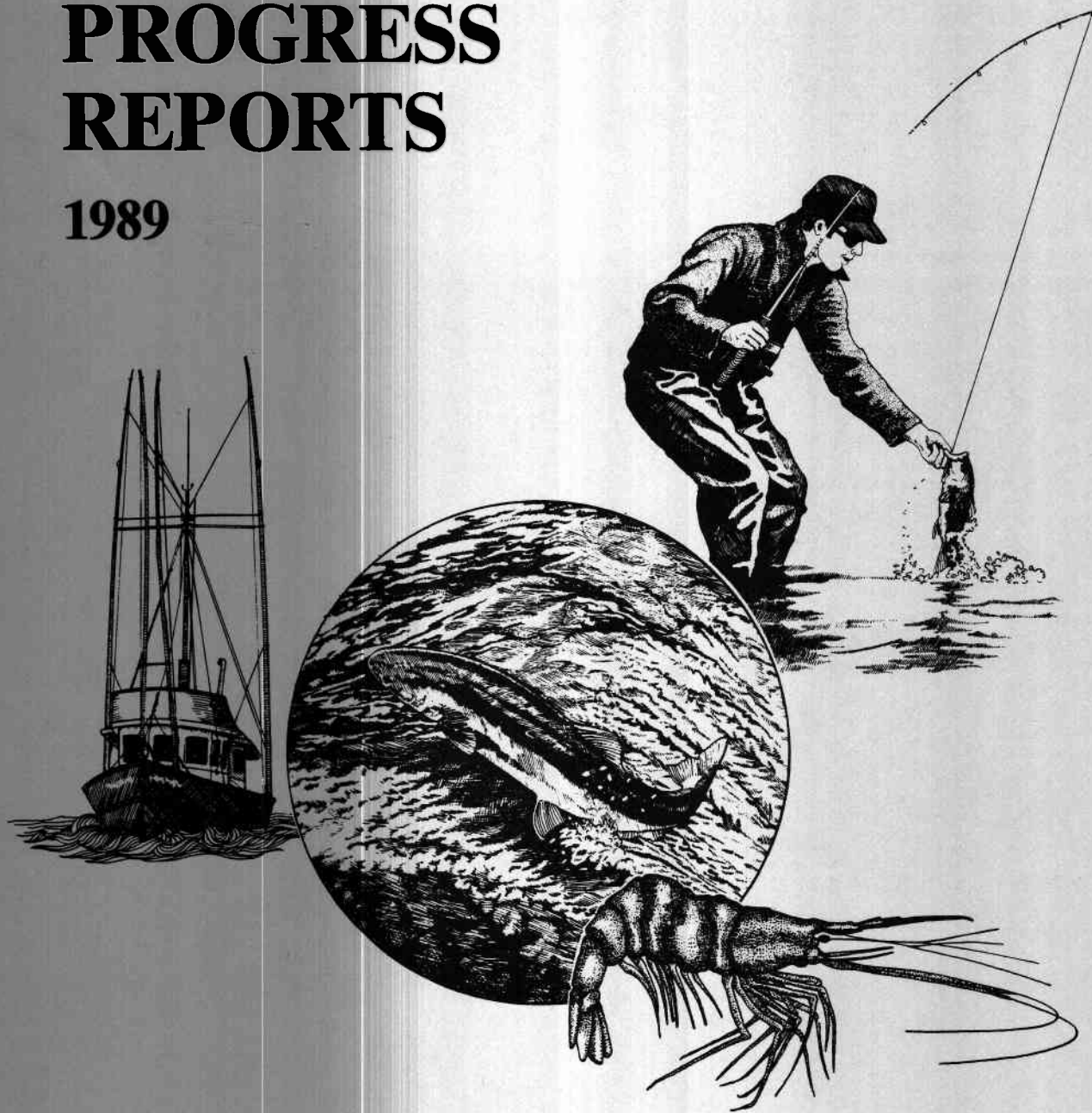


# PROGRESS REPORTS

1989



## FISH DIVISION

**Oregon Department of Fish and Wildlife**

Catch and Escapement of Fall Chinook Salmon from  
Salmon River, Oregon, 1988

ANNUAL PROGRESS REPORT  
MARINE RESOURCES PROGRAM  
OREGON

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Salmon River, Oregon, 1988

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## SUMMARY

### Objectives

1. Estimate the total number of all salmonids and the number of coded-wire tagged fall chinook salmon from Salmon River Fish Hatchery harvested in the fall recreational fishery at Salmon River in 1988.
2. Estimate the total number of fall chinook salmon and the number of coded-wire tagged fall chinook salmon from Salmon River Fish Hatchery that escaped to natural spawning areas in the Salmon River basin in 1988.
3. Determine the number of coded-wire tagged fall chinook salmon from Salmon River Fish Hatchery captured and retained at Salmon River Fish Hatchery in 1988.
4. Evaluate the adequacy of methods used in 1988 to estimate ocean escapement of fall chinook salmon to Salmon River.
5. Compile estimates of recoveries of coded-wire tagged fall chinook salmon from Salmon River Fish Hatchery harvested in 1988 Pacific Ocean fisheries.
6. Estimate the age and sex composition of fall chinook salmon that escape to Salmon River in 1988.
7. Collect data to evaluate spawning ground surveys for Oregon coastal chinook salmon.
8. Report other data derived from the creel survey and spawning ground surveys conducted in 1988 that are useful to the understanding and management of Oregon's coastal stocks of chinook salmon.

### Accomplishments

All objectives were accomplished.

### Findings

#### Recreational Fishery

We estimated that  $2,094 \pm 199$  fall chinook salmon were harvested in the Salmon River recreational fishery in 1988. This catch was composed of an estimated 2,053 adult, and 41 jack chinook salmon, and represents inriver harvest rates of 27.4% and 12.3% of the total estimated ocean escapement of adult and jack chinook salmon, respectively. The estimated harvest of coded-wire tagged chinook salmon from Salmon River Fish Hatchery was 149 adults (1982-85 brood years) and 19 jacks (1986 brood year).

## Escapement to Natural Spawning Areas

We estimated that  $5,477 \pm 471$  fall chinook salmon migrated upstream of Salmon River Fish Hatchery in 1988. This estimate was partitioned into stratified estimates of 2,078 adult male, 3,150 adult female, and 246 jack fall chinook salmon, and represents spawning escapement rates of 68.3% and 73.4% of the total estimated ocean escapement of adults and jacks, respectively. The estimated natural spawning escapement of CWT chinook salmon from Salmon River Fish Hatchery was 389 adults and 122 jacks.

## Hatchery Recovery

Salmon River Fish Hatchery retained 327 adult and 46 jack fall chinook salmon in 1988. Retention of chinook salmon by the hatchery accounted for 4.4% and 13.8% of the total estimated ocean escapement of adults and jacks, respectively. Hatchery personnel recovered 184 adult and 39 jack coded-wire tagged chinook salmon originating from Salmon River Fish Hatchery.

## Ocean Coded-wire Tag Recoveries

The Pacific Marine Fisheries Commission reported estimated harvests of 195 adult and 0 jack coded-wire tagged Salmon River chinook salmon in ocean fisheries in 1988. The majority of these tag recoveries occurred in Alaska (113 recoveries) and British Columbia (54 recoveries) commercial fisheries.

## INTRODUCTION

In accordance with the Pacific Salmon Treaty (PST) Act, the Ocean Salmon Management Section of the Oregon Department of Fish and Wildlife developed a program in 1986 to monitor the catch and escapement of coastal stocks of chinook salmon *Oncorhynchus tshawytscha* that contribute to fisheries addressed by the PST (Boechler and Jacobs 1987). A goal of this program is to estimate the exploitation rate of north-migrating stocks of Oregon coastal fall chinook salmon. The approach used to accomplish this goal is to estimate the total catch and escapement of a representative portion (indicator stock) of these stocks. Coded-wire tagged (CWT) fall chinook salmon from Salmon River Fish Hatchery have been selected as the indicator stock for this exploitation rate.

Total ocean catch of CWT chinook salmon from Salmon River Fish Hatchery is estimated from data collected annually in port sampling programs throughout the Pacific Coast. These estimates are available through the Pacific Marine Fisheries Commission, Portland, Oregon. Our objective is to estimate the ocean escapement of CWT fall chinook salmon from Salmon River Fish Hatchery and, from these estimates of escapement and ocean catch, derive estimates of exploitation rate. Returning chinook salmon that migrate up the Salmon River (1) are caught in the recreational fishery downstream of the hatchery, (2) are captured at the hatchery, (3) are caught in the recreational fishery upstream of the hatchery, or (4) spawn in the river basin above the hatchery. We estimated freshwater harvest directly with a creel survey, recorded hatchery

returns as they were recovered, and estimated the number of chinook salmon that escaped to natural spawning areas using mark-recapture techniques and extensive spawning surveys.

Additional goals of this program are to analyze and calibrate the spawning fish surveys conducted for fall chinook salmon, and to present additional results derived from the creel survey and spawning ground surveys. Currently, fall chinook salmon spawning surveys are used only to assess long-term trends in escapement (Jacobs 1988). In compliance with PST monitoring, we need the ability to assess short-term changes in escapement relative to changes in ocean harvest patterns. Information from this project may provide a means to evaluate the precision of these surveys and develop a procedure for estimating the total escapement of fall chinook salmon from spawning survey data.

This report presents results of the third year of this study. Results obtained in 1986 are presented in Boechler and Jacobs (1987) and results obtained in 1987 are presented in Jacobs and Boechler (1988). The objectives of this report are to (1) assess the adequacy of methodologies used in 1988 to estimate the escapement of CWT fall chinook salmon that were released from Salmon River Fish Hatchery, (2) present estimates of 1988 catch and escapement of CWT fall chinook salmon that were released from Salmon River Fish Hatchery, (3) document results of spawning surveys conducted in Salmon River in 1988 that will be used to evaluate coastal spawning escapement surveys, and (4) present additional results from the creel survey and the spawning ground surveys conducted in 1988 that are important to the understanding and management of Oregon's coastal chinook salmon stocks.

## METHODS

Methods used to estimate the ocean escapement of Salmon River fall chinook salmon in 1988 were previously described by Boechler and Jacobs (1987), with modifications described by Jacobs and Boechler (1988). Several additional modifications, which were enacted in 1988, follow.

### Recreational Fishery

1. The creel survey was conducted from 20 August through 6 November. We planned to conduct the creel survey from mid-August to the end of November, but because of staffing difficulties this was not possible. Fortunately, fishery effort subsided to a low level by early November because of poor weather and high flow.
2. A single sampler was used in 1988 for the creel survey. Based on analysis of the 1987 creel survey we decided that one sampler could effectively survey the fishery and obtain estimates of catch within an acceptable level of precision (Jacobs and Boechler 1988).

## Escapement to Natural Spawning Areas

1. The electric barrier on the weir was operated from 0800 hours on 15 October to 1600 hours on 16 October.

### RESULTS

#### Recreational Fishery

Results of the creel survey conducted in 1988 are presented in Tables 1-3. Estimates of the age composition of chinook salmon harvested in the 1988 recreational fishery are presented in APPENDIX A.

Table 1. Estimated harvest ( $\pm$  95% confidence interval) of salmonids in the Salmon River recreational fishery, 1988<sup>a</sup>.

Species <sup>b</sup>	Adults	Jacks <sup>c</sup>	Total
Chinook salmon	2,053 $\pm$ 198	41 $\pm$ 24	2,094 $\pm$ 199
Coho salmon	39 $\pm$ 23	20 $\pm$ 15	59 $\pm$ 27
Chum salmon	6 $\pm$ 7	--	6 $\pm$ 7
Steelhead	13 $\pm$ 13	0	13 $\pm$ 13
Cutthroat trout	84 $\pm$ 42	--	84 $\pm$ 42

<sup>a</sup> River mile 1.8-10.3, 20 August-6 November.

<sup>b</sup> Chinook salmon *Oncorhynchus tshawytscha*, coho salmon *O. kisutch*, chum salmon *O. keta*, steelhead *O. mykiss*, and cutthroat trout *O. clarkii*.

<sup>c</sup> Jacks are fish <610 mm fork length (except cutthroat trout).

Table 2. Estimated effort and catch statistics for fall chinook salmon in the Salmon River recreational fishery, 1988. RM = river mile.

Stratum	Effort (Angler-hrs)	Catch rate (Hrs/fish)		Total catch	
		Adults	Jacks	Adults	Jacks
Area:					
RM 1.8 to 4.3	66,979	38.0	1,689.0	1,765	38
RM 4.3 to 4.9	8,620	47.4	1,302.5	187	3
RM 4.9 to 10.3	3,064	36.5	--	101	0
Day-type:					
Weekday	47,144	37.8	1,915.7	1,276	22
Weekend	31,519	39.5	1,537.2	777	19
Angler-type:					
Boat	30,682	29.4	1,219.1	1,127	23
Bank	47,981	55.0	2,627.6	926	18
Total fishery	78,663	38.7	1,809.2	2,053	41



Table 3. Seasonal distribution of angling effort and catch of fall chinook salmon in the Salmon River recreational fishery, 1988.

Statistical week	Effort (Angler-hrs)	Catch rate (Hrs/fish)		Total catch	
		Adults	Jacks	Adults	Jacks
15 Aug-21 Aug <sup>a</sup>	558	171.0	171.0	3	3
22 Aug-28 Aug	2,030	31.6	182.0	75	10
29 Aug-4 Sep	3,621	39.9	778.0	78	4
5 Sep-11 Sep	7,655	33.3	1365.0	242	4
12 Sep-18 Sep	9,238	35.9	--	256	0
19 Sep-25 Sep	12,485	27.1	961.5	426	18
26 Sep-2 Oct	12,568	35.6	--	373	0
3 Oct-9 Oct	10,537	44.8	3,716.0	230	2
10 Oct-16 Oct	7,982	56.5	--	117	0
17 Oct-23 Oct <sup>b</sup>	5,870	50.0	--	143	0
24 Oct-30 Oct <sup>b</sup>	3,399	106.2	--	34	0
31 Oct-6 Nov <sup>b</sup>	2,720	46.6	--	76	0
Average	7,100 <sup>c</sup>	38.7	1,809.2	--	--
Total	78,663	--	--	2,053	41

<sup>a</sup> Weekend only.

<sup>b</sup> Includes estimates from the recreational fishery in the area upstream from the hatchery (RM 4.9 to 10.3).

<sup>c</sup> Not including 15 Aug-21 Aug.

## Escapement to Natural Spawning Areas

Results of the mark-recapture study conducted in 1988 to estimate the natural spawning escapement of chinook salmon in Salmon River are presented in Tables 4-9, Figures 1-4, and APPENDIXES A and B.

Table 4. Number of Salmon River fall chinook salmon tagged and recovered, by individual tag color, 1988.

Tag color	Tagging period	Number tagged			Tags recovered			Recovery rate (%)			
		Male	Female	Jack	Male	Female	Jack	Male	Female	Jack	Total
Dark blue	6-14 Oct	6	55	7	5	20	1	83.3	36.4	14.3	38.2
Orange	16-19 Oct	171	224	5	65	89	1	38.0	39.7	20.0	38.8
Green	21-28 Oct	17	28	6	7	7	1	41.2	25.0	16.7	29.4
Pink	31 Oct-4 Nov	209	303	5	78	111	0	37.3	36.6	0.0	36.6
Yellow	7-21 Nov	34	50	1	6	20	0	17.7	40.0	0.0	30.6
<b>Total</b>		<b>437</b>	<b>660</b>	<b>24</b>	<b>161</b>	<b>247</b>	<b>3</b>	<b>36.8</b>	<b>37.4</b>	<b>12.5</b>	<b>36.7</b>

Table 5. Average time elapsed between tagging and tag recovery for all tag colors used in the Salmon River mark-recapture study, 1988.

Tag color	Tagging period	Recovery period	Average elapsed time to recovery (days)
Dark blue	6-14 Oct	10 Oct-4 Nov	9.9
Orange	16-19 Oct	19 Oct-12 Dec	17.1
Green	21-28 Oct	27 Oct-19 Nov	16.0
Pink	31 Oct-4 Nov	7 Nov-21 Dec	18.9
Yellow	7-21 Nov	18 Nov-13 Dec	24.2
<b>Total</b>			<b>15.9</b>

Table 6. Incidence of prespawning mortality observed in tagged and untagged female fall chinook salmon sampled on spawning ground surveys within the Salmon River basin, 1988. RM = river mile.

Survey area	Anchor-tagged		Untagged	
	Total sampled	Percent prespawning mortality	Total sampled	Percent prespawning mortality
<b>Mainstem:</b>				
Tidewater	5	0.0	21	4.8
RM 4.4-4.9	15	0.0	91	19.8
RM 4.9-6.4	93	12.9	235	10.6
RM 6.4-8.8	6	16.7	39	10.3
RM 10.3-12.6	12	0.0	74	0.0
RM 12.6-13.7	15	0.0	79	5.1
RM 13.7-16.3	8	12.5	71	1.4
RM 16.3-16.9	0	0.0	4	0.0
<b>Total</b>	<b>154</b>	<b>9.1</b>	<b>614</b>	<b>8.6</b>
<b>Tributaries:</b>				
Salmon Cr.	1	0.0	7	0.0
Deer Cr. #1	1	0.0	2	0.0
Lower Bear Cr.	42	4.8	108	3.7
Middle Bear Cr.	0	0.0	1	0.0
Upper Bear Cr.	0	0.0	0	0.0
Slick Rock Cr.	26	26.9	109	10.1
Trout Cr.	23	4.4	93	2.2
<b>Total</b>	<b>93</b>	<b>10.8</b>	<b>320</b>	<b>5.3</b>
<b>Basin total</b>	<b>247</b>	<b>9.7</b>	<b>934</b>	<b>7.5</b>

Table 7. Estimated number of fall chinook salmon that escaped to natural spawning areas in the Salmon River basin, 1988. The estimated escapement is stratified by length and sex.

Fork length interval (mm)	Tagged (M)	Sampled (C)	Recaptured (R)	Recovery rate (%) (R/M x 100)	Point estimate (N)	95% confidence limits
<b>Males:</b>						
<600	23	40	3	13.0	246	41-451
600-799	54	67	18	33.3	197	124-270
800-999	289	478	107	37.0	1,286	1,074-1,499
≥1000	95	209	34	35.8	576	404-748
Unknown <sup>a</sup>	--	35	2	--	--	--
<b>Total males</b>	<b>461</b>	<b>829</b>	<b>164</b>	<b>35.6</b>	<b>2,324</b>	<b>2,008-2,640</b>
<b>Females:</b>						
<600	0	0	0	--	0	--
600-799	5	5	3	60.0	9	4-14
800-999	495	744	173	35.0	2,124	1,848-2,399
≥1000	158	404	66	41.8	961	752-1,170
Unknown <sup>a</sup>	2	28	5	--	--	--
<b>Total females</b>	<b>660</b>	<b>1,181</b>	<b>247</b>	<b>37.4</b>	<b>3,150</b>	<b>2,803-3,498</b>
<b>Total</b>	<b>1,121</b>	<b>2,010</b>	<b>411</b>	<b>36.7</b>	<b>5,477<sup>b</sup></b>	<b>5,066-5,948</b>

<sup>a</sup> Chinook salmon with undetermined lengths were added to totals.

<sup>b</sup> The total estimated escapement is an independent estimate based upon the total number of fish tagged, recovered, and sampled.

Table 8. Disposition of the run of fall chinook salmon in Salmon River, 1988.

Stratum	Inriver harvest		Natural spawning		Hatchery retention		Total
	Number	%	Number	%	Number	%	
Adults	2,053	27.4	5,130 <sup>b</sup>	68.3	327	4.4	7,510
Jacks <sup>a</sup>	41	12.3	246	73.9	46	13.8	333
<b>Total</b>	<b>2,094</b>	<b>26.7</b>	<b>5,376<sup>b</sup></b>	<b>68.5</b>	<b>373</b>	<b>4.8</b>	<b>7,843</b>

<sup>a</sup> Jacks are < 610 mm fork length.

<sup>b</sup> Excludes an estimated 101 adults caught in RM 4.9 to 10.3.

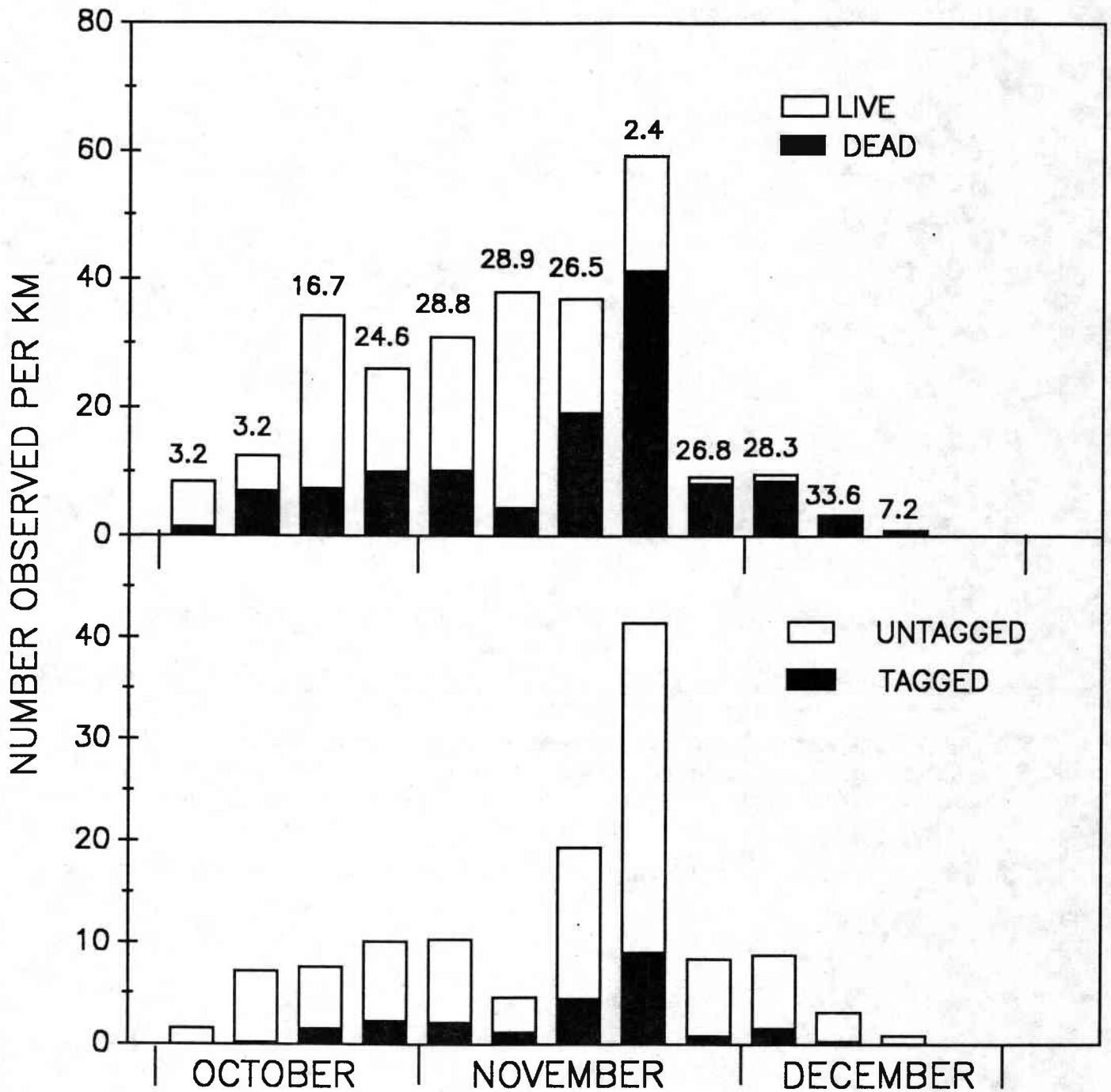


Figure 1. Temporal distribution of live and dead chinook salmon, and tagged and untagged chinook salmon carcasses observed on spawning ground surveys in the Salmon River basin, 1988. The total distance (kilometers) surveyed each week is presented at the top of the bars in the top half of the figure. Timing is based on Julian months.

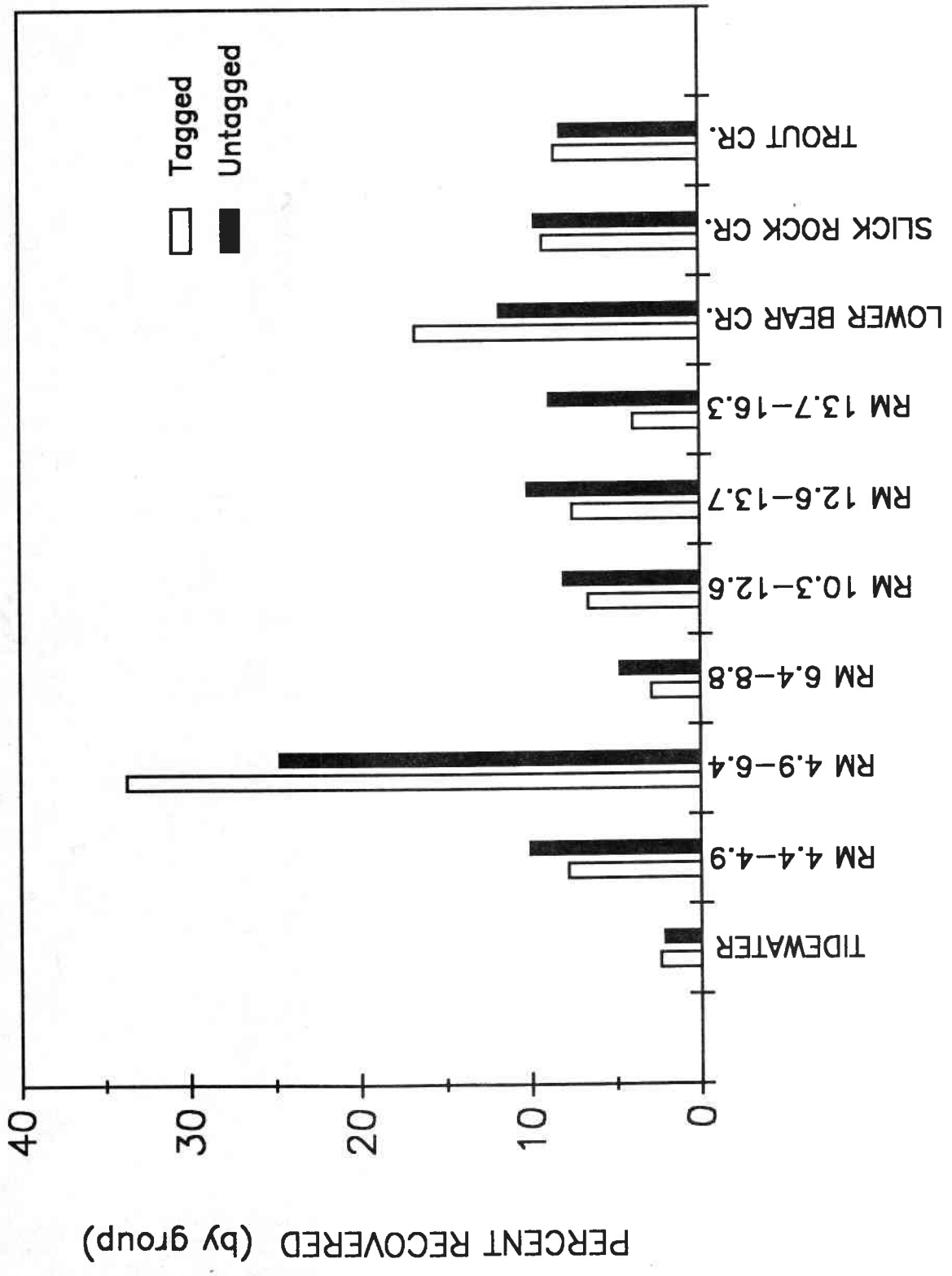


Figure 2. Spatial distribution of tagged and untagged chinook salmon carcasses recovered on spawning surveys in the Salmon River watershed, 1988.

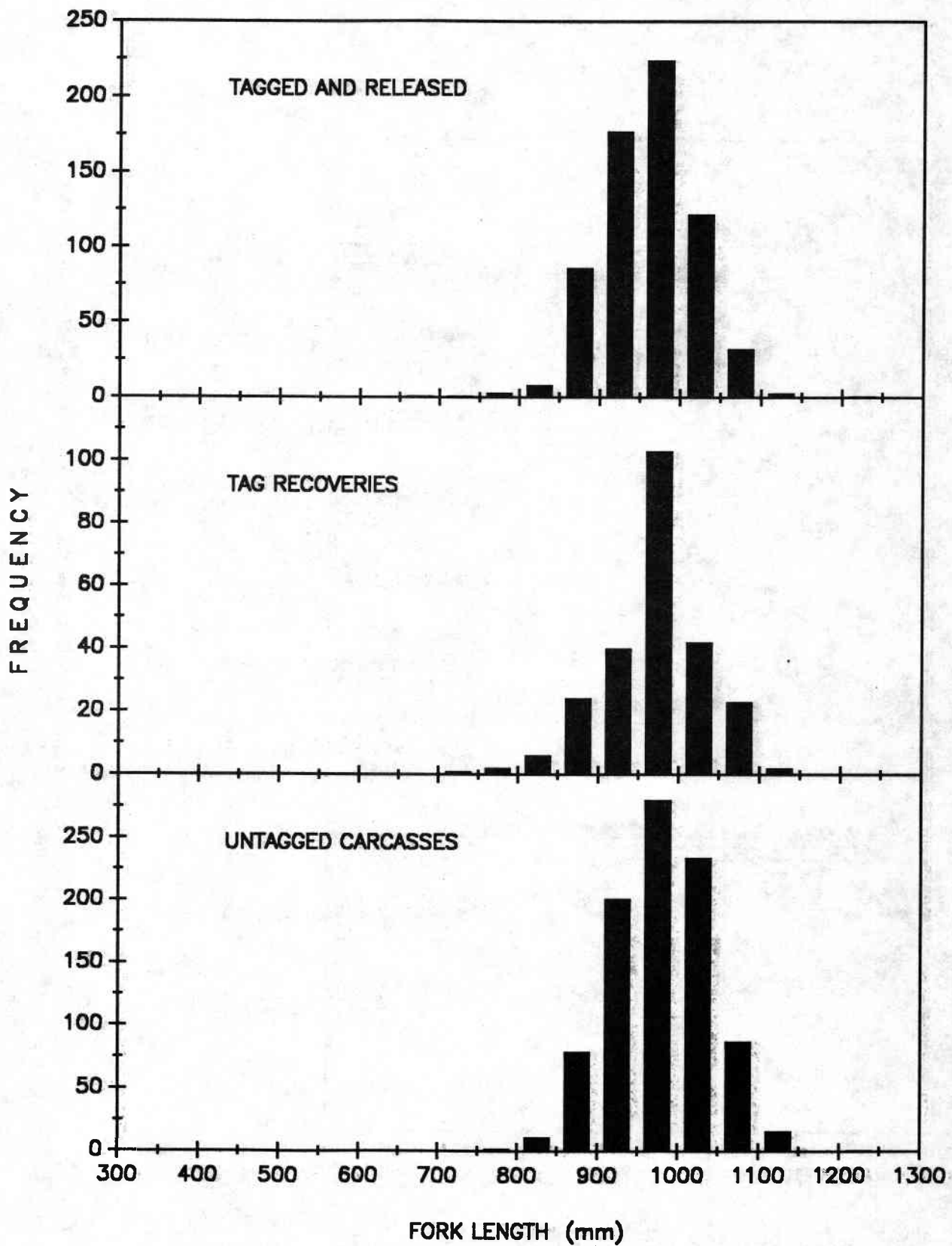


Figure 3. Size composition of female fall chinook salmon tagged and released, and recovered either tagged or untagged on spawning surveys in the Salmon River basin, 1988.

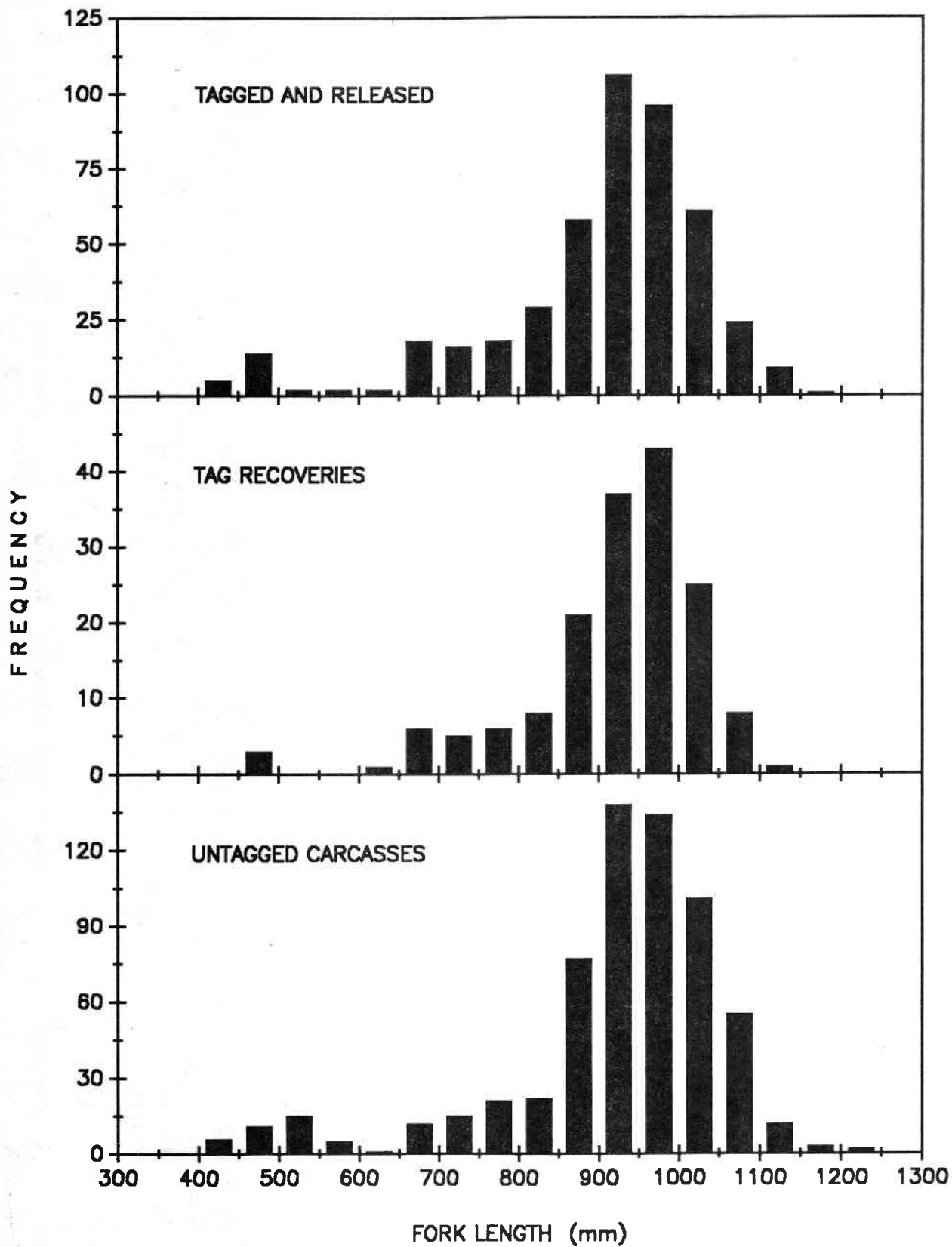


Figure 4. Size composition of male fall chinook salmon tagged and released, and recovered either tagged or untagged on spawning surveys in the Salmon River basin, 1988.



### Coded-wire Tag Recoveries

Estimates of 1988 recoveries of CWT chinook salmon from Salmon River Fish Hatchery are presented in Table 9. Expansion factors used to calculate these estimates appear in APPENDIX C. Estimates of recoveries of CWT chinook salmon from Salmon River Fish Hatchery by individual brood year beginning with 1982 appear in APPENDIX D.

Table 9. Estimated harvest and escapement of Salmon River coded-wire tagged fall chinook salmon, 1988. AK = Alaska, BC = British Columbia, WA = Washington, OR = Oregon, and CA = California.

Brood year (tag code)	Ocean (harvest)					Salmon River			Total
	AK	BC	WA	OR	CA	Inriver harvest	Hatchery recovery	Spawning escapement	
1982 (07 26 47)	8	0	0	0	0	2	1	16	27
1983 (07 27 26)	43	16	0	5	0	40	62	89	255
1984 (07 30 51)	27	8	5	8	0	46	45	134	273
1984 (07 30 52)	35	22	0	10	0	58	68	135	328
1985 (07 33 29)	0	0	0	0	0	0	5	6	11
1985 (07 33 30)	0	8	0	0	0	3	3	9	23
1986 (07 43 21)	0	0	0	0	0	0	5	12	17
1986 (07 43 22)	0	0	0	0	0	4	8	18	30
1986 (07 43 23)	0	0	0	0	0	9	14	37	60
1986 (07 43 24)	0	0	0	0	0	6	4	18	28
1986 (07 33 42)	0	0	0	0	0	0	8	37	45

### DISCUSSION

#### Recreational Fishery

Our sampling indicated that anglers expended 78,663 total hours of effort to harvest 2,094 fall chinook salmon in Salmon River in 1988. Effort levels have increased approximately 40% per year since 1986. The effort of boat anglers in 1988 was more than three times greater than that estimated in 1986. Catch rates have remained relatively constant throughout the study from a high of 34.8 hours per adult chinook salmon in 1986 to a low of 39.9 hours per adult chinook salmon in 1987. During each year boat anglers have consistently had a higher catch rate than bank anglers. The recreational harvest of chinook salmon from Salmon River represented approximately 26.7% of the total number of chinook salmon that entered Salmon River in 1988. Most chinook salmon harvested in 1988 (86%) were caught by anglers that fished in tidewater (RM 1.8-4.3). The high proportion of fish caught in this portion of the basin

resulted in part from low river flows in the early fall of 1988 that restricted the upstream movement of chinook salmon beyond areas influenced by tidal activity.

As in 1987, the estimated catch upstream from the hatchery (RM 4.9 to 10.3) represents a minimal estimate of the actual angler harvest of adults this area of the river. Because the creel survey in this area of the river began after the onset of salmon angling and because not all potential angling locations were surveyed, we believe our sampling underestimated the actual catch. However, based on the duration of the angling season and the estimated angling effort in this area of the river, we believe, the magnitude of this bias was not large and the vast majority of the chinook salmon that passed the hatchery escaped to spawning areas.

Overall, we sampled 32% of chinook salmon that were caught in the 1988 Salmon River recreational fishery. Sampling rates were 23.8% during week days and 45.2% during weekend days.

### Escapement to Natural Spawning Areas

We estimated that 5,477 fall chinook salmon escaped to natural spawning areas in the Salmon River basin in 1988. The 1988 estimated escapement was 120% higher than the 1986 estimate (2,492) and 89% higher than the 1987 estimate (2,896).

The temporal spawning distribution of fall chinook salmon observed in 1988 was more protracted than that observed during 1986 or 1987. Although peak counts of live spawners occurred within 1 week of each other during the 3 years, in 1988, weekly counts of live spawners remained relatively high from mid October through late November (Figure 1). In contrast, in 1986 and 1987, weekly counts of live spawners peaked sharply in early November and decreased rapidly thereafter.

In 1988, approximately 68% of the chinook salmon spawned in the mainstem, with approximately 32% of the fish spawning in the tributaries (Figure 2). This is in contrast to the spatial distribution of spawning observed in 1987, when extremely low water conditions allowed less than 10% of the chinook salmon to spawn in the tributaries.

Overall, methodologies used to estimate the spawning escapement of fall chinook salmon in 1988 appeared to be adequate. Ricker (1975) lists six conditions that must be met to justify the use of the Petersen formula in making an unbiased population estimate. The relevance of these conditions to our estimate in 1988 are discussed as follows:

1. *The marked fish suffer the same natural mortality as the unmarked fish.*

We collected data to estimate the relative incidence of prespawning mortality in tagged and untagged chinook salmon to test the assumption that tagged fish suffer the same natural mortality as the untagged fish. A total of 1,181 female chinook salmon carcasses (247 tagged and 934 untagged) recovered on the spawning grounds were examined for signs of prespawning

mortality (intact ovaries). The overall incidence of prespawning mortality was 9.7% for tagged, and 7.5% for untagged carcasses (Table 6). This difference between these mortality rates was not significant ( $P = 0.31$ , chi-square contingency analysis). Therefore, we concluded that no differential mortality of tagged fish occurred in 1988.

2. *The marked fish are as vulnerable to sampling as are the unmarked fish.*

This subject was previously discussed by Boechler and Jacobs (1987). Those conclusions also apply to the 1988 estimate.

3. *The marked fish do not lose their mark.*

The magnitude of tag loss was assessed by marking each fish with two tags. Surveyors recovering tagged carcasses noted the number of tags present. Of the 411 tagged carcasses recovered, we observed only 21 which had lost one tag. At this rate (2.6% tag loss), assuming loss of each tag occurred independently, approximately 0.07% of the fish would have lost both tags. We felt that this tag loss rate was insignificant so no adjustment was made to the population estimate.

4. *The marked fish become randomly mixed with, and are representative of the unmarked fish.*

The sex composition of tagged carcasses was 39.9% males (including jacks) and 60.1% females. The sex composition of untagged carcasses was 41.6% males (including jacks) and 58.4% females. Based on chi-square contingency analysis the sex composition of tagged and untagged carcasses did not differ significantly ( $P = 0.81$ ). Therefore, we feel tagged fish were representative of the untagged fish with regard to sex composition.

The size composition of the tagged and untagged carcasses appear to be generally similar with the exception that relatively more jacks were recovered as untagged carcasses. Length-frequency distributions of tagged and untagged female carcasses were similar (Figure 3). Length-frequency distributions of tagged and untagged male carcasses were similar for carcasses larger than 600 mm, but relatively more untagged carcasses were recovered at lengths less than 600 mm (Figure 4). However, any difference in size composition between marked and unmarked fish was not large enough to cause significant biases in the population estimate because sums of population estimates calculated for individual fork length strata differed by less than 1% and 2% of the overall population estimates for males and females, respectively (Table 7).

The temporal distribution of recovery differed significantly ( $P < 0.001$ , chi-square contingency analysis) among tagged and untagged carcasses. Although the temporal distribution of recovery was generally similar for both groups, a greater relative portion of the untagged carcasses were recovered during the last four weeks of the recovery season (Figure 1). However, because carcass recovery rates were fairly constant throughout the recovery season (see Table 4, page 7) resulting biases in the population estimate were probably not large.

The spatial distribution of recovery of tagged carcasses differed significantly from the spatial distribution of recovery of untagged carcasses

( $P < 0.001$ , chi-square contingency analysis). This difference may be the result of (1) delays in the migration of tagged fish caused by diverting and holding them in the hatchery, (2) stress, associated with handling and tagging, that impaired the ability of tagged fish to migrate upstream, or (3) differential rates of tagging among segments of the run that spawned in different areas of the basin. The magnitude of bias of the population estimate that resulted from a difference in the spatial distribution of tagged and untagged carcass recovery is dependent upon (1) the magnitude of difference between the spatial distribution of recovery of the two groups, and (2) the magnitude of variation in the rate of carcass recovery among different areas of the basin. Although the spatial distribution of recovery was significantly different among the two groups of fish, the distributions were similar in that both had the same general pattern of recoveries, and tagged carcasses were recovered in all locations where recoveries of untagged fish occurred (Figure 2). Presently we have no way of determining if carcass recovery rates differ among different portions of the watershed; however, because of the relatively small size of the Salmon River basin and the homogeneity of the channel morphology throughout the areas where carcasses are recovered, we believe that little variation occurs in carcass recovery rates among the areas we sample. Therefore, we believe that the difference in the spatial distribution of carcass recovery among tagged and untagged fish in 1988 did not cause an appreciable bias in the estimate of the population size of natural spawners.

5. *All marks are recognized and reported on recovery.*

This subject was previously discussed by Boechler and Jacobs (1987). Those conclusions also apply to the 1988 estimate.

6. *A negligible amount of recruitment to the catchable population occurs during the time of sampling.*

This subject was previously discussed by Boechler and Jacobs (1987). Those conclusions also apply to the 1988 estimate.

#### ACKNOWLEDGEMENTS

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**APPENDIX A**

**Age Composition of Scales Collected from Adult Fall  
Chinook Salmon in the Salmon River Basin, 1988**

Appendix Table A-1. Age composition of scales collected from fall chinook salmon harvested in the Salmon River recreational fishery, 1988.

Age	Male		Female		Sex unknown (number)	TOTAL	
	Number	%	Number	%		Number	%
2	11	7.0	0	- -	0	11	3.1
3	6	3.8	0	- -	0	6	1.7
4	73	46.2	49	25.0	0	122	34.5
5	63	39.9	132	67.4	0	195	55.1
6	5	3.2	15	7.6	0	20	5.6

Appendix Table A-2. Age composition of scales collected from untagged fall chinook salmon carcasses observed on spawning ground surveys in the Salmon River basin, 1988.

Age	Male		Female		Sex unknown (number)	TOTAL	
	Number	%	Number	%		Number	%
2	5	2.4	0	- -	0	5	1.0
3	22	10.3	0	- -	0	22	4.3
4	92	43.2	89	30.4	1	182	35.9
5	87	40.8	180	61.4	0	267	52.7
6	7	3.3	24	8.2	0	31	6.1

**APPENDIX B**

**Results of Spawning Ground Surveys Conducted  
in the Salmon River Watershed, 1988**



SPAWNING FISH SURVEY SUMMARY  
(1988 SPAWNING YEAR)

DISTRICT: 3 LINCOLN  
 BASIN: 16 SALMON RIVER  
 SUBBASIN: 1 MAIN STEM AND BAY  
 SURVEY: 9 TIDEWATER

DISTANCE: .2 MILES (.3 KM)  
 TARGET SPECIES: CHINOOK  
 SURVEY TYPE: SPOT CHECK  
 HATCHERY INFLUENCED

BASE COUNT:  
 1987 PEAK COUNTS: 112 ADULTS (12/18/87)  
 0 JACKS ( )

LOCATION: T06S R10 SECTION W3 SPOT CHECK TIDEWATER AREA OF SALMON RIVER FROM MOUTH OF DEER CREEK  
 #1 UPSTREAM APPROXIMATELY 0.2 MILES TO THE ANGLER ACCESS TRAIL AT  
 THE HATCHERY

\*\*\*\*\*

DATE	FLOW	VIS	WTHR	REDD	SPECIES	ALL FISH			LIVE FISH		DEAD FISH				COMMENTS
						TOTAL	AD	JACK	AD	JACK	AD	MALE	FEMA	JACK	
12/ 6/88	MOD.	2	RAIN		CHINOOK	63	63				63	26	35		2
					CHUM	1	1				1	1			

\*\*\*\*\*

SPAWNING FISH SURVEY SUMMARY  
(1988 SPAWNING YEAR)

DISTRICT: 3 LINCOLN  
 BASIN: 16 SALMON RIVER  
 SUBBASIN: 1 MAIN STEM AND BAY  
 SURVEY: 10 HATCHERY AREA

DISTANCE: .5 MILES (.8 KM)  
 TARGET SPECIES: CHINOOK  
 SURVEY TYPE: SUPPLEMENTAL SURVEY  
 HATCHERY INFLUENCED

BASE COUNT:  
 1987 PEAK COUNTS: 218 ADULTS (11/12/87)  
 9 JACKS (11/12/87)

LOCATION: T6S R10W SECTION 29 SURVEY FROM THE ANGLER ACCESS TRAIL AT THE DOWNSTREAM END OF THE  
 HATCHERY PROPERTY, UPSTREAM 0.5 MILES TO THE HATCHERY WEIR.

\*\*\*\*\*

DATE	FLOW	VIS	WTHR	REDD	SPECIES	ALL FISH			LIVE FISH		DEAD FISH					COMMENTS
						TOTAL	AD	JACK	AD	JACK	AD	MALE	FEMA	JACK	UNKN	
****	****	***	****	****	*****	*****	**	****	**	****	**	****	****	****	****	*****
10/ 3/88	LOW	1	OVER.	5	CHINOOK STEELHEAD	3 1	2	1			2	1	1	1		
10/11/88	LOW	1	OVER.	20	CHINOOK COHO STEELHEAD	14 11 1	10 6	4 5	3 5	4 4	7 1	3 1	3 1	1	1	
10/19/88	LOW	1	RAIN	30	CHINOOK COHO CHUM STEELHEAD	61 7 2 1	56 5 2	5 2	15 4 2	2	41 1	15	25	5	1 1	
10/26/88	LOW	1	CLEAR	32	CHINOOK COHO	62 1	61 1	1	14 1	1	47	12	33		2	DARK IN POOLS SNOUT RECOVERED DEAD TAGGED FISH OBSERVED
11/ 1/88	LOW	1	RAIN	51	CHINOOK COHO CHUM	141 11 5	134 11 5	7	66 9 2	1	68 2 3	19 1 2	40 1 1	6	9	DARK IN POOLS SNOUT RECOVERED DEAD TAGGED FISH OBSERVED
12/ 5/88	MOD.	2	OVER.		CHINOOK COHO CHUM	118 4 5	118 3 5	1			118 3 5	44 2 4	59 1 1	1	15	
12/13/88	LOW	1	OVER.		CHINOOK COHO STEELHEAD	85 1 1	85 1				85 1	19	43 1		23	

\*\*\*\*\*

**SPAWNING FISH SURVEY SUMMARY  
(1988 SPAWNING YEAR)**

DISTRICT: 3 LINCOLN  
 BASIN: 16 SALMON RIVER  
 SUBBASIN: 1 MAIN STEM AND BAY  
 SURVEY: 12 PANTHER CR TO SLICK ROCK CR

DISTANCE: 2.4 MILES (3.9 KM)  
 TARGET SPECIES: CHINOOK  
 SURVEY TYPE: SPOT CHECK  
 HATCHERY INFLUENCED

BASE COUNT:  
 1987 PEAK COUNTS: 137 ADULTS (11/06/87)  
 2 JACKS (11/06/87)

LOCATION: T7S R10W SECTION 4 SURVEY FROM THE MOUTH OF PANTHER CREEK, UPSTREAM 2.4 MILES TO THE MOUTH OF SLICK ROCK CREEK (RIVER MILES 6.4 TO 8.8).

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*****
                ALL FISH          LIVE FISH          DEAD FISH
                *****          *****          *****
DATE   FLOW  VIS  WTHR  REDD  SPECIES  TOTAL  AD  JACK  AD  JACK  AD  MALE  FEMA  JACK  UNKN  COMMENTS
****   ****  ***  ****  ****  *
10/20/88  LOW   1  CLEAR  13  CHINOOK  74  71  3    51  2    20  4  15  1  1
          COHO  5  2  3    1  2    1  1
12/12/88  MOD.  2  OVER.  1  CHINOOK  127 127          127 48  41  38  SNOUT RECOVERED
          COHO  10  9  1    1    8  5  3  1  DEAD TAGGED FISH OBSERVED
          CHUM  5  5          5  2  3
*****
  
```

SPAWNING FISH SURVEY SUMMARY  
(1988 SPAWNING YEAR)

DISTRICT: 3 LINCOLN  
 BASIN: 16 SALMON RIVER  
 SUBBASIN: 1 MAIN STEM AND BAY  
 SURVEY: 15 LITTLE SALMON TO TRIB G

DISTANCE: .6 MILES (1.0 KM)  
 TARGET SPECIES: CHINOOK  
 SURVEY TYPE: SUPPLEMENTAL SURVEY  
 HATCHERY INFLUENCED

BASE COUNT:  
 1987 PEAK COUNTS: JACKS (11/06/87)

LOCATION: T6S R9W SECTION 15 SURVEY FROM THE MOUTH OF LITTLE SALMON RIVER, UPSTREAM 0.6 MILE TO THE MOUTH OF TRIBUTARY G (RIVER MILES 16.3 TO 16.9).

\*\*\*\*\*

DATE	FLOW	VIS	WTHR	REDD	SPECIES	ALL FISH			LIVE FISH		DEAD FISH				COMMENTS
						TOTAL	AD	JACK	AD	JACK	AD	MALE	FEMA	JACK	
****	****	***	****	****	*****	*****	**	****	**	****	**	****	****	****	*****
11/ 7/88	LOW	1	OVER.	5	CHINOOK COHO	16 4	16 4		16 4						
11/17/88	MOD.	1	RAIN	2	CHINOOK	6	6		4		2	2			DARK IN POOLS
11/30/88	MOD.	1	OVER.	2	CHINOOK COHO	4 3	4 3				4 3	1 2	3 1		DARK IN POOLS
12/ 8/88	MOD.	1	OVER.		CHINOOK COHO	5 4	5 4		2		5 2		3 1		2
12/16/88	LOW	1	CLEAR		CHINOOK COHO	1 2	1 2				1 2		1 1		1

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**SPAWNING FISH SURVEY SUMMARY  
(1988 SPAWNING YEAR)**

DISTRICT: 3 LINCOLN  
 BASIN: 16 SALMON RIVER  
 SUBBASIN: 1 MAIN STEM AND BAY  
 SURVEY: 17 PRAIRIE TO LITTLE SALMON

DISTANCE: 2.6 MILES (4.2 KM)  
 TARGET SPECIES: CHINOOK  
 SURVEY TYPE: SUPPLEMENTAL SURVEY  
 HATCHERY INFLUENCED

BASE COUNT:  
 1987 PEAK COUNTS: 39 ADULTS (11/19/87)  
 0 JACKS ( )

LOCATION: T6S R9W SECTION 20 SALMON RIVER FROM PRAIRIE CREEK TO LITTLE SALMON RIVER

DATE	FLOW	VIS	WTHR	REDD	SPECIES	ALL FISH			LIVE FISH		DEAD FISH					COMMENTS
						TOTAL	AD	JACK	AD	JACK	AD	MALE	FEMA	JACK	UNKN	
10/20/88	LOW	1	CLEAR	18	CHINOOK COHO	67 2	64 2	3 2	63 2	3	1			1		LIVE TAGGED FISH OBSERVED DEAD TAGGED FISH OBSERVED DARK IN POOLS
10/30/88	LOW	1	OVER.	27	CHINOOK	68	67	1	17		50	23	27	1		IMPASSABLE BEAVER DAM PREDATION LIVE TAGGED FISH OBSERVED
11/ 7/88	LOW	1	OVER.	40	CHINOOK COHO	205 12	196 11	9 1	190 11	9 1	6	1	4		1	DARK IN POOLS
11/15/88	MOD.	2	RAIN	66	CHINOOK COHO	176 3	173 2	3 1	120 1	3 1	53 1	32	21			SNOUT RECOVERED DEAD TAGGED FISH OBSERVED DARK IN POOLS
11/30/88	MOD.	1	CLEAR		CHINOOK COHO	33 2	33 2		1 1		32 1	14	17		1	REDDS COVERED BY HIGH FLOW
12/ 7/88	MOD.	1	CLEAR		CHINOOK COHO	60 7	60 5		1 2		59 5	21 5	30		8	SNOUT RECOVERED REDDS COVERED BY HIGH FLOW
12/12/88	LOW	1	OVER.	2	CHINOOK COHO	57 6	57 5		1 1		57 4	20 3	27		10	DARK IN POOLS

SPAWNING FISH SURVEY SUMMARY  
(1988 SPAWNING YEAR)

DISTRICT: 3 LINCOLN DISTANCE: 1.5 MILES (2.4 KM) BASE COUNT:  
 BASIN: 16 SALMON RIVER TARGET SPECIES: CHINOOK  
 SUBBASIN: 1 MAIN STEM AND BAY SURVEY TYPE: SUPPLEMENTAL SURVEY 1987 PEAK COUNTS: 592 ADULTS (11/11/87)  
 SURVEY: 18 HATCHERY TO PANTHER CREEK HATCHERY INFLUENCED 8 JACKS (11/11/87)

LOCATION: T6S R10W SECTION 29 SURVEY FROM THE HATCHERY UPSTREAM TO THE MOUTH OF PANTHER CREEK.

DATE	FLOW	VIS	WTHR	REDD	SPECIES	ALL FISH			LIVE FISH		DEAD FISH					COMMENTS
						TOTAL	AD	JACK	AD	JACK	AD	MALE	FEMA	JACK	UNKN	
10/ 3/88	LOW	1	OVER.	15	CHINOOK COHO	24 14	17 14	7	15 14	7	2		2			
10/11/88	LOW	1	FOGGY	23	CHINOOK COHO	29 4	26 3	3 1	8 3	2	18	3	13	1	2	
10/19/88	LOW	1	OVER.	65	CHINOOK COHO	216 10	211 8	5 2	162 8	3 1	49	16	32	2	1	
10/27/88	LOW	1	CLEAR	78	CHINOOK COHO	351 14	341 9	10 5	209 8	3 3	132 1	41	87	7	4	
11/ 2/88	LOW	2	RAIN	56	CHINOOK COHO	394 4	382 1	12 3	205 1	1 3	177	67	99	11	11	SNOUT RECOVERED DEAD TAGGED FISH OBSERVED
11/ 9/88	MOD.	2	RAIN	48	CHINOOK COHO	298 4	296 2	2 2	190 1	1	106 1	33	70	1	3	DARK IN POOLS ACTUAL NO. PROBABLY HIGHER SNOUT RECOVERED
11/19/88	MOD.	2	OVER.	32	CHINOOK COHO CHUM STEELHEAD	171 4 3 1	170 3 3	1 1	43 1		127 2 3	47 1 2	73 1 1	1 1	7	SNOUT RECOVERED DEAD TAGGED FISH OBSERVED
12/ 2/88	MOD.	2	OVER.	13	CHINOOK COHO CHUM STEELHEAD	85 4 2 1	85 3 2	1	3 1		82 3 1	28 2 1	36 1 1		18	
12/ 9/88	MOD.	1	CLEAR	3	CHINOOK COHO	41 2	41 2		1		40 2	11 1	17 1		12	DARK IN POOLS
12/14/88	LOW	1	CLEAR		CHINOOK COHO	23 4	23 3	1	1		23 2	7 2	9	1	7	DARK IN POOLS

SPAWNING FISH SURVEY SUMMARY  
(1988 SPAWNING YEAR)

DISTRICT: 3 LINCOLN  
 BASIN: 16 SALMON RIVER  
 SUBBASIN: 1 MAIN STEM AND BAY  
 SURVEY: 19 WIDOW CR. TO DEER CR. NO. 2

DISTANCE: 2.3 MILES (3.7 KM)  
 TARGET SPECIES: CHINOOK  
 SURVEY TYPE: SUPPLEMENTAL SURVEY  
 HATCHERY INFLUENCED

BASE COUNT:  
 1987 PEAK COUNTS: 37 ADULTS (11/25/87)  
 2 JACKS (11/05/87)

LOCATION: T6S R10W SECTION 25 SURVEY FROM THE MOUTH OF WIDOW CREEK UPSTREAM 2.3 MILES TO THE MOUTH OF DEER CREEK NO. 2.

DATE	FLOW	VIS	WTHR	REDD	SPECIES	ALL FISH			LIVE FISH		DEAD FISH				COMMENTS
						TOTAL	AD	JACK	AD	JACK	AD	MALE	FEMA	JACK	
10/21/88	LOW	1	OVER.	20	CHINOOK COHO	87 1	84 1	3	76 1	3	8	2	6		DARK IN POOLS LIVE TAGGED FISH OBSERVED DEAD TAGGED FISH OBSERVED
10/28/88	LOW	1	OVER.	21	CHINOOK	67	67		35		32	13	17	2	
11/ 4/88	MOD.	2	OVER.	21	CHINOOK	91	90	1	54		36	15	18	1	3 DARK IN POOLS SNOUT RECOVERED DEAD TAGGED FISH OBSERVED
11/ 9/88	MOD.	2	RAIN	17	CHINOOK	68	68		45		23	14	8	1	SNOUT RECOVERED
11/15/88	HIGH	2	RAIN	8	CHINOOK	75	75		29		46	20	20	6	
12/ 1/88	MOD.	2	CLEAR	4	CHINOOK	73	73		1		72	31	31	10	
12/ 8/88	MOD.	2	CLEAR		CHINOOK COHO STEELHEAD	59 7 1	59 6	1			59 6	17 5	25	1	17 SNOUT RECOVERED 1 REDDS COVERED BY HIGH FLOW
12/13/88	LOW	1	RAIN	2	CHINOOK COHO	40 4	40 3	1			40 3	10 3	12	1	18 DARK IN POOLS





**SPAWNING FISH SURVEY SUMMARY  
(1988 SPAWNING YEAR)**

DISTRICT: 3 LINCOLN  
 BASIN: 16 SALMON RIVER  
 SUBBASIN: 1 MAIN STEM AND BAY  
 SURVEY: 32 SALMON CREEK (2)

DISTANCE: 1.5 MILES (2.4 KM)  
 TARGET SPECIES: CHINOOK  
 SURVEY TYPE: SUPPLEMENTAL SURVEY  
 HATCHERY INFLUENCED

BASE COUNT:  
 1987 PEAK COUNTS: 3 ADULTS (12/07/87)  
 0 JACKS ( )

LOCATION: T6S R10W SECTION 30 SURVEY FROM THE THREE ROCKS ROAD UPSTREAM 1.5 MILES TO THE CONFLUENCE WITH TELEPHONE CREEK.

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DATE	FLOW	VIS	WTHR	REDD	SPECIES	ALL FISH			LIVE FISH		DEAD FISH				COMMENTS
						TOTAL	AD	JACK	AD	JACK	AD	MALE	FEMA	JACK	
10/24/88	LOW	1	CLEAR												
10/31/88	LOW	1	OVER.												
11/ 8/88	LOW	2	RAIN	22	CHINOOK	17	16	1	16	1					
					COHO	11	10	1	10	1					
					CHUM	15	15		14		1		1		
11/18/88	HIGH	2	OVER.	9	CHINOOK	17	16	1	11	1	5	1	4		SNOUT RECOVERED
					COHO	6	6		4		2	1	1		DARK IN POOLS
					CHUM	4	4		4						DEAD TAGGED FISH OBSERVED
11/28/88	HIGH	2	OVER.	2	CHINOOK	5	5		1		4	1	3		
					COHO	1	1				1	1			
					CHUM	6	6		2		4	2	2		
12/ 7/88	MOD.	1	CLEAR	1	CHINOOK	4	4				4		2		2
					COHO	4	4				4	2	1		1
					CHUM	6	6				6	2	4		
12/12/88	LOW	1	FOGGY		CHINOOK	2	2				2		2		DARK IN POOLS
					COHO	1	1				1	1			
					CHUM	1	1				1		1		

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SPAWNING FISH SURVEY SUMMARY  
(1988 SPAWNING YEAR)

DISTRICT: 3 LINCOLN  
 BASIN: 16 SALMON RIVER  
 SUBBASIN: 1 MAIN STEM AND BAY  
 SURVEY: 41 DEER CREEK NO. 1

DISTANCE: 1.4 MILES (2.3 KM)  
 TARGET SPECIES: CHINOOK  
 SURVEY TYPE: SUPPLEMENTAL SURVEY  
 HATCHERY INFLUENCED

BASE COUNT:  
 1987 PEAK COUNTS: 1 ADULTS (12/02/87)  
 0 JACKS ( )

LOCATION: T6S R10W SECTION 30 SURVEY FROM THE MOUTH, UPSTREAM 1.4 MILES TO A SIX FOOT WATERFALL.

\*\*\*\*\*

DATE	FLOW	VIS	WTHR	REDD	SPECIES	ALL FISH			LIVE FISH		DEAD FISH					COMMENTS
						TOTAL	AD	JACK	AD	JACK	AD	MALE	FEMA	JACK	UNKN	
10/24/88	LOW	1	CLEAR													
11/ 3/88	LOW	1	OVER.	1	COHO CHUM	4 1	2 1	2 2	2 1	2 2						
11/ 8/88	MOD.	2	RAIN		COHO	1	1		1							
11/18/88	HIGH	2	OVER.		CHINOOK COHO CHUM	2 7 8	2 6 8		1 6 5	1 1	1 3	1 1	2 2			DARK IN POOLS DEAD TAGGED FISH OBSERVED
11/30/88	MOD.	2	CLEAR		CHINOOK COHO	2 5	2 5			2 5		2 2		2 1		SNOUT RECOVERED
12/ 7/88	MOD.	1	CLEAR	1	CHINOOK COHO CHUM	2 10 1	2 9 1		1 1	1 1	2 8 1	3 3	1 1		4	
12/12/88	LOW	1	OVER.		CHINOOK COHO	1 2	1 1		1 1		1 1			1 1		1 DEAD TAGGED FISH OBSERVED

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SPAWNING FISH SURVEY SUMMARY  
(1988 SPAWNING YEAR)

DISTRICT: 3 LINCOLN  
BASIN: 16 SALMON RIVER  
SUBBASIN: 1 MAIN STEM AND BAY  
SURVEY: 71 BEAR CREEK (LOWER)

DISTANCE: 2.0 MILES (3.2 KM)  
TARGET SPECIES: CHINOOK  
SURVEY TYPE: SUPPLEMENTAL SURVEY  
HATCHERY INFLUENCED

BASE COUNT:  
1987 PEAK COUNTS: 41 ADULTS (12/02/87)  
1 JACKS (11/13/87)

LOCATION: T7S R10W SECTION 3 SURVEY FROM THE MOUTH, UPSTREAM 2.0 MILES TO A POINT 0.5 MILE ABOVE  
BEAR CREEK ROAD BRIDGE.

DATE	FLOW	VIS	WTHR	REDD	SPECIES	ALL FISH			LIVE FISH		DEAD FISH					COMMENTS
						TOTAL	AD	JACK	AD	JACK	AD	MALE	FEMA	JACK	UNKN	
****	****	***	****	****	*****	*****	**	****	**	****	**	****	****	****	****	*****
10/24/88	LOW	1	CLEAR	6	CHINOOK	11	10	1	6		4	3	1	1		LIVE TAGGED FISH OBSERVED PASSABLE LOG JAM SNOUT RECOVERED
10/31/88	LOW	1	OVER.	11	CHINOOK COHO	13 1	12 1	1			12	6	5	1	1	
11/ 7/88	MOD.	1	OVER.	23	CHINOOK CHUM	191 22	185 22	6	176 22	6	9	4	5			SNOUT RECOVERED
11/14/88	MOD.	1	OVER.	116	CHINOOK COHO CHUM	320 51 38	308 42 38	12 9	161 34 21	8 8	147 8	63 4	82 4	4 1	2	POACHING
11/29/88	HIGH	2	CLEAR	19	CHINOOK COHO	77 17	77 15		13 5		64 10	22 5	33 5		2	9 SNOUT RECOVERED LIVE TAGGED FISH OBSERVED DEAD TAGGED FISH OBSERVED
12/ 6/88	MOD.	1	RAIN	11	CHINOOK COHO CHUM	110 14 4	109 14 4	1	15 3		94 11 4	27 7 2	40 4 1	1	27	
12/13/88	LOW	1	OVER.	11	CHINOOK COHO CHUM	67 14 2	67 12 2		3 3		64 9 2	18 4 1	30 2 1		16 3	
12/21/88	MOD.	2	OVER.	8	CHINOOK COHO	58 11	57 9	1 2		4	57 5	5 1	17 1	1 2	35 3	

SPAWNING FISH SURVEY SUMMARY  
(1988 SPAWNING YEAR)

DISTRICT: 3 LINCOLN  
 BASIN: 16 SALMON RIVER  
 SUBBASIN: 1 MAIN STEM AND BAY  
 SURVEY: 77 BEAR CREEK (MIDDLE)

DISTANCE: 1.4 MILES (2.3 KM)  
 TARGET SPECIES: CHINOOK  
 SURVEY TYPE: SUPPLEMENTAL SURVEY  
 HATCHERY INFLUENCED

BASE COUNT:  
 1987 PEAK COUNTS: 7 ADULTS (12/07/87)  
 0 JACKS ( )

LOCATION: T7S R10W SECTION 4 BEGIN AT THE ALUMINUM MARKER 0.5 MILES ABOVE THE BEAR CREEK ROAD  
 BRIDGE AND SURVEY UPSTREAM 1.4 MILES TO THE BRIDGE ON TROUT CREEK RD.

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DATE	FLOW	VIS	WTHR	REDD	SPECIES	ALL FISH			LIVE FISH		DEAD FISH					COMMENTS
						TOTAL	AD	JACK	AD	JACK	AD	MALE	FEMA	JACK	UNKN	
10/24/88	LOW	1	CLEAR													
10/31/88	LOW	1	OVER.													
11/ 7/88	LOW	1	OVER.	9	CHINOOK COHO	6 23	6 16	7	6 16	7						
11/14/88	LOW	1	OVER.	9	CHINOOK COHO	1 12	1 10	2	1 7	2	3	2	1			
11/29/88	HIGH	1	CLEAR	3	COHO	3	3		2		1	1				
12/ 8/88	MOD.	1	OVER.	6	CHINOOK COHO	3 14	3 12	2	2 4		1 8	1 6	2	2		
12/13/88	LOW	1	OVER.	2	CHINOOK COHO	4 12	4 11	1 1	1 1		3 10	2 7	1 2	1 1	1	

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SPAWNING FISH SURVEY SUMMARY  
(1988 SPAWNING YEAR)

DISTRICT: 3 LINCOLN  
 BASIN: 16 SALMON RIVER  
 SUBBASIN: 1 MAIN STEM AND BAY  
 SURVEY: 81 SLICK ROCK CREEK

DISTANCE: 1.3 MILES (2.1 KM)  
 TARGET SPECIES: CHINOOK  
 SURVEY TYPE: SPOT CHECK  
 HATCHERY INFLUENCED

BASE COUNT:  
 1987 PEAK COUNTS: 52 ADULTS (11/20/87)  
 1 JACKS (11/20/87)

LOCATION: T6S R10W SECTION 35 SURVEY FROM THE MOUTH, UPSTREAM 1.3 MILES TO THE MOUTH OF TROUT CREEK

\*\*\*\*\*

DATE ****	FLOW ****	VIS ***	WTHR ****	REDD ****	SPECIES *****	ALL FISH *****			LIVE FISH *****		DEAD FISH *****					COMMENTS *****
						TOTAL *****	AD **	JACK ****	AD **	JACK ****	AD **	MALE ****	FEMA ****	JACK ****	UNKN ****	
10/25/88	LOW	1	CLEAR	11	CHINOOK COHO	51 4	49 4	2	34 4	2	15	2	13		LIVE TAGGED FISH OBSERVED DEAD TAGGED FISH OBSERVED SNOUT RECOVERED	
11/ 3/88	MOD.	2	OVER.	13	CHINOOK COHO	101 2	101 2		80 2		21	2	19			
11/ 8/88	MOD.	2	RAIN	30	CHINOOK	90	90		66		24	5	15	4	MOST CARCASSES WASHED OUT ACTUAL NO. PROBABLY HIGHER COUNT IN HOLES ESTIMATED	
11/18/88	MOD.	2	OVER.	15	CHINOOK COHO	165 1	165 1		22 1		143	46	92	5		
12/ 5/88	MOD.	1	RAIN	11	CHINOOK COHO	67 10	67 8	2	2 3	1	65 5	13 2	32 1	20 1	2	
12/14/88	LOW	1	CLEAR	3	CHINOOK	18	18		1		17	5	8	4	HIGH GLARE	
12/21/88	MOD.	2	RAIN	4	CHINOOK	33	33				33	7	11	15		

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SPAWNING FISH SURVEY SUMMARY  
(1988 SPAWNING YEAR)

DISTRICT: 3 LINCOLN  
 BASIN: 16 SALMON RIVER  
 SUBBASIN: 1 MAIN STEM AND BAY  
 SURVEY: 91 TROUT CREEK

DISTANCE: 1.2 MILES (1.9 KM)  
 TARGET SPECIES: CHINOOK  
 SURVEY TYPE: SUPPLEMENTAL SURVEY  
 HATCHERY INFLUENCED

BASE COUNT:  
 1987 PEAK COUNTS: 42 ADULTS (11/23/87)  
 2 JACKS (11/16/87)

LOCATION: T7S R10W SECTION 1 SURVEY FROM THE MOUTH UPSTREAM 1.2 MILES TO A FOUR-STEP FALLS IN A NARROW CANYON.

\*\*\*\*\*

DATE	FLOW	VIS	WTHR	REDD	SPECIES	ALL FISH			LIVE FISH		DEAD FISH					COMMENTS
						TOTAL	AD	JACK	AD	JACK	AD	MALE	FEMA	JACK	UNKN	
****	****	***	****	****	*****	*****	**	****	**	****	**	****	****	****	****	*****
10/25/88	LOW	1	CLEAR	11	CHINOOK	70	66	4	48	4	18	6	12			SNOUT RECOVERED LIVE TAGGED FISH OBSERVED DEAD TAGGED FISH OBSERVED
11/ 3/88	MOD.	2	OVER.	5	CHINOOK COHO	110 1	105 1	5	81 1	5	24	6	18			
11/ 8/88	MOD.	1	RAIN	1	CHINOOK COHO	162 3	157 3	5	145 3	5	12	1	9	2		MOST CARCASSES WASHED OUT LIVE TAGGED FISH OBSERVED DEAD TAGGED FISH OBSERVED
11/18/88	HIGH	2	OVER.	16	CHINOOK COHO	145 8	144 4	1 4	36 4	3	108	27	71	1 1	10	
11/30/88	HIGH	2	CLEAR	2	CHINOOK COHO	22 5	22 5		3		19 5	7 4	12 1			
12/ 9/88	MOD.	1	OVER.	2	CHINOOK COHO	30 3	30 3		3 1		27 2	3 1	15		9 1	
12/14/88	LOW	1	CLEAR		CHINOOK COHO	18 4	18 4		2		18 2	3 1	8 1		7	
12/21/88	MOD.	2	RAIN		CHINOOK COHO	15 5	15 5				15 5	1 2	6 2		8 1	DARK IN POOLS

\*\*\*\*\*

**APPENDIX C**

**Data and Expansion Factors used to Calculate Estimates of Coded-wire  
Tagged Fall Chinook Salmon in the Salmon River Basin, 1988**

Appendix Table C-1. Data and expansion factors used to calculate the weekly estimates of coded-wire tagged fall chinook salmon caught in the Salmon River recreational fishery, 1988.

CWT expansion component	Statistical week <sup>a</sup>												
	34	35	36	37	38	39	40	41	42	43	44	45	
<b>ADULTS:</b>													
Estimated catch (N)	3	75	78	242	256	426	373	230	117	143	34	76	
Fish sampled (T)	1	23	39	82	78	142	97	83	48	39	10	13	
Adipose-clips observed (A)	0	2	4	5	7	15	8	9	5	4	0	1	
Snouts recovered <sup>b</sup>	0	2	4	4	5	13	7	11	4	4	0	1	
Snouts processed (S)	0	2	4	4	5	13	7	11	4	3	0	1	
Snouts with CWT (W)	0	2	4	4	3	12	6	7	2	3	0	1	
Snouts without CWT	0	0	0	0	2	1	1	4	2	0	0	0	
CWT decoded (D)	0	2	4	4	3	12	6	7	2	3	0	1	
CWT expansion factor (E)	--	3.26	2.00	3.70	4.59	3.46	4.39	2.27	3.05	4.89	--	5.89	
<b>JACKS:</b>													
Estimated catch (N)	3	10	4	4	0	18	0	2	0	0	0	0	
Fish sampled (T)	1	4	2	2	0	4	0	1	0	0	0	0	
Adipose-clips observed (A)	0	2	1	1	0	3	0	1	0	0	0	0	
Snouts recovered <sup>b</sup>	0	2	0	1	0	3	0	1	0	0	0	0	
Snouts processed (S)	0	2	0	1	0	3	0	1	0	0	0	0	
Snouts with CWT (W)	0	1	0	1	0	3	0	1	0	0	0	0	
Snouts without CWT	0	1	0	0	0	0	0	0	0	0	0	0	
CWT decoded (D)	0	1	0	1	0	3	0	1	0	0	0	0	
CWT expansion factor (E)	--	2.50	--	2.00	--	4.50	--	2.00	--	--	--	--	

<sup>a</sup> Monday through Sunday.

<sup>b</sup> Includes voluntary recoveries.



Appendix Table C-2. Data and expansion factors used to estimate the number of coded-wire tagged fall chinook salmon that escaped to natural spawning areas in the Salmon River basin, 1988.

CWT expansion components		Length stratum (fork length, mm)							
		Males				Females			
		<600	600-799	800-999	≥1,000	<600	600-799	800-999	≥1,000
Population estimate	(N)	246	197	1,286	576	0	9	2,124	961
Fish sampled	(T)	40	67	478	209	0	5	744	404
Adipose-clips observed	(A)	22	6	48	12	0	0	74	35
Snouts recovered		22	6	48	12	0	0	73	34
Snouts processed	(S)	22	6	47	12	0	0	73	34
Snouts with CWT	(W)	21	5	38	12	0	0	63	26
Snouts without CWT		1	1	9	0	0	0	10	8
CWT decoded	(D)	21	5	37	12	0	0	62	26
CWT expansion factor	(E)	6.15	2.94	2.82	2.76	0.00	0.00	2.94	2.45

**APPENDIX D**

**Estimated Harvest and Escapement of Coded-wire Tagged Fall  
Chinook Salmon Released from Salmon River Fish Hatchery  
Summarized by Individual Brood Year**

Appendix Table D-1. Estimated harvest and escapement of CWT chinook salmon released from Salmon River Fish Hatchery, by brood year. AK = Alaska; BC = British Columbia; WA = Washington; OR = Oregon; and CA = California.

Tag code	Recovery year	Ocean harvest										Inriver returns			Grand total									
		Commercial					Recreational					Recreational harvest	Hatchery recoveries	Spawning escapement		Total								
		AK	BC	WA	OR	CA	AK	BC	WA	OR	CA						Total							
		1982 Brood year																						
07-26-47:	1984	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	13	13	69	226	251	27		
	1985	6	61	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	106	152	19			
	1986	74	46	0	0	0	0	0	0	0	0	0	0	0	25	71	27	16						
	1987	41	55	0	3	0	0	0	0	0	0	0	0	0	65	60	1							
	1988	8	0	0	0	0	0	0	0	0	0	0	0	0	2									
		1983 Brood year																						
07-27-26:	1985	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34	
	1986	8	24	0	0	0	0	0	0	0	0	0	0	0	22	10	34	59	35	89	62	40	111	
	1987	29	38	0	4	0	0	0	2	2	0	75	68	47	68	48	134	20	134	225	191	112	273	
	1988	43	16	0	0	0	0	0	0	0	5	64	45	40	45	5	64	64	134	225	191	112	273	
	1989																							
		1984 Brood year																						
07-30-51:	1986	1	20	0	0	0	0	0	0	0	0	0	0	0	21	5	64	20	134	225	191	112	273	
	1987	2	16	0	5	0	0	0	0	0	0	23	21	21	48	4	64	20	134	225	191	112	273	
	1988	27	8	5	0	0	0	0	0	0	8	48	46	46	45	4	64	20	134	225	191	112	273	
	1989																							
	1990																							
		1985 Brood year																						
07-30-52:	1986	0	0	0	0	0	0	0	0	0	0	3	3	11	5	4	32	11	135	261	191	112	328	
	1987	7	18	0	4	0	0	0	0	0	2	31	26	26	44	4	32	11	135	261	191	112	328	
	1988	35	22	0	5	0	0	0	0	0	5	67	58	58	68	4	32	11	135	261	191	112	328	
	1989																							
	1990																							
		1985 Brood year																						
07-33-29:	1987	0	0	0	0	0	0	0	0	0	0	1	1	5	7	0	0	0	6	12	19	13	69	
	1988	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	106	152	19	69	226	
	1989																							
	1990																							
	1991																							





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