

ANNUAL STOCK ASSESSMENT -

CODED WIRE TAG PROGRAM

(ODFW)

2000 Annual Report

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## SUMMARY

This annual report is in fulfillment of contract obligations with Bonneville Power Administration which is the funding source for the Oregon Department of Fish and Wildlife's Annual Stock Assessment - Coded Wire Tag Program (ODFW) Project.

Tule stock fall chinook were caught primarily in British Columbia and Washington ocean, and Columbia Basin fisheries. Up-river bright stock fall chinook contributed primarily to Alaska and British Columbia ocean commercial, Columbia Basin gillnet and freshwater sport fisheries. Contribution of Rogue stock fall chinook released in the lower Columbia River occurred primarily in Oregon ocean commercial, Columbia Basin gillnet and freshwater sport fisheries.

Willamette stock spring chinook contributed primarily to Alaska and British Columbia ocean, and Columbia Basin sport fisheries. Willamette stock spring chinook released by CEDC contributed to similar ocean fisheries, but had much higher catch in Columbia Basin gillnet fisheries than the same stocks released in the Willamette Basin. Up-river stocks of spring chinook contributed almost exclusively to Columbia Basin fisheries.

The up-river stocks of Columbia River summer steelhead contributed almost exclusively to the Columbia Basin gillnet and freshwater sport fisheries.

Coho ocean fisheries from Washington to California were closed or very limited from 1994 through 1999 (1991 through 1996 broods). This has resulted in a lower percent of catch in Washington, Oregon and California ocean fisheries, and a higher percent of catch in Alaska and British Columbia ocean and Columbia Basin freshwater fisheries. Coho stocks released by ODFW below Bonneville Dam were caught mainly in Oregon, Washington, and British Columbia ocean, Columbia Gillnet and freshwater sport fisheries. Coho stocks released in the Klaskanine River and Youngs Bay area had similar ocean catch distributions, but a much higher percent catch in gillnet fisheries than the other coho releases. Ocean catch distribution of coho stocks released above Bonneville Dam was similar to the other coho groups. However, they had a higher percent catch in gillnet fisheries above Bonneville Dam than coho released below the dam.

Survival rates of salmon and steelhead are influenced, not only by factors in the hatchery (disease, density, diet, size and time of release) but also by environmental factors in the river and ocean. These environmental factors are influenced by large scale oceanic and weather patterns such as El Nino. Changes in rearing conditions in the hatchery do impact survival, however, these can be offset by impacts caused by environmental factors.

Coho salmon released in the Columbia River generally experience better survival rates when released later in the spring. However, for the 1990 brood year June releases of Columbia River coho had much lower survival than May releases, for all ODFW hatcheries. In general survival of ODFW Columbia River hatchery coho has declined to low levels in recent years.

Preliminary results from the evaluation of Visual Implant Elastomer (VIE) tags showed tagging rate and pre-release tag retention improved from the first to second years of tagging. Tagging rate remained identical from 1999 to 2000 while pre-release tag retention dropped to 95%. Returning jack and adult salmon were sampled for CWT and VIE tags in the fall of 2000. Of 606 adults recovered at Sandy Fish Hatchery in 2000, only 1 or 0.2%, retained their VIE tag. Of 36 jacks recovered in 2000, 13 or 36.1% retained their VIE tag.

## INTRODUCTION

The Columbia Basin Fish and Wildlife Program Section 203 (a) proposes an interim goal of doubling runs of salmon and steelhead in the Columbia Basin. As part of this effort Section 206 (c) states an objective of exploring methods for substantially increasing and improving hatchery production at existing hatcheries. Section 206 (e)(1) states Bonneville shall fund collection of Columbia Basin hatchery data for anadromous fish. These data will include at a minimum: number of returning adults; disposition of returning adults; source and description of brood stock; actions to maintain genetic diversity; and size, location and time of release of juvenile fish. A system of monitoring and evaluation is necessary to measure present and future levels of fish production by various hatchery and natural fish production components if we are going to be able to evaluate the success of this program in attaining the goal of doubling fish runs.

In September 1989 the Oregon Department of Fish and Wildlife received a grant from the Bonneville Power Administration to begin a project of annually coded-wire tagging production groups of anadromous salmonids not currently tagged. Some groups of hatchery production fish were already being tagged by other programs. The Bonneville Power Administration contract consisted of coded-wire tagging the remaining untagged production groups for the future data base. This project began in 1990 to coded-wire tag groups of juvenile anadromous salmon produced at Oregon hatcheries.

Tagging will enable evaluation of survival and contribution rates. As the fish mature and are captured in various fisheries or return to release/recapture facilities, they are sampled to recover coded-wire tags. All recoveries of coded-wire tagged fish are reported to the Pacific States Marine Fisheries Commission (PSMFC). Release and recovery information is stored along with sampling and mark/unmarked release ratios. This information is then used to estimate survival rates and catch contribution rates for each production lot of fish reared and released at each hatchery. This data is used to evaluate effectiveness of each hatchery as well as various rearing and release practices. Evaluation of the various hatchery and natural production projects will be needed to measure the effectiveness of any mitigation program and to help direct future efforts in maintaining or enhancing fish runs in the Columbia Basin. This information is also used by salmon harvest managers in developing scenarios that will allow harvest of excess hatchery fish while protecting threatened and endangered natural stocks.

## METHODS AND MATERIALS

The adipose fin clip + coded-wire tag (Jefferts et.al. 1963) was chose as the method of marking because its use is well established in the region, there is a regionwide sampling program for this mark, and there is an established regional data reporting, storing, and access system. In 1989 a committee of agency and tribal scientists recommended the number of fish tagged per group for this project be based on producing a minimum of 30 actual tag recoveries per group. Based on historic levels of survival, harvest, and sampling, the following levels of tagging should meet that goal; tag 25,000 for groups with expected survivals of 0.5% or higher, and tag 50,000 for groups with expected survivals of 0.5% or lower. Some groups of 30,000 are used for Willamette Basin spring chinook to maintain equal sample size with ongoing ODFW research projects funding other tagging at those hatcheries. These levels generally agree with Reisenbichler and Hartmann (1978) who recommended tagging 25,000 fish per group for estimation of fish contribution. However, the increasing

complexity of fisheries management regimes requires much higher levels of tagging (Hankin and Mohr 1990).

Objective 1. Insure all ODFW Columbia Basin hatchery coho and chinook production releases have a representative CWT group included in the release. Specific tasks and methods follow:

- a) Determine groups to be tagged and number of fish to tag. This is a three step process. First, all production releases are identified, based on program intent (ongoing regular smolt production), number of fish released (50,000 or more), and fish of an acceptable size (at least 2.0 gm/fish). Second, groups with adequate tagging funded by other sources are eliminated from the list. Finally, the number of fish to tag is determined based on the expected survival, generally 25,000 to 50,000 fish per group.
- b) The identified groups of fish are tagged based on the manufactures recommendations and standard techniques for coded-wire tagging (Jenkinson and Bilton 1981).
- c) Pre-release checks of 500 fish per group (PSC 1995) are made at least 4 weeks after tagging (Blankenship 1981).
- d) All release information is reported to the Pacific States Marine Fisheries Commission and is available on their on-line computer database.

Objective 2. Recover coded-wire tags from snouts of fish tagged under Objective 1. Specific tasks and methods follow:

- a) Snouts collected from marked fish sampled in fisheries, hatcheries, and other recovery areas are frozen and transported to the ODFW Fish Identification head lab in Clackamas, Oregon.
- b) Tags are recovered, read and stored using standard techniques. Tags recovered by other agencies are sent to the Clackams lab for verification.
- c) All recovery information is reported to the Pacific States Marine Fisheries Commission and is available on their on-line computer database.

Objective 3. Prepare annual report. Specific tasks and methods follow:

- a) Compile release and recovery information from all CWT groups released in the Columbia Basin by ODFW.
- b) Calculate survival (total estimated recoveries/number of tagged fish released) and catch distribution (percent of total recoveries by location) for each CWT group. Calculate 5 year averages of the above information by hatchery program (species/stock/release location) and display graphically.
- c) Compile and submit report to BPA by 90 days after end of contract. Report published by BPA.

In 1997 a fourth objective was added to evaluate methods of marking large numbers of hatchery fish.

Objective 4. Evaluate the technical, logistic, and biological feasibility of using alternative marking techniques to mark large numbers of juvenile coho salmon.

- a) Mark one group of 75,000 juvenile coho salmon at Sandy hatchery. Each fish will receive a code-wire tag (in the snout), adipose fin clip, and visual implant tag (in the jaw).
- b) Collect and record data during hatchery rearing (from tagging through release) including daily mortality, daily amounts fed, monthly fish size, and monthly disease checks.
- c) Pre-release checks of 500 fish per group (PSC 1995) are made at least 4 weeks after tagging (Blankenship 1981).

d) Coho salmon jacks and adults collected at Sandy hatchery will be checked for fin clips and visual implant tags. Marked fish will be sampled for gender, length, and have their snouts removed for CWT recovery.

## RESULTS

Objective 1. We completed coded-wire tagging and ad-clipping (Ad+CWT) a total of over 1.0 million juvenile 1999 brood spring and fall chinook and coho salmon (Table 1). The total represents 25 different tag groups. Of the Ad+CWT fish we also tagged with VIE tags about 73,000 coho salmon (Obj. 4 Act. 2 in Table 1). Operational costs for this tagging totaled about \$109,000 (without administrative overhead), or an average of \$97 per thousand fish tagged, ranged from \$76/1,000 to \$161/1,000.

Table 1. Fish Tagged and Respective Estimated Operational Costs. (January 1, 2000 to December 31, 2000)

Obj.	Act.	Period	Location	Brood	Sp.	CWT'd	Grps	\$/K	Tot. \$
1	1	April, 00	Big Creek	99	CHF	221,174	1	\$99	\$21,959
1	2	April, 00	Bonneville	99	CHF	107,809	2	\$83	\$8,903
1	3	April, 00	Oxbow	99	CHS	32,780	1	\$97	\$3,176
1	4	July, 00	Willamette	99	CHS	27,026	1	\$102	\$2,768
1	5	July, 00	Willamette	99	CHS	32,056	1	\$102	\$3,283
1	6	June, 00	Willamette	99	CHS	52,078	1	\$102	\$5,334
1	7	July, 00	South Santiam	99	CHS	54,134	1	\$96	\$5,197
1	8	Aug., 00	Marion Forks	99	CHS	30,746	1	\$92	\$2,816
1	9	Aug., 00	McKenzie	99	CHS	64,067	2	\$97	\$6,239
1	10	June, 00	Big Creek	99	Coho	54,684	2	\$94	\$5,129
1	11	Oct., 00	Bonneville	99	Coho	26,783	1	\$93	\$2,483
1	12	Sept., 00	Cascade	99	Coho	108,598	4	\$97	\$10,573
1	13	Aug., 00	Oxbow	99	Coho	54,070	2	\$85	\$4,586
1	14	Oct., 00	S Fk Klaskanine	99	Coho	26,668	1	\$161	\$4,281
1	15	Oct., 00	Sandy	99	Coho	27,279	1	\$99	\$2,704
1	16	Oct., 00	Sandy	99	Coho	54,217	2	\$99	\$5,373
4	2	July, 00	Sandy (VIE tag)	99	Coho	73,314	1	\$76	\$5,562
4	3	Nov., 00	Sandy	99	Coho	70,870	1	\$119	\$8,425
			TOTALS			1,118,353	26	\$97	\$108,792

Objective 2. During 2000 we completed processing a total of 23,926 tags at the laboratory in Clackamas. The total consisted of fish from sport, commercial, tribal, hatchery, spawning ground surveys, and miscellaneous other fisheries (Table 2). Verifications on the tags recovered and returned to ODFW by other agencies during 2000 have not yet been completed.

Objective 3. Summaries of available coded-wire tag recovery information for all groups of tagged fish released from Oregon Department of Fish and Wildlife hatcheries in the Columbia basin are presented in Appendix A. Charts depicting the latest five year average distribution of catch and estimated survival rate for each stock and hatchery are presented in Figures 1 to 42.

Objective 4. Results are reported in Appendix B.

Table 2. CWT's Recovered at Clackamas. (Jan. 2000 to Dec. 2000)

Fishery	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	2000 Total
River Sport	39	252	403	265	305	60	20	1,538	0	251	0	0	3,133
Hatchery	1,932	1,762	745	1,254	2,494	130	2,205	0	9	512	221	0	11,264
Spawning Ground	149	178	237	0	1	18	0	3	0	0	276	0	862
Treaty Gillnet	0	0	0	0	96	0	0	45	720	0	0	0	861
Non-Treaty Gillnet	1,594	39	30	0	0	11	0	335	0	118	0	188	2,315
Youngs Bay Gillnet	0	1,309	1	0	0	149	24	65	0	0	0	0	1,548
Terminal Gillnet	288	624	0	0	263	208	0	8	0	0	0	31	1,422
Ocean Sport/Troll	0	0	0	0	0	0	0	0	817	686	0	0	1,503
Estuary Sport	0	14	0	0	0	0	0	93	130	54	0	0	291
Whiting By-Catch	2	0	0	0	0	0	0	0	0	0	0	0	2
Ceremonial/Subsist	0	0	0	0	0	381	26	0	0	0	0	0	407
Columbia R Test	0	0	0	13	1	0	0	0	0	0	0	0	14
Smolt Recoveries	0	0	0	0	0	0	0	0	0	0	0	304	304
Totals	4,004	4,178	1,416	1,532	3,160	957	2,275	2,087	1,676	1,621	497	523	23,926
Verifications	0	0	0	0	0	0	0	0	0	0	0	0	0

#### DISCUSSION

The average percent recovery (by fishery) for the last 5 completed brood years (chinook 1990 to 1994 broods; coho 1992 to 1996 broods; steelhead 1991 to 1995 broods) is presented in Appendix A.

#### Big Creek Hatchery

Big Creek Hatchery is located 2 miles south of Knappa off Highway 30 near the mouth of the Columbia River. The hatchery, originally built in 1939-41, rears and releases tule and Rogue fall chinook, coho salmon, and winter steelhead.

Tule stock fall chinook 1990 to 1994 brood survival rate averaged 0.14%. They were caught primarily in British Columbia and Washington ocean fisheries, and Oregon freshwater fisheries (Figure 1).

Experimental releases of Rogue River stock fall chinook releases at Big Creek began in 1983. Good survival and contribution rates to Oregon fisheries resulted in expansion of the program. The 1990 to 1994 broods survived at an averaged rate of 0.74%, and were caught mainly in Oregon freshwater and ocean fisheries (Figure 2).

The 1992 to 1996 brood Big Creek stock coho released in Big Creek survived at an average rate of 0.69%. They were caught mainly in Oregon freshwater as well as British Columbia, and Washington ocean fisheries (Figure 3).

The 1992 to 1996 brood Big Creek stock coho released in Tualatin River survived at a average rate of 0.03% and were caught mainly in Washington ocean and Oregon ocean and freshwater fisheries (Figure 4).

Winter steelhead are reared at Big Creek but none have been marked with coded-wire tags for evaluation. Previously small groups of chum salmon and searun cutthroat trout were reared and released at Big Creek hatchery, but none of these fish were coded-wire tagged for evaluation.

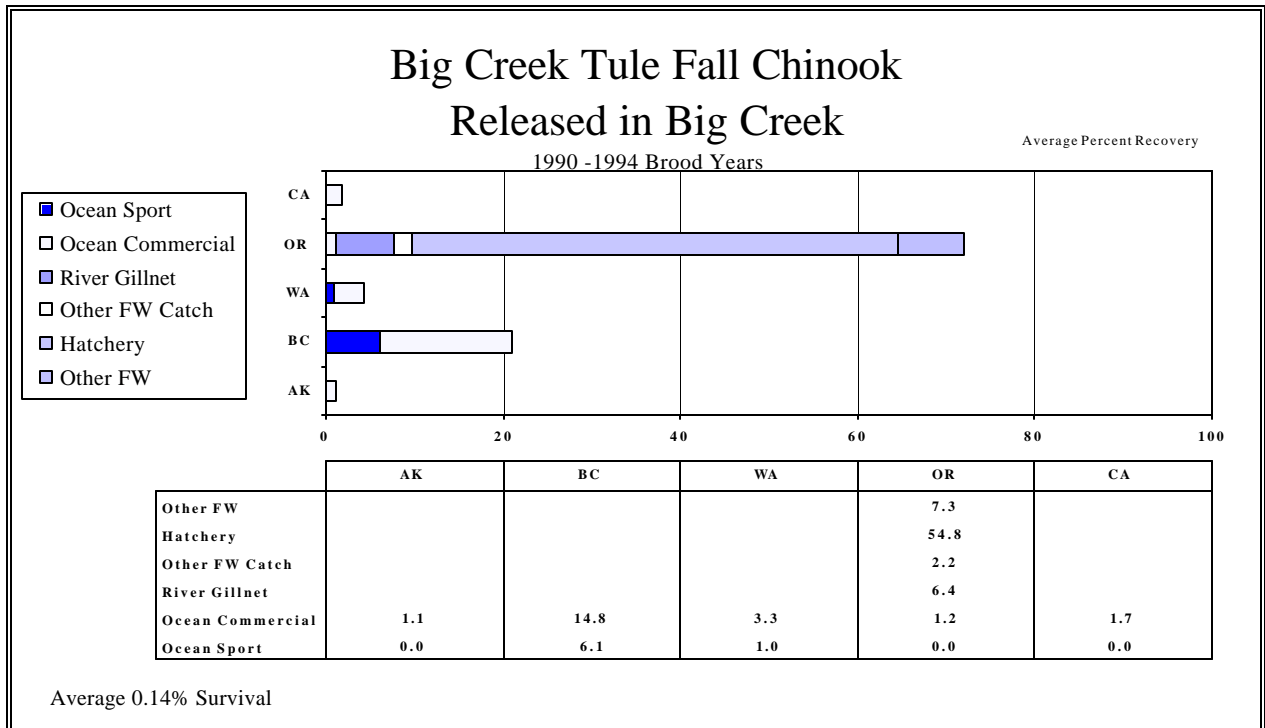


Figure 1. Average survival and catch distribution of Big Creek hatchery tule stock fall chinook, released in Big Creek (1990 to 1994 broods).

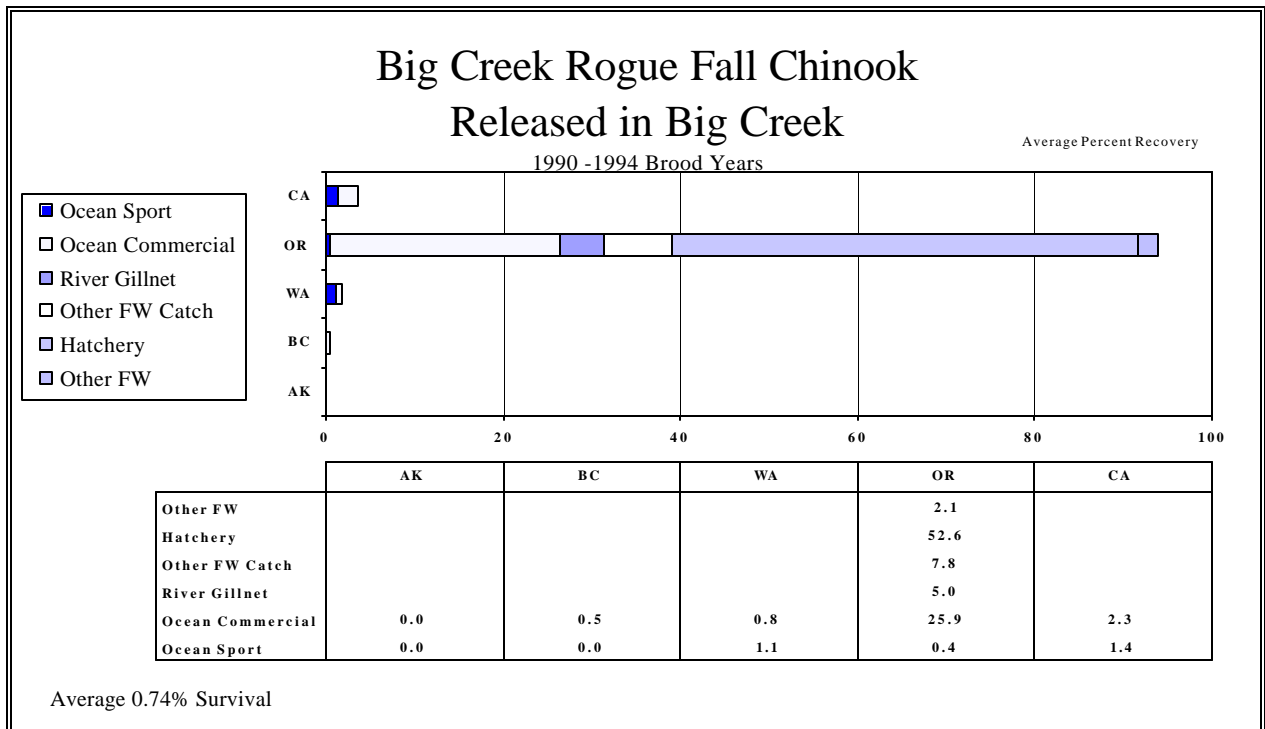


Figure 2. Average survival and catch distribution of Big Creek hatchery Rogue River stock fall chinook, released in Big Creek (1990 to 1994 broods).



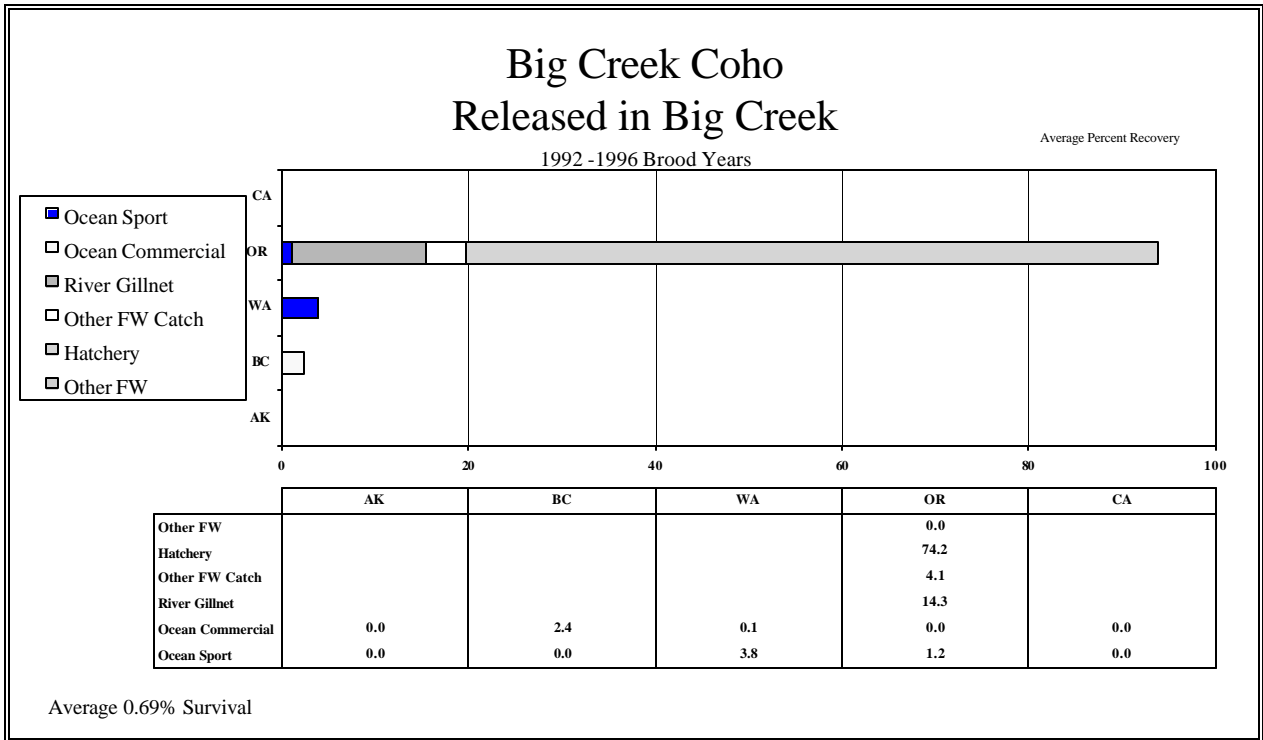


Figure 3. Average survival and catch distribution of Big Creek hatchery Big Creek stock coho, released in Big Creek (1992 to 1996 broods).

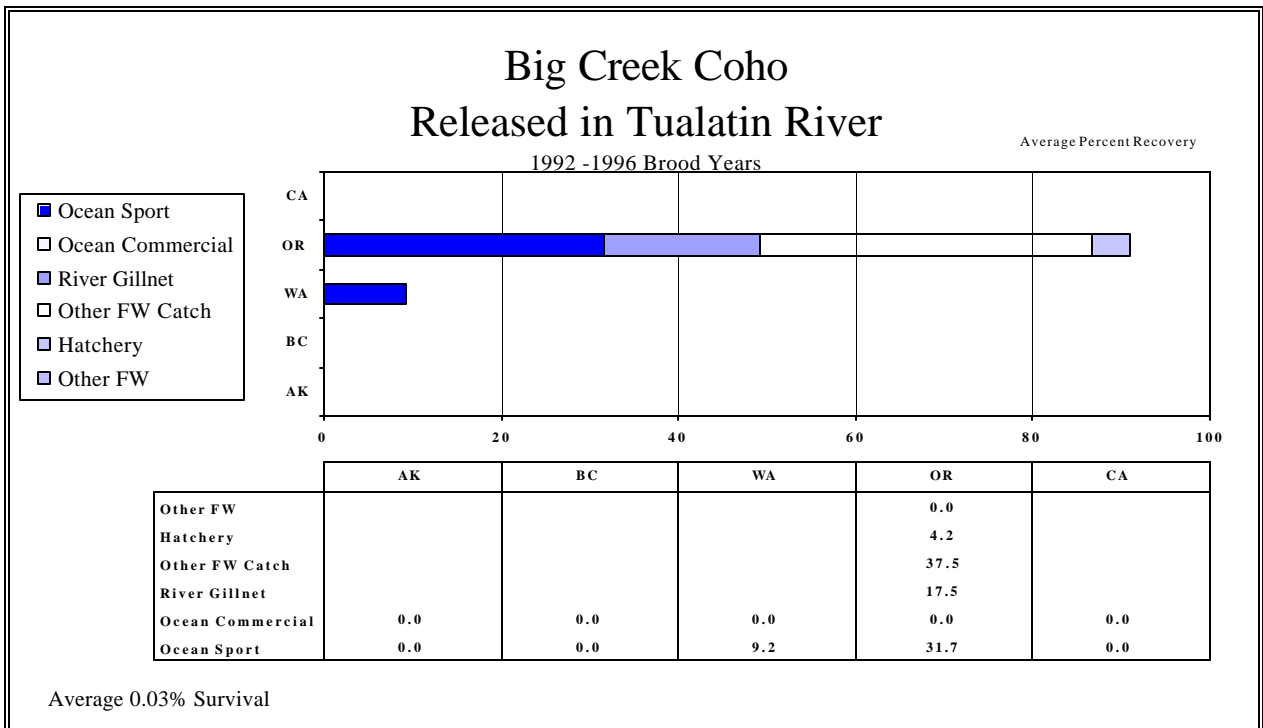


Figure 4. Average survival and catch distribution of Big Creek hatchery Big Creek stock coho, released in Tualatin River (1992 to 1996 broods).

**Klaskanine Hatchery**

Klaskanine Hatchery is located 21 miles southeast of Astoria, Oregon on Highway 202 adjacent to the Klaskanine River. The hatchery, originally built in 1913, was expanded and remodeled in 1953. Budget cuts have reduced hatchery staffing to 1 person and eliminated all rearing programs. The hatchery does serve as an acclimation and adult recapture facility for Rogue stock fall chinook and Big Creek stock winter steelhead.

Rogue Stock fall chinook releases began in 1997 (1996 brood). The tule fall chinook program was discontinued after the 1988 brood year. For information on the survival and catch distribution of these releases refer to prior annual reports.

The coho program was discontinued after the 1994 brood year. The 1992 to 1994 brood Klaskanine coho produced an average survival rate of 0.45%. They were caught primarily in Columbia Basin gillnet and freshwater sport fisheries, with ocean catch mainly from British Columbia to Oregon (Figure 5).

Winter steelhead are acclimated at Klaskanine Hatchery but none have been marked with coded-wire tags for evaluation.

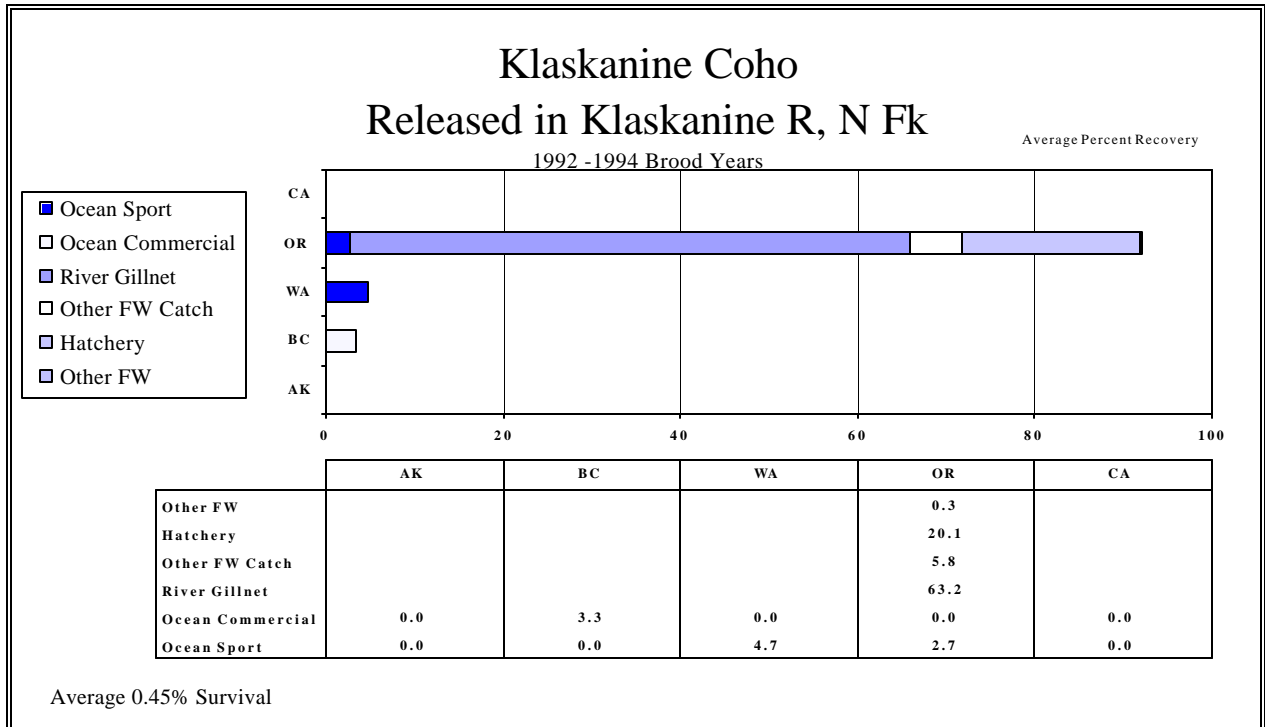


Figure 5. Average survival and catch distribution of Klaskanine hatchery Klaskanine River stock coho, released in North Fork Klaskanine River (1992 to 1994 broods).

**Clatsop Economic Development Commission (CEDC)**

CEDC operates freshwater ponds and estuary net pens in Youngs Bay and adjacent areas near Astoria, Oregon. CEDC releases coho and chinook salmon in cooperation with ODFW hatcheries.

Tule fall chinook production was discontinued after the 1987 brood year. For information on the survival and catch distribution of these releases refer to prior annual reports.

The Rogue River stock fall chinook released by CEDC (1991, 1993 to 1994 broods) survived at an average rate of 0.50%. They were caught primarily in Oregon ocean, gillnet, and freshwater sport fisheries (Figure 6).

The 1992 to 1996 brood Klaskanine River stock coho released in South Fork Klaskanine River survived at an average rate of 0.96%. They were caught mainly in Washington and Oregon ocean, Columbia Basin gillnet and freshwater sport fisheries (Figure 7).

The 1992 to 1996 broods of Clackamas River stock coho, reared at Eagle Creek NFH and acclimated for release in the Youngs Bay net pens, survived at a rate of 0.81% (Figure 8). Catch was primarily in gillnet and freshwater sport fisheries, with ocean catch off Washington and Oregon (Figure 8).

The 1992 to 1996 brood Tanner Creek coho stock acclimated and released from the Youngs Bay net pens survived at a rate of 1.00% (Figure 9). Catch was primarily in gillnet and freshwater sport fisheries, with ocean catch off Washington and Oregon (Figure 9).

The 1994 to 1995 brood Sandy River coho stock acclimated and released from the Youngs Bay net pens survived at a rate of 0.42% (Figure 10). Catch was primarily in gillnet and freshwater sport fisheries, with ocean catch off Washington and Oregon (Figure 10).

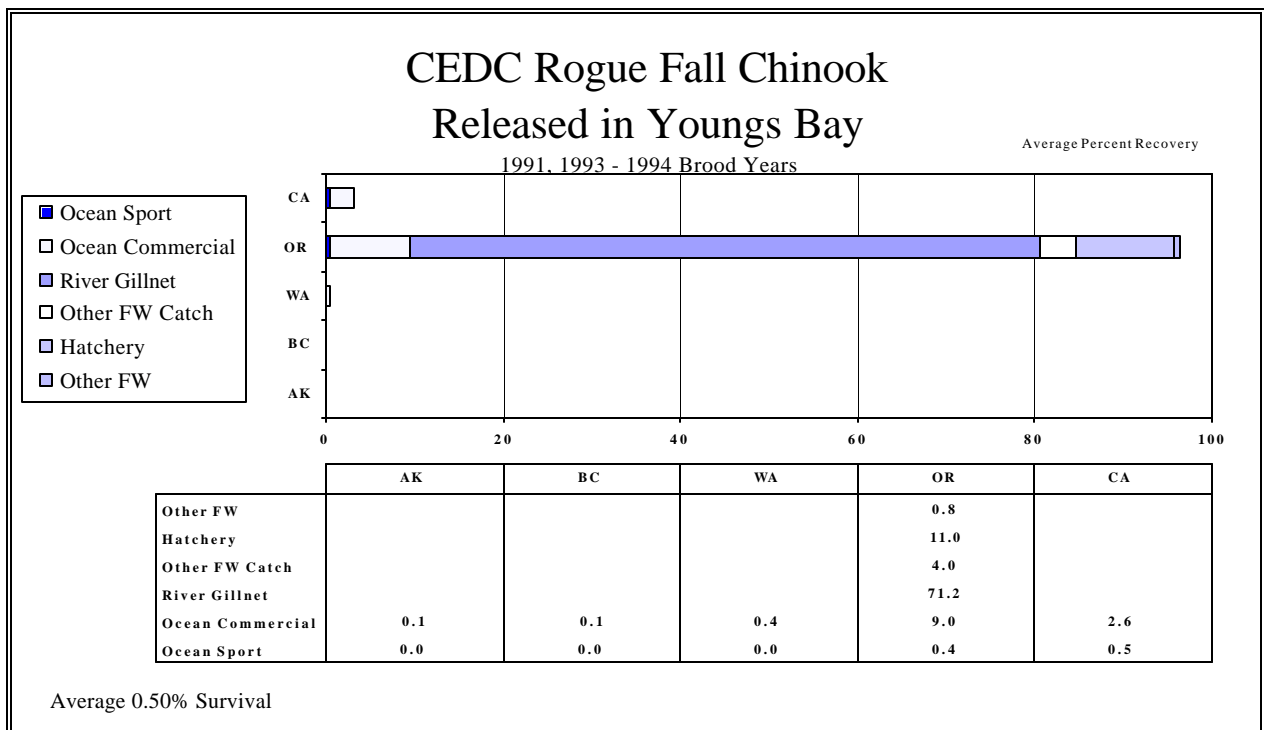


Figure 6. Average survival and catch distribution of CEDC hatchery Rogue stock fall chinook, released in South Fork Klaskanine River and Youngs River (1991, 1993 to 1994 broods).

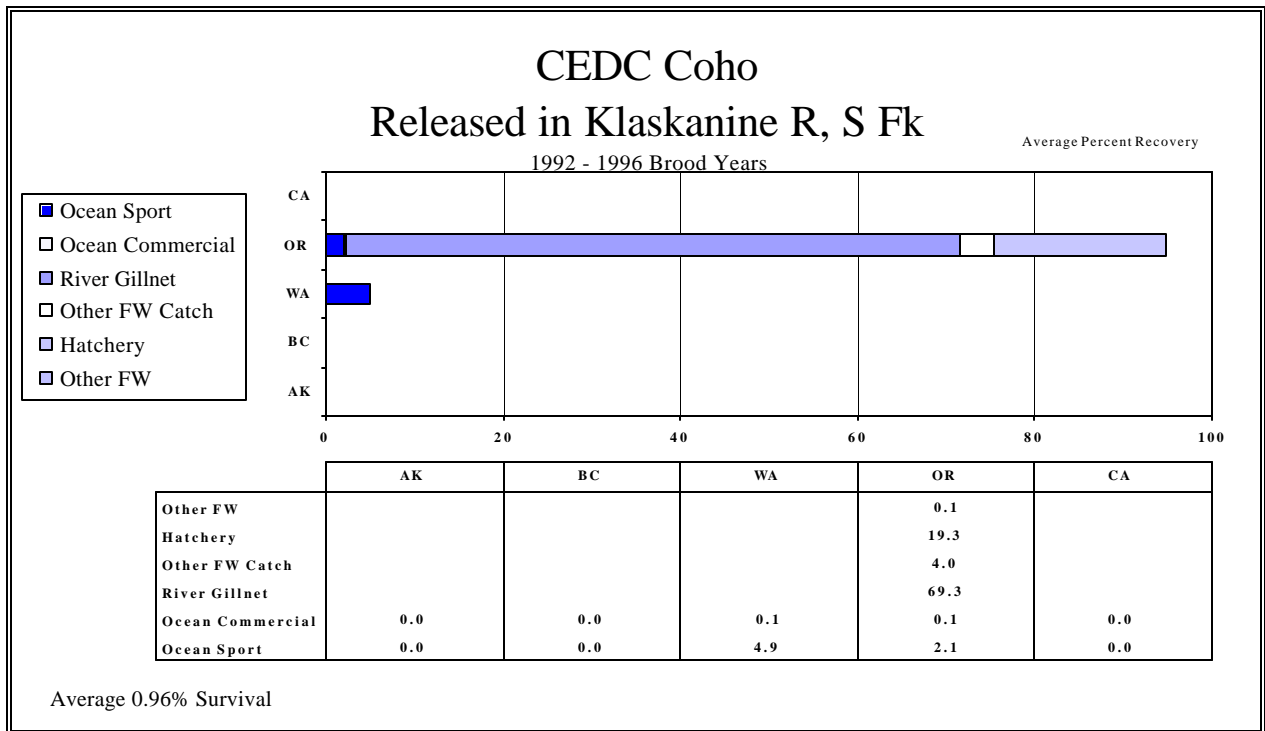


Figure 7. Average survival and catch distribution of CEDC hatchery coho, released in South Fork Klaskanine River (1992 to 1996 broods).

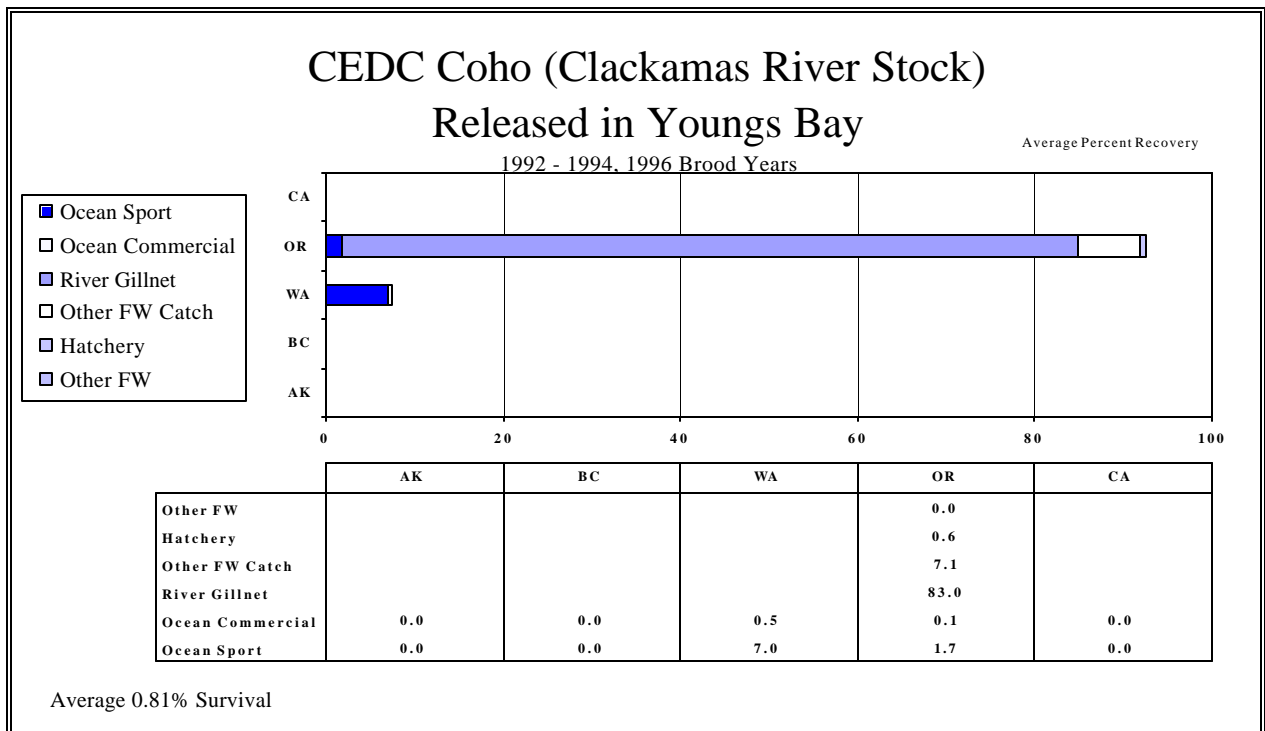


Figure 8. Average survival and catch distribution of CEDC hatchery Clackamas River stock coho, released in Youngs Bay (1992 to 1994, 1996 broods).

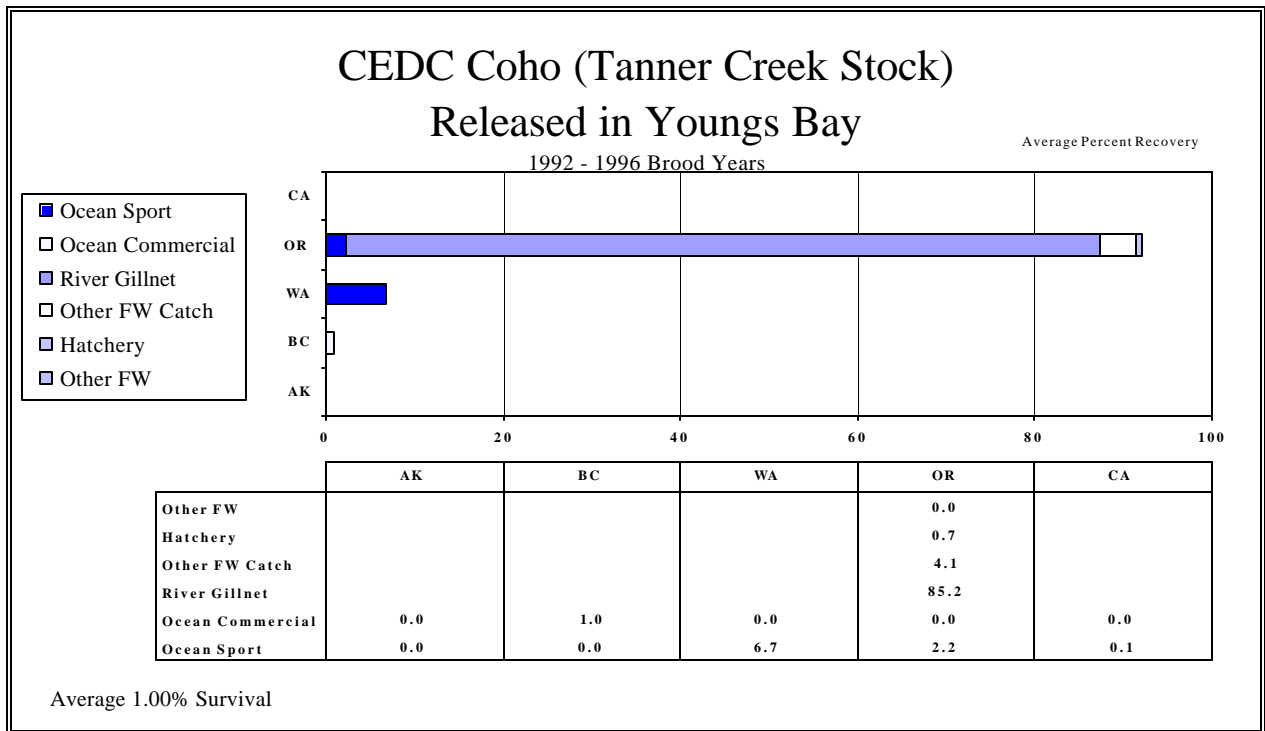


Figure 9. Average survival and catch distribution of CEDC hatchery Tanner Creek stock coho, released in Youngs Bay (1992 to 1996 broods).

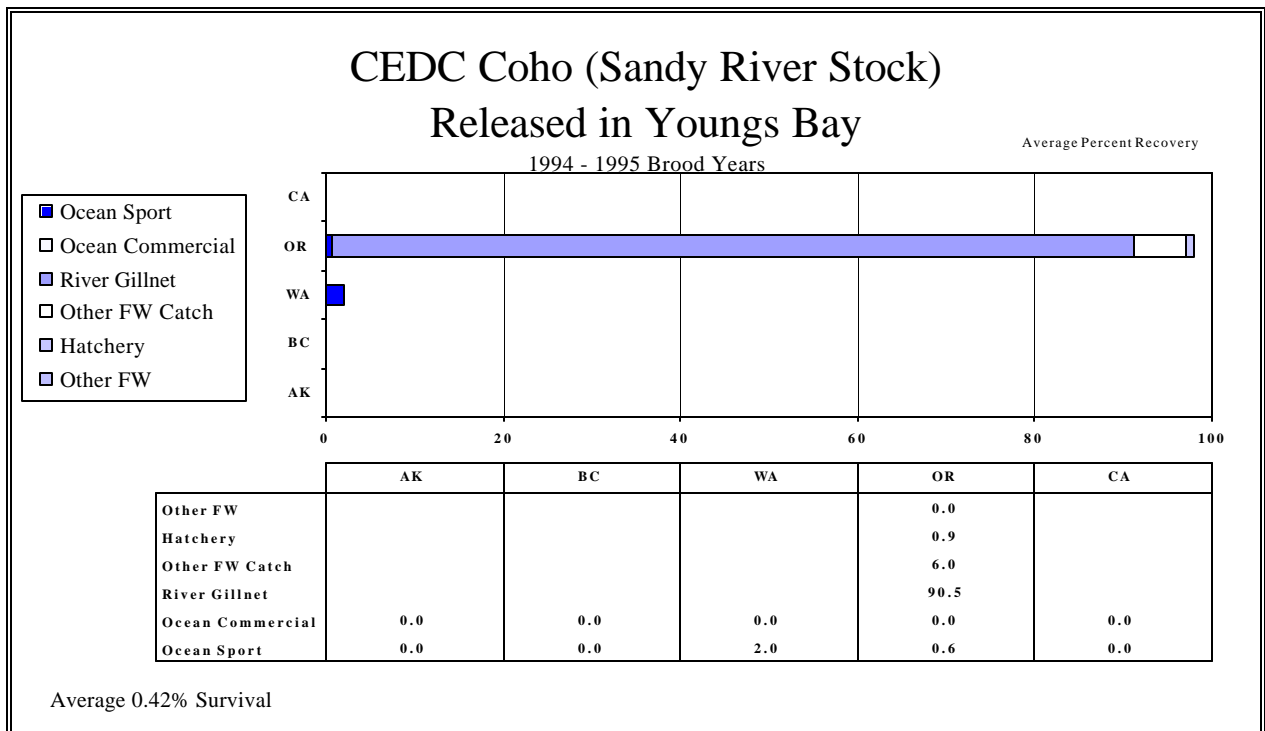


Figure 10. Average survival and catch distribution of CEDC hatchery Sandy River stock coho, released in Youngs Bay (1994 to 1995 broods).

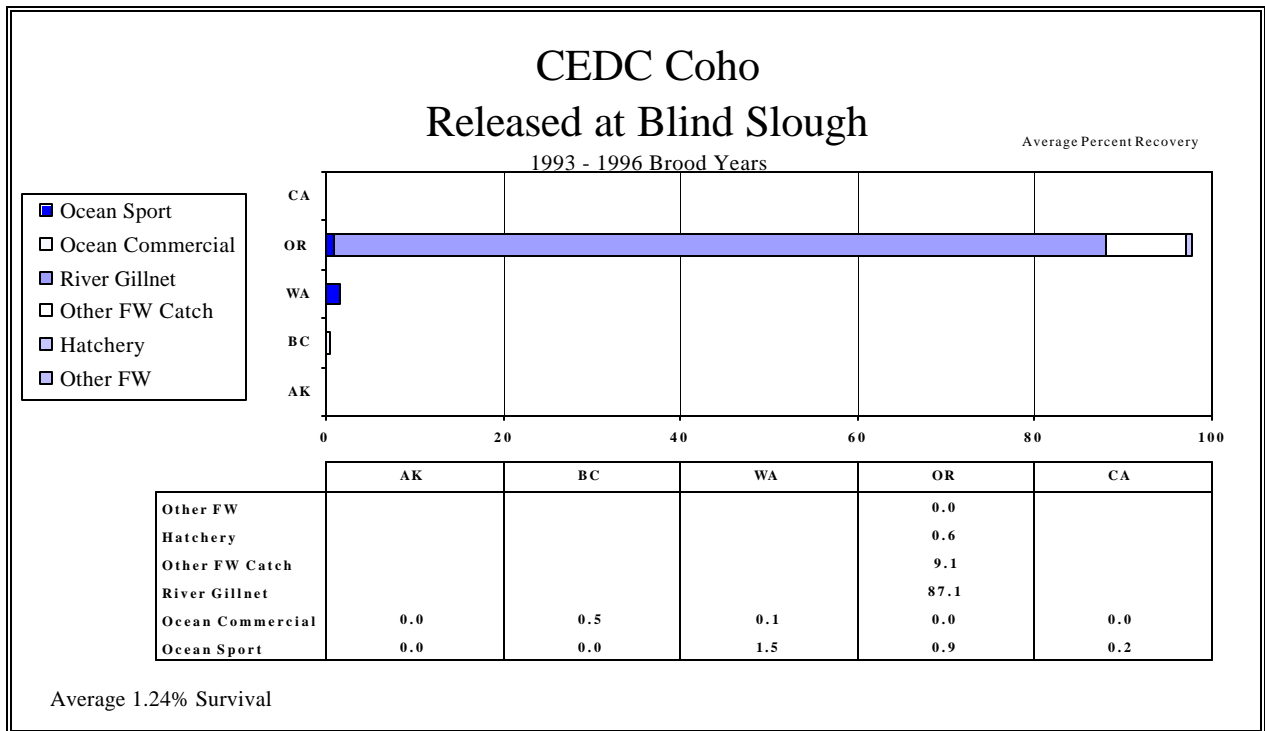


Figure 11. Average survival and catch distribution of CEDC hatchery coho, released at Blind Slough (1993 to 1996 broods).

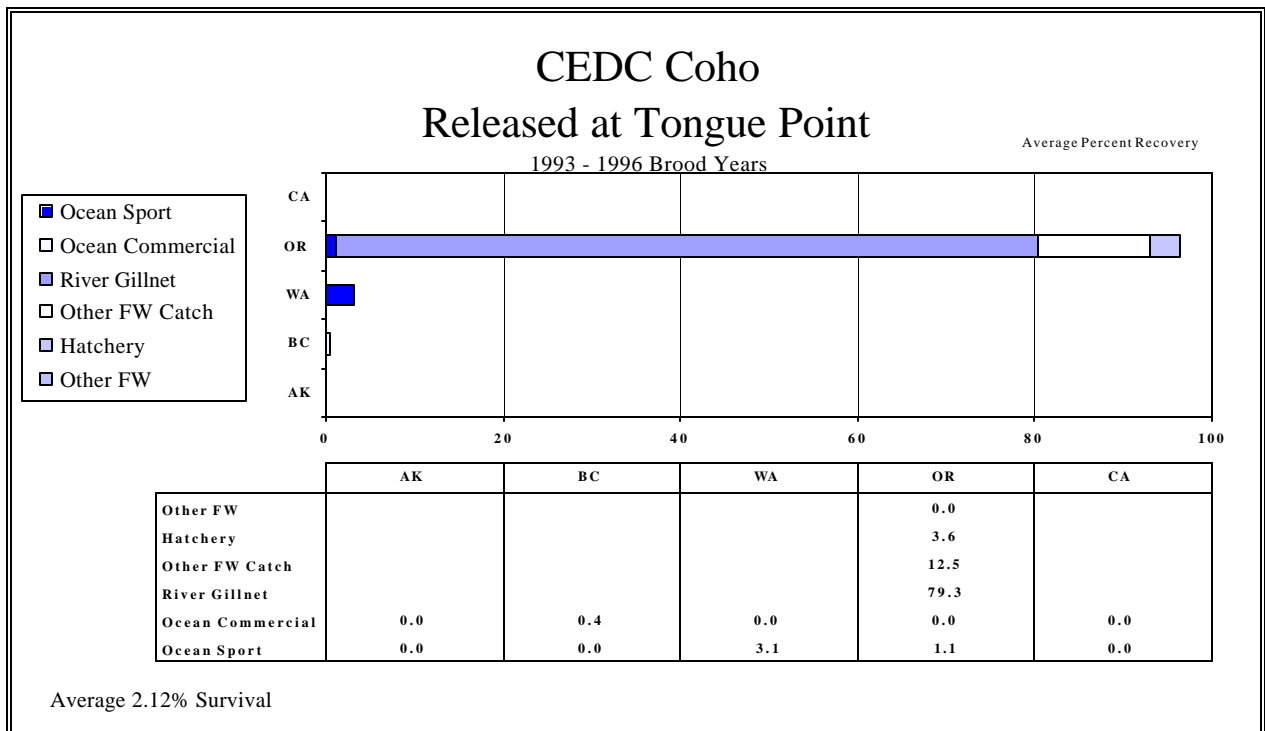


Figure 12. Average survival and catch distribution of CEDC hatchery coho, released at Tongue Point (1993 to 1996 broods).

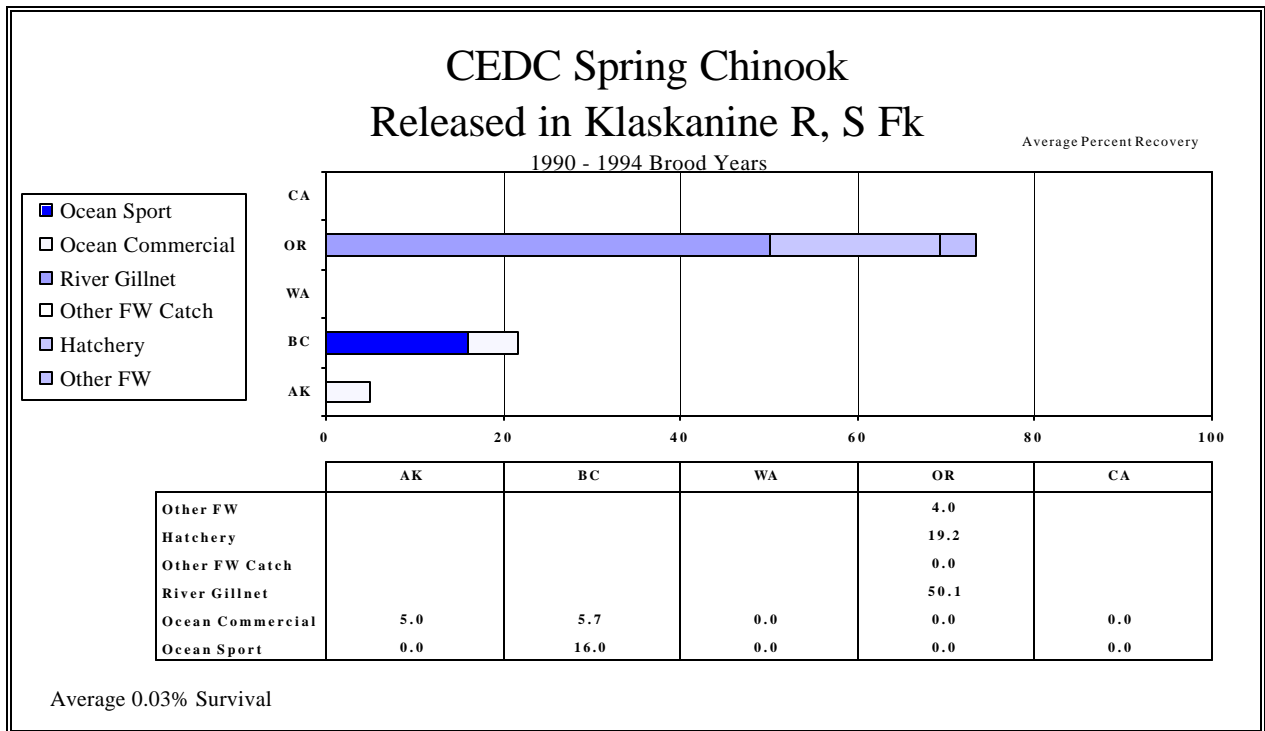


Figure 13. Average survival and catch distribution of CEDC hatchery Willamette Basin spring chinook, released in Klaskanine R., South Fork (1990 to 1994 broods).

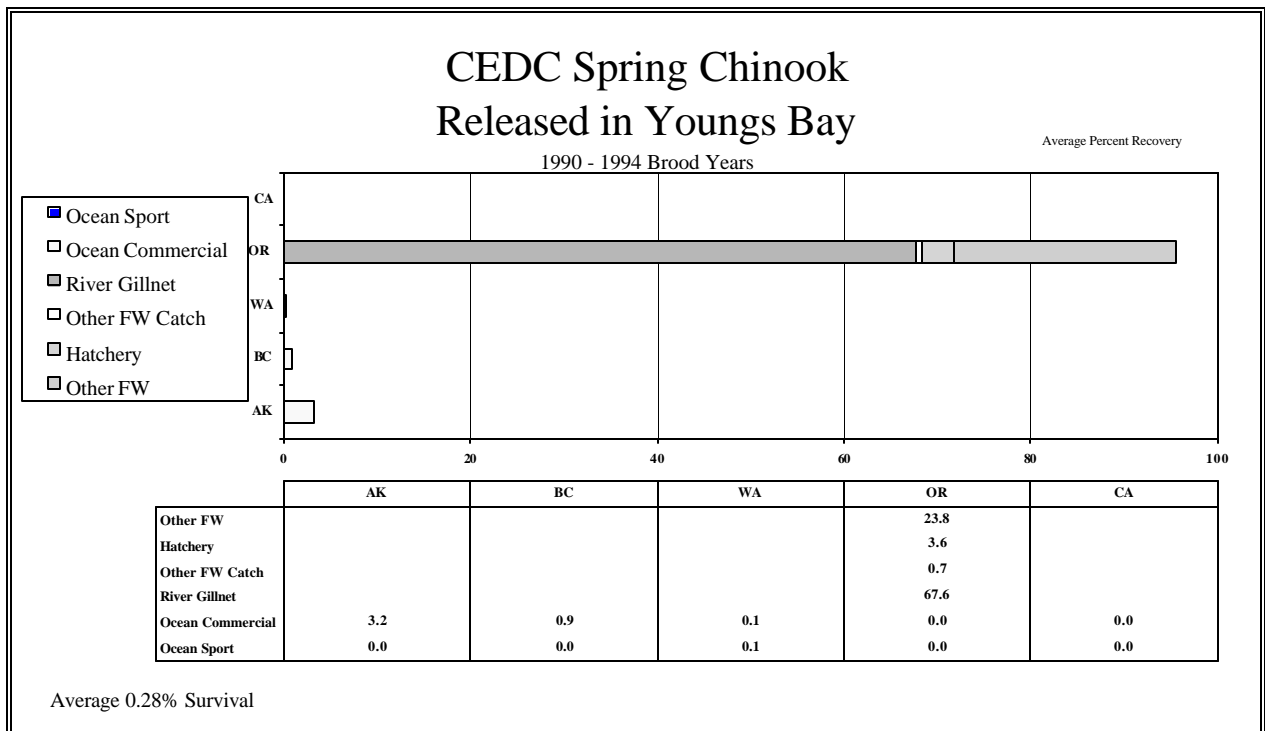


Figure 14. Average survival and catch distribution of CEDC hatchery Willamette Basin spring chinook, released in Youngs Bay (1990 to 1994 broods).

Evaluation of two new coho release sites began with the 1993 brood year. The 1993 to 1996 brood coho released at Blind Slough survived at an average rate of 1.24%, and were caught mainly in Columbia Basin gillnet and freshwater sport fisheries (Figure 11). The 1993 to 1996 brood coho released at Tongue Point survived at an average rate of 2.12% and were also caught mainly in Columbia Basin gillnet and freshwater sport fisheries (Figure 12).

The 1990 to 1994 brood Willamette Basin stocks of spring chinook released in South Fork Klaskanine River survived at a average rate of 0.03% (Figure 13). These fish were caught mainly in Alaska and British Columbia ocean, and Columbia Basin gillnet fisheries (Figure 13)..

The 1990 to 1994 brood Willamette Basin stocks of spring chinook released in Youngs Bay survived at a rate of 0.28% (Figure 14). These fish were caught mainly in Alaska ocean and Columbia Basin gillnet fisheries (Figure 14)..

#### **Gnat Creek Hatchery**

Gnat Creek Hatchery is located east of Knappa off Highway 30 on Gnat Creek a tributary to the Lower Columbia River. Gnat Creek Hatchery released summer and winter steelhead and cutthroat trout none of which were coded-wire tagged for evaluation. Due to budget cuts the hatchery has switched in 1996 to rearing Willamette River spring chinook for acclimation and release in lower Columbia River net pens in cooperation with CEDC. For discussion of these programs see the CEDC section above.

#### **Eagle Creek National Fish Hatchery**

Eagle Creek National Fish Hatchery (NFH) is located on Eagle Creek a tributary of the Clackamas River southeast of Portland. Eagle Creek Hatchery presently rears and releases coho salmon in Eagle Creek. Additional coho are reared for ODFW, and are transported to the CEDC net pens for acclimation in Youngs Bay near Astoria. For results of the Youngs bay releases see the CEDC discussion above (Figure 8).

#### **Clackamas Hatchery**

Clackamas Hatchery is located on the Clackamas River 4 miles west of Estacada near McIver Park. Clackamas Hatchery rears and released spring chinook salmon, summer and winter steelhead trout.

The 1990 to 1994 brood Clackamas River stock spring chinook released in the Clackamas River survived at an average rate of 0.36%. They were caught primarily in Columbia Basin freshwater sport and gillnet fisheries, and secondarily in ocean fisheries from Alaska to Oregon (Figure 15).

Clackamas stock spring chinook are also released in the Sandy River. Coded-wire tagging of these fish started with the 1991 brood year. The 1991 to 1994 brood years survived at an average rate of 0.13%. These fish were caught mainly in Alaska, British Columbia, and Oregon ocean fisheries and Oregon freshwater fisheries (Figure 16).

None of the Clackamas hatchery summer and winter steelhead releases have been marked with coded-wire tags for evaluation.



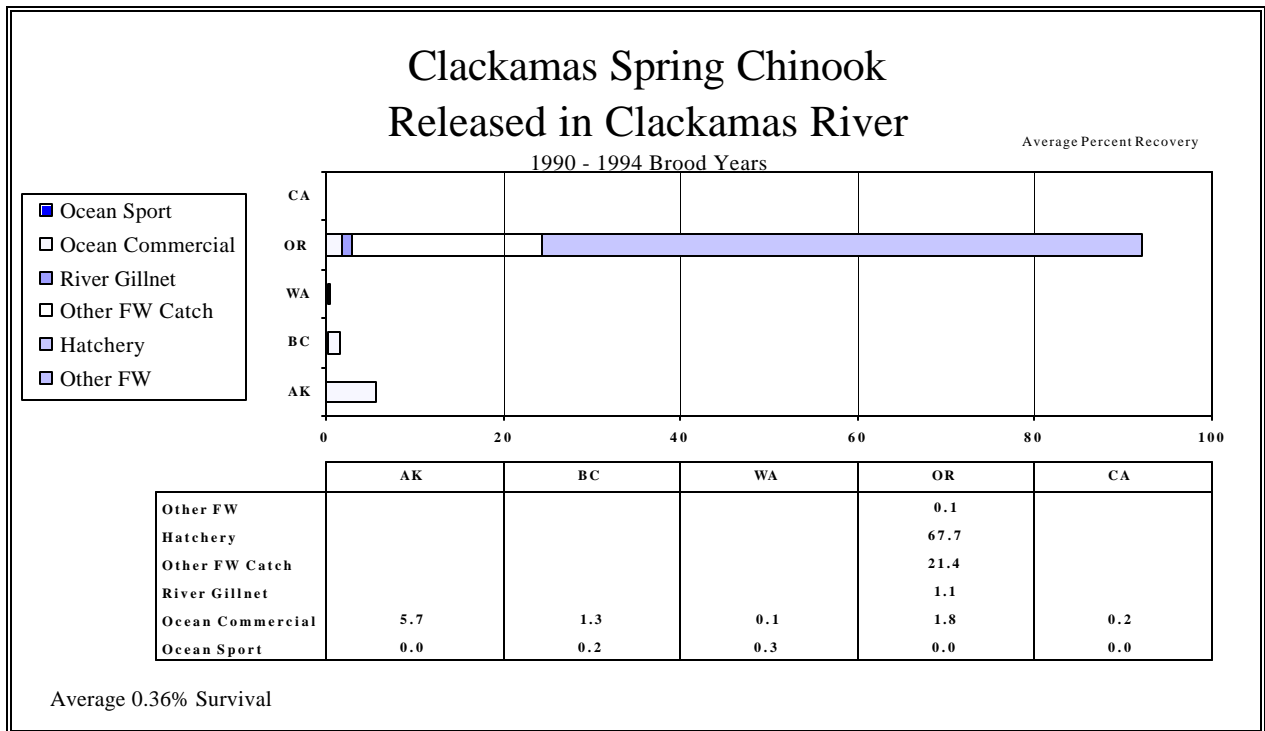


Figure 15. Average survival and catch distribution of Clackamas hatchery stock spring chinook, released in Clackamas River (1990 to 1994 broods).

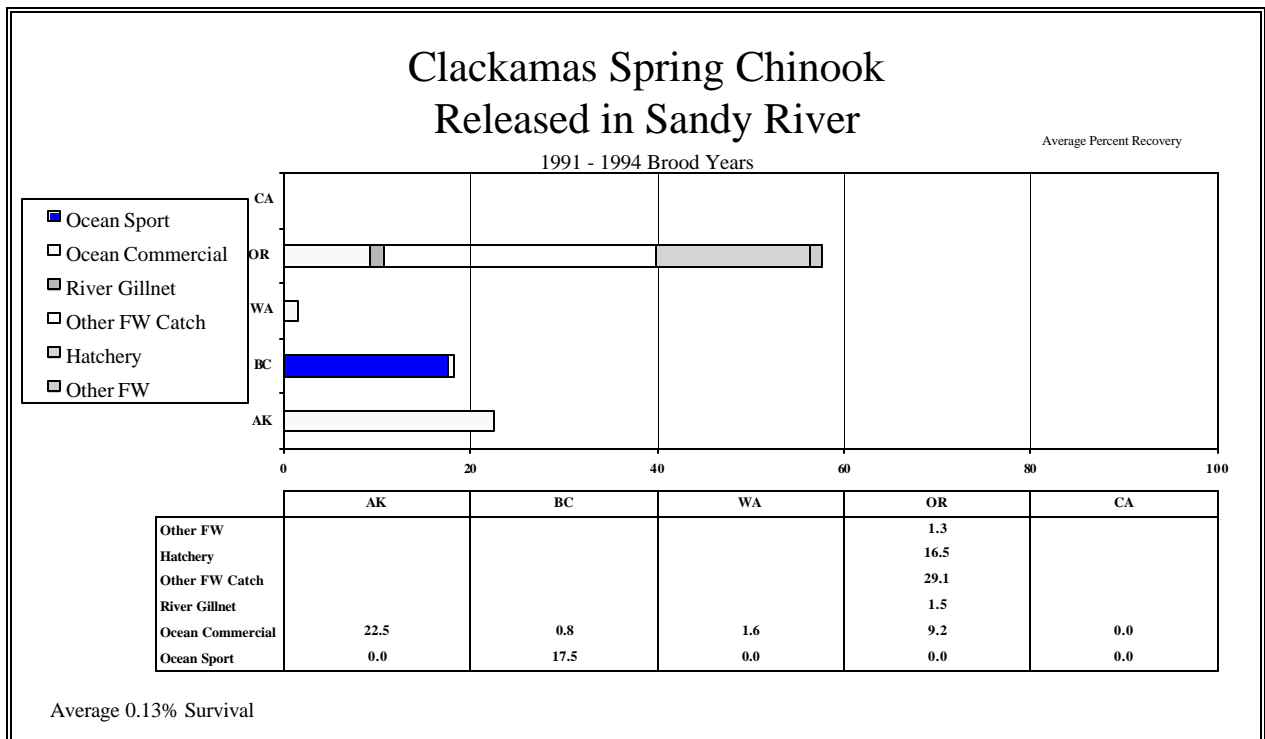


Figure 16. Average survival and catch distribution of Clackamas hatchery stock spring chinook, released in the Sandy River (1991 to 1994 broods).

**Marion Forks Hatchery**

Marion Forks Hatchery is located on the North Santiam River 10 miles east of Idana on Highway 22. Marion Forks Hatchery rears and releases spring chinook salmon, winter steelhead, rainbow and cutthroat trout.

The 1990 to 1994 brood North Santiam River stock spring chinook salmon released in the North Fork Santiam River survived at an average rate of 0.24% and were caught primarily in Columbia Basin freshwater, and Alaska and British Columbia ocean fisheries (Figure 17).

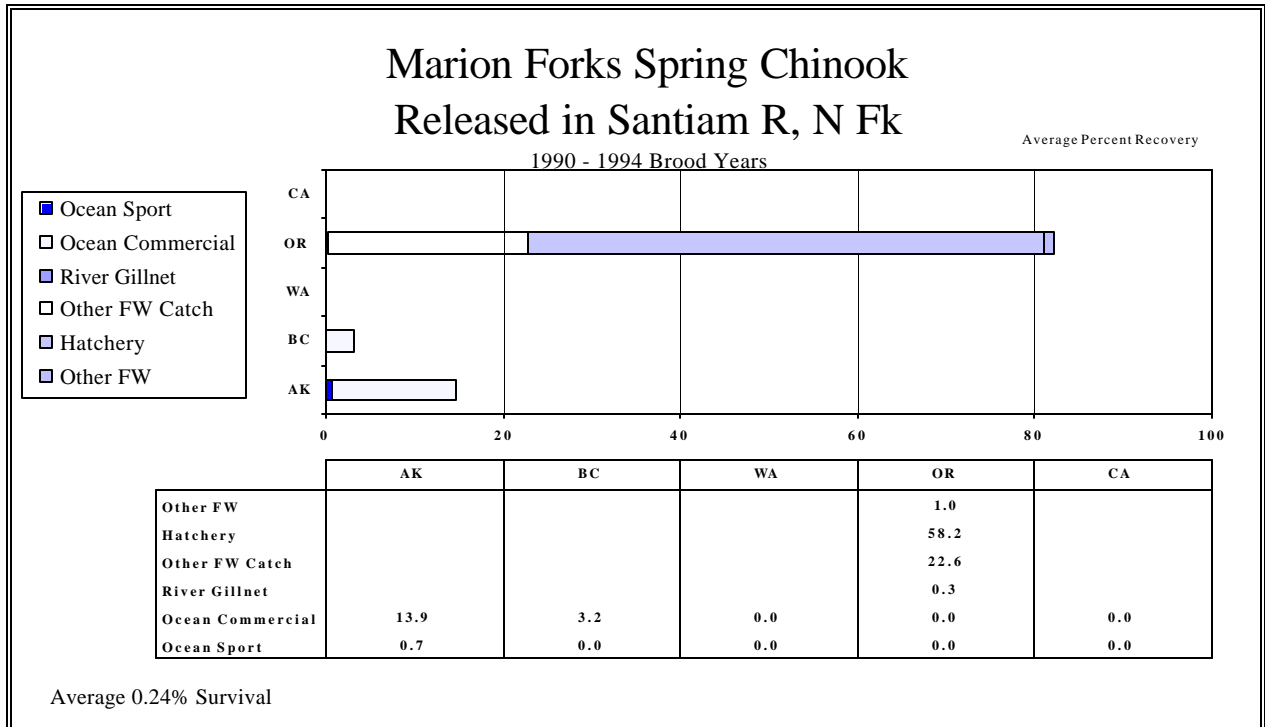


Figure 17. Average survival and catch distribution of Marion Forks hatchery North Santiam River stock spring chinook, released in North Fork Santiam River (1990 to 1994 broods).

Although prior brood years of winter steelhead have been coded-wire tagged, none were tagged for the current 5 year evaluation. All other rainbow and cutthroat trout released by the Marion Forks Hatchery were not coded-wire tagged for evaluation.

**South Santiam Hatchery**

South Santiam Hatchery is located below Foster Dam on the South Santiam River near Sweet Home. South Santiam Hatchery rears and releases spring chinook salmon and summer steelhead trout.

The 1990 to 1994 brood South Santiam River stock spring chinook released in the South Santiam River survived at a average rate of 0.32% and were caught primarily in Columbia Basin freshwater, and Alaska and British Columbia ocean fisheries (Figure 18).

Winter steelhead trout released by South Santiam Hatchery have not been coded-wire tagged to permit evaluation.

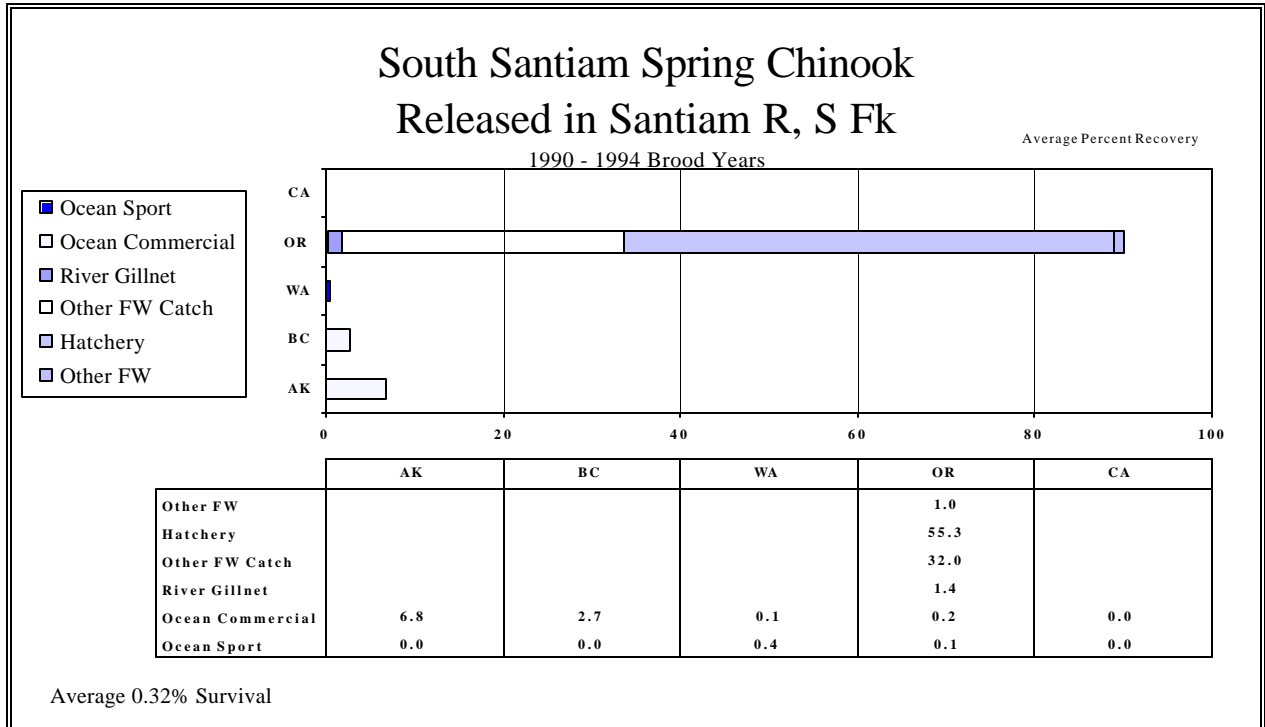


Figure 18. Average survival and catch distribution of South Santiam hatchery stock spring chinook, released in Santiam R, South Fork (1990 to 1994 broods).

#### Stayton Rearing Pond

Stayton Pond, a refurbished gravel pit located south of Stayton was operated as a satellite of the South Santiam Hatchery. Production at Stayton Pond was discontinued after the 1994 brood year due to budget cuts and flood damage to the facility.

The 1990 to 1994 brood tule stock fall chinook released from Stayton pond survived at an average rate of 0.05% and were caught primarily in British Columbia, Washington and Oregon ocean fisheries (Figure 19).

#### Roaring River Hatchery

Roaring River Hatchery rears and releases winter steelhead and rainbow trout. None of these fish have been coded-wire tagged for evaluation.

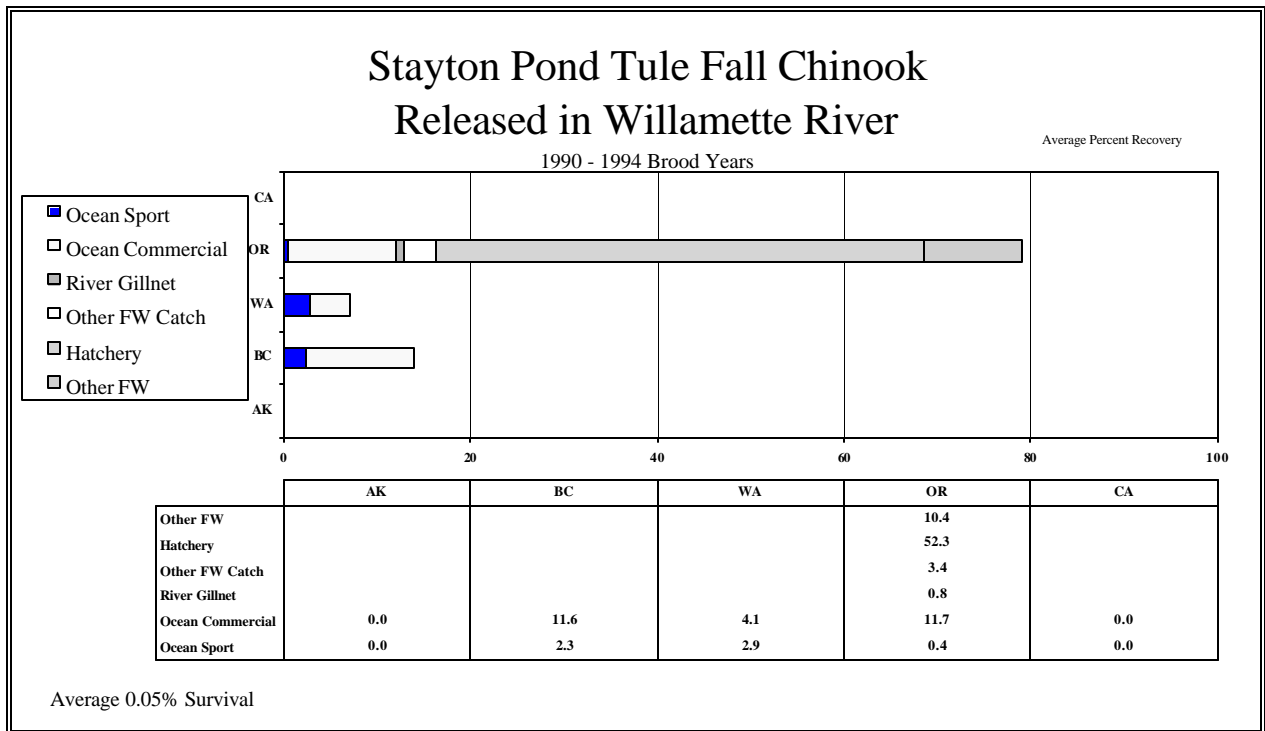


Figure 19. Average survival and catch distribution of Stayton Pond tule stock fall chinook, released in the Willamette River (1990 to 1994 broods).

#### McKenzie Hatchery

McKenzie Hatchery is located on the McKenzie River 16 miles east of Springfield. McKenzie Hatchery rears and releases spring chinook salmon and summer steelhead trout.

The 1990 to 1994 brood McKenzie River stock spring chinook salmon released in the McKenzie River survived at an average rate of 0.18% and were caught primarily in Columbia Basin freshwater, and Alaska and British Columbia ocean fisheries (Figure 20).

McKenzie hatchery is involved in a net pen acclimation experiment for spring chinook. The goal of the experiment is to determine the effect of releasing smolts, both acclimated and direct releases, at several sites below Willamette Falls on catch in the Lower Willamette fishery. The 1992 to 1994 brood spring chinook salmon released below Willamette Falls survived at an average rate of 0.05% and were caught primarily in Columbia Basin freshwater, and Alaska, British Columbia, and Oregon ocean fisheries (Figure 21).

None of the summer steelhead released from McKenzie Hatchery have been coded-wire tagged for evaluation.

#### Leaburg Hatchery

Leaburg Hatchery is located on the McKenzie River off Highway 126, 18 miles east of Springfield. Leaburg Hatchery rears and releases summer steelhead and rainbow trout. None of these fish have been coded-wire tagged for evaluation.

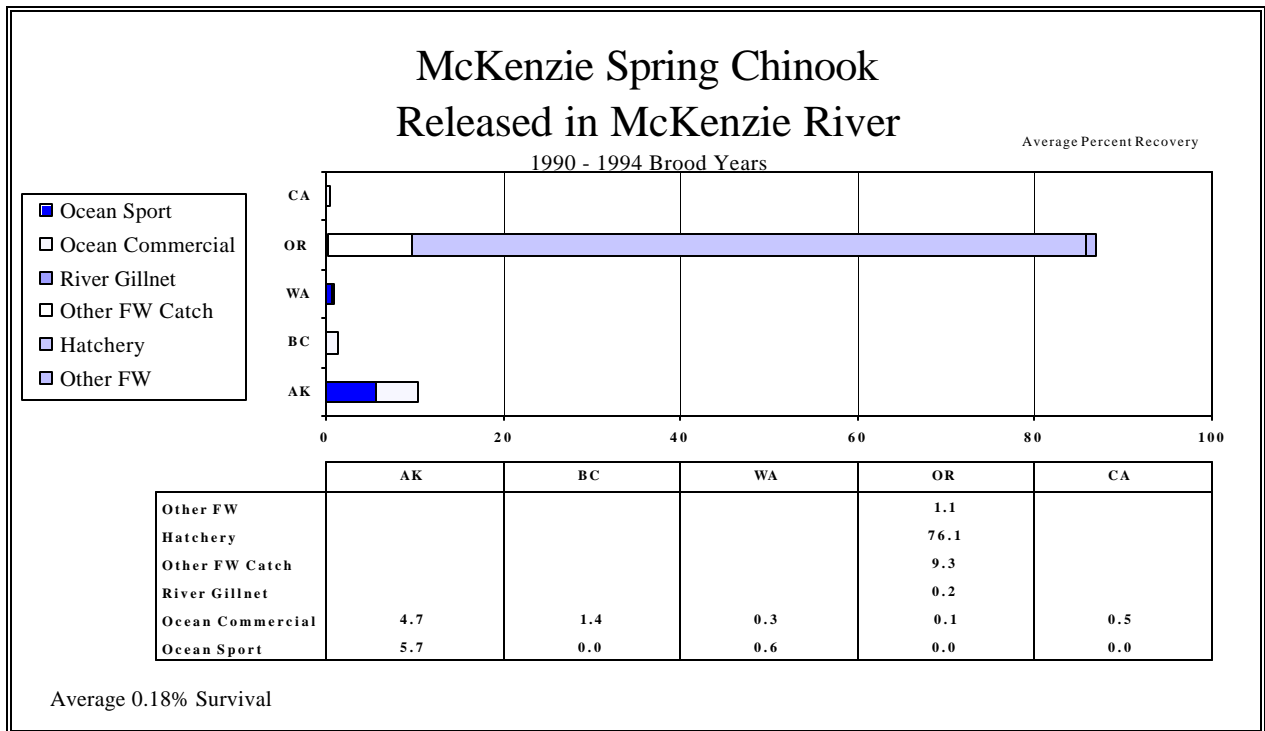


Figure 20. Average survival and catch distribution of McKenzie hatchery stock spring chinook, released in McKenzie River (1990 to 1994 broods).

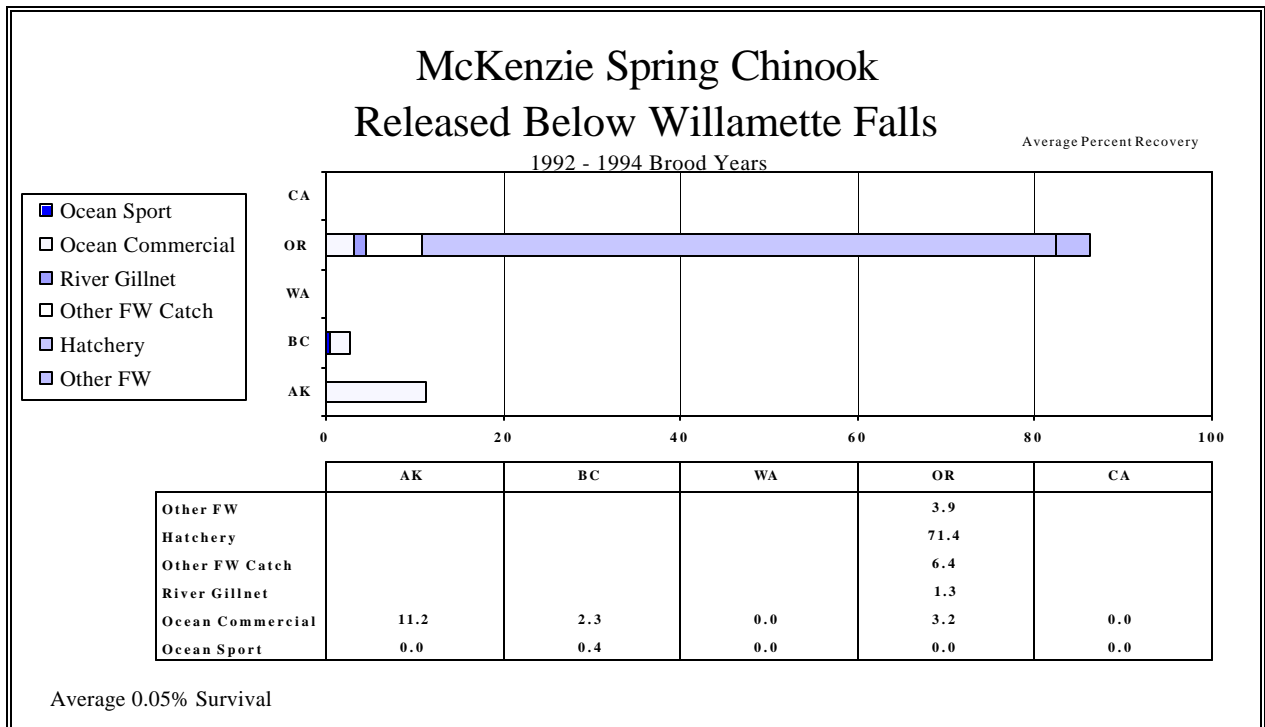


Figure 21. Average survival and catch distribution of McKenzie stock spring chinook, released below Willamette Falls, as part of a net pen study, (1992 to 1994 broods).

**Willamette Hatchery**

Willamette Hatchery is located on the Middle Fork Willamette River 1 mile east of Oakridge off Highway 58. Willamette Hatchery rears and releases spring chinook salmon, summer and winter steelhead and rainbow trout.

The 1990 to 1994 brood Mid-Willamette River stock spring chinook salmon released in the Middle Fork Willamette River survived at a average rate of 0.42% and were caught primarily in Columbia Basin freshwater fisheries, and Alaska and British Columbia ocean fisheries(Figure 22).

None of the steelhead or rainbow trout released from Willamette Hatchery have been coded-wire tagged for evaluation.

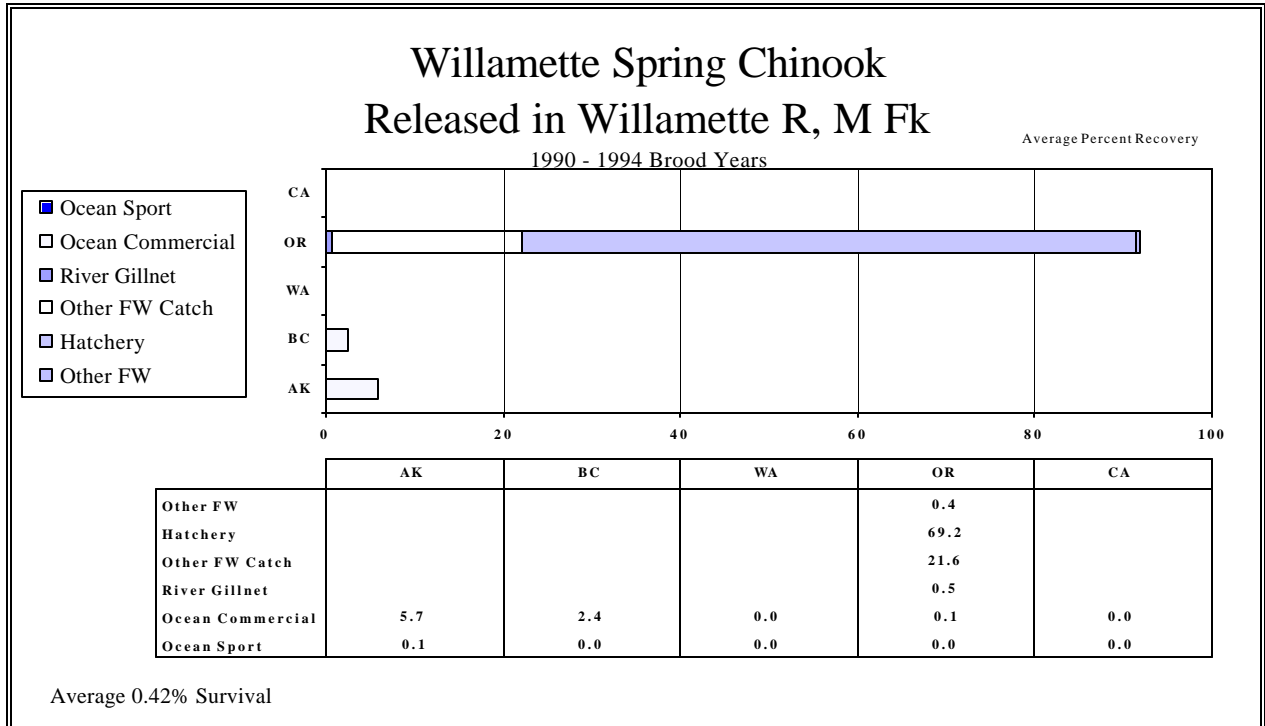


Figure 22. Average survival and catch distribution of Willamette hatchery Mid-Willamette River stock spring chinook, released in Middle Fork Willamette River (1990 to 1994 broods).

**Sandy Hatchery**

Sandy Hatchery is located on the Sandy River 1 mile northeast of the city of Sandy off Highway 26. Sandy Hatchery rears and releases coho salmon, rainbow and brook trout.

The 1992 to 1996 brood years of Sandy River stock coho released in the Sandy River survived at an average rate of 0.45% and were caught primarily in ocean fisheries from British Columbia to Oregon, and Columbia Basin sport and gillnet fisheries (Figure 23).

None of the rainbow or brook trout released by Sandy Hatchery were coded-wire tagged for evaluation.

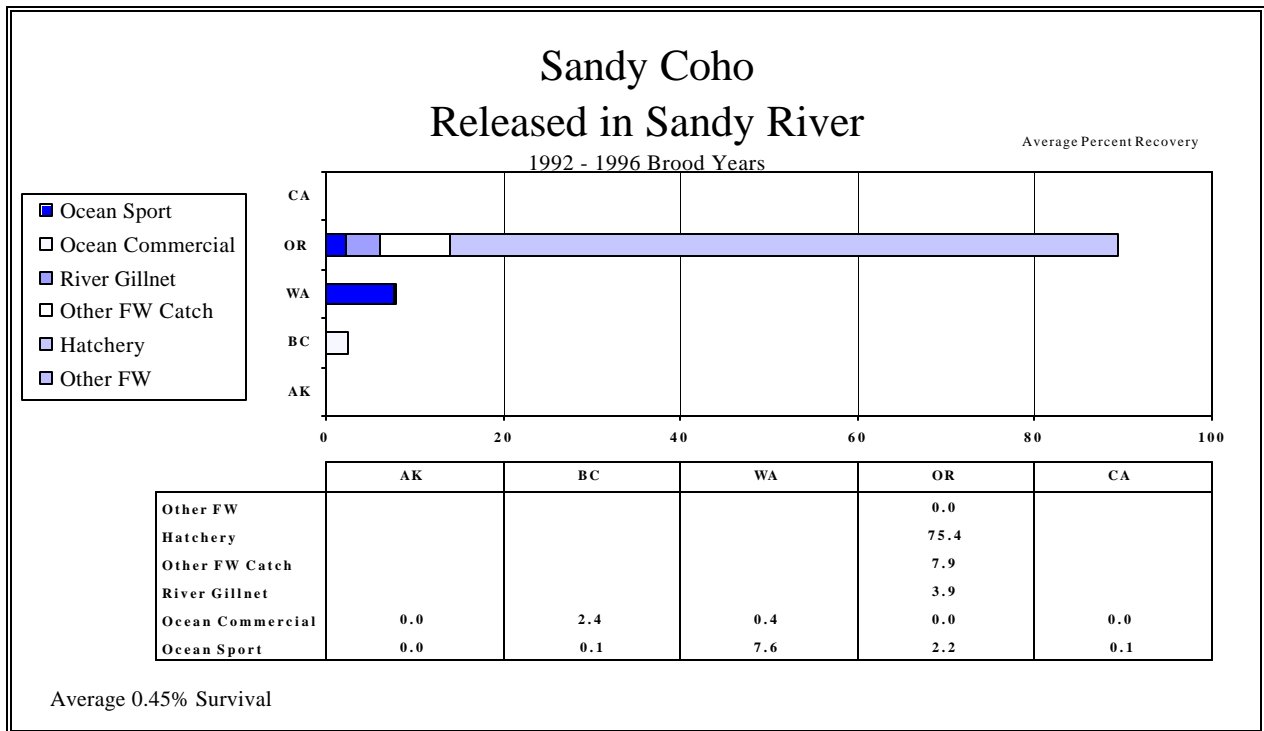


Figure 23. Average survival and catch distribution of Sandy hatchery Sandy River stock coho, released in Sandy River (1992 to 1996 broods).

#### Cascade Hatchery

Cascade Hatchery is located off Highway 84 just above Bonneville Dam. Cascade Hatchery rears coho salmon that are acclimated and released in the Yakima and Umatilla River Basins.

The 1992 to 1996 brood years of Tanner Creek stock coho released in the Umatilla River survived at an average rate of 0.22% and were caught primarily in Columbia Basin gillnet and sport fisheries, and ocean fisheries off Washington and Oregon (Figure 24).

The 1992 to 1996 brood years of coho salmon released in the Yakima River survived at an average rate of 0.13% and were caught primarily in Columbia Basin gillnet and sport fisheries, and ocean fisheries off Washington and Oregon (Figure 25).

#### Bonneville Hatchery

Bonneville Hatchery is located on the Columbia River off Highway 84 just below Bonneville Dam. Bonneville Hatchery rears and releases up-river bright fall chinook, spring chinook, sockeye and coho salmon.

Tule stock fall chinook production was discontinued after the 1995 brood year. The 1990 to 1994 brood years released at Tanner Creek survived at an average rate of 0.05% and were caught primarily in British Columbia to Oregon ocean fisheries and in Columbia Basin sport and gillnet fisheries (Figure 26).

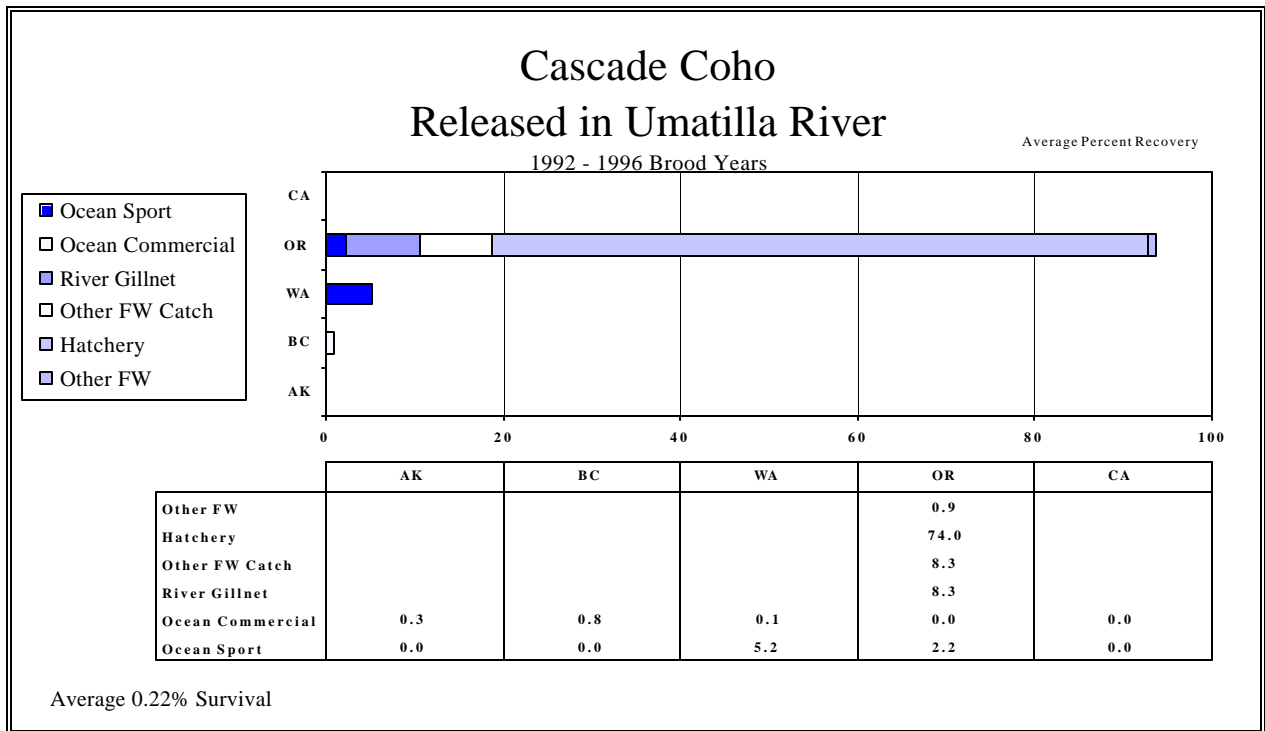


Figure 24. Average survival and catch distribution of Cascade Hatchery Tanner Creek stock coho, released in Umatilla River (1992 to 1996 broods).

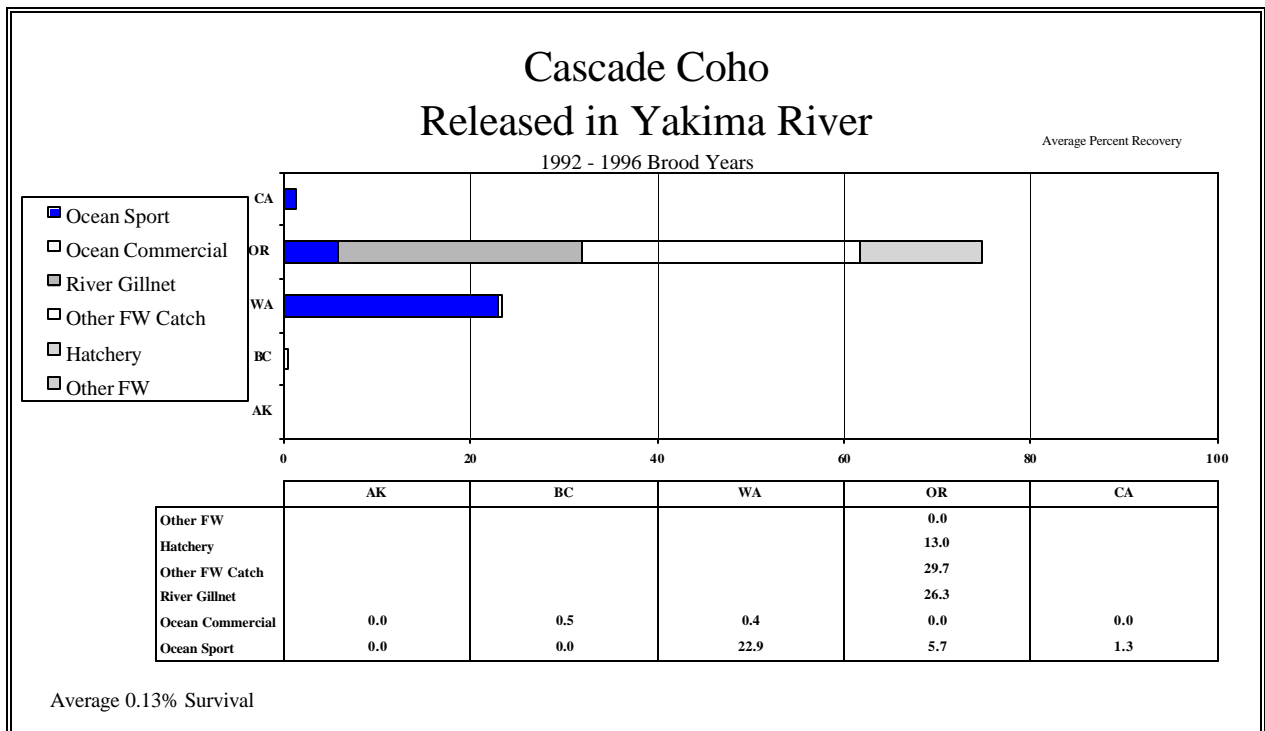


Figure 25. Average survival and catch distribution of Cascade Hatchery Tanner Creek stock coho, released in Yakima River (1992 to 1996 broods).



The 1990 to 1994 brood years of up-river bright stock fall chinook released at Tanner Creek survived at an average rate of 0.25% and were caught primarily in Alaska and British Columbia ocean, and Columbia Basin gillnet and sport fisheries (Figure 27).

The 1990 to 1994 brood years of up-river bright stock fall chinook released in the Umatilla River survived at an average rate of 0.14% and were caught primarily in British Columbia ocean and Columbia Basin sport and gillnet fisheries (Figure 28).

The 1990 to 1992 brood spring chinook from Bonneville hatchery released in the Umatilla River survived at an average rate of 0.17% and were caught primarily in Columbia Basin freshwater fisheries (Figure 29).

The 1990 to 1993 brood Lookingglass Creek (1990 brood) and Deschutes River stock (1991 and 1993 broods) spring chinook reared at Bonneville Hatchery and released in West Fork Hood River survived at a average rate of 0.03%. These fish were caught exclusively in Columbia Basin freshwater fisheries (Figure 30).

The 1992 to 1996 brood Tanner Creek stock coho released in Tanner Creek survived at an average rate of 0.76% and were caught primarily in Columbia Basin freshwater fisheries, and ocean fisheries off Washington and Oregon (Figure 31).

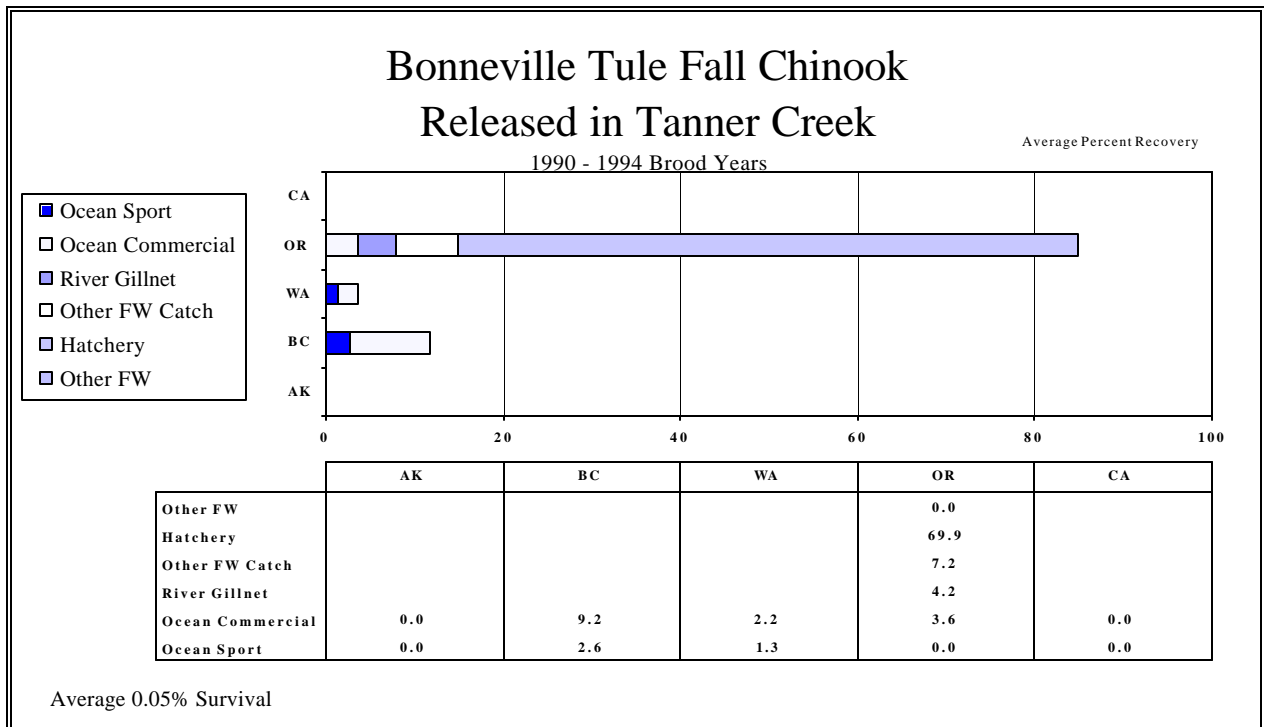


Figure 26. Average survival and catch distribution of Bonneville Hatchery tule stock fall chinook, released in Tanner Creek (1990 to 1994 broods).

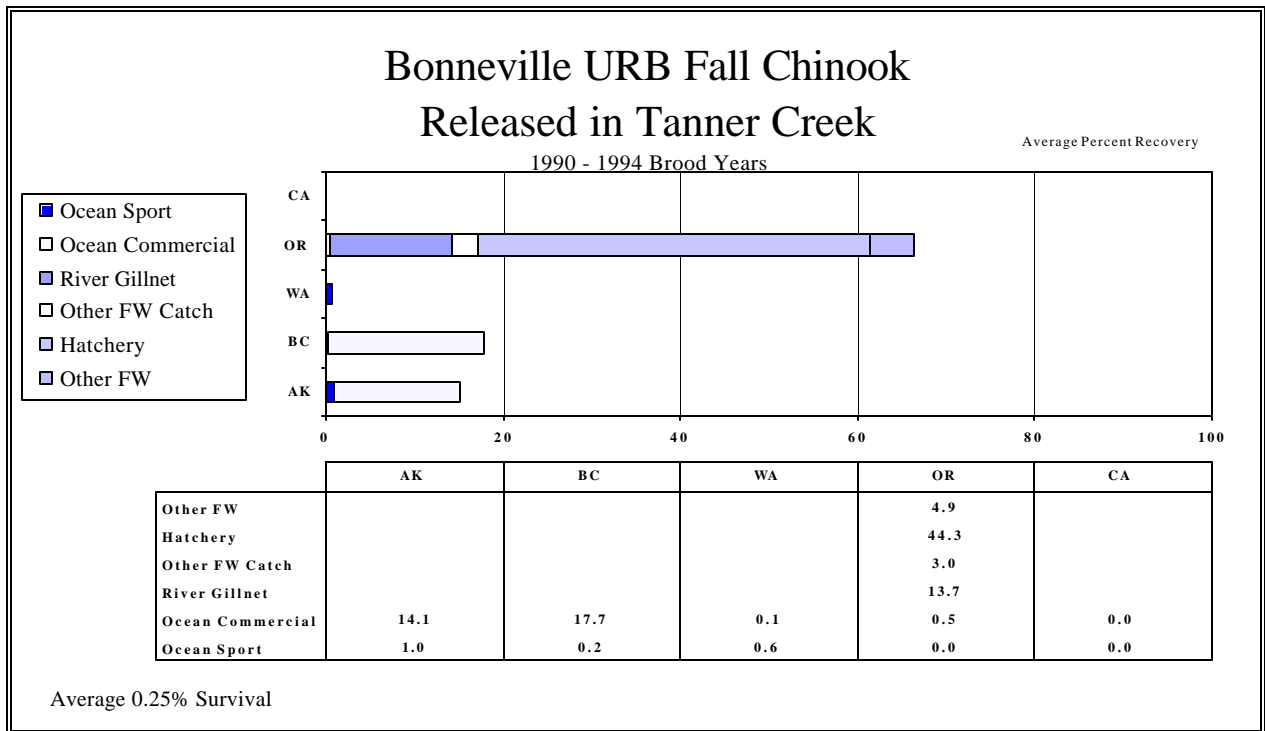


Figure 27. Average survival and catch distribution of Bonneville Hatchery up-river Bright stock fall chinook, released in Tanner Creek (1990 to 1994 broods).

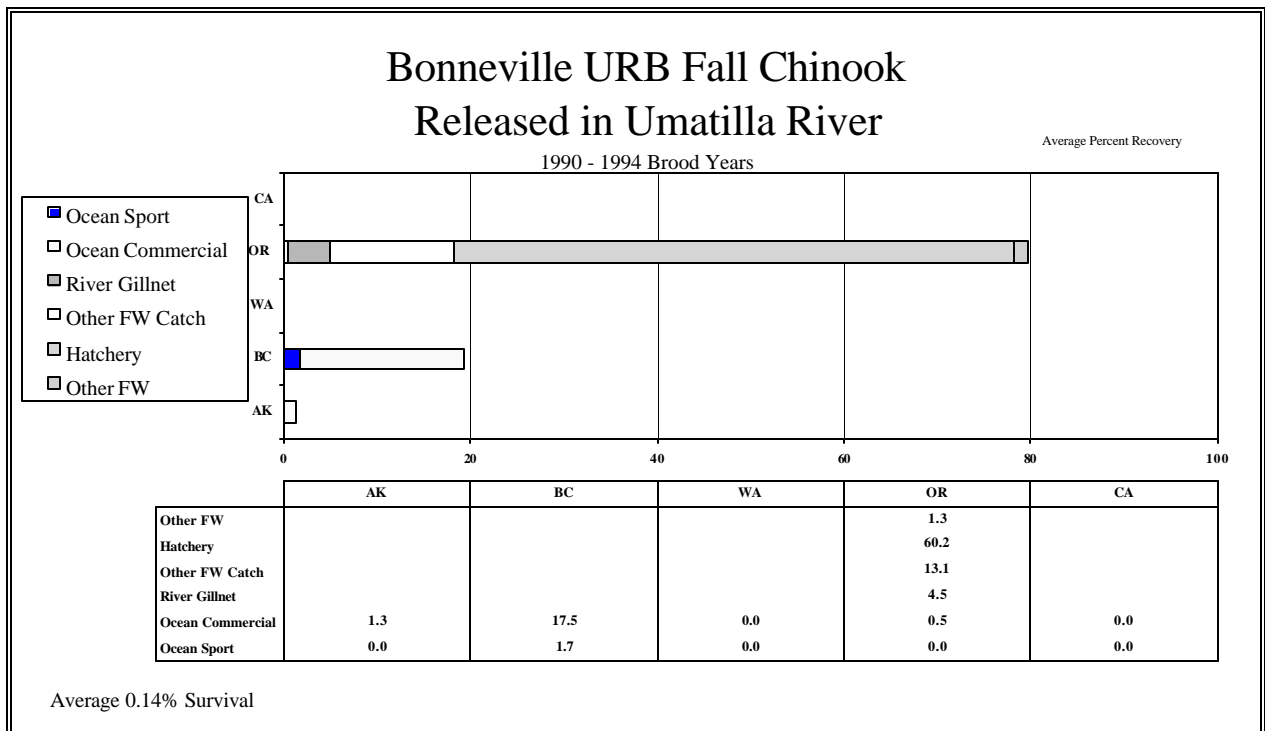


Figure 28. Average survival and catch distribution of Bonneville Hatchery up-river Bright fall chinook, released in Umatilla River (1990 to 1994 broods).

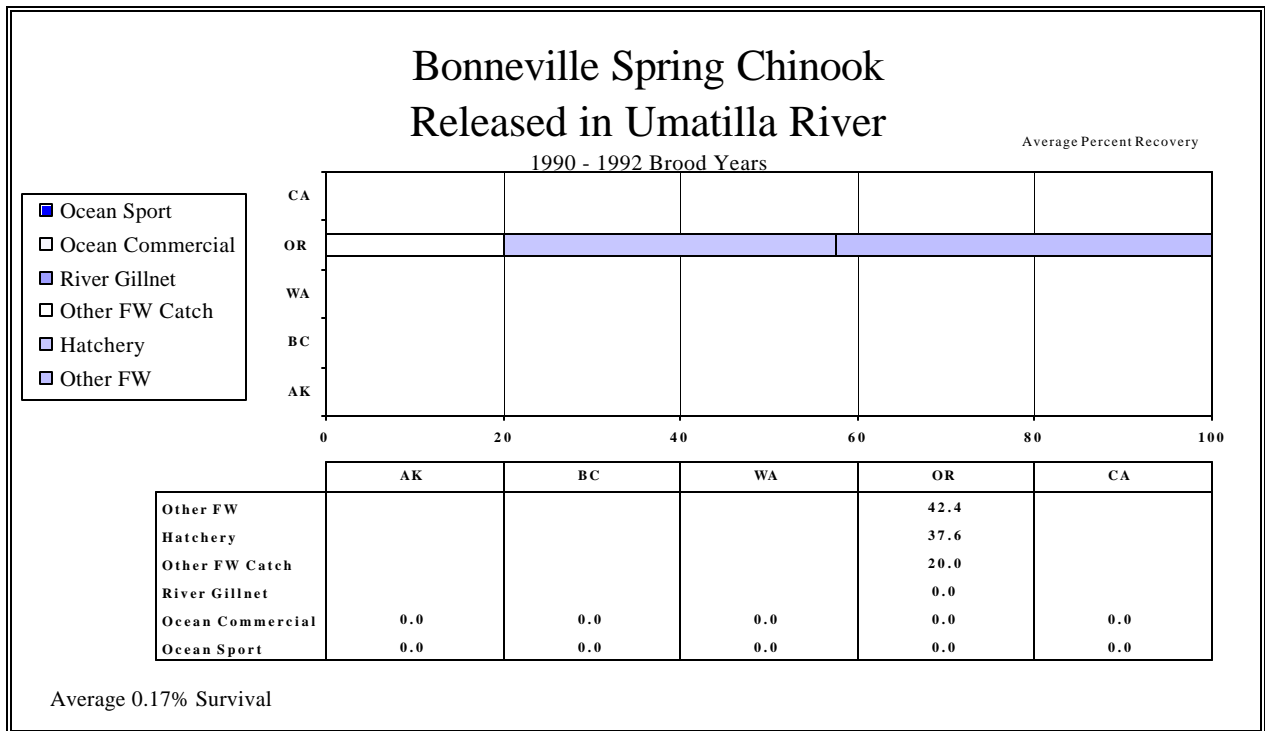


Figure 29. Average survival and catch distribution of Bonneville Hatchery spring chinook, released in Umatilla River (1990 to 1992 broods).

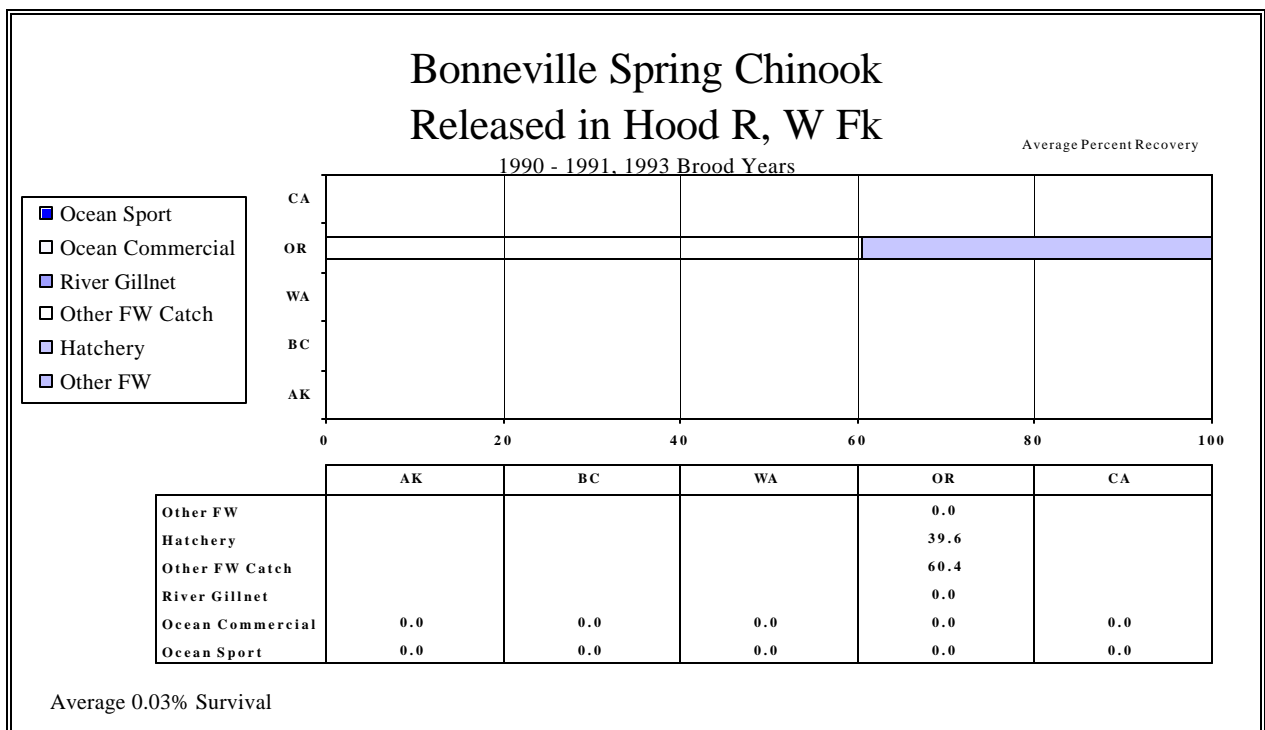


Figure 30. Average survival and catch distribution of spring chinook from Bonneville Hatchery, released in W Fk Hood River (1990-1991, 1993 broods).

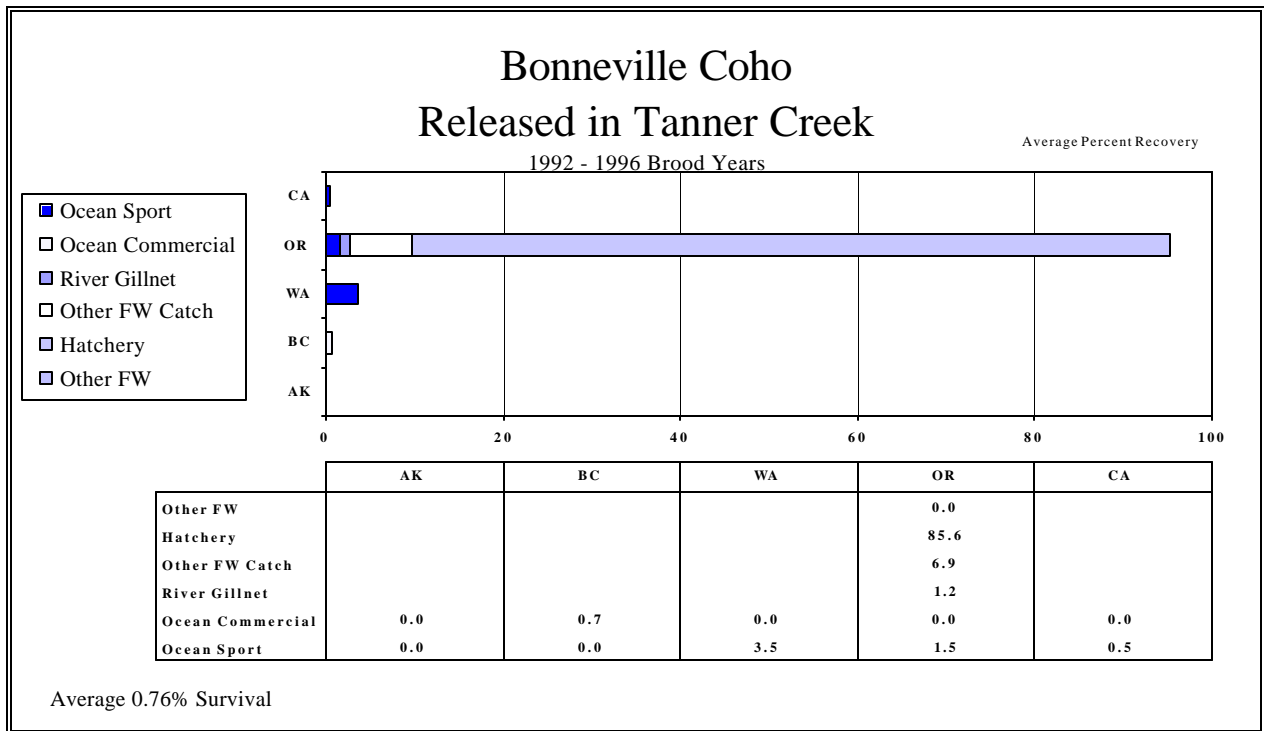


Figure 31. Average survival and catch distribution of Bonneville Hatchery Tanner Creek stock coho, released in Tanner Creek (1992 to 1996 broods).

#### Oxbow Hatchery

Oxbow Hatchery is located on the Columbia River 2 miles east of Cascade Locks off Highway 84. Oxbow Hatchery rears coho and spring chinook salmon. Coho reared by Oxbow hatchery are released at Tanner Creek, Youngs Bay, or Umatilla River after acclimation and/or extended rearing. For results from these programs see the Bonneville, CEDC and Oxbow discussions above. The Spring chinook from Oxbow are transferred to Clackamas hatchery for rearing and release, results are reported under the Clackamas hatchery section. Wahkeena Pond was operated as a coho rearing satellite of Oxbow Hatchery through the 1992 brood. Wahkeena pond is now being developed as a public fishing area instead of a hatchery rearing facility.

#### Wahkeena Pond

Wahkeena Pond is a lake rearing location near Multnomah Falls State Park off Highway 84. Coho stocked in Wahkeena Pond were fed daily by the crew from Oxbow Hatchery. Coho production was discontinued after the 1992 brood year. Wahkeena pond is now being developed as a public fishing area instead of a hatchery rearing facility.

The 1992 brood coho reared in Wahkeena Pond survived at a rate of 0.03% and were caught primarily in Washington ocean fisheries (Appendix A).

**Round Butte Hatchery**

Round Butte Hatchery is located at the base of Round Butte Dam on the Deschutes River east of Madras. Round Butte Hatchery rears and releases spring chinook, summer steelhead and brown trout.

The 1990 to 1993 brood Deschutes River stock spring chinook released in the Deschutes River survived at an average rate of 0.25% and were caught almost exclusively in freshwater sport in the Columbia and Deschutes Rivers (Figure 32).

The 1991 and 1994 brood Deschutes River stock spring chinook released in the West Fork Hood River survived at an average rate of 0.01% and were caught exclusively in Columbia Basin gillnet and sport fisheries (Figure 33).

The summer steelhead and brown trout released from Round Butte Hatchery have not been coded-wire tagged for evaluation.

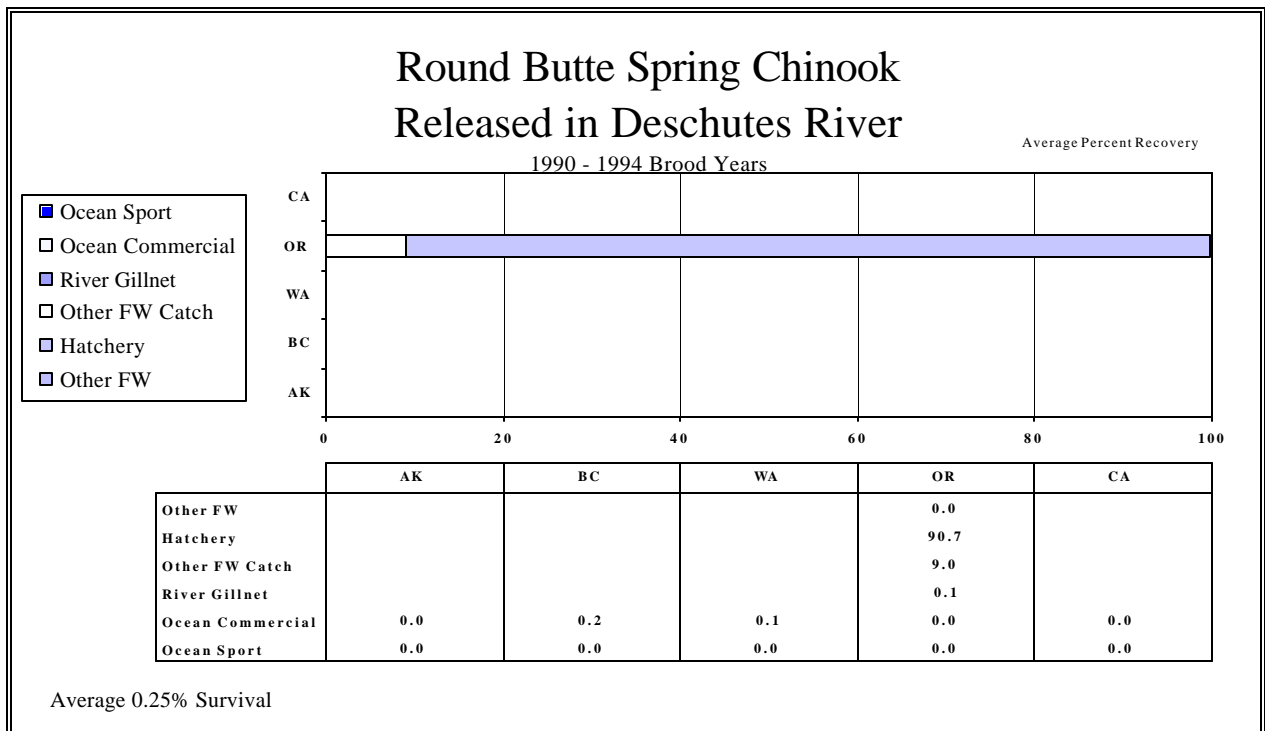


Figure 32. Average survival and catch distribution of Round Butte Hatchery Deschutes River stock spring chinook, released in Deschutes River (1990 to 1994 broods).

**Oak Springs Hatchery**

Oak Springs Hatchery is located on the Deschutes River 3 miles north of Maupin. Oak Springs Hatchery rears and releases summer and winter steelhead and rainbow trout.

The 1993 to 1995 brood Hood River stock winter steelhead reared at Oak Springs and released in East Fork Hood River survived at a rate of 0.26%. They were caught exclusively in Columbia Basin sport and gillnet fisheries (Figure 34).

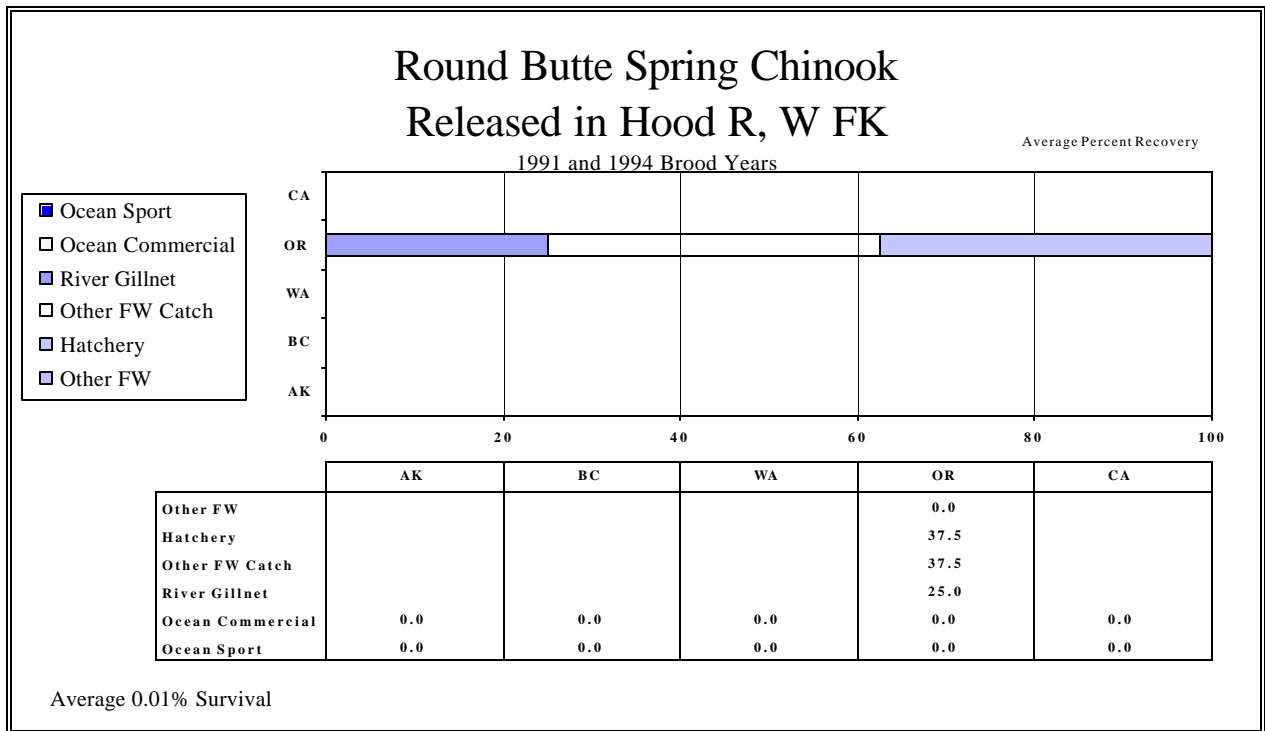


Figure 33. Average survival and catch distribution of Round Butte Hatchery Deschutes River stock spring chinook, released in West Fork Hood River (1991 and 1994 brood years).

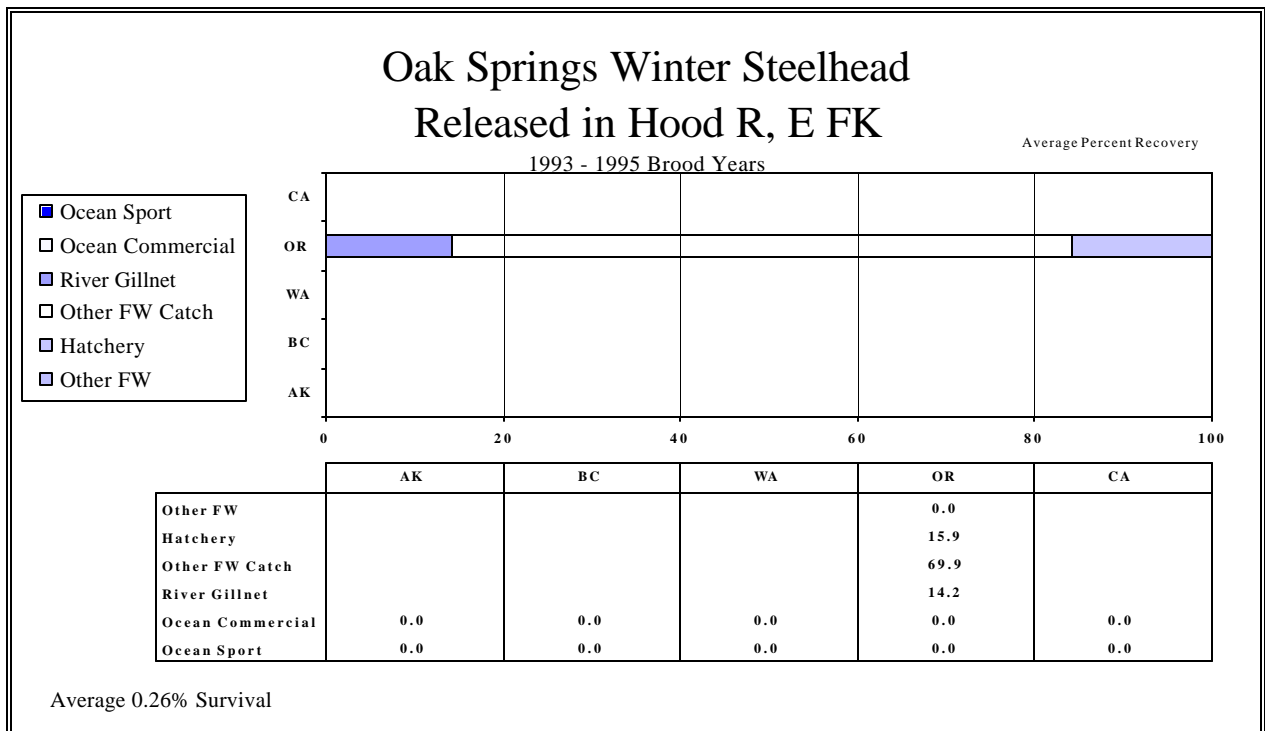


Figure 34. Survival and catch distribution of Oak Springs Hatchery Hood River stock Winter steelhead, released in East Fork Hood River (1993 - 1995 broods).

**Wizard Falls Hatchery**

Wizard Falls Hatchery is located on the Metolius River 2 miles north of Camp Sherman off Highway 20. Wizard Falls Hatchery rears and releases Atlantic and kokanee salmon, brown, brook and rainbow trout. None of these fish have been coded-wire tagged for evaluation.

**Fall River Hatchery**

Fall River Hatchery is located on Fall River, a tributary of the Deschutes River southeast of Bend. Fall River Hatchery rears and releases cutthroat, brook and rainbow trout. None of these fish have been coded-wire tagged for evaluation.

**Irrigon Hatchery**

Irrigon Hatchery is located on the Columbia River off Highway 730 near Irrigon. Irrigon rears and releases summer steelhead and rainbow trout. Starting with the 1991 brood year production of spring and fall chinook salmon for the Umatilla River was taken over by the new Umatilla Hatchery.

The 1990 brood up-river bright stock fall chinook reared at Irrigon hatchery and released in the Umatilla River survived at a rate of 0.20% and were caught primarily in Alaska and British Columbia ocean fisheries and Columbia Basin gillnet and sport fisheries (Appendix A).

The 1991 to 1995 brood Imnaha River stock summer steelhead released in Little Sheep Creek survived at an average rate of 0.23% and were caught primarily in Columbia Basin gillnet and sport fisheries (Figure 35).

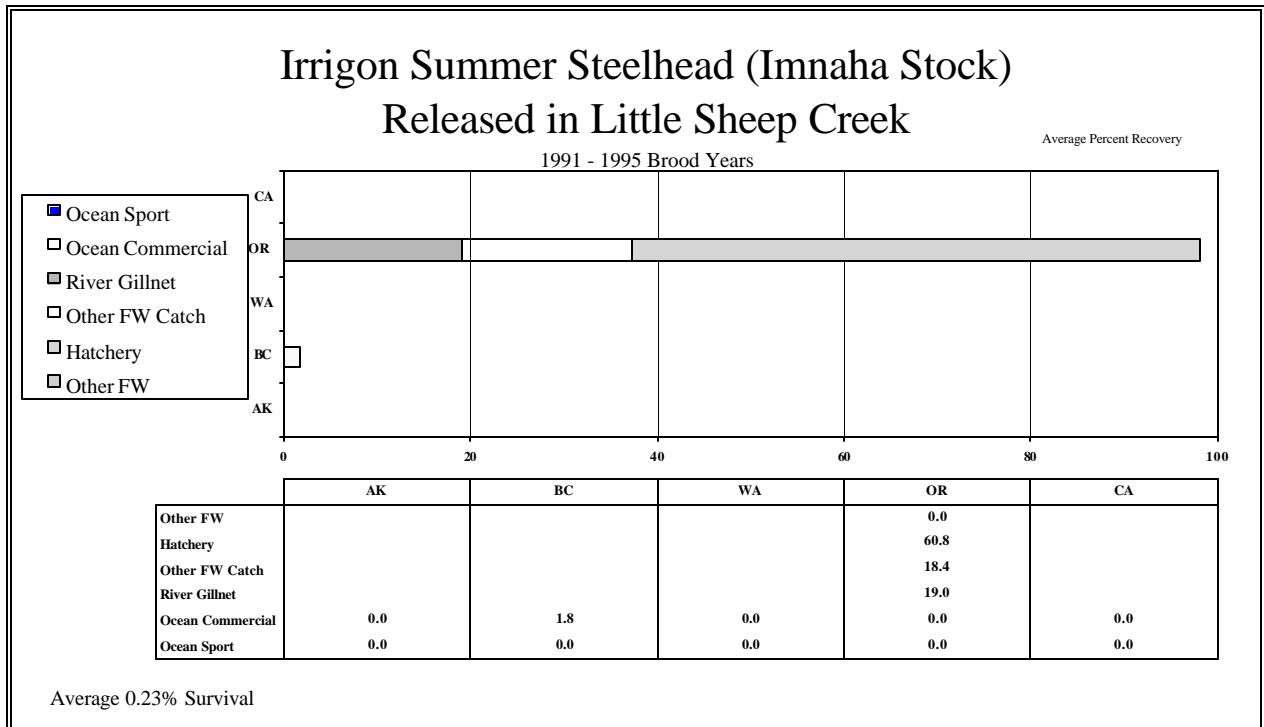


Figure 35. Average survival and catch distribution of Irrigon Hatchery Imnaha R. stock summer steelhead, released in Little Sheep Cr. (1991 to 1995 broods).

**Umatilla Hatchery**

Umatilla Hatchery, constructed in 1990 is located on the Columbia River adjacent to Irrigon Hatchery. Umatilla Hatchery rears up-river bright fall chinook, Carson stock spring chinook and summer steelhead trout.

The 1991 to 1994 brood up-river bright stock fall chinook released in the Umatilla River survived at an average rate of 0.03% and were caught primarily in Alaska and British Columbia ocean fisheries, and Columbia Basin gillnet and sport fisheries (Figure 36).

The 1991 to 1994 brood Carson stock spring chinook released in the Umatilla River survived at an average rate of 0.02% and were caught primarily in Columbia Basin sport fisheries (Figure 37).

The 1991 to 1995 brood Umatilla River stock summer steelhead released in the Umatilla River survived at an average rate of 0.41% and were caught primarily in Columbia Basin gillnet and sport fisheries (Figure 38).

**Lookingglass Hatchery**

Lookingglass Hatchery is located on Lookingglass Creek, a tributary to the Grande Ronde River north of Elgin. Lookingglass Hatchery rears and releases spring chinook salmon.

The 1990 to 1994 brood Rapid River stock spring chinook released in Lookingglass Creek survived at an average rate of 0.06% and were caught primarily in Columbia Basin sport fisheries (Figure 39).

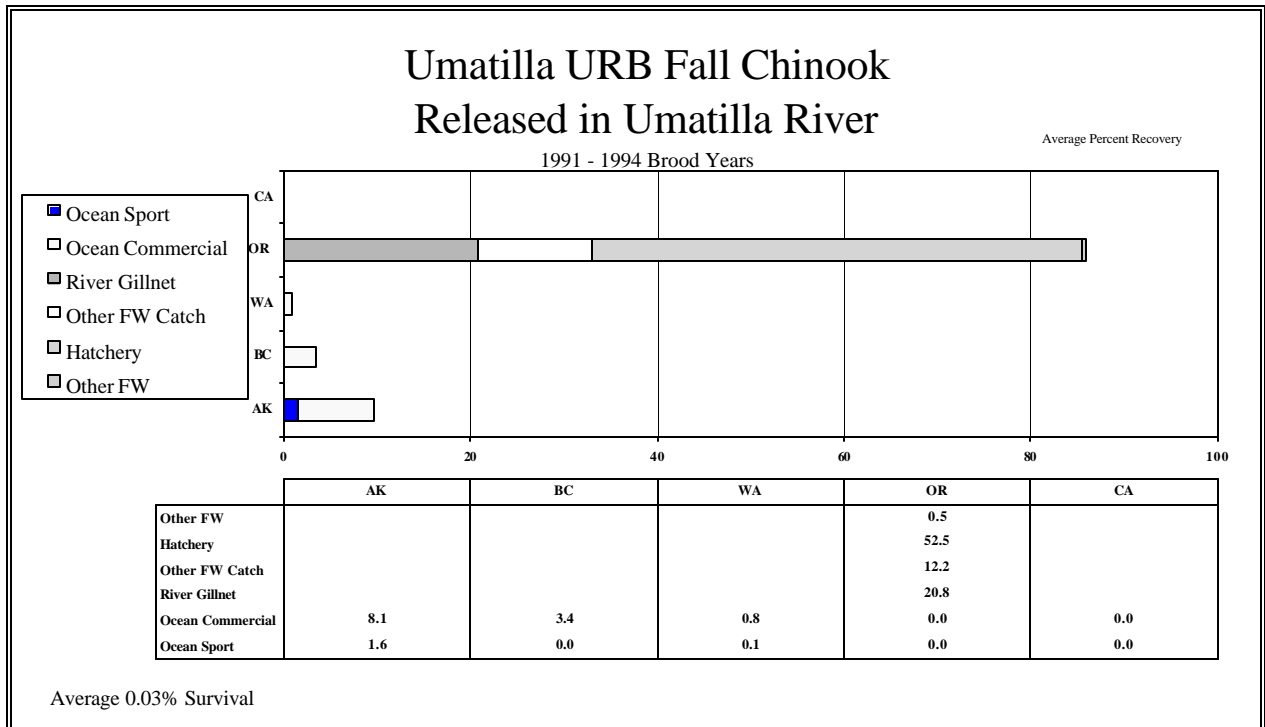


Figure 36. Average survival and catch distribution of Umatilla Hatchery up-river Bright fall chinook released in Umatilla River (1991 to 1994 broods).



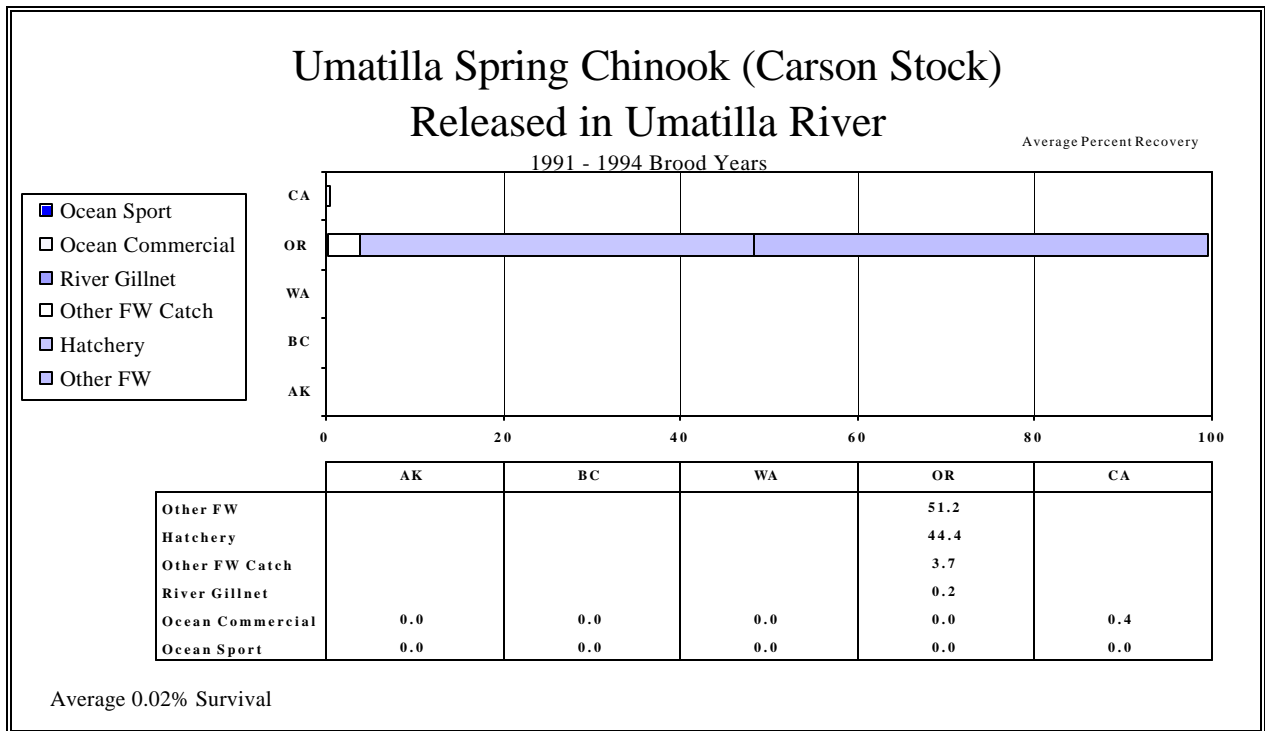


Figure 37. Average survival and catch distribution of Umatilla Hatchery Carson stock spring chinook released in Umatilla River (1991 to 1994 broods).

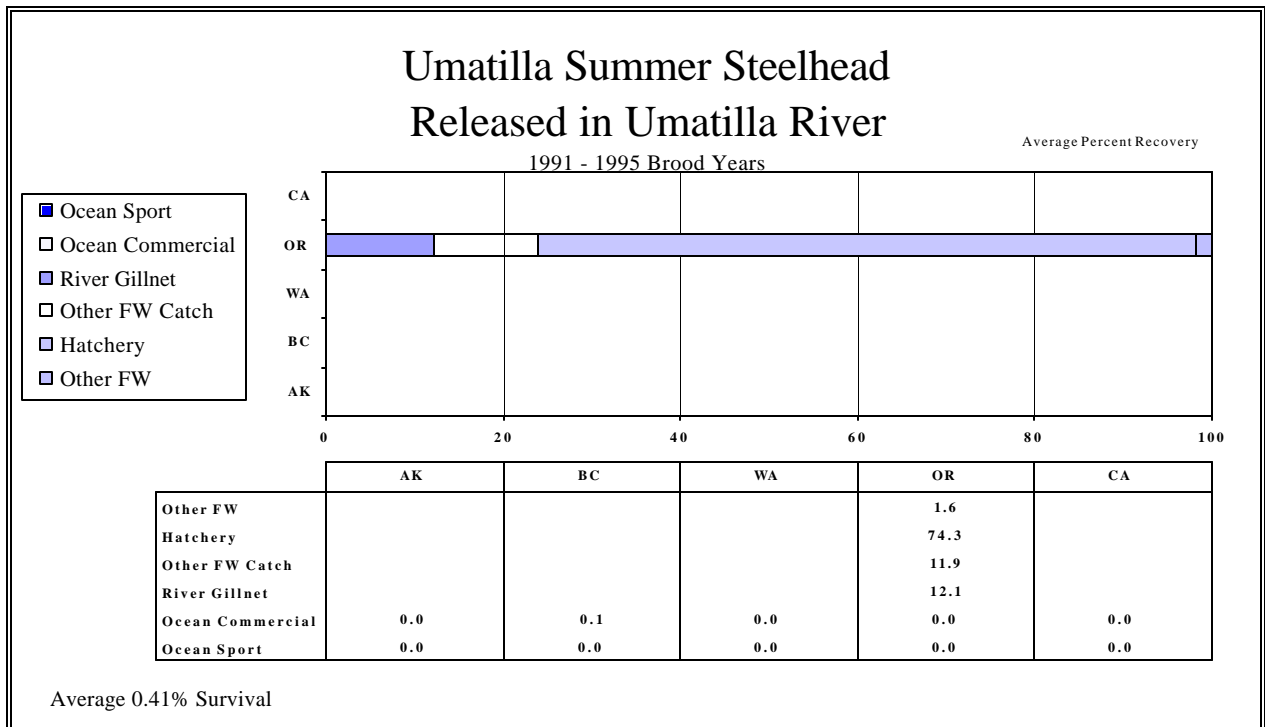


Figure 38. Average survival and catch distribution of Umatilla Hatchery Umatilla River stock summer steelhead, released in Umatilla River (1991 to 1995 broods).

The 1990 to 1994 brood Imnaha stock spring chinook released in Imnaha River survived at an average rate of 0.03% and were caught primarily in Columbia Basin sport and gillnet fisheries (Figure 40).

**Wallowa Hatchery**

Wallowa Hatchery is located on the Wallowa River near Enterprise. The Wallowa Hatchery rears and releases summer steelhead and rainbow trout. The rainbow trout have not been tagged for evaluation.

The 1991 to 1995 brood Wallowa stock summer steelhead reared at Irrigon and Wallowa hatcheries and released in Big Canyon Creek survived at an average rate of 0.46% and were almost exclusively caught in Columbia Basin gillnet and sport fisheries (Figure 41).

The 1991 to 1995 brood Wallowa stock summer steelhead reared at Irrigon hatchery, acclimated at Wallowa hatchery and released in Spring Creek survived at an average rate of 0.39% and were almost exclusively caught in Columbia Basin gillnet and sport fisheries (Figure 42).

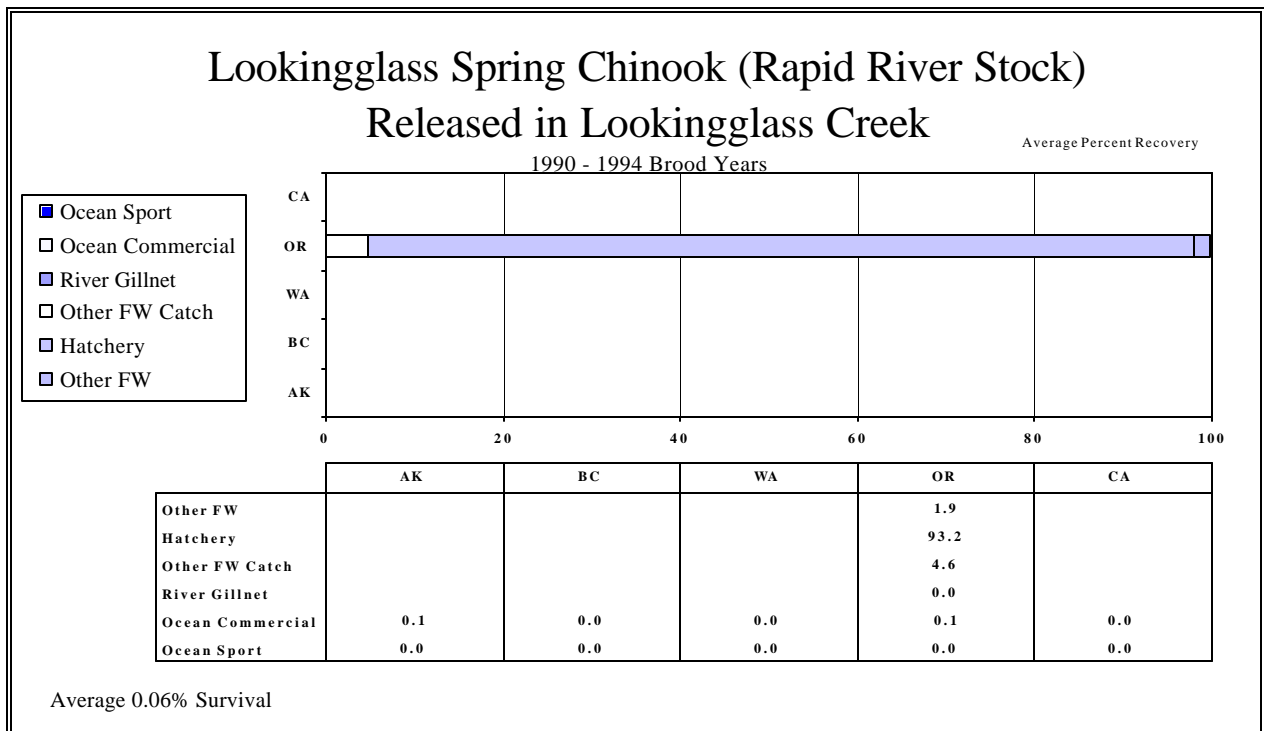


Figure 39. Average survival and catch distribution of Lookingglass Hatchery Rapid River stock spring chinook, released in Lookingglass Creek (1990 to 1994 broods).

**Wild Fish**

Small number of wild steelhead smolts, in the Hood Basin, and wild spring chinook smolts, in the McKenzie River basin have been tagged. To date there have been few reported recoveries of these tagged wild fish (Appendix A).

## Lookingglass Spring Chinook (Imnaha River Stock) Released in Imnaha River

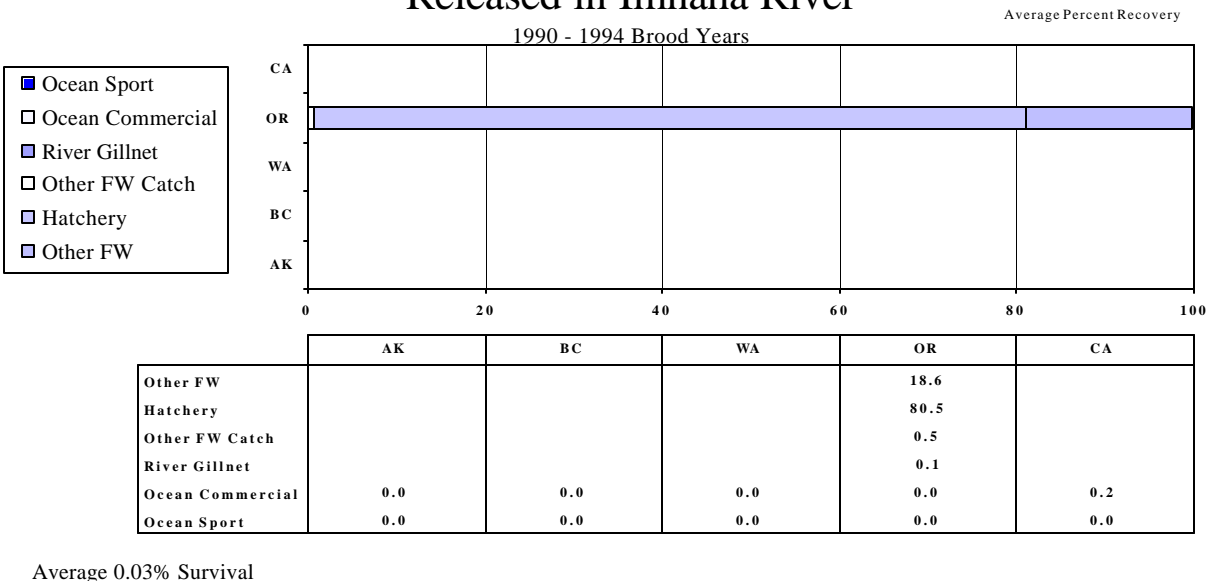


Figure 40. Average survival and catch distribution of Lookingglass Hatchery Imnaha River stock spring chinook, released in Imnaha River (1990 to 1994 broods).

## Irrigon/Wallowa Summer Steelhead (Wallowa Stock) Released in Big Canyon Creek

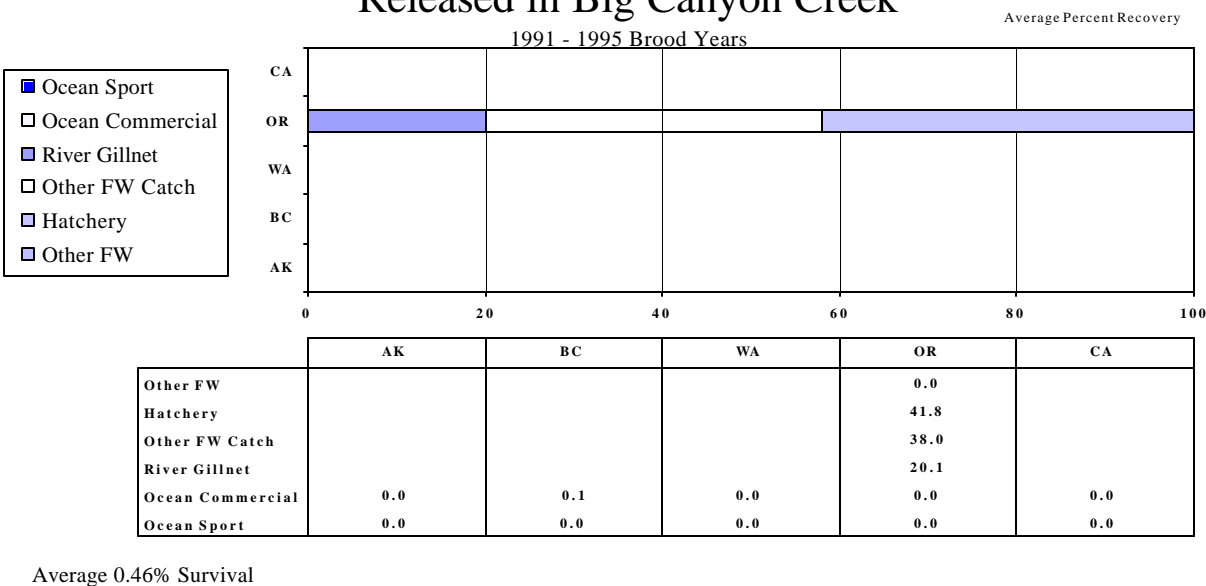


Figure 41. Average survival and catch distribution of Wallowa River stock summer steelhead, released in Big Canyon Creek (1991 to 1995 broods).

## Irrigon/Wallowa Summer Steelhead (Wallowa Stock) Released in Spring Creek

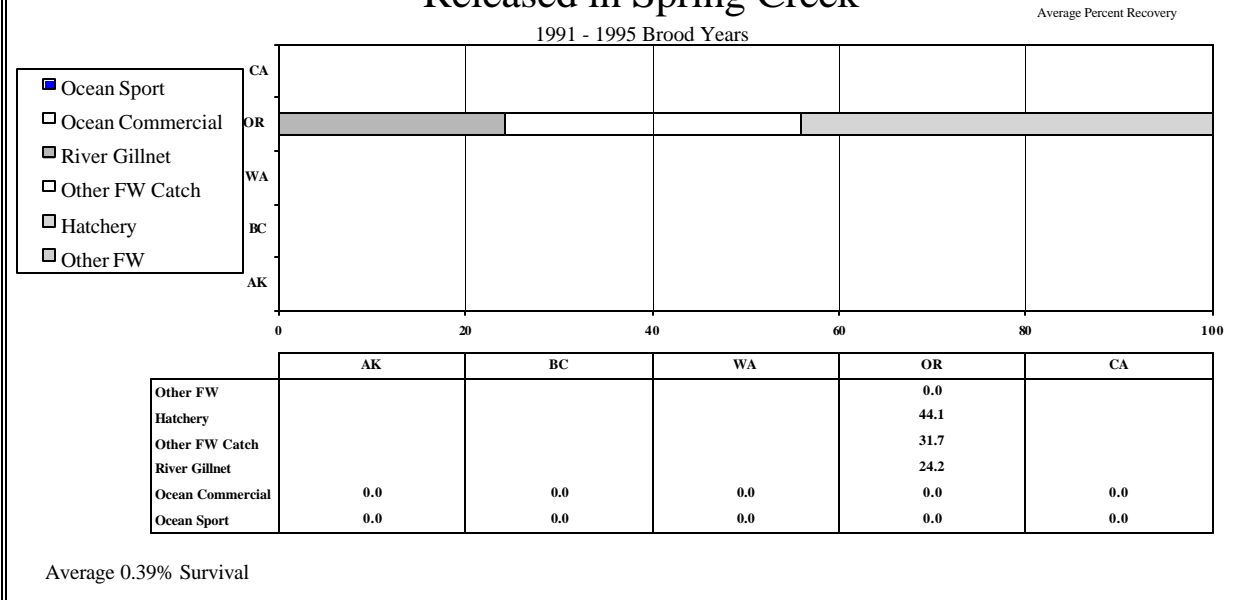


Figure 42. Average survival and catch distribution of Wallowa River stock summer steelhead, released in Spring Creek (1991 to 1995 broods).

### REFERENCES

- Blankenship, L. 1981. Coded-wire tag loss study. Washington Department of Fisheries, Technical Report No. 65, Olympia, Washington.
- Hankin, D.G. and S.M. Mohr. 1990. Determination of levels of coded-wire tagging needed to support time/area harvest management. Final contract report to Klamath River Technical Advisory Team.
- Jefferts, K.B., P.K. Bergman, and H.F. Fiscus. 1963. A coded-wire identification system for macro-organisms. *Nature* 198:460-462.
- Jenkinson, D.W., and H.T. Bilton. 1981. Additional guidelines to marking and coded wire tagging of juvenile salmon. Canadian Technical Report of Fisheries and Aquatic Sciences No. 1051. 24 pages.
- Pacific Salmon Commission (PSC). 1995. Hatchery methodology workshop. Held January 10th through 12th 1995, Seattle, Washington.
- Reisenbichler, R.R., and N.A. Hartmann. 1978. Effect of number of marked fish and years of repetition on precision in studies of contribution to a fishery. Oregon Department of Fish and Wildlife, Information Report 78-2, Portland, Oregon.

APPENDIX A

Appendix Table 1. Average Percent Recovery (by Fishery) for the Last 5 Completed Brood years  
(Chinook 1989 to 1993 broods; Coho 1991 to 1995 broods; Steelhead 1990 to 1994 broods)

Data through preliminary 1998 returns.

				Percent Recovery for All Areas																
				Number			Freshwater													
				Total	%	Alaska		British Col		Washington		Oregon		Other				California		
Hatchery	Stock	Release Site	Brood	Tagged	Released	Surv	Spt	Com	Spt	Com	Spt	Com	Spt	Com	Gillnet	Catch	Hatcher	Other	Spt	Com
Bonneville	Big Cr/Tanner Cr	Tanner Cr	1990	100,328	4,867,030	0.12	0.0	0.0	5.9	19.2	6.4	11.0	0.0	0.0	3.4	3.2	50.8	0.0	0.0	0.0
Bonneville	Big Creek	Tanner Cr	1991	106,605	7,757,835	0.03	0.0	0.0	0.0	9.2	0.0	0.0	0.0	12.7	0.0	0.0	78.0	0.0	0.0	0.0
Bonneville	Tanner Cr	Tanner Cr	1992	107,301	6,582,277	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.1	5.6	22.2	69.2	0.0	0.0	0.0
Bonneville	Tanner Cr	Tanner Cr	1993	52,175	5,866,287	0.05	0.0	0.0	0.0	7.7	0.0	0.0	0.0	0.0	3.9	0.0	88.5	0.0	0.0	0.0
Bonneville	Tanner/Wash. Tule	Tanner Cr	1994	159,071	8,240,031	0.04	0.0	0.0	7.1	10.0	0.0	0.0	0.0	2.4	8.1	10.7	61.7	0.0	0.0	0.0
Average				105,096	6,662,692	0.05	0.0	0.0	2.6	9.2	1.3	2.2	0.0	3.6	4.2	7.2	69.6	0.0	0.0	0.0
Bonneville	URB	Tanner Cr	1990	247,106	4,867,973	0.29	0.2	12.0	0.1	16.8	1.3	0.0	0.0	0.0	12.1	0.2	42.2	15.1	0.0	0.0
Bonneville	URB	Tanner Cr	1991	102,163	3,153,084	0.06	0.0	23.2	0.0	6.4	0.0	0.0	0.0	0.0	15.6	1.6	43.8	9.5	0.0	0.0
Bonneville	URB	Tanner Cr	1992	97,104	4,030,615	0.35	2.4	10.0	0.0	6.5	1.8	0.0	0.0	2.4	15.5	7.0	54.6	0.0	0.0	0.0
Bonneville	URB	Tanner Cr	1993	203,934	5,733,742	0.48	2.6	16.9	0.7	10.7	0.0	0.3	0.0	0.2	12.8	6.0	49.8	0.0	0.0	0.0
Bonneville	URB	Tanner Cr	1994	233,782	6,481,671	0.09	0.0	8.6	0.0	48.0	0.0	0.0	0.0	0.0	12.4	0.0	31.1	0.0	0.0	0.0
Average				176,818	4,853,417	0.25	1.0	14.1	0.2	17.7	0.6	0.1	0.0	0.5	13.7	3.0	44.3	4.9	0.0	0.0
Bonneville	URB	Mid-Columbia R	1990	190,571	848,688	0.17	1.3	18.2	0.0	18.6	0.0	0.0	0.0	0.0	17.1	0.0	36.9	7.8	0.0	0.0
Hanford Netpens	URB	Hanford Reach	1993	479,106	496,746	0.15	1.0	12.1	0.0	6.7	0.0	0.3	0.0	1.2	35.4	8.9	21.2	13.2	0.0	0.0
Bonneville	URB	Ringold Pond (WA)	1993	425,289	4,258,492	0.22	1.1	12.6	0.0	10.9	0.0	0.0	0.0	0.0	31.5	13.3	14.6	16.0	0.0	0.0
Bonneville	URB	Umatilla R	1990	52,338	58,682	0.02	0.0	0.0	0.0	49.4	0.0	0.0	0.0	0.0	0.0	40.5	10.1	0.0	0.0	0.0
Bonneville	URB	Umatilla R	1991	47,102	87,337	0.04	0.0	0.0	0.0	38.2	0.0	0.0	0.0	0.0	0.0	0.0	61.8	0.0	0.0	0.0
Bonneville	URB	Umatilla R	1992	47,169	283,453	0.26	0.0	0.0	8.4	0.0	0.0	0.0	0.0	2.4	3.6	10.8	68.6	6.3	0.0	0.0
Bonneville	URB	Umatilla R	1993	49,239	227,088	0.18	0.0	5.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	92.2	0.0	0.0	0.0
Bonneville	URB	Umatilla R	1994	55,918	421,316	0.20	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	18.8	11.9	68.1	0.0	0.0	0.0
Average				50,353	215,575	0.14	0.0	1.3	1.7	17.5	0.0	0.0	0.0	0.5	4.5	13.1	60.2	1.3	0.0	0.0
Big Creek	Big Creek	Big Cr	1990	157,694	10,880,963	0.09	0.0	2.4	22.2	18.3	0.0	4.3	0.0	0.0	0.0	3.0	42.3	7.6	0.0	0.0
Big Creek	Big Creek	Big Cr	1991	160,001	9,804,926	0.17	0.0	0.0	2.9	20.6	1.8	1.3	0.0	1.1	0.0	0.0	51.9	20.5	0.0	0.0
Big Creek	Big Creek	Big Cr	1992	105,966	7,901,061	0.08	0.0	0.0	0.0	8.6	0.0	0.0	0.0	3.3	13.6	2.1	69.6	2.8	0.0	0.0
Big Creek	Big Creek	Big Cr	1993	105,425	7,025,715	0.28	0.0	2.9	4.2	16.0	2.4	7.8	0.0	1.5	14.1	1.5	48.4	1.3	0.0	0.0
Big Creek	Big Creek	Big Cr	1994	158,756	11,188,784	0.06	0.0	0.0	1.5	10.5	1.0	3.4	0.0	0.0	4.4	4.5	62.0	4.4	0.0	8.4
Average				137,568	9,360,290	0.14	0.0	1.1	6.1	14.8	1.0	3.3	0.0	1.2	6.4	2.2	54.8	7.3	0.0	1.7
Big Creek	Rogue R	Big Cr	1990	153,009	785,934	0.78	0.0	0.0	0.0	0.0	4.7	1.1	1.6	27.8	3.7	8.1	46.2	4.5	0.6	1.7
Big Creek	Rogue R	Big Cr	1991	155,817	763,387	0.51	0.0	0.0	0.0	1.0	0.0	0.3	0.0	8.8	0.5	0.7	80.5	3.4	2.3	2.5
Big Creek	Rogue R	Big Cr	1992	104,250	444,718	1.54	0.0	0.1	0.1	0.5	0.2	1.0	0.0	29.2	4.7	2.8	54.4	2.0	2.1	3.0
Big Creek	Rogue R	Big Cr	1993	109,048	804,671	0.55	0.0	0.0	0.0	0.1	0.1	0.8	0.7	23.5	9.0	9.4	49.2	0.7	2.3	4.3
Big Creek	Rogue R	Big Cr	1994	105,325	1,008,598	0.31	0.0	0.0	0.0	0.9	0.5	0.5	0.0	40.1	7.1	17.7	33.0	0.2	0.0	0.0
Average				125,490	761,462	0.74	0.0	0.0	0.0	0.5	1.1	0.8	0.4	25.9	5.0	7.8	52.6	2.1	1.4	2.3

Appendix Table 1. Continued.

				Percent Recovery for All Areas																
				Number			Freshwater													
				Total	%	Alaska		British Col		Washington		Oregon		Other				California		
Hatchery	Stock	Release Site	Brood	Tagged	Released	Surv	Spt	Com	Spt	Com	Spt	Com	Spt	Com	Gillnet	Catch	Hatcher	Other	Spt	Com
<b>Fall Chinook</b>																				
Irrigon	URB	Umatilla R	1990	503,863	3,246,468	0.20	0.5	15.0	0.3	10.3	0.1	0.0	0.0	0.1	8.5	2.7	23.3	39.2	0.0	0.0
Umatilla	URB	Umatilla R	1991	304,968	2,678,343	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.1	0.0	82.9	0.0	0.0	0.0
Umatilla	URB	Umatilla R	1992	294,842	2,629,917	0.06	3.3	13.2	0.0	6.8	0.0	3.2	0.0	0.0	25.5	4.1	43.8	0.0	0.0	0.0
Umatilla	Washington Brights	Umatilla R	1993	308,481	2,843,212	0.07	2.9	19.2	0.0	6.9	0.4	0.0	0.0	0.0	15.6	9.0	44.0	2.1	0.0	0.0
Umatilla	URB/Wash. Brights	Umatilla R	1994	364,220	2,609,385	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.1	35.6	39.3	0.0	0.0	0.0
Average				318,128	2,690,214	0.03	1.6	8.1	0.0	3.4	0.1	0.8	0.0	0.0	20.8	12.2	52.5	0.5	0.0	0.0
CEDC Fisheries	Rogue R	Youngs R	1991	25,467	56,467	0.15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	89.2	0.0	10.8	0.0	0.0	0.0
CEDC Fisheries	Rogue R	Youngs R	1993	25,351	337,915	1.17	0.0	0.0	0.0	0.0	0.0	1.0	1.0	17.6	57.4	7.1	5.7	2.0	1.4	6.8
CEDC Fisheries	Rogue R	Youngs R	1994	249,492	1,251,787	0.19	0.0	0.2	0.0	0.2	0.1	0.2	0.3	9.4	66.8	5.0	16.5	0.3	0.2	0.9
Average				100,103	548,723	0.50	0.0	0.1	0.0	0.1	0.0	0.4	0.4	9.0	71.2	4.0	11.0	0.8	0.5	2.6
CEDC Fisheries	URB	Youngs R	1994	50,608	199,088	0.02	0.0	33.3	0.0	33.3	0.0	0.0	0.0	0.0	33.3	0.0	0.0	0.0	0.0	0.0
Stayton Pond	Tanner Cr	Willamette R	1990	196,187	9,516,779	0.15	0.0	0.0	3.8	20.4	8.8	10.2	1.9	4.3	1.7	6.5	41.5	1.0	0.0	0.0
Stayton Pond	Tanner Cr	Willamette R	1991	196,429	10,092,295	0.01	0.0	0.0	0.0	19.8	0.0	0.0	0.0	0.0	0.0	0.0	80.2	0.0	0.0	0.0
Stayton Pond	Tanner Cr	Willamette R	1992	206,306	5,031,540	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	49.6	0.0	0.0	0.0	50.4	0.0	0.0
Stayton Pond	Tanner Cr	Willamette R	1993	194,519	5,844,119	0.02	0.0	0.0	7.9	0.0	0.0	5.0	0.0	0.0	0.0	5.0	82.1	0.0	0.0	0.0
Stayton Pond	Tanner Cr	Willamette R	1994	206,717	10,667,979	0.06	0.0	0.0	0.0	18.0	5.5	5.5	0.0	4.7	2.3	5.5	57.8	0.8	0.0	0.0
Average				200,032	8,230,542	0.05	0.0	0.0	2.3	11.6	2.9	4.1	0.4	11.7	0.8	3.4	52.3	10.4	0.0	0.0
Stayton Pond	Tanner Cr	Tanner Cr	1992	55,442	56,442	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stayton Pond	Tanner Cr	Tanner Cr	1993	53,383	55,057	0.04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.0	0.0	87.0	0.0	0.0	0.0
Stayton Pond	Tanner Cr	Tanner Cr	1994	52,482	52,935	0.10	0.0	0.0	7.4	16.7	0.0	0.0	0.0	7.4	1.9	18.5	48.2	0.0	0.0	0.0
Average				53,769	54,811	0.05	0.0	0.0	3.7	8.3	0.0	0.0	0.0	3.7	7.4	9.3	67.6	0.0	0.0	0.0
Stayton Pond	Tanner Cr	Santiam R & N Fk	1992	51,429	1,254,750	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stayton Pond	Tanner Cr	Santiam R & N Fk	1993	46,981	1,402,112	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
Stayton Pond	Tanner Cr	Santiam R & N Fk	1994	53,689	54,086	0.07	0.0	0.0	43.6	5.1	0.0	0.0	0.0	5.1	0.0	15.4	23.1	7.7	0.0	0.0
Average				50,700	903,649	0.02	0.0	0.0	21.8	2.6	0.0	0.0	0.0	2.6	0.0	7.7	61.5	3.8	0.0	0.0
<b>Spring Chinook</b>																				
Bonneville	Lookingglass Cr	Hood R, W Fk	1990	52,732	163,295	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
Bonneville	Deschutes R	Hood R, W Fk	1991	39,739	40,317	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	70.0	30.0	0.0	0.0	0.0
Bonneville	Deschutes R	Hood R, W Fk	1993	42,861	170,004	0.04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.1	88.9	0.0	0.0	0.0
Average				45,111	124,539	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	60.4	39.6	0.0	0.0	0.0
Round Butte	Deschutes R	Hood R, W Fk	1991	28,133	28,810	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Round Butte	Deschutes R	Hood R, W Fk	1994	121,296	127,156	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	37.5	37.5	0.0	0.0	0.0
Average				74,715	77,983	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	37.5	37.5	0.0	0.0	0.0

Appendix Table 1. Continued.

Spring Chinook				Percent Recovery for All Areas																
				Number			Freshwater													
				Total	%		Alaska		British Col		Washington		Oregon		Other				California	
Hatchery	Stock	Release Site	Brood	Tagged	Released	Surv	Spt	Com	Spt	Com	Spt	Com	Spt	Com	Gillnet	Catch	Hatcher	Other	Spt	Com
Bonneville	Lookingglass Cr	Umatilla R	1990	313,457	367,653	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	28.1	68.7	3.3	0.0	0.0
Bonneville	Carson	Umatilla R	1991	171,620	224,471	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.8	35.5	43.7	0.0	0.0
Bonneville	Carson	Umatilla R	1992	93,349	405,102	0.49	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.3	8.5	80.3	0.0	0.0
Average				192,809	332,409	0.17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	37.6	42.4	0.0	0.0
Carson NFH	Wind R	Umatilla R	1990	32,335	97,718	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Umatilla	Carson	Umatilla R	1991	642,146	1,265,950	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0
Umatilla	Carson	Umatilla R	1992	747,602	1,333,319	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	11.5	17.5	70.6	0.0	0.0
Umatilla	Carson	Umatilla R	1993	866,996	1,890,965	0.08	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.5	3.1	60.2	34.3	0.0	1.7
Umatilla	Carson	Umatilla R	1994	137,208	378,561	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
Average				598,488	1,217,199	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	3.7	44.4	51.2	0.0	0.4
Clackamas	Clackamas R	Clackamas R	1990	134,529	1,000,235	0.44	0.0	4.8	0.9	1.5	0.1	0.0	0.0	0.0	0.6	43.5	48.6	0.0	0.0	0.0
Clackamas	Clackamas R	Clackamas R	1991	118,981	1,031,558	0.22	0.0	2.1	0.0	0.6	0.0	0.0	0.0	0.6	15.8	81.0	0.0	0.0	0.0	0.0
Clackamas	Clackamas R	Clackamas R	1992	127,363	836,872	0.26	0.0	0.4	0.0	2.9	1.3	0.0	0.0	4.8	0.2	9.3	79.9	0.0	0.0	1.2
Clackamas	Clackamas R	Clackamas R	1993	131,602	1,014,225	0.44	0.0	1.5	0.0	0.7	0.0	0.3	0.0	4.0	1.1	21.4	71.0	0.0	0.0	0.0
Clackamas	Clackamas R	Clackamas R	1994	76,692	991,941	0.45	0.0	19.9	0.0	1.1	0.0	0.4	0.0	0.4	2.7	17.0	58.3	0.3	0.0	0.0
Average				117,833	974,966	0.36	0.0	5.7	0.2	1.3	0.3	0.1	0.0	1.8	1.1	21.4	67.7	0.1	0.0	0.2
Clackamas	Clackamas R	Sandy R	1991	51,764	371,484	0.08	0.0	0.0	12.8	0.0	0.0	0.0	0.0	0.0	2.6	71.8	12.8	0.0	0.0	0.0
Clackamas	Clackamas R	Sandy R	1992	25,177	344,893	0.05	0.0	25.0	33.3	0.0	0.0	0.0	0.0	25.0	0.0	8.3	8.3	0.0	0.0	0.0
Clackamas	Clackamas R	Sandy R	1993	23,927	459,479	0.13	0.0	19.4	9.7	3.2	0.0	6.5	0.0	6.5	0.0	25.8	29.0	0.0	0.0	0.0
Clackamas	Clackamas R	Sandy R	1994	23,634	421,768	0.24	0.0	45.6	14.0	0.0	0.0	0.0	0.0	5.3	3.5	10.5	15.8	5.3	0.0	0.0
Average				31,126	399,406	0.13	0.0	22.5	17.5	0.8	0.0	1.6	0.0	9.2	1.5	29.1	16.5	1.3	0.0	0.0
Lookingglass	Imnaha R	Imnaha R	1990	259,377	262,500	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	91.1	6.6	0.0	0.0
Lookingglass	Imnaha R	Imnaha R	1991	156,886	157,659	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	73.0	27.0	0.0	0.0
Lookingglass	Imnaha R	Imnaha R	1992	421,847	438,617	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	80.0	20.0	0.0	0.0
Lookingglass	Imnaha R	Imnaha R	1993	386,120	394,304	0.08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	75.6	22.6	0.0	1.1
Lookingglass	Imnaha R	Imnaha R	1994	89,265	91,240	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	83.0	17.0	0.0	0.0
Average				262,699	268,864	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5	80.5	18.6	0.0	0.2
Lookingglass	Rapid R (Idaho)	Lookingglass Cr	1990	167,115	950,868	0.04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.8	81.6	7.6	0.0	0.0
Lookingglass	Rapid R (Idaho)	Lookingglass Cr	1991	446,248	448,219	0.03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	97.4	0.4	0.0	0.0
Lookingglass	Rapid R (Idaho)	Lookingglass Cr	1992	739,180	765,123	0.09	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	2.3	97.1	0.5	0.0	0.0
Lookingglass	Rapid R (Idaho)	Lookingglass Cr	1993	630,618	658,230	0.09	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.7	0.1	0.5	97.1	0.9	0.0	0.0
Lookingglass	Rapid R (Idaho)	Lookingglass Cr	1994	134,812	139,112	0.04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	93.1	0.0	0.0	0.0
Average				423,595	592,310	0.06	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	4.6	93.2	1.9	0.0	0.0



Appendix Table 1. Continued.

Spring Chinook				Percent Recovery for All Areas																
				Number			Freshwater													
				Total	%		Alaska		British Col		Washington		Oregon		Other				California	
Hatchery	Stock	Release Site	Brood	Tagged	Released	Surv	Spt	Com	Spt	Com	Spt	Com	Spt	Com	Gillnet	Catch	Hatcher y	Other	Spt	Com
Marion Forks	N Santiam R	Santiam R & N Fk	1990	34,835	553,887	0.17	0.0	3.0	0.0	15.3	0.0	0.0	0.0	0.0	0.0	41.6	40.1	0.0	0.0	0.0
Marion Forks	N Santiam R	Santiam R & N Fk	1991	71,502	444,917	0.36	0.0	9.0	0.0	0.8	0.0	0.0	0.0	0.0	0.4	57.2	32.3	0.3	0.0	0.0
Marion Forks	N Santiam R	Santiam R & N Fk	1992	28,469	489,825	0.15	0.0	33.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	65.4	1.3	0.0	0.0
Marion Forks	N Santiam R	Santiam R & N Fk	1993	30,780	665,684	0.25	0.0	19.9	0.0	0.0	0.0	0.0	0.0	0.0	1.0	4.1	73.0	2.0	0.0	0.0
Marion Forks	N Santiam R	Santiam R & N Fk	1994	25,687	699,402	0.29	3.5	4.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.4	80.4	1.1	0.0	0.0
Average				38,255	570,743	0.24	0.7	13.9	0.0	3.2	0.0	0.0	0.0	0.0	0.3	22.6	58.2	1.0	0.0	0.0
McKenzie	McKenzie R	McKenzie R	1990	143,245	1,022,561	0.11	0.0	1.7	0.0	0.5	0.0	0.0	0.0	0.3	0.4	15.1	82.0	0.1	0.0	0.0
McKenzie	McKenzie R	McKenzie R	1991	123,661	805,342	0.22	28.3	6.7	0.0	2.2	0.4	0.4	0.0	0.0	0.0	7.9	50.7	0.8	0.0	2.6
McKenzie	McKenzie R	McKenzie R	1992	678,222	732,635	0.18	0.0	2.6	0.0	1.0	0.0	0.1	0.0	0.2	0.8	9.9	83.9	1.4	0.0	0.0
McKenzie	McKenzie R	McKenzie R	1993	82,684	480,183	0.19	0.0	3.4	0.0	3.5	2.6	0.0	0.0	0.0	0.0	7.9	80.6	2.0	0.0	0.0
McKenzie	McKenzie R	McKenzie R	1994	85,033	592,237	0.22	0.0	9.2	0.0	0.0	0.0	0.9	0.0	0.0	0.0	5.7	83.1	1.2	0.0	0.0
Average				222,569	726,592	0.18	5.7	4.7	0.0	1.4	0.6	0.3	0.0	0.1	0.2	9.3	76.1	1.1	0.0	0.5
McKenzie	McKenzie R	Willamette R, Lower	1992	178,065	256,547	0.03	0.0	14.7	0.0	4.2	0.0	0.0	0.0	5.6	0.0	4.2	71.3	0.0	0.0	0.0
McKenzie	McKenzie R	Willamette R, Lower	1993	315,495	393,794	0.06	0.0	8.2	0.0	2.8	0.0	0.0	0.0	0.7	2.2	12.8	72.3	1.1	0.0	0.0
McKenzie	Clackamas R	Willamette R, Lower	1994	118,379	124,049	0.07	0.0	10.7	1.1	0.0	0.0	0.0	0.0	3.3	1.7	2.2	70.5	10.5	0.0	0.0
Average				203,980	258,130	0.05	0.0	11.2	0.4	2.3	0.0	0.0	0.0	3.2	1.3	6.4	71.4	3.9	0.0	0.0
McKenzie	Clackamas R	Clackamas R	1994	158,469	159,987	0.02	0.0	8.3	0.0	0.0	0.0	0.0	0.0	0.0	4.4	16.3	64.8	6.2	0.0	0.0
Wild	McKenzie R	McKenzie R	1993	1,721	1,721	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wild	McKenzie R	McKenzie R	1994	7,944	7,944	0.04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
Average				4,833	4,833	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
Round Butte	Deschutes R	Deschutes R	1990	118,920	270,779	0.29	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.2	84.8	0.0	0.0	0.0
Round Butte	Deschutes R	Deschutes R	1991	230,048	235,906	0.32	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.6	93.4	0.0	0.0	0.0
Round Butte	Deschutes R	Deschutes R	1992	232,724	237,569	0.47	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.2	0.3	15.5	83.7	0.1	0.0	0.0
Round Butte	Deschutes R	Deschutes R	1993	230,632	239,219	0.10	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	7.8	91.4	0.0	0.0	0.0
Round Butte	Deschutes R	Deschutes R	1994	320,496	333,466	0.08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
Average				226,564	263,388	0.25	0.0	0.0	0.0	0.2	0.0	0.1	0.0	0.0	0.1	9.0	90.7	0.0	0.0	0.0
South Santiam	S Santiam R	Santiam R, S Fk	1990	413,758	1,253,738	0.42	0.0	3.3	0.0	1.0	0.1	0.2	0.0	0.6	0.3	70.9	23.5	0.1	0.1	0.0
South Santiam	S Santiam R	Santiam R, S Fk	1991	406,765	1,291,561	0.35	0.0	8.2	0.0	4.1	0.3	0.0	0.0	0.0	1.1	38.7	47.0	0.7	0.0	0.0
South Santiam	S Santiam R	Santiam R, S Fk	1992	104,989	945,293	0.18	0.0	7.9	0.0	0.0	1.7	0.0	0.0	0.0	2.9	20.8	66.7	0.0	0.0	0.0
South Santiam	S Santiam R	Santiam R, S Fk	1993	110,392	919,238	0.30	0.0	5.8	0.0	3.0	0.0	0.2	0.0	0.0	1.8	18.4	69.0	1.9	0.0	0.0
South Santiam	S Santiam R	Santiam R, S Fk	1994	111,012	1,082,427	0.35	0.0	8.8	0.0	5.4	0.0	0.0	0.5	0.3	1.1	11.4	70.2	2.1	0.0	0.0
Average				229,383	1,098,451	0.32	0.0	6.8	0.0	2.7	0.4	0.1	0.1	0.2	1.4	32.0	55.3	1.0	0.0	0.0

Appendix Table 1. Continued.

Spring Chinook							Percent Recovery for All Areas													
							Number			Freshwater										
							Total	%		Alaska		British Col		Washington		Oregon		Other		
Hatchery	Stock	Release Site	Brood	Tagged	Released	Surv	Spt	Com	Spt	Com	Spt	Com	Spt	Com	Gillnet	Catch	Hatcher	Other	Spt	Com
CEDC Fisheries	Clackamas R	Clackamas R, S Fk	1990	26,472	119,627	0.02	0.0	0.0	80.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0	0.0
CEDC Fisheries	M Willamette R	Clackamas R, S Fk	1991	26,630	74,517	0.02	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	75.0	0.0	0.0	0.0	0.0	0.0
CEDC Fisheries	N Santiam R	Clackamas R, S Fk	1992	24,668	109,974	0.03	0.0	0.0	0.0	28.6	0.0	0.0	0.0	0.0	42.9	0.0	28.6	0.0	0.0	0.0
CEDC Fisheries	M Willamette R	Clackamas R, S Fk	1993	51,829	86,978	0.07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	41.7	0.0	58.3	0.0	0.0	0.0
CEDC Fisheries	S Santiam R	Clackamas R, S Fk	1994	52,205	76,618	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	90.9	0.0	9.1	0.0	0.0	0.0
Average				36,361	93,543	0.03	0.0	5.0	16.0	5.7	0.0	0.0	0.0	0.0	50.1	0.0	19.2	4.0	0.0	0.0
CEDC Fisheries	Clackamas R	Youngs R	1990	49,189	242,534	0.15	0.0	1.1	0.0	0.4	0.5	0.0	0.0	0.0	79.7	0.0	1.3	17.0	0.0	0.0
CEDC Fisheries	M Willamette R	Youngs R	1991	26,352	301,786	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0
CEDC Fisheries	N Santiam R	Youngs R	1992	26,418	301,361	0.36	0.0	2.1	0.0	3.1	0.0	0.0	0.0	0.0	86.5	0.0	7.3	1.0	0.0	0.0
CEDC Fisheries	M Willamette R	Youngs R	1993	144,189	363,222	0.75	0.0	6.8	0.0	1.2	0.0	0.5	0.0	0.0	84.2	1.8	5.1	0.5	0.0	0.0
CEDC Fisheries	Clack./S Santiam	Youngs R	1994	146,507	374,438	0.16	0.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	87.5	1.7	4.4	0.5	0.0	0.0
Average				78,531	316,668	0.28	0.0	3.2	0.0	0.9	0.1	0.1	0.0	0.0	67.6	0.7	3.6	23.8	0.0	0.0
CEDC Fisheries	S Santiam R	Blind Slough (Col. R)	1994	52,369	199,389	0.12	0.0	3.3	0.0	0.0	0.0	0.0	0.0	0.0	83.6	0.0	11.5	1.6	0.0	0.0
CEDC Fisheries	S Santiam R	Tongue Pt (Col. R)	1994	100,400	242,319	0.06	0.0	16.5	0.0	0.0	0.0	0.0	0.0	0.0	54.7	0.0	28.8	0.0	0.0	0.0
Willamette	M Willamette R	Willamette R, M Fk	1990	555,610	1,557,640	0.44	0.0	3.0	0.0	2.7	0.0	0.0	0.0	0.2	0.5	41.5	51.9	0.3	0.0	0.0
Willamette	M Willamette R	Willamette R, M Fk	1991	494,132	1,381,464	0.41	0.3	5.6	0.1	0.9	0.0	0.0	0.0	0.0	0.9	34.8	57.3	0.1	0.0	0.0
Willamette	M Willamette R	Willamette R, M Fk	1992	407,068	1,281,759	0.34	0.0	5.5	0.0	2.9	0.0	0.0	0.0	0.0	1.3	11.6	78.0	0.8	0.0	0.0
Willamette	M Willamette R	Willamette R, M Fk	1993	49,710	1,187,412	0.51	0.0	3.1	0.0	5.3	0.0	0.0	0.0	0.5	0.0	13.9	76.5	0.8	0.0	0.0
Willamette	M Willamette R	Willamette R, M Fk	1994	54,521	1,317,490	0.42	0.0	11.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.5	82.4	0.0	0.0	0.0
Average				312,208	1,345,153	0.42	0.1	5.7	0.0	2.4	0.0	0.0	0.0	0.1	0.5	21.6	69.2	0.4	0.0	0.0
Willamette	M Willamette R	Willamette R	1994	28,349	172,858	0.26	0.0	26.7	0.0	0.0	0.0	0.0	0.0	0.0	5.3	38.7	28.0	1.3	0.0	0.0
Lookingglass	Rapid R (Idaho)	Snake R	1992	79,382	84,051	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Coho</b>																				
Bonneville	Tanner Cr	Tanner Cr	1992	38,543	1,037,468	0.42	0.0	0.0	0.0	2.5	8.7	0.0	3.4	0.0	0.0	3.8	79.5	0.0	2.0	0.0
Bonneville	Tanner Cr	Tanner Cr	1993	51,936	1,279,197	0.86	0.0	0.0	0.0	1.1	1.4	0.0	2.7	0.0	0.6	2.4	91.4	0.0	0.3	0.0
Bonneville	Tanner Cr	Tanner Cr	1994	48,695	1,219,750	1.41	0.0	0.0	0.0	0.0	0.9	0.0	0.3	0.0	0.3	20.0	78.5	0.0	0.0	0.0
Bonneville	Tanner Cr	Tanner Cr	1995	56,330	1,115,249	0.50	0.0	0.0	0.0	0.0	4.5	0.0	0.2	0.0	1.9	7.4	86.1	0.0	0.0	0.0
Bonneville	Tanner Cr	Tanner Cr	1996	42,292	991,036	0.59	0.0	0.0	0.0	0.0	1.9	0.2	1.1	0.0	3.4	0.9	92.6	0.0	0.0	0.0
Average				47,559	1,128,540	0.76	0.0	0.0	0.0	0.7	3.5	0.0	1.5	0.0	1.2	6.9	85.6	0.0	0.5	0.0
Big Creek	Big Creek	Big Cr	1992	51,767	465,990	0.73	0.0	0.0	0.0	11.9	10.2	0.0	2.9	0.0	3.4	2.7	68.8	0.0	0.0	0.0
Big Creek	Big Creek	Big Cr	1993	53,842	533,857	0.77	0.0	0.0	0.0	0.0	2.4	0.4	2.1	0.0	11.2	2.6	81.5	0.0	0.0	0.0
Big Creek	Big Creek	Big Cr	1994	56,067	543,566	0.91	0.0	0.0	0.0	0.0	1.9	0.0	0.0	0.0	6.9	9.9	81.3	0.0	0.0	0.0
Big Creek	Big Creek	Big Cr	1995	55,296	535,702	0.56	0.0	0.0	0.0	0.0	3.2	0.0	0.2	0.0	26.8	3.5	66.3	0.0	0.0	0.0
Big Creek	Big Creek	Big Cr	1996	51,133	501,194	0.48	0.0	0.0	0.0	0.0	1.3	0.0	0.9	0.0	23.1	1.8	73.0	0.0	0.0	0.0
Average				53,621	516,062	0.69	0.0	0.0	0.0	2.4	3.8	0.1	1.2	0.0	14.3	4.1	74.2	0.0	0.0	0.0

Appendix Table 1. Continued.

Coho				Percent Recovery for All Areas																
				Number			Freshwater													
				Total	%	Alaska	British Col		Washington		Oregon		Other				California			
Hatchery	Stock	Release Site	Brood	Tagged	Released	Surv	Spt	Com	Spt	Com	Spt	Com	Spt	Com	Gillnet	Catch	Hatcher	Other	Spt	Com
Big Creek	Big Creek	Tualatin R	1992	26,533	60,239	0.02	0.0	0.0	0.0	0.0	16.7	0.0	66.7	0.0	0.0	0.0	16.7	0.0	0.0	0.0
Big Creek	Big Creek	Tualatin R	1993	26,303	59,250	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Big Creek	Big Creek	Tualatin R	1994	26,426	59,919	0.09	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
Big Creek	Big Creek	Tualatin R	1995	25,222	60,000	0.02	0.0	0.0	0.0	0.0	20.0	0.0	40.0	0.0	20.0	20.0	0.0	0.0	0.0	0.0
Big Creek	Big Creek	Tualatin R	1996	27,506	60,152	0.04	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.0	50.0	30.0	0.0	0.0	0.0	0.0
Average				26,398	59,912	0.03	0.0	0.0	0.0	0.0	9.2	0.0	31.7	0.0	17.5	37.5	4.2	0.0	0.0	0.0
Cascade	Tanner Cr	Umatilla R	1992	81,628	884,105	0.24	0.0	0.0	0.0	3.8	12.1	0.0	2.9	0.0	3.5	16.8	60.9	0.0	0.0	0.0
Cascade	Tanner Cr	Umatilla R	1993	79,300	999,554	0.06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.0	0.0	82.3	4.7	0.0	0.0
Cascade/Oxbow	Tanner Cr	Umatilla R	1994	79,057	1,477,383	0.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	3.9	92.4	0.0	0.0	0.0
Gnat/Klask./Oxbw	Tanner Cr/Umatilla	Umatilla R	1995	81,160	1,365,363	0.40	0.0	1.4	0.0	0.0	7.0	0.5	3.7	0.0	4.5	18.7	64.2	0.0	0.0	0.0
Cascade/Oxbow	Tanner Cr	Umatilla R	1996	79,517	1,579,746	0.37	0.0	0.0	0.0	0.0	6.8	0.0	4.4	0.0	16.7	2.1	70.1	0.0	0.0	0.0
Average				80,132	1,261,230	0.22	0.0	0.3	0.0	0.8	5.2	0.1	2.2	0.0	8.3	8.3	74.0	0.9	0.0	0.0
Cascade	Tanner Cr	Yakima R	1992	78,354	710,574	0.13	0.0	0.0	0.0	2.6	38.1	2.1	12.3	0.0	14.3	20.3	10.3	0.0	0.0	0.0
Cascade	Tanner Cr	Yakima R	1993	62,015	565,616	0.09	0.0	0.0	0.0	0.0	14.5	0.0	0.0	0.0	35.4	26.8	16.7	0.0	6.6	0.0
Cascade	Tanner Cr	Yakima R	1994	79,406	580,379	0.08	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	20.6	73.4	4.6	0.0	0.0	0.0
Rosa Accl. Pond	Clackamas R	Yakima R	1995	25,046	33,802	0.19	0.0	0.0	0.0	0.0	39.6	0.0	4.2	0.0	16.7	18.8	20.8	0.0	0.0	0.0
Cascade	Tanner Cr	Yakima R	1996	80,745	672,472	0.16	0.0	0.0	0.0	0.0	20.9	0.0	12.3	0.0	44.5	9.5	12.8	0.0	0.0	0.0
Average				65,113	512,569	0.13	0.0	0.0	0.0	0.5	22.9	0.4	5.7	0.0	26.3	29.7	13.0	0.0	1.3	0.0
L. Wht Salmon	Klaskanine R	L Wht Salmon R (WA)	1995	26,754	948,592	0.96	0.0	0.0	0.0	0.0	4.3	2.3	0.8	0.0	8.6	7.8	76.3	0.0	0.0	0.0
Sandy	Sandy R	Klickitat R (WA)	1995	30,918	273,896	0.02	0.0	0.0	0.0	0.0	16.7	0.0	33.3	0.0	33.3	0.0	16.7	0.0	0.0	0.0
Klaskanine	Klaskanine R	Klaskanine R, N Fk	1992	26,574	831,887	0.32	0.0	0.0	0.0	8.3	6.0	0.0	3.6	0.0	67.9	6.0	8.3	0.0	0.0	0.0
Klaskanine	Kalama R	Klaskanine R, N Fk	1993	26,279	1,201,313	0.51	0.0	0.0	0.0	1.5	5.9	0.0	2.2	0.0	58.5	3.7	28.2	0.0	0.0	0.0
Klaskanine	Klaskanine R	Klaskanine R, N Fk	1994	24,974	837,355	0.52	0.0	0.0	0.0	0.0	2.3	0.0	2.3	0.0	63.1	7.7	23.9	0.8	0.0	0.0
Average				25,942	956,852	0.45	0.0	0.0	0.0	3.3	4.7	0.0	2.7	0.0	63.2	5.8	20.1	0.3	0.0	0.0
CEDC Fisheries	Clackamas R	Youngs R	1992	48,790	1,046,376	0.58	0.0	0.0	0.0	0.0	18.3	0.0	5.5	0.2	72.7	2.5	0.7	0.0	0.0	0.0
CEDC Fisheries	Clackamas R	Youngs R	1993	44,602	747,943	0.27	0.0	0.0	0.0	0.0	7.9	0.0	0.0	0.0	87.1	5.0	0.0	0.0	0.0	0.0
CEDC Fisheries	Clackamas R	Youngs R	1994	48,378	557,526	1.44	0.0	0.0	0.0	0.0	0.2	0.1	0.3	0.0	82.2	16.5	0.7	0.0	0.0	0.0
CEDC Fisheries	Clackamas R	Youngs R	1996	103,114	530,524	0.93	0.0	0.0	0.0	0.0	1.7	2.0	1.0	0.0	90.0	4.3	1.0	0.0	0.0	0.0
Average				61,221	720,592	0.81	0.0	0.0	0.0	0.0	7.0	0.5	1.7	0.1	83.0	7.1	0.6	0.0	0.0	0.0
CEDC Fisheries	Sandy R	Youngs R	1994	26,418	295,512	0.19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	88.0	12.0	0.0	0.0	0.0	0.0
CEDC Fisheries	Sandy R	Youngs R	1995	26,598	633,310	0.65	0.0	0.0	0.0	0.0	4.1	0.0	1.2	0.0	93.0	0.0	1.7	0.0	0.0	0.0
Average				26,508	464,411	0.42	0.0	0.0	0.0	0.0	2.0	0.0	0.6	0.0	90.5	6.0	0.9	0.0	0.0	0.0

Appendix Table 1. Continued.

Coho				Percent Recovery for All Areas																
				Number			Freshwater													
				Total	%		Alaska		British Col		Washington		Oregon		Other				California	
Hatchery	Stock	Release Site	Brood	Tagged	Released	Surv	Spt	Com	Spt	Com	Spt	Com	Spt	Com	Gillnet	Catch	Hatcher	Other	Spt	Com
CEDC Fisheries	Tanner Cr	Youngs R	1992	78,614	1,128,771	1.32	0.0	0.0	0.0	4.6	18.0	0.1	6.3	0.0	68.7	2.2	0.1	0.0	0.1	0.0
CEDC Fisheries	Tanner Cr	Youngs R	1993	54,881	960,556	0.69	0.0	0.0	0.0	0.2	0.4	0.0	0.1	0.0	96.8	0.6	1.8	0.0	0.0	0.0
CEDC Fisheries	Tanner Cr	Youngs R	1994	54,847	1,637,863	0.45	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	87.4	11.2	0.6	0.0	0.0	0.0
CEDC Fisheries	Tanner Cr	Youngs R	1995	27,198	146,818	1.44	0.0	0.0	0.0	0.0	3.1	0.0	0.5	0.0	89.3	6.4	0.8	0.0	0.0	0.0
CEDC Fisheries	Tanner Cr	Youngs R	1996	55,141	559,007	1.09	0.0	0.0	0.0	0.0	11.2	0.1	4.3	0.0	83.8	0.3	0.1	0.0	0.2	0.0
Average				54,136	886,603	1.00	0.0	0.0	0.0	1.0	6.7	0.0	2.2	0.0	85.2	4.1	0.7	0.0	0.1	0.0
CEDC Fisheries	Klaskanine R	Klaskanine R, S Fk	1992	25,978	538,994	0.62	0.0	0.0	0.0	0.0	16.2	0.0	3.7	0.6	68.9	1.9	8.1	0.6	0.0	0.0
CEDC Fisheries	Klaskanine R	Klaskanine R, S Fk	1993	23,160	433,674	0.97	0.0	0.0	0.0	0.0	3.6	0.0	2.2	0.0	63.0	5.4	25.9	0.0	0.0	0.0
CEDC Fisheries	Klaskanine R	Klaskanine R, S Fk	1994	25,979	443,183	0.50	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	56.2	10.8	33.1	0.0	0.0	0.0
CEDC Fisheries	Klaskanine R	Klaskanine R, S Fk	1995	28,284	621,932	1.73	0.0	0.0	0.0	0.0	2.3	0.0	0.8	0.0	82.2	0.6	14.1	0.0	0.0	0.0
CEDC Fisheries	Klaskanine R	Klaskanine R, S Fk	1996	26,787	550,427	0.99	0.0	0.0	0.0	0.0	2.6	0.4	3.8	0.0	76.3	1.5	15.4	0.0	0.0	0.0
Average				26,038	517,642	0.96	0.0	0.0	0.0	0.0	4.9	0.1	2.1	0.1	69.3	4.0	19.3	0.1	0.0	0.0
CEDC Fisheries	Tanner Cr	Blind Slough (Col. R)	1993	26,258	140,267	1.95	0.0	0.0	0.0	2.0	3.5	0.2	1.6	0.0	88.9	2.5	0.6	0.0	0.8	0.0
CEDC Fisheries	Clackamas R	Blind Slough (Col. R)	1994	24,942	209,761	1.30	0.0	0.0	0.0	0.0	1.5	0.0	0.6	0.0	76.2	20.7	0.9	0.0	0.0	0.0
CEDC Fisheries	Tanner Cr	Blind Slough (Col. R)	1995	25,104	196,963	0.07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	88.9	11.1	0.0	0.0	0.0	0.0
CEDC Fisheries	Tanner Cr	Blind Slough (Col. R)	1996	24,607	144,958	1.65	0.0	0.0	0.0	0.0	1.0	0.0	1.5	0.0	94.6	2.2	0.7	0.0	0.0	0.0
Average				25,228	172,987	1.24	0.0	0.0	0.0	0.5	1.5	0.1	0.9	0.0	87.1	9.1	0.6	0.0	0.2	0.0
CEDC Fisheries	Tanner Cr	Tongue Pt (Col. R)	1993	26,426	130,623	3.09	0.0	0.0	0.0	1.6	4.9	0.0	1.6	0.0	82.4	7.8	1.7	0.0	0.0	0.0
CEDC Fisheries	Clackamas R	Tongue Pt (Col. R)	1994	23,942	190,032	0.90	0.0	0.0	0.0	0.0	2.3	0.0	0.0	0.0	57.4	36.1	4.2	0.0	0.0	0.0
CEDC Fisheries	Tanner Cr	Tongue Pt (Col. R)	1995	26,174	430,221	0.53	0.0	0.0	0.0	0.0	2.9	0.0	0.0	0.0	84.2	5.0	7.9	0.0	0.0	0.0
CEDC Fisheries	Tanner Cr	Tongue Pt (Col. R)	1996	18,355	119,611	3.96	0.0	0.0	0.0	0.0	2.5	0.0	2.8	0.0	93.3	1.1	0.4	0.0	0.0	0.0
Average				23,724	217,622	2.12	0.0	0.0	0.0	0.4	3.1	0.0	1.1	0.0	79.3	12.5	3.6	0.0	0.0	0.0
Sandy	Sandy R	Cedar Cr (Sandy R)	1992	188,044	917,334	0.45	0.0	0.0	0.7	11.3	15.3	1.2	2.5	0.0	1.5	4.9	62.7	0.0	0.0	0.0
Sandy	Sandy R	Cedar Cr (Sandy R)	1993	106,492	112,610	0.33	0.0	0.0	0.0	0.7	9.2	0.0	0.0	0.0	0.3	6.0	83.8	0.0	0.0	0.0
Sandy	Sandy R	Cedar Cr (Sandy R)	1994	220,654	668,951	0.32	0.0	0.0	0.0	0.0	1.6	0.0	1.4	0.0	0.6	16.0	79.8	0.0	0.7	0.0
Sandy	Sandy R	Cedar Cr (Sandy R)	1995	130,377	670,670	0.68	0.0	0.0	0.0	0.0	1.9	0.0	2.3	0.0	3.2	4.6	88.0	0.0	0.0	0.0
Sandy	Sandy R	Cedar Cr (Sandy R)	1996	59,021	255,602	0.45	0.0	0.0	0.0	0.0	9.8	0.6	4.9	0.0	13.8	8.3	62.7	0.0	0.0	0.0
Average				140,918	525,033	0.45	0.0	0.0	0.1	2.4	7.6	0.4	2.2	0.0	3.9	7.9	75.4	0.0	0.1	0.0
Wahkeena Pond	Sandy R	Wahkeena Pond	1992	23,472	1,503,732	0.03	0.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	50.0	0.0	0.0	0.0
<b>Summer Steelhead</b>																				
Irrigon	Imnaha R	Ltl Sheep Cr (Imnaha)	1991	105,670	248,787	0.01	0.0	0.0	0.0	8.8	0.0	0.0	0.0	0.0	43.9	17.6	29.8	0.0	0.0	0.0
Irrigon	Imnaha R	Ltl Sheep Cr (Imnaha)	1992	95,126	286,716	0.23	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	16.8	20.2	62.8	0.0	0.0	0.0
Irrigon	Imnaha R	Ltl Sheep Cr (Imnaha)	1993	95,621	300,775	0.22	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.3	38.2	54.6	0.0	0.0	0.0
Irrigon	Imnaha R	Ltl Sheep Cr (Imnaha)	1994	108,595	287,836	0.43	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.9	7.0	79.2	0.0	0.0	0.0
Irrigon	Imnaha R	Ltl Sheep Cr (Imnaha)	1995	105,711	322,146	0.26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.0	9.1	77.9	0.0	0.0	0.0
Average				102,145	289,252	0.23	0.0	0.0	0.0	1.8	0.0	0.0	0.0	0.0	19.0	18.4	60.8	0.0	0.0	0.0

Appendix Table 1. Continued.

				Percent Recovery for All Areas																
				Number			Freshwater													
				Total	%	Alaska		British Col		Washington		Oregon		Other				California		
Hatchery	Stock	Release Site	Brood	Tagged	Released	Surv	Spt	Com	Spt	Com	Spt	Com	Spt	Com	Gillnet	Catch	Hatcher	Other	Spt	Com
<b>Summer Steelhead</b>																				
Irrigon	Wallowa R	Spring Cr (Wallowa R)	1991	50,507	496,805	0.08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	43.0	28.7	28.3	0.0	0.0	0.0
Irrigon	Wallowa R	Spring Cr (Wallowa R)	1992	51,501	495,164	0.26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.3	44.1	31.6	0.0	0.0	0.0
Irrigon	Wallowa R	Spring Cr (Wallowa R)	1993	54,881	494,342	0.74	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.6	34.6	46.8	0.0	0.0	0.0
Irrigon	Wallowa R	Spring Cr (Wallowa R)	1994	53,273	495,137	0.43	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.1	24.8	54.1	0.0	0.0	0.0
Irrigon	Wallowa R	Spring Cr (Wallowa R)	1995	54,066	494,481	0.42	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.2	26.3	59.5	0.0	0.0	0.0
Average				52,846	495,186	0.39	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.2	31.7	44.1	0.0	0.0	0.0
Irrigon	Wallowa R	Big Canyon Cr	1991	104,867	298,732	0.10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.9	31.9	25.3	0.0	0.0	0.0
Irrigon	Wallowa R	Big Canyon Cr	1992	99,210	275,525	0.35	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	20.9	47.3	31.2	0.0	0.0	0.0
Irrigon	Wallowa R	Big Canyon Cr	1993	99,086	155,754	0.80	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.7	49.6	38.7	0.0	0.0	0.0
Irrigon	Wallowa R	Big Canyon Cr	1994	104,795	278,778	0.57	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.5	36.1	52.4	0.0	0.0	0.0
Irrigon	Wallowa R	Big Canyon Cr	1995	104,577	273,807	0.48	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.6	25.1	61.3	0.0	0.0	0.0
Average				102,507	256,519	0.46	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	20.1	38.0	41.8	0.0	0.0	0.0
Umatilla	Umatilla R	Umatilla R	1991	91,486	199,404	0.08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	35.3	1.7	60.3	2.8	0.0	0.0
Umatilla	Umatilla R	Umatilla R	1992	92,952	158,268	0.39	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	3.8	5.2	86.5	4.2	0.0	0.0
Umatilla	Umatilla R	Umatilla R	1993	57,034	153,098	0.40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.7	39.1	53.1	0.0	0.0	0.0
Umatilla	Umatilla R	Umatilla R	1994	57,884	146,463	0.91	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.1	6.7	86.2	1.1	0.0	0.0
Umatilla	Umatilla R	Umatilla R	1995	61,580	146,703	0.25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.5	6.9	85.5	0.0	0.0	0.0
Average				72,187	160,787	0.41	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	12.1	11.9	74.3	1.6	0.0	0.0
<b>Winter Steelhead</b>																				
Oak Springs	Hood R	Hood R, E Fk	1993	25,217	26,018	0.36	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.4	83.2	6.4	0.0	0.0	0.0
Oak Springs	Hood R	Hood R, E Fk	1994	39,072	42,898	0.38	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.6	59.1	33.2	0.0	0.0	0.0
Oak Springs	Hood R	Hood R, E Fk	1995	50,087	50,866	0.05	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.4	67.5	8.1	0.0	0.0	0.0
Average				38,125	39,927	0.26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.2	69.9	15.9	0.0	0.0	0.0
<b>Wild Steelhead</b>																				
Wild	Hood R	Hood R	1993	197	197	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wild	Hood R	Hood R, W Fk	1993	96	96	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wild	Hood R	Hood R, Mid Fk	1993	40	40	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wild	Hood R	Hood R, E Fk	1993	157	157	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

APPENDIX B

Annual Report

Project Title:

Evaluate the Technical and Biological Feasibility of Using Visual Implant  
Elastomer (VIE) Tags to Mark Large Numbers of Juvenile Coho Salmon  
(Oncorhynchus kisutch)

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### ABSTRACT

In an effort to evaluate the Visual Implant Elastomer (VIE) tag as a tool to mass mark juvenile salmonids, we marked groups of juvenile coho at Sandy Fish Hatchery in July of 1998, 1999 and 2000, for release the following May. Fish received an initial Elastomer tag in the lower right jaw above the sinus cavity which leads up to the operculum. Groups were Coded Wire Tagged (CWT'ed) in November and VIE tag retention rates determined in January of each year. If the VIE tag was not easily detected with the naked eye, the fish were re-tagged with a secondary VIE tag of an alternate color to the lower left jaw. Tagging rate and pre-release tag retention improved from the first to second years of tagging. The tagging rate remained identical from 1999 to 2000 while pre-release tag retention dropped to 95%. Returning jack and adult salmon were sampled for CWT and VIE tags in the fall of 2000. Of 606 adults recovered at Sandy Fish Hatchery in 2000, only 1 or 0.2%, retained their VIE tag. Of 36 jacks recovered in 2000, 13 or 36.1% retained their VIE tag.

### ACKNOWLEDGMENTS

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### INTRODUCTION

Based on concerns related to the ODFW Wild Fish Management Policy, there is a need to distinguish hatchery reared from naturally produced coho salmon. There may be an additional need to differentiate between stocks in a mixed stock fishery or with mixed stocks returning to hatchery racks. Presently, several fin marks are used to accomplish this task. Some fin clips are undesirable, either for their contribution to lower survival rates or for the difficulty in long term recognition by anglers, etc. The adipose fin clip has been used as an external indicator for the recovery of CWTs (PSC 1995). This study attempts to address the need for alternative external and visible marks. Our objective is to identify a mark that is easy to apply, does not harm the fish, and is recognizable in returning adults.

### METHODS AND MATERIALS

In July of 1998, 1999 and 2000, we set up a standard marking trailer with 6 to 7 work stations at Sandy Hatchery. Work stations were set up with hand held VIE injectors powered by compressed air. Each station had an injector, power



supply, hand piece, and associated air hoses. The mixing packages for the fluorescent dye contained 6CC of colored Elastomer, a jar of curing agent, a 10CC syringe, and a stir stick. After mixing the Elastomer with the curing agent, the material was loaded into several 0.5CC injecting syringes. The system is designed to achieve a mark similar in volume to NMT's coded wire tags, about 0.05 microliter (NMT 1998). The injecting syringes that are not being used immediately were kept on ice and in the hatchery freezer to prevent premature curing of the Elastomer material.

The initial VIE tag was injected into the lower right jaw, just above the sinus cavity which leads up to the operculum. As the Elastomer began to cure and started to set in the injection syringes, the needles were replaced. The Elastomer syringes were replaced every 5 to 90 minutes

The time period from mixing the Elastomer material with the curing agent until the point of set up is temperature dependent. If put on ice or frozen it will stay workable for up to 24 hours. At room temperature it will begin to set up in 30 to 60 minutes.

The juvenile coho were VIE tagged in July at a size of approximately 60 fish per pound or an average of 8.8 centimeters in fork length. To avoid inadvertent selection of fish for tagging and to accurately monitor tag retention, all the fish in one pond were tagged. Sandy hatchery rears about 75,000 juvenile coho per pond. During this initial VIE tagging session, if an injected VIE tag was not administered well enough to be easily visible, the fish was tagged a second time, in the same location as the first tag.

In November of 2000, about four months after the initial VIE tagging, the fish were coded wire tagged and at the same time, examined for the presence or absence of the original VIE tag. If the VIE tag was not visible with the naked eye, the fish were re-tagged with a secondary VIE tag of an alternate color to the opposite lower jaw.

Some of the fish receiving a secondary VIE tag were exposed to ultra violet (UV) light at which time remnant original VIE tags were detected. Therefore, the total number of applied secondary, VIE tags does not reflect initial VIE tag loss accurately.

In order to minimize secondary VIE tag loss we replaced the Elastomer syringes in the injectors more frequently than was done during the original VIE tagging.

## RESULTS

In July 2000, a total of 73,314 fish were green VIE tagged in the lower right jaw at 60 fish per pound or an average of 8.8 centimeters in fork length. Pond side tag quality checks were performed noting zero "no tags".

In November 2000 a total of 70,870 fish were marked with an adipose fin clip and CWT (code 09-27/48) and if necessary a VIE jaw tag. Of these, 56,353 fish, or 79.5%, had green VIE right jaw tags and the remaining 14,517 fish, or 20.5%, were marked with red VIE left jaw tags. Size at tagging was 20 fish per pound or an average of 12.64 centimeters in fork length for the red VIE tags.

A pre-release tag retention check was conducted in January, 2001, six months after the July green VIE tagging and two months after the November red VIE and CWT tagging. A total of 500 fish were sampled for the presence of a CWT and

an easily observed green or red VIE tag. All 500 fish were observed to have a CWT. Of the 500 fish sampled 375 or 75% had a green VIE tag, 100 or 20% had a red VIE tag and 25 or 5% had no visible VIE tag. The 25 fish with no VIE tag were sampled a second time, using a UV light and UV glasses, and all 25 fish still had no indication of a VIE tag. Thus, VIE tag retention was 95% for the combined groups (green and red VIE tags).

In May, 2000 the coho tagged in 1999 were released (Table 1.). The fish tagged in 2000 will be released in May, 2001.

Table 1. Release information for coho salmon tagged at Sandy Hatchery for the VIE evaluation.

Brood Year	Tag Code	Release Date	Total Release	Initial VIE #	Right Jaw %	Second VIE #	Left Jaw %
1997	07-13/16	05/14/99	63,354	49,416	78.0%	13,938	22.0%
1998	09-27/47	05/15/00	73,749	61,654	83.6%	12,095	16.4%
1999*	09-27/48	May 2001	70,870	56,353	79.5%	14,517	20.5%

\* Planned release date, and total number of fish VIE tagged, not released.

The marking crew consisted of 6 experienced VIE taggers. During the July tagging period we marked an average of 2,387 fish per person per day ranging from a low of 250 fish per person per hour to a high of 364 fish per person per hour.

The previous year, the marking crew consisted of 6 people, 3 of whom had prior VIE experience. They marked approximately 2,500 fish per day by the end of the July marking period. Their tagging rate ranged from a low of 227 fish per person per hour, to a high of 450 fish per person per hour.

In 1998, the crew size varied from 5 to 7 employees. Each crew member tagged 300-500 fish per hour. Approximately 17,000 fish were tagged per day.

The data below indicates that as the fish increase in size, better tag retention is achieved (Table 2). Experience suggests that one should avoid marking fish smaller than 8 cm in fork length.

Table 2. Tag retention rates for coho salmon tagged with VIE tags at different sizes during 1998, 1999 and 2000.

Date	07/98	11/98	07/99	11/99	07/00	11/00
Avg. Fk. length	9.3 cm	12.6 cm	8.8 cm	13.9 cm	8.8 cm	12.6 cm
VIE Tag Loss	22.0%	2.3%	16.4%	0.6%	23.1%	5.0%

#### CONCLUSION AND DISCUSSION

In July of 2000, the VIE marking crew tagged 73,314 fish in 248 hours resulting in 296 fish per hour per tagger, identical to the tagging rate of July 1999. That year, 78,181 fish were VIE tagged in 264 hours which also results in 296 fish per hour per tagger. In 1998, 66,170 fish were VIE tagged in 266 hours, resulting in 249 fish tagged per hour per tagger.

From October 11, through November 15, 2000, the first adult coho salmon with VIE tags returned to Sandy hatchery. These fish were CWT'ed with tag code 07-13/16 in November of 1998. Of the 606 adult coho with this tag code, only one fish (0.2%) had an easily observed VIE tag. This was a red VIE tag in the right lower jaw.

During the same period of time(10/11/00-11/15/00), precocial male coho salmon (jacks), returning to Sandy hatchery were sampled for the presence or absence of VIE tags administered in 1999. Of the 36 fish recovered with CWT code 09-27/47, 13 were observed with VIE tags (36.1%). Twelve (33.3%) of these fish retained their original red VIE tag in the lower right jaw. One fish (2.8%) had a green VIE tag in its lower left jaw. In the Fall of 1999, 12 jack returns out of 17 total fish (70.6%) with CWT code 07-13/16 were observed with VIE tags.

From our observations of VIE tagging over the last 3 years, we determined that red VIE is easier to see than green VIE, especially when administered to the lower jaw. The lower jaw tends to turn dark before other areas of the body, making it a less desirable target area than adipose eye tissue.

Sampling and analysis of adult and jack returns will continue in future years in order to adequately evaluate this method of fish identification.

#### REFERENCES

- Pacific Salmon Commission (PSC). 1995. Ad-Hoc Selective Fishery Evaluation Committee. Selective Fishery Evaluation.
- Northwest Marine Technology (NMT). 1998. Northwest Marine Technology Instruction Manual for Elastomer Tag Air Driven Injector System.