BONNEVILLE POWER ADMINISTRATION

Annual Coded Wire Tag Program

Oregon Missing Production Groups

Annual Report 1996 March 1998 DOE/BP-01610-5

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ANNUAL CODED WIRE TAG PROGRAM

OREGON

MISSING PRODUCTION GROUPS

1996 Annual Report

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TABLE OF CONTENTS

ABSTRACT

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 Coded Wire Tag Program - Oregon Missing Production Groups Project.

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

Willamette stock spring chinook contributed primarily to Alaska and British Columbia ocean commercial, Oregon freshwater sport and Columbia River gillnet fisheries. Willamette stock spring chinook released by CEDC contributed to similar fisheries as the same stocks released in the Willamette system. Up-river stocks of spring chinook contributed almost exclusively to Columbia River sport fisheries and other freshwater recovery areas.

The up-river stocks of Columbia River summer steelhead contributed primarily to the Columbia River gillnet and other freshwater fisheries.

Coho ocean fisheries from Washington to California were closed or very limited in 1994 and 1995 (1991 and 1992 broods). This has resulted in a greater average percent of catch for other fishery areas. Coho stocks released by ODFW below Bonneville Dam contributed mainly to Oregon and Washington ocean, Columbia Gillnet and other freshwater fisheries. Coho stocks released in the Klaskanine River and Youngs Bay area had much higher contribution to gillnet fisheries than the other coho releases. Coho stocks released above Bonneville Dam contributed to the same fisheries as those released below Bonneville 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 controlled by large scale weather patterns such as El Nino over which man has no influence. Changes in rearing conditions in the hatchery, over which man has some influence, do impact the survival rates. However, these impacts can be offset by impacts caused by environmental factors.

Brood years of salmon and steelhead that were in the ocean during the 1983 El Nino event exhibited poor survival all along the Pacific coast of California, Oregon, and Washington. However, stocks of chinook and coho that entered the ocean in the fall of 1984 following the El Nino experienced remarkably improved survival rates. In some instances, tule fall chinook experienced survival rates almost ten times higher than for the previous brood years of the same stock. 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 since the 1989 brood year.

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 the size of 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 missing 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 “missing” 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. 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 information is then used to evaluate effectiveness of each hatchery and various rearing and release practices conducted by the hatcheries. 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 will also be valuable to 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 goal of this program is to develop the ability to estimate hatchery production survival values and evaluate effectiveness of Oregon hatcheries. To accomplish this goal, work has progressed under three objectives.

Objective 1. Implement the project by tagging missing production groups within hatcheries to assure each production group is identifiable to allow future evaluation upon recovery of tag data.

Objective 2. Recover coded-wire tags from snouts of fish tagged under Objective 1.

Objective 3. Prepare an annual report for all Oregon fish hatcheries in the Columbia Basin in a Propagation Evaluation Format. The annual report will include a Propagation Evaluation Summary format for each tag code released by an ODFW hatchery in the Columbia Basin. The hatchery summary will include estimates of survival and contribution for each hatchery represented by a coded-wire tag release group. The information will be obtained from the latest information available on the Pacific States Marine Fish Commission's computer data base at the time of report preparation.

RESULTS

Objective 1. We completed coded-wire tagging and ad-clipping a total of about 1.2 million juvenile 1994 and 1995 brood spring and fall chinook and coho salmon (Table 1). Of this total, the USFW Service tagged 50,159 coho for ODFW at their Eagle Creek Hatchery. The total represents 38 different tag groups. Estimated total operational costs for this tagging (without administrative overhead) averaged between $67 and $111 per thousand fish tagged.

Objective 2. During 1996 we completed processing a total of 34,376 tags at the laboratory in Clackamas. The total consisted of fish from sport, commercial, ceremonial, hatchery, spawning ground surveys, and miscellaneous other fisheries (Table 2). During 1996 we verified 884 ODFW tags recovered and returned to ODFW by other agencies.

Objective 3. We prepared 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 in the Propagation Evaluation Format. Summaries of the coded-wire tag recovery and survival information are presented in Appendix Table 1. Charts depicting the latest five year average distribution of catch and estimated survival rates for each stock and hatchery are presented in Figures 1 to 46.

Table 1. Fish Tagged and Respective Estimated Operational Costs. (September 1, 1995 to December 31, 1996)

Period	Location	Brood	Sp.	CWT'd	Grps	$/K	Tot. $
Sept, 95	Cascade	94	Coho	163,718	6	$78	12,790.27
Oct, 95	McKenzie	94	CHS	28,039	1	$68	1,901.18
Oct, 95	Sandy	94	Coho	115,352	4	$79	9,068.78
Mar, 96	Bonneville	95	CHF	163,682	6	$84	13,815.88
Mar-Apr, 96	Big Creek	95	CHF	158,831	3	$108	17,193.81
Apr, 96	Oxbow	95	CHS	53,743	1	$81	4,361.24
June, 96	McKenzie	95	CHS	53,482	1	$108	5,773.48
July, 96	Eagle Creek *	95	Coho	50,159	2	-	-
Aug, 96	McKenzie	95	CHS	91,456	3	$108	9,878.12
Sept, 96	South Santiam	95	CHS	26,233	1	$111	2,919.49
Sept, 96	Cascade	95	Coho	177,389	6	$80	14,157.28
Nov, 96	Sandy	95	Coho	117,544	4	$67	7,907.20
	TOTALS			1,199,628	38		99,766.73

* Coordinated tagging with USFW Services

Table 2. CWT's Recovered at Clackamas. (Oct. 95 to Dec. 96)

FISHERY	10/95-12/95	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	1996 Total
River Sport	366	868	1	22	68	77	85	26	505	120	25	76	402	2,275
Test Fishery	21	0	0	0	5	10	0	0	0	0	0	0	0	15
Estuary Sport	1	1	0	0	0	0	0	14	8	5	0	1	0	29
Treaty Gillnet	390	0	0	0	0	0	0	0	0	1,218	108	0	0	1,326
Non-Treaty Gillnet	11	0	17	0	0	0	0	0	113	30	197	46	0	403
Youngs Bay Gillnet	191	0	0	0	0	52	25	0	45	150	432	159	0	863
Columbia Terminal	0	0	0	0	0	0	0	0	26	310	1,138	1	0	1,475
Ocean Sport/Troll	658	518	0	0	0	0	0	11	1,336	80	69	1,811	995	4,820
Hatchery Returns	5,425	2,498	2,666	4,235	926	1,698	2,202	3,050	481	0	110	968	2,662	21,496
Spawning Ground	114	466	70	1	0	0	5	0	18	0	19	1	699	1,279
Whiting Fishery	0	0	0	0	0	0	0	17	2	0	0	0	0	19
River Seine	28	0	0	0	0	0	0	0	0	0	0	0	0	0
Smolt Recoveries	11	0	85	0	67	4	0	0	0	0	7	0	0	163
Ceremonial/Subsist.	0	0	0	0	59	24	0	0	103	0	27	0	0	213
TOTAL	7,216	4,351	2,839	4,258	1,125	1,865	2,317	3,118	2,637	1,913	2,132	3,063	4,758	34,376
Verifications	0	0	0	0	0	0	0	0	549	295	0	0	0	844

DISCUSSION

The average percent recovery (by fishery) for the last 5 completed brood years (chinook 1986 to 1990 broods; coho 1988 to 1992 broods; steelhead 1987 to 1991 broods) are presented in Appendix Table 1.

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 was originally built in 1939-41 and was operated by the Oregon Fish Commission. Big Creek Hatchery rears and releases tule and Rogue fall chinook, coho salmon, and winter steelhead.

Tule stock fall chinook 1986 to 1990 brood survived at a average rate of 0.12%. They were caught primarily in British Columbia and Washington ocean fisheries, and Oregon freshwater fisheries (Figure 1).

Rogue fall chinook were originally released at Big Creek as an experiment beginning with the 1982 brood year. Good survival and contribution rates to Oregon fisheries have resulted in expansion of this program. Rogue River stock fall chinook from the 1986 to 1990 broods survived at a average rate of 1.49%. They contributed mainly to Oregon ocean commercial and freshwater fisheries (Figure 2).

The 1988 to 1992 brood Big Creek stock coho released in Big Creek survived at an average rate of 1.79%. They contributed mainly to Oregon ocean and freshwater fisheries (Figure 3).

The 1991 to 1992 brood Big Creek stock coho released in the Tualatin River survived at a average rate of 0.03% and were recovered predominantly in Oregon ocean and freshwater fisheries (Figure 4).

Previously small experimental groups of chum salmon were reared and released at Big Creek hatchery, but none of these fish were coded-wire tagged for evaluation.

Winter steelhead are reared at Big Creek but none have been marked with coded-wire tags for evaluation. Searun cutthroat trout have also been reared at Big Creek hatchery but again none were marked with coded-wire tags for evaluation

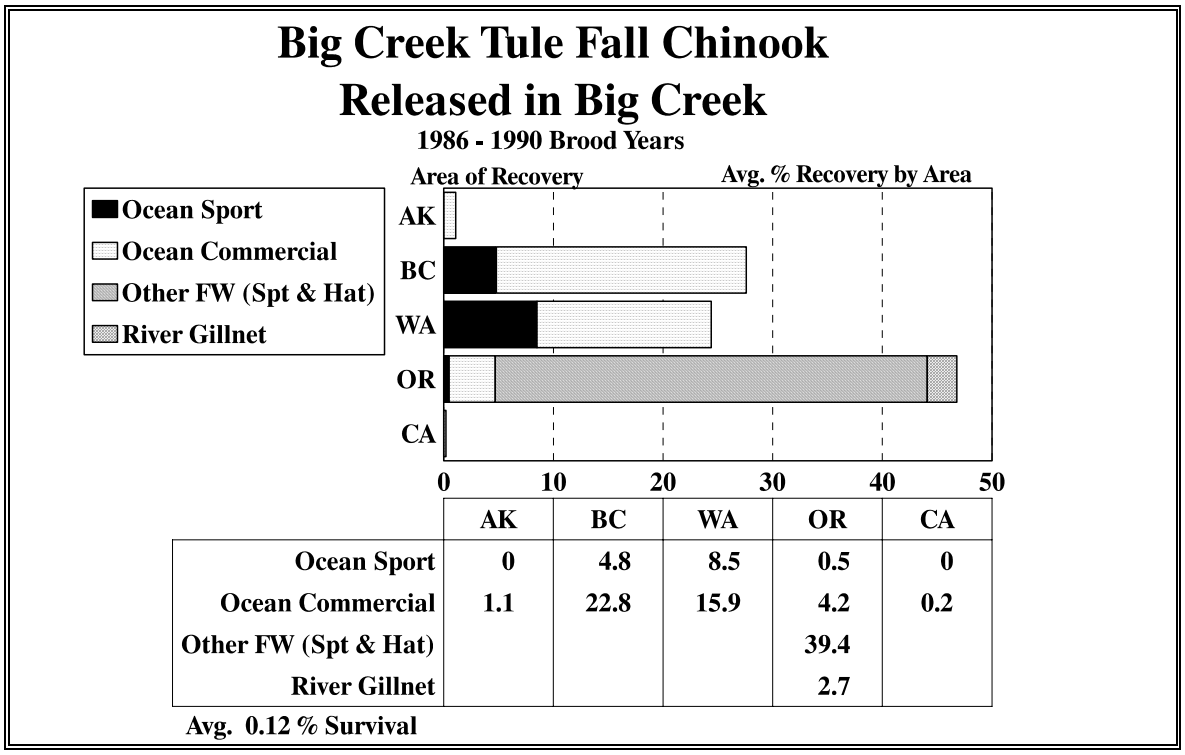


Figure 1. Average survival and catch distribution of Big Creek hatchery tule stock fall chinook, released in Big Creek (1986 to 1990 broods).

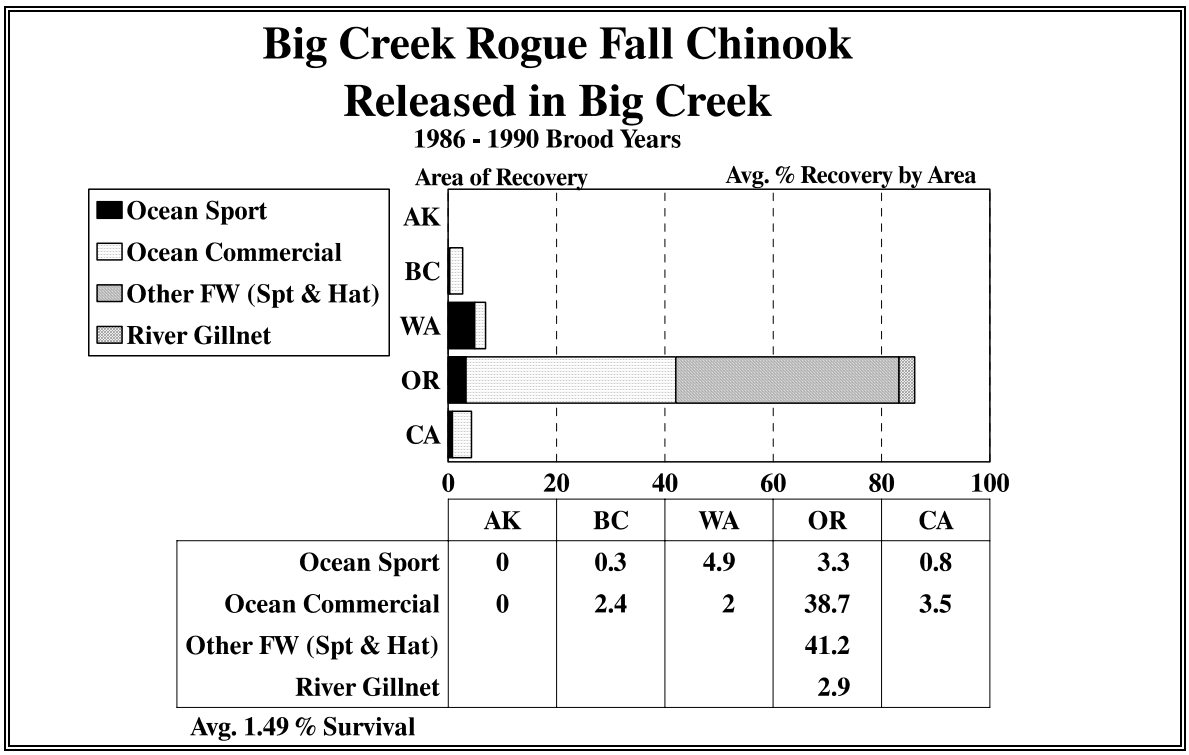
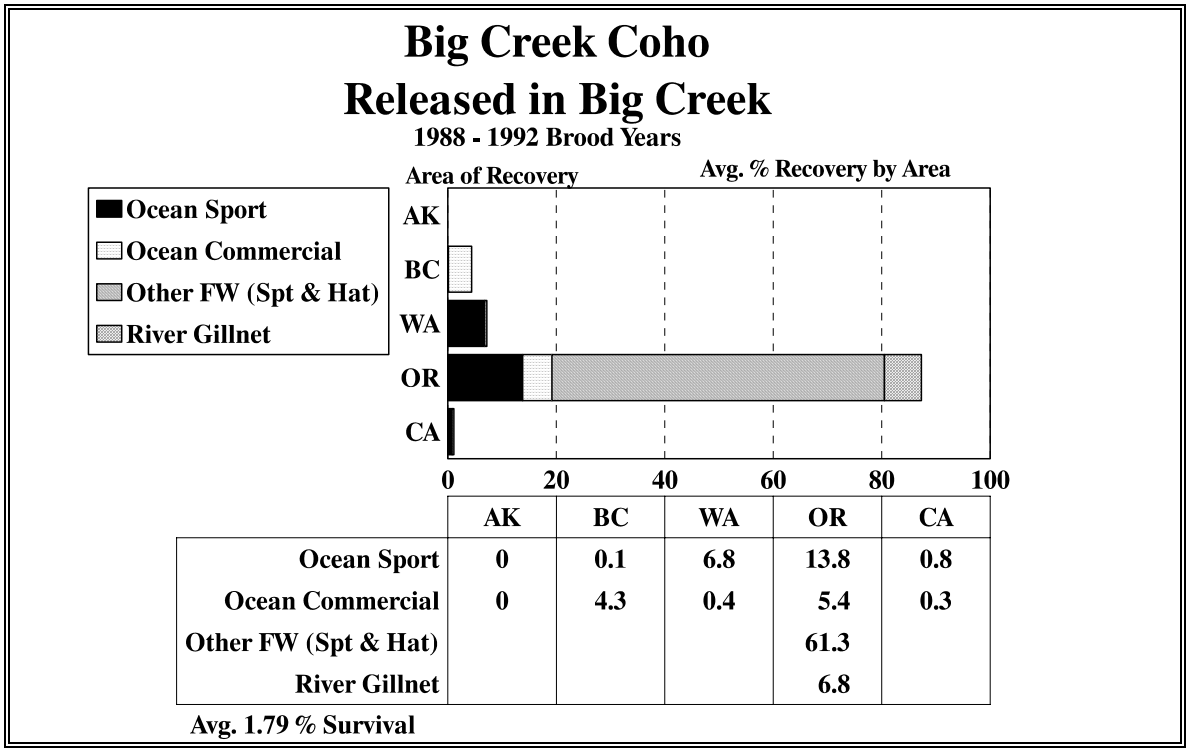
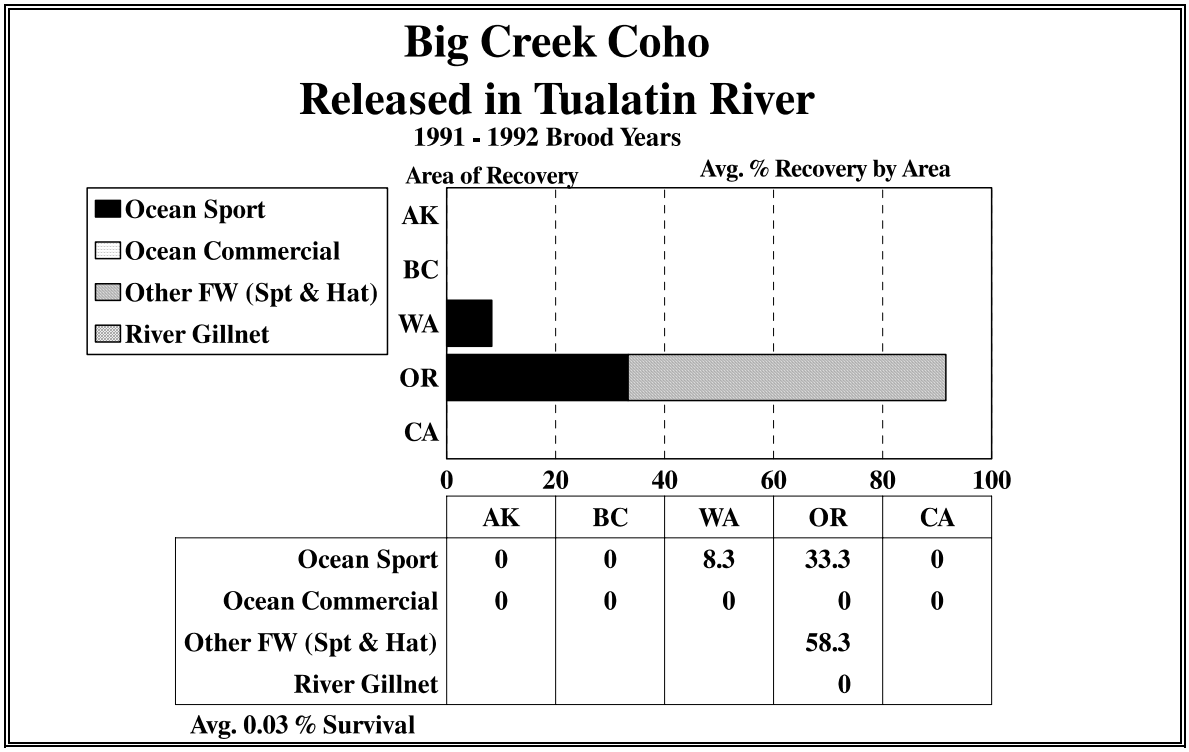


Figure 2. Average survival and catch distribution of Big Creek hatchery Rogue River stock fall chinook, released in Big Creek (1986 to 1990 broods).



	AK	BC	WA	OR	CA
Ocean Sport	0	0.1	6.8	13.8	0.8
Ocean Commercial	0	4.3	0.4	5.4	0.3
Other FW (Spt & Hat)				61.3	
River Gillnet				6.8	

Figure 3. Average survival and catch distribution of Big Creek hatchery Big Creek stock coho, released in Big Creek (1988 to 1992 broods).



	AK	BC	WA	OR	CA
Ocean Sport	0	0	8.3	33.3	0
Ocean Commercial	0	0	0	0	0
Other FW (Spt & Hat)				58.3	
River Gillnet				0	

Figure 4. Average survival and catch distribution of Big Creek hatchery Big Creek stock coho, released in Tualatin River (1991 to 1992 broods).

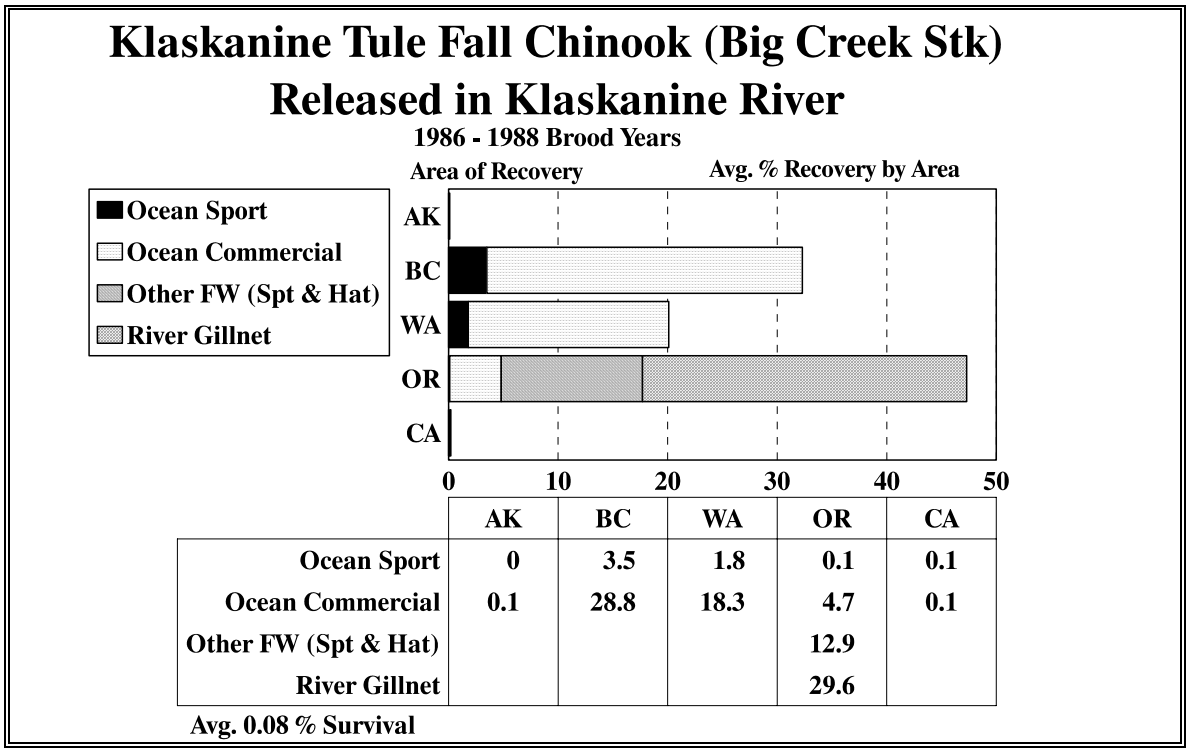
Klaskanine Hatchery

Klaskanine Hatchery is located 21 miles southeast of Astoria on Highway 202 adjacent to the Klaskanine River. The hatchery originally built in 1913 was expanded and remodeled in 1953. Klaskanine Hatchery presently raises tule fall chinook, coho salmon, and winter steelhead trout.

The 1986 to 1988 brood tule fall chinook released from Klaskanine Hatchery survived at a rate of 0.08%. They contributed primarily to the British Columbia and Washington ocean fisheries, and the Columbia River and Youngs Bay gillnet fisheries (Figure 5).

The 1988 to 1992 brood Klaskanine coho produced an average survival rate of 1.48%. They contributed primarily to Oregon and Washington ocean fisheries, and the Columbia River and Youngs Bay gillnet fisheries (Figure 6).

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



	AK	BC	WA	OR	CA
Ocean Sport	0	3.5	1.8	0.1	0.1
Ocean Commercial	0.1	28.8	18.3	4.7	0.1
Other FW (Spt & Hat)				12.9	
River Gillnet				29.6	

Figure 5. Average survival and catch distribution of Klaskanine hatchery Big Creek tule stock fall chinook, released in Klaskanine River (1986 to 1988 broods).

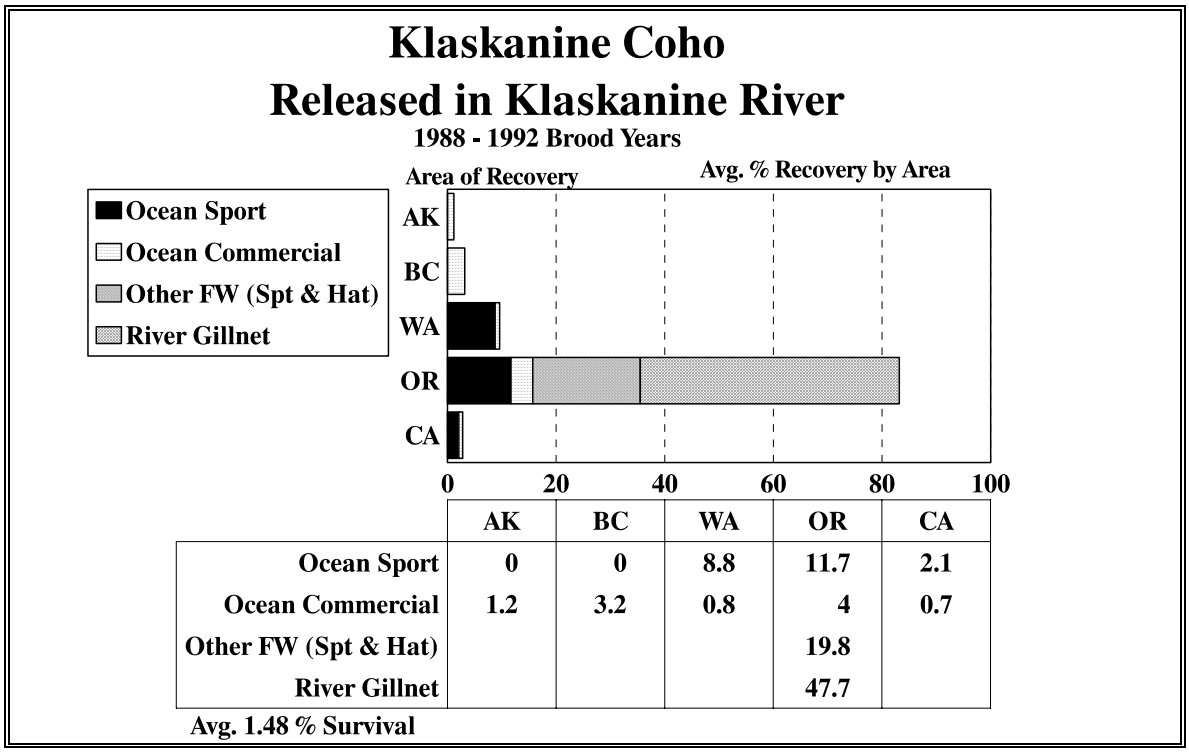


Figure 6. Average survival and catch distribution of Klaskanine hatchery Klaskanine River stock coho, released in North Fork Klaskanine River (1988 to 1992 broods).

Clatsop Economic Development Commission (CEDC)

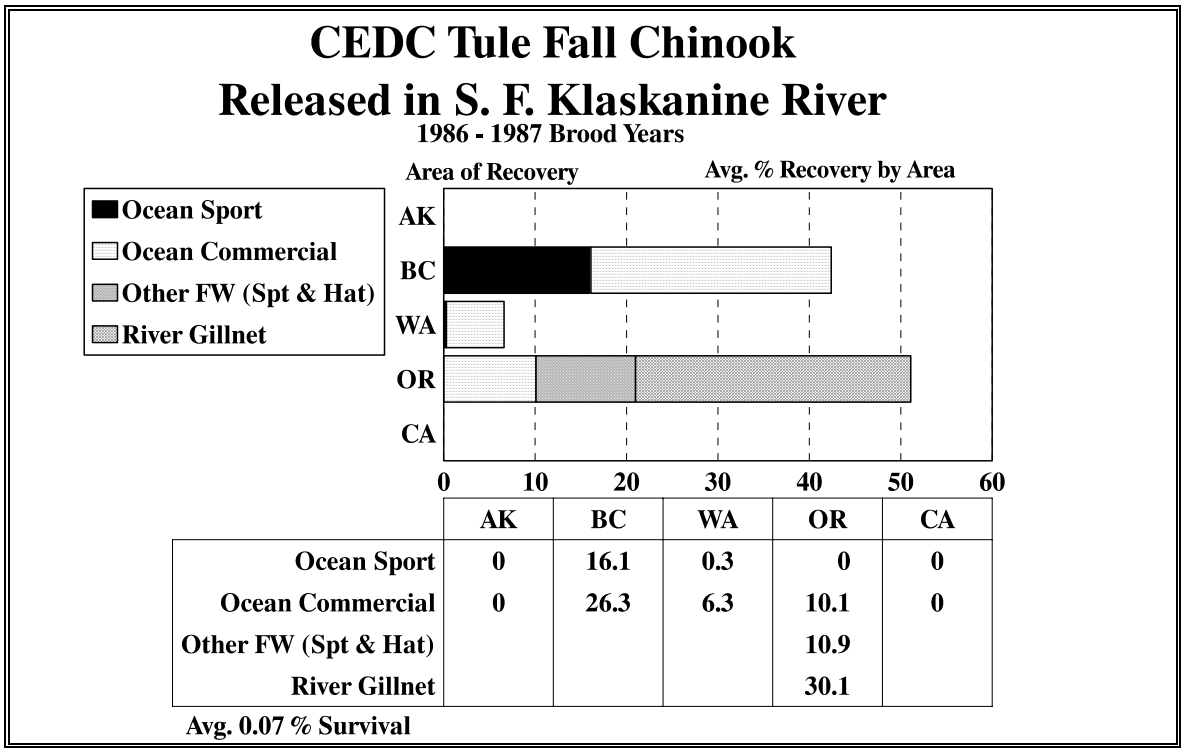
CEDC operates a series of freshwater ponds and saltwater net pens in Youngs Bay near Astoria. CEDC releases coho and chinook salmon in cooperation with ODFW hatcheries.

The 1986 to 1987 broods tule fall chinook released in the South Fork Klaskanine River survived at an average rate of 0.07%. They were caught primarily in the British Columbia ocean and the lower Columbia River and Youngs Bay gillnet fisheries (Figure 7).

The 1986 to 1989 brood Rogue River stock fall chinook reared by CEDC and released in the Klaskanine River averaged a survival rate of 1.58%. They were caught primarily in the Oregon ocean commercial and Youngs Bay gillnet fisheries (Figure 8).

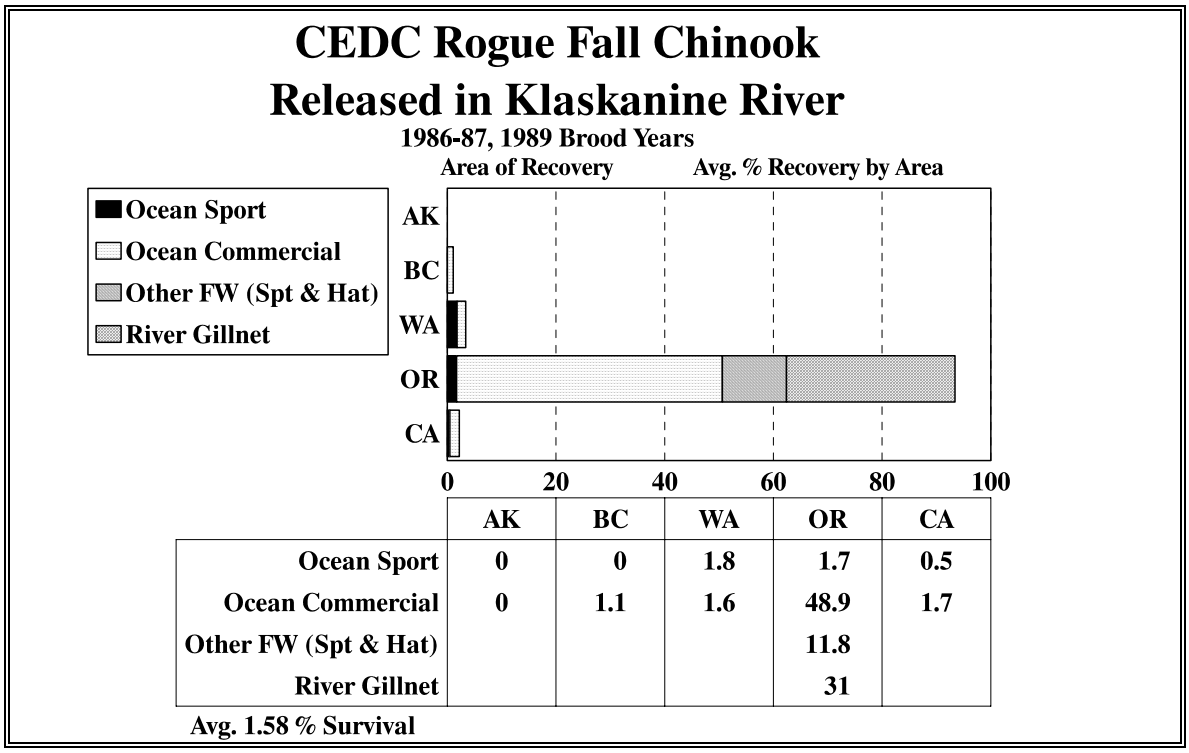
The 1988 to 1992 brood Klaskanine River stock coho released in South Fork Klaskanine River survived at an average rate of 2.13%. These contributed mainly to Oregon and Washington ocean, and Columbia River gillnet fisheries (Figure 9).

The 1988-89 and 1991-92 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 3.37 % (Figure 10). Catch distribution for this group was very similar to the Klaskanine River stock released in South Fork Klaskanine River.



	AK	BC	WA	OR	CA
Ocean Sport	0	16.1	0.3	0	0
Ocean Commercial	0	26.3	6.3	10.1	0
Other FW (Spt & Hat)				10.9	
River Gillnet				30.1	

Figure 7. Average survival and catch distribution of CEDC hatchery Big Creek tule stock fall chinook, released in South Fork Klaskanine River (1986 to 1987 broods).



	AK	BC	WA	OR	CA
Ocean Sport	0	0	1.8	1.7	0.5
Ocean Commercial	0	1.1	1.6	48.9	1.7
Other FW (Spt & Hat)				11.8	
River Gillnet				31	

Figure 8. Average survival and catch distribution of CEDC hatchery Rogue stock fall chinook, released in South Fork Klaskanine River and Youngs River (1986 to 1987, and 1989 broods).

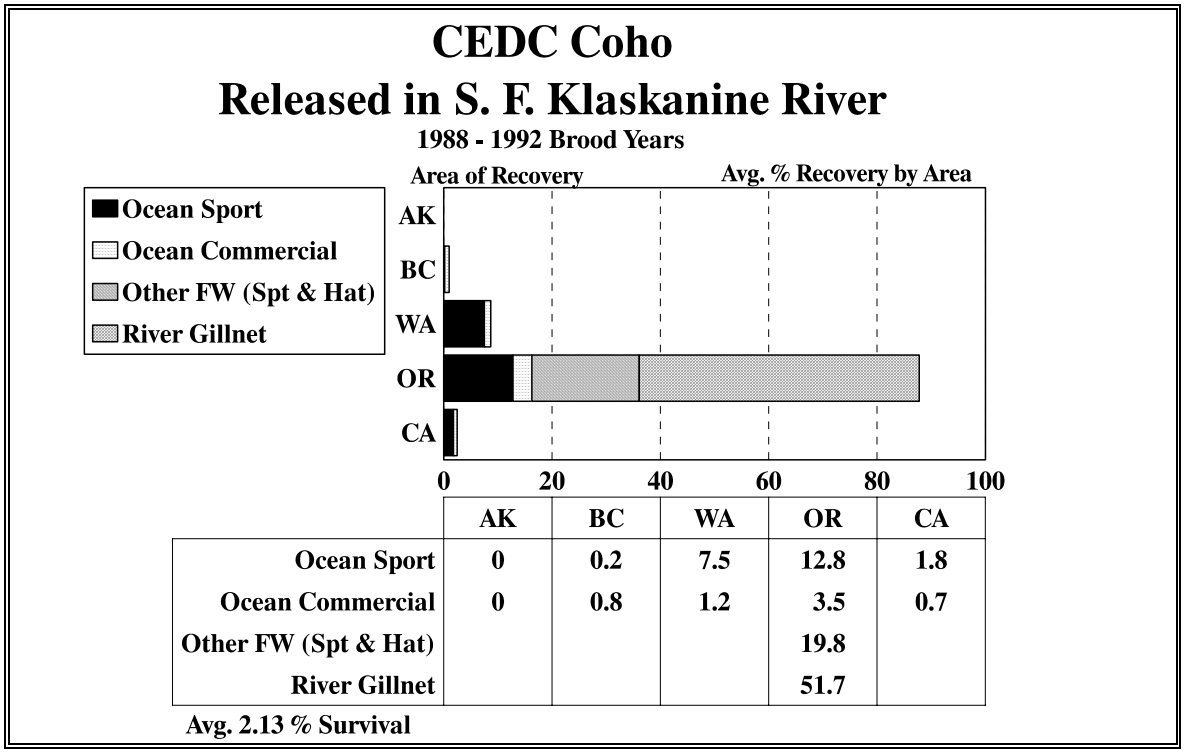


Figure 9. Average survival and catch distribution of CEDC hatchery Klaskanine River stock coho, released in South Fork Klaskanine River (1988 to 1992 broods).

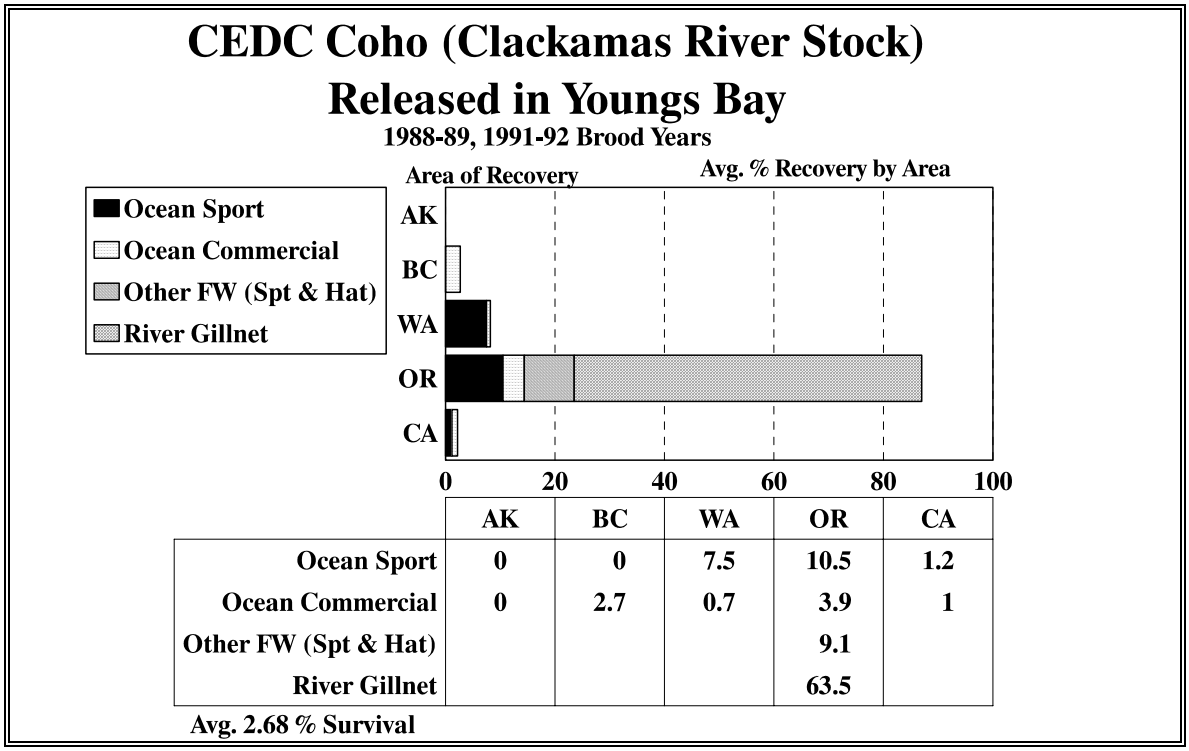


Figure 10. Average survival and catch distribution of CEDC hatchery Clackamas River stock coho, released in Youngs Bay (1988-89, and 1991-92 broods).

The 1990 brood releases at Youngs Bay compared four different stocks, Big Creek, Klaskanine River, Sandy River, and Kalama River. All are considered south migrating coho stocks except for Kalama River which is a north migrating stock. Unfortunately due to logistic limitations the stocks were released over a range of dates and sizes. Two stocks were released earlier and larger and had much higher survivals (Big Creek 1.10% and Klaskanine River 3.45%). Two stocks released later (Sandy River 0.03% and Kalama River 0.13%) exhibited the very low survivals seen for all 1990 brood late release coho. Catch distribution of the four stocks released in Youngs Bay correspond with the north versus south migration patterns (Appendix Table 1).

The 1990 to 1991 brood Klaskanine River coho stock acclimated and released from the Youngs Bay net survived at a rate of 2.10% and contributed mainly to Columbia River gillnet and Oregon and Washington ocean fisheries (Figure 11).

The 1991 to 1992 brood Tanner Creek coho stock acclimated and released from the Youngs Bay net survived at a rate of 2.11% and contributed mainly to Columbia River gillnet and Washington and Oregon ocean fisheries (Figure 12).

The 1988 to 1990 brood Willamette and Clackamas River stocks of spring chinook reared in the South Fork Klaskanine Hatchery and released in South Fork Klaskanine River survived at a average rate of 0.02% (Figure 13). These fish contributed mainly to British Columbia ocean and Oregon freshwater fisheries.

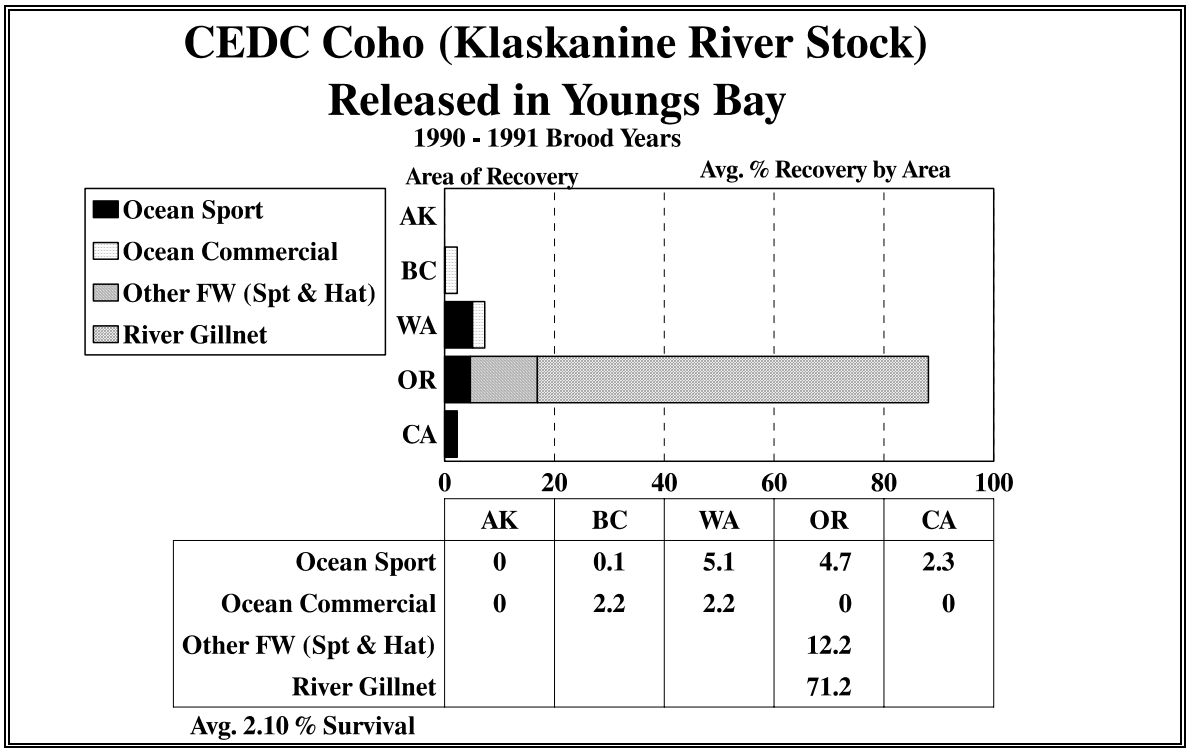
The 1988 to 1990 brood Willamette and Clackamas River stocks of spring chinook reared in the South Fork Klaskanine Hatchery and released in Youngs Bay survived at a rate of 0.23%(Figure 14). These fish contributed mainly to Alaska ocean and Oregon freshwater fisheries.

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 have been coded-wire tagged for evaluation. Due to budget cuts the hatchery has switched to rearing Willamette River spring chinook stocks for acclimation and release in lower Columbia River netpens in cooperation with CEDC.

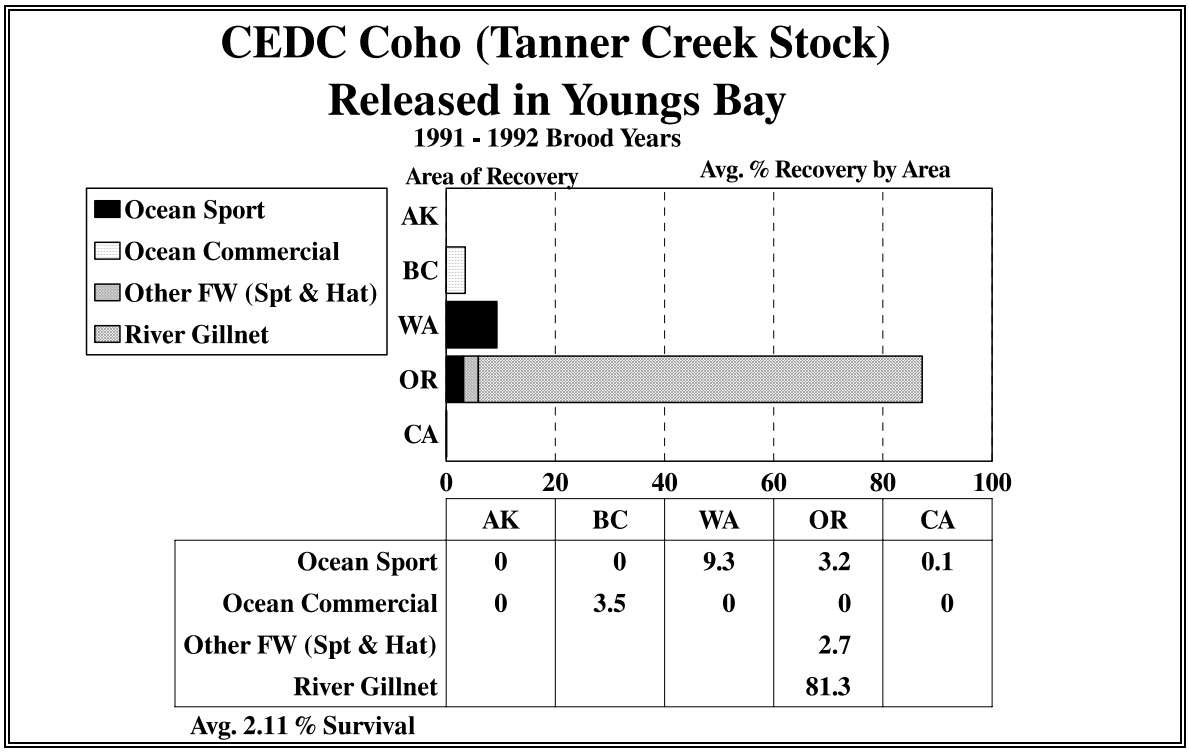
Eagle Creek National Fish Hatchery

Eagle Creek National Fish Hatchery 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.



	AK	BC	WA	OR	CA
Ocean Sport	0	0.1	5.1	4.7	2.3
Ocean Commercial	0	2.2	2.2	0	0
Other FW (Spt & Hat)				12.2	
River Gillnet				71.2	

Figure 11. Average survival and catch distribution of CEDC hatchery Klaskanine River stock coho, released in Youngs Bay (1990 to 1991 broods).



	AK	BC	WA	OR	CA
Ocean Sport	0	0	9.3	3.2	0.1
Ocean Commercial	0	3.5	0	0	0
Other FW (Spt & Hat)				2.7	
River Gillnet				81.3	

Figure 12. Average survival and catch distribution of CEDC hatchery Tanner Creek stock coho, released in Youngs Bay (1991 to 1992 broods).

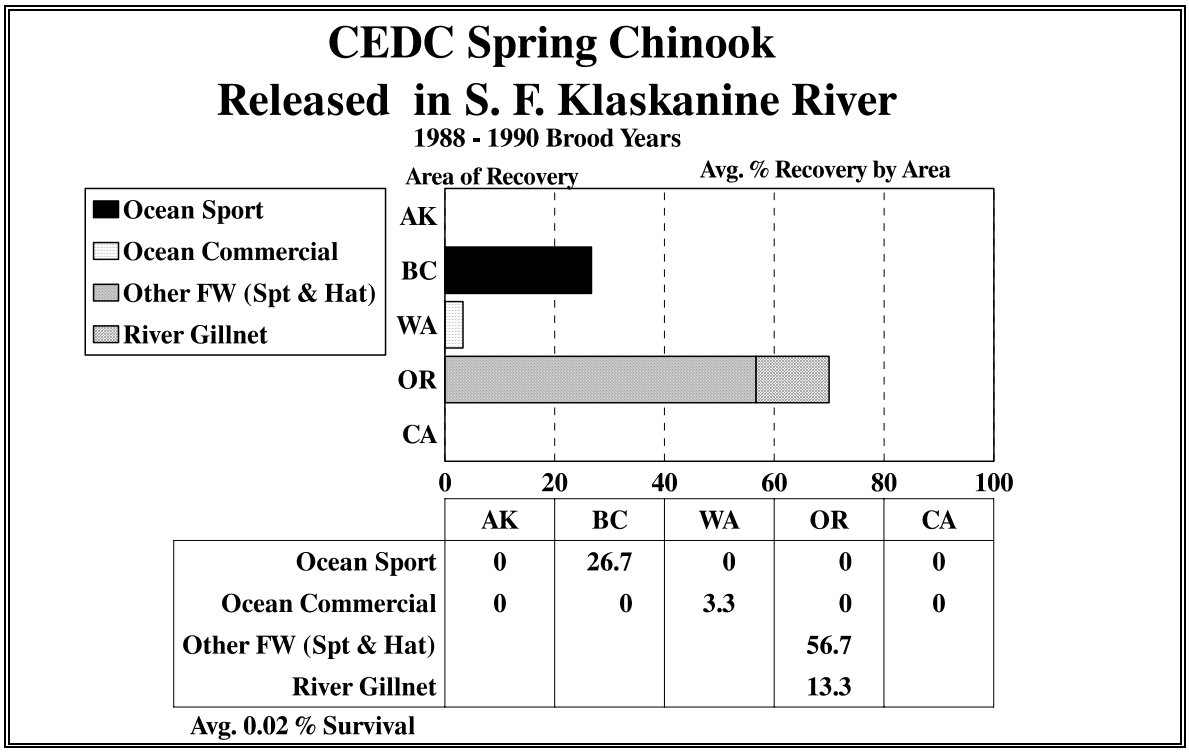


Figure 13. Average survival and catch distribution of CEDC hatchery Willamette and Clackamas stocks spring chinook, released in South Fork Klaskanine River (1988 to 1990 broods).

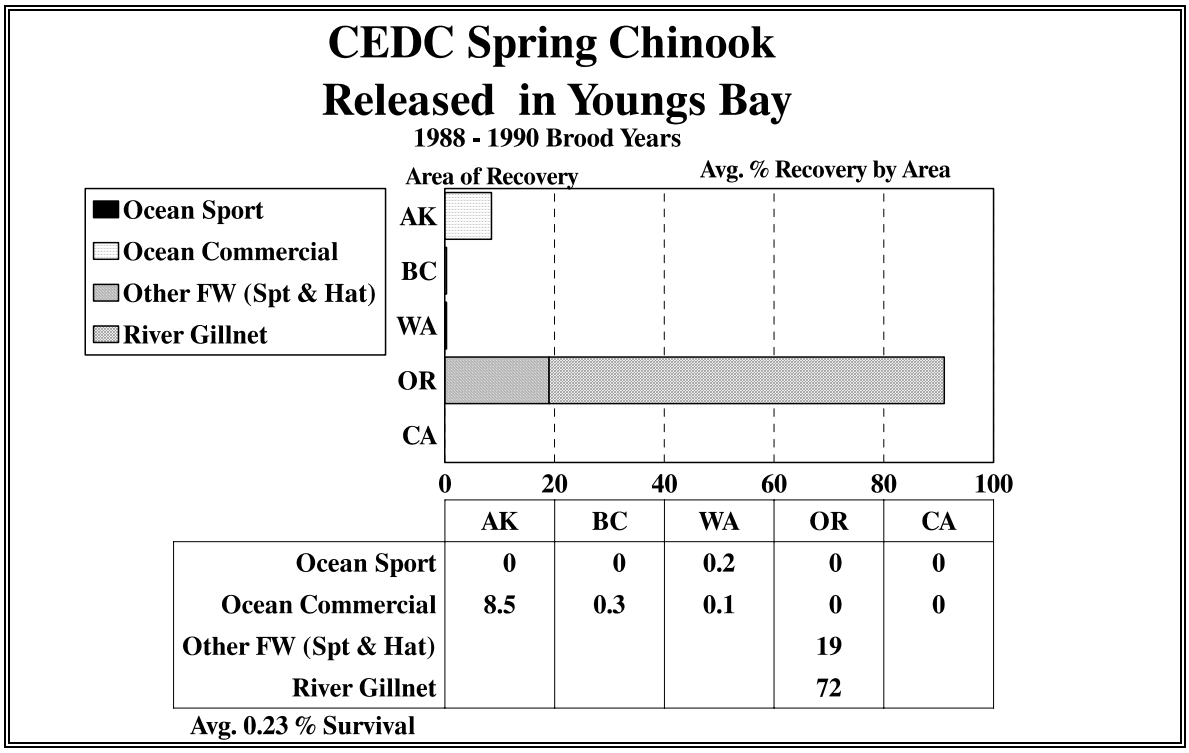


Figure 14. Average survival and catch distribution of CEDC hatchery Willamette and Clackamas stocks spring chinook, released in Youngs Bay (1988 to 1990 broods).

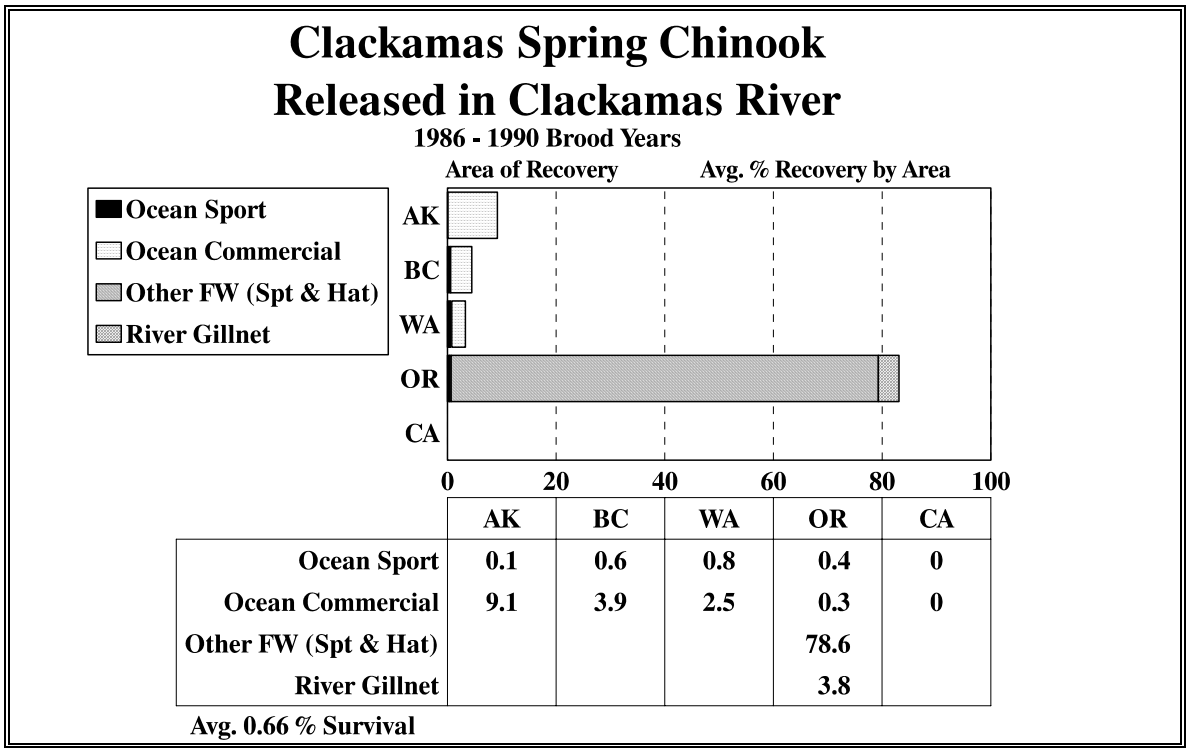
Clackamas Hatchery

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 1986 to 1990 brood Clackamas River stock spring chinook released in the Clackamas River survived at an average rate of 0.66%. They were caught primarily in the Oregon freshwater fisheries with lesser contributions to the Alaska and British Columbia ocean commercial and Columbia River gillnet fisheries (Figure 15).

Clackamas River and Mid-Willamette River stock spring chinook were released in the Clackamas River for the 1987 brood year. Catch distributions for the two stocks were very similar, contributing mainly to freshwater fisheries with lesser contributions to the Alaska and British Columbia ocean commercial fisheries (Appendix Table 1). Survival of the two stocks was also very similar (Clackamas 0.85% and Mid-Willamette 0.99%, Appendix Table 1).

None of the summer and winter steelhead were marked with coded-wire tags for evaluation.



	AK	BC	WA	OR	CA
Ocean Sport	0.1	0.6	0.8	0.4	0
Ocean Commercial	9.1	3.9	2.5	0.3	0
Other FW (Spt & Hat)				78.6	
River Gillnet				3.8	

Figure 15. Average survival and catch distribution of Clackamas hatchery Clackamas River stock spring chinook, released in Clackamas River (1986 to 1990 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 1986 to 1990 brood North Santiam River stock spring chinook salmon released in the North Fork Santiam River survived at an average rate of 1.05% and contributed primarily to the Oregon freshwater sport and Columbia River gillnet fisheries, and Alaska and British Columbia ocean fisheries (Figure 16).

The 1986 to 1987 brood North Santiam River stock spring chinook salmon released in the South Fork Santiam River survived at an average rate of 1.76% and contributed primarily to the Oregon freshwater sport and Columbia River gillnet fisheries, and Alaska and British Columbia ocean fisheries (Figure 17).

Although prior brood years of winter steelhead have been coded-wire tagged, none were tagged for the current 5 year (1987 to 1991) brood years evaluation. All other rainbow and cutthroat trout released by the Marion Forks Hatchery were not coded-wire tagged for evaluation.

South Santiam Hatchery

The 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 1987 to 1990 brood South Santiam River stock spring chinook salmon released in the South Santiam River survived at a average rate of 0.66% and contributed primarily to the Oregon freshwater sport and Columbia River gillnet fisheries, and Alaska and British Columbia ocean fisheries (Figure 18).

The 1986 to 1987 brood South Santiam River stock spring chinook salmon released in the Willamette River survived at a average rate of 1.08% and contributed primarily to the Oregon freshwater sport and Columbia River gillnet fisheries, and Alaska and British Columbia ocean fisheries (Figure 19).

The winter steelhead trout released by the South Santiam Hatchery were not coded-wire tagged to permit evaluation.

Stayton Rearing Pond

Stayton Pond, a refurbished gravel pit located south of Stayton is operated as a satellite of the South Santiam Hatchery. Tule stock fall chinook are reared and released from Stayton Pond.

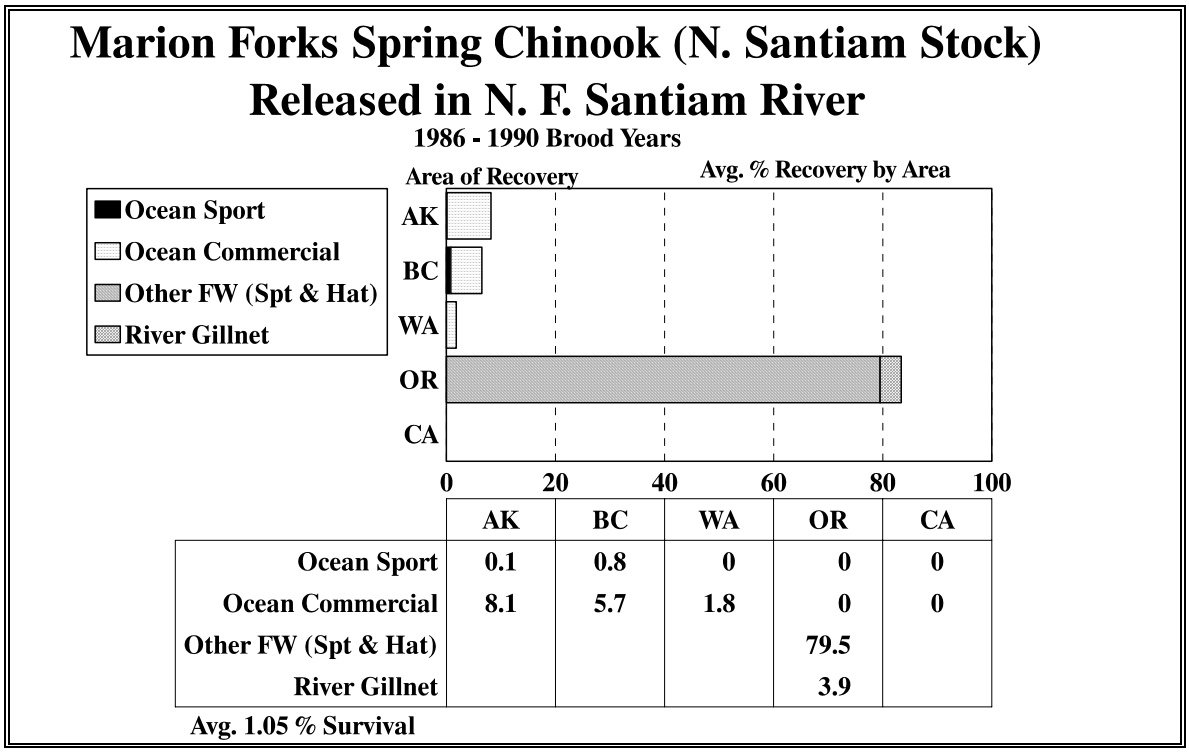


Figure 16. Average survival and catch distribution of Marion Forks hatchery North Santiam River stock spring chinook, released in North Fork Santiam River (1986 to 1990 broods).

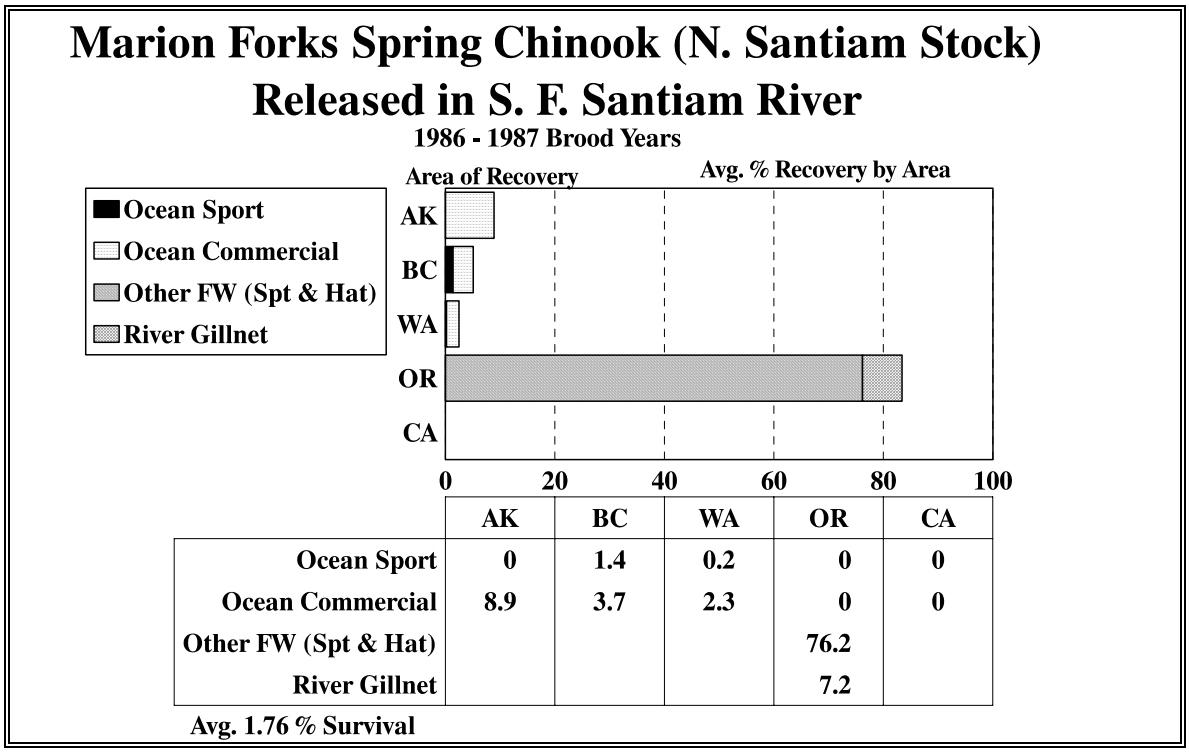
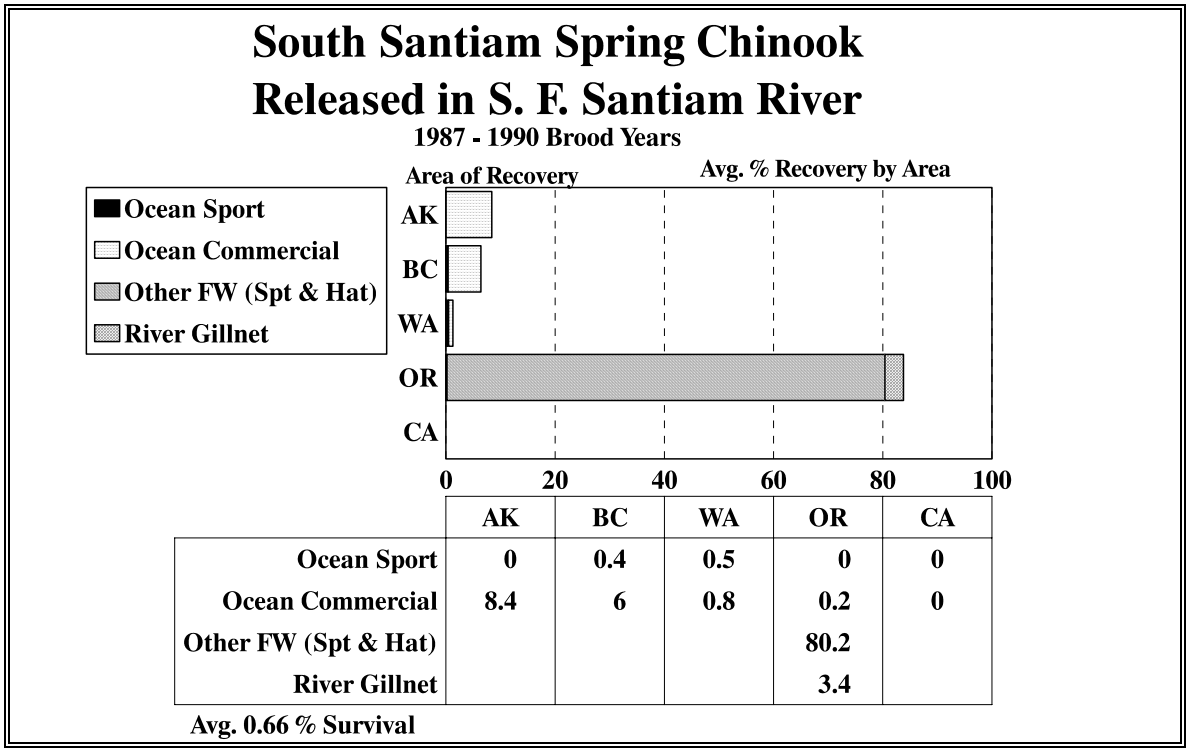
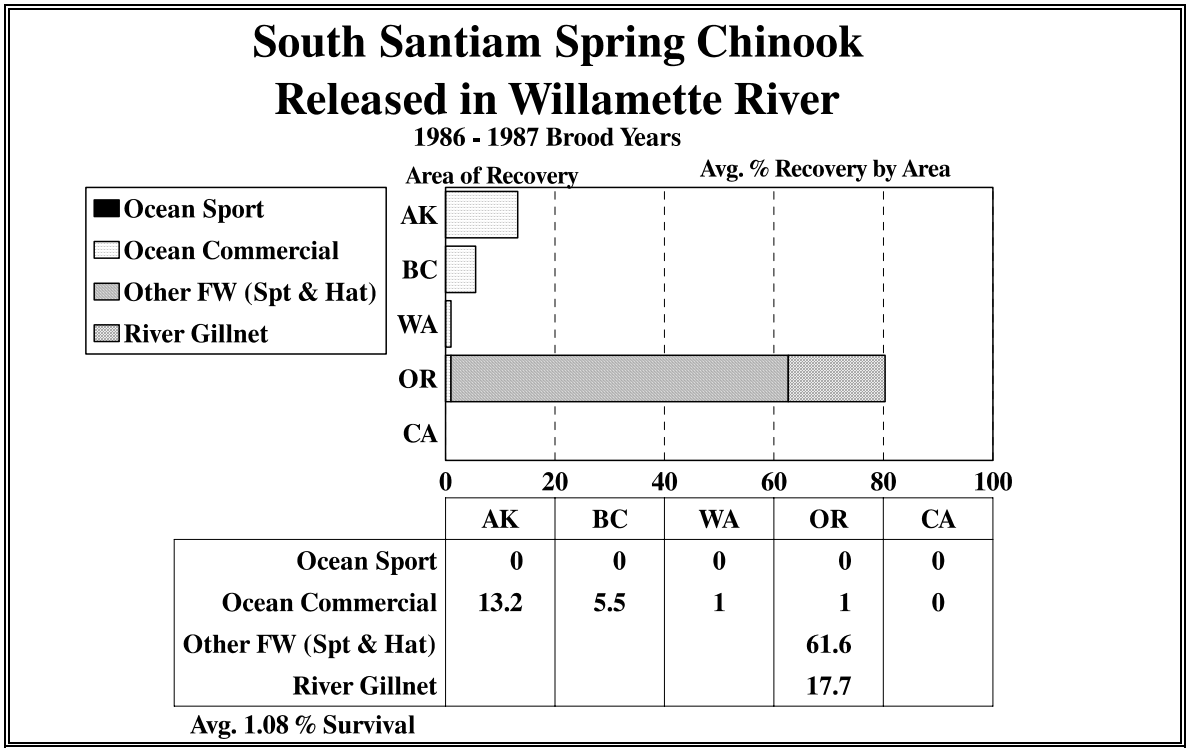


Figure 17. Average survival and catch distribution of Marion Forks hatchery North Santiam River stock spring chinook, released in South Fork Santiam River (1986 to 1987 broods).



	AK	BC	WA	OR	CA
Ocean Sport	0	0.4	0.5	0	0
Ocean Commercial	8.4	6	0.8	0.2	0
Other FW (Spt & Hat)				80.2	
River Gillnet				3.4	

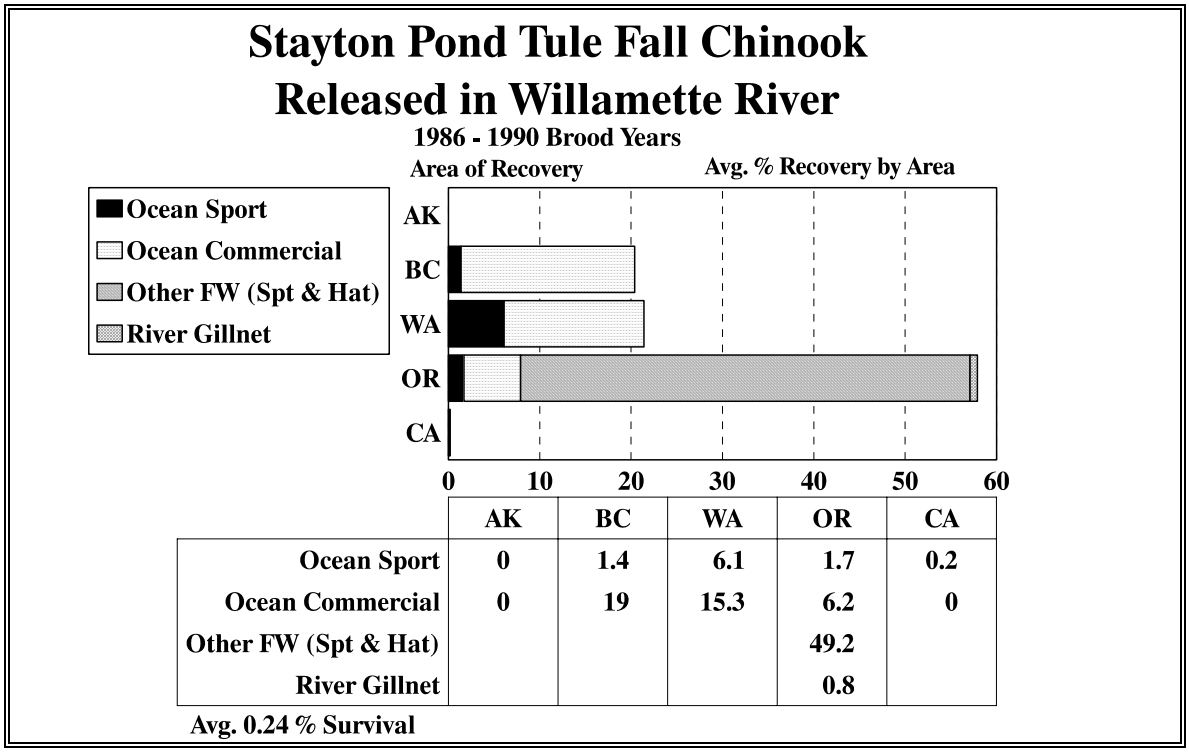
Figure 18. Average survival and catch distribution of South Santiam hatchery South Santiam River stock spring chinook, released in South Fork Santiam River (1987 to 1990 broods).



	AK	BC	WA	OR	CA
Ocean Sport	0	0	0	0	0
Ocean Commercial	13.2	5.5	1	1	0
Other FW (Spt & Hat)				61.6	
River Gillnet				17.7	

Figure 19. Average survival and catch distribution of South Santiam hatchery South Santiam River stock spring chinook, released in Willamette River (1986 to 1987 broods).

The 1986 to 1990 brood tule stock fall chinook released from Stayton pond survived at an average rate of 0.24% and contributed primarily to the British Columbia, Washington and Oregon ocean sport and commercial fisheries and the Columbia River freshwater fisheries (Figure 20).



	AK	BC	WA	OR	CA
Ocean Sport	0	1.4	6.1	1.7	0.2
Ocean Commercial	0	19	15.3	6.2	0
Other FW (Spt & Hat)				49.2	
River Gillnet				0.8	

Figure 20. Average survival and catch distribution of Stayton Pond hatchery Tule stock fall chinook, released in Willamette River (1986 to 1990 broods).

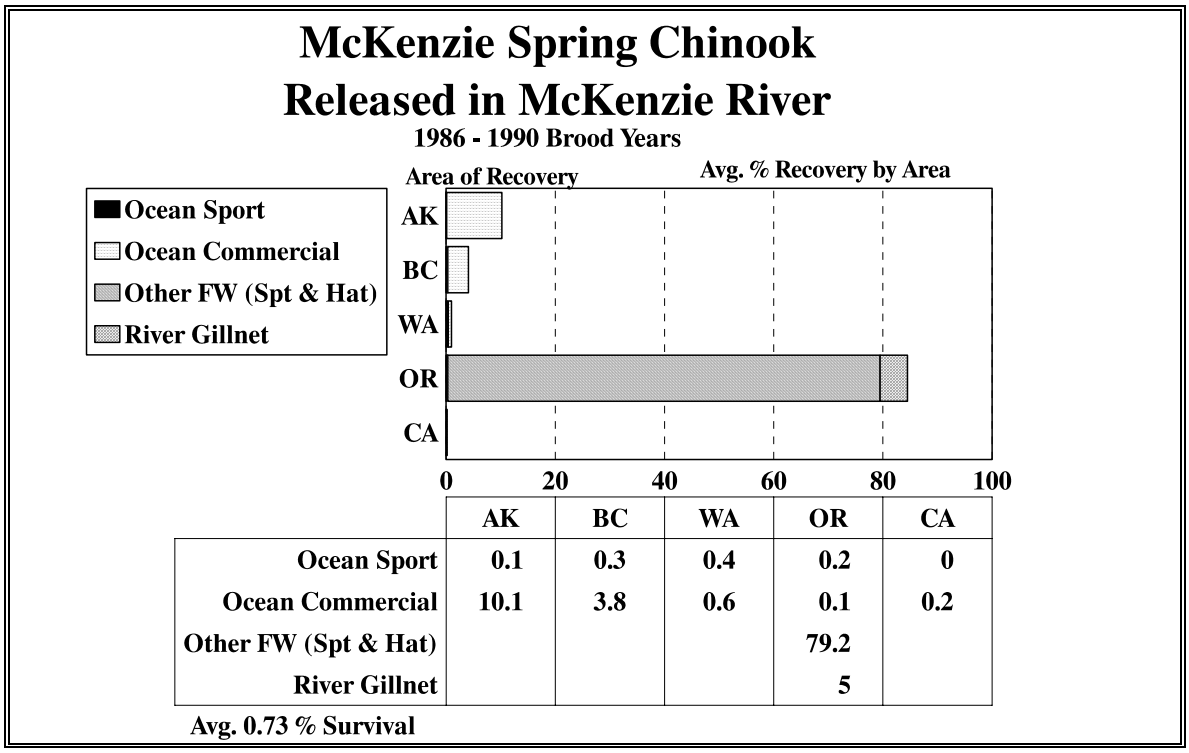
Roaring River Hatchery

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

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 1986 to 1990 brood McKenzie River stock spring chinook salmon released in the McKenzie River survived at a average rate of 0.73% and contributed primarily to the Oregon freshwater sport and Columbia River gillnet fisheries, and Alaska and British Columbia ocean fisheries (Figure 21).



	AK	BC	WA	OR	CA
Ocean Sport	0.1	0.3	0.4	0.2	0
Ocean Commercial	10.1	3.8	0.6	0.1	0.2
Other FW (Spt & Hat)				79.2	
River Gillnet				5	

Figure 21. Average survival and catch distribution of McKenzie hatchery McKenzie River stock spring chinook, released in McKenzie River (1986 to 1990 broods).

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.

Willamette Hatchery

Willamette Hatchery is located on the 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 1985 to 1989 brood Mid-Willamette River stock spring chinook salmon released in the Middle Fork Willamette River survived at a average rate of 0.79% and contributed primarily to the Oregon freshwater sport and Columbia River gillnet fisheries, and Alaska and British Columbia ocean fisheries(Figure 22).

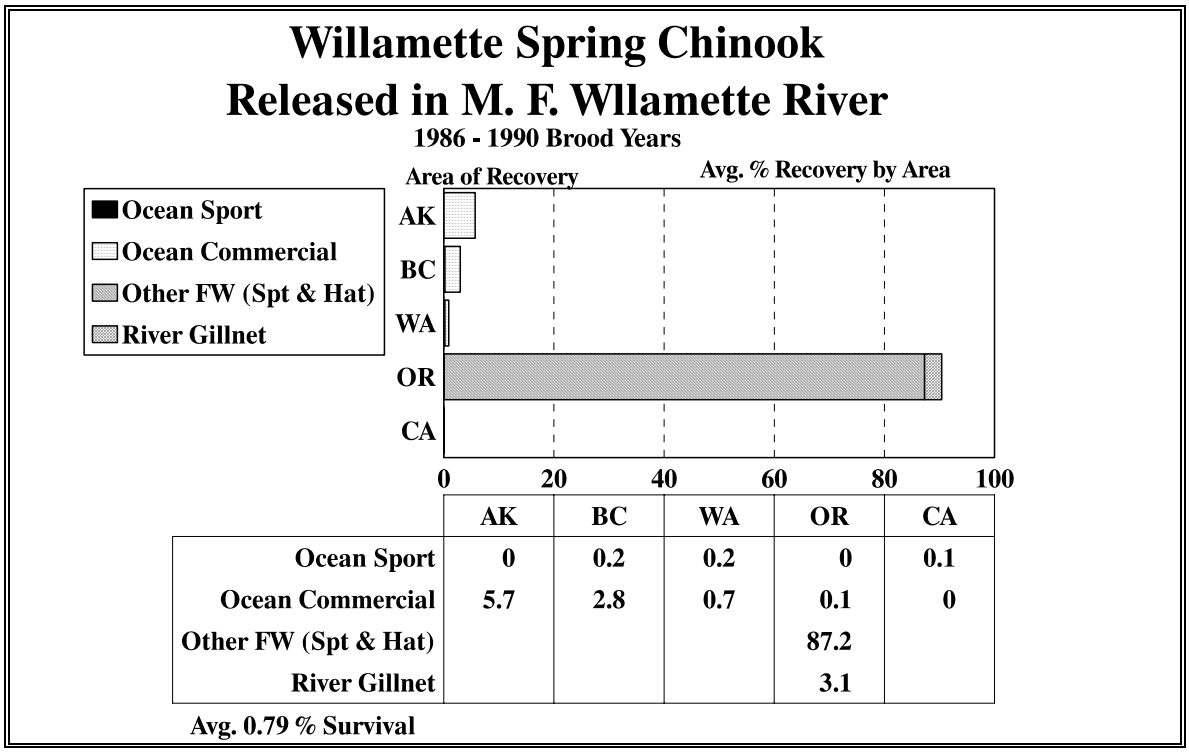


Figure 22. Average survival and catch distribution of Willamette hatchery Mid-Willamette River stock spring chinook, released in Middle Fork Willamette River (1986 to 1990 broods).

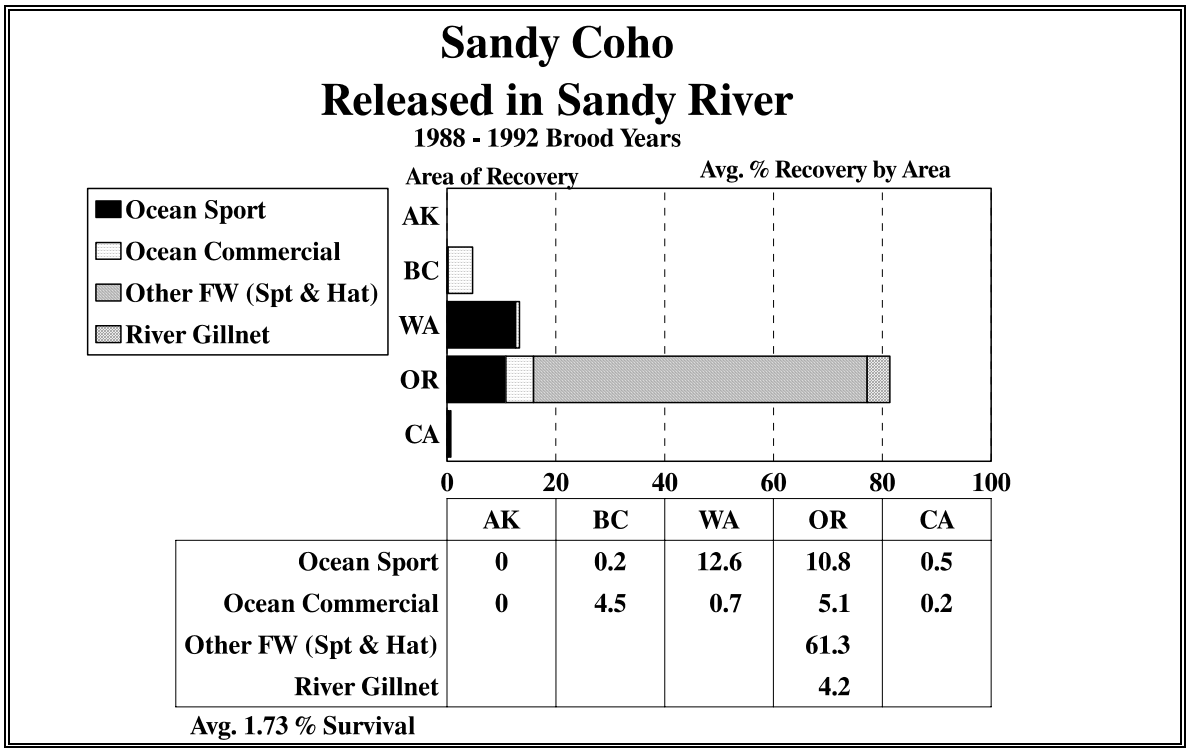
Sandy Hatchery

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 1988 to 1992 brood years of Sandy River stock coho released in the Sandy River survived at an average rate of 1.73% and contributed primarily to the Oregon and Washington ocean fisheries and Columbia River freshwater fisheries (Figure 23). Survival of the 1990 brood Sandy River stock coho was extremely low (0.07% Appendix Table 1) and the hatchery only achieved about 10% of their egg take needs. All 1990 brood late coho releases had very low survival and Sandy hatchery released about 95% of their 1990 brood coho in the late time frame, June release.

The 1989 and 1991 brood years of Sandy River stock coho reared at Trojan pond and released in the Columbia River survived at an average rate of 0.22% and contributed primarily to the British Columbia, Oregon and Washington ocean fisheries and Columbia River freshwater fisheries (Figure 24).

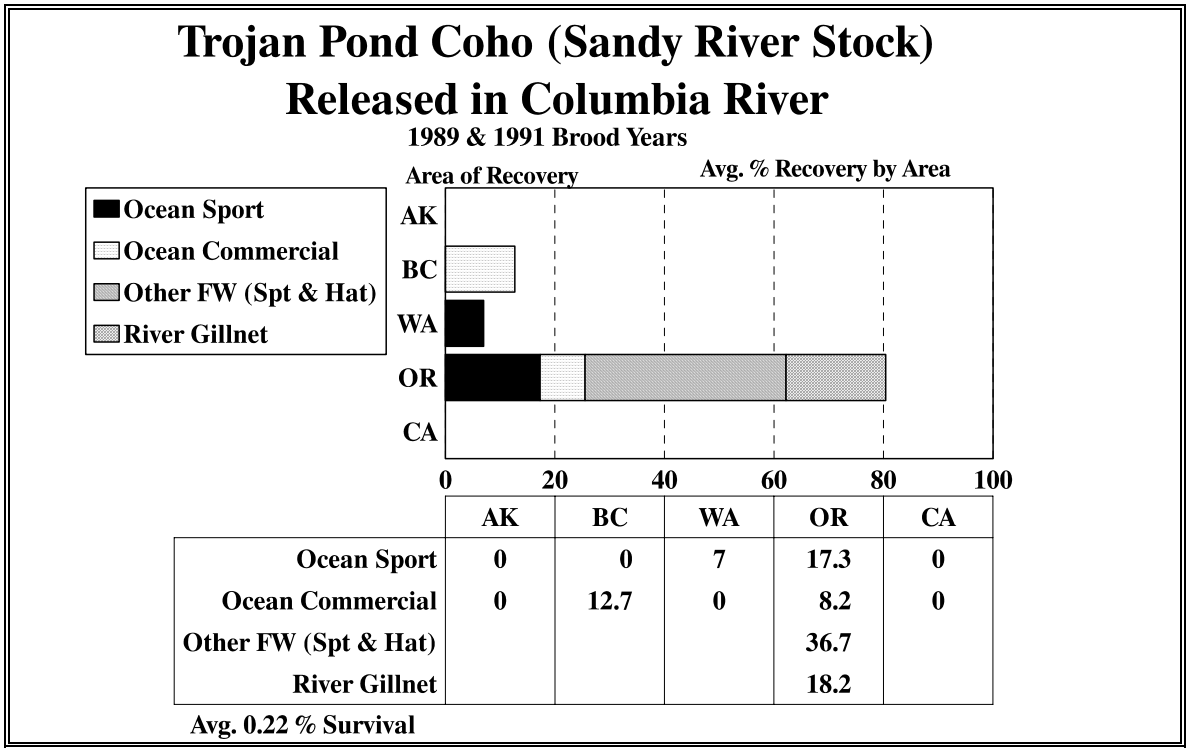
None of the rainbow or brook trout released by Sandy Hatchery were coded-wire tagged for evaluation.



	AK	BC	WA	OR	CA
Ocean Sport	0	0.2	12.6	10.8	0.5
Ocean Commercial	0	4.5	0.7	5.1	0.2
Other FW (Spt & Hat)				61.3	
River Gillnet				4.2	

Avg. 1.73 % Survival

Figure 23. Average survival and catch distribution of Sandy hatchery Sandy River stock coho, released in Sandy River (1988 to 1992 broods).



	AK	BC	WA	OR	CA
Ocean Sport	0	0	7	17.3	0
Ocean Commercial	0	12.7	0	8.2	0
Other FW (Spt & Hat)				36.7	
River Gillnet				18.2	

Avg. 0.22 % Survival

Figure 24. Average survival and catch distribution of Trojan Pond Sandy River stock coho, released in the Lower Columbia River (1988 & 1991 broods).

Cascade Hatchery

The Cascade Hatchery is located off Highway 84 near Bonneville Dam. Cascade Hatchery rears and releases coho salmon that are presently all trucked and released in the Yakima and Umatilla River systems.

The 1988 to 1992 brood years of Tanner Creek stock coho released in the Umatilla River survived at an average rate of 0.92% and contributed primarily to the Oregon and Washington ocean fisheries and Columbia River freshwater fisheries (Figure 25).

The 1988 to 1992 brood years of Tanner Creek stock coho released in the Yakima River survived at an average rate of 0.48% and contributed primarily to the Oregon and Washington ocean fisheries and Columbia River freshwater fisheries (Figure 26).

Bonneville Hatchery

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

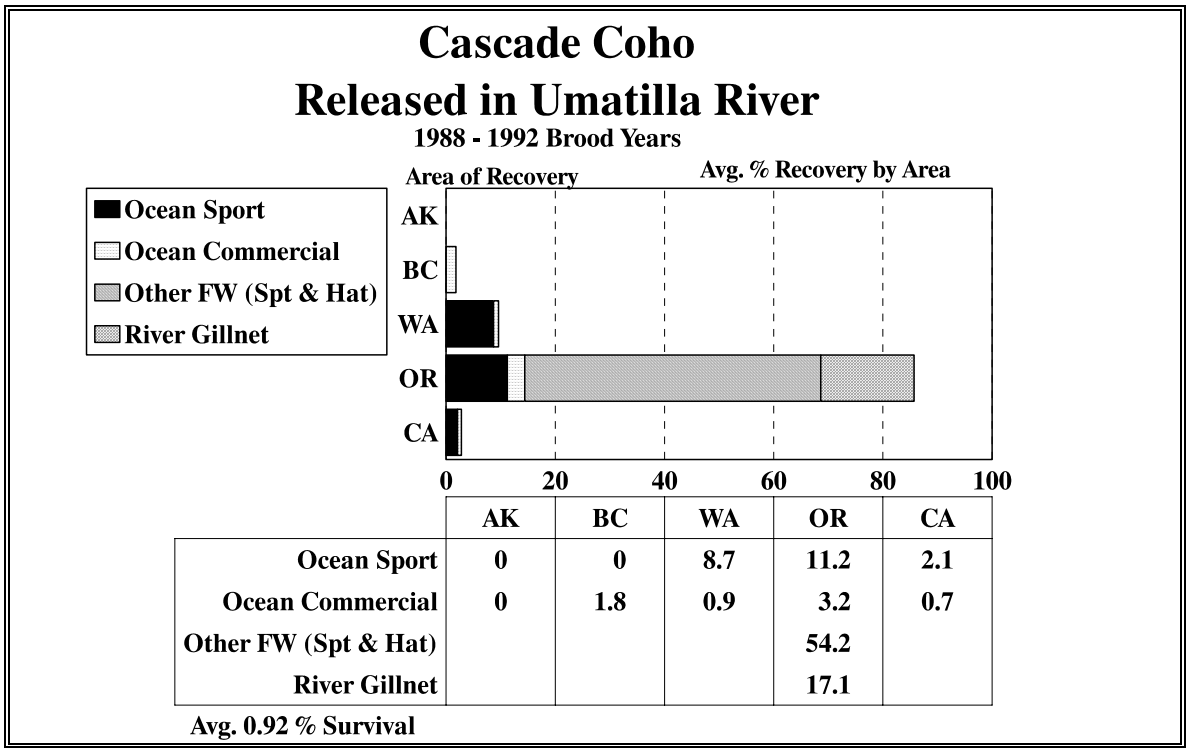
The 1986 to 1990 brood years of tule stock fall chinook released at Tanner Creek survived at an average rate of 0.13% and contributed primarily to the British Columbia and Washington ocean fisheries and the Columbia River freshwater fisheries (Figure 27).

The 1986 to 1990 brood years of Upriver Bright stock fall chinook released at Tanner Creek survived at an average rate of 0.40% and contributed primarily to the Alaska and British Columbia ocean commercial fisheries and the Columbia River gillnet fishery (Figure 28).

The 1986, 1987, and 1990 brood years of Upriver Bright stock fall chinook released in the Umatilla River survived at an average rate of 1.13% and contributed primarily to the Alaska and British Columbia ocean commercial fisheries and the Columbia River freshwater and gillnet fisheries (Figure 29).

The 1988 to 1990 brood years of Upriver Bright stock fall chinook released in the Mid-Columbia River channel survived at an average rate of 0.22% and contributed primarily to the Alaska and British Columbia ocean commercial fisheries and the Columbia River freshwater and gillnet fisheries (Figure 30).

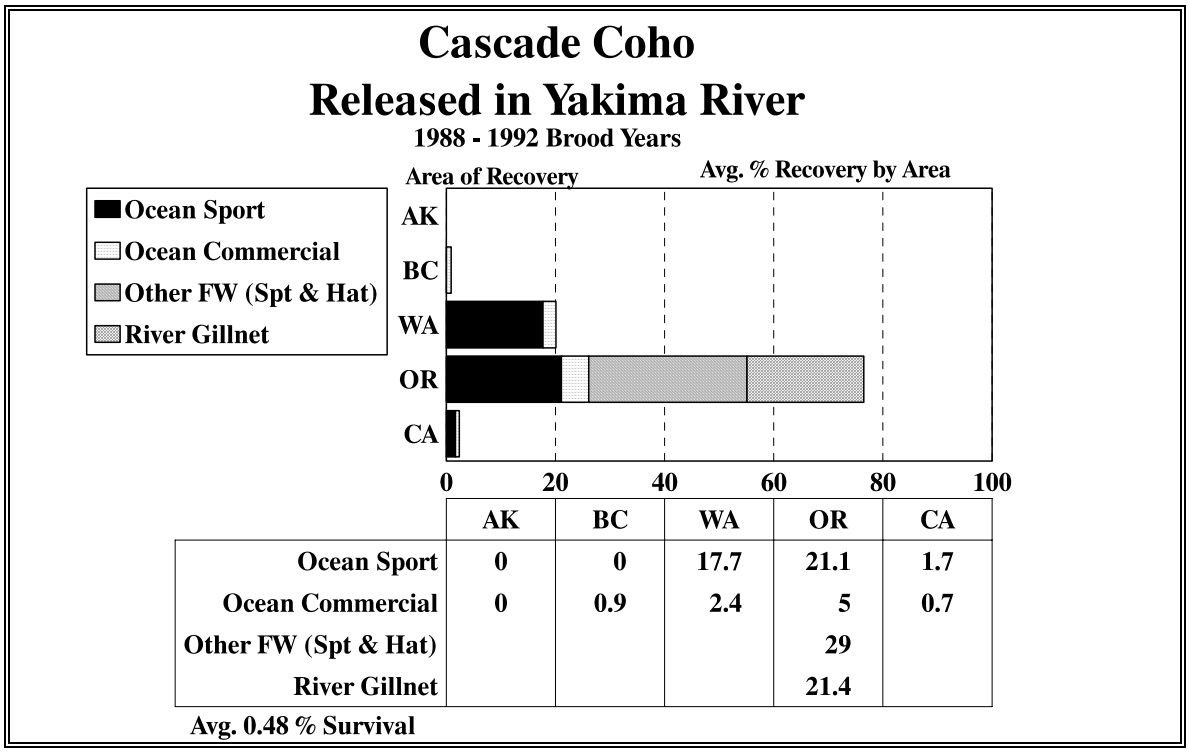
The 1986 brood of Upriver Bright stock summer chinook released in Tanner Creek survived at a rate of 0.23% and contributed primarily to the Alaska and British Columbia ocean fisheries and the Columbia River freshwater and gillnet fisheries(Figure 31).



	AK	BC	WA	OR	CA
Ocean Sport	0	0	8.7	11.2	2.1
Ocean Commercial	0	1.8	0.9	3.2	0.7
Other FW (Spt & Hat)				54.2	
River Gillnet				17.1	

Avg. 0.92 % Survival

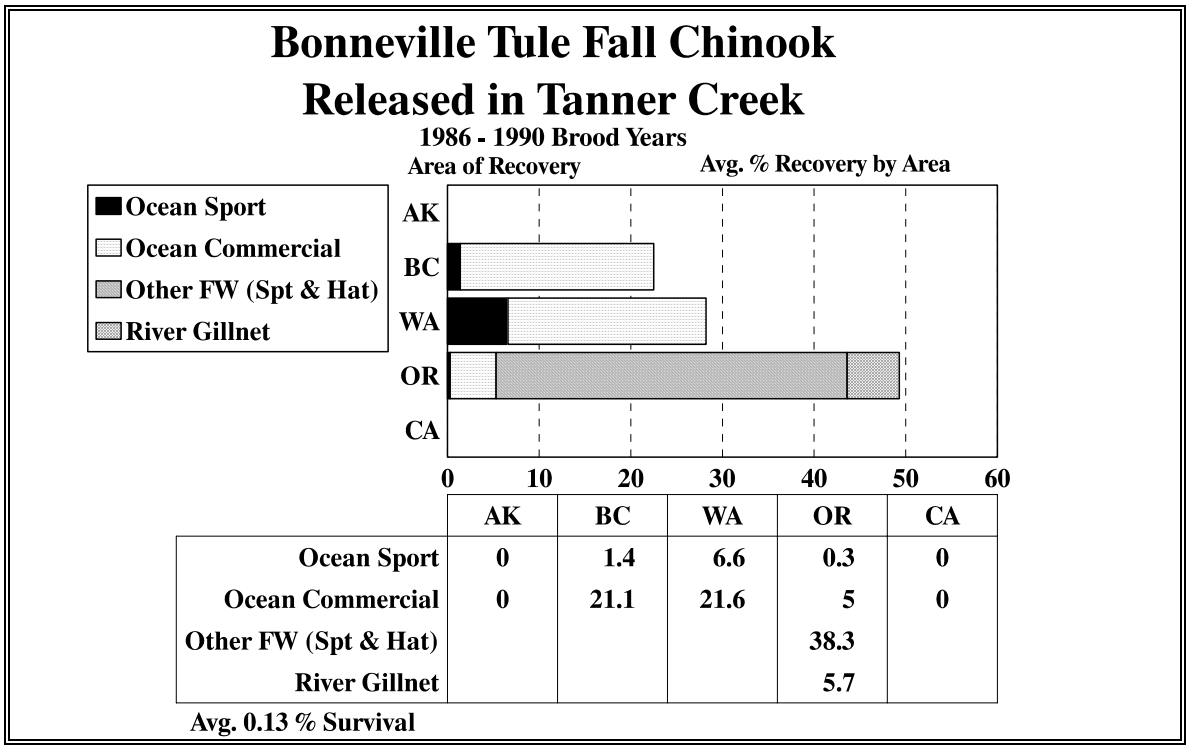
Figure 25. Average survival and catch distribution of Cascade Hatchery Tanner Creek stock coho, released in Umatilla River (1988 to 1992 broods).



	AK	BC	WA	OR	CA
Ocean Sport	0	0	17.7	21.1	1.7
Ocean Commercial	0	0.9	2.4	5	0.7
Other FW (Spt & Hat)				29	
River Gillnet				21.4	

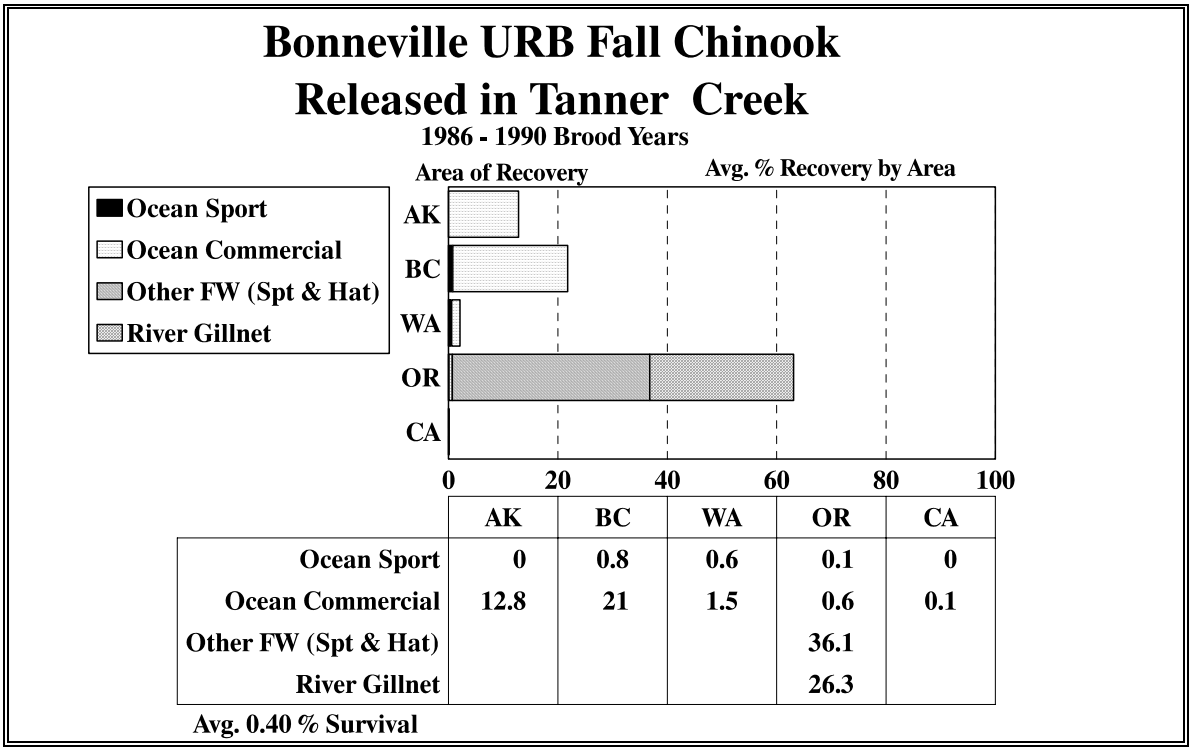
Avg. 0.48 % Survival

Figure 26. Average survival and catch distribution of Cascade Hatchery Tanner Creek stock coho, released in Yakima River (1988 to 1992 broods).



	AK	BC	WA	OR	CA
Ocean Sport	0	1.4	6.6	0.3	0
Ocean Commercial	0	21.1	21.6	5	0
Other FW (Spt & Hat)				38.3	
River Gillnet				5.7	

Figure 27. Average survival and catch distribution of Bonneville Hatchery tule stock fall chinook, released in Tanner Creek (1986 to 1990 broods).



	AK	BC	WA	OR	CA
Ocean Sport	0	0.8	0.6	0.1	0
Ocean Commercial	12.8	21	1.5	0.6	0.1
Other FW (Spt & Hat)				36.1	
River Gillnet				26.3	

Figure 28. Average survival and catch distribution of Bonneville Hatchery Upriver Bright stock fall chinook, released in Tanner Creek (1986 to 1990 broods).

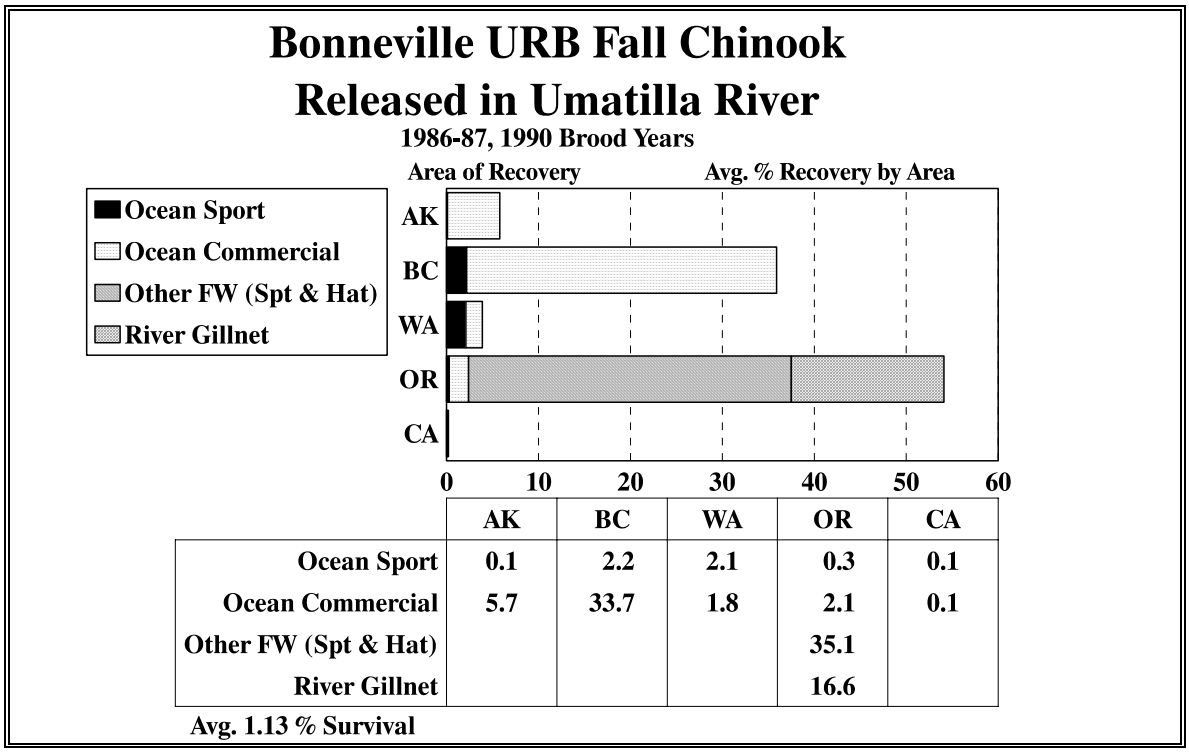


Figure 29. Average survival and catch distribution of Bonneville Hatchery Upriver Bright stock fall chinook, released in Umatilla River (1986, 1987, and 1990 broods).

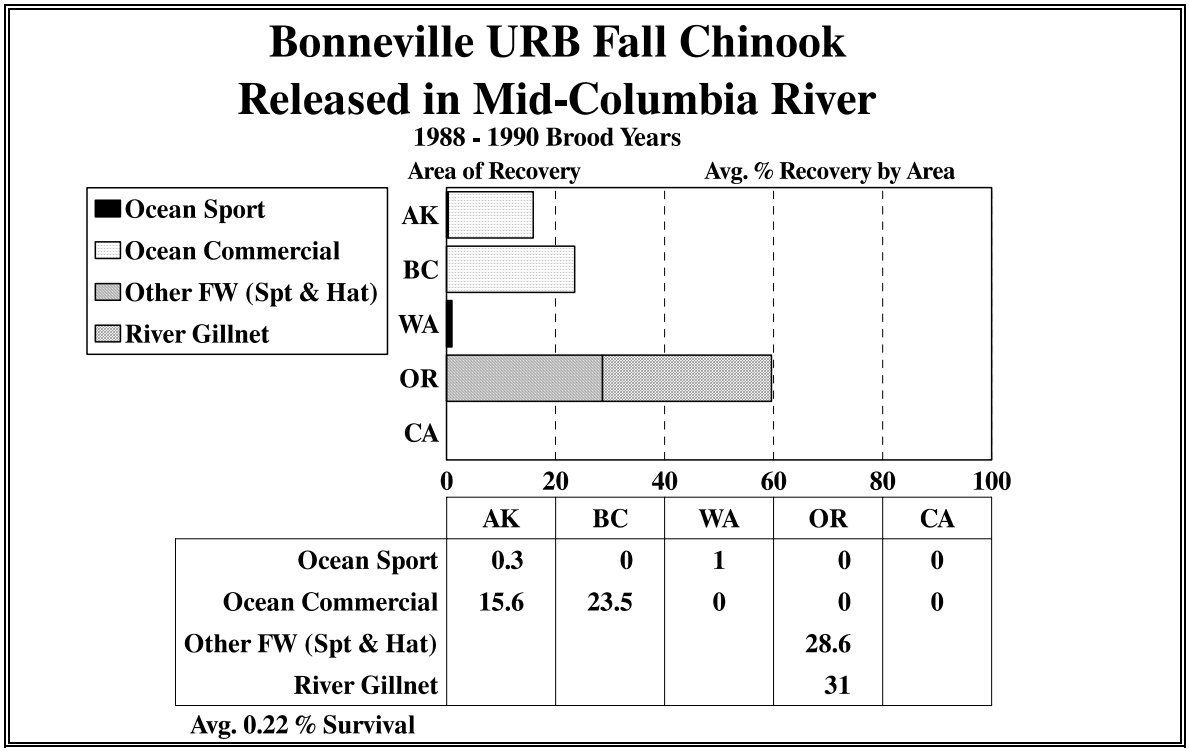


Figure 30. Average survival and catch distribution of Bonneville Hatchery Upriver Bright stock fall chinook, released in the Mid-Columbia River channel Below Bonneville Dam (1988 to 1990 broods).

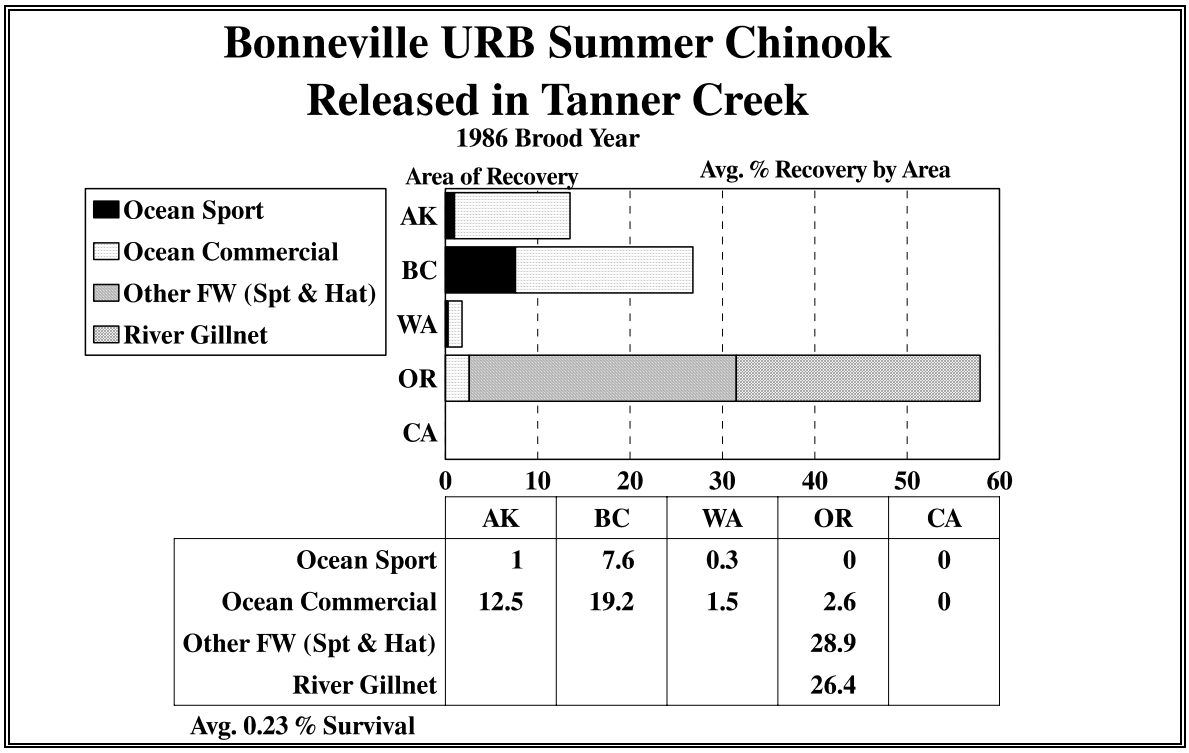


Figure 31. Average survival and catch distribution of Bonneville Hatchery Upriver Bright stock summer chinook, released in Tanner Creek (1986 brood).

The 1986 to 1990 brood Lookingglass Creek stock spring chinook released in the Umatilla River survived at an average rate of 0.29% and contributed primarily to the Columbia River freshwater and gillnet fisheries (Figure 32).

The 1988 to 1992 brood Tanner Creek stock coho released in Tanner Creek survived at an average rate of 1.75% and contributed primarily to Oregon and Washington ocean fisheries and Columbia River freshwater and gillnet fisheries (Figure 33).

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, Wahkeena Pond or Umatilla River after acclimation and/or extended rearing. Wahkeena Pond is operated as a satellite of Oxbow Hatchery.

The 1986 to 1990 brood Lookingglass Creek stock spring chinook reared at Oxbow/Bonneville Hatchery and released in West Fork Hood River survived at a average rate of 0.14% and contributed primarily to the Columbia freshwater sport and gillnet fisheries (Figure 34).

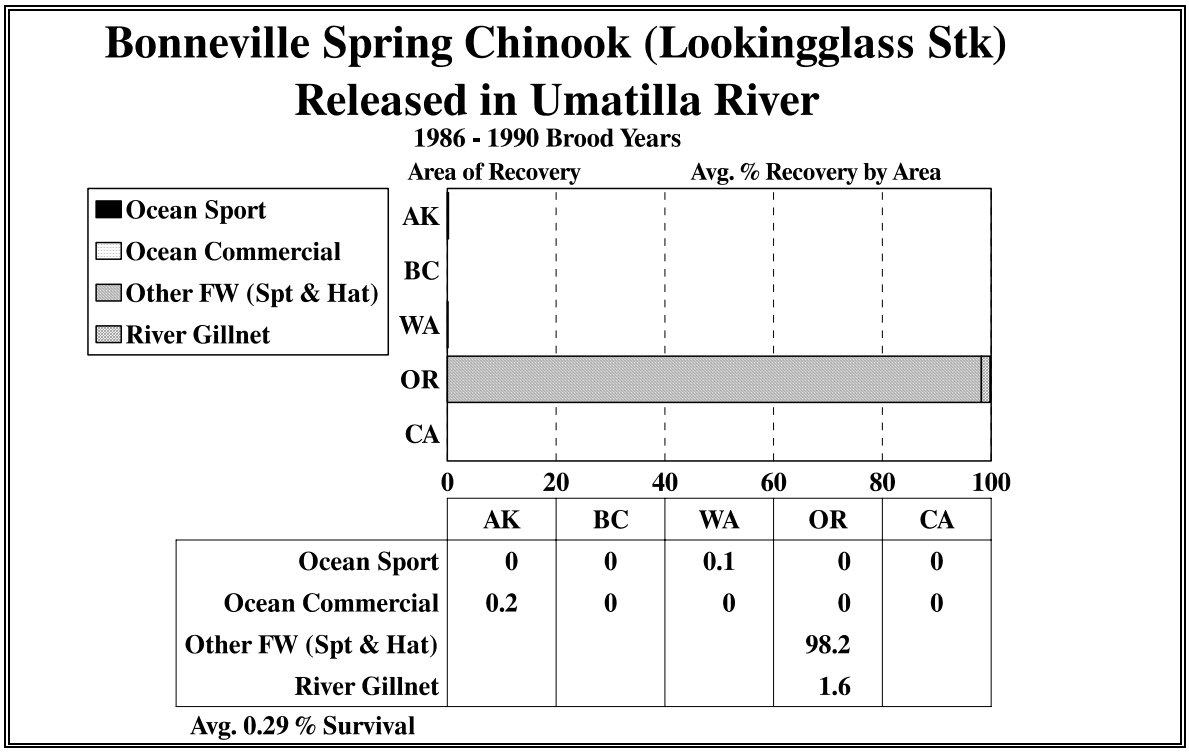


Figure 32. Average survival and catch distribution of Bonneville Hatchery Lookingglass Creek stock spring chinook, released in Umatilla River (1986 to 1990 broods).

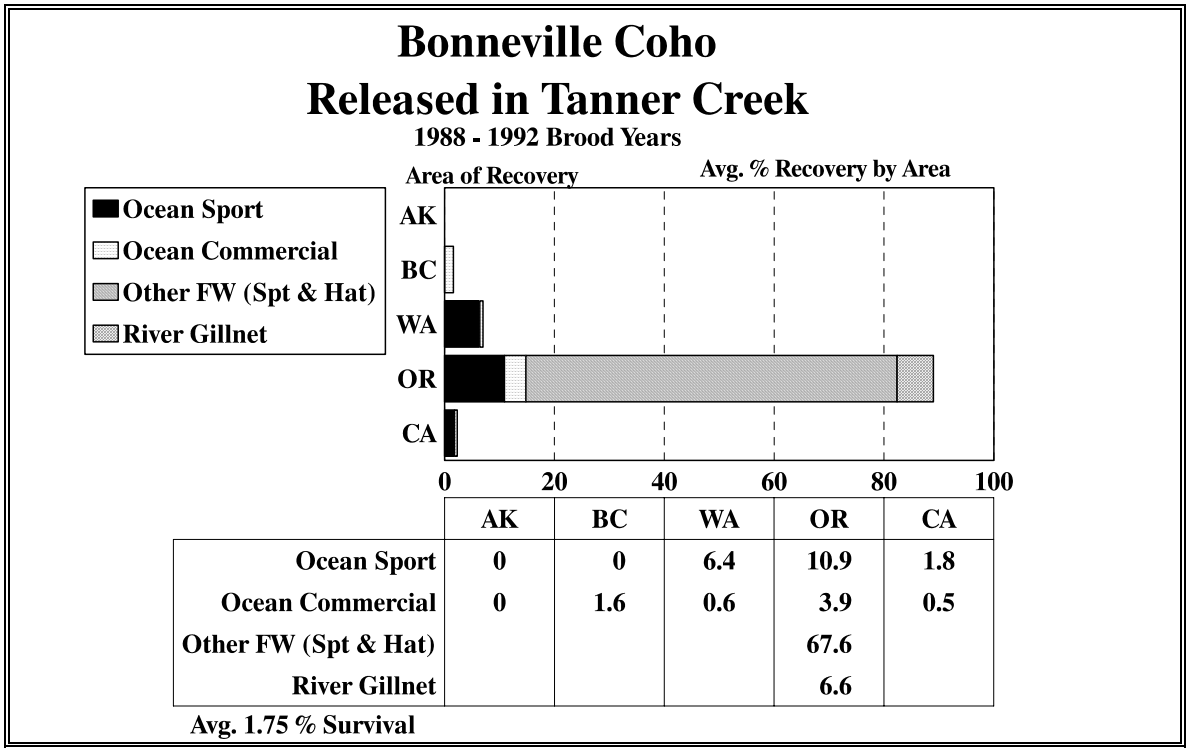


Figure 33. Average survival and catch distribution of Bonneville Hatchery Tanner Creek stock coho, released in Tanner Creek (1988 to 1992 broods).

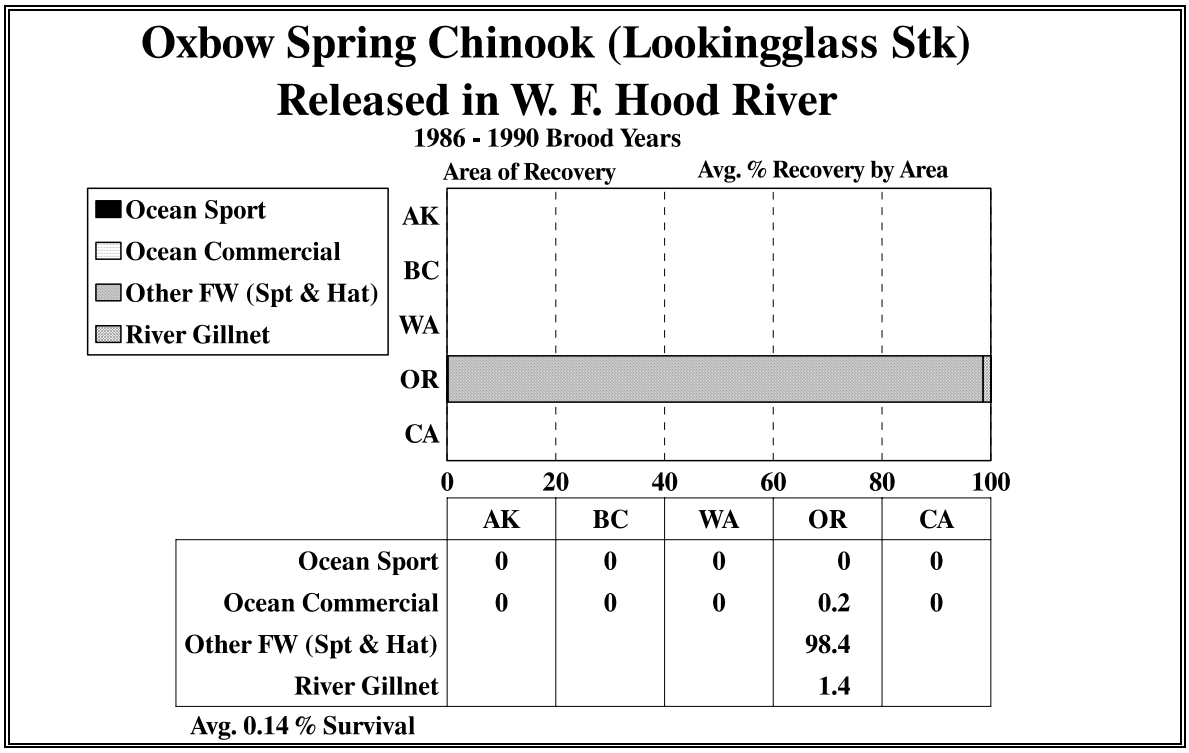


Figure 34. Average survival and catch distribution of Oxbow/Bonneville Hatchery Lookingglass Creek stock spring chinook, released in West Fork Hood River (1986 to 1990 broods).

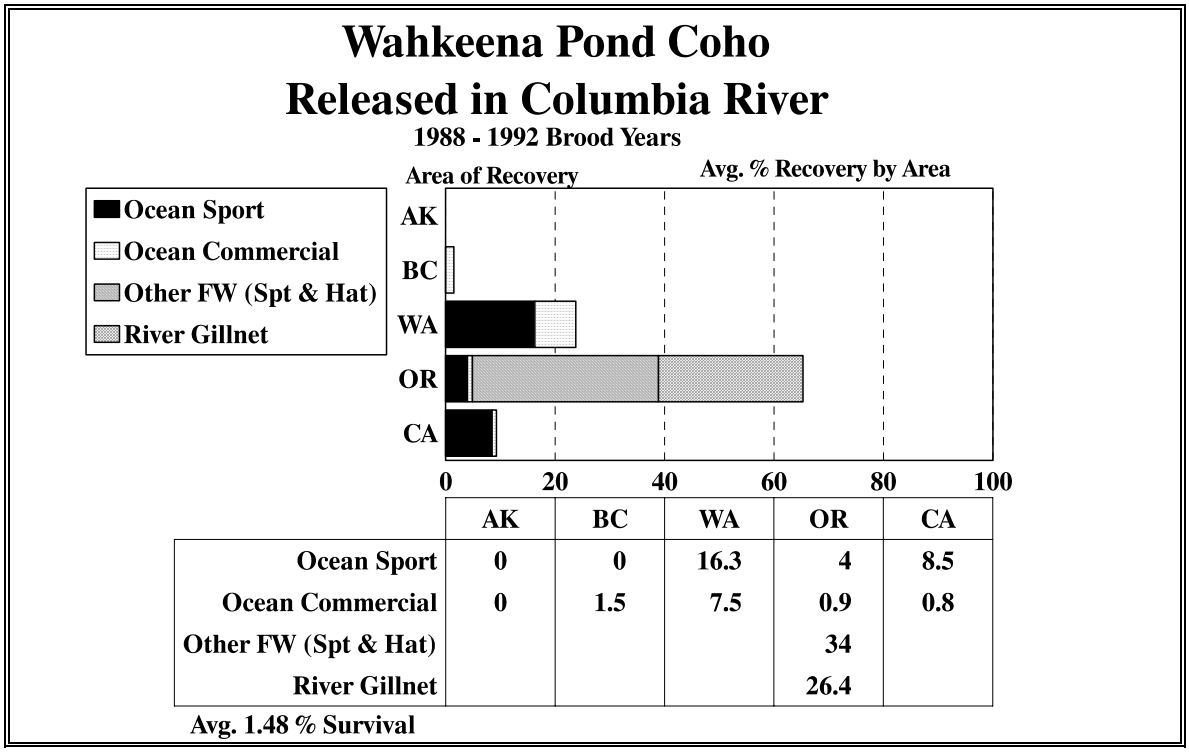


Figure 35. Average survival and catch distribution of Wahkeena Pond Tanner Creek and Sandy River stocks coho, released in the Columbia River (1988 to 1992 broods).

Wahkeena Pond

Wahkeena Pond is a natural lake rearing location near Multnomah Falls State Park off Highway 84. Coho stocked in Wahkeena Pond are fed daily by the crew from Oxbow Hatchery.

The 1988 to 1992 brood years of coho reared in Wahkeena Pond survived at an average rate of 1.48% and contributed primarily to the Washington, Oregon and California ocean sport and commercial fisheries and the Columbia River gillnet fishery (Figure 35).

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 1986 to 1990 brood Deschutes River stock spring chinook released in the Deschutes River survived at an average rate of 1.22% and contributed primarily to the freshwater sport fishery in the Columbia and Deschutes Rivers (Figure 36).

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

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 1987 to 1990 brood Umatilla River stock summer steelhead reared at Oaks Springs and released in the Umatilla River survived at an average rate of 0.61% and contributed primarily to the Columbia River sport and gillnet fisheries (Figure 37).

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.

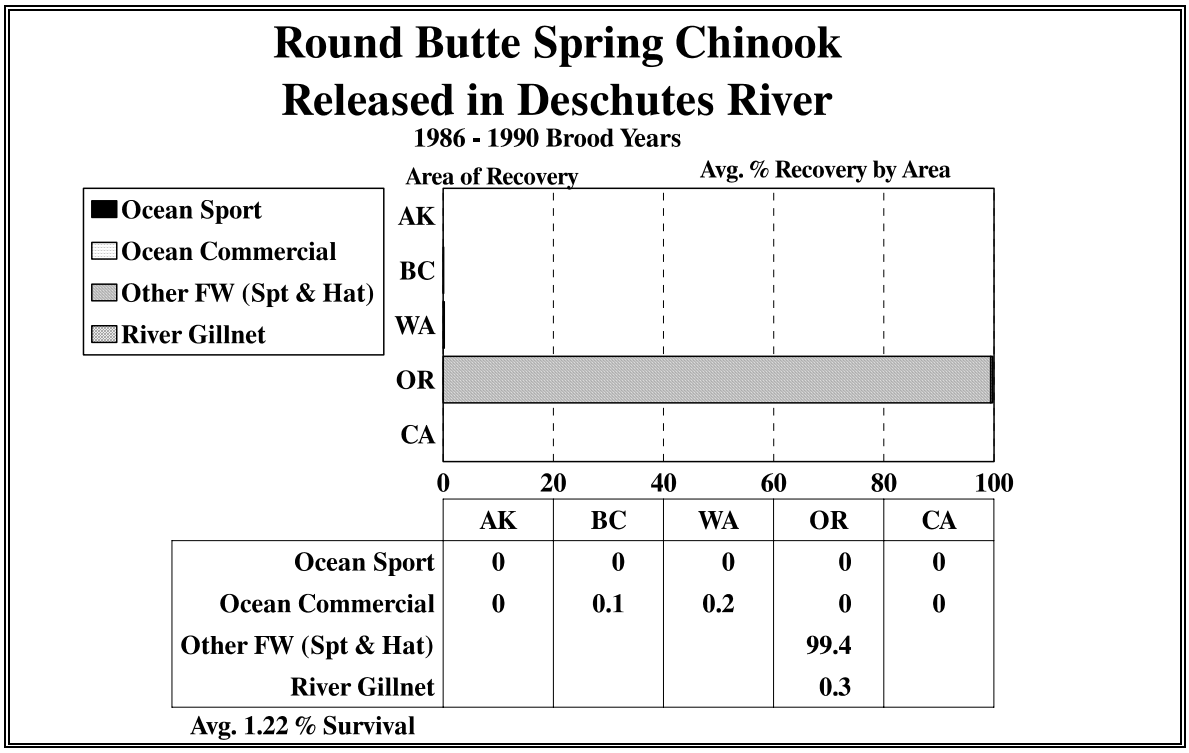


Figure 36. Average survival and catch distribution of Round Butte Hatchery Deschutes River stock spring chinook, released in Deschutes River (1986 to 1990 broods).

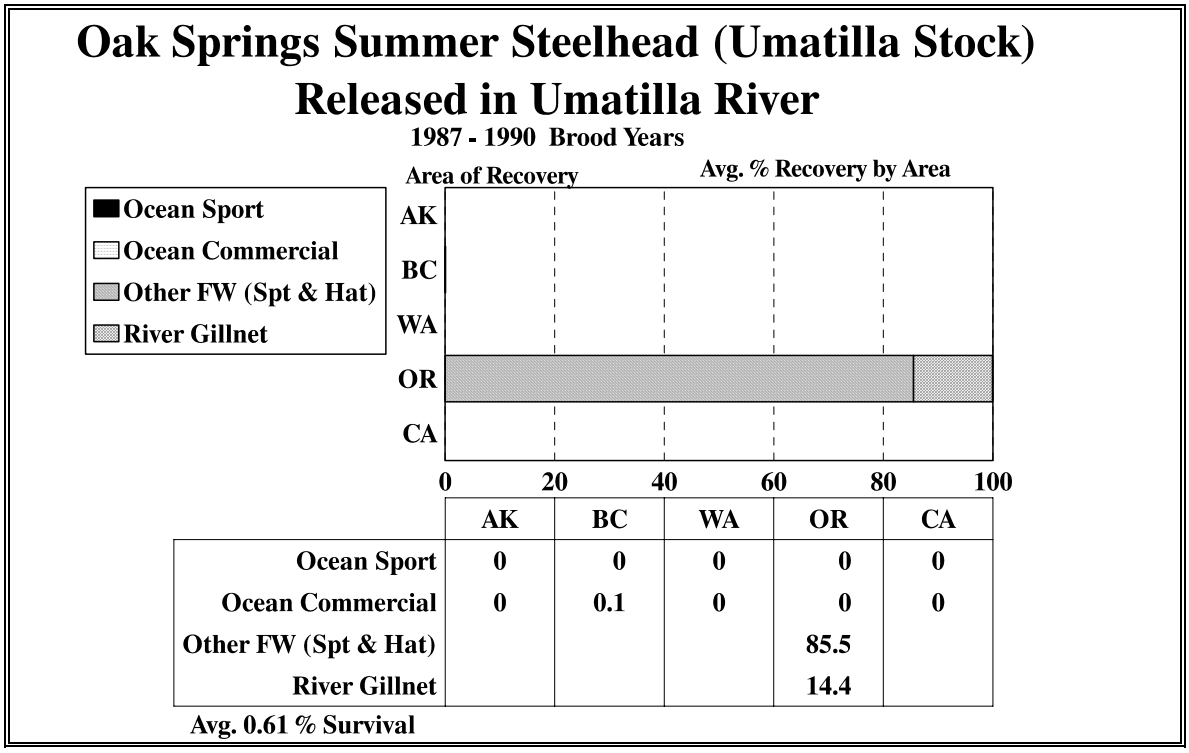


Figure 37. Average survival and catch distribution of Oak Springs Hatchery Umatilla River stock summer steelhead, released in Umatilla River (1987 to 1990 broods).

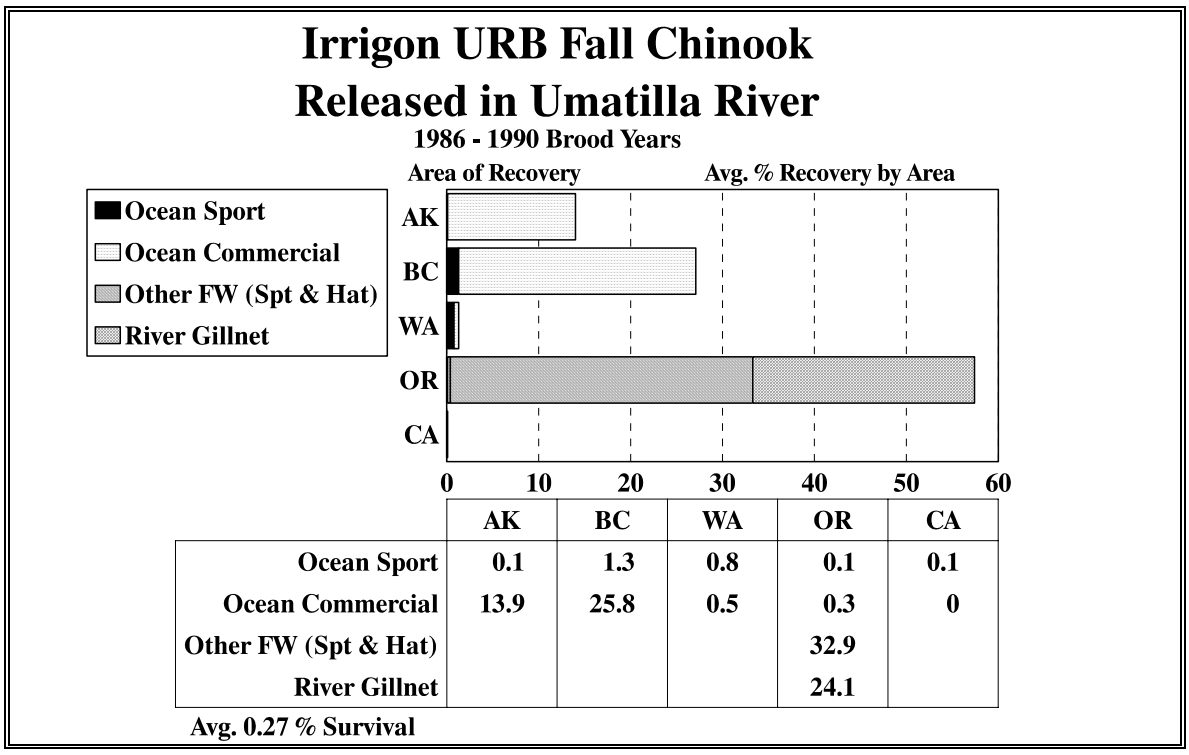
Irrigon Hatchery

Irrigon Hatchery is located on the Columbia River off Highway 730 near Irrigon. Irrigon rears and releases spring and fall chinook salmon, summer steelhead and rainbow trout.

The 1986 to 1990 brood Upriver Bright stock fall chinook released in the Umatilla River survived at an average rate of 0.27% and contributed primarily to the Alaska and British Columbia ocean commercial fisheries and the Columbia River freshwater sport and gillnet fisheries (Figure 38).

The 1986 to 1988 brood Rapid River stock spring chinook released in Lookingglass Creek survived at an average rate of <0.01% and contributed exclusively to Columbia River freshwater fisheries (Figure 39).

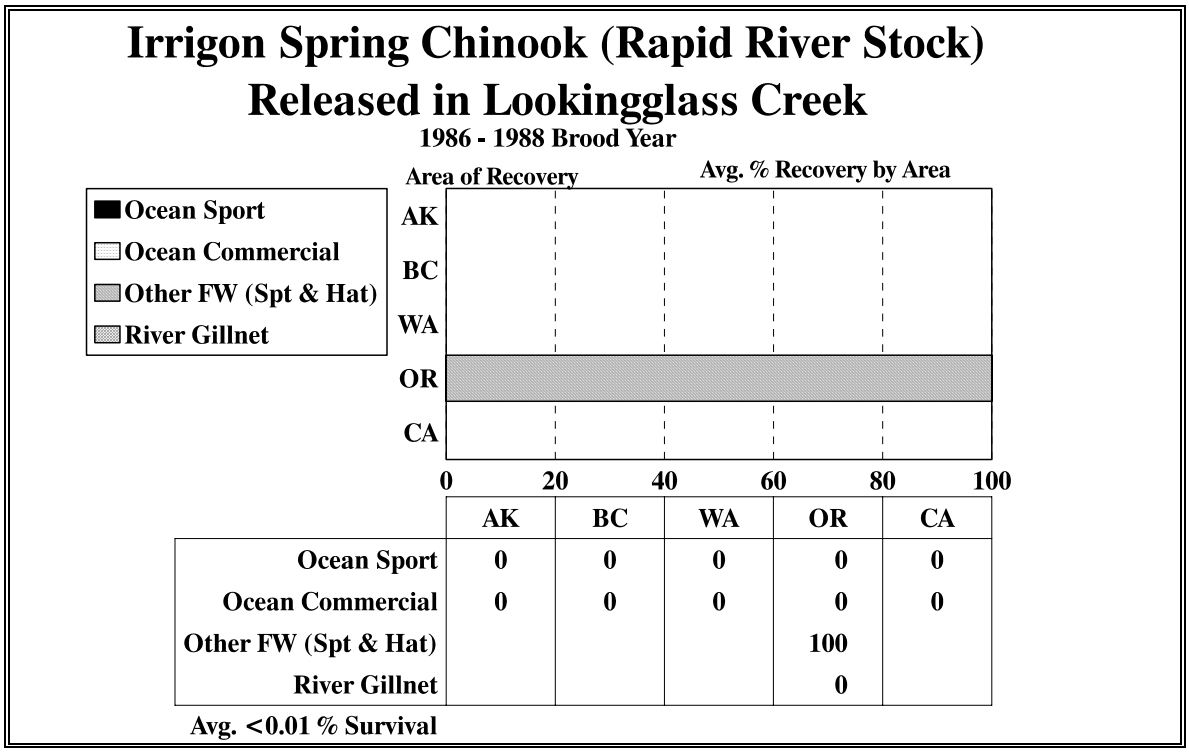
The 1987 to 1991 brood Imnaha River stock summer steelhead released in Little Sheep Creek (Grande Ronde River) survived at an average rate of 0.57% and contributed primarily to the Columbia River freshwater and gillnet fisheries (Figure 40).



	AK	BC	WA	OR	CA
Ocean Sport	0.1	1.3	0.8	0.1	0.1
Ocean Commercial	13.9	25.8	0.5	0.3	0
Other FW (Spt & Hat)				32.9	
River Gillnet				24.1	

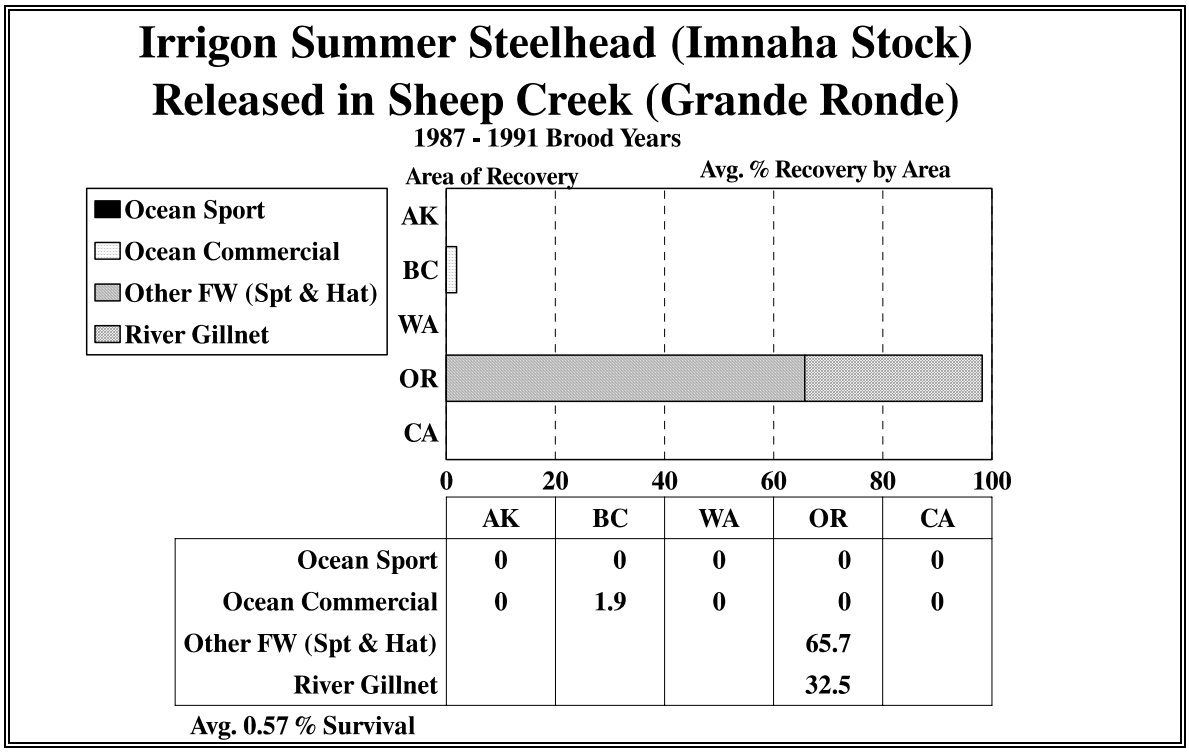
Avg. 0.27 % Survival

Figure 38. Average survival and catch distribution of Irrigon Hatchery Upriver Bright stock fall chinook, released in Umatilla River (1986 to 1990 broods).



	AK	BC	WA	OR	CA
Ocean Sport	0	0	0	0	0
Ocean Commercial	0	0	0	0	0
Other FW (Spt & Hat)				100	
River Gillnet				0	

Figure 39. Average survival and catch distribution of Irrigon Hatchery Rapid River stock spring chinook, released in the Lookingglass Creek (1986 to 1988 broods).



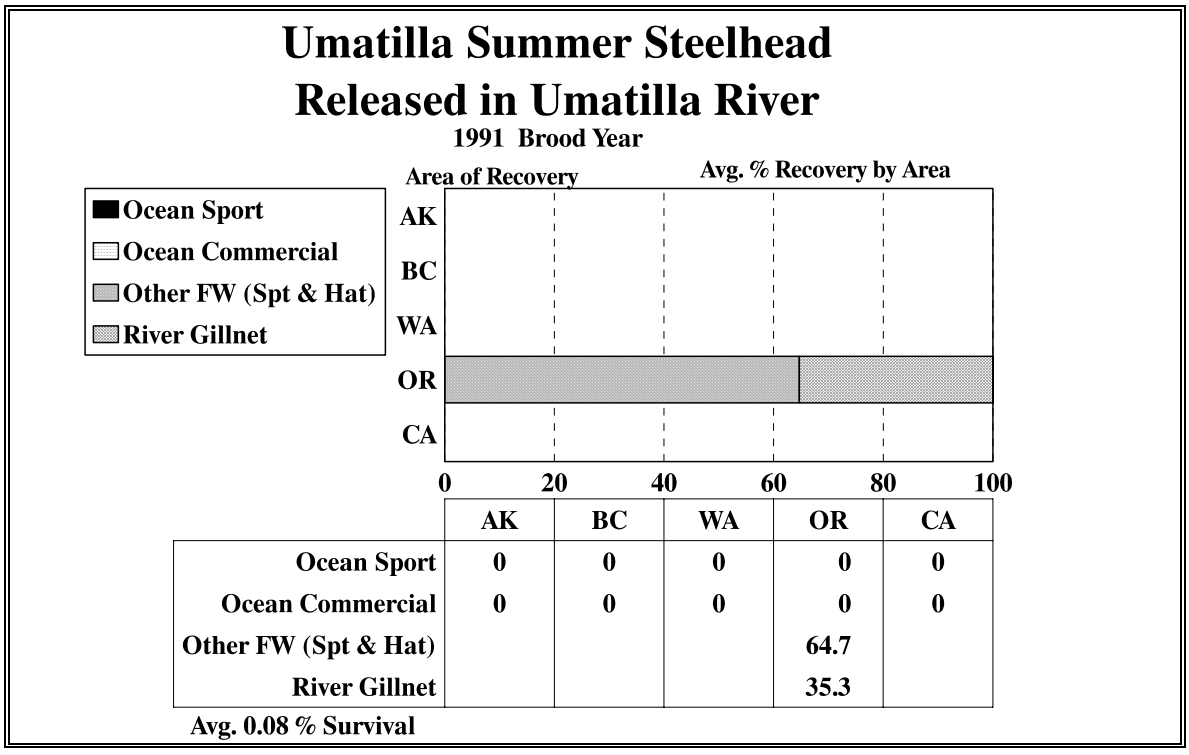
	AK	BC	WA	OR	CA
Ocean Sport	0	0	0	0	0
Ocean Commercial	0	1.9	0	0	0
Other FW (Spt & Hat)				65.7	
River Gillnet				32.5	

Figure 40. Average survival and catch distribution of Irrigon Hatchery Imnaha River stock summer steelhead, released in Imnaha River (1987 to 1991 broods).

Umatilla Hatchery

Umatilla Hatchery, constructed in 1990 is located on the Columbia River adjacent to Irrigon Hatchery. Umatilla Hatchery rears Upriver Bright fall chinook salmon and summer steelhead trout. Representative groups of these fish have been coded-wire tagged. Only one year of steelhead recovery data is currently available.

The 1991 brood Umatilla River stock summer steelhead released in the Umatilla River survived at an average rate of 0.08% and contributed primarily to the Columbia River freshwater and gillnet fisheries (Figure 41).



	AK	BC	WA	OR	CA
Ocean Sport	0	0	0	0	0
Ocean Commercial	0	0	0	0	0
Other FW (Spt & Hat)				64.7	
River Gillnet				35.3	

Avg. 0.08 % Survival

Figure 41. Average survival and catch distribution of Umatilla Hatchery Umatilla River stock summer steelhead, released in Umatilla River (1991 brood).

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 1986 to 1990 brood Rapid River stock spring chinook released in Lookingglass Creek survived at an average rate of 0.13% and contributed primarily to freshwater sport and Columbia river gillnet fisheries (Figure 42).

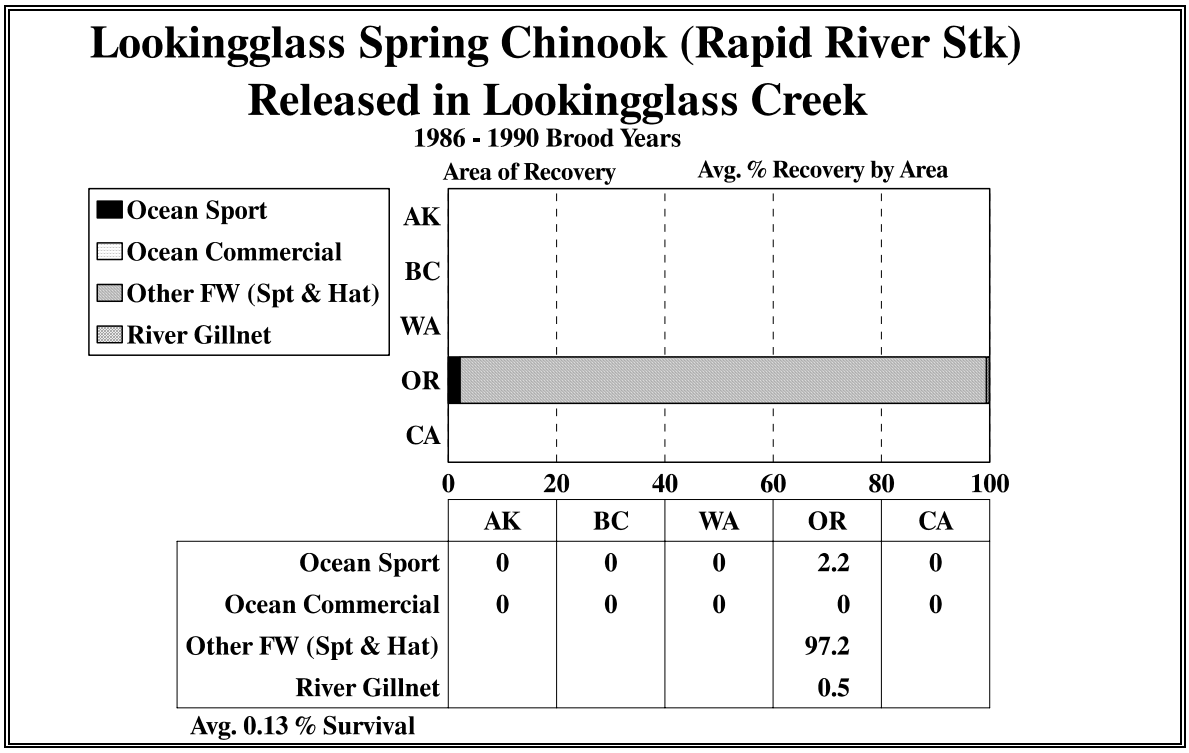


Figure 42. Average survival and catch distribution of Lookingglass Hatchery Rapid River stock spring chinook, released in Lookingglass Creek (1986 to 1990 broods).

The 1986 brood Lookingglass Creek stock spring chinook released in Lookingglass Creek survived at a rate of <0.01% (Figure 43)

The 1986 to 1990 brood Imnaha stock spring chinook released in Imnaha river survived at an average rate of 0.17% and contributed to freshwater and Columbia River gillnet fisheries (Figure 44).

Wallowa Hatchery

Wallowa Hatchery is located on the Wallowa River near Enterprise. The Wallowa Hatchery rears and releases summer steelhead and rainbow trout.

The 1990 to 1991 brood Wallowa stock summer steelhead reared at Irrigon hatchery and released in Big Canyon Creek survived at an average rate of 0.53% and contributed to Columbia River freshwater and gillnet fisheries (Figure 45).

The 1987 to 1991 brood Wallowa stock summer steelhead reared at Irrigon hatchery, acclimated at Wallowa hatchery and released in Spring Creek survived at an average rate of 0.57% and contributed to Columbia River freshwater and gillnet fisheries (Figure 46).

Rainbow trout are not tagged for evaluation.

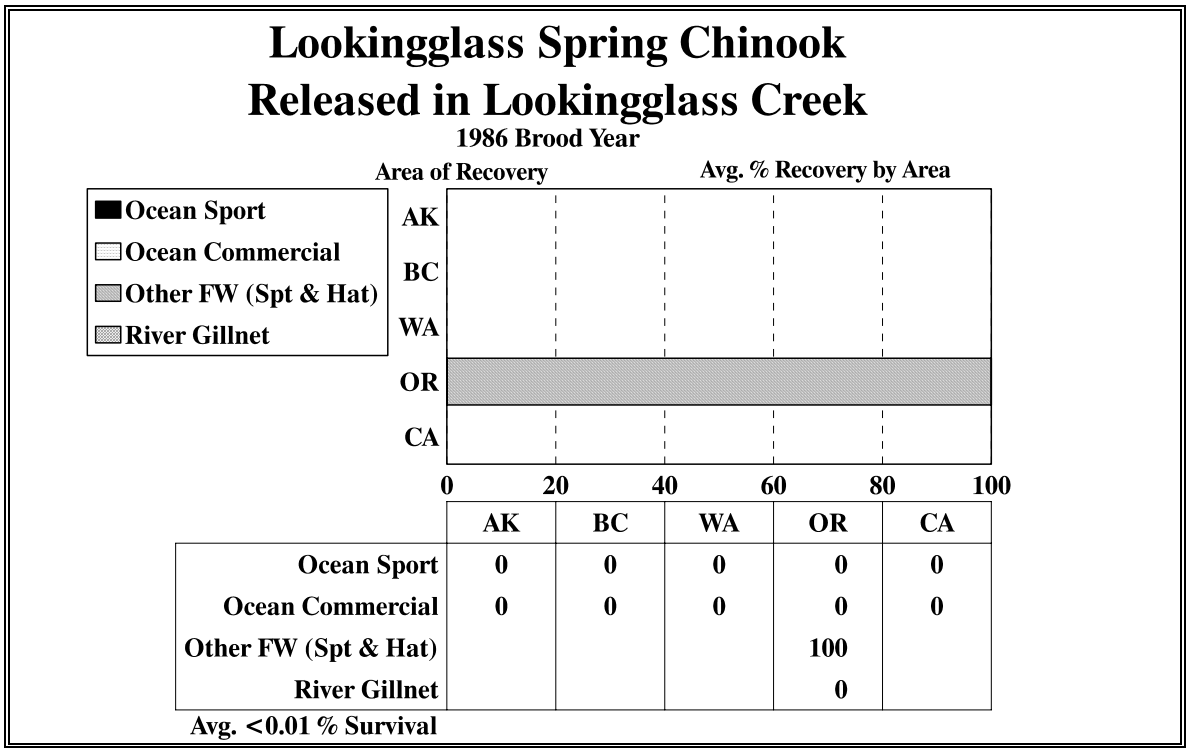


Figure 43. Average survival and catch distribution of Lookingglass Hatchery Lookingglass Creek stock spring chinook, released in Lookingglass Creek (1986 brood).

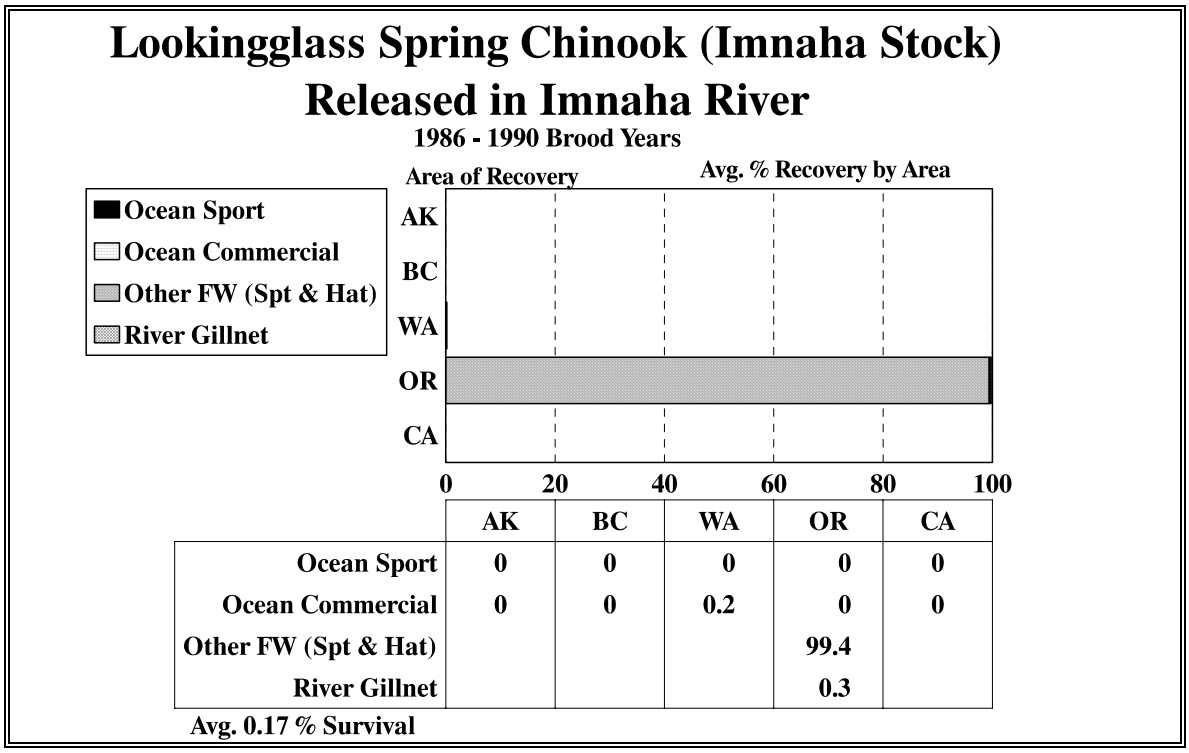


Figure 44. Average survival and catch distribution of Lookingglass Hatchery Imnaha River stock spring chinook, released in Imnaha River (1986 to 1990 broods).

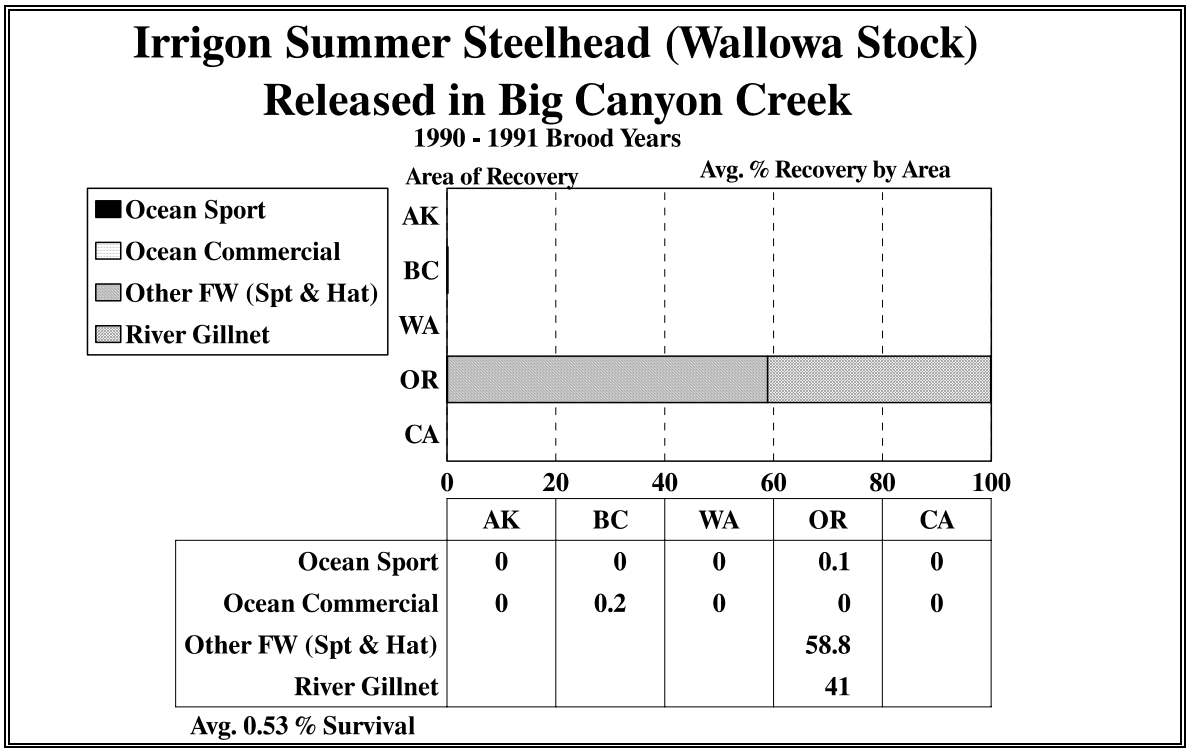


Figure 45. Average survival and catch distribution of Irrigon/Wallowa Hatchery Wallowa River stock summer steelhead, released in Big Canyon Creek (1990 to 1991 broods).

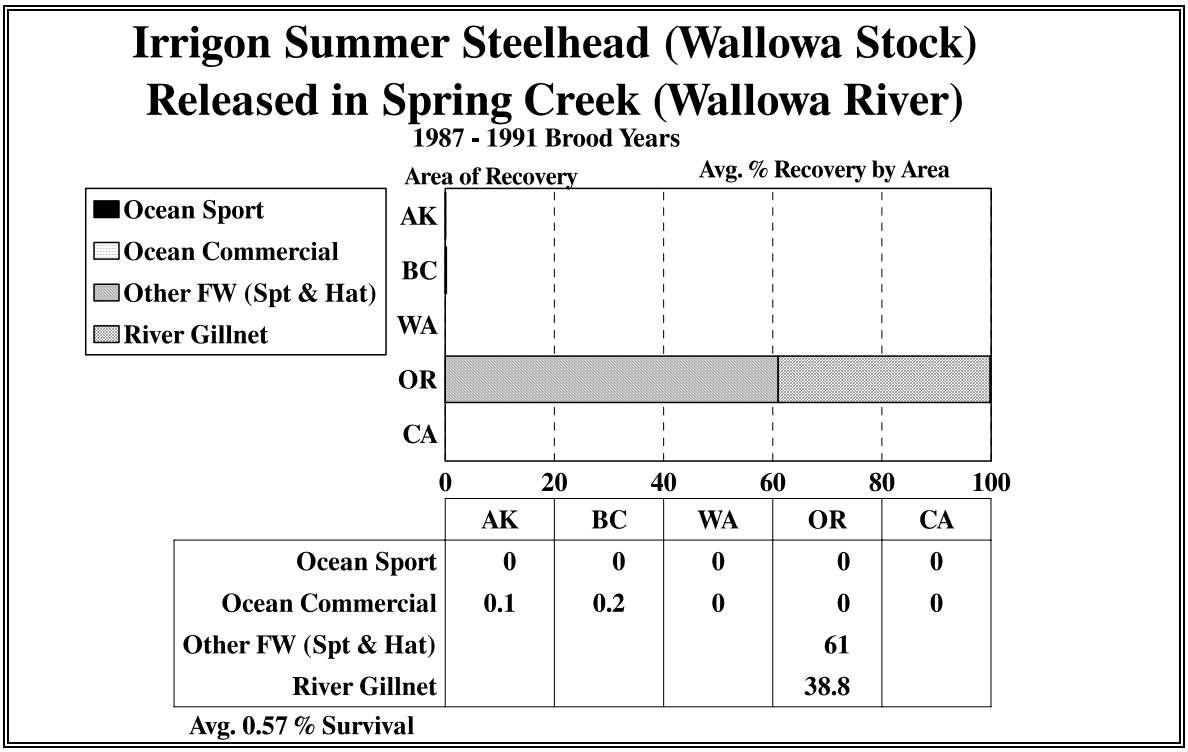


Figure 46. Average survival and catch distribution of Irrigon/Wallowa Hatchery Wallowa River stock summer steelhead, released in Spring Creek (Wallowa River) (1987 to 1991 broods).

APPENDIX