

MANAGEMENT OF THE TROLL SALMON FISHERY

**Annual and Completion Report
October 1, 1977 to September 30, 1978**

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MANAGEMENT OF THE OCEAN SALMON FISHERY

INTRODUCTION

The Troll Salmon Investigation is responsible for obtaining fishery and biological data, analyzing these data, and recommending appropriate management options for the troll fishery. Proposed management options are designed to achieve the optimum use of the salmon resource on a sustained basis.

Activities pursued during FY 1978 included the sampling and analysis of catch statistics, chinook age composition, mark recovery data, and coded wire tag data. Short term work was conducted to study chinook maturity, to evaluate a troll season extension for chinook salmon off southern Oregon, and to obtain random coho scales for a Research Section scale study to separate hatchery and wild coho.

The 1977 Troll Salmon Season

Regulations

The following regulations were promulgated by the Pacific Fisheries Management Council for the 1977 commercial troll season. The major change was to establish a management boundary at Tillamook Head.

The 1977 chinook troll season opened on May 1 and continued through October 31 with two exceptions. The first exception was the June 15-30 closure north of Tillamook Head. The second exception was the one month extension (November) off the Elk and Chetco Rivers. The 1977 coho season opened on June 15th south of Tillamook Head and July 1st north of Tillamook Head. The coho season closed on October 31st, with the exception of the one month extension off the Elk and Chetco Rivers.

The Department of Fish and Wildlife extended the troll season through November, 1977 in two areas off the southern Oregon coast. The purpose of the extension was to reduce the numbers of surplus hatchery chinook anticipated at the Elk and Chetco River stations. The extended fishery was restricted to the following areas:

Elk River Area: Cape Blanco south to Humbug Mountain and offshore to three miles.

Chetco River Area: Goat Island south to the California-Oregon border and offshore to three miles.

Catch Statistics

Final 1977 Oregon troll fishery landings are summarized in Tables 1 and 2 for chinook and coho respectively. The number of individual Oregon salmon landings made during 1977 was tabulated as a measure of fishing effort (Table 3). Landings from May 1 to June 15 were exclusively chinook. Columbia River area includes Astoria, Warrenton and Tillamook. Newport area includes Pacific City, Depoe Bay and Newport. Coos Bay area includes Florence, Winchester Bay, Coos Bay, Bandon, Port Orford and Gold Beach.

Troll chinook landings were 3,985,000 pounds round weight in 1977, up 80% over the 2,210,000 pounds round landed in 1976 (Figure 1). The 1977 landings were

Table 1. Oregon Troll Chinook Catch Statistics for 1977 by Area and Month

Category and Month	Columbia River	Newport	Coos Bay	Brookings	Total
<u>No. of Lbs Round</u>					
May	55,754	43,060	66,652	19,301	184,767
June	221,758	153,039	199,265	35,274	609,336
July	145,434	202,918	816,853	134,880	1,300,085
August	32,845	453,145	778,264	71,422	1,335,676
September	28,405	37,313	242,249	47,045	355,012
October	12,584	7,472	60,832	51,858	132,746
November	0	0	38,012	29,052	67,064
Total	496,780	896,947	2,202,127	388,832	3,984,686
<u>No. of Fish</u>					
May	5,897	3,460	7,250	1,752	18,359
June	18,256	11,717	17,393	3,066	50,432
July	12,518	14,568	67,862	12,620	107,568
August	3,063	32,869	73,729	6,689	116,350
September	2,442	3,241	23,213	3,805	32,701
October	1,028	589	5,245	3,601	10,463
November	0	0	2,611	1,530	4,141
Total	43,204	66,444	197,303	33,063	340,014

Table 2. Oregon Troll Coho Catch Statistics for 1977 by Area and Month

Category and Month	Columbia River	Newport	Coos Bay	Brookings	Total
<u>No. of Lbs Round</u>					
June	208,113	89,845	181,969	3,656	483,583
July	411,061	635,998	722,526	46,115	1,815,700
August	83,792	327,299	232,622	11,566	655,279
September	25,205	24,420	23,103	1,158	73,886
October	4,184	1,518	2,613	159	8,474
November	0	0	0	0	0
Total	732,355	1,079,080	1,162,833	62,654	3,035,922
<u>No. of Fish</u>					
June	40,999	15,892	34,555	549	91,995
July	69,433	90,419	98,200	5,646	263,698
August	11,166	39,042	28,312	1,251	79,771
September	3,909	2,872	2,798	113	9,692
October	470	164	319	13	956
November	0	0	0	0	0
Total	125,977	148,389	164,184	7,572	446,122

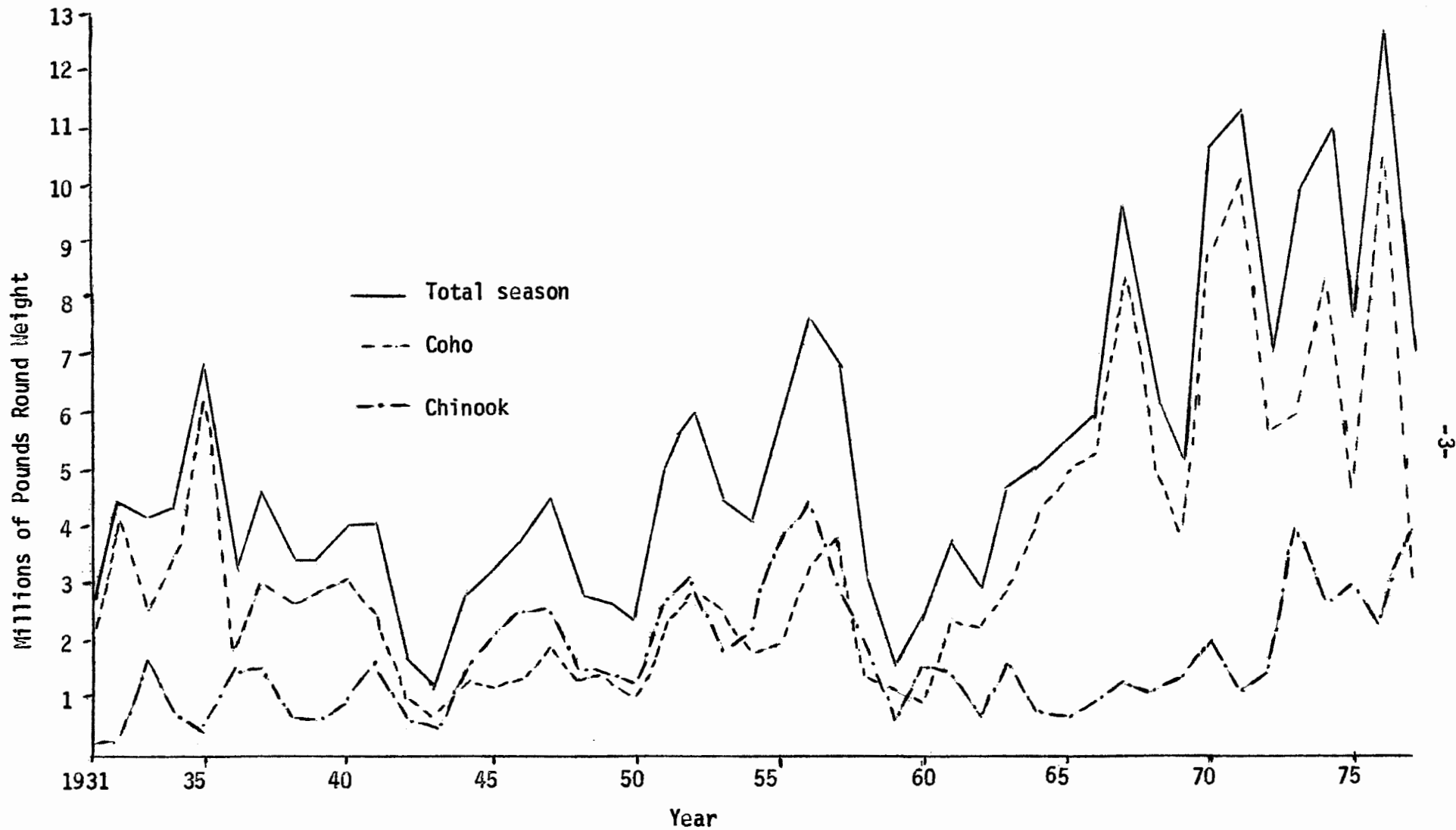


Figure 1. Oregon Ocean Troll Salmon Production, 1931-1977

1,966,000 pounds (97%) above the 1967-76 average. The excellent 1977 landings are the second best on record. The chinook landings were excellent in all areas from June through August.

Table 3. Number of Individual Salmon Landings in Oregon for 1977 by Area and Month.

Month	Landing Area				Total
	Columbia	Newport	Coos Bay	Brookings	
May	329	698	1,035	245	2,307
June	1,006	2,698	3,512	362	7,578
July	5,386	15,351	25,346	3,173	49,256
August	1,165	6,763	9,179	870	17,977
September	454	1,387	2,685	519	5,045
October	130	212	726	945	2,013
November			301	600	901
Total	8,470	27,109	42,784	6,714	85,077

The 1977 troll coho landings were 3,037,000 pounds round compared to 10,420,000 pounds landed in 1976 (Figure 1). The 1977 landings were 4,030,000 pounds (57%) below the 1967-76 average. Coho landings were poor in all areas during the entire season.

Extended Troll Season

Chinook landings during the extended season were 67,000 pounds round weight or an estimated 4,141 fish. No coho landings were reported during this period.

An anticipated benefit of the extended season has always been the high incidence of mature Elk and Chetco chinook observed in the catch. This year was somewhat exceptional in that many unmarked chinook were landed during the period from November 13 to November 19. It is impossible to determine the origin of these fish although some may have been Elk River wild stock.

Most of the marked fish recoveries at Port Orford were actual or probable Elk River chinook (Table 6). Weekly landings consisted of 73 to 77% Elk River Hatchery fish except during the third week of the season when the percentage dropped to only 9%. The influx of small unmarked chinook reduced the overall incidence of Elk River Hatchery fish to 58%. Based on past experience, this is somewhat lower than usual. However, stream surveys on the Elk River also indicated a larger population of wild fish on the spawning areas. This could partially account for the unmarked fish taken in the troll fishery.

Fifty-eight percent of the chinook landed were in their 3rd year of life which is a reversal from previous years. Normally fish in their fourth year of life and older will make up 60 to 70% of the extended season landings. Age composition data from fish sampled in Elk River also indicated over 50% age 3 fish.

The extended season reduced the return of chinook to both the Elk and Chetco Rivers. Both the troll and sport fisheries took substantial numbers of large chinook. Adequate numbers of chinook entered Elk River to meet the needs of hatchery and wild production.

1977 Troll Chinook Age Composition

Chinook landings were sampled at several ports to obtain age composition information. Scales were taken from 2,672 chinook. Plastic impressions were prepared from these scales and ages were determined. Age composition estimates were applied to the total landings.

As in most years, fish in their third year of life were predominant (Figure 2). In 1977, third-year fish represented 70% and fourth-year fish 27% of the total catch. The 1967-76 average was 64% for third-year fish and 33% for fourth-year fish.

Troll Salmon Mark Sampling

Two samplers each were assigned to both Astoria and Charleston. Newport, Port Orford and Brookings were assigned one sampler each. This sampling effort resulted in 22% of all chinook and 19% of all coho being examined for marks and coded wire tags. Detailed sampling information is presented in Tables 4 and 5 for chinook and coho.

Samplers observed 4,118 fin-clipped chinook in the landings (Table 6). Most of the marks were either duplicated or unassignable. Approximately 13% of the total mark recoveries were from the Rogue River and 6% were from the Umpqua River.

We collected 1,323 chinook heads for coded wire tag recovery. Technicians found tags in 991 or 75%. The main contributing agencies were Oregon Department of Fish and Wildlife with 66% and U.S. Fish & Wildlife Service (USFWS) with 19% of the total.

Samplers found 2,059 marked coho in the troll fishery (Table 7). Almost all of the marks were either duplicated or unassignable. The use of coded wire tags has drastically reduced the number of assignable fin marks used on coho.

We collected 1,421 coho heads for coded wire tag recovery. Technicians found tags in 1,097 or 77% of these heads. The main contributing agencies were Washington Department of Fisheries with 52% and USFWS with 32% of the total.

Average Weight Data

Average weight data were collected from chinook and coho salmon for conversion of landings in pounds to numbers of fish. The 1977 chinook average weights are presented in Table 8. The seasonal average weight for chinook was 10.2 pounds dressed weight compared to 10.4 pounds in 1976. Chinook average weights were up from 1976 in all areas except Brookings. Chinook average weights seldom reflect

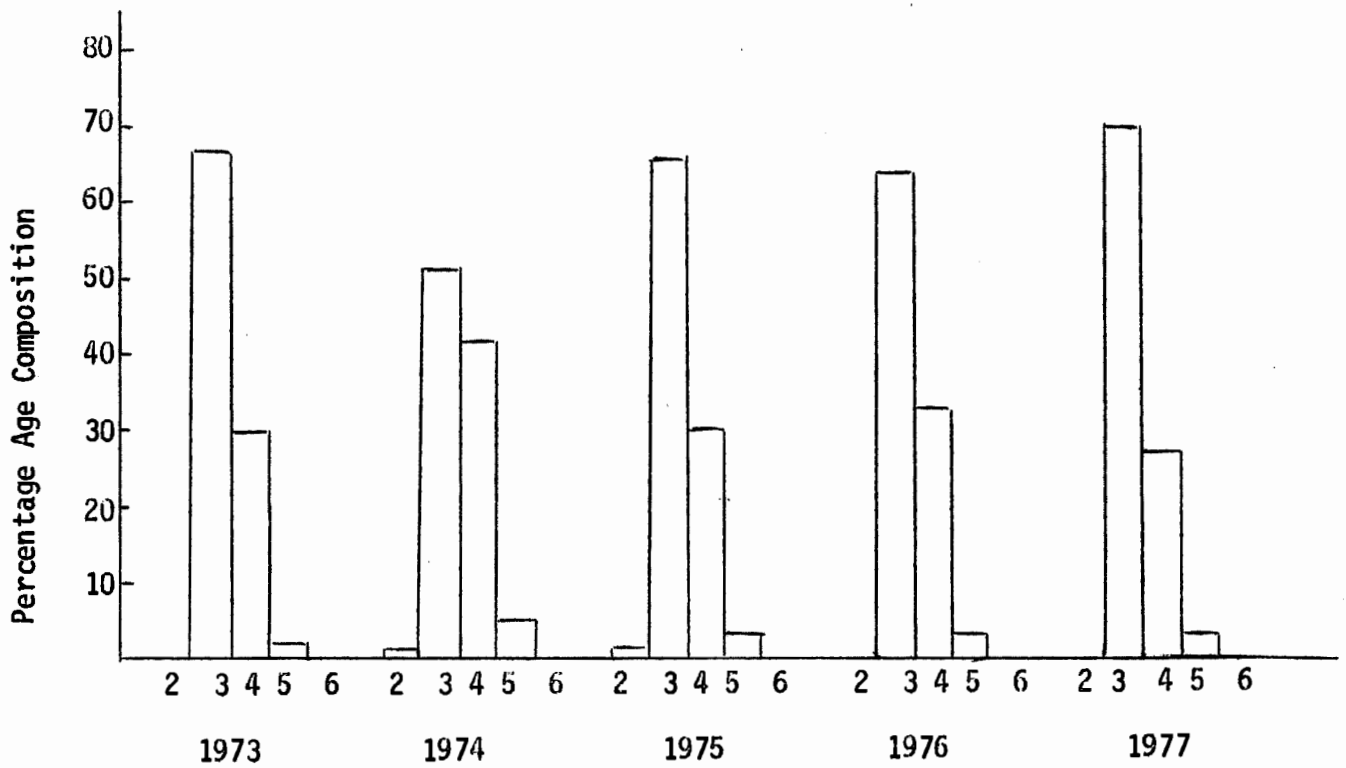
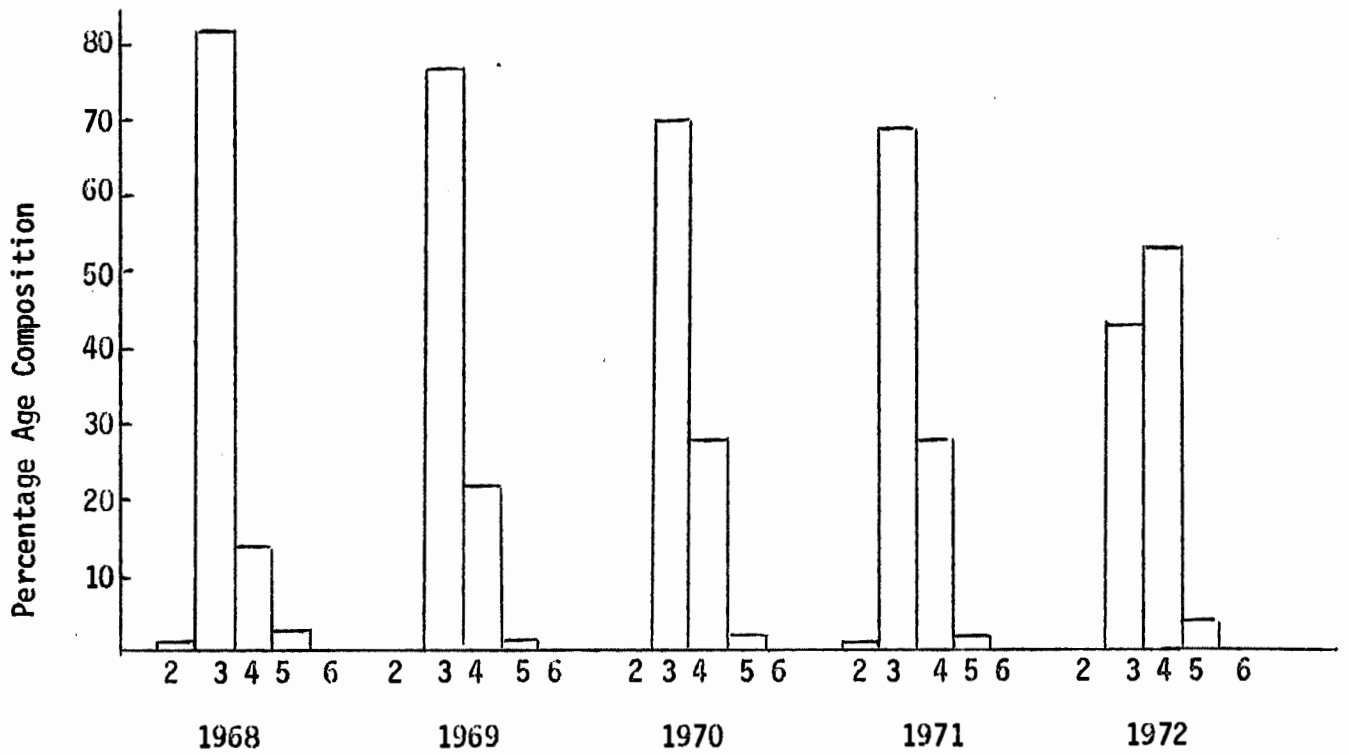


Figure 2. Age Composition by Year of Life for Chinook in the Oregon Troll Fishery, 1968-1977.

Table 4. Oregon Troll Chinook Mark Sampling, 1977.

Landing Area	May	June	July	August	Sept.	Oct.	Nov-Dec	Total
<u>Columbia River</u>								
No. Examined	1,433	1,817	2,064	577	9	0	0	5,900
No. Landed	5,897	18,256	12,518	3,063	2,442	1,028	0	43,204
% Examined	24	10	16	19	tr.	0	0	14
<u>Newport</u>								
No. Examined	0	1,313	1,209	3,201	194	20	0	5,937
No. Landed	3,460	11,717	14,568	32,869	3,241	589	0	66,444
% Examined	0	11	8	10	6	3	0	9
<u>Coos Bay</u>								
No. Examined	1,620	3,771	12,827	11,084	2,027	506	0	31,835
No. Landed	7,248	15,688	57,291	66,271	16,399	4,059	0	166,956
% Examined	22	24	22	17	12	12	0	19
<u>Port Orford</u>								
No. Examined	0	1,081	5,611	5,482	2,342	616	2,111	17,243
No. Landed	2	1,705	10,571	7,458	6,814	1,186	2,611	30,347
% Examined	0	63	53	74	34	52	81	57
<u>Brookings</u>								
No. Examined	0	114	6,455	4,573	199	1,380	801	13,522
No. Landed	1,752	3,066	12,620	6,689	3,805	3,601	1,580	33,113
% Examined	0	4	51	68	5	38	51	41
<u>Total</u>								
No. Examined	3,053	8,096	28,166	24,917	4,771	2,522	2,912	74,437
No. Landed	18,359	50,432	107,568	116,350	32,701	10,463	4,191	340,064
% Examined	17	16	26	21	15	24	69	22

tr. = trace

Table 5. Oregon Troll Coho Mark Sampling, 1977.

Landing Area	June	July	August	Sept.	Oct-Nov	Total
<u>Columbia River</u>						
No. Examined	7,499	20,348	4,655	202	0	32,704
No. Landed	40,999	69,433	11,166	3,909	470	125,977
% Examined	18	29	42	5	0	26
<u>Newport</u>						
No. Examined	928	6,732	2,611	198	5	10,474
No. Landed	15,892	90,419	39,042	2,872	164	148,389
% Examined	6	7	7	7	3	7
<u>Coos Bay</u>						
No. Examined	8,898	18,094	4,842	318	103	32,255
No. Landed	34,072	90,839	27,218	2,654	303	155,085
% Examined	26	20	18	12	34	21
<u>Port Orford</u>						
No. Examined	301	3,340	459	73	0	4,173
No. Landed	483	7,361	1,094	144	16	9,098
% Examined	62	45	42	51	0	46
<u>Brookings</u>						
No. Examined	5	3,228	832	5	13	4,083
No. Landed	549	5,646	1,251	113	13	7,572
% Examined	1	57	66	44	100	54
<u>Total</u>						
No. Examined	17,631	51,742	13,399	796	121	83,689
No. Landed	91,995	263,698	79,771	9,692	966	446,122
% Examined	19	20	17	8	13	19

Table 6. Summary of Chinook Marks Recovered from the Oregon Troll Fishery, 1977.

Origin	Marks	Brood	May		June				July				August				Sept				Oct				Nov		Total		
			CR	CB	CR	N	CB	B	CR	N	CB	B	CR	N	CB	B	CR	N	CB	B	CR	N	CB	B	PO	B			
Mendenhall R	D	1972																									1		1
Cedar Creek	D	1973								1																			1
Duplicated	D	1974					1																						1
Abernathy Center	D-Ad	1972																											1
Elk River	D-Ad-RP	1972								2				1	1				1										5
Not Assigned	D-Ad-RP	1973																								2			2
Not Assigned	D-Ad-RP	Unk.								1																			1
Round Butte	D-RP	1973					1																						1
Not Assigned	D-RM	1974																											1
Duplicated	Ad	1972								1																			1
Duplicated	Ad	1973	5		5	2	10		7	3	42	13	2	13	16	15					3				1	42	22		200
Duplicated	Ad	1974	26	20	36	19	58	4	38	25	299	101	19	60	228	56	1	65	2					1	30	27	52	17	1,184
Duplicated	Ad	1975					1																						1
Not Assigned	Ad	Unk.		1		2		1	3																	2			10
Coos Bay	Ad-LV	1973					4				16	4		3	10	1				2	3				1	1			45
Not Assigned	Ad-LV	1974					1																						2
Not Assigned	Ad-LV	Unk.												1							1								3
N. Umpqua R	Ad-LV-RV	1973	1				3			9	1		1	8	1														24
Not Assigned	Ad-LV-RV-LM	1973										1									1								2
Not Assigned	Ad-LV-RV-RM	1973								2																			2
Not Assigned	Ad-LV-LM	1973								1																			1
Not Assigned	Ad-LV-LM	1974								1	1				3														5
Not Assigned	Ad-LV-LM-RM	1974								1																			1
Not Assigned	Ad-LV-RM	1973																			1						2		3
Cole Rivers-Rogue	Ad-LV-RM	1974					3			42	25		7	89	18					34	3				6				227
Not Assigned	Ad-LV-RM	Unk.												1	3														4
Coos Bay	Ad-RV	1973					2			1	1		1	3	1				1		1								12
Not Assigned	Ad-RV	1974											1																1
Not Assigned	Ad-RV	Unk.					2		1	1	1																		5
Not Assigned	Ad-RV-LP-LM	1974								1																			1
Butte Falls	Ad-RV-LM	1974					2			85				55	10					11					1				164
Not Assigned	Ad-RV-LM	Unk.												2															2
Not Assigned	Ad-RV-LM-RM	1974													1														1
Not Assigned	Ad-RV-RM	1974												2															2
Row River	Ad-LP	1973													2														2
Sacramento R	Ad-LP	1974					1			4	1			3						2							1		1
Row River	Ad-RP	1972											1	1						1					2	1	1		13
																													5

Table 6. Continued

Origin	Marks	Brood	May		June				July				August				Sept				Oct				Nov		Total
			CR	CB	CR	N	CB	B	CR	N	CB	B	CR	N	CB	B	CR	N	CB	B	CR	N	CB	B	PO	B	
Sacramento R	Ad-RP	1974		4			1	2	1	15	1			8	2							1					35
Not Assigned	Ad-RP-LM	1974					1																			1	
Not Assigned	Ad-LM	1973								2				1												3	
Not Assigned	Ad-LM	1974								6	2			1	2											11	
Not Assigned	Ad-RM	1973													1	1										2	
Not Assigned	Ad-RM	1974					1			1	2				1						1					6	
Not Assigned	An	1973					2														1					4	
Round Butte	An	1974														2										3	
Not Assigned	An	Unk.														1										2	
Not Assigned	An-LV-RM	1973								1											1					1	
Butte Falls-Umpqua	An-LM	1974								31					23						3		1			58	
Not Assigned	An-LM	Unk.																			1					1	
Not Assigned	An-LM-RM	1974													2											2	
Duplicated	LV	1972		1						4												1		1		7	
Duplicated	LV	1973		1			17			64	10			5	49	2					17	2	63	2	106	338	
Duplicated	LV	1974		1			31			269	17			13	122	5				1	25	1	154	3	124	766	
Duplicated	LV	Unk.								1				1							2					4	
N. Umpqua R	LV-RV	1972								1												1				2	
Leaburg-McKenzie R	LV-RV	1973					2			7				2	2							1				14	
Not Assigned	LV-RV	Unk.					1								1											2	
N. Umpqua R	LV-RV-LM	1973		1			1			8					3	2					2				1	18	
Not Assigned	LV-RV-RM	1974					1																			1	
Feather River	LV-LP	1973														1										1	
Coquille River	LV-RP	1972															1									1	
Cedar Creek	LV-RP	1974								2						3										5	
Not Assigned	LV-RP-RM	1973					1																			1	
Upper Rogue R	LV-LM	1972														1										2	
Round Butte	LV-LM	1973					2			1	4	1			6						2					16	
Not Assigned	LV-LM	1974														1					1					2	
Not Assigned	LV-LM	Unk.														1					1					2	
Not Assigned	LV-LM-RM	1973								6						7										13	
S. Santiam R	LV-RM	1972								2						1										3	
Cole Rivers	LV-RM	1973		3			17			118	4			4	120	4					47	2	5			324	
Elk River-Coos	LV-RM	1974		1			2			23	1				24						7					58	
Not Assigned	LV-RM	Unk.		1						1					2						2					6	
Not Assigned	RV	1971																						1		1	
Duplicated	RV	1972					1			5											2		4		1	13	

Table 6. Continued

Origin	Marks	Brood	May		June				July				August				Sept				Oct				Nov		Total
			CR	CB	CR	N	CB	B	CR	N	CB	B	CR	N	CR	B	CR	N	CB	B	CR	N	CB	B	PO	B	
Duplicated	RV	1973	2				11			32	5		1	1	10	1		11				136	3	53		266	
Duplicated	RV	1974	2				2			18	2			2	21			16				21	1	9		94	
Not Assigned	RV	Unk.					1								1			1								3	
Coos & Millicoma	RV-LP	1972																								1	
Feather River	RV-LP	1974													3											1	
Coos Bay	RV-LM	1973					2			6								1								5	
Not Assigned	RV-LM	1974	1												7			1								17	
Not Assigned	RV-LM-RM	1973													1											2	
Not Assigned	RV-RM	1973								1					1							1				2	
Not Assigned	RV-RM	1974								1					1							1				3	
Floras Lake	LP	1973						3		1	1				1											1	
Duplicated	LP	1974				1	2			7	2				2	2							1			6	
Not Assigned	LP	Unk.							1																	17	
Not Assigned	LP-RP	1973						1																		1	
Not Assigned	LP-LM	1974																								1	
Not Assigned	LP-RM	1974																	1							1	
Elk River	RP	1972						1							1											1	
Duplicated	RP	1973	2		1			3		1	1															1	
Deschutes R	RP	1974	1		2	1	2			1	3				2							3		5		16	
Totals			31	43	44	25	198	4	49	36	1,151	201	22	118	859	126	1	2	269	16	0	1	478	47	379	18	4,118

CR = Columbia River
N = Newport
CB = Coos Bay
B = Brookings
PO = Port Orford

Table 7. Summary of Coho Marks Recovered from the Oregon Troll Fishery, 1977.

Origin	Marks	Brood	June				July				August				September				October		Totals			
			CR	N	CB	B	CR	N	CB	B	CR	N	CB	B	CR	N	CB	B	N	CB		B		
Not Assigned	D-LP	1974			1																		1	
Duplicated	Ad	1974	137	19	171		487	169	442	38	122	43	52	9	9	1	1				1		1,701	
Duplicated	Ad	1975	5	1	4		3	1	19	2	9	3	7								1		55	
Not Assigned	Ad-LV-RV	1974							1														1	
Rock Cr. - Umpqua	Ad-LV-RV	1975											1										1	
Willamette system	Ad-LP	1974			2				1														3	
Willamette system	Ad-RP	1974			1		1	2	1		1												6	
Not Assigned	Ad-LM	1974							1	1													2	
Not Assigned	Ad-RM	1974	1																				1	
Not Assigned	An	1974			2																		2	
Duplicated	LV	1974	6		9		3	2	48	3	1	4	5			1							82	
Duplicated	LV	1975							1														1	
Not Assigned	LV-RV	1974										1											1	
Rock Cr. - Umpqua	LV-RV	1975							1				1										2	
Not Assigned	LV-LP	1974											1										1	
Cedar Creek	LV-LM	1974			2			1	7			1											11	
Not Assigned	LV-RM	1974							1														1	
Duplicated	RV	1974	9		15		1	1	24	1	1	3	7	1						1			64	
Cedar Creek	RV-LM	1974			3				2				1										6	
Not Assigned	LP	1974	4		8		8	5	24	1	5	2	1										58	
Duplicated	RP	1974	6	1	13		3	5	18	3	4	2	2									1	1	59
Totals			168	21	231	0	506	186	591	49	143	59	78	10	9	2	2	0	0	3	1		2,059	

CR = Columbia River
 N = Newport
 CB = Coos Bay
 B = Brookings

Table 8. Observed Average Dressed Weight and Calculated Numbers of Troll Chinook by Month and Area, 1977.

	May	June	July	Aug.	Sept.	Oct.	Nov.	Total
<u>Columbia River</u>								
Number	5,897	18,256	12,518	3,063	2,442	1,028	0	43,204
Pounds	48,482	192,833	126,465	28,561	24,699	10,943	0	431,983
Ave. Wt.	8.2	10.6	10.1	9.3	10.1	10.6	-	10.0
<u>Newport</u>								
Number	3,460	11,717	14,568	32,869	3,241	589	0	66,444
Pounds	37,443	133,077	176,451	394,040	32,445	6,498	0	779,954
Ave. Wt.	10.8	11.4	12.1	12.0	10.0	11.0	-	11.7
<u>Coos Bay</u>								
Number	7,250	17,393	67,862	73,729	23,213	5,245	2,611	197,303
Pounds	57,959	173,274	710,306	676,750	210,651	52,898	33,054	1,914,892
Ave. Wt.	8.0	10.0	10.5	9.2	9.1	10.1	13.8	9.7
<u>Brookings</u>								
Number	1,752	3,066	12,620	6,689	3,805	3,601	1,530	33,063
Pounds	16,783	30,673	117,287	62,106	40,909	45,094	25,263	338,115
Ave. Wt.	9.6	10.0	9.3	9.3	10.8	12.5	16.5	10.2
<u>Total</u>								
Number	18,359	50,432	107,568	116,350	32,701	10,463	4,141	340,014
Pounds	160,667	529,857	1,130,509	1,161,457	308,704	115,433	58,317	3,464,944
Ave. Wt.	8.8	10.5	10.5	10.0	9.4	11.0	14.1	10.2

Table 9. Observed Average Dressed Weight and Calculated Numbers of Troll Coho by Month and Area, 1977.

	June	July	Aug.	Sept.	Oct.	Nov.	Total
<u>Columbia River</u>							
Number	40,999	69,433	11,166	3,909	470	0	125,977
Pounds	180,968	357,444	72,863	21,918	3,638	0	636,831
Ave. Wt.	4.4	5.1	6.5	5.6	7.7	-	5.1
<u>Newport</u>							
Number	15,892	90,419	39,042	2,872	164	0	148,389
Pounds	78,126	553,041	284,607	21,235	1,321	0	938,330
Ave. Wt.	4.9	6.1	7.3	7.4	8.1	-	6.3
<u>Coos Bay</u>							
Number	34,555	98,200	28,312	2,798	319	0	164,184
Pounds	158,233	628,283	202,281	20,090	2,272	0	1,011,159
Ave. Wt.	4.6	6.4	7.1	7.2	7.1	-	6.2
<u>Brookings</u>							
Number	549	5,646	1,251	113	13	0	7,572
Pounds	3,179	40,100	10,058	1,007	138	0	54,482
Ave. Wt.	5.8	7.1	8.0	8.9	10.6	-	7.2
<u>Total</u>							
Number	91,995	263,699	79,771	9,692	966	0	446,122
Pounds	420,506	1,578,868	569,809	64,250	7,369	0	2,640,802
Ave. Wt.	4.6	6.0	7.1	6.6	7.6	-	5.9

growth with time because age and stock composition in a given area continually fluctuate.

Coho average weights usually show a monthly increase from June through the end of the season. This was not the case in the Astoria and Coos Bay areas. An influx of small fish in September and October reduced the average weight in these two areas.

The seasonal average weight was 5.9 pounds dressed compared to 5.0 pounds in 1976. Average weights in all areas were above the 1976 figures.

CHINOOK MATURITY STUDY

Efforts were made to obtain an adequate chinook maturity sample along the southern Oregon coast in 1978. One sampler was stationed at sea aboard a salmon troller and one person sampled the recreational catch at Charleston.

The on-board sampler tagged 68 chinook shakers. Two tags have been recovered to date. These were both tagged off Crescent City in late May. One was recovered off of Eureka in June and the other was picked up at the Red Bluff diversion dam in November.

REPORTS

The following reports and papers were completed by the staff during the 1978 fiscal year.

McQueen, Robert K. 1977. Oregon troll salmon status report for the Pacific Marine Fisheries Commission annual meeting.

Lewis, Stephen L., Robert K. McQueen and Malcolm H. Zirges. 1977. Management of the troll salmon fishery. Annual and Completion Report. Oregon Department of Fish and Wildlife.