TROLL SALMON INVESTIGATION PROGRESS REPORT

January-December 1960

Oregon Fish Commission
Research Division
Astoria, Oregon

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF TABLES (CONTINUED)

INTRODUCTION

The year's activities included planning and executing a tagging program, compiling returns from two tagging programs, and catch sampling for age and marked fish composition. Other activities were interspersed and are detailed below.

MEETINGS ATTENDED

The more important meetings attended by one or both troll salmon staff members are listed in Table 1.

Table 1. Principal meetings attended during 1960.

	Title	Place	Those attending
1.	PMFC Technical Staff	Portland	Loeffel, Ellis
2.	Annual PMFC Meeting	Portland	Loeffel, Ellis
3.	Salmon Abstention Case	Portland	Loeffel
4.	Pacific Fishery Biologists	Lake Wilderness	Ellis
5.	OFC Policy Conference	Astoria	Loeffel
6.	Marine Sport Fishery Study	Portland	Loeffel
7.	Project Leaders' Meetings	Portland and Astoria	Loeffel

Preparation for these meetings consisted primarily of being able to discuss the subject at hand except for the presentation of a status report of the Pacific Coast troll salmon fishery at the annual PMFC meeting.

REPORTS SUBMITTED

Reports prepared and submitted during the year are listed below:

1. "Oregon Fish Commission Cruise Report, Salmon Tagging Cruise, March 15-April 14, 1960."
2. "Status of the 1960 Ocean Salmon Fishery and a Review of Past Landings." (Published in Thirteenth Annual Report of the Pacific Marine Fisheries Commission for the Year 1960.)
3. "Proposed Program for Troll Salmon Investigations."
4. "The Effect of Confinement on Blood Levels in Chinook Salmon and Coho Salmon." (Submitted for publication)
5. Summary of Troll Salmon Activities for the Biennial Report.

PERSONNEL

Bob Ellis was transferred to the Columbia River Fishery Development Program to work on a contract study. His replacement was not named during 1960. Temporary or seasonal help employed during the year is summarized in Table 2.

Table 2. Temporary help employed during 1960.

Name	Starting date	Terminating date
Robert Erwin	3-14-60	5-5-60
William Hess	5-9-60	5-13-60
Robert Gretzner	6-14-60	9-12-60
Robert Rohland	6-17-60	9-27-60

EQUIPMENT PURCHASED OR CONSTRUCTED

Two "anethetizing" boxes were built from fish shipping boxes. The dimensions are approximately 40 x18 x12 inches. A tagging cradle was also constructed.

PROCEDURE FOR MAKING CURRENT CATCH ESTIMATES

Additional ocean mark samplers were assigned to the investigation in 1959 and 1960 to provide better coastwise coverage. A sampling level of 20% of the catch was set as the acceptable minimum. In order to observe this minimum, knowledge of the magnitude of the catch had to be obtained concurrently with the sampling data. Official catch statistics are not available until well after the termination of the fishing season necessitating the development of a system for estimating the catch on a current basis. The solution taken was to compute estimates from partial statistics obtained from key buyers, weighted by the importance of these buyers in the area in question during the previous season. Week and PMFC zone were considered the smallest practical work units. Estimates of this type are

attainable by Thursday of the week following the catch period under study which is soon enough to permit two or three reviews of progress within a month—the time unit used in mark sampling and analysis. Cumulating the weekly records provides an estimate of the total season catch by zone and date.

The accuracy of the catch estimates can only be determined by comparison of the estimates with official statistics over a period of years. However, their reliability increases with each additional set of records used in making the weekly estimate. To this end all readily attainable records were utilized, providing about 70% complete reporting.

In practice the company offices were visited and the landings obtained by species and size group. These were totaled by PMFC zone and expanded by dividing the landings by the appropriate factors. The estimated total landings were divided by average weight values obtained during the period under study, yielding numbers of fish. Additional totaling made comparison with the number of fish sampled possible. The computational form used is shown in Table 3.

Table 3. Example of ocean mark sampling summary form. 1/

Summary—ocean mark sampling July 17-23, 1960											
	Astoria			Total			Newport	Coos Bay	Total		
	L	M	S 2/	Incl	Chin.	Coho			Chin.	Coho	
No. lbs.			531								
Adj. fact			.61								
Lbs. landed			870								
Ave. wt.			6.3								
Nos. landed			138								
Nos. in sam.			57								
% sample			41								

1/ Subordinate headings for Newport and Coos Bay are identical with those for Astoria. In practice entries are made in all blanks.

2/ Large, medium, and small size groups, respectively.

The landing records received serve also as a means of breaking the official catch records, which do not provide catch values by size group, into these categories. This permits sampling average weight data that is collected by size group to be applied directly and should impart greater accuracy to the estimate of total numbers of fish in the catch.

PROCEDURE FOR ESTIMATING THE AGE COMPOSITION OF THE TROLL CHINOOK CATCH

Prior to 1960 annual estimates of age composition of the Oregon troll chinook catch were not made. One of the reasons was the difficulty in securing representative samples for all PMFC areas (hereafter referred to as port) for the important months of the season. This barrier was effectively removed when samplers were assigned to Coos Bay and Newport for most of the 1960 season.

Information on the age composition of the catch was needed to determine the predominant age(s) at which the stocks were being harvested and to detect changes in the age composition between years. Eventually this information may facilitate detection of weak or strong year classes entering the fishery and permit observations on the health of the stocks.

The ambitiousness of the present program is limited by the staff's ability to collect and read the scales used in age determination. It is further restricted by the frequent occasions on which the fish in the catch are only partially available for examination.

The procedure follows that of Gulland (1955). The catch is stratified into three weight groups and the age composition of each group estimated separately. The weight groups in question are those of the industry, viz., small--less than 8 pounds dressed, medium--8 pounds to 12 pounds, and large--12 pounds and over. Scales are taken from five randomly determined

fish per size group per port per day (normally five days per week). Randomness is attempted (but perhaps not achieved) by consistently taking the samples from the first five fish available to the sampler as he approaches a container of large, medium, or small salmon.

The daily samples are placed in prenumbered positions on a gummed 3 x 5 card. Numbers 1-5 indicate small salmon, 6-10 medium, and 11-15 large. The card is in turn numbered with the last two digits of the year of collection followed by its serial ranking within the year. Consequently scales from each fish receive a unique number. A catalog is kept which shows by card number, the date, place, and number size group of all daily samples.

Age readings are made with reference to the individual sample number only. Independent first readings are made by two readers. Readings resulting in disagreement are repeated again independently. Samples upon which aging disagreement still remains are submitted to a third reader. His agreement with either of the second readings determines a final age. Samples still unresolved are assigned to a non-ageable category. Regenerate samples are also assigned to this group.

The age data is then tabulated by size group, by card number for each port-month unit and totals derived (Table 4). From this summary the sample percentage age composition for each port-month unit can be determined.

The percentage sample age composition is applied to the appropriately subdivided annual landings. Month-port totals by age group are obtained (Table 5). These in turn are summarized to provide the number by age group in the annual catch.

Weaknesses in the procedure include: (1) method of selection of individual fish to be sampled; (2) the fixed five fish size of the daily size-group sample instead of proportional sampling; (3) the disproportionate sampling between size groups; (4) the age determination method; and (5) validity of the landing breakdown into catches by size group.

Table 4. Example of two steps of age determination procedure for a port-month unit. 1/

Tabulation of age groups from age determinations

Card no.	Small					Medium						Large					
	2_1	3_2	3_1	4_2	R	2_1	3_2	3_1	4_2	4_1	R	3_1	4_2	4_1	5_2	5_1	R
60-23								1				1					
24		1	3	1					2	2	1			3			2
28			5					4	1			1	1	3			
29			5					5				3	2				
30			4		1			3		2		2	1	2			
31			1				1					1		1			
32			4		1			3				2		3			
33			4		1			3		1	1	1	3	1			
34			3					2		1							
35			4	1				3	2				2	3			
40							1	4				1					
41			2					2				1		1			
42			5									1		1		1	
43			5					3	1		1	3					2
Total		1	45	2	3		2	33	6	6	3	17	9	18		1	4
Grand Total			48						47					45			

Sample size group age composition

Small		Medium		Large	
3_2	1/48 = 2%	3_2	2/47 = 4%	3_1	17/45 = 38%
3_1	45/48 = 94%	3_1	33/47 = 70%	4_2	9/45 = 20%
4_2	2/48 = 4%	4_2	6/47 = 13%	4_1	18/45 = 40%
	100%	4_1	6/47 = 13%	5_1	1/45 = 2%
			100%		100%

1/ Columbia River--June 1960.

Table 5. Example of final step for age determination procedure for port-month unit. 1/

Weight group	N	n	Age 2_1	3_2	3_1	4_2	4_1	5_2	5_1	6_2
Small	1,483	np		1	45	2				
		p		0.02	0.94	0.04				
		Np		30	1,390	60				
Medium	751	np		2	33	6	6			
		p		0.04	0.70	0.12	0.13			
		Np		30	530	100	100			
Large	338	np			17	9	18		1	
		p			0.38	0.20	0.40		0.02	
		Np			130	70	140		10	
Total	2,572	2,590		60	2,050	230	240		10	
Per cent	100	99		2	79	9	9		—	

1/ Columbia River—June 1960.

CATCH STATISTICS FOR THE 1959 OREGON TROLL SALMON FISHERY

The 1959 catch statistics, received in June 1960 from the Portland office. were summarized in the usual manner and are presented in Tables 6 and 7 for chinook and coho, respectively.

The total Oregon chinook catch of 532,000 pounds (636,000-104,000 pounds landed in Washington) was the poorest since 1943. The decrease was more severe at the Oregon coastal ports than at the Columbia ports. The Coos Bay and Newport areas were both 22% of average for the period 1950-59. Columbia ports were 57% of this average. Only in the Columbia area did the 1959 catch approach 1958 (67%). At Newport and Coos Bay the 1959 landings were only 31 and 22% of 1958.

The 1959 Oregon coho catch was 1,004,000 pounds (total--Washington Columbia River ports + miscellaneous) which like the chinook catch was the poorest since 1943 (Figure 1). This follows only two years behind the high silver catch made in 1957. The abruptness of the decline suggests adverse fluctuations in the environment rather than fishing as the cause. Landings at all PMFC areas were below the 10-year average with Newport (36%) exhibiting the greatest decline Chinook and coho landings combined were also the poorest since 1943.

THE 1960 OREGON TROLL FISHERY

General comments

Poor fishing weather greeted the fishermen at the opening of the season. Landings in the Astoria area were good in late April but very poor in May. Early landings at the coastal ports were good when the weather permitted fishing. Bad weather hampered fishing in portions

Table 6. Troll chinook catch statistics for 1959 by area and month.

Category and month	Columbia River area			Newport	Coos Bay	Brookings	Total
	Oreg.	Wash.	Combined				
Number of landings							
April	99	196	295	8	73	0	376
May	40	42	82	81	253	5	421
June	250	452	702	519	865	16	2,102
July	310	736	1,046	1,033	881	16	2,981
August	336	1,122	1,458	1,316	824	10	3,608
September	267	539	806	563	514	9	1,892
October	87	234	321	140	335	2	798
Total	1,389	3,321	4,710	3,665	3,745	58	12,178
Number of pounds round							
April	19,445	16,751	36,196	900	6,468	0	43,564
May	4,104	2,727	6,831	12,644	29,242	987	49,704
June	13,351	12,241	25,592	46,806	109,926	2,739	185,063
July	13,483	10,708	24,191	32,560	56,320	668	113,739
August	29,557	51,639	81,196	94,935	14,340	829	191,300
September	3,656	5,501	9,157	23,633	8,060	1,354	42,204
October	1,199	4,251	5,450	2,668	2,209	332	10,659
Total	84,795	103,818	188,613	214,146	226,565	6,909	636,233
Number of fish							
April	2,196	1,859	4,055	92	662	0	4,809
May	425	278	703	1,294	2,626	95	4,918
June	1,290	1,162	2,452	4,111	11,645	277	18,485
July	1,448	1,130	2,578	3,255	5,503	65	11,401
August	3,473	5,964	9,437	9,381	1,356	78	20,252
September	312	461	773	2,418	815	137	4,143
October	166	577	743	273	226	34	1,276
Total	9,310	11,431	20,741	20,824	23,033	686	65,284

Table 7. Troll coho catch statistics for 1959 by area and month.

Category and month	Columbia River area			Newport	Coos Bay	Brookings	Total
	Oreg.	Wash.	Combined				
Number of landings							
June	250	452	702	460	840	16	2,018
July	310	736	1,046	1,018	881	16	2,961
August	336	1,122	1,458	1,252	824	10	3,544
September	267	539	806	537	514	9	1,866
October	87	234	321	139	335	2	797
Total	1,250	3,083	4,333	3,406	3,394	53	11,186
Number of pounds round							
June	72,103	102,992	175,095	36,579	95,212	8,284	315,170
July	120,211	165,592	285,803	148,082	84,796	5,787	524,468
August	46,888	73,272	120,160	163,111	77,080	3,525	363,876
September	24,377	50,096	74,473	33,312	39,308	1,678	148,771
October	7,164	18,903	26,067	7,003	26,781	38	59,889
Total	270,743	410,855	681,598	388,087	323,177	19,312	1,412,174
Number of fish							
June	14,581	20,471	35,052	7,069	17,616	1,533	61,270
July	21,778	29,486	51,264	26,280	14,458	987	92,989
August	7,030	10,798	17,828	28,947	12,890	589	60,254
September	3,785	7,646	11,431	5,083	5,794	247	22,555
October	1,113	2,885	3,998	1,068	3,947	6	9,019
Total	48,287	71,286	119,573	68,447	54,705	3,362	246,087

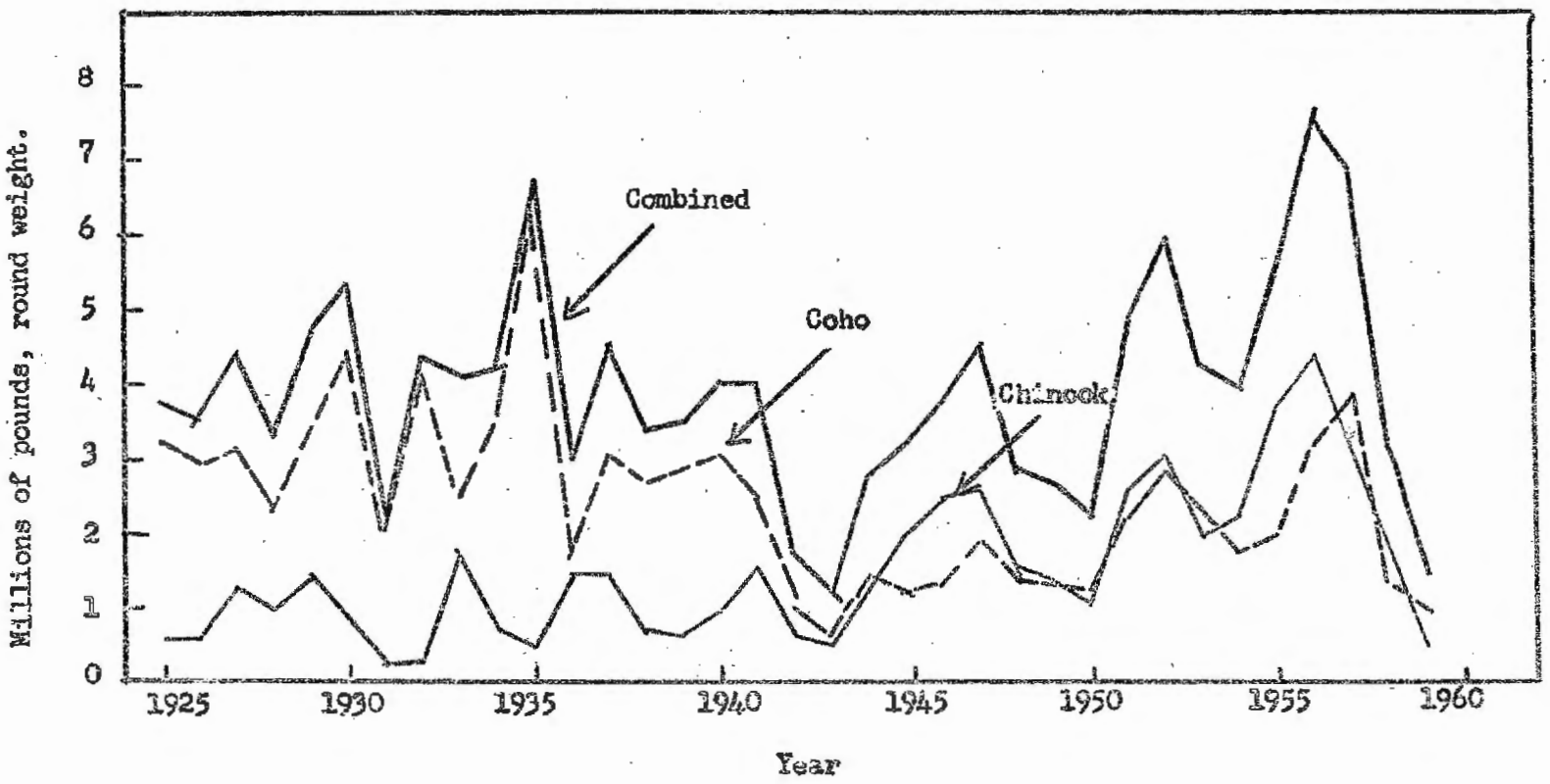

Figure 1. Oregon commercial troll salmon production, 1925-59.

of July and August. Nevertheless some good chinook landings were made in late July and early August with the fish coming from the Bandon and Heceta Head areas. The August chinook landings were characterized by good numbers of large fish.

Poor coho fishing prevailed in the fisheries north of the Columbia causing prices to be high. The seasonal maximum on the Seattle board was $ .61 per pound for silvers and $ .95 for chinook. Oregon fishermen, of course, benefited from these better than usual prices.

Estimated catch

The current catch estimating procedure employed for the first time during the 1960 fishing season proved to be acceptable in basic design. Landing record copying and computing consumed about one man-day per week. Landings were collected on a two-week basis for one Newport company due to the lack of a permanently assigned sampler at that port. Records for the other Newport buyers were obtained at their Astoria offices. Sampling at both Coos Bay and Newport was spasmodic in April, May, and September which resulted in low mark sampling intensities and less frequent catch estimates.

Tables 8 and 9 present the estimated 1960 catch as compiled through the end of September. Landings are shown by species by PMFC zone in pounds (dressed) and for the entire state in pounds and in numbers of fish. The Columbia River area catch includes estimates of landings made at the Washington Columbia River ports of Ilwaco and Chinook which amounted to about 45% of the chinook and 60% of the silvers landed in the Columbia River area. These figures indicate that Oregon chinook landings were approximately 1.6 million pounds or three times the 1959 figure. Estimated Oregon coho landings were near 1 million pounds.

Table 8. Summary of 1960 chinook landings and sampling (includes Washington Columbia River ports).

Date		Pounds landed (cum.) (dressed weight)						
		Col. River	Newport	Coos Bay	Total lbs.	Cum. nos. landed	Cum. nos. sam.	Cum. % sam.
Apr.	15-16							
	17-23							
	24-30	37,700	10,700	5,400	53,800	6,223	1,623	26.1
May	1-7	38,800	38,300	28,900	106,000	11,482	2,185	19.0
	8-14	39,700	43,400	51,400	134,500	14,584	2,806	19.2
	15-21	39,700	64,700	75,000	179,400	19,446	3,116	16.0
	22-31	40,800	107,800	133,000	281,600	30,295	3,783	12.3
Jun.	1-4	42,800	121,700	164,100	328,600	35,277	4,265	12.1
	5-11	43,100	122,800	189,100	355,000	37,879	4,418	11.7
	12-18	47,400	125,000	196,500	368,900	39,254	4,499	11.5
	19-25	60,100	125,400	198,500	384,000	41,045	5,039	12.3
	26-2	72,500	144,300	246,900	463,700	49,344	6,949	14.1
Jul.	3-9	76,700	155,400	253,000	485,100	51,516	7,151	13.9
	10-16	98,900	181,000	292,400	572,300	60,714	9,371	15.4
	17-23	114,900	198,300	386,500	699,700	73,427	12,681	17.3
	24-31	128,300	234,700	439,000	802,000	83,422	14,250	17.1
Aug.	1-6	133,900	299,500	500,800	934,200	96,100	18,936	18.9
	7-13	149,900	365,300	606,800	1,122,000	113,911	24,478	21.5
	14-20	176,600	387,000	693,300	1,256,900	126,624	28,029	22.1
	21-31	182,200	404,300	838,400	1,424,900	143,614	32,927	22.9
Sept.	1-10	190,700	414,500	877,700	1,482,900	149,711	34,411	23.0
	11-30	203,808	425,245	903,825	1,532,878	155,017	35,732	23.1

Table 9. Summary of 1960 coho landings and sampling (includes Washington Columbia River ports).

Date	Pounds landed (cum.) (dressed weight)						
	Col. River	Newport	Coos Bay	Total lbs.	Cum. nos. landed	Cum. no. sam.	Cum. % sam.
Jun. 12-18	900	0	200	1,100	280	18	6.9
19-25	33,300	100	6,700	40,100	8,911	1,831	20.5
26-2	84,400	2,400	23,400	110,200	24,497	7,215	29.5
Jul. 3-9	104,000	5,900	27,400	137,300	30,027	8,029	26.7
10-16	191,900	24,900	73,300	290,100	61,226	12,611	20.6
17-23	231,800	50,500	121,000	403,300	84,328	15,232	18.1
24-31	262,600	99,100	157,200	508,900	105,881	16,467	15.6
Aug. 1-6	285,900	199,000	182,400	667,300	125,745	19,815	14.6
7-13	369,300	268,700	224,000	862,000	172,466	24,577	14.25
14-20	423,900	292,900	244,500	961,300	191,214	26,951	14.0
21-31	497,100	328,700	260,100	1,085,900	214,717	28,415	13.2
Sept. 1-10	548,100	342,900	264,000	1,156,000	227,016	29,769	13.1
11-30	599,900	353,000	270,100	1,223,000	238,762	31,794	13.3

RESULTS OF 1959 SAMPLING

Mark sampling

A mark sampler was stationed at Astoria from April to September and at Newport and Coos Bay (Charleston) from June to September. This sampling effort resulted in 11.4% of all chinook landed and 15.5% of all coho landed being sampled for marks. This level of examination was somewhat lower than desired and was the product of several factors, viz. (1) the reduction on the amount and importance of Charleston landings; (2) the late start, mid June, of the Charleston sampling; and (3) the low volume landed which led to quick disposal of the fish before sampling was possible. The sampling information and mark recovery ratios are presented in Tables 10 and 11 for chinook and coho, respectively. Using this information a calculated number of recoveries by the fishery of each double fin mark was obtained (Tables 12 and 13). No chinook mark was observed in abundance and only three were recovered more than twice. Coho marks were more commonly encountered with 140 actual recoveries of one mark, 1956 brood Klaskanine, occurring. This mark occurred regularly in all areas and months of sampling. In addition to the double fin marks recovered, 114 single fin marks were found in 1959.

Average weight sampling

Average weight data obtained from sampling the catch is presented in Table 14 for both chinook and coho. Unweighted averages of the data for port, month, and season are shown as are the month and seasonal catch-weighted averages. The chinook catch-weighted average weight for the season was only 8.45 pounds dressed. This is the weight equivalent of 27-inches fork length which calls attention to the small average size of the chinook now taken in this fishery. When it is remembered

Table 10. Summary of sampling results from the 1959 Oregon troll fishery, chinook salmon.

Port of landing	Month							
	April	May	June	July	August	Sept.	Oct.	Total
Astoria								
No. sampled	1,887	105	611	555	315	337	147	3,957
No. landed	3,813	666	2,296	2,430	8,655	710	667	19,237
Per cent sampled	49.5	15.8	26.6	22.8	3.6	47.5	22.0	20.6
No. double-fin marks	16	0	1	8	0	0	0	25
Mark recovery ratio	1:118	0	1:611	1:69	0	0	0	1:158
Newport								
No. sampled	0	0	655	291	258	0	12	1,216
No. landed	92	1,294	4,111	3,255	9,380	2,418	273	20,823
Per cent sampled	0	0	15.9	8.9	2.8	0	4.4	5.8
No. double-fin marks	0	0	1	4	0	0	0	5
Mark recovery ratio	0	0	1:655	1:73	0	0	0	1:243
Coos Bay								
No. sampled	0	15	625	1,159	82	93	4	1,978
No. landed	662	2,968	10,509	5,568	1,434	952	260	22,353
Per cent sampled	0	0.5	5.9	20.8	5.7	9.8	1.5	8.9
No. double-fin marks	0	0	3	3	0	0	0	6
Mark recovery ratio	0	0	1:208	1:386	0	0	0	1:330
Total								
No. sampled	1,887	120	1,891	2,005	655	430	163	7,151
No. landed	4,567	4,928	16,916	11,253	19,469	4,080	1,200	62,413
Per cent sampled	41.3	2.4	11.2	17.8	3.4	10.5	13.6	11.5
No. double-fin marks	16	0	5	15	0	0	0	36
Mark recovery ratio	1:118	0	1:378	1:134	0	0	0	1:199

Table 11. Summary of sampling results from the 1959 Oregon troll fishery, coho salmon.

Port of landing	Month					
	June	July	August	Sept.	Oct.	Total
Astoria						
No. sampled	5,207	11,909	2,623	3,623	1,167	24,529
No. landed	32,383	47,414	16,415	10,422	3,622	110,256
Per cent sampled	16.1	25.1	16.0	34.8	32.2	22.2
No. double-fin marks	12	47	22	44	12	137
Mark recovery ratio	1:434	1:253	1:119	1:82	1:97	1:179
Newport						
No. sampled	1,931	549	1,132	0	46	3,658
No. landed	7,054	26,267	28,931	5,083	1,008	68,343
Per cent sampled	27.4	2.1	3.9	0	4.6	5.4
No. double-fin marks	13	15	14	0	1	43
Mark recovery ratio	1:149	1:37	1:81	0	1:46	1:85
Coos Bay						
No. sampled	3,059	3,445	889	688	344	8,425
No. landed	18,983	15,445	13,479	6,041	3,953	57,901
Per cent sampled	16.1	22.3	6.6	11.4	8.7	14.6
No. double-fin marks	21	46	18	1	2	88
Mark recovery ratio	1:146	1:75	1:49	1:688	1:172	1:96
Total						
No. sampled	10,197	15,903	4,644	4,311	1,557	36,612
No. landed	58,420	89,126	58,825	21,546	8,583	236,500
Per cent sampled	17.5	17.8	7.9	20.0	18.1	15.5
No. double-fin marks	46	108	54	45	15	268
Mark recovery ratio	1:222	1:147	1:86	1:96	1:104	1:137

Table 12. Summary of actual and calculated chinook salmon marks taken by Oregon troll fishery, 1959.

Origin	Mark	Brood year	April Col.	April NP	April CB	May Col.	May NP	May CB	June Col.	June NP	June CB	July Col.	July NP	July CB	August Col.	August NP	August CB	Sept. Col.	Sept. NP	Sept. CB	Actual recov.	Calc. recov.
Oxbow hatchery, OFC	D-Ad-RV	1956	1																		1	2
Satsop River (fall)	D-RV	1956	1																		1	2
Deschutes, Satsop, Klickitat, WSDF; Am. R., CDFG	Ad-LV	1955	1															1			2	4
Hutchinson Cr., Klickitat, WSDF	Ad-LV	1956							2	2	2		1					1			8	68
									8	13	34		11					2				
Klickitat, Satsop, Deschutes; WSDF	Ad-RV	1955	1																		1	2
Am. R., CDFG, Klickitat R., WSDF	Ad-RV	1956	5						3		1	2									11	47
			10						11		17	9										
Spring Creek, USFWS	Ad-LP	1956	2																		2	4
Spring Creek, USFWS	Ad-RP	1956	4						1		1	2	1								9	49
			8						4		17	9	11									
Klickitat, Issaquah, WSDF; Umpqua, OGC	LV-RV	1955	1																		1	2
			2																			
No such mark listed	LV-RP	1955										1									1	4
												4										
Klickitat, Deschutes, WSDF	LV-LM	1956							1		1										2	10
									4		6											
Skagit, WSDF; Umpqua, OGC	LV-RM	1956													2						2	54
															54							
Nemah River, WSDF	LV-RM	1957																1			1	2
Umpqua River, OGC	RV-RM	1955												2				2			2	10
														10								
Skagit River, WSDF	RV-RM	1956										1									1	4
												4										
Totals			16						7	3	4	6	2	2	2			3			45	264
			32						27	19	68	26	22	10	54			6				

Table 13. Summary of actual and calculated coho salmon marks taken by Oregon troll fishery, 1959.

Origin	Mark	Brood year	June Col.	June NP	June CB	July Col.	July NP	July CB	August Col.	August NP	August CB	Sept. Col.	Sept. NP	Sept. CB	October Col.	October NP	October CB	Actual recov.	Calc. recov.
Klaskanine River, OFC	D-Ad	1957										2/6						2	6
Lake Union (Puget Sound), WSDF; Klaskanine River, OFC	D-LV	1956	1/6			1/4	2/15					1/3						5	28
Klaskanine River, OFC	D-RV	1956	5/31	1/4	2/12	7/28		10/45	4/25	1/26	2/30	10/31			3/9			45	243
Klaskanine River, OFC	Ad-LV	1956	13/81	13/47	23/143	21/84	2/96	20/90	8/50	6/153	3/46	24/74			7/22			140	886
No such mark listed	Ad-LV-RV	1956	1/6			1/4				1/3								3	13
Hood Canal, WSDF; Klaskanine R., OFC	Ad-RV	1956	5/31	1/4	1/6	6/24		1/5				4/12			1/3			19	83
Wilson River, OFC	Ad-LP	1956			1/6	1/4												2	10
Wilson River, OFC	Ad-RP	1956					1/48											1	48
Lake Melbourne (P.S.), WSDF	An-LV	1956				1/4												1	4
Wilson River, OFC	An-RP	1956	1/6															1	6
Umpqua River, OGC	LV-RV	1956	3/19	9/33	9/56	4/16	1/48	14/63	1/6	5/128	3/46	1/3	1/9	1/3	1/22	2/23		55	473
Elokomin River, WSDF	LV-LM	1956	1/6															1	6
Elokomin River, WSDF	LV-RM	1956						1/5										1	5
Elokomin River, WSDF	RV-LM	1956						1/5										1	5
Big Creek, OFC	RV-LM	1957										1/3						1	3
No such mark listed	RV-LM-RM	1956										1/3						1	3
No such mark listed	LP-RP	1956				1/4												1	4
Gnat Creek, OFC	LP-LM	1956					1/48											1	48
Totals			30/186	24/88	36/223	43/172	7/255	47/213	13/81	13/310	8/122	44/135	1/9	1/37	1/22	2/23		281	1876

Table 14. Average weight data for troll-caught chinook and coho by month and port, 1959 (dressed weight).

Port	April	May	June	July	August	Sept.	Oct.	Total
Chinook								
Astoria								
Nos.	1538	35	272	501	180	52	30	2608
Lbs.	11836	293	2446	4049	1337	530	188	20679
Ave.	7.7	8.4	9.0	8.1	7.4	10.2	6.3	7.9
Newport								
Nos.			442	291	177			910
Lbs.			4378	2540	1564			8482
Ave.	8.5 1/	8.5 1/	9.9	8.7	8.8	8.5 1/	8.5 1/	9.3
Coos Bay								
Nos.		15	546	1159	82	92		1894
Lbs.		135	4680	10341	753	789		16698
Ave.	8.5 1/	9.0	8.6	8.9	9.2	8.6	8.5	8.8
Total 2/								
Nos.	1538	50	1260	1951	439	144	30	5412
Lbs.	11836	428	11504	16930	3654	1319	188	45859
Ave.	7.7	8.6	9.1	8.7	8.3	9.2	6.3	8.5
Total 3/								
Nos.	4809	4918	18485	11401	20252	4143	1276	65284
Lbs.	37634	43182	160747	98747	165585	36618	9206	551719
Ave.	7.8	8.8	8.7	8.7	8.2	8.8	7.2	8.45
Coho								
Astoria								
Nos.			2105	6266	602	626		9599
Lbs.			9128	29818	3462	3488		45896
Ave.			4.3	4.8	5.8	5.6	5.6 1/	4.8
Newport								
Nos.					470			470
Lbs.					2283			2283
Ave.			4.5 1/	4.9 1/	4.9	5.7 1/	5.7 1/	4.85
Coos Bay								
Nos.			1962	2885	849	584		6280
Lbs.			9231	14580	4407	3451		31669
Ave.			4.7	5.1	5.2	5.9	5.9 1/	5.0
Total 2/								
Nos.			4067	9151	1921	1210		16349
Lbs.			18359	44398	10152	6939		79848
Ave.			4.5	4.85	5.3	5.7		4.9
Total 3/								
Nos.		4	61270	92989	60254	22555	9019	246087
Lbs.		17	272536	453608	315334	128624	51798	1221917
Ave.		4.25	4.4	4.9	5.2	5.7	5.7	5.0

1/ Values substituted for voids in sampling data to permit catch number calculations
2/ Totals of actual unweighted observations.
3/ Totals of average weight data weighted by the landings.

that fish making up the spawning runs of this species seldom have an average size of less than 15 pounds the loss of potential growth in ocean harvesting is apparent. Equally distressing, but maybe less avoidable, is the 5.0 pound dressed average weight of coho in 1959. Comparison between these sampling data and those from prior years (1956-58) shows the 1959 coho to be 14% smaller. The small size in this case is more likely related to poor growing conditions.

CATCH SAMPLING OF 1960 FISHERY

Mark sampling

The 1960 season was a more prolific producer of marks than 1959. This was particularly noticeable for chinook which increased from 45 in 1959 to 263 in 1960, a change that is probably attributable to the increased landings and changes in numbers of marked fish released more than to increased sampling effort. Table 15 summarizes the recoveries of both chinook and coho showing all marks recovered by month of recovery. Two chinook marks showing most frequently were the adipose-left maxillary and adipose-right maxillary from OGC Rogue and Umpqua spring chinook releases. Fish bearing these marks were from the 1956 or 1957 brood year.

About 23% of the chinook and 13% of the coho landed during 1960 were sampled for marks (Table 16). This rate was not constant throughout the season being particularly low for chinook in May and for coho in August and September. The coho decline was the result of shifting emphasis to chinook sampling as these landings picked up in July and August.

Scale collection

Although the troll chinook season opened on April 15, scale collection did not commence until the landings increased towards the end of April. The first samples were taken from the Columbia River area fishery, but by May sampling was conducted at several ports along the coast. The previously

Table 15. Actual recoveries of marked chinook and coho salmon in the 1960 Oregon troll fishery, by mark, species, and month.

Marks	Chinook								Coho					
	Apr.	May	June	July	Aug.	Sept.	Oct.	Totals	June	July	Aug.	Sept.	Oct.	Totals
D-Ad									2	5	8	1		16
D-LV		1						1	1	5	6	4		16
D-RV				1				1		3	6	2		11
D-LP										4	3			7
D-RP									2		6	4		12
Ad		1		3	1			5	7	11	10	3		31
Ad-LV				1				1		1	1			2
Ad-LV-RV					1			1						
Ad-RV					3	1		4	1	1	5	2		9
Ad-LP	1		1					2	1		1			2
Ad-RP	2		1	2		1		6	3	2	6			11
Ad-LM				1	47	16		64	13	12	18	1		44
Ad-RM			2	26	62	15		105	4	1	3			8
An					1			1						
An-RV				1				1						
An-LP	2	1		1	1			5						
An-RP	1	1						2						
LV				2	2			4	1	11	7	6		25
LV-RV			2	4	10	1		17	1	5	14	4	1	25
LV-RV-RM				3	13	2		18			2			2
LV-LM		1		1				2		5	4			9
LV-RM						1		1		1		1		2
RV				4	2	1		7	2	8	7	3		20
RV-LM									1	6	8	4		19
RV-RM		1			4			5						
LP				1	1	1		3		6	4	1		11
LP-RP										1				1
LP-LM					1			1		2				2
LP-RM										1				1
RP				1	3	1		5	1	3	2			6
RP-LM					1			1						
Total	6	6	6	52	153	40		263	40	94	121	36	1	292

Table 16. Estimated per cent of Oregon troll chinook and coho catch sampled during each summation period, 1960.

Date		Chinook	Coho
April	24-30	26.1	
May	1-7	10.7	
	8-14	20.0	
	15-21	6.3	
	22-31	5.7	
June	1-4	10.6	
	5-11	5.9	
	12-18	5.9	6.9
	19-25	30.2	21.0
	26-2	23.0	34.5
July	3-9	9.3	14.7
	10-16	24.1	14.7
	17-23	26.0	11.3
	24-31	15.7	5.7
August	1-6	37.0	11.2
	7-13	31.1	13.0
	14-20	28.0	11.6
	21-31	28.8	7.1
Sept.	1-10	24.3	11.0
	11-30	24.9	17.2

described procedure calling for scales from five fish from each size group per day per zone (Columbia R., Newport, and Coos Bay) was followed. One-hundred and eighty daily samples were taken which involved scales from 2,177 fish (Table 17). The number of scales collected by size group varied little within the zones and only moderately between zones. No difficulty was experienced with this procedure for collecting scales except for the times when sufficient fish were not available and the five per size group could not be collected.

Plastic impressions of the scales were made using the OSU Seafoods Laboratory press and were completed by December. Reading of the scales had commenced by then also.

SPRING TAGGING PROGRAM

Program outline

Preliminary results of the 1959 March-April tagging program were presented at the 1959 PMFC meeting in San Francisco. It was decided to repeat the experiment in 1960. The program like the first one was to be PMFC sponsored and conducted jointly by the Oregon Fish Commission and the Washington Department of Fisheries. Subsequently, a detailed 6-page outline of program plans and procedures was prepared by this investigation and reviewed with WDF staff members.

There were two general goals. The first was to catch chinook to measure abundance, age composition, spring and fall stock contribution, and compare barbless vs. barbed hooks. The second was to tag and release fish to determine quantitative contribution by stream of origin. Recovery distribution by fishery was also of interest.

Results of 1960 tagging

Detailed results of the Oregon field work are available in the cruise report. Briefly stated the results were as follows. The Whisper skippered

Table 17. Log of 1960 troll chinook random scale samples.

Month	No. of cards	Number of scales/size group									Total
		Col. R.			Newport			Coos Bay			
		S	M	L	S	M	L	S	M	L	
April	2	5	5	7							17
May	15	17	20	12	20	30	30	15	25	20	189
June	30	51	50	49	20	20	20	40	52	52	354
July	54	64	56	56	64	69	74	94	100	99	676
August	54	62	53	60	58	58	87	95	100	110	683
September	23	21	35	32	16	21	20	28	33	31	237
October	2	0	5	5	5	1	5	0	0	0	21
Total	180	220	224	221	183	199	236	272	310	312	2177

by George Crishaber was chartered for the period March 15 to April 15. Fishing was done on 14 days near but north of the mouth of the Columbia River. Two hundred and seventeen chinook were caught of which 157 were over the minimum commercial length of 26 inches. A total of 194 were tagged and released. Washington's results were similar.

Tag returns were from ocean and river fisheries from hatcheries and from natural spawning runs. The 1960 total Oregon tag return of 53 (27%) is summarized in Table 18. Recovery data was entered on "Rocket" punch cards as received.

Table 18. 1960 recoveries of chinook tagged in the 1960 spring tagging program by gear of recapture.

Gear of recapture	Number
Ocean troll fishery	14
Ocean sport fishery	16
River gill-net fishery	15
Hatchery	6
Spawning migration	1
River sport fishery	1
Total	53

Second year returns of 1959 tagging

Six recoveries were received in 1960 from the 1959 Oregon tagging. Four were taken in the ocean fisheries (two each troll and sport) and two in the Columbia River gill-net fishery. No hatchery or spawning ground recoveries were made. The 2-year recovery of 94 is 30% of the tagged fish released.

DATA FOR CALIFORNIA

Oregon 1959 catch statistics for chinook and coho were summarized and sent to California. The calculated number of California marks (fin clips) recovered by the Oregon troll fishery was determined from sampling information and sent to California.

PLAN FOR MARINE SPORT FISHERY STUDY

Public Law 359 enacted in 1960 authorized appropriation of seven million dollars for research on marine game fish. The money was to be spent through the Department of Interior with some passed on to the states. Oregon, Washington, and California anticipating receipt of some of the funds agreed to prepare individual plans of study that would be integrated into a single plan under PMFC auspices.

The PMFC administrator prepared a general outline as a guide to the states. The Coastal Rivers and Troll Salmon project leaders were charged with developing an Oregon plan from the PMFC guide. Consideration was initially given to inclusion of all species--salmon and non salmon--taken by the sport fishery, but the plan first submitted was for salmon alone. The general study phases included were:

1. Estimate of the salmon sport effort and catch per unit of effort by species by area.
2. Evaluation of age composition and maturity.
3. Determine mortality of released sport-caught fish.
4. Study origin of salmon stocks taken by fishery.
5. Study of gear and methods.
6. Develop methods to increase productivity.

FATIQUE-MORTALITY

Determination of chinook and coho blood-lactate levels in samples taken during late 1959 were completed in 1960. The data gathered in this two-year study to observe the mortality induced by fatigue were analyzed and the results presented for publication in the draft of a paper entitled: "The effect of confinement on blood levels in chinook salmon and coho salmon." Publication will be in the Fish Commission Research Briefs.