			
87	074 440	27550	28116	0	0.000	89	2						
				3	0.011						90	3	
				84	0.305						91	4	
				4	0.015						92	5	
				Totals	91						0.330		
87	074443	24165	24663	2	0.008	89	2	2	Bonn.				
				2	0.008						90	3	
				74	0.306						91	4	
				7	0.029						92	5	
				Totals	85						0.352		
88	075063	24801	24968	1	0.004	90	2	1	Bonn.				
				2	0.008						91	3	
				8	0.024						92	4	
				5	0.020						93	5	
				Totals	14						0.056		
88	075101	28109	28299	0	0.000	90	2						
				0	0.000						91	3	
				11	0.039						92	4	
				22	0.078						93	5	
				Totals	33						0.117		
88	075102	27299	27483	1	0.004	90	2	1	Bonn.				
				2	0.007						91	3	
				10	0.037						92	4	
				12	0.044						93	5	
				Totals	25						0.092		
88	075103	27137	27287	2	0.007	91	3						
				6	0.022						92	4	
				10	0.037						93	5	
				Totals	18						0.066		
				88	075104						28560	28718	5
18	0.063	92	4										
9	0.032	93	5										
Totals	32	0.112											
88	075105	27695	27848			1	0.004	91	3				
				4	0.014	92	4						
				8	0.029	93	5						
				Totals	13	0.047							
				88	075106	26638	38224				1	0.004	
2	0.008	91	3										
67	0.252	92	4										
58	0.218	93	5										
Totals	128	0.481											

Appendix C (cont.)

CWT Code	Year Recov.	Test Net Fishery/i	Oregon			Wash.		Wash./Idaho Hatch. & Trap
			Indian Ceremonial	Umatilla R. /1 Fish Trap	Umatilla R. Spawn Surveys	sport	Treaty Troll	
074440	89							
	90				2	1		
	91	1	11	30	42			
	92		2	1		1		
074443	89				2			
	90				19	42		
	91	2	11	2	5			
	92							
075083	91				1			
	92	1			2			1
	93				1	2		Tucannon R.
075101	90							1
	91							IDFG
	92				4	5		1
	93				2	20		Dwarshak Hatch.
075102	90							
	91				2			
	92				8			
	93				2	10		
075103	91				2			
	92				6			
	93					8		
075104	91				5			
	92				4			
	93				1	8		
075105	91				1			
	92				4			
	93					8		
075108	90							1
	91				2			IDFG
	92	1	13	28	23			
	93		7	5	48			

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Appendix C (cont.)

Brood	CWT Code	CWT Released	Total Released	Estimated Recoveries		Year Recov.	Age at Recov.	Hatch.	Oregon Cot. R. Sport	Col. R. Gillnet
				Number	%					
88	075107	26160	37538	1	0.004	91	3			10
				81	0.310	92	4			
				83	0.317	93	5			
				Totals	165	0.631				
88	075108	26888	38583	0	0.000	91	3	1 Wensha		16
				57	0.212	92	4			
				70	0.260	93	5			
				Totals	127	0.472				
88	075109	25611	39012	1	0.004	90	2	1 Bonn.		20
				2	0.008	91	3			
				72	0.281	92	4			
				107	0.418	93	5			
				Totals	182	0.711				
88	075110	26307	40072	6	0.023	91	3		5	9
				85	0.323	92	4			
				104	0.395	93	5			
				Totals	195	0.741				
88	075111	25172	38343	0	0.000	90	2			2
				3	0.012	91	3			
				45	0.179	92	4			
				77	0.306	93	5			
				Totals	125	0.497				
89	075114	25947	33473	0	0.000	92	3			
				58	0.224	93	4			
				Totals	58	0.224				
89	075115	25921	33440	2	0.008	92	3			
				45	0.174	93	4			
				Totals	47	0.181				
a9	075116	26039	33593	0	0.000	92	3			
				62	0.238	93	4			
				Totals	62	0.238				
89	075440	24365	31932	30	0.123	93	4			
89	075441	24559	32187	31	0.126	93	4			
89	075442	24441	32032	32	0.131	93	4			
89	074505	26670	26757	3	0.011	93	4			
89	074506	26717	26805	2	0.007	93	4			
89	074507	26788	26876	0	0.000	93	4			

Appendix C (cont.)

CWT Code	Year Recov.	Test Net Fishery/I	Oregon			Wash.		Wash./Idaho Hatch. 8 Trao
			Indian Ceremonial /1	Umatilla R. Fish Trap	Umatilla R. Spawn Surveys	Soort	Treaty Troll	
075107	91				1			
	92			17	22	32		7
	93			9	4	70		5 Tucannon Hatch. 1 Dwarshak Hatch. 1 Tucannon River
075108	91							
	92			7	24	9		1
	93			9	7	54		Chewack R.
075109	90							
	91							
	92			7				1
	93	1		7				Chiwawa R.
075110	91				6			
	92	2		22	24	27	1	2
	93			13	10	76		1 Dwarshak H. 1 Nason Cr.
075111	90							2
	91				3			IDFG
	92	1		11	22			7
	93			11	5			1 Koskia Hatch. 1 Leavenworth Hatch. 1 Dwarshak Hatch. 1 Wells Dam sp. ch. 1 Tucannon R. 1 Nason Cr. 1 Icicle Cr.
075114	92							
	93			9	12	32		
075115	92				2			
	93			5	14	26		
075116	92							
	93			5	29	28		
075440	93				12	18		
075441	93				17	14		
075442	93			5	13	14		
074505	93				1	2		
074506	93					2		
074507	93							

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Appendix C (cont.)

Brood	CWT Code	CWT Released	Total Released	Estimated Recoveries		Year Recov.	Age at Recov.	Hatch.	Oregon Col. R. Spat	Col. R. Gillnet
				Number	%					
89	074508	25876	26050	2	0.008	93	4			
89	074509	26104	26279	0	0.000	93	4			
89	074510	25497	25669	2	0.008	93	4			
89	635661	23797	96733	37	0.155	93	4			
90	075626	26769	27040	3	0.011	93	4			
90	075827	26737	27007	4	0.015	93	4			
90	075828	26827	27098	2	0.007	93	4			
90	075829	25499	28019	0	0.000	93	4			
90	075830	25382	25900	1	0.004	93	4			
90	075831	26029	26561	1	0.004	93	4			
90	075835	26570	36351	1	0.004	93	4			
90	075836	26426	36154	0	0.000	93	4			
90	075837	26750	36596	0	0.000	93	4			
90	075832	25503	32994	0	0.000	93	4			
90	075833	25472	32953	1	0.004	93	4			
90	075834	25493	32982	2	0.008	93	4			

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/1 Columbia River.

Appendix C (cont.)

CWT Code	Year Recov.	Test Net Fishery/I	Indian Ceremonial	Oregon		Wash.		Wash./Idaho Hatch. & Trap
				/1	Umatilla R. Fish Trap	Umatilla R. Spawn Surveys	Sport	
074508	93			2				
074509	93							
074510	93					2		
835661	93	1		16		14		
075826	93							
075827	93					1		
075828	93					1		
075829	93							
075830	93							
075831	93							
075835	93					1		
075836	93							
075837	93							
075832	93							
075833	93					1		
075834	93					2		

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Appendix D. Liberation and survival information for coho salmon released in the Umatilla River, wa

Brood	CWT Code	CWT Released	Total Released	Estimated Recoveries		Year Recov. A g e	Oregon										
				NO.	%		Ocean			Freshwater							
							Comm.	Sport	Col. R. Gillnet	Test Net Fishery	Sport Hatch.	Uma.R.					
85	073617	13440	212266	1	0.01	a7	2										
				251	1.17	88	3	83	20	77	1	4	1 Case 2 Case	15			
			Total	252	1.18												
a5	073624	19879	313061	0	0.00	a7	2										
				314	1.58	88	3	96	52	62		6	6 Case	10			
			Total	314	1.58												
a5	073625	26740	422322	0	0.00	a7	2										
				400	1.50	88	3	158	40	99		5	4 Case 1 Bonn.	12			
			Total	400	1.50												
86	074356	20592	334038	44	0.21	88	2			16							
				898	4.36	69	3	202	126	171			8 Case 1 Trask	28 147			
			Total	942	4.57												
66	074357	19663	360689	32	0.17	66	2										
				805	4.25	69	3	207	116	126		3	4 Case 1 Rock Cr 1 Salmon R SGS	32 170			
			Total	837	4.41												
86	074358	16513	301706	28	0.15	66	2										
				783	4.28	89	3	189	129	117	1	6	6 Case 1 Bonn.	28 168			
			Total	811	4.43												
a7	074809	27062	829607	10	0.04	a9	2										
				144	0.53	90	3	32	24	2		32	4 Case	10 9			
			Total	154	0.57												
87	074610	26416	72627	18	0.07	89	2										
				256	0.97	90	3	23	68	24			6 Case 1 Bonn.	18 19			
			Total	274	1.04												
87	074611	26739	64672	22	0.06	so	2										
				266	0.90	90	3	55	35	16			12 Case 1 Bonn.	20 18			
			Total	288	1.08												
88	074814	26033	67309	35	0.12	90	2			4							
				823	2.94	91	3	127	65	238	2	37	6 Case 30 Case 11 Bonn. /o	16 65			
			Total	858	3.06												
88	074813	26881	256524	47	0.17	90	2			16							
				785	2.92	91	3	104	130	192		48	5 Case 17 Case 14 Bonn.	25 46			
			Total	832	3.10												
88	074815	27226	65095	42	0.15	90	2			2							
				1056	3.88	91	3	162	146	216	3	99	8 Case 49 Case 20 Bonn.	28 67			
			Total	1098	4.03												
89	075535	24584	152974	4	0.02	91	2										
				45	0.18	92	3		15	6				4			
			Total	49	0.20												
as	075534	25338	449678	7	0.03	91	2										
				35	0.14	92	3		13	10		4	1 Case 2 Case	6 2			
			Total	42	0.17												

Revised: 2-14-94

File Name: C:\123R2\FILES\COHSURV3

Appendix D. (cont.)

CWT Code	Year Recov.	Washington							California Ocean		Canada Ocean			FWS
		Ocean				Fw			Comm.	spt.	Comm.	spt.	Net & Seine	Hatch.
		Comm.	Spt.	Net & Seine	Treaty Troll	Buoy 1	0	Hatch. Spt.						
073617	07 88		6				27		4	7	5			
073624	07 66		5				15		13	17	10			
073825	a7 88						27	1	10	7	16			1 LWS
074356	88 89	11	52	4	18	56	1/3		20	30	36	5	0	
074357	66 60	6	44		16	57			6	12	31	3		
074356	88 60	19	52		22	36		1	11	17	11		6	
074609	60 00		4			6			10	12				
074610	as 90	2	33		3	11			35	21	6			
074611	89 90	37	29		5	6			28	16	7			
074814	00 91	28	33			3 103			14	48			3	1 Kalama R Spawns
074613	90 01	10	24			1 116			32	34	18			
074815	90 91	16	2 43			127			49	49	7		2	1 LWS
075535	91 92	2	13											
075534	01 02		4											

Revised: 2-14-94

File Name: C:\123R2\FILES\COHSURV3



Appendix D. (cont.)

CWT Code	Year Recov.	Washington							California Ocean		Canada Ocean			FWS
		Ocean			Treaty Troll	Fw			Comm.	Spt.	Comm.	Spt.	Net & seine	Hatch.
		Comm.	spt.	Net & Seine		Buoy 10	Hatch	spt.						
075533	91 92		10											
075620	92 03		11		6		10		11					
075621	82 93		33		to		17		18					
075622	92 93		15		21				18					
071521	93													
071522	93													
071523	93													

Revised: 2-14-94

File Name: C:\123R2\FILES\COHSURV3

Appendix E. Umatilla River summer steelhead broodstock collection in 1992-93.

Date Collected	Opercle Mark	Ad LV		Total Ad LV	Unmarked		Total Unmarked	Total		Total
		Male	Female		Male	Female		Male	Female	
11-23	3ROP	0	0	0	0	1	1	0	1	1
11-30	3ROP	0	0	0	1	0	1	1	0	1
12-28	3LOP	0	0	0	1	1	2	1	1	2
2-1	2LOP	0	0	0	4	4	8	4	4	8
2-11	2LOP	0	0	0	2	2	4	2	2	4
2-1 4	2LOP	0	0	0	2	3	5	2	3	5
3-6	1 ROP	0	1	1	0	0	0	0	1	1
3-8	1 ROP	3	3	6	4	5	9	7	8	15
3-12	1 ROP	6	4	10	7	5	12	13	9	22
3-15	1 ROP	6	7	13	0	0	0	6	7	13
3-19	1 ROP	1	0	1	4	4	8	5	4	9
3-23	1 ROP	4	4	8	0	0	0	4	4	8
3-29	1 ROP	9	8	17	7	5	12	16	13	29
3-30	1 ROP	5	7	12	2	2	4	7	9	16
3-31	1 ROP	0	0	0	3	4	7	3	4	7
4-1	1LOP	4	4	8	3	3	6	7		14
4-2	1LOP	4	10	14	10	8	18	14	15	32
4-a	1LOP	0	0	0	6	6	12	6	6	12
4-1s	1LOP	0	0	0	2	2	4	2	2	4
4-20	1LOP	0	0	0	1	3	4	1	3	4
4-22	1LOP	0	0	0	2	2	4	2	2	4
4-26	1LOP	0	0	0	2	0	2	2	0	2
5-11	1LOP&I ROP	0	1	1	1	1	2	1	2	3
Totals		42	49	91	64	61	125	106	110	216

Revised: 12/15/93

File Name: C:\123R3\DATA\93BRCOL

Appendix F. Summer steelhead broodstock spawning at Minthorn Acclimation Facility in 1993.

Date Spawned	Fish No.	Sex	Family No.	Fork Ln. mm	MEHP In mm	Weight gms.	Opercle Mark /a	Month Collected	Green Eggs	Eyed Eggs
3/30/93	1	F	/b 1	760	648	3840	1ROP	March		
	2	F	1	727	615	4090	2LOP	February		
	3	M	/b 1	632	530	2140	1ROP	March		
	4	M	1	736	604	3430	2LOP	February		
									11,390	10,809
4/7/93	5	F	2	678	665	2190	3ROP	November		
	6	F	2	700	595	2370	2LOP	February		
	7	F	2	695	595	2240	1ROP	March		
	8	M	2	753	630	3410	1ROP	March		
	9	M	2	646	540	2390	1ROP	March		
	10	M	2	723	690	3320	1ROP	March		
	11	F	3	- -	445	1050	1ROP	March		
	12	M	3	642	520	2160	3LOP	December		
									22,392	21,930
4/14/93	13	F	4	676	570	2440	1ROP	March		
	14	F	4	602	505	1410	3LOP	December		
	15	F	4	757	650	2940	1LOP	April		
	16	M	4	709	575	2920	1ROP	March		
	17	M	4	826	675	4590	1LOP	April		
	18	M	4	720	590	2560	1LOP	April		
	19	F	5	786	670	2980	2LOP	February		
	20	F	5	666	570	2380	1ROP	March		
	21	F	5	- -	575	2150	1ROP	March		
	22	M	5	725	605	2950	1ROP	March		
	23	M	5	760	640	3820	3ROP	November		
	24	M	5	608	505	1950	1ROP	March		
	25	F	6	756	635	2760	1ROP	March		
	26	M	6	636	515	2040	1ROP	March		
27	M	Green	634	515	2100	1LOP	April			
									35,742	24,108
4/21/93	28	F	7	634	535	1780	1ROP	March		
	29	F	7	684	585	2150	2LOP	February		
	30	F	7	650	555	2110	1ROP	March		
	31	M	7	573	475	1770	1ROP	March		
	32	M	7	617	510	2010	1ROP	March		
	33	M	7	715	595	2770	1LOP	April		
	34	F	8	650	560	2210	1LOP	April		
	35	F	8	640	565	2470	1ROP	March		
	36	M	8	595	490	1830	1ROP	March		
	37	M	8	584	490	1590	1LOP	April		
4/28/93	38	F	9	725	610	2580	2ROP	February		
	39	F	9	740	640	2940	1LOP	April		
	40	F	9	623	525	1670	1LOP	April		
	41	M	9	585	500	1850	2LOP	February		
	42	M	9	770	640	3410	1ROP	March		
43	M	9	695	510	1740	1LOP	April			
									15,331	12,727
5/6/93	44	F	10	- -	600	2670	1ROP	March		
	45	F	10	700	590	2370	1LOP	April		
	46	F	10	- -	650	2990	1LOP	April		
	47	M	10	- -	590	2660	1ROP	March		
	48	M	10	- -	510	1970	1ROP	March		
	49	M	10	780	610	3180	1ROP	March		
	50	F	11	- -	580	2230	1ROP	March		
	51	F	11	723	615	2470	1ROP	March		
	52	F	11	705	605	2400	1ROP	March		
	53	M	11	660	470	1380	1LOP	April		
	54	M	11	676	560	2720	1LOP	April		
	55	M	11	545	452	1350	1LOP	April		
	56	M	Green	563	470	1400	1LOP	April		
57	M	Green	665	575	2670	1LOP	April			
									36,143	35,948

Appendix F. (Cont)

Date Spawned	Fish No.	Sex	Family No.	Fork Ln mm	MEHP Ln. mm	Weight gms.	Opercle Mark II	Month Collected	Green Eggs	Eyed Eggs	
5/12/93	58	F	12	--	610	--	1ROP	March			
	59	F	12	--	525	--	1 LOP	April			
	60	F	12	736	610	--	1 LOP	April			
	61	M	12	572	480	--	1ROP	March			
	62	M	12	588	490	--	1LOP	April			
	63	M	12	592	495	--	1ROP	March			
	64	F	13	568	490	--	1LOP	April			
	65	F	13	591	500	--	1 LOP	April			
	66	F	13	710	610	--	1LOP	April			
	67	M	13	659	645	--	1LOP	April			
	68	M	13	791	680	--	1ROP	March			
	69	M	13	564	500	--	1LOP	April			
	70	F	14	665	560	--	1ROP	March			
	71	F	14	592	510	--	2LOP	February			
	72	F	14	--	610	--	1ROP	March			
	73	M	14	610	610	--	1LOP	April			
	74	M	14	592	490	--	1LOP	April			
	75	M	14	605	495	--	1ROP	March			
	76	F	15	717	610	--	1 LOP	April			
	77	F	15	680	580	--	1ROP	March			
	70	F	15	590	520	--	1LOP	April			
	79	M	15	582	490	--	1ROP	March			
	80	M	15	759	635	--	1LOP	April			
	81	M	15	677	560	--	2LOP	February			
	82	F	/b	16	570	475	--	1LOP&1ROP	May		
	83	F		16	636	705	--	1LOP&1ROP	May		
	84	F		16	--	490	--	2LOP	February		
	85	M		16	--	510	--	1LOP	April		
	66	M		16	726	600	--	1LOP&1ROP	May		
	a7	M		16	536	460	--	1LOP	April		
									72,209	66,640	
5/19/93	88	F	17	676	573	2090	1ROP	March			
	89	F	17	615	610	2500	1LOP	April			
	90	F	17	--	500	1460	1LOP	April			
	91	M	17	--	495	1730	1LOP	April			
	92	M	17	z	480	1640	2LOP	February			
	93	M	17	535	440	1360	1LOP	April			
	94	F	18	--	650	3410	1LOP	April			
	95	F	10	559	470	1220	2LOP	February			
	96	F	16	712	695	2340	2LOP	February			
	97	M	18	545	465	1380	1ROP	March			
	98	M	18	570	490	1660	1ROP	March			
	99	M	18	588	550	1700	1LOP	April			
	100	F	19	--	660	2630	1ROP	March			
	101	M	19	560	495	1700	1LOP	April			
102	M	Sad Milt	570	490	1659	1ROP	March				
103	F	Green	680	590	31m	1LOP	April				
									33,204	29,806	
TOTAL									255.44	1	222,940
FECUNDITY									6,213		

Revised: 12/16/93

File Name: 123R3\DATA\SPAWN93

/a 1LOP = one left opercle hole punch, 2LOP = two left opercle hole punches, 3LOP = three left opercle hole punches.  
 1ROP = one right opercle hole punch, 2ROP = two right opercle hole punches, 3ROP = three right opercle hole punches.  
 /b Hatcheryfish.

Appendix G. Disposition of fall chinook salmon broodstock held at Minthorn Acclimation Facility in 1993.

Date	Fish No.	Disposition	Family No.	Sex	Weight (gms)	Fork Ln. (mm)	MEHP Ln. (mm)	Fin Marks	Scale No.	Card Pos.	Green Eggs	Eyed Eggs
10/11/93	1	Mortality	- -	M	2920	a30	518	None	93-1	1		
	2	.	- -	M	3350	889	558	RV	93-1	2		
10/19/93	3	Mortality	- -	M	3220	667	524	AdRV	93-1	3		
	4	.	- -	F	3250	686	554	RV	93-1	4		
	5	.	- -	M	5740	822	654	None	93-1	5		
10/27/93	6	Mortality	- -	M	6760	848	658	None	93-1	6		
10/29/93	7	Mortality	- -	F	5810	766	657	None	93-1	7		
11/1/93	8	Mortality	- -	M	10970	1020	617	None	93-1	8		
	9	.	- -	F	8800	965	805	"	93-1	9		
11/3/93	10	Mortality	- -	F	9300	911	764	None	93-1	10		
	11	.	- -	M	2430	634	525	"	93-1	11		
	12	.	- -	F	2510	654	545	Ad	93-1	12		
	13	.	- -	M	3070	583	584	RV	93-1	13		
	14	.	- -	M	7500	884	701	None	93-1	14		
	15	.	- -	M	3890	701	572	"	93-1	15		
	16	.	- -	M	4220	735	588	RV	93-1	16		
	17	.	- -	M	5970	866	702	None	93-1	17		
	18	.	- -	F	4050	762	647	.	93-1	18		
	11/4/93	19	Spawned	1	F	9150	075	805	None	93-2	5	
20		.	1	F	3950	630	592	Ad	93-2	6		
21		.	1	F	4170	740	650	RV	93-2	7		
22		.	1	F	7360	a25	728	None	93-2	8		
23		.	1	M	3870	665	593	.	93-2	1		
24		.	1	M	2670	647	553	"	93-2	2		
25		.	1	M	4000	690	597	Ad	93-2	3		
26		.	1	M	3050	645	560	None	93-2	4		
27		.	2	F	7410	694	610	RV	93-2	13		
28		.	2	F	4150	830	737	None	93-2	14		
29		.	2	F	7130	870	764	"	93-2	15		
30		.	2	F	6360	811	707	"	93-2	16		
31		.	2	M	3090	662	566	RV	93-2	9		
32		.	2	M	3610	655	567	.	93-2	10		
33		.	2	M	4680	680	582	None	93-2	11		
34		.	2	M	3310	763	643	RV	93-2	12		
35		.	3	F	4796	639	551	.	93-3	1		
36		.	3	F	3200	775	672	None	93-3	2		
37		.	3	F	7810	673	766	"	93-3	3		
39		.	3	F	9040	920	815	"	93-3	4		
39		.	3	M	3210	668	563	RV	93-2	17		
40		.	3	M	2190	574	465	AdBT	93-2	18		
41		.	3	M	1940	550	472	RV	93-2	19		
42		.	3	M	5100	770	652	"	93-2	20		
43		.	4	F	7330	645	740	None	93-3	9		
44		.	4	F	7240	712	611	RV	93-3	10		
45		.	4	F	4570	884	870	Ad	93-3	11		
46		.	4	F	6470	815	706	None	93-3	12		
47		.	4	M	2410	590	506	Ad	93-3	5		
48		.	4	M	4380	732	640	None	93-3	6		
49		.	4	M	9530	922	776	.	93-3	7		
50		.	4	M	7450	a65	717	LV	93-3	8		
51		.	5	F	5560	655	754	None	93-3	13		
52		.	5	F	6590	a67	755	"	93-3	14		
53	.	5	F	6490	821	720	"	93-3	15			
54	.	5	F	4360	739	640	RV	93-3	16			
55	.	5	M	2530	610	512	None	93-3	17			
56	.	6	M	7710	671	722	.	93-3	18			
67	.	5	M	3330	685	580	Ad	93-3	19			
58	.	5	M	5940	886	751	None	93-3	20			
59	.	6	F	4280	725	620	Ad	93-4	1			
60	.	6	F	6050	762	683	None	93-4	2			
61	.	6	F	3300	652	572	Ad	93-4	3			
62	.	6	F	5760	796	697	None	93-4	4			

Revised: 1/4/93

File Name: C:\123R3\DATA\93CHFBP

Appendix G. (Cont)

Date	Fish No.	Disposition	Family No.	Sex	Weight (gms)	Fork Ln. (mm)	MEHP Ln. (mm)	Fin Marks	Scale Card No.	Card Pos.	Green Eggs	Eyed Eggs	
11/4/93 (cont.)	63	Spawned	6	M	12110	1050	852	Ad	93-4	5			
	64	"	6	M	2910	625	535	None	m-4	a			
	65	"	6	M	4130	747	628	"	93-4	7			
	66	"	6	M	3090	653	545	w	93-4	8			
	67	"	7	F	5140	760	662	None	93-4	9			
	68	"	7	F	6030	a50	732	"	93-4	10			
	69	"	7	F	5870	800	685	"	93-4	11			
	70	"	7	F	4230	715	610	w	93-4	12			
	71	"	7	M	3450	680	576	None	93-4	13			
	72	"	7	M	3720	725	610	"	93-4	14			
	73	"	7	M	6490	830	700	"	93-4	15			
	74	"	7	M	3210	672	562	"	93-4	16			
	75	"	8	F	7370	a55	732	"	93-4	17			
	76	"	8	F	5130	780	665	Ad	93-4	18			
	77	"	8	F	4500	725	635	w	93-4	19			
	78	"	8	F	4240	704	607	"	93-4	20			
	79	"	8	M	4300	721	610	"	93-6				
	80	"	8	M	a010	905	880	None	93-s	2			
	81	"	8	M	13510	1090	610	W	93-5	3			
	82	"	8	M	4230	729		"	93-5	4			
	83	"	9	F	8210	a70	760	None	93-5	6			
	84	"	9	F	4230	801	705	"	93-5	7			
	85	"	9	F	5650	706	615	w	93-s	8			
	86	"	9	F	5250	750	647	None	93-5	9			
	87	"	9	M	2710	634	540	w	93-5	10			
	88	"	9	M	2950	654	555	Ad	93-5	11			
	89	"	9	M	5590	638	540	None	93-5	12			
	90	"	9	M	3150	788	666	"	93-5	13			
	91	"	10	F	4610	730	625	Ad	93-5	14			
	92	"	10	F	6980	849	735	None	93-5	15			
	93	"	10	M	4420	775	650	"	93-5	16			
	94	"	10	M	2680	645	548	W	93-5	17			
	95	Green	--	--	M	--	805	690	None	93-5			
												169737	125440
	11/4/93	96	Mortality	--	M	6790	a76	695	None	93-1	19		
97		"	--	F	5280	795	662	"	93-1	20			
11/8/93	98	Spawned	11	F	3840	705	612	None	93-5	19			
	99	"	11	F	4050	700	612	w	93-5	20			
	100	"	11	F	4280	745	656	None	93-6				
	101	"	11	F	4760	760	681	"	93-6	2			
	102	"	11	M	7420	888	772	"	93-6	3			
	103	"	11	M	4380	780	665	"	93-6	4			
	104	"	11	M	2960	664	567	"	93-6	5			
	105	"	11	M	2380	620	521	W	93-6	a			
	106	"	12	F	6760	a25	723	None	93-6	7			
	107	"	12	F	6780	880	708	"	93-a	8			
	108	"	12	F	7260	880	777	"	93-6	9			
	109	"	12	F	6960	810	714	"	93-6	10			
	110	"	12	M	3370	682	581	"	93-6	11			
	111	"	12	M	3760	887	724	"	93-6	12			
	112	"	12	M	7740	665	575	"	93-6	13			
	113	"	12	M	7510	670	570	"	93-6	14			
	114	"	13	F	3590	685	611	W	93-6	15			
	115	"	13	F	4060	660	594	"	93-6	16			
	116	"	13	F	4050	685	593	"	93-6	17			
	117	"	13	F	3680	680	588	None	93-6	18			
	118	"	13	M	3780	692	598	w	93-6	19			
	119	"	13	M	11170	1020	830	None	93-6	20			
	120	"	13	M	3750	701	592	w	93-7	1			
	121	"	13	M	8490	702	591	"	93-7	2			
	122	"	14	F	6370	821	705	None	93-7	3			
123	"	14	F	7480	850	743	"	93-7	4				
124	"	14	F	7350	a20	715	"	93-7	5				
125	"	14	F	10140	955	810	"	93-7	a				
126	"	14	M	4560	935	598	W	93-7	7				
127	"	14	M	4950	790	670	None	93-7	8				
128	"	14	M	3220	677	580	w	93-7	9				
129	"	14	M	6670	ail	690	None	93-7	10				

Revised: 1/4/93

File Name: C:\123\F3\DATA\93CHFBR

Appendix G. (Cont.)

Date	Fish No.	Disposition	Family No.	Sex	Weight (gms)	Fork Ln. (mm)	MEHP Ln. (mm)	Fin Marks	Scale No.	Card Pos.	Green Eggs	Eyed Eggs
11/8/93 (mnt.)	130	spawned	15	F	9390	as7	665	.	93-7	11	701 22	a3753
	131	.	15	F	2630	624	543	w	93-7	12		
	132	.	15	M	10260	912	665	None	93-7	13		
	133	.	15	M	8780	1020	a40	.	93-7	14		
11/8/93	134	Mortality	- -	M	1430	528	439	RV	93-5	18		
11/10/93	135	Spawned	16	F	8420	884	780	None	93-8	1	28527	26037
	136	.	16	F	6050	834	742	"	93-8	2		
	137	.	16	F	4130	726	a44	w	93-8	3		
	138	.	16	F	3360	667	589	None	93-8	4		
	139	.	16	M	7410	890	739	"	93-8	5		
	140	.	16	M	3260	675	577	w	93-8	6		
	141	.	16	M	9860	1030	854	None	93-8	7		
	142	.	16	M	3020	660	550	w	93-8	a		
	143	.	17	F	2900	a57	568	.	93-8	9		
	144	.	17	F	5570	805	703	Ad	93-8	10		
	145	.	17	F	7630	875	772	None	93-8	11		
	146	.	17	M	3310	692	603	w	93-8	12		
	147	.	17	M	2610	631	540	.	93-8	13		
	148	.	17	M	9270	920	775	None	93-8	14		
11/15/93	149	Mortality	- -	M	8460	945	762	None	93-9	1		
	150	.	- -	M	9640	980	768	"	93-9	2		
	151	.	- -	M	670	428	337	"	93-9	3		
11/16/93	152	spawned	18	F	4730	760	673	None	93-10	1	62094	52298
	153	.	18	F	7810	880	761	"	93-10	2		
	154	.	18	F	3510	740	848	.	93-10	3		
	155	.	18	F	7080	a44	722	.	93-10	4		
	156	.	18	M	3940	710	620	Ad	93-10	5		
	157	.	18	M	1740	555	479	w	93-10	a		
	158	.	18	M	9480	915	790	None	93-10	7		
	159	.	18	M	2500	617	527	w	93-10	a		
	160	.	19	F	4660	741	647	None	93-10	9		
	161	.	19	F	4770	750	643	.	93-10	10		
	162	.	19	F	3120	654	580	.	93-10	11		
	163	.	19	F	4600	697	601	.	93-10 93-10	12		
	164	.	19	M	3490	706	608	w	93-10	13		
	165	.	19	M	7590	922	782	None	93-10	14		
	166	.	19	M	1960	570	493	w	93-10	15		
	167	.	19	M	6600	a52	716	None	93-10	16		
	166	.	20	F	5760	770	667	.	93-10	17		
	169	.	20	F	6370	830	740	"	93-10	18		
	170	.	20	F	5230	777	683	Ad	93-10	19		
	171	.	20	F	4020	742	650	w	93-10	20		
	172	.	20	M	3220	661	560	None	93-11			
	173	.	20	M	2520	616	531	w	93-11	2		
	174	.	20	M	3310	685	585	None	93-11	3		
	175	.	20	M	9350	926	782	.	93-11	4		
176	.	21	F	7210	830	727	"	93-11	5			
177	.	21	F	6560	820	716	"	93-11	a			
178	.	21	F	8190	871	752	"	93-11	7			
179	.	21	F	5060	765	671	.	93-11	a			
180	.	21	M	6880	865	733	.	93-11	9			
181	.	21	M	5320	800	682	.	93-11	10			
182	.	21	M	7690	875	747	.	93-11	11			
183	.	21	M	1250	510	436	.	93-11	12			
184	.	22	F	5450	780	665	.	93-11	13			
185	.	22	F	4600	740	644	w	93-11	14			
188	.	22	M	3430	672	577	.	93-11	15			
187	.	22	M	1a40	556	494	None	93-11	16			
11/16/93	188	Mortality	- -	M	5720	- -	640	None	93-9	4		
	189	.	- -	M	3060	750	620	.	None	- -		
	190	.	- -	M	3070	- -	540	w	93-9	5		

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Appendix G. (Cont)

Date	Fish No.	Disposition	Family No.	Sex	Weight (gms)	Fork Ln. (mm)	MEHP Ln. (mm)	Fin Marks	Scale No.	Card Pos.	Green Eggs	Eyed Eggs
11/16/93 (cont.)	191	Mortality	--	F	6850	--	710	None	93-9	6		
	192	"	--	M	2320	650	530	w	93-9	7		
	193	"	--	M	2190	--	535	None	93-9	8		
	194	"	--	M	3110	--	545	w	93-9	9		
	195	"	--	M	1500	--	445	None	93-9	10		
	196	"	--	M	6250	635	874	"	93-9	11		
	197	"	--	M	5550	--	660	"	93-9	12		
	198	"	--	M	2520	--	515	w	93-9	13		
11/18/93	199	Mortality	--	M	2490	653	503	None	93-9	14		
	200	"	--	M	4700	729	629	.	93-9	15		
11/22/93	201	Mortality	--	M	4100	728	596	W	93-9	16		
	202	"	--	M	5550	815	660	None	93-9	17		
	203	"	--	M	3000	645	544	W	93-9	18		
	204	"	--	M	2820	--	536	None	93-9	19		
	205	"	--	M	1720	554	482	Ad	93-9	20		
	206	"	--	M	5330	828	693	None	93-12	1		
	207	"	--	M	2360	625	521	W	93-12	2		
	208	"	--	M	3320	--	653	.	93-12	3		
	209	"	--	M	1030	480	406	Ad	93-12	4		
	210	"	--	M	2980	675	557	w	93-1;	5		
	211	"	--	M	6210	797	654	None	93-12	a		
	212	"	--	M	2410	--	534	"	93-12	7		
	213	"	--	M	2640	--	504	w	93-12	a		
	214	"	--	M	2880	668	535	"	93-12	9		
	215	"	--	M	6260	863	698	None	93-12	10		
	216	"	--	M	6500	820	662	.	93-12	11		
	217	"	--	M	3160	665	550	"	93-12	12		
	218	"	--	M	2760	--	535	Ad	93-12	13		
	219	"	--	M	8590	968	765	None	93-12	14		
	220	"	--	M	3380	--	572	AdRV	93-12	15		
	221	"	--	M	8930	995	753	None	93-12	16		
	222	"	--	F	7910	857	715	"	93-12	17		
	223	"	--	M	4920	790	640	AdRV	93-12	18		
	224	"	--	M	2560	642	540	w	93-12	19		
	225	"	--	M	5460	a47	705	None	93-12	20		
	226	"	--	M	3770	727	595	.	93-11	17		
	227	"	--	M	5200	780	635	AdRV	93-11	18		
	228	"	--	M	1370	504	515	w	93-13	1		
	229	"	--	M	3830	745	565	Ad	93-13	2		
	230	"	--	M	5550	820	675	None	93-13	4		
	231	"	--	M	6680	905	740	"	93-13	5		
	232	"	--	M	1500	--	453	AdRV	93-13	6		
	233	"	--	M	9420	975	780	None	93-13	3		
234	"	--	M	2830	--	540	w	93-13	7			
235	"	--	M	5010	767	635	Ad	93-13	8			
236	"	--	M	6460	860	715	None	93-13	9			
237	"	--	M	2510	840	533	AdRV	93-13	10			
236	"	--	M	1080	480	385	.	93-13	11			
11/23/93	239	Mortality	--	M	9140	--	775	None	None	--		
	240	"	--	M	3550	--	535	W	"	--		
	241	"	--	M	3550	--	537	.	"	--		
	242	"	--	M	1930	--	480	Ad	"	--		
	243	"	--	M	4130	--	570	w	"	--		
	244	"	--	M	820	--	350	None	"	--		
	245	"	--	M	1630	515	415	w	"	--		
	246	"	--	M	3440	--	573	None	"	--		
	247	"	--	M	2110	--	485	AdRV	"	--		
	248	"	--	M	3440	--	545	w	"	--		
	249	"	--	M	6430	--	680	None	"	--		
	250	"	--	M	3910	--	590	.	"	--		
	251	"	--	M	3180	675	560	None	"	--		
	252	"	--	M	7050	860	705	Ad	"	--		
	253	"	--	M	5670	--	660	None	"	--		
	254	"	--	M	3640	694	555	w	"	--		
	255	"	--	M	4190	--	580	.	"	--		
	256	"	--	M	5840	--	880	None	"	--		
257	"	--	M	4090	727	605	.	"	--			
258	"	--	M	2340	--	505	RV	"	--			

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Appendix G. (Cont)

Date	Fish No.	Disposition	Family No.	Sex	Weight (gms)	Fork Ln. (mm)	MEHP Ln. (mm)	Fin Marks	Scale No.	Card Pos.	Green Eggs	Eyed Eggs
11/23/93 (cont.)	259	Mortality	--	M	1640	530	440	None	None	--		
	260	"	--	M	2490	--	525	"	"	--		
	261	"	--	M	4300	--	600	"	"	--		
	262	"	--	M	4120	765	615	"	"			
	263	"	--	M	1150	--	400	w	"			
	264	"	--	M	1770	--	452	None	"			
	265	"	--	M	5650	--	670	"	"	--		
	266	"	--	M	4660	--	600	W	"			
	267	"	--	M	2790	--	520	"	"			
268	"	--	M	3470	--	550	BT	"				
11/23/93	269	Spawned	23	F	4320	740	634	None	93-14			
	270	"	23	F	8000	676	756	"	93-14	2		
	271	"	23	F	6200	814	760	"	93-14	3		
	272	"	23	F	4670	736	634	"	93-14	4		
	273	"	23	M	8540	950	759	"	93-14	5		
	274	"	23	M	2740	644	542	W	93-14	6		
	275	"	23	M	4620	742	638	"	93-14	7		
	276	"	23	M	7230	896	753	None	93-14	8		
	277	"	24	F	2650	618	532	Ad	93-14	9		
	278	"	24	F	7560	822	730	None	93-14	10		
	279	"	24	M	7810	861	732	"	93-14	11		
	280	"	24	M	6160	811	677	"	93-14	12		
											21840	11480
11/24/93	281	Sacrificed	--	M	3190	670	550	None	93-15	1		
	282	"	--	M	2560	655	520	Ad	93-15	2		
	283	"	--	M	5610	643	675	None	93-15	3		
	284	"	--	M	4230	--	608	"	w - 15	4		
	285	"	--	M	4790	765	615	"	93-15	5		
	286	"	--	M	9020	910	715	Ad	93-15	6		
	287	"	--	M	9610	--	793	None	93-15	7		
	288	"	--	M	9720	905	765	"	93-15	8		
	289	"	--	M	5240	795	653	"	93-15	9		
	290	"	--	F	9640	954	765	"	93-15	10		
	291	"	--	M	3690	705	580	"	93-15	11		
	292	"	--	M	5110	800	665	Ad	93-15	12		
	293	"	--	M	5360	790	643	None	93-15	13		
	294	"	--	M	3080	730	605	Ad	93-15	14		
	295	"	--	M	6860	890	725	None	93-15	15		
	296	"	--	M	2400	635	520	"	93-15	16		
	297	"	--	M	7930	930	755	"	93-15	17		
	298	"	--	M	3960	730	610	"	93-15	16		
	299	"	--	M	2710	655	555	w	93-15	19		
	300	"	--	M	5330	730	645	None	93-15	20		
	301	"	--	M	4090	745	605	w	93-16			
	302	"	--	M	2610	640	530	None	93-16	2		
	303	"	--	M	4110	755	610	Ad	93-16	3		
	304	"	--	M	6390	620	742	W	93-16	4		
	305	"	--	M	3310	685	550	"	93-16	5		
	306	"	--	M	3150	--	550	None	93-16	6		
	307	"	--	M	3080	695	565	w	93-16	7		
	308	"	--	M	4520	703	630	None	93-16	8		
	309	"	--	M	3680	710	565	w	93-16	9		
	310	"	--	M	5160	645	677	None	93-16	10		
	311	"	--	M	2780	670	533	"	93-16	11		
	312	"	--	M	5400	052	680	"	93-16	12		
	313	"	--	M	2650	660	555	"	93-16	13		
	314	"	--	M	3620	740	590	w	93-16	14		
315	"	--	M	3260	665	555	"	93-16	15			
316	"	--	M	2980	663	540	None	93-16	16			
317	"	--	M	3700	712	565	"	93-16	17			
318	"	--	M	3000	675	555	Ad	93-16	18			
319	"	--	M	4490	760	633	None	93-16	19			
320	"	--	M	3290	705	560	Ad	93-16	20			
321	"	--	M	4190	755	615	RV	93-17				
322	"	--	M	5630	640	690	None	93-17	2			
323	"	--	M	4950	--	645	"	93-17	3			
324	"	--	M	2180	635	510	w	93-17	4			
326	"	--	M	3310	715	590	None	None				
326	"	--	M	2420	625	515	RV	93-17	5			

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Appendix G. (Cont)

Date	Fish No.	Disposition	Family No.	Sex	Weight (gms)	Fork Ln. (mm)	MEHP Ln. (mm)	Fin Marks	Scale No.	Card Pos.	Green Eggs	Eyed Eggs	
11/24/93 (cont.)	327	Sacrificed		M	3030	685	540	Ad	93-17	6			
	328	·	= =	M	6680	- -	710	None	93-17	7			
	329	·	- -	M	2060	--	505	·	None	--			
	330	·	- -	M	6080	835	673	·	93-17	8			
	331	·	- -	M	3040	710	565	None	93-17	9			
	332	·	- -	M	3170	665	555	W	93-17	10			
	333	"	- -	M	3080	665	543	None	None	- -			
	334	·	- -	M	3270	693	570	W	·	--			
	335	·	- -	M	3520	720	570	None	·	--			
	336	·	- -	M	2590	645	525	W	·	--			
	337	·	- -	M	4510	755	605	"	·	--			
	338	·	- -	M	2240	656	530	·	·	--			
	339	·	= =	M	3640	710	560	None	·	--			
	340	·	- -	M	1810	577	465	·	·	--			
	341	·	- -	M	3050	670	534	W	·	--			
	342	·	- -	M	3300	665	545	·	·	--			
	343	·	- -	M	3930	709	580	None	·	--			
	344	·	- -	M	3200	715	560	W	·	--			
	345	·	- -	M	2960	675	525	Ad	·	--			
	346	·	- -	M	2170	- -	495	·	·	--			
	347	·	- -	M	7880	--	765	·	·	--			
	TOTAL											352320	279008
	FECUNDITY											4050	

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Appendix H. Disposition of coho salmon broodstock held at Minthorn Acclimation Facility in 1993.

Date	Fish No.	Disposition	Family No.	Sex	Fork Ln. (mm)	MEHP Ln. (mm)	Fin Marks	Green Eggs	Eyed Eggs	
11/3/93	1	Mortality	--	F	630	502	Ad			
	2	.	--	M	728	565	None			
11/4/93	3	Mortality	--	M	798	583	None			
1114193	4	Spawned	1	F	700	565	None			
	5	.	1	F	828	509				
	6	.	1	F	662	540	"			
	7	.	1	F	704	571				
	8	.	1	M	655	509	"			
	9	.	1	M	674	525	Ad			
	10	.	1	M	645	510	None			
	11	.	1	M	735	554	.			
	12	.	2	F	683	555				
	13	.	2	F	707	554				
	14	.	2	F	691	570				
	15	.	2	F	715	580				
	16	"	2	M	693	534				
	17	.	2	M	669	528				
	18	.	2	M	682	520				
	19	"	2	M	714	613	Ad			
									13263	12268
	11/8/93	20	Spawned	3	F	725	586	None		
		21	.	3	F	689	556			
22		.	3	F	674	548	Ad			
23		.	3	F	715	578	None			
24		.	3	M	467	384	Ad			
25		.	3	M	- -	- -	None			
26		"	3	M	667	587				
27		.	3	M	703	559				
28		"	4	F	737	597				
29		"	4	F	727	582				
30		"	4	F	643	513				
31		.	4	F	655	547				
32		"	4	M	610	508				
33		"	4	M	746	608				
34		"	4	M	652	544				
35		.	4	M	589	487	Ad			
36		.	5	F	700	560	None			
37		"	5	F	720	578				
38		.	5	F	734	604				
39		.	5	M	634	504	Ad			
40		.	5	M	653	525	None			
41		.	5	M	749	573				
42		Overripe	- -	F	719	578				
									26926	21513
11/8/93	43	Mortality	- -	M	598	482	Ad			
	44	.	- -	M	630	493	None			
11/1 0/93	45	Spawned	6	F	708	590	None			
	46	.	6	F	780	636				
	47	"	6	F	836	577	Ad			
	48	"	6	F	655	694	.			
	49	"	6	M	680	553	None			
	50	"	6	M	880	525				

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Appendix H. (Cont.)

Date	Fish No.	Disposition	Family No.	Sex	Fork Ln. (mm)	MEHP Ln. (mm)	Fin Marks	Green Eggs	Eyed Eggs
1 III 0/93 (cont.)	51	Spawned	6	M	632	530	None		
	52	.	6	M	752	598	.		
	53	.	7	F	718	600	Ad		
	54	.	7	F	712	590	None		
	55	.	7	F	680	577	"		
	56	.	7	F	673	565	.		
	57	.	7	M	740	599	.		
	58	.	7	M	635	536	.		
	59	.	7	M	672	538	.		
	60	.	7	M	642	507	.		
	61	"	8	F	727	622	.		
	62	.	8	F	671	566	.		
	63	.	8	F	754	542	.		
	64	"	8	F	700	581	Ad		
	65	.	8	M	815	662	None		
	66	"	8	M	737	584	.		
	67	.	8	M	798	632	Ad		
	68	.	8	M	770	624	None		
	69	"	9	F	703	584	"		
	70	"	9	F	694	588	.		
	71	"	9	F	645	547	.		
	72	.	9	F	717	599	.		
	73	.	9	M	834	658	.		
	74	.	9	M	812	645	"		
	75	"	9	M	624	507	"		
	76	"	9	M	760	608	.		
	77	"	10	F	623	528	.		
	78	"	10	F	630	532	.		
	79	"	10	F	585	500	.		
	80	"	10	M	720	584	.		
	81	"	10	M	647	520	"		
	82	.	10	M	698	571	.		
	83	Green	- -	M	652	835	.		
								46278	30611
11/10/93	84	Mortality	- -	M	760	607	None		
	85	"	- -	M	668	533	"		
11/15/93	86	Mortality	- -	M	733	557	Ad		
	87	.	- -	M	638	499	None		
11/16/93	88	Spawned	11	F	883	547	None		
	89	.	11	F	694	566	.		
	90	"	11	F	687	525	.		
	91	"	11	F	693	547	.		
	92	"	11	M	778	585	.		
	93	"	11	M	805	594	"		
	94	"	11	M	796	595	"		
	95	"	11	M	687	537	"		
	96	"	12	F	726	567	"		
	97	"	12	F	685	545	.		
	98	"	12	F	766	600	"		
	99	"	12	F	659	547	"		
	100	"	12	M	580	457	.		
101	"	12	M	661	514	.			

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Appendix H. (Cont.)

Date	Fish No.	Disposition	Family No.	Sex	Fork Ln. (mm)	MEHP Ln. (mm)	Fin Marks	Green Eggs	Eyed Eggs
11/16/93 (cont.)	102	Spawned	12	M	699	524	None		
	103	·	12	M	664	515			
	104	·	13	F	643	513			
	105	·	13	F	715	565	▪		
	106	·	13	F	678	539	Ad		
	107	·	13	F	718	564	None		
	108	·	13	M	790	603	·		
	109	·	13	M	735	574	·		
	110	·	13	M	605	475	·		
	111	·	13	M	830	640	·		
	112	·	14	F	755	814			
	113	·	14	F	712	582	Ad		
	114	·	14	F	715	579			
	115	·	14	F	730	597	None		
	116	·	14	M	701	539			
	117	·	14	M	724	558			
	118	·	14	M	- -	581			
	119	·	14	M	710	564			
	120	·	15	F	654	549	Ad		
	121	·	15	F	724	590	None		
	122	·	15	F	755	597			
	123	·	15	F	670	455	Ad		
	124	·	15	M	595	470	None		
	125	·	15	M	589	465	·		
	126	·	15	M	810	634			
	127	·	15	M	600	475	·		
	128	·	16	F	623	517	·		
	129	·	16	F	715	580			
	130	·	16	F	674	544	·		
	131	·	16	F	739	599	Ad		
	132	·	16	M	705	544	None		
	133	·	16	M	843	494			
	134	·	16	M	789	595			
	135	·	16	M	695	537			
									64263
11/16/93	136	Mortality	- -	F	877	525	None		
	137	·	- -	M	580	444			
	138	·	- -	M	685	529	·		
11/23/93	139	Spawned	17	F	734	610	None		
	140	·	17	F	725	617			
	141	·	17	F	706	606			
	142	·	17	F	655	566	Ad		
	143	·	17	M	680	563	None		
	144	·	17	M	608	511			
	145	·	17	M	534	455	Ad		
	146	·	17	M	695	590	None		
	147	·	18	F	726	624	·		
	148	·	18	F	691	801			
	149	·	18	F	725	628			
	150	·	18	F	749	642			
	151	·	18	M	745	621			
	152	·	18	M	710	593			
	153	·	18	M	716	594			
	154	·	18	M	657	558			

Revised: 1/4/93

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Appendix H. (Cont.)

Date	Fish No.	Disposition	Family No.	Sex	Fork Ln. (mm)	MEHP Ln. (mm)	Fin Marks	Green Eggs	Eyed Eggs
11/23/93 (cont.)	155	Spawned	19	F	657	569	None		
	156	"	19	F	718	823	"		
	157	"	19	F	655	563	"		
	158	"	19	F	730	615	"		
	159	"	19	M	748	613	"		
	160	"	19	M	541	449	"		
	161	"	19	M	610	495	"		
	162	"	19	M	503	428	"		
	163	"	20	F	667	568	"		
	164	"	20	F	707	591	"		
	165	"	20	F	678	581	"		
	166	"	20	F	693	590	Ad		
	167	"	20	M	640	522	None		
	168	"	20	M	802	654	Ad		
169	"	20	M	768	615	None			
170	"	20	M	770	608	"			
								43240	28348
11/23/93	171	Mortality	- -	M	648	525	None		
12/1/93	172	Spawned	21	F	695	573	None		
	173	"	21	F	662	547	"		
	174	"	21	F	722	591	"		
	175	"	21	F	695	580	"		
	176	"	21	M	807	480	LVRV		
	177	"	21	M	730	585	None		
	178	"	21	M	600	490	"		
	179	"	21	M	682	555	"		
								9291	8352
12/1/93	180	Mortality	- -	M	703	565	None		
	181	"	- -	M	690	550	"		
	182	"	- -	M	658	534	"		
	183	Sacrificed	- -	M	675	537	"		
12/13/93	184	Mortality	- -	M	715	550	None		
	185	"	- -	M	750	579	"		
	186	"	- -	M	707	554	"		
	187	"	- -	M	784	620	"		
	188	"	- -	F	707	567	"		
	189	"	- -	F	730	585	"		
	190	"	- -	M	764	597	Ad		
	191	"	- -	M	604	473	None		
	192	"	- -	M	702	555	"		
	193	"	- -	M	774	610	"		
	194	"	- -	M	793	615	"		
	195	"	- -	M	710	545	"		
	196	"	- -	M	657	530	"		
	197	"	- -	M	664	510	"		
	198	"	- -	M	598	477	"		
	199	"	- -	F	775	829	"		
12/14/93	200	Spawned	22	F	745	615	None		
	201	"	22	F	606	555	"		
	202	"	22	F	755	615	"		
	203	"	22	F	620	524	"		

Appendix H. (Cont.)

Date	Fish No.	Disposition	Family No.	Sex	Fork Ln. (mm)	MEHP Ln. (mm)	Fin Marks	Green Eggs	Eyed Eggs
12/1 4/93 (cont.)	204	Spawned	22	F	672	544	None		
	205	'	22	F	720	585	'		
	206	'	22	F	714	589	'		
	207	'	22	F	720	599	'		
	208	'	22	M	773	620	'		
	209	'	22	M	727	579	'		
	210	'	22	M	770	621	'		
	211	'	22	M	597	485	'		
	212	'	23	F	700	575	'		
	213	'	23	F	698	583	'		
	214	'	23	F	723	592	'		
	215	'	23	F	704	594	'		
	216	'	23	F	580	487	'		
	217	'	23	F	570	479	'		
	218	'	23	F	639	537	'		
	219	'	23	F	770	645	'		
	220	'	23	M	740	603	'		
	221	'	23	M	640	527	'		
	222	'	23	M	585	479	'		
	223	'	23	M	830	660	Ad		
	224	'	24	F	715	594	None		
	225	'	24	F	690	580	'		
	226	'	24	F	745	622	Ad		
	227	'	24	F	635	529	None		
	228	'	24	F	730	599	'		
	229	'	24	F	704	582	'		
	230	'	24	F	676	565	'		
	231	'	24	F	- -	620	'		
	232	'	24	M	735	588	'		
	233	'	24	M	665	530	'		
	234	'	24	M	755	605	Ad		
	235	'	24	M	765	605	'		
	236	'	25	F	655	556	None		
237	'	25	F	628	526	'			
238	'	25	F	- -	540	'			
239	'	25	F	570	473	'			
240	'	25	F	655	555	'			
241	'	25	F	668	559	'			
242	'	25	F	657	532	'			
243	'	25	F	670	550	'			
244	'	25	M	545	450	'			
245	'	25	M	- -	543	'			
246	'	25	M	659	534	'			
247	'	25	M	768	610	'			
248	'	26	F	610	513	'			
249	'	26	F	758	609	'			
250	'	26	F	713	583	'			
251	'	26	F	680	569	'			
252	'	26	F	719	595	'			
253	'	26	F	530	432	'			
254	'	26	F	707	585	'			
255	'	26	F	640	535	'			
256	'	26	M	668	538	'			
257	'	26	M	715	570	'			
258	'	26	M	733	584	'			
259	'	26	M	775	606	'			

Appendix H. (Cont.)

Date	Fish No.	Disposition	Family No.	Sex	Fork Ln. (mm)	MEHP Ln. (mm)	Fin Marks	Green Eggs	Eyed Eggs
12/1 4/93 (cont.)	260	Spawned	27	F	700	590	None		
	261	"	27	F	660	545	.		
	262	"	27	F	675	573	.		
	263	"	27	F	627	625	.		
	264	"	27	F	665	564	.		
	265	"	27	F	668	562	Ad		
	266	"	27	F	730	610	None		
	267	"	27	F	642	535	.		
	268	"	27	M	667	533	.		
	269	"	27	M	- -	468	Ad		
	270	"	27	M	700	555	.		
	271	"	27	M	760	604	,		
	272	"	28	F	695	580	None		
	273	"	28	F	665	550	"		
	274	"	28	F	690	572	"		
	275	"	28	F	670	562	"		
	276	"	28	F	710	595	.		
	277	"	28	F	735	610	"		
	278	"	28	F	637	540	"		
	279	"	28	F	695	578	.		
	280	"	28	M	735	600	.		
	281	"	28	M	728	590	.		
	282	"	28	M	579	470	"		
	283	"	28	M	693	563	"		
	284	"	29	F	675	560	"		
	285	"	29	F	707	600	"		
	286	"	29	F	680	572	Ad		
	287	"	29	F	720	616	None		
	288	"	29	F	665	550	,		
	289	"	29	F	623	525	.		
	290	"	29	F	- -	622	.		
	291	"	29	F	695	590	"		
	292	"	29	M	707	572	"		
	293	"	29	M	675	560	"		
	294	"	29	M	710	579	"		
	295	"	29	M	- -	552	"		
	296	"	29	F	712	590	"		
	297	"	29	F	673	570	"		
	298	"	29	F	675	572	"		
299	"	29	F	770	654	"			
300	"	29	F	653	555	"			
301	"	29	F	725	612	"			
302	"	29	F	710	599	Ad			
303	"	29	F	765	574	None			
304	"	29	M	752	593	Ad			
305	"	29	M	655	535	None			
306	"	29	M	594	485	.			
307	"	29	M	764	620	.			
308		Green	- -	M	530	433	.		
309		Watery	- -	M	615	509	"		
								175548	129000
12/14/93	310	Mortality	- -	F	736	615	None		
	311	"	- -	F	745	624	.		
	312	"	- -	M	720	565	.		
	313	"	- -	F	710	582	.		

Appendix H. (Cont.)

Date	Fish No.	Disposition	Family No.	Sex	Fork Ln. (mm)	MEHP Ln. (mm)	Fin Marks	Green Eggs	Eyed Eggs	
12/14/93 (cont.)	314	Mortality	--	F	754	634	None			
	315	"	--	M	739	585	"			
	316	"	--	M	690	539	"			
	317	"	--	M	685	550	"			
	318	"	--	F	675	555	"			
	319	"	--	F	687	572	"			
	320	"	--	M	575	472	"			
	321	"	--	M	685	545	"			
	322	"	--	M	525	432	"			
	323	"	--	M	659	513	"			
	324	"	--	F	593	505	"			
	325	"	--	M	675	545	"			
	326	"	--	M	725	582	"			
	327	"	--	F	635	533	Ad			
	328	"	--	F	715	594	"			
	329	"	--	F	634	518	"			
	330	"	--	F	666	560	None			
	331	"	--	F	660	554	"			
	332	"	--	F	660	563	"			
	333	"	--	M	-	614	"			
	334	"	--	F	666	560	"			
	335	"	--	F	590	494	"			
	336	"	--	F	670	549	"			
	337	"	--	M	685	535	"			
	338	"	--	M	770	615	"			
	339	"	--	M	700	560	"			
	340	"	--	M	730	575	"			
	341	"	--	M	805	635	"			
	342	"	--	F	635	535	"			
	343	"	--	M	720	560	"			
	12/15/93	344	Spawned	30	F	695	585	None		
		345	"	30	F	690	575	"		
		346	"	30	F	828	525	"		
		347	"	30	F	687	573	"		
348		"	30	F	686	570	"			
349		"	30	F	600	550	"			
350		"	30	F	674	566	"			
351		"	30	F	534	536	"			
352		"	30	F	707	609	"			
353		"	30	F	725	610	"			
354		"	30	F	680	573	"			
355		"	30	F	755	630	"			
356		"	30	M	635	510	"			
357		"	30	M	745	608	"			
358		"	30	M	621	515	"			
359		"	30	M	753	604	"			
360		"	30	M	720	570	"			
361		"	30	M	705	575	"			
362		"	31	F	644	540	Ad			
363		"	31	F	685	568	None			
364		"	31	F	621	528	"			
365	"	31	F	700	595	Ad				
366	"	31	F	747	618	"				
367	"	31	F	695	580	None				
368	"	31	F	680	578	"				

Appendix H. (Cont.)

Date	Fish No.	Disposition	Family No.	Sex	Fork Ln. (mm)	MEHP Ln. (mm)	Fin Marks	Green Eggs	Eyed Eggs
12/15/93 (cont.)	369	Spawned	31	F	728	605	None		
	370	.	31	F	704	590	.		
	371	▪	31	F	878	571	▪		
	372	.	31	F	759	645	▪		
	373	.	31	F	635	530	.		
	374	.	31	M	610	495	Ad		
	375	.	31	M	559	450	None		
	376	ε	31	M	715	580	▪		
	377	▪	31	M	686	565	▪		
	378	.	31	M	691	549	.		
	379	ε	31	M	805	625	.		
	380	ε	32	F	685	573	▪		
	381	ε	32	F	670	570	Ad		
	382	ε	32	F	735	604	None		
	383	▪	32	F	700	578	Ad		
	384	ε	32	F	775	570	None		
	385	.	32	F	640	545	.		
	386	.	32	F	679	565	Ad		
	387	ε	32	F	668	545	None		
	388	ε	32	F	524	440	.		
	389	▪	32	F	701	588	.		
	390	▪	32	F	661	545	.		
	391	▪	32	F	705	580	.		
	392	▪	32	M	759	610	▪		
	393	ε	32	M	735	580	▪		
	394	ε	32	M	739	590	.		
	395	▪	32	M	550	455	▪		
	396	▪	32	M	648	525	▪		
	397	ε	32	M	649	523	.		
	398	.	33	F	673	555	Ad		
	399	ε	33	F	711	580	None		
	400	ε	33	F	707	603	.		
	401	▪	33	F	650	552	.		
	402	▪	33	F	609	509	.		
	403	ε	33	F	692	575	.		
	404	▪	33	F	720	605	.		
	405	▪	33	F	604	573	.		
	406	▪	33	F	724	597	.		
	407	▪	33	F	705	595	▪		
	408	ε	33	F	681	570	.		
	409	ε	33	F	624	530	▪		
	410	ε	33	M	602	505	▪		
	411	▪	33	M	736	590	▪		
	412	ε	33	M	755	600	.		
413	▪	33	M	623	500	▪			
414	ε	33	M	750	605	▪			
415	ε	33	M	730	589	.			
416	ε	34	F	685	570	.			
417	ε	34	F	649	550	▪			
418	ε	34	F	778	565	.			
419	ε	34	F	680	563	.			
420	.	34	F	720	605	.			
421	▪	34	F	725	595	Ad			
422	▪	34	F	658	543	None			
423	▪	34	F	666	565	▪			
424	ε	34	F	688	578	▪			

Appendix H. (Cont.)

Date	Fish No.	Disposition	Family No.	Sex	Fork Ln. (mm)	MEHP Ln. (mm)	Fin Marks	Green Eggs	Eyed Eggs
12/15/93	425	Spawned	34	F	728	595	Ad		
(cont.)	426	·	34	F	726	585	None		
	427	·	34	F	661	552	·		
	428	·	34	M	710	565	·		
	429	·	34	M	646	532	Ad		
	430	·	34	M	741	585	None		
	431	·	34	M	561	422	·		
	432	·	34	M	578	461	·		
	433	·	34	M	655	528	Ad		
	434	·	35	F	590	495	None		
	435	·	35	F	689	575	·		
	436	·	35	F	640	540	·		
	437	·	35	F	655	558	·		
	438	·	35	F	728	620	·		
	439	·	35	F	665	560	·		
	440	·	35	F	658	550	·		
	441	·	35	F	735	600	·		
	442	·	35	F	718	610	·		
	443	·	35	F	719	608	·		
	444	·	35	F	640	538	·		
	445	·	35	F	658	555	Ad		
	446	·	35	M	571	460	None		
	447	·	35	M	568	465	·		
	448	·	35	M	674	545	·		
	449	·	35	M	705	570	·		
	450	·	35	M	611	500	·		
	451	·	35	M	650	533	·		
	452	·	36	F	744	615	·		
	453	·	36	F	661	552	·		
	454	·	36	F	681	558	·		
	455	·	36	F	660	558	·		
	456	·	36	F	756	815	·		
	457	·	36	F	- -	528	·		
	458	·	36	F	639	530	·		
	459	·	36	F	673	562	·		
	460	·	36	F	720	582	·		
	461	·	36	F	703	590	·		
	462	·	36	F	605	505	·		
	463	·	36	F	698	585	·		
	464	·	36	M	481	400	·		
	465	·	36	M	670	535	·		
	466	·	36	M	645	520	Ad		
	467	·	36	M	773	610	None		
	468	·	37	F	690	589	·		
	469	·	37	F	- -	614	·		
	470	·	37	F	640	534	·		
	471	·	37	F	563	475	Ad		
	472	·	37	F	669	560	None		
	473	·	37	F	587	499	·		
	474	·	37	F	700	590	·		
	475	·	37	F	745	626	Ad		
	476	·	37	F	633	530	None		
	477	·	37	F	692	585	·		
	478	·	37	F	663	590	·		
	479	·	37	F	664	550	·		
	480	·	37	M	710	585	·		

Appendix H. (Cont.)

Date	Fish No.	Disposition	Family No.	Sex	Fork Ln. (mm)	MEHP Ln. (mm)	Fin Marks	Green Eggs	Eyed Eggs
12/15/93 (cont.)	481	Spawned	37	M	672	540	None		
	482	·	37	M	610	505	·		
	483	·	37	M	635	520	·		
	484	·	38	F	715	597	·		
	485	·	38	F	665	565	·		
	486	·	38	F	730	613	·		
	487	·	38	F	615	510	Ad		
	488	·	38	F	660	550	None		
	489	·	38	F	670	549	·		
	490	·	38	M	690	558	·		
	491	·	38	M	676	530	·		
	492	·	38	M	648	519	·		
								243540	190500
12/15/93	493	Mortality	- -	F	714	640	None		
	494	·	- -	M	759	583	·		
	495	·	- -	F	667	617	·		
	496	·	- -	M	647	509	·		
	497	·	- -	F	719	575	·		
	498	·	- -	F	690	580	·		
	499	·	- -	F	693	586	·		
	500	·	- -	F	- -	- -	·		
12/20/93	501	Spawned	39	F	715	605	None		
	502	·	39	F	663	554	·		
	503	·	39	F	715	600	·		
	504	·	39	F	704	595	·		
	505	·	39	F	637	535	·		
	506	·	39	F	655	560	·		
	507	·	39	F	660	563	·		
	508	·	39	F	680	580	·		
	509	·	39	F	650	543	Ad		
	510	·	39	F	695	585	None		
	511	·	39	F	- -	545	·		
	512	·	39	F	590	495	·		
	513	·	39	M	718	575	·		
	514	·	39	M	744	595	·		
	515	·	39	M	745	595	·		
	516	·	39	M	770	620	·		
	517	·	39	M	704	595	·		
	518	·	39	M	598	495	·		
	519	·	40	F	745	615	·		
	520	·	40	F	635	524	·		
	521	·	40	F	653	545	·		
	522	·	40	F	- -	520	·		
	523	·	40	F	700	575	·		
	524	·	40	F	600	510	·		
	525	·	40	F	660	557	·		
	526	·	40	F	633	535	·		
	527	·	40	F	730	610	Ad		
	528	·	40	F	672	565	None		
	529	·	40	F	618	515	·		
	530	·	40	F	650	528	·		
531	·	40	M	605	490	·			
532	·	40	M	665	535	·			
533	·	40	M	773	515	·			

Appendix H. (Cont.)

Date	Fish No.	Disposition	Family No.	Sex	Fork Ln. (mm)	MEHP Ln. (mm)	Fin Marks	Green Eggs	Eyed Eggs	
12/20/93 (cont.)	534	Spawned	40	M	607	495	None			
	535	·	40	M	730	575				
	536	·	40	M	677	545				
	537	·	41	F	- -	- -	▪			
	538	·	41	F	703	585				
	539	▪	41	F	600	510	▪			
	540	·	41	F	700	575	▪			
	541	·	41	F	533	453	▪			
	542	·	41	F	580	490				
	543	·	41	F	652	545				
	544	▪	41	M	563	447				
	545	·	41	M	682	575				
	546	▪	41	M	375	304				
	547	▪	41	M	660	533	▪			
								53822	42950	
12/20/93	548	Mortality	- -	M	- -	595	Ad			
	549	·	- -	F	675	570	▪			
	550	▪	- -	F	700	597	None			
	551	▪	- -	F	722	616				
	552	·	- -	F	659	556				
	553	·	- -	F	710	620				
	554	·	- -	M	570	475				
	555	·	- -	F	735	616				
	556	▪	- -	F	988	643				
	557	·	- -	F	660	559	Ad			
	558	·	- -	M	- -	593	None			
	559	·	- -	M	585	493	·			
	560	·	- -	M	715	590				
	561	·	- -	M	510	425	▪			
562	▪	- -	M	650	535	Ad				
563	▪	- -	M	475	410	None				
564	·	- -	M	595	495	▪				
12/20/93	565	Sacrificed	- -	M	575	480	None			
	566	·	- -	M	645	510				
	567	▪	- -	M	608	495	▪			
	568	·	- -	M	785	625				
	569	▪	- -	M	660	535				
	570	▪	- -	M	683	555				
	571	·	- -	M	465	394	▪			
	572	·	- -	M	695	552	▪			
	573	·	- -	M	554	450	▪			
	574	▪	- -	M	723	574				
	575	▪	- -	M	690	582	▪			
	576	·	- -	M	590	482				
	577	·	- -	M	733	590				
	578	·	- -	M	720	585	▪			
	579	·	- -	M	550	450				
	580	·	- -	M	556	458				
								TOTAL	676171	512785
								FECUNDITY	2356	

Revised: 1/4/93

File Name: C:\123R3\DATA\93COHO BR

Appendix I. Liberation information for summer steelhead coded-wire tagged and released in the Umatilla River Basin.

Brood	Number Released /a	Release Date	No./lb.	Number tagged	CWT code	Release location
87	10,187	Apr 88	7.4	9,829	073859	Minthorn
87	10,075	Apr 88	7.4	9,721	073860	Minthorn
87	<u>10,287</u>	Apr 88	7.4	<u>9,925</u>	073861	Minthorn
	30,549			29,475		
87	10,423	Apr 88	6.5	9,689	073856	Nr. Minthorn
87	10,171	Apr 88	6.5	9,455	073857	Nr. Minthorn
87	<u>10,163</u>	Apr 88	6.5	<u>9,448</u>	073858	Nr. Minthorn
	30,757			28,592		
88	9,949	May 89	6.6	8,784	074720	Minthorn
88	9,954	May 89	6.6	8,789	074723	Minthorn
88	<u>9,949</u>	May 89	6.6	<u>8,784</u>	074724	Minthorn
	29,852			26,357		
88	9,873	May 89	5.6	8,800	074715	Nr. Minthorn
88	9,864	May 89	5.6	8,791	074717	Nr. Minthorn
88	<u>9,849</u>	May 89	5.6	<u>8,778</u>	074718	Nr. Minthorn
	29,586			26,369		
89	10,239	May 90	5.9	9,331	075212	Bonifer
89	10,022	May 90	5.9	9,133	075213	Bonifer
89	<u>9,964</u>	May 90	5.9	<u>9,080</u>	075214	Bonifer
	30,225			27,544		
89	9,830	May 90	5.5	9,511	075215	Nr. Bonifer
89	9,845	May 90	5.5	9,525	075216	Nr. Bonifar
89	<u>9,771</u>	May 90	5.5	<u>9,454</u>	075217	Nr. Bonifer
	29,446			28,490		
90	10,086	May 91	6.2	9,835	075340	Bonifer
90	10,070	May 91	6.2	9,819	07534 1	Bonifer
90	<u>10,065</u>	May 91	6.2	<u>9,814</u>	075342	Bonifer
	30,221			29,468		
90	9,754	May 91	8.7	9,432	075343	Nr. Bonifer
90	9,790	May 91	8.7	9,467	075344	Nr. Bonifer
90	<u>9,781</u>	May 91	8.7	<u>9,458</u>	075345	Nr. Bonifer
	29,325			28,357		

Revised: 1-6-94

File Name: C:\123R3\DATA\93STSREL

Appendix I. (Cont.)

Brood	Number Released	Release Date	No./lb.	Number tagged	CWT code	Release location
91	22,474	March 92	5.8	10,394	073759	Bonifer/Minthorn
91	22,902	March 92	5.8	10,594	073862	Bonifer/Minthorn
91	<u>22,059</u>	March 92	5.8	10,203	074 127	Bonifer/Minthorn
	67,435			31,191		
91	22,262	April 92	5.0	10,108	075841	Meacham Creek
91	21,365	April 92	5.0	9,498	075842	Meacham Creek
91	<u>20,923</u>	April 92	5.0	9,747	075843	Meacham Creek
	64,550			29,353		
91	22,469	April/May 92	5.5	10,562	075838	Meacham Creek
91	22,662	April/May 92	5.5	10,275	075839	Meacham Creek
91	<u>22,288</u>	April/May 92	5.5	10,105	075840	Meacham Creek
	67,419			30,942		
92	15,115	April 93	4.5	10,194	076058	Bonifer
92	14,922	April 93	4.5	9,792	076059	Bonifer
92	<u>14,787</u>	April 93	4.5	9,440	076060	Bonifer
	44,824			29,426		
92	16,016	April 93	5.6	10,031	076055	Minthorn
92	15,940	April 93	5.6	9,418	076056	Minthorn
92	<u>16,023</u>	April 93	5.6	9,643	076057	Minthorn
	47,979			29,092		
92	23,862	May 93	6.1	13,117	076052	Bonifer
92	21,644	May 93	6.1	11,410	076053	Bonifer
92	<u>19,959</u>	May 93	6.1	9,907	076054	Bonifer
	65,465			34,434		

Revised: 1-6-94

File Name: C:\123R3\DATA\93ST SREL

/a The following releases are not included in the table:

- 33,984 adipose clipped fish at 10.3/lb. were released at Umatilla RM 23 in May, 1988
- 10,033 adipose clipped fish at 57.5/lb. were released at Umatilla RM 89 in December, 1986
- 22,274 adipose clipped fish at 5.5/lb. were acclimated and released from Sonifer in May, 1989
- 29,522 adipose clipped fish at 7.7/lb. were acclimated and released with the coded-wie tagged fish at Bonifer in May, 1990
- 12,389 adipose clipped fish at 7.5/lb. were acclimated and released with the coded-wie tagged fish at Sonifer in May, 1991
- 3,998 adipose clipped fish at 12.5/lb. were released at Umatilla RM 3 in April 1991
- 5,443 adipose clipped fish at 5.8/lb. were released at Umatilla AM 3 in April, 1992

Appendix J. Liberation information for fall chinook salmon coded-wire tagged and released in the Umatilla River Basin.

Brood	Number Released /a	Release Date	No./lb.	Number tagged	CWT code	Release location
81	306,279	April 82	79.0	46,707	050851	Uma RM 1.5 & 51.5
81	<u>672,057</u>	April 82	79.0	<u>102,331</u>	051057	Uma RM 1.5 & 51.5
	978,336			149,038		
81	2,828,835	April 82	92.0	102,386	072663	Uma RM 1.5
81	100,564	Mar83	5.9	99,570	072141	Bonifer & Mea. CR.
82	228,412	Mar84	8.6	96,448	072829	Bonifer & Mea. CR.
83	966,250	June 84	85.1	210,441	073124	Uma RM 1.5
83	198,162	Mar85	7.8	88,306	073127	Uma RM 87 & Bonifer
84	3,223,172	June 85	92.3	203,756	073326	Uma RM 1.5
84	51,003	Oct 85	16.2	30,838	073162	Bonifer
84	91,036	Mar 86	5.0	88,396	073327	Minthorn
85	197,432	June 86	86.0	20,636	073833	Uma RM 1.5
85	198,153	June 86	86.0	21,335	073834	Uma RM 1.5
85	197,488	June 86	86.0	20,690	073835	Uma RM 1.5
85	196,952	June 86	86.0	20,170	073836	Uma RM 1.5
85	197,788	June 86	86.0	20,982	073837	Uma RM 1.5
85	208,103	June 86	86.0	20,815	073838	Uma RM 1.5
85	208,958	June 86	86.0	21,659	073839	Uma RM 1.5
85	207,550	June 86	86.0	20,269	073840	Uma RM 1.5
	208,184	June 86	86.0	20,895	07384 1	Uma RM 1.5
	<u>208,994</u>	June 86	86.0	<u>21,694</u>	073842	Uma RM 1.5
	2,029,602			209,145		
85	22,216	Mar 87	8.1	10,103	073823	Minthorn
85	22,523	Mar 87	8.1	10,243	073824	Minthorn
85	21,807	Mar 87	8.1	9,917	073825	Minthorn
85	20,881	Mar 87	8.1	9,496	073826	Minthorn
85	<u>21,716</u>	Mar 87	8.1	<u>9,876</u>	073827	Minthorn
	109,143			49,635		
85	20,786	Mar 87	8.6	10,253	073828	Bonifer
85	20,212	Mar 87	8.6	9,970	073829	Bonifer
85	20,546	Mar 87	8.6	10,135	073830	Bonifer
85	20,381	Mar87	8.6	10,053	073831	Bonifer
85	<u>20,438</u>	Mar 87	8.6	<u>10,081</u>	073832	Bonifer
	102,363			50,492		
86	497,572	May 87	60.4	40,793	073912	Uma RM 1.5
86	501,266	May 87	60.4	41,096	073913	Uma RM 1.5
86	<u>477,992</u>	May 87	60.4	<u>39,187</u>	073914	Uma RM 1.5
	19476,830			121,076		

Revised: 1-7-94

File Name: C:\123R3\DATA\CHFREL93

## Appendix J. (cont.)

Brood	Number Released	Release Date	No./lb.	Number tagged	CWT code	Release location
86	670	July 87	20.0	643	073915	Minthorn
86	672	July 87	20.0	645	073916	Minthorn
86	658	July 87	20.0	632	074035	Minthorn
	2,000			1,920		
86	52,317	Mar 88	8.8	42,068	074038	Minthorn
86	48,474	Mar88	8.8	38,978	074039	Minthorn
	100,791			81,046		
86	50,480	Mar88	10.2	39,509	074036	Bonifer
86	49,070	Mar 88	10.2	38,405	074037	Bonifer
	99,550			77,914		
87	1,886,757	May 88	68.3	198,285	075007	Uma RM 23
87	4,823	Nov 88	9.8	4,438	074539	Minthorn
87	4,660	Nov 88	9.8	4,289	074540	Minthorn
87	4,925	Nov 88	9.8	4,533	074541	Minthorn
	14,408			13,260		
87	26,858	NOV88	8.6	24,656	074636	Nr Minthorn
87	25,493	Nov 88	8.6	23,403	074587	Nr Minthorn
87	27,330	NOV88	8.6	25,089	074538	Nr Minthorn
	79,681			73,148		
88	797,904	May 89	66.6	52,228	074646	Uma RM 23
88	797,903	May 89	66.6	49,771	074647	Uma RM 23
88	797,903	May 89	66.6	52,244	074648	Uma RM 23
	2,393,710			154,243		
88	26,770	Oct 89	10.9	26,358	074753	Minthorn
88	26,617	Oct 89	10.9	25,028	074754	Minthorn
88	25,438	Oct 89	10.9	25,438	074757	Minthorn
	78,825			76,824		
88	27,071	Oct 89	11.1	26,790	074758	Nr Minthorn
88	25,428	Oct 89	11.1	24,285	074760	Nr Minthorn
88	25,633	Oct 89	11.1	25,350	074763	Nr Minthorn
	78,132			76,425		
89	808,567	May- Jun 90	86.4	52,612	075403	Uma RM 70 -79
89	808,560	May- Jun 90	86.4	53,160	075404	Uma RM 70-79
89	808,554	May- Jun 90	86.4	53,248	075405	Uma RM 70 -79
	2,425,681			159020		
89	25,311	Oct 90	9.2	23,396	075325	Minthorn
89	23,724	Oct 90	9.2	21,929	075326	Minthorn
89	22,828	Oct 90	9.2	21,101	075327	Minthorn
	7 1,863			66,426		

Revised: 1-7-94

File Name: C:\123R3\DATA\CHFREL93

Appendix J. (cont.)

Brood	Number Released	Release Date	No./lb.	Number tagged	cw-r code	Release location
89	25,472	Oct 90	8.8	23,413	075322	Nr Minthorn
89	25,694	Oct 90	8.8	23,617	075323	Nr Minthorn
89	<u>25,480</u>	Oct 90	8.8	<u>23,420</u>	075324	Nr Minthorn
	76646			70,450		
90	1,343,311	May 91	82.0	52,252	075225	Uma RM 70 -79
90	1,343,042	May 91	82.0	51,728	075226	Uma RM 70 -79
90	100,642	May 91	73.0	48,266	075328	Uma RM 70 -79
90	99,962	May 91	73.0	48,481	075449	Uma RM 70 -79
90	99,225	May 91	73.0	48,301	070016	Uma RM 70 -79
90	52,326	May 91	82.0	51,814	075450	Uma RM 70 -79
90	<u>52,706</u>	May 91	82.0	<u>52,444</u>	075451	Uma RM 70 -79
	3,091,214			353,286		
90	26,481	May 91	80.5	26,173	075563	Minthorn
90	26,585	May 91	80.5	24,762	075501	Minthorn
90	<u>26,606</u>	May 91	80.5	<u>25,476</u>	075602	Minthorn
	79,672			76,411		
90	25,962	May 91	86.0	25,720	075560	Nr Minthorn
90	25,708	May 91	86.0	25,425	075561	Nr Minthorn
90	<u>23,295</u>	May 91	86.0	<u>22,309</u>	075562	Nr Minthorn
	74,665			73,454		
90	122,639	Mar 92	7.7	26,160	075619	Uma RM 56
90	<u>97,801</u>	Mar 92	7.6	<u>26,178</u>	075618	Uma RM 70
	220,440			52,338		
91	286,578	May 92	70.6	31,892	071429	Uma RM 42.5
91	281,350	May 92	65.1	32,287	071430	Uma RM 42.5
91	182,931	May 92	56.2	28,951	071431	Uma RM 42.5
91	191,257	May 92	58.3	29,425	071432	Uma RM 42.5
91	303,878	May 92	61.0	29,066	071433	Uma RM 42.5
91	306,802	May 92	65.7	31,224	071434	Uma RM 42.5
91	297,331	May 92	60.9	30,326	071435	Uma RM 42.5
91	302,555	May 92	61.9	30,365	071436	Uma RM 42.5
91	223,830	May 92	55.2	30,508	071437	Uma RM 42.5
91	<u>301,931</u>	May 92	64.5	<u>30,924</u>	071439	Uma RM 42.5
	2,678,343			304,968		
91	66,345	March 93	9.1	23,239	071461	Uma RM 73.5
91	<u>68,492</u>	March 93	9.1	<u>23,863</u>	071460	Uma RM 73.5
	134,937			47,102		

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File Name: C:\123R3\DATA\CHFREL93

Appendix J. (cont.)

Brood	Number Released	Release Date	No./lb.	Number tagged	CWT code	Release location
92	292,895	May 93	63.0	28,964	076330	Uma RM 73.5
92	269,336	May 93	62.9	27,092	070127	Uma RM 73.5
92	282,175	May 93	68.0	29,958	076334	Uma RM 73.5
92	282,125	May 93	67.3	29,537	076331	Uma RM 73.5
92	273,662	May 93	60.3	29,718	076333	Uma RM 73.5
82	277,931	May 93	61.5	29,451	076332	Uma RM 73.5
92	268,001	May 93	59.3	29,594	070126	Uma RM 73.5
92	203,731	May 93	66.7	30,706	076329	Uma RM 73.5
92	272,496	May 93	60.3	29,360	070125	Uma RM 73.5
92	207,565	May 93	59.4	30,462	076335	Uma RM 73.5
	2629,917			294,842		

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File Name: C:\123R3\DATA\CHFRELE93

/a The following releases are not included in the table:

- 115,779 non-tagged fish at 4.7/lb. were acclimated and released from Bonifer In March, 1986
- 35,574 non-tagged fish at 11.6/lb. were acclimated and released from Minthornin October, 1986
- 1,429,250 non-tagged fish at 93.1/lb. were released at Umatilla RM 9 in June, 1988
- 217,443 non-tagged fish at 8.6/lb. were released at Umatilla RM 63 & 70 in March, 1989
- 255,614 non-tagged fish at 8.2/lb. were released at Umatilla RM 70 In March, 1990
- 629,800 non-tagged fish at 82.4/lb. were released at Umatilla RM 70 8 79 in May, 1990
- 194,847 non-tagged fish at 7.8/lb. were released at Umatilla RM 56, 70 and 79 In March, 1991
- 10,462 non-tagged fish at 80-1 94/lb. were released at Umatilla RM 3 in April and May, 1991
- 504,369 non-tagged fish at 53.4/lb. were released at Umatilla RM 42.5 in May, 1992
- 7,837 non-tagged fish at 62.8-112/lb. were released at Umatilla RM 3 in April and May, 1992
- 29,681 non-tagged fish at 95.5-142/lb. were released between UmatillaRM0.5 and 27.3 in March through May, 1993

Appendix K. Liberation information for spring Chinook salmon coded-wire tagged and released in the Umatilla River Basin.

Brood	Number Released /a	Release Date	No./lb.	Number tagged	CWT code	Release location
86	38,948	Mar-Apr 88	10.1	26,648	074325	Bonifer
86	35,148	Mar-Apr 88	10.1	25,863	074326	Bonifer
86	<u>35,137</u>	Mar-Apr 88	10.1	<u>25,853</u>	074327	Bonifer
	106,231			78,356		
86	34,187	Apr 88	8.6	26,319	074328	Uma RM 23-81
86	33,573	Apr 88	8.6	25,722	074329	Uma RM 23-81
86	<u>34,116</u>	Apr 88	8.6	<u>26,252</u>	074330	Uma RM 23-81
	101,078			78,293		
87	416	Nov 88	21.4	410	074420	Bonifer
87	399	Nov 88	21.4	393	074423	Bonifer
87	<u>381</u>	Nov 88	21.4	<u>376</u>	074424	Bonifer
	1,196			1,179		
87	26,109	Nov 88	11.1	25,987	074427	Uma RM 89
87	24,183	Nov 88	11.1	24,070	074429	Uma RM 89
87	<u>25,475</u>	Nov 88	11.1	<u>25,356</u>	074430	Uma RM 89
	75,767			75,413		
87	26,135	Mar-May 89	10.6	25,427	074433	Bonifer
87	27,756	Mar-May 89	10.6	27,004	074434	Bonifer
87	<u>26,093</u>	Mar-May 89	10.6	<u>25,386</u>	074436	Bonifer
	79,984			77,017		
87	28,153	Mar 89	10.6	27,585	074439	Nr. Bonifer
87	28,116	Mar 89	10.6	27,550	074440	Nr. Bonifer
87	<u>24,663</u>	Mar83	10.6	<u>24,165</u>	074443	Nr. Bonifer
	80,932			79,300		
88	24,963	Oct 89	12.0	24,801	075063	Bonifer
88	28,298	Oct 89	12.0	28,109	075101	Bonifer
88	<u>27,483</u>	Oct 89	12.0	<u>27,299</u>	07511M	Bonifer
	80,750			80,209		
88	27,287	Oct 89	12.0	27,137	075103	Nr. Bonifer
88	28,718	Oct 89	12.0	28,560	075104	Nr. Bonifer
88	<u>27,848</u>	Oct 89	12.0	<u>27,695</u>	075105	Nr. Bonifer
	83,853			83,362		
88	38,224	March 90	9.0	26,638	075106	Bonifer
88	37,536	March 90	9.0	26,160	075107	Bonifer
88	<u>38,583</u>	March 90	9.0	<u>26,888</u>	075106	Bonifer
	114,345			79,686		
88	39,012	March 90	9.6	25,611	075109	Nr. Bonifer
88	40,072	March 90	9.6	26,307	075110	Nr. Bonifer
88	<u>38,343</u>	March 90	9.6	<u>25,172</u>	075111	Nr. Bonifer
	117,427			77,090		
89	26,757	Oct 90	11.5	26,670	074505	Bonifer
89	26,805	Oct 90	11.5	26,717	074506	Bonifer
89	<u>26,876</u>	Oct 90	11.5	<u>26,788</u>	074507	Bonifer
	80,438			80,175		
89	26,050	Oct 90	13.4	25,876	074588	Nr. Bonifer
89	26,279	Oct 90	13.4	26,104	074509	Nr. Bonifer
89	<u>25,659</u>	Oct 90	13.4	<u>25,149</u>	074510	Nr. Bonifer
	77,938			77,477		

## Appendix K. (cont.)

Brood	Number Released	Release Date	No./lb.	Number tagged	CWT code	Release location
89	33,473	Mar 91	10.1	25,947	075114	Bonifer
89	33,440	Mar 91	10.1	25,921	075115	Bonifer
89	<u>33,593</u>	Mar 91	10.1	<u>26,039</u>	075116	Bonifer
	100,505			77,907		
89	31,932	Mar 91	11.8	24,365	075440	Nr. Bonifer
89	32,187	Mar 91	11.8	24,559	075441	Nr. Bonifer
89	32,032	Mar 91	11.8	<u>24,441</u>	075442	Nr. Bonifer
	96,152			73,366		
89	90,796	April 91	20.6	22,336	635561	Uma FM 89
89	<u>5,937</u>	Apr-May 91	16.9	<u>1,461</u>	635561	Uma FM 3
	96,733			23,797		
90		Nov 91	16.5	26,769	075826	Bonifer
90	27,007	Nov 91	16.5	26,737	075827	Bonifer
90	<u>27,098</u>	Nov 91	16.5	<u>26,827</u>	075828	Bonifer
	81,144			80,333		
90	26,019	Nov 91	16.8	25,499	075829	Nr. Bonifer
90	25,900	Nov 91	16.8	25,382	075830	Nr. Bonifer
90	<u>26,561</u>	Nov 91	16.8	<u>26,029</u>	075831	Nr. Bonifer
	78,480			76,910		
90	90,982	April 92	18.7	30,106	633962	Uma FM 89
90	<u>5,272</u>	April 92	18.7	<u>1,745</u>	633962	Uma FM 3
	96,254			31,851		
90	36,351	April 92	9.2	26,570	075835	Bonifer
90	36,154	April 92	9.2	26,426	075836	Bonifer
90	<u>36,596</u>	April 92	9.2	<u>26,750</u>	075837	Bonifer
	109,101			79,746		
90	32,994	April 92	8.5	25,503	075832	Nr. Bonifer
90	32,953	April 92	8.5	25,472	075833	Nr. Bonifer
90	<u>32,982</u>	April 92	8.5	<u>25,493</u>	075834	Nr. Bonifer
	98,928			76,468		
91	97,013	May 92	32.1	50,511	071443	Uma FM 80
91	63,585	May 92	31.2	48,051	071444	Uma FM 80
91	63,305	May 92	32.2	49,498	071445	Uma FM 80
91	95,456	May 92	32.1	50,045	071446	Uma FM 80
91	104,670	May 92	36.4	50,047	071447	Uma FM 80
91		May 92	36.3	51,707	071448	Uma FM 80
91	109,528	May 92	38.3	51,518	071449	Uma FM 80
91		May 92	37.8	51,271	071450	Uma FM 80
91	198,617	May 92	39.2	52,128	071451	Uma FM 80
91	<u>108,652</u>	May 92	36.8	<u>51,359</u>	071452	Uma FM 80
	955,752			506,535		
91		Nov 92	13.0	25,104	076042	Uma FM 80
91	25,075	Nov 92	13.0	24,992	076043	Uma FM 80
91	<u>24,838</u>	Nov 92	13.1	<u>15,423</u>	076044	Uma FM 80
		Nov 92	9.9	24,538	076045	Uma FM 80
91	24,715	Nov 92	10.0	24,221	076046	Uma FM 80
91	<u>17,667</u>	Nov 92	10.1	<u>17,269</u>	076047	Uma FM 80
	132,929			131,547		
91	50,736	Nov 92	19.3	26,135	071542	Uma FM 80
91	<u>50,680</u>	Nov 92	19.5	<u>25,633</u>	071543	Uma FM 80
	101,416			51,768		

Revised: I-7-94

File Name: C:\1230\DATA\93CHSREL

## Appendix K. (cont.)

Brood	Number Released	Release Date	No./lb.	Number tagged	CWT code	Release location
91	92,728	March 93	14.7	19,951	071455	Uma RM 80
91	94,220	March 93	14.3	20,022	071456	Uma RM 80
	186,948			39,973		
91	50,310	March 93	8.3	21,499	075739	Uma RM 80
91	50,109	March 93	8.3	20,880	075740	Uma RM 80
91	54,347	March 93	8.3	21,157	075741	Uma RM 80
91	54,016	March 93	8.3	20,307	075742	Uma RM 80
	208,782			83,843		
91	85,134	April 93	20.3	27,838	635950	Uma RM 89
91	1,626	April 93	20.0	532	635950	Uma RM 3
91	9,326	April 93	20.5	3,050	635950	Uma RM 27.3
	96,066			31,421		
92	105,290	June 93	27.0	52,588	076136	Uma RM 80
92	109,473	June 93	27.3	51,680	076135	Uma RM 80
92	113,852	June 93	28.5	52,893	076132	Uma RM 80
92	111,103	June 93	27.1	52,172	076137	Uma RM 80
92	111,133	June 93	27.4	51,963	076134	Uma RM 80
92	116,316	June 93	28.1	52,335	076133	Uma RM 80
	667,367			313,631		
92	49,694	Nov 93	20.3	34,541	070159	Uma RM 80
92	52,211	Nov 93	21.5	35,657	070161	Uma RM 80
92	47,867	Nov 93	20.8	36,102	070216	Uma RM 80
92	49,081	Nov 93	20.9	35,408	070160	Uma RM 80
92	48,343	Nov 93	20.2	35,467	070162	Uma RM 80
92	49,318	Nov 93	20.8	36,157	070163	Uma RM 80
92	40,661	Nov 93	18.5	35,710	070155	Uma RM 80
92	39,656	Nov 93	18.0	34,857	070157	Uma RM 80
92	42,734	Nov 93	18.8	33,998	07m 56	Uma RM 80
92	41,244	Nov 93	19.2	34,130	070158	Uma RM 80
	460,809			352,028		

Revised: 1-7-94

File Name: C:\123RD\DATA\93CHSREL

/a The following releases are not included in the table:

- 99,895 non-tagged fish at 20.5/lb. were released at Umatilla RM 23 in April, 1988
- 89,268 non-tagged fish at 10.3/lb. were released into the upper Umatilla River in April, 1988
- 99,775 non-tagged fish at 18.6/lb. were released at Umatilla RM 23 in April, 1990
- 294,458 non-tagged fish at 32.5/lb. were released at Umatilla RM 80 in May, 1992

Appendix L. Liberation information for coho salmon coded-wire tagged and released in the Umatilla River Basin.

Brood	Number Released /a	Release Date	No./lb.	Number tagged	CWT code	Release location
85	37,245	April 87	13.5	13,440	073617	Minthorn
85	53,754	April 87	13.5	19,879	073624	Minthorn
85	<u>70,890</u>	April 87	13.5	<u>26,740</u>	073625	Minthorn
	161,889			60,059		
86	334,038	March 88	16.8	20,592	074356	LUmaR
86	360,689	March 88	17.3	18,963	074357	LUmaR
86	<u>301,706</u>	March 88	15.7	<u>18,513</u>	074358	LUmaR
	996,433			58,068		
87	75,970	March 89	17.2	27,062	074609	Nr Minthorn
87	72,627	March 89	17.3	26,416	0746 10	Minthorn
87	<u>84,672</u>	March 89	19.1	<u>26,739</u>	0746 11	Minthorn
	233,269			80,217		
88	67,309	March 90	13.5	28,033	074814	Minthorn
88	59,682	March 90	13.3	26,881	074813	Nr Minthorn
88	<u>65,095</u>	April 90	11.2	<u>27,226</u>	074815	Minthorn
	192,086			82,140		
89	152,974	March 91	15.4	24,584	075535	Minthorn
89	449,678	March 91	16.5	25,338	075534	Uma RM 56-60
89	<u>352,977</u>	March 91	16.8	<u>25,407</u>	075533	Uma RM 63-70
	955,629			75,329		
90	472,221	March 92	15.5	27,908	075620	Uma RM 56
90	244,615	March 92	15.7	27,705	07562 1	Uma RM 60
90	<u>244,550</u>	March 92	15.7	<u>27,458</u>	075622	Uma RM 60
	961,386			83,071		
91	454,794	April 93	17.6	28,273	071521	Uma RM 60
91	218,618	April 93	17.5	27,821	071522	Uma RM 42.5
91	<u>219,266</u>	April 93	17.5	<u>27,984</u>	071523	Uma RM 42.5
	892,678			84,078		

Revised: 1-7-94

File Name: C:\123R3\DATA\93COHREL

/a The following releases are not included in the table:

786,660 non-tagged fish at 14.0/lb. were released at Umatilla RM 23 in April, 1987

753,637 non-tagged fish at 17.6/lb. were released at Umatilla RM 56 and 70 in March, 1989

594,527 non-tagged fish at 14.8/lb. were released at Umatilla RM 70 in March and April, 1990

202,315 non-tagged fish at 14.5/lb. were released at Umatilla RM 23 in March, 1990

Appendix M. Fish sampled at the Westland Canal fishtrapping facility in 1993. /1

Date	No. Fish Sampled	Salmonids											Non-game and Warm Water Species							
		Hatchery Production						Natural Production					Suckers	Dace	Chisel-mouths	Shiners	Squawfish	Other		
		Coho (Y)	Fall Chinook (Y)	Spring Chinook (Y)	Fall Chinook (SY)	Spring Chinook (SY)	STS (Y)	STS (Y)	STS (SY)	Coho (Y)	Coho (SY)	Chinook							Bull Trout	
6/15	360				356	1						1								
6/18	344				339								1		2	1			1	
6/22	276				276							1								1
6/25	233				221	1						4		3	1	1	1			1
7/14	209				16	1						2		149		8		1	27	3
TOTAL	1424	0	0	0	1212	1	2	0	0	0	0	6	1	152	3	10	2	26	5	

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File Name: C:\123R3\DATA\WLSAMP93

M-1

/1 Y = yearling; SY = subyearling

Appendix N. Liberation and survival information for summer steelhead released in the Umatilh River.

Brood	Number Released	Date of Release	Size at Release	Number Tagged	CWT Code	Release Location	Estimated Adult Survival					
							%	Total	Oregon			Umatilla River
									C a n a d a Ocean	Col.R. Net	Col.R. sport	
87	10187	Apr 80	7.4	9829	073859	Minthorn	0.57	58	0	12	0	48
87	10075	Apr 88	7.4	9721	073860	Minthorn	0.83	84	0	36	0	48
87	<u>10287</u>	Apr 88	7.4	<u>9925</u>	07388 1	Minthorn	<u>0.73</u>	<u>75</u>	<u>0</u>	<u>23</u>	<u>3</u>	<u>49</u>
Total	30549			29475			0.71	217	0	71	3	143
87	21940	Apr 88	8.5	9889	073856	Nr. Minthorn	0.77	170	5	29	25	111
87	21409	Apr 88	8.5	9455	073857	Nr. Mhthorn	0.51	109	0	18	0	93
87	<u>21392</u>	Apr 88	8.5	<u>9448</u>	073858	Nr. Minthorn	<u>0.33</u>	<u>70</u>	<u>0</u>	<u>0</u>	<u>7</u>	<u>63</u>
Total	84741 /a			28592			0.54	349	5	45	32	287
88	10033	Dec 88	57.5	0		Uma RM 89	NA					
88	17372	May 89	8.8	8784	074720	Minthorn	0.08	10	0	0	8	4
88	17382	May 09	8.8	8789	074723	Minthorn	0.02	4	0	0	0	4
88	<u>17372</u>	May 89	8.8	<u>8784</u>	074724	Minthorn	<u>0.03</u>	<u>6</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>6</u>
Total	52128 lb			28357			0.04	20	0	0	8	14
88	9873	May 89	5.8	8800	074715	Nr. Minthorn	0.08	8	0	0	0	8
88	9884	May 89	5.8	8791	074717	Nr. Minthorn	0.11	11	0	0	0	11
88	<u>9849</u>	May 89	5.8	<u>8778</u>	074718	Nr. Minthorn	<u>0.01</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1</u>
Total	29588			28389			0.07	20	0	0	0	20
09	20240	May 90	5.9	9331	0752 12	Bonifer	0.87	178	0	22	20	134
09	19811	May 90	5.9	9133	0752 13	Bonifer	0.99	197	0	15	4	178
89	<u>19696</u>	May 90	5.9	<u>9080</u>	0752 14	Bonifer	<u>0.91</u>	<u>180</u>	<u>0</u>	<u>48</u>	<u>13</u>	<u>119</u>
Total	59747 /c			27544			0.93	553	0	85	37	431
89	9830	May 90	5.5	9511	0752 15	Nr. Bonifer	0.99	97	0	19	7	71
89	9845	May 90	5.5	9525	0752 18	Nr. Bonifer	1.07	105	0	20	4	81
89	<u>9771</u>	May 90	5.5	<u>9454</u>	0752 17	Nr. Bonifer	<u>0.86</u>	<u>84</u>	<u>0</u>	<u>14</u>	<u>26</u>	<u>44</u>
Total	29448			28490			0.97	288	0	53	37	198
90	14221	May 91	8.2	9835	075340	Bonifer	0.51	72	0	20	23	29
90	14198	May 91	8.2	9819	07534 1	Bonifer	0.51	73	0	25	10	38
90	<u>14191</u>	May 91	8.2	<u>9814</u>	075342	Bonifer	<u>0.66</u>	<u>94</u>	<u>0</u>	<u>25</u>	<u>17</u>	<u>52</u>
Total	42810 ld			29488			0.58	239	0	70	50	119
90	11084	May 91	8.7	9432	075343	Nr. Bonifer	0.58	84	0	19	7	38
90	11125	May 91	8.7	9487	075344	Nr. Bonifer	0.42	47	0	9	7	31
90	<u>11114</u>	May 91	8.7	<u>9458</u>	075345	Nr. Bonifer	<u>0.55</u>	<u>61</u>	<u>0</u>	<u>25</u>	<u>2</u>	<u>34</u>
Total	33323 /e			28357			0.52	172	0	53	18	103

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File Name: C:\123R3\DATA\STSSURV

/a The number released includes 33,984 adipose clipped fish at 10.3/lb. released at Umatilh RM 23 in May  
 /b The number released includes 22,274 adipose clipped fish at 5.5/lb. acclimated and released at Bonifer in May  
 /c The number released includes 29,522 adipose clipped fish at 7.7/lb. acclimated and released with the coded-wire tagged fish in May  
 /d The number released includes 12,389 adipose clipped fish at 7.5/lb. acclimated and released with the coded-wire tagged fish in May  
 /e The number released includes 3,998 adipose clipped fish at 12.5/lb. released at Umatilb RM 3 in April

Appendix 0. Liberation and survival information for Spring Creek tule stock fall chinook salmon released in the Umatilla River (1982).

Br. Yr.	Number Released	Date of Release	Size at Release	Number Tagged	CWT Code	Release Location	Estimated Adult Survival				
							%	Total	Ocean	Col. & Snake R. Umatilla R.	
81	308,279	Apr 82	79.0	48,707	050851	Umatilla R. /1	0.47	1,429	767	662	0
81	<del>672,057</del>	Apr82	79.0	<del>102,331</del>	051057	Umatilla R. /1	<del>0.56</del>	<del>3,730</del>	<del>2,154</del>	<del>1,576</del>	<del>0</del>
Total	978,338			149,038			0.53	5,159	2,921	2,239	0
81	2,828,835	Apr 82	92.0	102,398	072663	Umatilla R. (RM 1.5)	0.48	12,988	7,543	5,443	0

Revised: 2-10-94

File Name: C:\123\DATA\CHFSURV

/1 Approximately 48.7% of the fish were released at RM 1.5 and 51.3% at RM 51.5.

Appendix P. Liberation and survival information for Bonneville URB stock yearling fall chinook salmon released in the Umatilla River (1983-1993). /1

Br. Yr.	Number Released	Date of Release	Size at Release	Number Tagged	CWT Code	Release Location	Estimated Adult Survival /2				
							%	Total	Ocean	Col. & Snake R.	Uma.R.
81	100,584	Apr 83	5.9	99,570	072741	Bonifer & Meacham Cr.	0.17	188	88	80	0
82	228,412	Apr 84	8.8	98,448	072829	Bonifer & Meacham Cr.	0.08	178	128	52	0
a3	198,182	Mar 85	7.8	88,308	073127	Uma.R.(RM 87) 8 Bonifer	0.79	1,566	853	711	2
84	206,815	Mar 86	5.0	68,398	073327	Bonifer & Minthorn	3.15	8,509	3,524	2,893	292
85	22,218	Mar a7	8.1	10,103	073623	Minthorn	2.17	482	231	194	57
85	22,523	Mar 87	8.1	10,243	073824	Minthorn	2.03	457	204	220	33
a5	21,807	Mar 87	8.1	9,917	073825	Minthorn	2.18	475	222	194	59
85	20,661	Mar 87	8.1	9,498	073828	Minthorn	2.42	506	185	310	31
85	<u>21,716</u>	Mar87	8.1	<u>9,676</u>	073827	Minthorn	<u>2.16</u>	<u>469</u>	<u>196</u>	<u>233</u>	<u>40</u>
Total	109,143			49,835			2.19	2,389	1,018	1,151	220
85	20,786	Mar a7	8.6	10,253	073828	Bonifer	2.33	464	231	237	18
85	20,212	Mar a7	8.6	9,970	073829	Bonifer	2.28	460	235	209	18
85	20,548	Mar 87	8.6	10,135	073830	Bonifer	2.80	575	245	306	24
85	20,381	Mar 87	8.6	10,053	073831	Bonifer	2.15	439	201	195	43
85	<u>20,438</u>	Mar 87	8.6	<u>10,061</u>	073832	Bonifer	<u>2.40</u>	<u>490</u>	<u>223</u>	<u>237</u>	<u>30</u>
Total	102,383			50,492			2.39	2,448	1,135	1,184	129
86	52,317	Mar 88	8.8	42,088	074038	Minthorn	3.30	1,727	745	507	475
86	<u>48,474</u>	Mar 88	8.8	<u>38,978</u>	074039	Minthorn	<u>3.12</u>	<u>1,513</u>	<u>678</u>	<u>408</u>	<u>427</u>
Total	100,791			81,048			3.21	3,240	1,423	915	902
86	50,480	Mar88	10.2	39,509	074036	Bonifer	2.40	1,213	589	317	327
86	<u>49,070</u>	Mar 88	10.2	<u>38,405</u>	074037	Bonifer	<u>2.61</u>	<u>1,282</u>	<u>565</u>	<u>395</u>	<u>322</u>
Total	99,550			77,914			2.51	2,495	1,134	712	849
a?	217,443	Mar a9	8.6	0		Uma RM 63-70	NA				
88	255,814	Mar 90	a.2	0		Uma RM 70	NA				
89	194,847	Mar 91	7.8	0		Uma RM 56-79	NA				
90	122,839	Mar 92	7.7	28,180	075619	Uma RM 56	0.00	0	0	0	0
90	<u>97,801</u>	Mar 92	7.8	<u>26,178</u>	075818	Uma RM 70	<u>0.00</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	220,440			52,338			0	0	0	0	0
91	88,345	Mar 93	8.1	23,239	071461	Uma RM 73.5	0.00	0	0	0	0
91	<u>68,492</u>	Mar93	9.1	<u>23,863</u>	071460	Uma RM 73.5	<u>0.00</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	134,837			47,102			0	0	0	0	0

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File Name: C:\123R3\DATA\CHFSURV

/1 Adult returns from the 1986, 1990 and 1991 broods are incomplete.

/2 The data reported in the table are expanded numbers.

Appendix Q. Liberation and survival information for Bonneville URB and Umatilla River stock subyearling fall chinook salmon released in the Umatilla River (1984-1992). /1

Br. Yr.	Number /2 Released	Date or Release	Size at Release	Number Tagged	CWT Code	Release Location	Estimated Adult Survival /3				
							%	Total	Ocean	Col. & Snake R.	Uma.R.
83 B	966,250	Jun 84	85.1	210,441	073124	Umatilla R. (RM 1.5)	0.78	7,548	2,383	5,185	0
84 B	3223172	Jun 85	Q2.3	206,756	073326	Umatilla R. (RM 1.5)	0.87	27,999	11,022	16,930	47
84 B	51,080	Oct 85	16.2	30,838	073162	Bonirer	0.87	340	147	190	3
85 B	35,574	Oct 86	11.6	0		Minthorn	NA				
85 B			86.0	20,838	073833	Umatilla R. (RM 1.5)	0.75	1,473	528	947	0
85 B	198,153 197,432	Jun 86	86.0	21,335	073834	Umatilla R. (RM 1.5)	0.38	715	382	353	0
85 B	197,488	Jun 86	86.0	20,690	073835	Umatilla R. (RM 1.5)	0.37	735	363	372	0
85 B	198,952	Jun 86	86.0	20,170	073836	Umatilla R. (RM 1.5)	0.49	967	254	713	0
85 B	208,103 197,788	Jun 86	86.0	20,982	073837	Umatilla R. (RM 1.5)	0.47	934	255	679	0
85 B			86.0	20,815	073838	Umatilla R. (RM 1.5)	0.38	790	330	460	0
85 B	207,550	Jun 86	86.0	21,858	073839	Umatilla R. (RM 1.6)	0.54	1,138	289	849	0
85 B			86.0	20,269	073840	Umatilla R. (RM 1.5)	0.57	1,188	825	563	0
85 B	208,184	Jun 86	88.0	20,895	073841	Umatilla R. (RM 1.5)	0.81	1,285	149	1,118	0
85 B	708,934	Jun 86	86.0	21,694	073842	Umatilla R. (RM 1.5)	0.46	954	289	665	0
Total	2,029,602			209,145			0.50	10,159	3,442	8,717	0
87 B	1,429,250 /4	Jun 88	93.1	0		Umatilla R. (RM 9)	NA				
89 B	808,567	May-Jun 90	87.5	52,812	075403	Umatilla R. (RM 70-79)	0.10	784	277	338	189
89 B	808,560	May-Jun 90	87.5	53,180	075404	Umatilla R. (RM 70-79)	0.11	913	213	854	46
89 B	808,554	May-Jun 90	87.5	53,248	075405	Umatilla R. (RM 70-79)	0.04	349	15	197	137
Total	2,425,681			159,020			0.08	2,048	505	1,189	352
89 B	25,311	Oct 90	9.2	23,398	075325	Minthorn	0.03	7	4	2	1
89 B	23,724	Oct 90	9.2	21,929	075326	Minthorn	0.08	14	2	11	1
89 B	22,828	Oct 90	9.2	21,101	075327	Minthorn	0.06	14	2	9	3
Total	71,883			88,426			0.05	35	8	22	5
89 B	25,472	Oct 90	8.8	23,413	075322	Nr. Minthorn	0.02	5	0	5	0
89 B	25,894	Oct 90	8.8	23,817	075323	Nr. Minthorn	0.00	1	0	1	0
89 B	25,480	Oct 90	8.8	23,420	075324	Nr. Minthorn	0.01	3	0	2	1
Total	78,848			70,450			0.01	9	0	8	1
90 B	1,347,858	May 91	82.0	52,252	075225	Umatilla R. (RM 70-79)	0.00	52	0	28	28
90 B	1,347,587	May 91	82.0	51,726	075226	Umatilla R. (RM 70-79)	0.00	52	0	0	52
90 B	100,983	May 91	73.0	48,286	075328	Umatilla R. (RM 70-79)	0.03	30	0	17	13
90 B	100,300	May 91	73.0	48,481	075449	Umatilla R. (RM 70-79)	0.02	18	0	10	8
90 B	99,561	May 91	73.0	48,301	070016	Umatilla R. (RM 70-79)	0.03	31	8	23	2
90 B	52,503	May 91	82.0	51,814	075450	Umatilla R. (RM 70-79)	0.02	11	4	4	3
90 B	52,884	May 91	82.0	52,444	075451	Umatilla R. (RM 70-79)	0.03	16	3	8	5
Total	3,101,676 /5			353,288			0.01	208	13	88	10?
90 B	28,481	May 91	80.5	28,173	075563	Minthorn	0.01	3	0	0	3
90 B	28,565	May 91	80.5	24,762	075601	Minthorn	0.03	9		8	
90 B	26,606	May 91	80.5	25,476	075602	Minthorn	0.04	11	4	3	4
Total	79,872			78,411			0.03	23	4	11	8
90 B	25,882	May 91	86.0	25,720	075560	Nr. Minthorn	0.03	8	0	7	1
90 B	25,708	May 91	86.0	25,425	075561	Nr. Minthorn	0.04	9	1	6	2
90 B	23,295	May 91	86.0	22,309	075562	Nr. Minthorn	0.03	6	0	4	2
Total	74,885			73,454			0.03	23	1	17	5

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Appendix Q. (cont.)

Br. Yr.	Number Stock /2 Released	Date of Release	Size at Release	Number Tagged	CWT	Code	Release Location	Estimated Adult Survival /3				
								%	Total	Ocean	Col. & Snake R.	Uma R.
91 B	286,864	May92	70.6	31,892	071429		Umatilla R. (RM 42.5)	0.00	0	0	0	0
91 B	281,630	May 92	65.1	32,267	071430		Umatilla R. (RM 42.6)	0.00	0	0	0	0
91 B	163,113	May92	56.2	26,951	071431		Umatilla R. (RM 42.5)	0.00	0	0	0	0
91 B	191,440	May92	58.3	29,425	071432		Umatilla R. (RM 42.5)	0.00	0	0	0	0
91 O	304,181	May 92	61.0	29,066	071433		Umatilla R. (RM 42.5)	0.00	0	0	0	0
91 B	307,108	May 92	66.7	31,224	071434		Umatilla R. (RM 42.5)	0.00	0	0	0	0
91 B	297,627	May92	60.9	30,326	071435		Umatilla R. (RM 42.5)	0.00	0	0	0	0
91 B	302,857	May 92	61.9	30,365	071436		Umatilla R. (RM 42.5)	0.00	0	0	0	0
91 B	224,053	May 92	66.2	30,506	071437		Umatilla R. (RM 42.5)	0.00	0	0	0	0
91 B	302,132	May 92	64.5	30,924	071439		Umatilla R. (RM 42.5)	0.00	0	0	0	0
	2,681,013 /6			304,968				0.00	0	0	0	0
91 U	504,369	May92	63.4	0			Umatilla R. (RM 42.6)					
91 u	5,167	Apr-May 92	62.8	0			Umatilla R. (RM 3)					

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- /1 Adult returns from the 1986-91 brood years are incomplete.
- /2 B = Bonneville URB stock; U = Umatilla River stock
- /3 The data reported in the table are expanded numbers.
- /4 These fish were not coded-tire tagged, but to estimate adult contribution, they were included in the Priest Rapids URB stock subyearling release in 1999 (075007). Both stocks were reared at Irrigon Hatchery.
- /5 The number released includes 10,462 non-tagged fish at 80-194/lb. released at Umatilla RM 3 in April and May
- /6 The number released includes 2,670 non-tagged fish at 112/lb. released at Umatilla RM 3 in April and May

Appendix R. Liberation and survival information for Priest Rapids URB stock fall chinook salmon released in the Umatilla River (1987-1990). /1

Br. Yr.	Number Released	Date of Release	Size at Release	Number Tagged	CWT Code	Release Location	Estimated Adult Survival /2				
							%	Total	Ocean	Col. & Snake R. Uma.R.	
86	497,572	May 87	60.4	40,793	073912	Umatilla R. (RM 1.6)	0.72	3,586	1,537	1,976	73
86	501,266	May 87	60.4	41,096	073913	Umatilla R. (RM 1.5)	0.07	4,354	1,939	2,366	49
86	<u>477,992</u>	May 87	60.4	<u>39,187</u>	073914	Umatilla R. (RM 1.5)	<u>0.85</u>	<u>4,050</u>	<u>2,086</u>	<u>1,842</u>	<u>122</u>
Total	1,476,830			121,076			0.61	11,990	5,562	6,164	244
86	670	Jul 87	20.0	6 4 3	073915	Minthorn	0.00	0	0	0	0
86	672	Jul 87	20.0	6 4 5	073916	Minthorn	0.00	0	0	0	0
86	<u>658</u>	Jul 87	20.0	<u>632</u>	074035	Minthorn	<u>0.79</u>	<u>5</u>	<u>0</u>	<u>5</u>	<u>0</u>
Total	2,000			1,920			0.25	5	0	5	0
87	3,316,007 /3	May 66	66.3	198,285	075007	Umatilla R. (RM 23)	0.07	2,442	1,321	a70	251
87	4, 0 2 3	Nov 88	9.8	4,430	074539	Minthorn	0.43	21	11	9	1
87	4,660	Nov 88	9.8	4,289	074640	Minthorn	0.23	10	4	5	1
87	<u>4,925</u>	Nov 88	9.8	<u>4,533</u>	074641	Minthorn	<u>0.62</u>	<u>31</u>	<u>21</u>	<u>10</u>	<u>0</u>
Total	14,406			13,260			0.43	62	36	24	2
87	26,856	Nov 88	8.6	24,656	074536	Nr. Minthorn	0.40	106	41	51	14
87	25,493	Nov 88	8.6	23,403	074637	Nr. Minthorn	0.62	156	98	41	17
07	<u>27,330</u>	Nov 88	8.6	<u>25,089</u>	074538	Nr. Minthorn	<u>0.52</u>	<u>142</u>	<u>61</u>	<u>59</u>	<u>22</u>
Total	79,681			73,146			0.51	404	200	151	53
88	797,904	May 89	66.6	52,226	074646	Umatilla R. (RM 23)	0.12	931	412	412	107
88	797,903	May 89	66.6	49,771	074647	Umatilla R. (RM 23)	0.11	898	433	401	64
83	<u>797,903</u>	May 89	66.6	<u>52,244</u>	074648	Umatilla R. (RM 23)	<u>0.10</u>	<u>794</u>	<u>367</u>	<u>412</u>	<u>15</u>
Total	2,393,710			154,243			0.11	2,623	1,212	1,225	166
88	26,770	Oct 89	10.9	26,358	074753	Minthorn	0.11	29	12	16	1
88	26,617	Oct 89	10.9	25,028	074754	Minthorn	0.09	24	6	11	7
88	<u>25,438</u>	Oct 89	10.9	<u>25,438</u>	074757	Minthorn	<u>0.07</u>	<u>18</u>	<u>4</u>	<u>7</u>	<u>7</u>
Total	76,625			76,824			0.09	71	22	34	15
88	27,071	Oct 89	11.1	26,790	074758	Nr. Minthorn	0.06	16	4	9	3
88	25,428	Oct 89	11.1	24,265	074760	Nr. Minthorn	0.08	21	13	7	1
88	<u>25,633</u>	Oct 89	11.1	<u>25,350</u>	074763	Nr. Minthorn	<u>0.06</u>	<u>16</u>	<u>z</u>	<u>5</u>	<u>4</u>
Total	70,132			76,425			0.07	53	24	21	8
69	629,800	May 90	62.4	0		Umatilla R. (RM 70-79)					

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/1 Adult returns are incomplete.

/2 The data reported in the table are expanded numbers.

/3 The number released includes 1,429,250 Bonneville URB stock subyearlings released at 93.1/lb. in June at Umatilla RM 9.

Appendix S. Liberation and survival information for spring chinook salmon released in the Umatilla River (1988–1992).

Brood	Number Released	Date of Release	Size at Release	Number Tagged	CWT Code	Release Location	Estimated Adult Survival			
							%	Total	Columbia & Snake Rivers	Umatilla River
86	99895	Apr 88	20.6	0		Uma.R. (RM 23)	NA			
86	35946	Mar-Apr 88	10.1	26640	074325	Bonifer	0.95	342	34	308
86	35148	Mar-Apr 88	10.1	25863	074326	Bonifer	0.94	332	98	234
86	35137	Mar-Apr 88	10.1	25853	074327	Bonifer	0.94	332	53	279
Total	106231			78356			0.95	1006	145	821
86	64142	Apr 88	8.6	26319	074328	Uma.R. (RM 23-81)	0.65	426	54	366
86	62991	Apr 88	8.6	25722	074329	Uma.R. (RM 23-81)	0.48	303	83	220
86	64013	Apr 88	8.6	26252	074330	Uma.R. (RM 23-81)	0.92	588	95	493
Total	191146	/1		78293			0.69	1311	232	1079
87	399	Nov 88	21.4	410	074420	Bonifer	0.00	0	0	0
87	381	Nov 88	21.4	393	074423	Bonifer	0.25	1	0	1
67			21.4	376	074424	Bonifer	0.26	1	0	1
Total	1196			1179			0.17	2	0	2
87	26109	Nov 88	11.1	25987	074427	Uma.R. (RM 89)	0.06	15	0	15
87	24183	Nov 88	11.1	24070	074429	Uma.R. (AM 89)	0.12	28	3	25
67	25475	Nov 88	11.1	25356	074430	Uma.R. (RM 89)	0.09	22	0	22
Total	75767			75413			0.09	65	3	62
87	26135	Mar-May 89	10.6	26427	074433	Bonifer	0.35	92	11	81
87	27756	Mar-May 89	10.6	27004	074434	Bonifer	0.25	69	9	60
87	26093	Mar-May 89	10.6	25386	074436	Bonifer	0.25	66	14	52
Total	79984			77817			0.26	227	34	193
a7	28153	Mar 89	10.6	27585	074439	Nr. Bonifer	0.32	90	24	66
87	28116	Mar 89	10.6	27550	074440	Nr. Bonifer	0.33	93	15	78
87	24663	Mar 89	10.6	24165	074443	Nr. Bonifer	0.35	86	15	71
Total	80932			79300			0.33	269	54	215
66	24968	Oct 89	12.0	24801	075063	Bonifer	0.06	15	9	6
88	28299	Oct 89	12.0	28109	075101	Bonifer	0.12	35	4	31
88	27483	Oct 89	12.0	27299	075102	Bonifer	0.09	25	5	20
Total	80750			80209			0.09	75	18	57
88	27287	Oct 89	12.0	27137	075103	Nr. Bonifer	0.07	18	2	16
88	28718	Oct 89	12.0	28560	075104	Nr. Bonifer	0.11	32	16	16
88	27848	Oct 89	12.0	27695	075105	Nr. Bonifer	0.05	13	0	13
Total	83853			83392			0.08	63	18	45
88	99775	April 90	18.6	0		Uma.R. (RM 23)	NA			
88	38224	March 90	9.0	26638	075106	Bonifer	0.48	185	36	149
88	37538	March 90	9.0	26160	075107	Bonifa	0.66	247	62	185
88	38583	March 90	9.0	26888	075108	Bonifer	0.48	184	49	135
Total	114345			79686			0.54	616	147	469
88	39012	March 90	9.6	25611	075109	Nr. Bonifer	0.71	270	56	222
88	40072	March 90	9.6	26307	075110	Nr. Bonifa	0.75	300	82	216
88	38343	March 90	9.6	25172	075111	Nr. Bonifer	0.53	204	56	148
Total	117427			77090			0.67	782	194	588

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Appendk S. (Cont.)

Brood	Number Released	Date of Release	Size at Release	Number Tagged	CWT Code	Release Location	Estimated Adult Survival			
							%	Total	Columbia & Snake Rivers	Umatilla Rivet
89	26757	Oct 90	11.5	26670	074505	Bonifer	0.01	3	0	3
89	26805	Oct 90	11.5	26717	074506	Bonifsr	0.01	2	0	2
89	<del>26876</del>	Oct 90	11.5	<del>26788</del>	074507	Bonifer	<u>0.00</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	80436			80175			0.01	5	0	5
89	26050	Oct 90	13.4	25876	074508	Nr. Bonifer	0.01	2	2	0
89	26279	Oct 90	13.4	26104	074509	Nr. Bonifer	0.00	0	0	0
89	<del>25669</del>	Oct 90	13.4	<del>25497</del>	074510	Nr. Bonifsr	<u>0.01</u>	<u>2</u>	<u>0</u>	<u>2</u>
Total	77998			77477			0.01	4	2	2
89	33473	Mar 91	10.1	25947	075114	Bonifer	0.22	75	18	57
89	33440	Mar 91	10.1	25921	075115	Bonifer	0.18	60	6	54
89	<del>33593</del>	Mar 91	10.1	<del>26039</del>	075116	Bonifer	<u>0.24</u>	<u>80</u>	<u>6</u>	<u>74</u>
Total	100506			77907			0.21	215	30	185
89	31932	Mar91	11.8	24365	075440	Nr. Bonifer	0.12	39	0	39
89	32187	Mar 91	11.8	24559	075441	Nr. Bonifer	0.13	41	0	41
89	<del>32032</del>	Mar91	11.8	<del>24441</del>	075442	Nr. Bonifer	<u>0.13</u>	<u>42</u>	<u>7</u>	<u>35</u>
Total	96151			73365			0.13	122	7	115
89	96733	Apr-May 91	20.3	23797	635661	Uma.R. (RM 3 & 89)	0.16	150	69	81
90	27040	Nov 91	16.5	26769	075826	Bonifa	0.01	3	0	3
90	27007	Nov 91	16.5	26737	075827	Bonifer	0.01	4	0	4
90	<del>27098</del>	Nov 91	16.5	<del>26827</del>	075826	Bonifsr	<u>0.01</u>	<u>2</u>	<u>0</u>	<u>2</u>
Total	81145			80333			0.01	9	0	9
90	26019	Nov 91	16.8	25499	075829	Nr. Bonifer	0.00	0	0	0
90	25900	Nov 91	16.8	26362	075830	Nr. Bonifer	0.00	1	0	1
90	<del>26561</del>	Nov 91	16.8	<del>26029</del>	075831	Nr. Bonifer	<u>0.00</u>	<u>1</u>	<u>0</u>	<u>1</u>
Total	78480			76910			0.00	2	0	2
90	96254	April 92	18.7	31851	633962	Uma.R. (RM 3 & 89)	0.00	0	0	0
90	36351	April 92	9.2	26570	075835	Bonifer	0.00	1	0	1
90	36154	April 92	9.2	26426	075836	Bonifer	0.00	0	0	0
90	<del>35596</del>	April 92	9.2	<del>26750</del>	075837	Bonifer	<u>0.00</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	109101			79746			0.00	1	0	1
90	32994	April 92	8.5	25503	075832	Nr. Bonifer	0.00	0	0	0
90	32953	April 92	8.5	25472	075833	Nr. Bonifsr	0.00	1	0	1
90	<del>32982</del>	April 92	8.5	<del>25493</del>	075834	Nr. Bonifer	<u>0.01</u>	<u>3</u>	<u>0</u>	<u>3</u>
Total	98929			76466			0.00	4	0	4

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/1The number released includes 89,268 non-fagged fish at 10.3/lb. released in the upper Umatilla River in April, 1988

Appendix T. Liberation and survival information for coho salmon released in the Umatilla River (1987-1993). /a

Brood	Number Released	Date of Release	Sue at Release	Number Tagged	CWT Code	Release Location	Estimated Adult Survival				
							%	Total	Ocean	Col.R.	Uma.R.
85	212266	Apr 87	13.5	13440	073617	Minthorn	1.88	3980	1974	1769	237
85	313961	Apr 87	13.5	19879	073624	Mmthorn	1.58	4959	3048	1753	158
85	<u>422322</u>	Apr 87	13.5	<u>26740</u>	073625	Minthorn	<u>1.50</u>	<u>6317</u>	<u>3790</u>	<u>2337</u>	<u>190</u>
Total	948549 /b			60059			1.61	15256	8812	5859	585
86	334038	Mar-Apr 88	16.8	20592	074356	Lower Umatilla R.	4.57	15281	8354	4088	2839
86	360689	Mar-Apr 88	17.3	18963	074357	Lower Umatilla R.	4.41	15920	8426	3652	3842
86	<u>301706</u>	Mar-Apr 88	16.7	<u>18513</u>	074358	Lower Umatilla R.	<u>4.43</u>	<u>13379</u>	<u>7431</u>	<u>2754</u>	<u>3194</u>
Total	996433			58068			4.47	44580	24211	10494	9675
87	829607	Mar 89	17.2	27062	074609	Nr. Minthorn	0.57	4721	2790	1349	582
87	72627	Mar 89	17.3	26416	074610	Minthorn	1.04	754	531	121	102
87	<u>84672</u>	Mar 89	19.1	<u>26739</u>	074611	Minthorn	<u>1.08</u>	<u>912</u>	<u>684</u>	<u>108</u>	<u>120</u>
Total	157299			53155			1.06	1666	1215	229	222
Ba	67309	Mar 90	13.5	28033	074814	Minthorn	3.06	2060	819	1047	194
88	856524 /c	Mar 90	13.3	26881	074813	Uma Rm 63-70	3.10	26510	11216	13032	2262
88	65095	Apr 90	11.2	27226	074815	Minthorn	4.03	2625	1143	1255	227
89	152974	Mar 91	15.4	24584	075535	Minthorn	0.20	305	187	81	37
89	449678	Mar 91	16.5	25338	075534	Uma Rm 56-60	0.17	746	302	302	142
89	<u>352977</u>	Mar 91	16.8	<u>25407</u>	075533	Uma Rm 63-70	0.15	<u>528</u>	<u>292</u>	<u>69</u>	<u>167</u>
Total	802655			50745			0.16	1274	594	371	309
90	472221	Mar 92	15.5	27908	075620	Uma Rm 56	0.64	3028	964	1303	761
90	244615	Mar 92	15.7	27705	075621	Uma Rm 60	1.00	2438	892	901	645
90	<u>244550</u>	Mar 92	15.7	<u>27458</u>	075622	Uma Rm 60	<u>0.66</u>	<u>1621</u>	<u>561</u>	<u>650</u>	<u>410</u>
Total	961386			83071			0.74	7087	2417	2854	1816
91	454794	Apr 93	17.6	28273	071521	Uma Rm 60	0.01	32	0	32	0
91	218618	Apr 93	17.5	27821	071522	Uma Rm 42	0.01	16	0	0	16
91	<u>219266</u>	Apr 93	17.5	<u>27984</u>	071523	Uma Rm 42	0.00	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	892678			84078			0.01	48	0	32	16

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/a Survival date for the 1991 brood includes age-2 fish only (1993 returns).

/b The number released includes 786,680 non-tagged fish at 14.0/lb. released at Umatilla RM 23 in April

/c The number released includes 694,527 non-tagged fish at 14.8/lb. released at Umatilla RM 70 in March and April, and 202,315 non-tagged fish at 14.5/lb. released at Umatilla RM 23 in March