OTTER TRAWL INVESTIGATIONS
Progress Report
May - October, 1957

Introduction

During this "summer" period, the activities of the otter trawl fleet increased, and the field work for the otter trawl investigation increased accordingly.

Dave Leith remained with the otter trawl investigation until mid-November when he transferred to hatchery biology studies.

The following meetings were attended during the period:

Month	Meeting	Location	Personnel
May	Project Leaders' Meeting	Clackamas	Morgan
July	PMFC Otter Trawl Biologists	Portland	Morgan Jones
Sept.	Project Leaders' Meeting	Clackamas	Morgan
Oct.	Statistics Meeting	Clackamas	Morgan

Field activities during this period included the following:

1. Sampling the landings of Dover sole caught on the grounds off Astoria for age-composition, size-composition, and sex ratio.
2. Sampling the Dover sole from the local grounds off Astoria for comparison study of otoliths and scales.
3. Making trips at sea to obtain juvenile Dover sole as weather and charters permitted.
4. Conducting shrimp fishing gear studies on board commercial boats and in conjunction with the juvenile Dover sole trips.
5. Preparing for a cooperative shrimp fishing gear study with California.
6. Conducting limited sampling of mink food landings for species composition of the catch and size composition of the Dover,

English, and petrale soles.

7. Conducting routine interviews with trawl skippers to obtain catch per unit of effort data.

8. Making observations on the herring fishery at Winchester Bay.

Laboratory activities included the following:

1. Compiling the 1956 otter trawl landings.
2. Preparing a summary of the 1956 otter trawl landings for PMFC by species, by month, by PMFC area.
3. Preparing the November 1956-April 1957 progress report.
4. Processing and reading Dover sole scales and otoliths from the samples taken from commercial landings and at sea for the juvenile Dover sole study.
5. Processing current tag recovery data.
6. Compiling all current sampling records.
7. Setting up with the help and cooperation of the statistics section, a more convenient method of receiving otter trawl landings from the Portland office.

Reports written during this period included the following:

1. Summary of proposed petrale sole regulations.
2. Summaries of shrimp fishing gear studies at sea.
3. Summary of observations on the Winchester Bay herring fishery.

Dover Sole Sampling

The Dover sole sampling for age-composition, size-composition, and sex ratio consisted of 9 samples (3,600 fish) taken during the period May-September. Scales were taken from 450 of these fish. Approximately 1/3 of these were read during the sampling period.

The second Dover sole sampling program, begun in 1956, was continued to obtain scales and otoliths to demonstrate the time of

annulus formation and to determine whether scales could be substituted for otoliths in determining the age of Dover sole. Unfortunately, landings of Dover sole during the winter have been very limited. However, samples of scales and otoliths have been taken when the Dover sole were available. All of the otoliths were read once fresh and about 3/4 of the scales were read during the sampling period.

While no analysis has been made, it appears from observation to date, that scales can be substituted for otoliths in determining the age of Dover sole. This study will be continued through part of the 1958 season.

Juvenile Dover Sole Study

Several trips were made on the boat Rose Ann Hess which was chartered for the purpose of obtaining juvenile Dover sole. A small mesh (1 1/4-inch) net was attached over the cod-end of a 3-inch otter-trawl net and promising catches of small Dover sole were made in several areas.

These trips were later combined with shrimp gear studies in which a semi-balloon, gulf shrimp trawl was used. Good samples were obtained with this gear, but few trips were made. This study will be continued through the 1958 season.

Tagged Fish Returns

As in past seasons, tagged bottomfish occurred in the trawl catches. During the 1957 season, tagged English sole and true cod released by the Washington Department of Fisheries were recovered at Astoria. These tags with recovery data were returned to the tagging agency.

In addition, tagged bottomfish were recovered from two Oregon experiments.

Dover Sole Tagging: 1955

During the period May- October, 1957 additional tag recoveries

were made of tags released during deep-water tagging experiments in 1955. These recoveries are included with recoveries from previous seasons in the following table.

Table 1. Recoveries of Tagged Dover Sole Released During Deep-Water Tagging in April 1955

Recovery Time	Recovery Areas			
	Inshore 1/	Offshore 2/	Unknown	Total
1955				
April	4	0	0	4
May-June	5	12	0	17
July-August	0	7	0	7
September-October	5	1	2	8
November-December	0	2	0	2
Total	14	22	2	38
1956				
January-February	10	0	0	10
March-April	4	0	5	9
May-June	5	11	0	16
July-August	0	5	0	5
Sept mber-October	0	3	0	3
November-December	0	26	0	26
Total	19	45	5	69
1957				
January-February	0	21	0	21
March-April	0	38	0	38
May-June	5	6	0	11
July-August	1	0	0	1
September-October 3/	2	0	0	2
Total	8	65	0	73
Grand Total	41	132	7	180

1/ < 150 fathoms
2/ > 150 fathoms
3/ January-October

Of the 2,400 tags released in deep water in 1955, 1.7 per cent (41 recoveries) have been recovered on inshore grounds, 5.5 per cent (132 recoveries) have been recovered while concentrated in deep-water areas offshore, and for 0.3 per cent (7 recoveries) the area of recovery is unknown. Over a 30-month period 7.5 per cent (180 recoveries) of the tags released in deep water have been recovered. This is a minimum

recovery because the returns are voluntary and some tags have been reported but could not be found.

Flounder Tagging: 1951-1953

Occasional recoveries are made of starry flounder tagged during salmon tagging experiments at Sand Island and McGowan, Washington near the mouth of the Columbia River. The following table includes recoveries through October 1957.

Table 2. Recoveries of Tagged Flounder Released in the Columbia River In 1951-1953

Recovery Year	Inside Columbia	Outside Columbia	Total
1951	4	4	8
1952	12	2	14
1953	56	15	71
1954	13	5	18
1955	11	6	17
1956	0	15	15
1957 1/	0	9	9
Total	96	56	152

1/ January-October

Of interest is the fact that during 1956 and 1957 no tagged starry flounder were recovered inside the Columbia River, but 15 recoveries were made in otter trawl landings in 1956 and 9 in 1957.

Of the 15 recoveries in 1956, 40 per cent (6 recoveries) were recovered off the coast of Washington 120-140 miles north of the Columbia River. Of the 9 recoveries in 1957, 55 per cent (5 recoveries) had made similar migrations north off Washington. These percentage recoveries are misleading, however, since nearly all of the starry flounder landed at Astoria are sold as unsorted mink food, and consequently, there is very little chance of a tagged fish going over a fillet line where the tag would be noticed.

Landing Records

The 1956 landing records were received in October, and compilation was begun but was not completed during the period covered by this progress report.

A summary of landings by species, by area, by month, for PMFC was also begun in October, but was not completed during this period.

Industry Activities

Trawl fishing out of Oregon ports occurred at a relatively steady pace throughout the summer of 1957. The tuna fishing provided the only disrupting factor during July through September. The tuna fishing fever was comparatively mild among the Oregon trawl fleet. Only 7 of the 42 trawl boats in the Oregon fleet were lured from the steady income of the trawl fishery to the gamble of tuna trolling.

The fillet line at the New England Fish Company which had been closed in the spring of 1955 was reopened in May of 1957. However, filleting operations at the Astoria plant were not expected to be as great as before the 1955 closure. The New England Fish Company also increased fillet operations at their Newport plant. The Winchester Bay Fish Company at Winchester Bay, completed installation of a modern stainless steel fillet room and increased their production of fillets, principally Dover sole, this past season over the previous year.

Technological Changes

Improvements and changes in fish processing procedures and fishing gear that have affected the trawl fishery the past year are as follows:

1. A fillet skinning machine.
2. Refrigerated brine water tanks for holding fish after delivery from the boat.
3. Trawl net retrieving drums.

The fillet skinning machine in operation at the San Juan Fish Company in Warrenton has increased fillet production capacity of rockfishes, starry flounder, and rex sole by 25 per cent according to the manager of

the plant. It is not as efficient on the thinner fillets of the other flatfish.

Thr refrigerated brine tanks were placed in operation at the Astoria Seafoods Company on a trial basis. The tanks, replacing the icing of fish in bins, are used to hold the fish until they can be processed. The tanks will contain 9,000 pounds of sole and about 7,500 pounds of rockfish. The mild brine solution, kept at 29-30 °F temperature, is constantly circulated in the tank. The operator of the plant is very pleased with the quality of the fish held in the refrigerated tanks and with the saving of time and money to operate the tanks compared to the old method of icing fish. He plans to install two more tanks for the coming season.

The trawl net retrieving reel, as used by the trawler Marie H, was installed on the Mary R. The enthusiastic reports by the crews of these vessels about the time and labor saved with the use of the reel caused several other vessel owners to install them on their boats this past winter.

The reels are approximately four feet in diameter and six feet long. A single reel is mounted on the stern deck of the boat, and is power-driven from the main engine. As the net is retrieved from fishing, it is wound onto the reel almost as far as the cod-end. The catch is then landed from the cod-end in the conventional manner over the side of the boat. The net reel permits effective trawl fishing with only two men on smaller boats.

Mink Food Sampling

The Oregon mink food fishery has been extensively sampled from 1953 through 1956. In 1957 it was planned to shift the time and effort required in this study to other projects, principally to a study of juvenile Dover sole. However, several complaints of large landings of small sole for mink food use were received this past summer and made it necessary

to conduct a limited sampling program. Eleven samples were taken from June through September at the three major ports receiving mink food. These samples, (Table 3) along with numerous observations of mink food landings, indicated that the 20 per cent limitation on Dover, English, and petrale soles in the mink food landings was frequently violated.

Complaints that a 3-inch trawl net was the common net used to fish mink food were verified. According to the regulation, it is not illegal to use the 3-inch net for fishing mink food, however, the small mesh net was allowed with the intent that only rockfishes and Pacific Ocean perch would be taken with it. The 4 1/2- inch nets intended to be used for fishing the flatfishes allow a majority escapement of soles too small for the fillet markets. The length-frequency distribution of the Dover, English, and petrale soles, (Figure 1), measured in the 1957 mink food samples indicate that 84, 91, and 87 per cent, respectively, of the three species were smaller than the minimum fillet size of approximately 14 inches for Dover sole and 13 inches for the other two species.

Shrimp Fishery

The booming shrimp trawl fishery out of Westport, Washington in 1957 stimulated keen interest among fishermen in the Astoria area. The fishing industry, however, claimed that a shrimp fishing industry could not develop in Oregon if the regulation allowing only a beam trawl for shrimp fishing was retained. Fishermen claimed that the beam trawl would catch only a fraction of the quantity of shrimp that could be taken with the Gulf of Mexico type shrimp trawl used by the Washington fishermen. In addition, the beam trawl was considered too dangerous to use in rough weather.

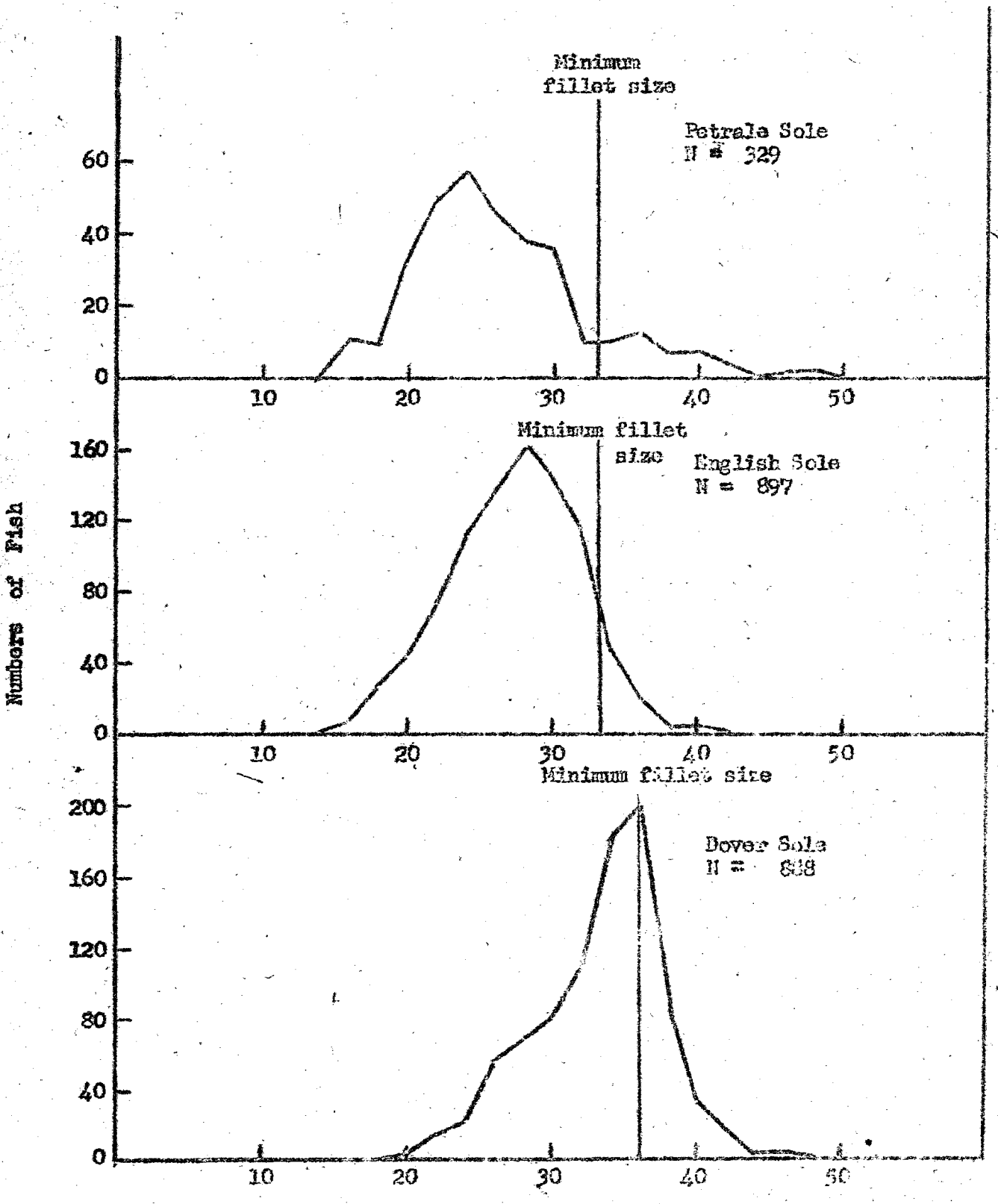
Table 3. Species Composition of Trawl Fish Counted in Mink Food Samples, Oregon 1957

Species	Catch by Port: Astoria Pounds	%	Newport Pounds	%	Winchester Bay Pounds	%
Dover sole	350	10	175	9	236	11
English sole	115	4	195	11	169	8
Petrale sole	1	Tr.	59	3	131	6
Arrowtooth sole	1,446	43	514	28	399	18
Bellingham sole	598	18	6	Tr.	70	3
Rex sole	376	11	351	19	432	22
Misc. soles	141	4	408	22	551	25
Rockfishes	103	3	59	3	100	4
Misc. Fishes	242	7	87	5	66	3
Total	3,372		1,854		2,224	

The Gulf shrimp trawls were generally made of 1 1/2-inch mesh and utilized otter doors fastened close to the wings of the net. Concern was felt by the Oregon trawl biologists on the effect the small mesh net might have on small fillet market flatfish. Information was obtained from Washington shellfish biologists, Herb Tegelberg and John Smith about sampling at sea of the Washington shrimp fishery. The sampling was conducted aboard commercial vessels and the Fish and Wildlife research vessel John N. Cobb. This information was very useful, but had not been gathered with the intent of a detailed study of the incidental fish catch. Two Oregon biologists were assigned to observe the Washington shrimp fishery. Two trips were made to Westport to accomplish this purpose, but on both occasions the fishermen was unable to leave port as scheduled.

It became apparent that any information concerning the catch taken with the Gulf shrimp trawl would have to be gained from a chartered vessel. A shrimp net comparable to those used by Washington fishermen was ordered and was received by the middle of August. Some time was taken

Figure 1. Length-Frequency Distribution Grouped by Two's of Fish Measured in Eleven Mink Food Samples Taken at Oregon Ports June Through September, 1957



to install rib lines, floats, tickler chains, and chafing gear. A charter trip aboard the trawler Rose Ann Hegg was arranged for the middle of September. On this and a subsequent charter trip, shrimp were found and the incidental catch of fish was studied and is summarized in Table 4. More detailed information of the shrimp cruises and two previous cruises earlier in the summer for juvenile Dover sole can be obtained from the cruise reports of these trips.

Two shrimp peeling machines were installed in the Warrenton area in September and October. One by the Seaside Clam Company and the other by Pacific Shrimp Incorporated. Permission was granted by the Oregon Fish Commission to two vessels, the Nestucca and the Kinchel'ol, to use the Gulf shrimp trawl until it could be determined if regulation allowing the Gulf shrimp trawl would be passed.

Four observation cruises aboard the two trawlers were taken by biologists, Jones and Ayers, and the catches of shrimp and fish were noted. The ratio of fish to shrimp in numbers and pounds, as derived from the four observation cruises and the two exploratory chartered cruises, are shown in Table 5. The data are only preliminary and should not be considered as conclusive.

An extensive study of the incidental catch of fish in the shrimp fishery is being planned for the summer of 1958. It is hoped that gear studies will develop a method of reducing the catch of fish in the shrimp trawling operations.

Alfred R. Morgan
Walter G. Jones
Otter Trawl Investigations

August 11, 1958

Table 4. Species Composition of Catches Made in a Semi-Balloon Gulf Shrimp Trawl in Two Trips off Astoria, September 1957.

Species	Trip I Sept. 15-17 Depth Range 39-83 Fathoms Numbers	Trip II Sept. 29-30 Depth Range 70-124 Fathoms Numbers
Shrimp (Pink)	2,900 (Pounds)	1,200 (Pounds)
Soles		
Dover	624	480
English	55	0
Petrale	24	66
Flathead	68	6
Rex	3,043	517
Slender	1,613	579
Turbot	530	466
Bellingham	20	
Sand Dab	848	
Rock Fish (Sebastodes)		
S. alutus	0	75
S. crameri	24	17
S. flavidus	3	
S. melanopinis	1	
S. ninniger	18	3
S. elongatus	1	79
S. rubrivinctus		5
S. rosaceus		0
S. saxicola		148
Sebastalogus alascanus		
Ling Cod	8	2
Sable Fish	50	728
Hake	1,835	997
Skates	64	41
Ratfish	43	14
Dogfish Shark	1	
Wry Mouth	2	
Tom Cod	50	
Jack Mackeral	1	
Herring	1	
Total Nos. Fish	8,890	4,236
Total Wt. Fish	7,952	5,762
Sea Poachers	Tr.-numerous	Tr.
Eel Pouts	Tr.-numerous	Tr.
Box Crabs	0	8
Dungenese Crabs	50	0
Octopus	Tr.	Tr.
Squid	12	Tr.
Sea Urchins	Tr.-numerous	0-very numerous
Sea Cucumbers	0	0-very numerous
Sea Biscuits	0	0-numerous
Star Fish	Tr.	0-Tr.
Hagfish	13	0
Scallops	4	0
Smelt (Spirinchus)	Tr.-numerous	Tr.

Table 5. Summary of Observations Made on Commercial and Experimental Shrimp Fishing Trips off Astoria, September-October 1957

	Trip Number					
	1	2	3	4	5	6
Time Fished (Minutes)	231	115	180	815	700	770
Lbs. Shrimp/Hr.	753	626	667	847	849	367
Lbs. Fish/Lbs. Shrimp	2.74	4.80	1.85	0.85	0.66	2.64
Nos. Fish/Lbs. Shrimp	3.07	3.53	...	...	...	...
Nos. DEP/Lbs. Shrimp 1/	0.24	0.46	0.12	0.05	0.04	0.14
Nos. Unmkt. DEP/ Lbs. Shrimp 2/	...	0.12	...	...	...	...
Dominant Fish by Weight	Hake Turbot Rex Dover Slender	Hake Turbot Dover Sable Fish	Sable Fish Rock Fish Ocean Perch Hake	Sable Fish Hake Rook Fish Dover	Rock Fish Sable Fish Hake Turbot	Sable Fish Rock Fish Hake Turbot Skates Dover
Dominant Fish by Numbers	Rex Slender Dover Hake Sand Dab	Hake Turbot Dover Sable Fish Slender Rex	...	...	...	...

1/ DEP - Dover, English, and petrale soles.

2/ UnMKT DEP - Fish of the three species too small for the fillet market (Less than 14 inches for Dover sole and less than 13 inches for English and petrale sole)