

*Van Hyning*

TROLL SALMON INVESTIGATION PROGRESS REPORT

January 1961-December 1962

Oregon Fish Commission  
Research Division  
Astoria, Oregon

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## INTRODUCTION

This progress report presents two years of data. The activities include planning and executing two research programs. One was concerned with hooking and holding mortality, the other was a barbed-barbless hook study. Other activities were age composition and marked fish sampling.

## MEETINGS ATTENDED

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

Table I. Principal meetings attended during 1961 and 1962

Year	Title	Place	Those attending
<u>1961</u>			
1.	PMFC technical staff meeting	Portland	Loeffel and McQueen
2.	Annual PMFC meeting	San Francisco	Loeffel
3.	Pass book review with industry	Astoria-Coos Bay	Loeffel
<u>1962</u>			
1.	PMFC technical staff	Portland	Loeffel and McQueen
2.	Annual PMFC meeting	Seattle	Loeffel
3.	Seismic meetings	Astoria-Coos Bay	Loeffel
4.	Pacific fisheries biologist meeting	California	Loeffel

Preparation for these meetings consisted of being able to discuss the subject at hand except for a presentation on coho mortality at the 1961 annual PMFC meeting.

## REPORTS SUBMITTED

Reports prepared and submitted during this period are listed below.

1. "The effect of confinement in blood lactate levels in chinook and coho salmon."
2. Salmon research proposals to PMFC.
3. "Oregon Fish Commission Cruise Report, silver salmon mortality study May 28-June 14, 1961."
4. Oregon troll landings from 1950-60 for PMFC.
5. "A statement on the need for an international chinook and silver salmon committee."
6. "Observations on the physiological reaction of salmon to conditions of stress."

## PERSONNEL

Bob McQueen joined the troll salmon staff in January, 1961. This filled the position vacated when Bob Ellis transferred to the Columbia River Fisheries Development Program. Temporary or seasonal help employed during 1961 and 1962 is summarized in Table 2.

Table 2. Additional help employed during 1961-2

Name	Starting Date	Terminating Date
Paul Reimers	June 1961	September 1961
Fernie Espinoza	June 1961	September 1961
Dave Bancroft	April 1961	September 1961
Jim Cummings	April 1962	September 1962
Stephen Lewis	June 1962	September 1962
George Williams	April 1962	September 1962

## EQUIPMENT PURCHASED OR CONSTRUCTED

The large holding tank built in 1959 was remodeled to make it better for use at sea. The staff made a three-compartment form-fitting fiberglass tagging cradle for use in the 1962 barbed-barbless study.

## CATCH STATISTICS FOR 1960 OREGON TROLL FISHERY

The staff received the final 1960 statistics in June 1961 and summarized them in Tables 3 and 4 for chinook and coho respectively.

The total Oregon chinook catch of 1,527,000 pounds (1,632,000 - 105,000 Washington) was almost three times the 532,000 pounds landed in 1959. <sup>(Figure 1)</sup> The Oregon-Wash. Col. River catch <sup>was</sup> ~~at~~ 1.2 million pounds under the 1950-60 average. The Columbia River area catch was 27%, Newport area 46% and Coos Bay area 96% of the 1950-60 average. The Columbia River area landings were only 10% higher than in 1959 while Newport area was almost double and Coos Bay area was over four times last years landings.

The 1960 Oregon coho catch was 841,000 pounds (1,235,300 - 394,300 Washington) which is the poorest since 1943 (Figure 1). Landings in all areas

*Don't retype  
photocopy!* 3

*Chinook*  
TABLE 3 . TROLL CATCH STATISTICS FOR 1960 BY AREA BY MONTH

Category and Month	Columbia River Area			Newport	Geos Bay	Breakings	Total
	Oreg.	Wash.	Combined				
<b>Number of Landings</b>							
April	96	106	202	32	20	0	254
May	24	28	52	317	379	0	748
June	131	309	440	217	539	7	1,203
July	311	740	1,051	615	1,008	47	2,721
August	396	1,490	1,886	1,323	1,651	122	4,982
September	282	849	1,131	496	509	322	2,548
October	57	59	116	129	85	202	532
<b>Total</b>	<b>1,297</b>	<b>3,581</b>	<b>4,878</b>	<b>3,129</b>	<b>4,191</b>	<b>700</b>	<b>12,898</b>
<b>Number of Pounds Round</b>							
April	17,583	15,376	32,959	9,490	4,428	0	46,877
May	2,031	1,063	3,094	87,613	105,324	0	196,031
June	15,921	12,124	28,045	40,515	93,525	1,222	163,367
July	31,151	25,520	56,671	80,770	211,911	13,559	362,911
August	26,349	40,540	66,889	177,283	378,150	29,475	651,797
September	8,826	9,831	18,657	23,447	81,542	49,391	173,017
October	1,430	223	1,653	6,656	3,992	25,645	37,946
<b>Total</b>	<b>94,729</b>	<b>104,657</b>	<b>207,948</b>	<b>425,774</b>	<b>878,872</b>	<b>119,292</b>	<b>1,631,886</b>
<b>Number of Fish</b>							
April	1,758	1,538	3,296	842	387	0	4,525
May	186	97	283	7,194	9,667	0	17,144
June	1,562	1,189	2,751	3,059	8,175	107	14,092
July	2,993	2,452	5,445	6,338	17,300	1,112	30,195
August	1,972	3,034	5,006	13,129	31,132	2,418	51,685
September	705	784	1,489	1,958	7,657	4,668	15,772
October	113	18	131	578	367	2,424	3,500
<b>Total</b>	<b>9,289</b>	<b>9,112</b>	<b>18,401</b>	<b>33,898</b>	<b>74,685</b>	<b>10,729</b>	<b>136,913</b>

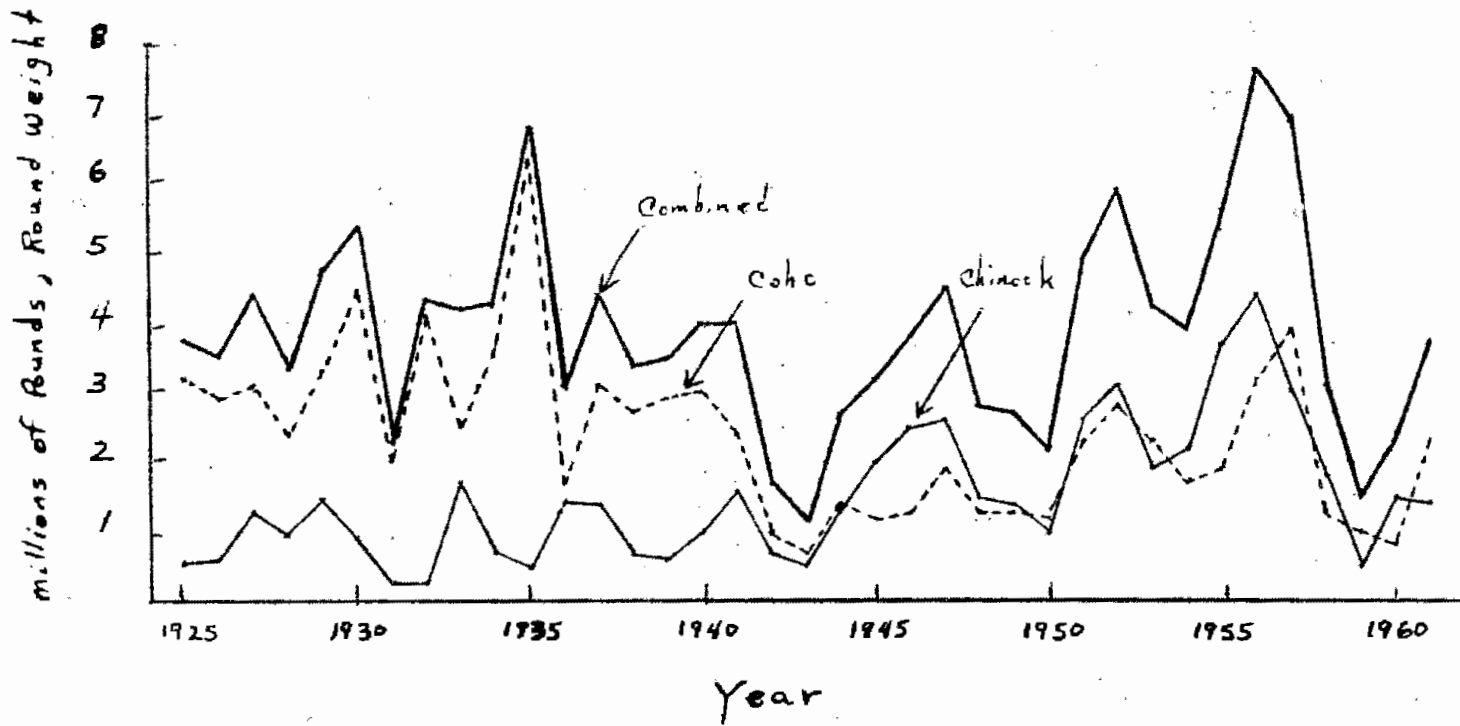
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TABLE 4. TROLL COHO CATCH STATISTICS FOR 1960 BY AREA BY MONTH

Category and Month	Columbia River Area			Newport	Coos Bay	Brookings	Total
	Oreg.	Wash.	Combined				
<b>Number of Landings</b>							
June	103	309	412	79	318	0	809
July	311	740	1,051	615	1,008	47	2,721
August	396	1,490	1,886	1,323	1,651	122	4,982
September	282	849	1,131	496	509	322	2,458
October	57	59	116	125	85	202	528
Total	1,149	3,447	4,596	2,638	3,571	693	11,498
<b>Number of Pounds Round</b>							
June	34,620	48,366	82,986	3,708	18,735	0	105,429
July	81,080	90,826	171,906	68,329	114,137	139	354,511
August	111,434	190,533	301,967	221,074	94,774	115	617,930
September	45,622	62,110	107,732	27,438	10,253	0	145,423
October	4,146	2,506	6,652	4,529	346	415	11,942
Total	276,902	394,341	671,243	325,078	238,245	669	1,235,235
<b>Number of Fish</b>							
June	5,903	8,246	14,149	620	3,017	0	17,786
July	10,364	11,615	21,984	9,141	17,112	21	48,258
August	13,095	22,389	35,484	28,693	13,511	16	77,704
September	4,959	6,751	11,710	3,224	1,537	0	16,471
October	429	259	688	625	52	62	1,427
Total	34,755	49,260	84,015	42,303	35,229	99	161,646

Fig 1. Oregon ~~Commercial~~ <sup>Ocean</sup> ~~Fish~~ Salmon Production 1925 to 1961



were far below the 1950-60 average. The Columbia River area was 70%, Newport 32%, and Coos Bay 38% of the eleven year average. Columbia River area and Newport area landings were down slightly from 1959. Coos Bay area landed only 70% of their 1959 poundage.

1960 CHINOOK AGE COMPOSITION

We estimated the age composition of the 1960 troll chinook landings, using the procedures described in the 1960 progress report. This is the first time that such an appraisal of the annual landings was made. It revealed that most of the fish taken in the Oregon troll fishery are in their third year of life when captured (Table 5). This finding agrees with fragmentary age and length-frequency data from earlier years.

We used the Gilbert system of aging, ~~in~~ which employs a double numbering method. <sup>with</sup> <sup>of a pair</sup> The first number <sup>indicates</sup> the year of life the fish <sup>was</sup> ~~is~~ in when scales were taken. The second or subscript number indicates the year of life in which the fish migrated to the ocean.

In all areas, Columbia River, Newport and Coos Bay, 3<sub>1</sub>s are the strong age group, making up 66% of the total landings. The 4<sub>1</sub> group is next in importance, contributing 16% to the landings. The other age groups are of minor importance to the troll fishery. The 4<sub>2</sub> group contributes 8%, the 3<sub>2</sub> group 5%, the 5<sub>2</sub> and 2<sub>1</sub> groups 2%, the 5<sub>1</sub> group 1% and the 6<sub>2</sub> group only a trace.

The sub<sub>1</sub> group, or the fish that leave fresh-water in the first year of life, contribute far more (84%) to the fishery than the sub<sub>2</sub> group (16%). The Coos Bay area landed about 75% of the total sub<sub>2</sub> catch. This high percentage of sub<sub>2</sub> fish is very likely due to the contribution of the Umpqua and Rogue Rivers to the fisheries of this area. Both of these streams have large runs of spring chinook which generally have sub<sub>2</sub> type scales. Sub<sub>1</sub> fish are normally thought of as fall chinook which suggests that fall chinook (coastal) make up

Table 5

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1960 Troll Chinook Age Data

Per Cent of Each Age Group per Port of the Season's Total.

Month	Port		2 <sub>1</sub>	3 <sub>2</sub>	3 <sub>1</sub>	4 <sub>2</sub>	4 <sub>1</sub>	5 <sub>2</sub>	5 <sub>1</sub>	6 <sub>2</sub>	No. Fish per Port
April-	Col. R. ✓	No.		80	2,010	460	800	20			3,370
		%		0.1	1.5	0.3	0.6				
May	Newport	No.			4,710	250	2,820	150	100		8,030
		%			3.5	0.2	2.1	0.1	0.1		
	Coos Bay	No.			7,280	410	1,980		400		10,070
		%			5.4	0.3	1.5		0.3		
June	Col. R. ✓	No.		60	2,050	230	240		10		2,590
		%			1.5	0.2	0.2				
	Newport	No.			2,320		680		60		3,060
		%			1.7		0.5				
	Coos Bay	No.	140	140	5,660	480	1,560	200	50	50	8,280
		%	0.1	0.1	4.2	0.4	1.1	0.1			
July	Col. R. ✓	No.	580	340	3,660	160	280	70	40		5,130
		%	0.4	0.3	2.7	0.1	0.2	0.1			
	Newport	No.	260		4,620	240	1,150	70			6,340
		%	0.2		3.4	0.2	0.8	0.1			
	Coos Bay	No.	210	640	12,770	1,570	2,890	130	200		18,410
		%	0.2	0.5	9.4	1.2	2.1	0.1	0.1		
August	Col. R. ✓	No.	430	160	2,980	160	770	70			4,590
		%	0.3	0.1	2.2	0.1	0.6	0.1			
	Newport	No.		730	8,550	1,160	2,480	110	110		13,140
		%		0.5	6.3	0.9	1.8	0.1	0.1		
	Coos Bay	No.	500	2,860	21,170	3,840	4,020	950	230		33,570
		%	0.4	2.1	15.6	2.8	3.0	0.7	0.2		
Sept.-	Col. R. ✓	No.	190	70	920	70	140	40	70		1,500
		%	0.1	0.1	0.7	0.1	0.1		0.1		
Oct.	Newport	No.	140	100	1,870	50	250	30	110		2,550
		%	0.1	0.1	1.4		0.2		0.1		
	Coos Bay	No.		1,370	10,080	1,760	1,220	700			15,130
		%		1.0	7.4	1.3	1.0	0.5			
Total	Col. R. ✓	No.	1,200	710	11,620	1,100	2,230	200	120		17,180
		%	0.9	0.5	8.6	0.8	1.6	0.1	0.1		
	Newport	No.	400	830	22,070	1,700	7,380	360	380		33,120
		%	0.3	0.6	16.3	1.3	5.4	0.3	0.3		
	Coos Bay	No.	850	5,010	56,960	8,060	11,670	1,980	880	50	85,460
		%	0.6	3.6	42.0	5.9	8.6	1.5	0.6		
Grand Total Numbers			2,450	6,550	90,650	10,860	21,280	2,540	1,380	50	
Per Cent			2	5	66	8	16	2	1		

Summation of all ages = 135,760 <sup>2/</sup>

✓ Includes Washington Columbia River.

2/ The discrepancy between this total and the total number of fish shown in Table 3 of 1135 was recognized but not changed. The fish were distributed so as to not change the %'s substantially.

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a large part of the Oregon troll chinook catch. The origin of these fish is questionable but the Sacramento may be a major contributor.

Aging work was done by Bob Loeffel who had previously read scales as a routine part of his Columbia River Investigation work. Differences were noted between the troll scales in question and the Columbia River scales. Two differences that left doubt as to the interpretation of the troll scales were: 1. the small size of the first year growth that was deduced to be marine-not fresh-water-growth, and 2. the frequent occurrence of a pattern that had within the area normally covered by the first year of a sub1 scale a large amount of close packed fresh-water circuli, followed by a few circuli of marine growth and another band of close circuli that appear as an annulus but is not clearly the first or the second. Both problems need further study.

#### 1960 CATCH ESTIMATE ANALYSIS

A method for marking current estimates of the ocean commercial troll landings was needed for various reasons. Such a method was developed (see 1960 progress report) and put into use in 1960.

Both monthly and cumulative figures were kept. This gave us a current estimate of the catch for that sake alone and provided a standard to measure sampling success by.

The 1960 chinook estimate was 111% of the actual landings so in hindsight is seen to be usable for evaluating the sampling effort (Table 6). Area estimates were 114% for Columbia River, 117% for Newport and 107% for Coos Bay.

The 1960 coho estimates were 115% of the actual landings (Table 6). Area estimates were 104% for Columbia River, 127% for Newport, and 130% for Coos Bay.

Accuracy of the monthly estimates for both species fluctuated greatly. The cause lies mainly in the use of an average annual blow-up factor for each area rather than a monthly factor. A monthly factor will be used for next

Table 6. 1960 Troll catch estimate analysis (in thousands of pounds dressed)

*Put in as feet made 19*

Month	Columbia River <sup>2/</sup>			Newport			Coos Bay <sup>3/</sup>		
	Estimate	Catch	Est/catch in %	Estimate	Catch	Est/catch in %	Estimate	Catch	Est/catch in %
CHINOOK									
April	38	29	131	11	8	138	5	4	125
Cumulative	38	29	131	11	8	138	5	4	125
May	3	3	100	97	77	126	128	92	139
Cumulative	41	31	132	108	85	127	133	96	139
June	32	24	133	37	35	106	114	82	139
Cumulative	73	56	130	144	120	120	247	178	139
July	56	49	114	90	70	129	192	196	98
Cumulative	128	105	122	235	190	124	439	374	117
August	54	58	93	170	154	110	399	355	112
Cumulative	182	163	112	404	344	117	838	729	115
September	22	16	138	21	20	105	65	114	57
Cumulative	204	180	113	425	365	116	904	842	107
October <sup>2/</sup>	0	-	0	0	-	0	0	-	
Cumulative	204	180	113	425	365	116	904	842	107
Grand Total	1533	1385	111						
COHO									
June	84	72	117	2	3	67	23	16	144
Cumulative	84	72	117	2	3	67	23	16	144
July	168	150	112	97	59	164	134	99	135
Cumulative	253	222	114	99	63	157	157	116	135
August	245	263	93	230	192	120	103	83	124
Cumulative	497	484	103	329	255	129	260	198	131
September	103	94	110	24	24	100	10	9	111
Cumulative	600	578	104	353	279	127	270	207	130
October <sup>3/</sup>	0	-	0	0	-	0	0	-	0
Cumulative	600	578	104	353	279	127	270	207	130
Grand Total	1223	1064	115						

<sup>2/</sup> Includes Washington Columbia River landings.

<sup>3/</sup> Includes Brookings area.

<sup>3/</sup> October estimates not made.

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years calculations.

The coho estimates for the Newport and Coos Bay areas were high. This may have resulted from poor catches by the day-boat fleet which would reduce the landings of the smaller buyers. This doesn't affect the major buyers which depend heavily on the more mobile trip boats that are able to follow the fish.

## THE 1961 OREGON TROLL FISHERY

### General comments

Chinook landings in the Columbia River area were very poor in April but picked up in May, June and September. Newport area had very poor catches in April and May. July landings were excellent but August and September were mediocre. Coos Bay area catches were poor except in July. Excellent landings were made at the port of Brookings during June, July and August.

Coho landings were very good in all areas. Fishermen found plenty of coho available as the season opened. Fish in the Newport and Coos Bay areas were larger than usual at the start of the season.

Average weights were above normal for chinook as well as coho. This indicates favorable growing conditions in the ocean during 1961.

Prices did not go as high as in 1960. The seasonal maximum on the Seattle board was ~~\$.53~~<sup>1</sup> for coho and \$.83 for chinook. This compares with \$.61 and \$.95 respectively in 1960.

### Estimated catch

Staff members copied landings from most of the selected buyers on a weekly basis. Sampling at Newport was spasmodic in April, and May which resulted in low mark-sampling intensities and infrequent catch estimates from that area.

Tables ~~8 and 9~~<sup>7</sup> show the estimated 1961 catch for chinook and coho accumulated through the end of October. Landings are shown by species by PMFC zone in pounds dressed and for the entire area in pounds and numbers of fish. Included is the estimated cumulative sampling percentage for the combined areas.

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 Table 8. Estimated 1961 Oregon salmon landings and sampling  
 by species and area (in thousands of pounds and percent).

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Date	Cumulative pounds dressed			Total	Cumulative % Sampled
	Col. River	Newport	Coos Bay		
<b>Chinook</b>					
April 15-22	10	1	2	13	34
23-30	10	2	6	18	50
May 1-6	11	3	8	22	47
7-13	12	4	8	24	47
14-20	15	4	9	28	48
21-31	18	4	14	36	46
June 1-10	23	6	21	50	47
11-17	41	7	25	73	41
18-24	51	9	40	100	44
25-30	59	35	57	151	50
July 1-8	68	75	80	223	47
9-15	79	124	96	299	45
16-22	95	212	120	427	38
23-31	104	265	164	533	36
Aug. 1-5	125	293	199	617	37
6-12	146	300	202	648	36
13-19	199	320	216	735	35
20-31	227	332	247	806	36
Sept. 1-9	241	336	287	864	35
10-16	255	351	329	935	34
17-23	262	373	370	1,005	32
24-30	266	380	380	1,026	31
October	269	396	413	1,078	30
<b>Coho</b>					
June 11-17	13	4	52	69	41
18-24	95	16	105	216	31
25-30	142	68	154	364	39
July 1-8	164	113	198	475	44
9-15	214	136	247	597	42
16-22	363	216	298	877	39
23-31	410	386	399	1,195	39
Aug. 1-5	427	460	456	1,343	41
6-12	451	476	461	1,388	40
13-19	486	578	495	1,559	40
20-31	686	716	525	1,927	39
Sept. 1-9	819	727	537	2,083	38
10-16	947	756	548	2,251	36
17-23	1,037	777	556	2,370	36
24-30	1,089	812	557	2,458	35
October	1,120	838	570	2,528	35

1/ Includes Washington Columbia River landings.



The Columbia River area catch includes estimates of landings made at the Washington Columbia River ports of Ilwaco and Chinook. These ports received about 53% of the chinook and 58% of the coho landed in the Columbia River area.

The estimates show that the "Oregon" chinook catch was approximately 1,075,000 pounds round. The estimated "Oregon" coho catch was 2,160,000 pounds round.

CATCH STATISTICS FOR 1961 OREGON TROLL FISHERY

The final 1961 catch statistics are summarized in Tables <sup>8</sup> ~~X~~ and <sup>9</sup> ~~X~~ for chinook and coho respectively. The total Oregon chinook catch of 1,468,000 pounds (1,583,000-115,000 Washington) was almost identical to the 1,527,000 pounds landed in 1960 and was 1.2 million pounds under the 1950-61 average. The Columbia River area was 41%, Newport area 46% and Coos Bay area 86% of the 1950-61 average. The Columbia River area landings were 41% higher than in 1960 while Newport area was 95% and Coos Bay area 47% of last years landings.

The 1961 coho catch was 2,635,000 pounds round (3,154,000 - 519,000 Washington) which was over three times the 841,000 pounds landed in 1960, and was 498,000 pounds above the 1950-61 average. The Columbia River area was 25% and Coos Bay area 31% higher than the 12-year average while Newport area landings were about double those of 1960. Newport and Coos Bay landings were almost three times larger than the 1960 landings.

1961 CHINOOK AGE COMPOSITION

We estimated the age composition of the 1961 troll chinook landings and as in 1960, the 3<sub>1</sub> group was dominant (Table 10 Figure 2), ~~This 3<sub>1</sub> group~~ represents 86% of the total landings for the state. The 4<sub>1</sub> group is next in importance, contributing 18% to the landings. The 3<sub>2</sub> group was stronger than in 1960, making up 8% of the landings compared to 5% in 1960. The 2<sub>1</sub> group at 3% which was similar to 1960. The 4<sub>2</sub> group contributed only 3% which was down from the 8% observed in 1960. The 5<sub>2</sub> and 5<sub>1</sub> groups both contributed 1%

TABLE 1. TROLL CHINOOK CATCH STATISTICS FOR 1961 BY AREA BY MONTH

Category and Month	Columbia River Area			Newport	Coos Bay	Brookings	Total
	Oreg.	Wash.	Combined				
Number of Landings							
April	59	108	167	32	58	7	264
May	21	44	65	59	109	172	405
June	207	445	652	365	615	704	2,336
July	397	1,122	1,519	1,501	2,000	811	5,831
August	438	1,709	2,147	1,077	1,537	740	5,501
September	564	1,412	1,976	508	712	22	3,218
October	102	200	302	66	192	37	597
Total	1,788	5,040	6,828	3,608	5,223	2,493	18,152
Number of Pounds Round							
April	6,735	6,304	13,039	3,004	6,938	991	23,972
May	4,824	3,812	8,636	2,161	11,401	30,945	53,143
June	25,436	17,961	43,397	41,026	48,960	116,032	249,415
July	19,711	28,100	47,811	238,581	114,237	175,062	575,691
August	45,846	83,665	129,511	66,627	123,508	145,041	464,687
September	18,321	28,764	47,085	41,524	92,457	1,843	182,909
October	1,468	2,969	4,437	12,469	11,648	4,649	33,203
Total	114,573	171,575	293,916	405,392	409,149	474,563	1,583,020
Number of Fish							
April	609	570	1,179	254	594	84	2,111
May	311	245	556	192	1,099	2,957	4,804
June	2,284	1,612	3,896	3,040	4,154	9,989	21,079
July	1,837	2,618	4,455	17,401	9,650	14,637	46,143
August	3,316	6,052	9,368	5,276	9,673	11,260	35,577
September	1,615	2,534	4,149	4,032	7,149	1,742	17,072
October	142	288	430	1,178	1,171	470	3,249
Total	10,114	13,919	24,033	31,373	33,490	41,139	130,035

TABLE 9. TROLL COHO CATCH STATISTICS FOR 1961 BY AREA BY MONTH

Category and Month	Columbia River Area			Newport	Coos Bay	Brookings	Total
	Oreg.	Wash.	Combined				
Number of Landings							
June	207	445	652	365	615	122	1,754
July	397	1,122	1,519	1,501	2,000	811	5,831
August	438	1,709	2,147	1,077	1,537	740	5,501
September	564	1,412	1,976	508	712	22	3,218
October	102	200	302	66	192	37	597
Total	1,708	4,888	6,596	3,517	5,056	1,732	16,901
Number of Pounds Round							
June	80,779	94,139	174,918	89,569	174,985	4,411	443,883
July	125,811	221,276	347,087	402,248	341,641	83,355	1,174,331
August	149,844	201,623	351,462	360,975	175,473	27,934	915,844
September	151,834	302,278	454,112	68,713	37,959	405	561,189
October	10,536	28,240	38,776	16,036	4,268	142	59,222
Total	518,804	847,556	1,366,355	937,541	734,326	116,247	3,154,469
Number of Fish							
June	16,725	19,492	36,217	15,578	31,054	783	83,632
July	20,260	35,635	55,895	59,287	50,355	12,285	177,822
August	18,884	25,412	44,296	43,001	23,120	3,680	114,097
September	16,928	33,702	50,630	8,660	4,926	53	64,269
October	1,065	2,856	3,921	1,603	382	13	5,919
Total	73,862	117,097	190,959	128,129	109,837	16,814	445,739

Table 10

1961 Troll Chinook Age Data

Per Cent of Each Age Group per Port of the Season's Total.

Month	Port		2 <sub>1</sub>	3 <sub>2</sub>	3 <sub>1</sub>	4 <sub>2</sub>	4 <sub>1</sub>	5 <sub>2</sub>	5 <sub>1</sub>	6 <sub>2</sub>	No. Fish per Port
April	Col. R. <sup>1/</sup>	No.		53	892	147	88				1,180
		%		Tr	0.7	0.1	0.1				
	Newport	No.									
		%									
	Coos Bay	No.		9	348	30	266	13	13		679
		%		Tr	0.3	Tr	0.2	Tr	Tr		
May	Col. R. <sup>1/</sup>	No.			517		39				556
		%			0.4		Tr				
	Newport	No.									
		%									
	Coos Bay	No.		213	2,591	373	779	50	50		4,056
		%		0.2	2.0	0.3	0.6	Tr	Tr		
June	Col. R. <sup>1/</sup>	No.	208	302	2,747	86	457	50	46		3,896
		%	0.2	0.2	2.1	0.1	0.4	Tr	Tr		
	Newport	No.			2,221		749	70			3,040
		%			1.7		0.6	0.1			
	Coos Bay	No.		716	9,848	642	2,937				14,143
		%		0.6	7.6	0.5	2.3				
July	Col. R. <sup>1/</sup>	No.	248	769	3,020	51	359	9			4,456
		%	0.2	0.6	2.3	Tr	0.3	Tr			
	Newport	No.		708	9,546	489	6,657				17,400
		%		0.5	7.4	0.4	5.1				
	Coos Bay	No.		847	18,071	537	4,539	147	147		24,288
		%		0.7	13.9	0.4	3.5	0.1	0.1		
August	Col. R. <sup>1/</sup>	No.	1,875	1,426	4,609	198	1,071	192			9,371
		%	1.4	1.1	3.6	0.2	0.8	0.1			
	Newport	No.	25	409	2,878	311	1,459		193		5,275
		%	Tr	0.3	2.2	0.2	1.1		0.1		
	Coos Bay	No.	51	1,738	15,538	309	2,833	232	232		20,933
		%	Tr	1.3	12.0	0.2	2.2	0.2	0.2		
Sept.	Col. R. <sup>1/</sup>	No.	1,102	438	2,308	17	202	58	25		4,150
		%	0.9	0.3	1.8	Tr	0.2	Tr	Tr		
	Newport <sup>2/</sup>	No.	69	1,107	3,229	205	444	34	112		5,200
		%	0.1	0.9	2.5	0.2	0.3	Tr	0.1		
	Coos B. <sup>2/</sup>	No.	312	1,941	7,496	85	360	85	169	85	10,533
		%	0.2	1.5	5.8	0.1	0.3	0.1	0.1	0.1	
Oct.	Col. R. <sup>1/</sup>	No.	181	112	121	7	7				428
		%	0.1	0.1	0.1	Tr	Tr				

<sup>1/</sup> Includes Washington Columbia River.

~~Newport~~ Coos Bay Combined Sept. and Oct.

Table 10

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1961 Troll Chinook Age Data (Cont'd)  
 Per Cent of Each Age Group per Port of the Season's Total.

Month	Port		2 <sub>1</sub>	3 <sub>2</sub>	3 <sub>1</sub>	4 <sub>2</sub>	4 <sub>1</sub>	5 <sub>2</sub>	5 <sub>1</sub>	6 <sub>2</sub>	No. Fish per Port
Total	Col. R. <sup>1/</sup>	No.	3,614	3,100	14,214	506	2,223	309	71		24,037
		%	2.8	2.4	11.0	0.4	1.7	0.2	0.1		
Newport		No.	94	2,224	17,874	1,005	9,309	104	305		30,915
		%	0.1	1.7	13.8	0.8	7.2	0.1	0.2		
Coos Bay		No.	363	5,464	53,892	1,976	11,714	527	611	85	74,632
		%	0.3	4.2	41.6	1.5	9.0	0.4	0.5	0.1	
Grand Total Numbers			4,071	10,788	85,980	3,487	23,246	940	987	85	
		Per Cent	3.1	8.3	66.4	2.7	17.9	0.7	0.8	0.1	

Summation of all ages = 129,584 <sup>2/</sup>

<sup>1/</sup> Includes Washington Columbia River.

<sup>2/</sup> The difference of 451 fish between the total number of chinook in the 1961 catch as indicated in table \_\_\_ and this total is due to the absence of age composition data for Newport during the months of April and May.

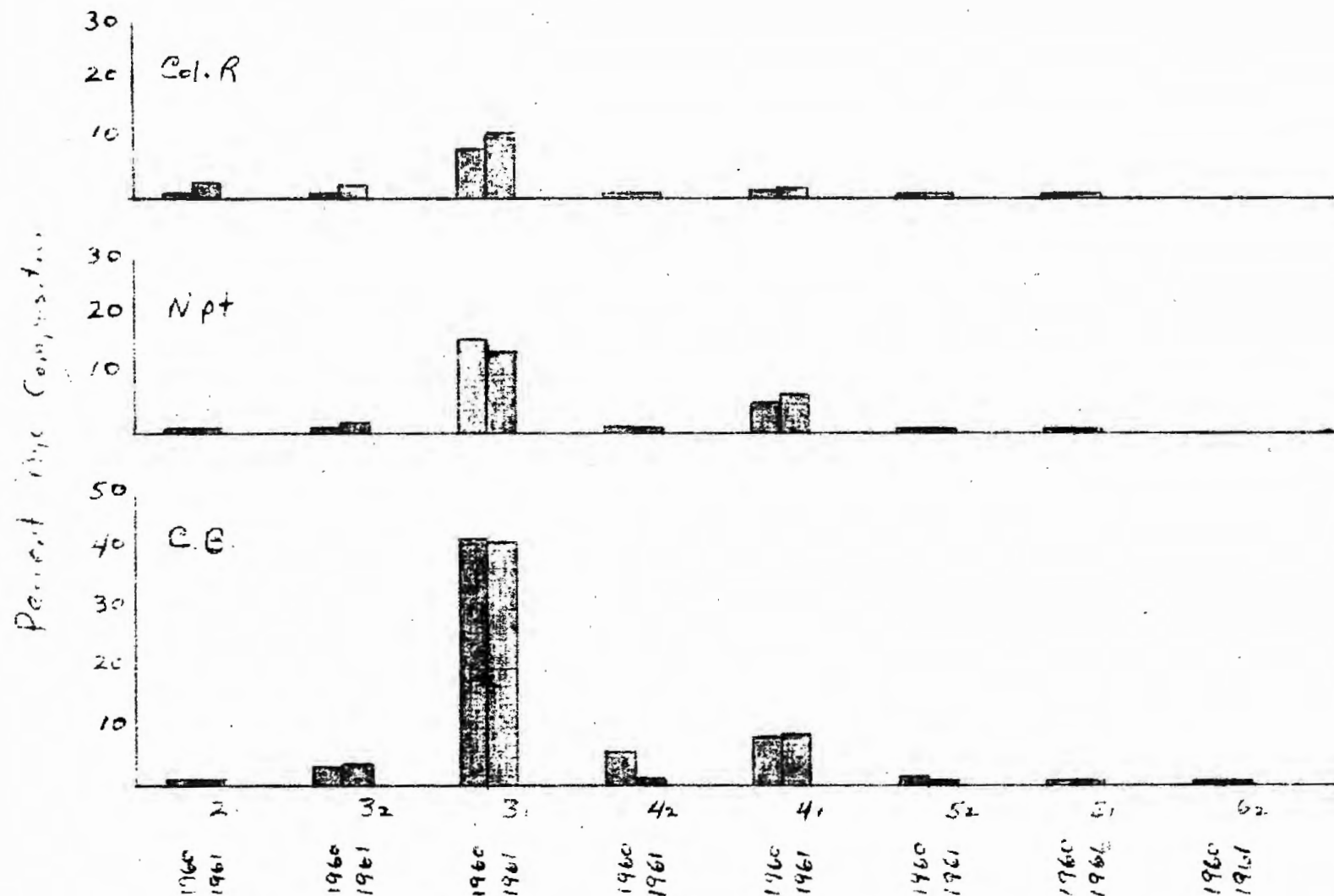


Figure 2: Age Composition of the Oregon Fish Landings Catch with Age Group Strength shown as a Percent of the Annual Oregon Landings, 1960-1961.

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and the 6<sub>2</sub> group only a trace.

The sub<sub>1</sub> group increased in importance compared to 1960. The 1961 landings were composed of 88% sub<sub>1</sub> and 12% sub<sub>2</sub> chinook as compared to 84% and 16% respectively in 1960. The catch of sub<sub>2</sub> chinook was scattered along the coast with the Coos Bay area landing 53%, Newport area, 23% and Columbia River area, 25% of the total sub<sub>2</sub> catch. In 1960, Coos Bay area had 75%, Newport area 15%, and Columbia River area 10% of the total sub<sub>2</sub> type fish.

#### 1961 CATCH ESTIMATE ANALYSIS

The 1961 chinook estimate was only 78% of the actual landings (Table <sup>11</sup>~~13~~). The Columbia River area estimate was 100%, Newport area 112% and Coos Bay area 55% of the actual poundage.

The 1961 chinook estimate for Coos Bay was surprisingly low, a fact that accounts for much of the underestimation of the state catch. It is due to a shift in fishing intensity to Brookings following port improvement and probably to a fortuitous change in chinook abundance that could not be forecast. Landing records were not obtained from the Brookings buyers in 1961 which let their increased landings go undetected. Estimates for 1962 will not contain this shortcoming.

The 1961 coho estimate was 92% of the actual landings (Table <sup>11</sup>~~14~~). The Columbia River area estimate was 93%, Newport area 103% and Coos Bay area 79% of the actual landings. The Coos Bay area estimate was low because of the unusually large Brookings landings.

Our estimates should improve as we recognize and consider changes such as occurred in Brookings. If accuracy approaches  $\pm 10\%$  our needs will be served.

#### THE 1962 OCEAN TROLL FISHERY

##### General comments

Chinook landings were poor in all areas during April. Columbia River area

cut in ~~Percent in title~~  
 as footnote ~~✓~~ 19

Table 11. 1961 troll catch estimate analysis  
 (in thousands of pounds dressed).

Month	Columbia River <sup>22/</sup>			Newport			Coos Bay <sup>32/</sup>		
	Estimate	Catch	Est/catch in %	Estimate	Catch	Est/catch in %	Estimate	Catch	Est/catch in %
Chinook									
April	10	11	91	2	3	67	6	7	86
Cumulative	10	11	91	2	3	67	6	7	86
May	7	8	88	22	2	50	8	37	22
Cumulative	17	19	89	4	5	80	14	44	32
June	41	38	108	31	36	86	44	144	31
Cumulative	58	57	102	35	41	85	58	188	31
July	45	42	107	230	208	111	106	252	42
Cumulative	103	99	104	265	249	106	164	440	36
August	123	126	98	67	58	116	83	220	38
Cumulative	226	225	100	332	307	108	247	660	37
September	39	41	95	47	36	131	133	82	162
Cumulative	265	266	100	379	343	110	380	742	51
October	3	4	75	17	11	155	33	14	236
Cumulative	268	270	99	396	354	112	413	756	55
Grand Total	1,077	1,380	78						
Coho									
June	142	152	93	68	78	87	154	156	99
Cumulative	142	152	93	68	78	87	154	156	99
July	269	302	89	318	350	91	245	370	66
Cumulative	411	454	91	386	428	90	399	526	76
August	276	306	90	330	314	105	126	177	71
Cumulative	687	760	90	716	742	96	525	703	75
September	403	395	102	96	60	160	33	33	100
Cumulative	1,090	1,155	94	812	802	101	558	736	76
October	30	34	88	26	14	186	13	4	325
Cumulative	1,120	1,189	94	838	816	103	571	740	77
Grand Total	2,529	2,745	92						

<sup>22/</sup> Includes Washington Columbia River landings.  
<sup>32/</sup> Includes Brookings area.



atches were good in May, June and July but very poor in August and September. Newport and Coos Bay area catches were poor throughout the entire season.

Coho landings were fair in all areas. Columbia River area catches were good in June, July and August but very poor in September. The Newport area had only fair landings in June and July and very good landings in August. Coos Bay area had poor June and July catches but landings improved for August, September and October.

Average weights for chinook were a little above normal in all areas but coho average weights were down in the Columbia River and Coos Bay areas.

The price on chinook averaged higher than in 1961 and coho prices were lower. The seasonal maximum on the Seattle board was \$.51 for coho and \$.97 for chinook. This compares with \$.53 $\frac{1}{2}$  and \$.83 respectively in 1961.

Estimated catch

Staff members copied landings from most of the selected buyers on a weekly basis. Sampling at Newport was spasmodic in April and May which resulted in low mark sampling intensities and infrequent catch estimates from that area.

Tables <sup>12</sup> ~~15 and 20~~ show the estimated 1962 catch of chinook and coho compiled through October 6. Landings are shown by species by PMFC zone and for ~~the entire state~~ <sup>Oregon including Washington Columbia River ports</sup> in pounds dressed and in numbers of fish. Included is the estimated cumulative sampling percentage for the combined areas.

The Columbia River area catch includes estimates of landings made at the Washington Columbia River ports of Ilwaco and Chinook. These ports received about 51% of the chinook and 60% of the coho landed in the Columbia River area.

The estimates show that the Oregon chinook catch was approximately 653,000 pounds round. The estimated coho catch was 1,793,000 pounds round.

RESULTS OF 1960 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

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Out as Foot note 21

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Table . Estimated 1962 Oregon Salmon landings and sampling  
by species by area (in thousands of pounds and per cent.)

Date	Cumulative pounds, dressed				Cumulative % sampled
	Col. River	Newport	Coos Bay	Total	
Chinook					
April 15-21	1	3	1	5	20
22-30	2	3	4	9	19
May 1-5	2	3	5	10	17
6-12	4	3	8	15	12
13-19	7	3	9	19	22
20-31	14	5	21	40	22
June 1-9	21	6	42	69	16
10-16	45	6	52	103	24
17-23	59	26	64	149	31
24-30	62	37	76	175	34
July 1-7	69	40	97	206	35
8-14	77	58	147	282	34
15-21	85	59	152	296	36
22-31	104	68	188	360	34
Aug. 1-11	107	98	272	477	28
12-18	114	100	279	493	29
19-25	121	100	315	536	27
26-31	129	100	324	553	29
Sept. 1-8	135	112	346	593	30
9-15	147	113	351	611	30
16-22	156	120	358	634	29
23-30	160	124	364	648	28
Oct. 1-6	160	124	365	649	28
Coho					
June 10-16	39	1	5	45	22
17-23	138	9	23	170	31
24-30	164	23	37	224	33
July 1-7	213	59	88	360	38
8-14	277	165	180	622	36
15-21	377	188	204	769	39
22-31	433	253	291	977	37
Aug. 1-11	571	561	393	1,525	39
12-18	673	596	432	1,701	38
19-25	854	598	446	1,898	37
26-31	908	601	467	1,976	37
Sept. 1-8	941	624	485	2,050	37
9-15	948	625	489	2,062	37
16-22	1,012	629	498	2,139	36
23-30	1,036	635	504	2,175	35
Oct. 1-6	1,041	637	506	2,184	35

1/ Includes Washington Columbia River landings.

resulted in 27% of all chinook and 21% of all coho landed being sampled for marks. This exceeded the goal of a 20% sample of landing of both species.

The information is presented in Tables <sup>13</sup> ~~14 and 15~~ for chinook and coho. Tables 14 and 15 show the actual mark recoveries for chinook and coho respectively by month and area.

Samplers picked up 266 marked chinook from the catch. Of this number, Ad-Rm (99) and Ad-Lm (60) were the major contributors. These marks could be assigned to either the Deschutes River in Puget Sound or the Rogue River in southern Oregon. The recovery pattern of these marks was surprising in that they did not appear in the fishery in abundance until July and were highly concentrated at Coos Bay. Such timing at these locations causes us to assume that most of the fish ~~involved~~ with these two marks were from the Rogue River. Coho marks numbered 298 with one mark (Ad-LM) being found most frequently (45).

Average weight sampling

Table ~~22~~ <sup>16</sup> shows unweighted averages for chinook and coho for area, month and season as well as the month and seasonal catch-weighted averages.

The chinook catch-weighted average weight for ~~1960~~ <sup>1960</sup> was 10.3 pounds dressed. This is slightly above the normal average weight and 1.85 pounds higher than the 1959 average weight.

The coho catch-weighted average weight for the season was 6.6 pounds dressed. This average weight is 14% higher than the 1956-59 observed weights and 1.6 pounds or 32% higher than the 1959 average.

RESULTS OF 1961 SAMPLING

Mark Sampling

A mark sampler was stationed at Coos Bay (Charleston) from April to September and at Astoria and Newport from June to September. Thus, 23% of all chinook landed and 31% of all coho landed were sampled for marks. This level of sampling effort was sufficient for both chinook and coho.

Table 13. Oregon troll sampling - 1960

Port	April	May	June	July	August	Sept.	Oct.	Total
<u>Chinook</u>								
Columbia River								
No. examined	1,623	143	766	2,536	1,173	375	11	6,627
No. landed	3,296	283	2,751	5,445	5,006	1,489	131	18,401
% examined	49	51	28	47	23	25	8	36
Newport								
No. examined	0	796	200	1,947	3,098	327	13	6,381
No. landed	843	7,194	3,099	6,338	13,129	1,958	978	33,098
% examined	0	11	7	31	24	17	2	19
Coos Bay								
No. examined	0	1,193	1,545	4,841	13,647	2,126	0	23,352
No. landed	387	9,667	8,282	18,412	33,550	12,325	2,791	81,414
% examined	0	12	19	26	41	17	0	29
<u>Coho</u>								
Columbia River								
No. examined			6,591	5,930	4,914	2,647	112	20,194
No. landed			14,149	21,984	35,484	11,710	688	84,015
% examined			47	27	14	23	16	24
Newport								
No. examined			0	1,089	3,982	523	7	5,541
No. landed			620	9,141	28,693	3,224	685	42,363
% examined			0	11	14	16	1	13
Coos Bay								
No. examined			718	4,122	2,838	224	0	7,902
No. landed			3,017	17,133	13,527	1,537	134	35,248
% examined			24	24	21	15	0	22

Table <sup>14</sup> Summary of chinook marks recovered from the Oregon troll fishery, 1960.

Origin	Mark	Brood	April		May		June		July		August		September		Total	
			Col.	NP CB	Col.	NP CB	Col.	NP CB	Col.	NP CB	Col.	NP CB	Col.	NP CB		
Deschutes R. (P.S.)	D-LV	1957			1										1	
Deschutes R. (P.S.)	D-RV	1957							1						1	
Duplicated	Ad	1956			1			1							2	
Duplicated	Ad	1957									1				1	
Not Assigned	Ad	?						1	1						2	
Klickitat R.	Ad-LV	1956	1					1							2	
Not assigned	Ad-LV-RV	1957									1				1	
Klickitat R.	Ad-RV	1957									2		1		3	
Not assigned	Ad-RV	?									1				1	
Spring Cr.	Ad-IP	1957	1			1									2	
Spring Cr.	Ad-RP	1956				1		1							2	
Spring Cr.	Ad-RP	1957	2							1					3	
Spring Cr.	Ad-RP	1958						1							1	
Duplicated	Ad-LM	1956									1			1	2	
Duplicated	Ad-LM	1957								1	1	1		15	60	
Not assigned	Ad-LM	?										3			3	
Duplicate	Ad-RM	1956								2	2	1			5	
Duplicate	Ad-RM	1957				2		7	10	6	5	12	42	1	1	99
Not assigned	Ad-RM	?						1							1	
Eagle Creek	An	1956									1				1	
Herman Cr.	An-RV	1957						1							1	
Little White Salmon	An-LP	1956			1							1			4	

Table 17. (Continued).

Origin	Mark	Brood	April			May			June			July			August			September			Total
			Col.	NP	CB	Col.	NP	CB	Col.	NP	CB	Col.	NP	CB	Col.	NP	CB	Col.	NP	CB	
Little White Salmon	An-LP	1957									1										1
Little White Salmon	An-RP	1956	1			1															2
Duplicate	LV	1956										1									1
Klickitat	LV	1957										1				2					3
Duplicated	LV-RV	1956									1	1				2					4
Duplicated	LV-RV	1957							2	1	1			3	5			1	1		13
Umpqua	LV-RV-RM	1957										3		5	7			1	1		17
Not assigned	LV-RV-RM	?														1					1
Duplicate	LV-LM	1956									1										1
Not assigned	LV-LM	?					1														1
Nemah R.	LV-RM	1957																		1	1
Duplicated	RV	1956									1										1
Klickitat	RV	1957									1	2			2			1			6
Not assigned	RV	?										1									1
Duplicated	RV-RM	1955														1					1
Duplicated	RV-RM	1956						1						1	1						3
Nemah R.	RV-RM	1957														1					1
Gnat Cr.	LP	1955									1										1
Little White Salmon	LP	1957																		1	1
Little White Salmon	LP	1958												1							1
Not Assigned	LP-LM	1957												1							1
Gnat Cr.	RP	1955														1					1
Columbia R.	RP	1956												1	1						2
Little White Salmon	RP	1957									1								1		2
Not assigned	RP-LM	1957														1					1
<b>Totals</b>			<b>6</b>	<b>1</b>		<b>1</b>	<b>5</b>	<b>4</b>	<b>2</b>	<b>1</b>	<b>20</b>	<b>18</b>	<b>9</b>	<b>25</b>	<b>120</b>	<b>6</b>	<b>1</b>	<b>32</b>			<b>266</b>

Table 15 Summary of Ohio marks recovered from the Oregon troll fishery, 1960.

Origin	Mark	Brood	June			July			August			September		October	Total
			Col.	NP	CB	Col.	NP	CB	Col.	NP	CB	Col.	NP	CB	
Maskanine R.	D-Ad	1957	2			2	3		2	4	2	1			16
Sandy R.	D-LV	1957	1			2	1	2		3	3	3	1		16
Sandy R.	D-RV	1957				1		2	4	2	2	1	2		13
Hood R.	D-LP	1957				1	1	2	1	1	1				7
Hood R.	D-RP	1957	2						3		3	3	1		12
Duplicated	Ad	1957	7			7	1	3	5	2	3	2	1		31
Pudding Cr. (Calif.)	Ad-LV	1957						1	1						2
Mad R. (Calif.)	Ad-RV	1957			1			1	2	2	1	1	1		9
Hood R.	Ad-LP	1957			1						1				2
Lake Pleasant	Ad-RP	1957	3			2			5		1				11
Lewis R.	Ad-LM	1957	13			7	4	2	12	4	2		1		45
Lewis R.	Ad-RM	1957	4			1			1	1	1				8
Big Lagoon (Calif.)	LV	1957			1	1	1	9		3	4	6			25
North Coast Streams	LV-RV	1957			1	1		4	3	5	7	2	1	1	26
Simpson Hatchery	LV-RV-RM	1957							1	1					2
Big Cr.	LV-IM	1957				1	1	3	2	1	1				9
Big Cr.	LV-RM	1957						1				1			2
Big Lagoon (Calif.)	RV	1957			2			6	3	3	1	3			20
Big Cr.	RV-LM	1957	1			3	2	1		7	1	3	1		19
Winter Cr.	LP	1957						6	1	1	2		1		11
Gnat Cr.	LP	1958											2		2
Not assigned	LP-RP	1957				1									1
Not assigned	LP-LM	1957					1	1							2
Gnat Cr.	LP-RM	1957						1							1
Not assigned	RP	1957			1	1		2	1		1				6
<b>Totals</b>			<b>33</b>	<b>5</b>	<b>32</b>	<b>15</b>	<b>49</b>	<b>47</b>	<b>40</b>	<b>26</b>	<b>26</b>	<b>8</b>	<b>5</b>	<b>1</b>	<b>298</b>



Table 2.16 Average Weight data for troll salmon landings by species, by month and area, 1960 in dressed weight.

CHINOOK

Area	April	May	June	July	August	September	October	Total
Columbia River								
Nos.	1442	142	742	1520	783	275	1	4905 <sup>2/</sup>
Lbs.	12682	1263	6367	13783	9121	3350	7	46573
Ave.	8.8	8.9	8.6	9.1	11.6	12.2	7.0	9.5
Newport								
Nos.		708	200	1694	2549	325	13	5489 <sup>2/</sup>
Lbs.		7387	2301	20580	29561	3299	156	63284
Ave.	10.3 <sup>1/</sup>	10.4	11.5	12.1	11.6	10.2	12.0	11.5
Coos Bay								
Nos.		1193	1542	3686	9201	2126		17748
Lbs.		12189	15383	41598	98556	19622		187348
Ave.	10.3 <sup>1/</sup>	10.8	10.0	11.3	10.7	9.2	10.3 <sup>1/</sup>	10.6
Totals <sup>2/</sup>								
Nos.	1442	2043	2484	6900	12533	2726	14	28142
Lbs.	12682	20839	24051	75961	137238	26271	163	297203
Ave.	8.8	10.2	9.7	11.0	11.0	9.6	11.6	10.6
Total <sup>3/</sup>								
Nos.	4525	17144	14092	30195	51685	15772	3500	136913
Lbs.	40763	170468	142012	315587	566801	150955	32998	1409584
Ave.	9.0	9.9	10.1	10.5	11.0	9.6	9.4	10.3

COHO

Columbia River								
Nos.	4798	3023	3898	3037	3838	2237	9	13890 <sup>2/</sup>
Lbs.			21110	20424	28425	17792	76	91127
Ave.			5.1	6.8	7.4	8.0	8.4	6.6
Newport								
Nos.				523	3047	491	7	4070 <sup>2/</sup>
Lbs.				3395	20385	3629	44	27453
Ave.	6.6 <sup>1/</sup>	6.5	6.6 <sup>1/</sup>	6.5	6.7	7.4	6.3	6.7
Coos Bay								
Nos.			818	2538	2243	223		5723 <sup>2/</sup>
Lbs.			3861	14717	13583	1293		33454
Ave.			5.4	5.8	6.1	5.8	6.6 <sup>1/</sup>	5.8
Totals <sup>2/</sup>								
Nos.	5516		5516	6086	9128	2951	16	23697
Lbs.			28271	38536	62393	22714	120	152034
Ave.			5.1	6.3	6.8	7.7	7.5	6.6
Total <sup>3/</sup>								
Nos.			137786	48258	77704	16471	1427	161646
Lbs.			91679	308279	537345	126458	10384	1074145
Ave.			5.2	6.4	6.9	7.7	7.3	6.6

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.



The sampling information is presented in Table ~~24~~<sup>17</sup> for chinook and coho respectively. Tables ~~18~~<sup>18</sup> and ~~19~~<sup>19</sup> show the actual mark recoveries for chinook and coho respectively by month and area.

Samplers recovered 660 marked chinook from the catch. Of this number, 212 or 32% were from the Sacramento River system and 171 or 26% were from the Umpqua River. The recovery of coho marks number 1,334, a four-fold increase over 1960. This increase was due to a two-fold increase in the potential number of marks available plus a doubling of the sampling effort. Of the total recoveries, 258 or 19% were from the Washougal and Elokomln Rivers while 226 or 17% were from the Hood River. Marks from Ketchikan Creek, Alaska, were abundant but there is some doubt as to the validity of this assignment of the 191 adipose marks recovered.

#### Average weight sampling

Table ~~22~~<sup>20</sup> and ~~30~~<sup>30</sup> shows unweighted averages for area, month, and season as well as the month and seasonal catch--weighted averages.

The chinook catch-weighted average weight for the season was 10.6 pounds dressed. This is 7% above the 1956-60 observed weights and 0.3 pounds or the same as the 1960 average weight.

The coho catch-weighted average weight for the season was 6.2 pounds dressed. This average weight is 3% higher than the 1956-60 average but is 0.4 pounds or 6% less than the 1960 average weight.

#### Scale collection

Chinook scale collecting was satisfactory at all ports from April to October. We collected 188 daily samples <sup>involving</sup> from a total of 2,275 fish (Table ~~21~~<sup>21</sup>). The number of scales collected by size group varied little within the areas. However, the numbers fluctuated greatly between the areas. We collected 1,040 scales from the Columbia River area, 479 from the Newport area, and 756 from the Coos Bay area.

Table 17. Oregon troll sampling - 1961

Part	April	May	June	July	August	Sept.	Oct.	Total
			<u>Chinook</u>					
Columbia River								
No. examined	462	188	2,134	1,765	3,264	1,794	128	9,735
No. landed	1,179	556	3,896	4,455	9,368	4,149	430	24,033
% examined	39	34	55	40	35	43	30	41
Newport								
No. examined	2	0	11,588	6,397	2,576	892	263	11,718
No. landed	234	192	33,000	17,401	5,276	4,032	1,178	31,373
% examined	1	0	52	37	49	22	22	37
Cosco Bay								
No. examined	508	347	11,693	2,697	2,786	1,077	69	9,067
No. landed	678	4,056	14,143	24,287	20,933	8,891	1,641	74,629
% examined	75	9	11	11	13	12	4	12
			<u>Coho</u>					
Columbia River								
No. examined			11,848	24,906	12,271	9,822	1,659	60,506
No. landed			36,217	55,894	44,296	50,630	3,921	190,958
% examined			33	45	28	19	42	32
Newport								
No. examined			5,754	12,069	14,755	1,837	370	14,785
No. landed			15,578	59,287	43,001	8,660	1,603	128,129
% examined			37	20	34	21	23	27
Cosco Bay								
No. examined			12,895	18,591	10,300	1,113	315	43,214
No. landed			31,837	62,640	26,800	4,979	395	126,651
% examined			41	30	38	22	80	34

Table 18 Summary of chinook marks recovered from the Oregon troll fishery, 1961.

Origin	Mark	Brood	April			May			June			July			August			September			October			Total
			Col	NP	CB	Col	NP	CB	Col	NP	CB	Col	NP	CB	Col	NP	CB	Col	NP	CB	Col	NP	CB	
Carson Depot Spr.	D	1958						1				1											2	
Not Assignable	D	?			1											1							2	
Puget Sound Lagoons	D-Ad	1958	1					2	2			8	1		1	1							16	
Elwha R.	D-Ad-IM	1957										2	1		1								4	
San Francisco Bay	D-Ad-IM	1958			1		1	2	5	3	2	27	12	1	9	7		2	3			1	76	
Not Assignable	D-Ad-IM	?								1				2				1					4	
Elwha R.	D-Ad-RM	1957								1		1	1										2	
Sacramento R.	D-Ad-RM	1958			1			1	4	4	4	16	9	3	4	12	1	1	1			1	62	
Not Assignable	D-Ad-RM	?										1											1	
Little White Salmon	D-IP	1958												1			1						2	
Little White Salmon	D-RP	1958									1												1	
San Francisco Bay	D-IM	1958						2			1	8	2	2	4	3			3		1		26	
Not Assigned	D-IM-RM	1956								1													1	
Not Assigned	D-RM	1957	1									1											2	
Upper Sacramento R.	D-RM	1958	2					2	2		3	15	3	1	4	2			3	8		3	48	
Duplicated	Ad	1957								1		6			2				1				10	
Duplicated	Ad	1958	1					2		2		7		2	2	1	1		1	1	1		20	
Not Assignable	Ad	?								1													1	
Middle Willamette R.	Ad-LV	1958								1													1	
Nestucca R.	Ad-LV-RV	1958						2		1	3	3		2									11	
Not Assignable	Ad-LV-RV	?								1													1	
Spring Cr.	Ad-IP	1958								1					1								2	
Spring Cr.	Ad-RP	1957								1													1	
Spring Cr.	Ad-RP	1958								1				1	1								4	
Duplicated	Ad-IM	1957										2	1		1	1				1			6	
Rogue R.	Ad-IM	1958						1				2	3		1	4	1			3			15	
Not Assigned	Ad-IM-RM	1958														1							1	
Duplicated	Ad-RM	1957							5		2	13	9	1	6	4	1						41	
W. Umpqua R.	Ad-RM	1958						5			7	33	26	8	20	25	11	3	3			3	144	
Not Assignable	Ad-RM	?						1															1	
Nemah R.	An-LV	1958																		2			2	
Not Assigned	An-LV-IP	1958													1								1	
Little White Salmon	An-IP	1957						1			2												3	
Little White Salmon	An-IP	1958						2			2	1	1	11			8				1		26	
Little White Salmon	An-RP	1956								1													1	
Little White Salmon	An-RP	1957						1		1													1	
Little White Salmon	An-RP	1958						1		1					4	1			4				3	
																							15	

Table 18. Summary of chinook marks (Continued)

Origin	Mark	Brood	April			May			June			July			August			September			October			Total	
			Col	NP	CB	Col	NP	BB	Col	NP	CB	Col	NP	CB	Col	NP	CB	Col	NP	CB	Col	NP	CB		
Not Assigned	An-LM	1958																					1	1	
Not Assigned	An-RM	1958							1															1	
Duplicated	LW	1958							2															2	
Duplicated	LV-RV	1957	1		1						1	2	1				1							7	
Wildhorse R.	LV-RV	1958							1				1											2	
Not Assigned	LV-RV-RP	1958														1								1	
Rogue R.	LV-RV-LM	1957														1								1	
Rogue R.	LV-RV-LM	1958														1	1					1		3	
Uapqua	LV-RV-RM	1957					1		6	3	2		6	2	3	3	1							27	
Not Assigned	LV-RV-RM	1958							1			2	3		2	3	1					1		13	
Not Assignable	LV-RV-RM	?													1									1	
Klickitat	RV	1957											1		1										2
Duplicated	RV	1958							1				1			1	1		1						5
Saish R.	RV-LM	1958							1																1
Wasah R.	RV-RM	1957								1		1	1	1											4
Beschutes R. (P.S.)	RV-RM	1958											1												1
Little White Salmon	LP	1957											1		1										2
Little White Salmon	LP	1958							1			1	3		1										6
Not Assignable	LP	?											1												1
Little White Salmon	RP	1957								1			1			1									3
Little White Salmon	RP	1958	1						3			4	2	2	3	2									17
<b>Totals</b>			<b>7</b>	<b>4</b>	<b>2</b>	<b>1</b>	<b>42</b>	<b>32</b>	<b>19</b>	<b>40</b>	<b>169</b>	<b>74</b>	<b>53</b>	<b>71</b>	<b>67</b>	<b>33</b>	<b>15</b>	<b>20</b>	<b>3</b>	<b>4</b>	<b>4</b>			<b>660</b>	

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Table M Summary of catch marks recovered from the Oregon troll fishery, 1961.

Origin	Mark	Brood	June			July			August			September			October			Total
			Col	NP	CB	Col	NP	CB	Col	NP	CB	Col	NP	CB	Col	NP	CB	
Granberry Lake	D	1958	1						1	2								4
Hood River	D-Ad	1958	13	7	19	29	36	44	28	27	14	9						226
Tennile Lake	D-LV	1958	2															2
Tennile Lake	D-RV	1958		1		1												2
Minter Cr.	D-IP	1958				1												1
Ketchikan Cr.	Ad	1958	12	10	25	25	29	19	9	32	18	9	2	1				191
Not Assigned	Ad-LV	1958							1									1
Wash. Fish Farms	Ad-RV	1958	6	3	4	19	6	3	7	3		2						53
Millicoma R.	Ad-LP	1958	2	1	26	2	6	30	3	11	16	1	3					101
Saltwater Lagoons (P.S.)	Ad-RP	1958	1	1		1		1		2	1							7
Not Assigned	Ad-RP-RM	1958					1											1
Washougal & Elokomn R.	Ad-IM	1958	9	6	3	22	6	15	8	13	3	6						91
Not Assigned	Ad-IM-RM	1958				2												2
Washougal & Elokomn R.	Ad-RM	1958	12	6	5	38	20	23	14	25	11	13						167
Gnat Cr.	An	1958				4						1						5
Speelyai Cr.	An-LV	1958	21	2	2	24	6	6	11	2		4						78
Lake Merwin	An-RV	1958	1	1		4												6
Speelyai Cr.	An-LP	1958					1	1										1
Duplicated	LV	1958	8	9	7	20	15	8	13	18	8	6						111
Not Assigned	LV-RV	1958	1	1	2	3	4	5	3	4	1	4						28
Not Assigned	LV-LP	1958						1										1
Not Assigned	LV-RP	1958						2			1	1						4
Duplicated	RV	1958	11	7	5	16	14	9	10	19	4	12	1	2				110
Not Assigned	RV-LP	1958			1	1	1											3
Not Assigned	RV-RP	1958				4	1		3			1						9
Not Assigned	RV-IM	1958									1							1
Gnat Cr.	LP	1958	2	1	1	2	4	4	9	20	2	3						48
Not Assigned	LP-RP	1958					1			1								2
Not Assigned	LP-RM	1958	1															1
Gnat Cr.	RP	1958	4	6	2	6	15	4	5	18	5	9	1	1				76
Gnat Cr.	RP	1959										1						1
<b>Total</b>			<b>107</b>	<b>62</b>	<b>102</b>	<b>224</b>	<b>166</b>	<b>174</b>	<b>125</b>	<b>199</b>	<b>82</b>	<b>81</b>	<b>6</b>	<b>5</b>	<b>1</b>			<b>1334</b>

Table 27. Average weight data for troll salmon by species, by month and area, 1961 in dressed weight.

Area	Month							Total
	April	May	June	July	August	September	October	
Chinook								
Columbia River								
Nos.	386	151	1481	1153	921	438	60	4590
Lbs.	3730	2037	14172	9869	11244	3944	563	45559
Ave.	9.6	13.5	9.6	8.6	12.2	9.0	9.4	9.9
Newport								
Nos.	2	0	1282	5333	1690	129	190	8626
Lbs.	24	0	14699	64924	18850	1069	1756	101328
Ave.	12.0	10.1	11.5	12.2	11.2	8.3	9.2	11.7
Coos Bay								
Nos.	499	331	806	2283	2450	778	69	7216
Lbs.	5021	2987	7744	24748	23896	6975	601	71898
Ave.	10.1	8.8	9.6	10.8	9.8	9.0	8.7	10.0
Total <sup>2/</sup>								
Nos.	887	482	3569	8769	5061	1345	319	20432
Lbs.	8775	4944	36615	99541	53990	11988	2920	218773
Ave.	9.9	10.3	10.3	11.4	10.7	8.9	9.2	10.7
Total <sup>3/</sup>								
Nos.	2111	4804	21079	46143	35577	17072	3249	130035
Lbs.	20846	46213	216890	500620	404088	159056	28874	1376587
Ave.	9.8	9.6	10.3	10.8	11.4	9.3	8.9	10.6
Coho								
Columbia River								
Nos.			2898	1815	682	1611	62	5928
Lbs.			9867	6692	4656	12530	534	34269
Ave.			4.2	5.4	6.9	7.8	8.6	5.8
Newport								
Nos.			4530	7869	7483	578	0	20456
Lbs.			22772	46473	54939	3977	0	128161
Ave.			4.9	5.9	8.8	6.9	6.2	6.3
Coos Bay								
Nos.			8317	11766	4000	460	13	24553
Lbs.			40869	68864	26483	3086	119	139421
Ave.			4.9	5.9	6.6	6.7	9.2	5.7
Total <sup>2/</sup>								
Nos.			15177	20880	12155	2645	75	50938
Lbs.			73508	122029	86078	19583	653	301851
Ave.			4.8	5.8	7.1	7.4	8.7	5.9
Total <sup>3/</sup>								
Nos.			86632	177822	114097	64269	5919	445739
Lbs.			386004	1021208	796422	488022	51501	2743159
Ave.			4.5	5.7	7.0	7.6	8.7	6.2

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.



Columbia River  
 Mar.  
 Apr.  
 May  
 Newport  
 Mar.  
 Apr.  
 May  
 Coos Bay  
 Mar.  
 Apr.  
 May

Table 21. Log of 1961 troll chinook random scale samples.

Month	No. of cards	Number of scales/size group									Total
		Col. River			Newport			Coos Bay			
		S	M	L	S	M	L	S	M	L	
April	14	25	26	19	0	1	1	19	24	20	135
May	9	8	15	21	0	0	0	15	17	15	91
June	33	60	65	65	19	26	23	47	50	60	406
July	48	100	93	79	50	65	61	56	64	49	617
August	51	84	75	79	48	55	54	81	79	80	635
September	23	60	62	57	25	25	20	25	24	17	385
October	10	17	20	10	5	5	5	0	8	6	76
<b>Total</b>	<b>188</b>	<b>354</b>	<b>356</b>	<b>330</b>	<b>138</b>	<b>177</b>	<b>164</b>	<b>249</b>	<b>266</b>	<b>247</b>	<b>2275</b>

Columbia River  
 Mar.  
 Apr.  
 May  
 Newport  
 Mar.  
 Apr.  
 May  
 Coos Bay  
 Mar.  
 Apr.  
 May

Total of ...  
 Total of ...  
 Total of ...

We used the OSU Seafood Lab press to make plastic impressions of the scales.

CATCH SAMPLING OF 1962 FISHERY

Mark sampling

The 1962 season produced 236 chinook marks compared to 660 recovered in 1961. This reduction in marks is not due to reduced sampling effort but is the result of two other factors, viz. less marked fish available for capture and a poor chinook season. Of the total, 135 or 57% were from the Umpqua River.

Coho sampling effort apparently was consistent with the 1961 effort. Total coho mark recovery of 1,157 was only slightly less than in 1961 while mark potential and landings were very similar to last year. Approximately 22% of the coho marks were double-fin marks assignable to Cascade Hatchery. Single adipose marks made up another 26% of the recoveries. Since in 1959 an adipose mark was used only by Cascade hatchery, it is evident that this hatchery contributed about 48% of the total coho mark recovery in 1962.

About 28% of the chinook and 35% of the coho landed during 1962 were sampled for marks (~~Table 3~~). The sampling rate for coho was fairly consistent throughout the season but chinook sampling rate was very erratic.

The fluctuating sampling rate seems to be typical of a low-catch season. If a sampler happens to miss even a few fish, ~~he~~ <sup>it</sup> may have ~~missed~~ <sup>missed</sup> the entire weekly catch and his sampling rate would be zero. If the sampler picks up these same fish, a high sampling rate results. →

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~~This is fairly evident if you look at the chinook cumulative percentage column.~~ From mid-June through the end of the season, the <sup>chinook</sup> weekly sampling rate ranges from 0 to 71% yet the cumulative percentage varies only 9 percentage points.

*check table*



Scale collection

Chinook scale collecting was slow in April in all areas, but picked up in the Columbia River area during May. Scarcity of chinook made it difficult to get adequate samples at all times in that fish buyers were processing and packing almost as soon as the fish were landed leaving little time for examination.

The samplers collected 179 daily samples which included scales from 1991 fish (~~1991-74~~). By port we obtained 833 scales from the Columbia River area, 414 from the Newport area and 744 from the Coos Bay area. Market conditions caused the number of scales collected by size group to be biased toward larger fish.

We made plastic impressions of the scales using the O.S.U. Seafoods Lab press and read the scales when time permitted.

# TROLL MORTALITY STUDY

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## Introduction

Study of the mortality of incidentally-caught salmon in the ocean troll fishery was begun in May, 1961, and concluded in 1962 when the last of the tag recoveries was received. The work was described in an unpublished paper most of which is presented below. In addition a cruise report was prepared and a summary of the work was presented at the 1961 PMFC meeting in San Francisco.

A consequence of "minimum size" regulations is the failure of part of released fish to survive to be recaptured. The troll fishery for salmon which must release a selected portion of the fish captured generates such a loss. This study examines quantitatively the loss incurred when coho salmon are taken incidentally in the chinook season. Information on the distribution and exploitation of both coho and chinook stocks was also obtained.

Field work was conducted from the chartered commercial troller "Barracuda" of Astoria skippered by owner Al Berthelsen. Fishing was done in the 2.5 weeks just prior to the opening of the silver season (June 15) between Cannon Beach and the south jetty of the Columbia River (about 23 statute miles) and the 8 and 40 fathom curves. The fishing gear and procedures used were those normally employed by the skipper and the choice of fishing area was essentially left to his discretion.

Several scientists have investigated the degree of mortality occurring when troll caught salmon are released. These men recognized two types of mortality, viz. that which is apparent at the time the fish is in hand (immediate), and that which occurs to fish after their release in an apparently unharmed condition (delayed).

The California Department of Fish and Game reported a mortality of 38 per cent for coho after 24 hours of holding. Milne and Ball took 67 coho on troll gear in 1954 and observed a direct mortality of 18 per cent with an additional delayed mortality through 1 to 6 hours of holding of 16 per cent. The same

authors in a 1956 study show an 18 per cent delayed mortality for 289 troll caught silvers caught on barbless hooks and held aboard the boat for at least 1 hour. Parker, Black and Larkin in 1958 held 115 coho, for as long as 8 hours and reported a delayed mortality of 44 per cent. In all cases the estimate of delayed mortality was obtained by holding fish in tanks aboard the boat - an unnatural experience for the fish.

These authors have shown that a serious loss occurs when coho are captured and released on troll gear. However, since the numbers of fish utilized were small or the work involved an evaluation based on holding fish in one or more tanks aboard the boat there was reason to investigate further. We attempted to secure larger numbers of fish and to assess the effect, if any, that holding troll caught coho in an artificial environment has on the level of mortality observed during holding.

Parker and Black (1959) reported a delayed mortality estimate for troll caught chinook of 71 per cent. In discussing the results of this study they acknowledge that the confinement during observation could have produced a psychotic reaction terminating with death.

Van Hyning and Ellis felt that death due to psychosis was a plausible factor in the high level of mortality. The premise was studied by Ellis utilizing the idea of tranquilizers to calm the fish. Working with mature coho jacks in fresh water he compared blood lactate levels on test and control fish to show the effect of the tranquilizer. His results based on holding 33 tranquilized and 32 untranquilized fish for up to 4.5 hours showed a lower level of blood lactate in the tranquilized fish. Thus he said the fish in tranquilizer were under less stress than those in untranquilized water and that the tension lost would be that which had a psychotic origin or in other words was due to confinement. In this study we are extending Ellis' work to troll caught 3rd year coho with the effect to be measured by comparative mortalities rather than by blood lactate analysis.

### Methods

The methods employed in our study were as follows: (1) evaluate direct mortality by enumerating the coho that come aboard according to condition, i.e. those that are mortally injured or dead and those that are alive and not bearing serious injury; (2) evaluate delayed mortality by holding fish that are not considered mortalities on landing on the boat for up to six hours and observing the subsequent mortality, (3) evaluate holding mortality by retaining one-half of the "held fish" in seawater with tranquilizer and the other half in straight seawater and comparing the mortality and (4) evaluate hooking or total mortality due to capture by combining the estimates of direct and delayed mortality. In addition all live fish were tagged prior to treatment so that the comparative returns would provide additional information on delayed mortality.

An objective determination of whether a fish was dead or mortally injured on landing was not available. As an alternative, the skipper was instructed to call all fish that were without apparent life or were suffering severe physical damage - cutting of the isthmus and gill arches or extensive damage to eye and brain area - mortalities on landing. Other than for this initial instruction he was not aided in his decision and was never informed as to the treatment the fish would undergo if declared to be in "taggable condition".

All fish that were not judged to be mortalities on landing were tagged prior to further experimental treatment, after being anesthetized with M.S. 222. Plastic spaghetti tubing with colored inserts bearing the number and return data was used with the ends secured by a numbered monel clip. Rewards were paid for their recovery.

Following tagging, a given fish was either placed in a canvas tank with circulating seawater for recovery from the anesthetic or was put into the holding tank as decided prior to tagging. As soon as a fish in the canvas tank recovered his equilibrium he was removed and released.

The holding tank was of bait tank design, constructed of plywood, with bottom dimensions of 3 feet by 4 feet and 4 feet tall. The chimney was 18 by 24 inches by 21 inches high. The capacity was 350 gallons. The tank was carried in the hatch of the boat with only the chimney above hatch top level. It was filled, using the boat's deck pump, at the start of each holding period. Oxygenation of the water was accomplished using industrial grade compressed oxygen fed to the tank through 2 lines equipped with aquarium air stones. A small pump was used to stir the holding water while fish were being retained. The dissolved oxygen supply in the water was measured frequently using the modified Winkler method.

The holding period was 2 to 6 hours. All fish were removed 6 hours after the first one was put in and no fish were added later than 4 hours after the first fish was entered. This permitted 2 holding periods in each day and ample time for mortality to occur. M.S. 222 at a tranquilizing level (1:150,000) was used in one tank each day. Whether this was the morning or afternoon tank was randomly determined prior to the experiment. Fish were removed from the tank using a dip net. Liberation stress on all fish was reduced and the effect of liberation kept comparable between holding media by adding tranquilizer to the fresh seawater tank at least 15 minutes prior to netting.

Results

The daily fishing success for coho varied from spectacular to poor. The total catch was 1537 coho of which all but 2 appeared to be in their 3rd year of life. They averaged 23 inches in total length and a calculated 4 pounds in dressed weight.

The procedure followed on the first day of tagging differed from that pursued thereafter so values for the first day were omitted where appropriate from the data subsequently presented. The catch for that day was 251 coho.

Of 1286 coho caught 238 were considered mortalities on landing giving

an estimate of direct mortality of 18 per cent with a 95 per cent confidence interval of 15 to 21 per cent.

The primary purpose for having a recovery tank was to permit a sobering up of the anesthetized tagged fish. However, it proved to be a point for detecting further mortality since the fish were not released until normal activity was resumed. This mortality which we chose to call delayed mortality was 10 per cent or 92 of the 754 coho put into the recovery tank + 140 of the coho that were dead on landing. Because of the short period of holding this value is a minimum estimate, but for the same reason it is free of error due to fatal psychotic reactions. The estimate of direct mortality (18%) and the estimate of delayed mortality (10%) combined give a total hooking mortality of 28 per cent.

Program design provided 2 additional methods of measuring delayed mortality, viz. the observed mortality of the fish held in the holding tank and by a comparison of the returns of tagged fish released immediately with those released after holding. Neither of these methods produced. The former was inconclusive because of holding problems and the latter because of a lack of statistical significance in the difference between the levels of tag recovery.

Holding mortality was evaluated by holding viable silvers in the live tank in tranquilized and untranquilized states and comparing the % mortality. If holding in a tranquilizer reduced the stress on the fish a difference in the observed mortality between the two groups should result. Instead, the tranquilized group show a mortality of 19% and the controls 17% which are for this purpose the same. This surprising result may have been due to the same holding problems that affected the delayed mortality estimate even though random treatment was in effect.

Evidence indicated that the holding difficulties were 2-pronged in nature. Because of the use of tranquilizer the holding systems were closed, i.e. no

introduction of new seawater into the tank occurred after the initial filling. Water was recirculated within the system. Dissolved  $O_2$  levels changed as fish were added. This change was measured frequently and adjustments in the  $O_2$  input were made. Even so the dissolved  $O_2$  level varied from 3 to 16 parts per million compared to an original level of 8 to 9 ppm. The observed mortality was negatively correlated with the dissolved  $O_2$  level ( $R = .58$ ) as seen in Figure 3, which suggests that the  $O_2$  level affected survival.

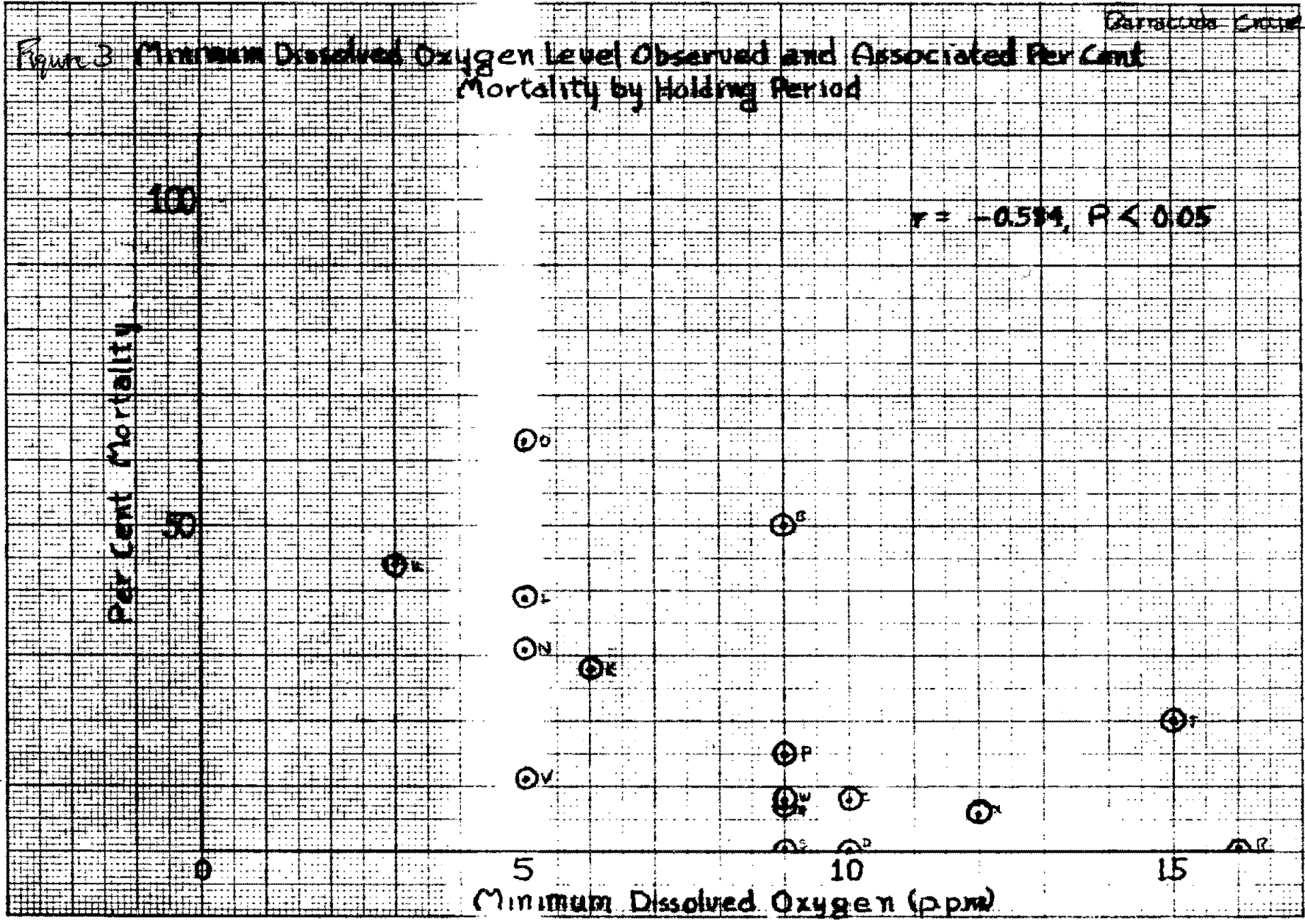
The second factor, a build up of metabolic waste in the system, is suggested by figure A. The best returns of tagged fish occurred from release groups (nos. held) of 8 or 9 fish. As the release size increased returns decreased. Since the capacity of the environment was fixed and the average hours per fish in the tank was less for the smaller groups stress on small groups should have been less. Oxygen levels may have been directly responsible but equally likely is the possibility that the build up of metabolic wastes was the cause. They may have acted directly or indirectly by reducing the fish's ability to remove  $O_2$  from the water thus putting him in a weakened condition at release. Regardless of cause it is likely that the holding capacity of the tank was exceeded. Under those conditions less than 0.25 pound of fish per gallon of water is recommended.

Detailed age-length data for coho and chinook are presented in the cruise report. All coho were in their 3rd year of life except 2 very small 2nd year fish. The modal size for coho was 23 inches. The 222 chinook caught included 2nd year (50%), 3rd year (43%) and 4th year (1%) fish. Five per cent were not ageable.

Of the 1537 3rd year coho caught 1074 were released bearing tags. The total recovery was 202 or 18.8%. The recoveries were distributed from northern California to southern Canada, but were made primarily off the northern Oregon coast and in the Columbia River (Table 29).

Barro Colorado

Figure 3 Minimum Dissolved Oxygen Level Observed and Associated Per Cent Mortality by Holding Period



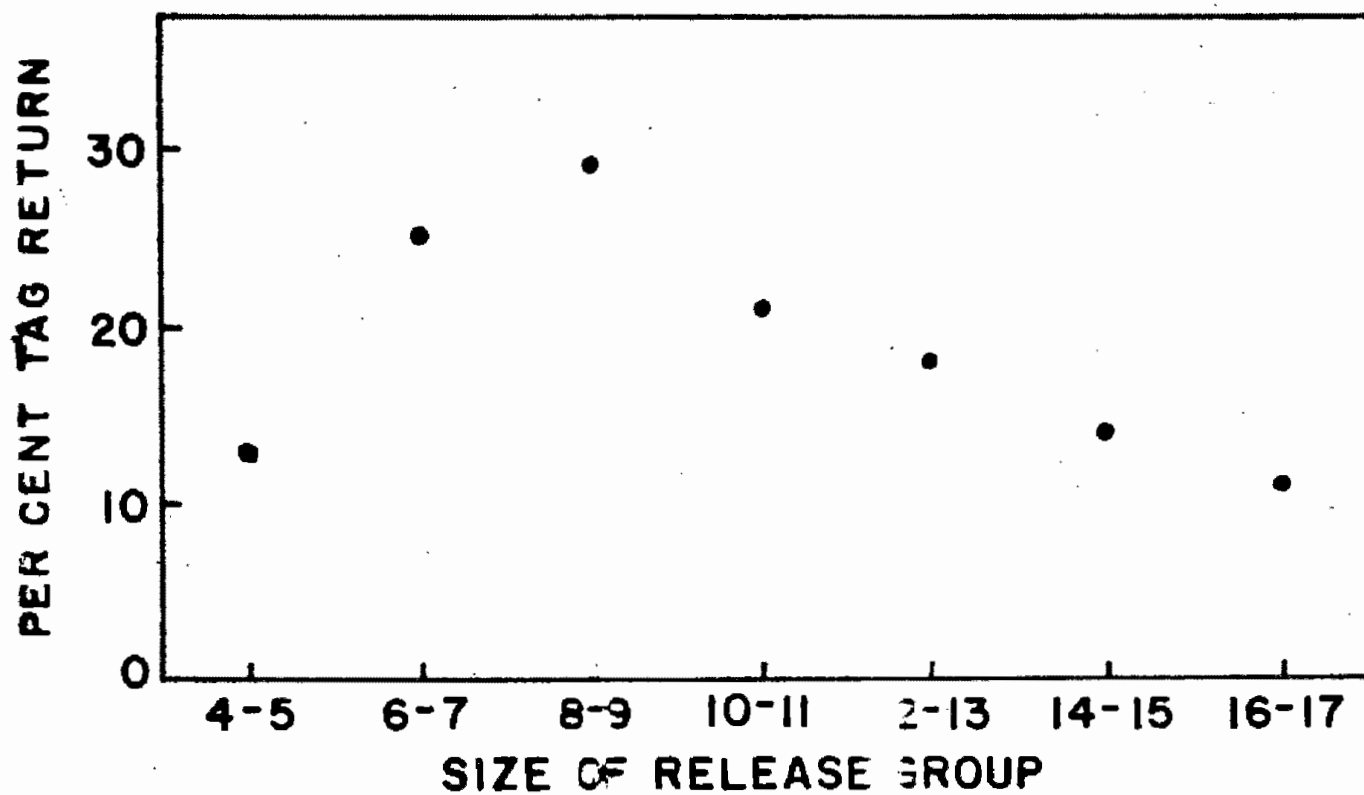
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Figure 4.

**RELATION BETWEEN THE NUMBERS OF FISH RELEASED  
FOLLOWING HOLDING AND THE PER CENT  
SUBSEQUENTLY RECOVERED**



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Table <sup>22</sup>~~22~~. Recovery of tagged coho by area<sup>1/</sup> of recovery, 1961 May-June tagging off Columbia River.

Area	Number
Point Arena to Heceta Head - marine	18
Heceta Head to Cape Lookout - marine	37
Heceta Head to Cape Lookout - freshwater	5
Cape Lookout to Willapa Bay - marine	73
Cape Lookout to Willapa Bay - freshwater exc. Col. R. Columbia River	3
Willapa Bay to Cape Johnson - marine	32
Willapa Bay to Cape Johnson - freshwater	18
Cape Johnson to Pachena Point	1
Puget Sound inside of Port Angeles	6
Total	7
	200

<sup>1/</sup> Two recoveries unassignable to area not included.

The majority of the recoveries were made in the ocean. Ocean sport fishermen recovered 89 tags or 8%; commercial trollers 64 tags or 6%; and hatcheries picked up 18 tags or 2%. Columbia River gillnets accounted for 17 or 2%, river sport fishermen picked up 9 or 1% and Puget Sound purse seiners captured 4 tags. One tag was picked up from a stream bed.

Of the 222 chinook caught, 168 were released with tags. The total recovery was \_\_\_ or \_\_\_%. The recoveries were distributed from the Sacramento River system to \_\_\_\_\_ (Table 23).

Table 23. Recovery of tagged chinook by area of recovery, 1961 May-June tagging off Columbia River.

Area	Number
Sacramento-San Joaquin System	
Monterey to Point Arena	
Point Arena to Heceta Head	
Heceta Head to Cape Lookout	
Cape Lookout to Willapa Bay - marine	
Cape Lookout to Willapa Bay - freshwater exc. Col. R. Columbia River	
Willapa Bay to Cape Johnson	
Cape Johnson to Pachena Point	
Total	

The majority of the recoveries were made in the ocean. Commercial trollers recovered \_\_\_ tags or \_\_%, ocean sport fishermen \_\_\_ tags or \_\_%, Columbia River gillnets accounted for \_\_\_ tags, hatcheries \_\_\_ tags and river sport-fishermen \_\_\_ tags. One tag was picked up on the beach near Depoe Bay and another was \_\_\_\_\_.

Chinook tag recoveries shown by age at tagging and year of recovery are listed in Table 24.

Table 24. Chinook tag recoveries by age at tagging and year of recovery.

Age	Number released	Numbers 1961	Recovered 1962	Total	% Rec.
21	77				
32	16				
31	63				
42	1				
41	2				
Regenerate	9				
Total	168				

## BARBLESS HOOK STUDY

The purpose of the study was to evaluate barbless hooks for catching salmon on troll gear. Information obtained from the study included differences in species composition, sex, age, size, maturity, and dollar value between the catch on barbed and barbless hooks over a prolonged fishing period.

Four commercial fishing vessels were used during this study, <sup>with</sup> each vessel fishing for about one month. The vessels were the Barracuda of Astoria, the Elaine Dell of Charleston, the Sealanes of Newport, and the Dreamer of Warrenton.

They fished for chinook and coho salmon using regular trolling methods, except that barbless hooks were used on all lures on one side of the boat. The barbless hooks were assigned daily to the port or starboard sides on a random basis. The same type of lures were used on both sides in comparable positions. Each fisherman operated in his normal fishing areas and retained possession of the legal fish. Fishing was done on 79 days and areawise from Grays Harbor, Washington to Coos Bay, Oregon. A summary of the results is presented in the cruise report (Oregon Fish Commission, Cruise Report - Barbless Hook Study, June 1, to September 27, 1962).

Table <sup>25</sup> ~~X~~ shows the total numbers caught by species, by type of hook, and the value to the fishermen of the legal fish. A tabulation from the field records shows that the barbless hooks caught fewer but larger chinook that were worth \$165.09 more than the fish caught on barbed hooks. The coho catch on barbless gear was 151 fish fewer than the barbed gear catch and worth \$196.68 less. The gross difference to the fishermen between the catch value on barbed and barbless hooks was \$31.59, in favor of barbed hooks.

The percent of chinook caught by barbed (50.8) and barbless (49.2) hooks are nearly equal but the barbed hooks caught 53.9 of the coho to 46.1% on barbless hooks. This difference between the catch of coho and chinook for the two types of hooks is thought to be due to the more active struggling of the coho.

Table <sup>25</sup> X. Numbers of fish caught and the dollar value of legal sized fish taken on barbed and barbless hooks.

Species / Gear	Total No. Caught	Dollar Value 1/
Chinook		
Barbed	191	882.32
Barbless	<u>185</u>	<u>1,047.09</u>
Difference	-6	+ 165.09
Coho		
Barbed	1,037	2,007.47
Barbless	<u>886</u>	<u>1,810.79</u>
Difference	151	196.68

Total difference between barbed and barbless - 31.59  
1/ Only legal sized fish used in computing the dollar value.

Viable, sub-legal chinook and pre-season coho were tagged and released. Table <sup>26</sup>X shows the numbers tagged by species, hook type and the number and per cent recovered through 1962 and reveals the marginal quality of this part of the program. The percent recovery of chinook caught on the two types of hooks are similar. However, for coho the recoveries of barbless hook caught fish is much higher.

The average length data (Cruise Report) shows no difference in length between barbed and barbless hooks for sub-legal chinook, but for legal chinook the average total length was larger for the barbless hooks (31.8 to 31.4 inches).

The age composition of the chinook catch is presented in Table <sup>27</sup>X and shows that the barbless hooks caught proportionally more older and fewer younger chinook than the barbed gear. This may be due to the relative size (holding power) of the barb decreasing as size of the fish being captured increases.

Table ~~X~~<sup>26</sup> Numbers of sub-legal chinook and coho salmon tagged during the 1962 cruises and the number and percent recovered in 1962.

Species Gear	Number Tagged	Number Recovered <sup>1/</sup>	% Recovered
Chinook			
Barbed	84	3	3.6
Barbless	62	2	3.2
Coho			
Barbed	52	1	1.9
Barbless	41	3	7.3

<sup>1/</sup> Recoveries can be expected through 1965 for chinook.

Table <sup>27</sup>X. Age composition of chinook salmon caught on barbed and barbless hooks off the Oregon coast, 1962.

Age	Barbed		Barbless	
	No.	%	No.	%
2 <sub>2</sub>	2	1	0	0
2 <sub>1</sub>	59	31	39	21
3 <sub>2</sub>	21	11	13	7
3 <sub>1</sub>	70	36	76	41
4 <sub>2</sub>	16	8	13	7
4 <sub>1</sub>	21	11	37	20
5 <sub>2</sub>	1	1	0	0
Reg.	<u>1</u>	<u>1</u>	<u>7</u>	<u>4</u>
Total	191		185	