Otter Trawl Investigation
Progress Report

May-October 1956

Introduction

The period May-October of each year is approximately the "summer" season for the Oregon trawlers. Some 70-80 per cent of their annual production is achieved during this period. Naturally enough, this is the period when the trawl investigations staff conducts most of its field work.

The regular trawl staff of 2 was increased by 3 assistants during portions of this period. These assistants were: Wayne A. Burck, George C. Miller, and David A. Leith.

Wayne Burck arrived June 11, for his second consecutive summer with the trawl staff, and resigned September 14 to return to Oregon State College. Wayne took part in the first "Brown Bear" cruise, July 17-August 3, at which time he assisted Ed Holmberg with the albacore tuna studies on the cruise.

George Miller also arrived June 11, for his second term with the trawl staff (his last was in 1950-51), and transferred to the shellfish staff September 1. George took part in the second "Brown Bear" cruise, August 5-August 31, at which time he assisted Ed Holmberg with the albacore tuna studies on the cruise.

Dave Leith transferred from the Columbia River salmon staff to the trawl staff October 10, and is still with the trawl staff. He is also serving as a part-time assistant to Bob Ayers on the razor clam studies.

The following meetings were attended during the period:

MONTH	MEETING	LOCATION	PERSONNEL
May	OFC Public Hearing	Portland	Westrheim Jones
	Meeting of the Oregon Legislative Interim Committee on Fisheries	Portland	Westrheim
October	PMFC Agenda Meeting	Seattle	Westrheim
	Portland Sportsmen's Meeting		

Fleet Activities

Under the inducement of good fishing weather and adequate markets, trawling was normal from May until the middle of August. During the third week in August two Oregon trawl vessels, the "Betty" and the "Kiska", encouraged by the show of albacore found by the research vessels "Brown Bear" and "John N. Cobb", prospected for tuna along the Oregon coast in conjunction with trawl fishing. The two trawlers made catches (by trolling lures) of commercial quantities of albacore south by west of Newport. The resulting cry of "tuna" that resounded throughout the Oregon ports generally disrupted trawling operations through September. Twenty of the 40 Oregon trawlers fishing this past summer rigged up for albacore trolling and made one or more trips.

The trawl fishery was further restrained in September for about a week while the fishermen tied up their boats and successfully negotiated an increased price scale for their catches of trawl fish. In October poor fishing weather held the boats in port for a good part of the month.

During this past summer 25 trawlers were based at Astoria; 1 at Garibaldi; 7 at Winchester Bay; and 4 in the Coos Bay area.

Whole fish delivered for mink food dominated the trawl landings at Oregon ports other than Astoria, as shown in Table 1. However, more fillet-market fish were landed and processed at the southern ports this summer than in any of the previous 3 years. Filleting operations were initiated or enlarged at all of the ports south of Astoria. Much, but not all, of the increase was due to landings of fillet fish incidental to the mink food fishery.

In the Astoria area deliveries of fillet-market fish still exceeded deliveries of whole fish for mink food. The fillet market for Pacific Ocean perch was strong at Astoria this summer. The demand exceeded the supply at most of the plants. The fishermen complained of difficulty in finding ocean perch and that generally the catches were small. The demand for Dover sole was spotty. It varied from plant to plant and from week to week. At least one of the major filleting plants imposed a 10,000-pound limit of Dover sole per trip on their fishermen.

Table 1. Unofficial Trawl-Fish Landings in Pounds
January to September 1956

Market	Astoria	Newport	Other Ports 1/	Total All Ports
Fillet	8,470,000	967,000	591,000	10,028,000
Mink Food	5,733,000	4,533,000	2,228,000	12,494,000
Total	14,203,000	5,500,000	2,819,000	22,522,000

1/ Winchester Bay, Coos Bay, and Tillamook Bay

An increase in price of 1 cent per pound for all species of bottomfish was sought by the fishermen in their price negotiations with the fish buyers the first week of September. The prices finally settled for ranged from no increase for round ling cod and true cod to 1.5 cents per pound for large and small dressed sablefish, as shown in Table 2. The price of rockfish had previously been reduced from 4.0 to 3.0 cents per pound during the first week of June. This loss was regained in the new price scale.

Field Activities

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. Sampling mink food landings (whole bottomfish) in all Oregon ports for species-composition and size-composition of Dover, English, and petrale soles.

4. Recovering tagged bottomfish from the trawl landings.

5. Two short cruises aboard the "Elena N" for preliminary studies on juvenile Dover sole.

6. Routine vessel interview program to obtain area of catch and duration of trip for trawl landings in Astoria.

7. Preparation of marine fish display for the Astoria Fish Festival, August 30-September 2.

Laboratory Activities

Laboratory activities during this period included the following:

1. Preparation of the November 1955-April 1956 progress report.

2. Compilation of the 1955 trawl landings.

3. Preparation of the 1957-59 budget.

4. Editing.

5. Processing and reading Dover sole otoliths.

6. Processing Dover sole scales.

Table 2. Prices Received by Fishermen for Bottomfish in the Astoria Area Previous to, and After September 7, 1956 1/

Species	Previous Price	Present Price
	Cents Per Pound	Cents Per Pound
Dover Sole	5.0	5.5
English Sole	6.0	6.5
Petrale Sole	7.5	8.5
Rex Sole	4.0	5.0
Pacific Ocean Perch	4.0	4.5
Rockfish	3.0	4.0
True Cod	4.0	4.0
Large Sablefish Dressed	11.0	12.5
Small Sablefish Dressed	5.0	6.5
Round Ling Cod	4.0	4.0
Dressed Ling Cod	7.5	8.5
Mink Food	2.5	2.75

1/ Taken from "Astorian Budget", September 7, 1956

7. Processing current tag recovery data.

8. Compiling all current sampling records.

Dover Sole Sampling

The Dover sole sampling for age-composition, size-composition, and sex ratio, consisted of 10 samples (3,337 fish) taken during the period June-August. Otoliths were collected from 550 of these fish, and all otoliths were read currently through the summer. All data connected with this season's sampling have been compiled, and partial analyses completed.

A second Dover sole sampling program was instigated for two reasons: (1) to determine, if possible, the time of annulus formation on both scales and otoliths; and (2) to determine whether scales are superior to otoliths for determining the age of Dover sole, particularly the larger and older members of this species.

Heretofore, the demonstration of time of annulus formation has been virtually impossible for Dover sole, since practically none were caught during the winter months. However, since 1955 the development of the deepwater Dover sole fishery has indicated that we may anticipate at least moderate landings of this species through the winter period, weather permitting.

The second problem involved is the poor readability of Dover sole otoliths, especially those with more than 10 rings. Since more than 30 per cent of the otoliths examined fall in this category, this problem is a serious one. Scales are being investigated in the hopes that increased readability and more accurate age determination may result.

This second Dover sole sampling program began in June 1956 and will continue approximately 15 months, with monthly or bimonthly sampling. To date, 4 samples (100 fish each) have been taken (2 from mink food landings and 2 from fillet-fish landings). Alternate samples are taken from mink food and fillet-fish landings in order to obtain a larger size range. The Dover sole in the mink food landings

are smaller than those landed for human consumption. Scales and otoliths have been taken from each fish, together with the total length (mm.) and sex. All otoliths have been cleaned and stored, and 200 have been read at least twice and a final "age" established. Likewise, all scales have been mounted, but none have been read.

Mink Food Sampling

The greatest part of the summer field work was taken up in sampling whole bottomfish landed for mink food by the Oregon trawl fleet. The purposes of this sampling were: (1) determine the species-composition of the landings; and (2) determine the size-composition of Dover, English, and petrale sole landed for mink food.

A total of 125 samples was taken during the period May through September from various Oregon ports receiving landings of whole bottomfish for mink food. At least 50 different species of fish were encountered among the 79,902 (87,685 lbs.) examined.

A schedule calling for 5 mink food samples per week was set up for the Astoria area, and was followed as closely as available manpower allowed. There were no biologists from Astoria made monthly trips to the ports south of Astoria to sample mink food landings. Each trip usually 5-7 days and extended over a week end in order to obtain more samples, since at these ports landings were not limited to week days as is the case in Astoria.

In the Astoria area, 46 different species of fish were recorded in the 57,851 fish examined. Eighty-five samples were taken at four plants. As in the past three years, rex sole was the dominant species by number, and turbot was dominant by weight, as shown in Tables 3 and 4. These two species combined with Dover and English sole constituted 81 per cent by weight of the fish landed for mink food at Astoria.

Forty samples were taken from mink food landings at the ports south of Astoria. More samples of the landings at Newport, Winchester Bay, and Coos Bay would have been desirable; however, this was not feasible under the existing conditions.

Table 3. Numbers of Fish by Species Found in the Mink Food Samples in Oregon in 1956.

Species	Astoria		Newport		Winchester Bay-Coos Bay Area		Total
	Numbers	Per Cent	Numbers	Per Cent	Numbers	Per Cent	Numbers
Dover Sole	6,567	11	2,232	13	1,013	24	9,812
English Sole	5,712	10	350	2	133	3	6,195
Petrale Sole	1,005	2	210	1	166	4	1,381
Bellingham Sole	1,052	2	28	Trace	10	Trace	1,090
Flounder	1,446	2	—	—	—	—	1,446
Rex Sole	22,413	39	2,856	16	677	16	25,946
Turbot	10,785	19	2,247	13	562	14	13,594
Misc. Sole 1/	4,352	8	2,754	15	340	8	7,446
Misc. Fish 2/	795	1	402	2	82	3	1,279
Rockfish 3/	3,734	6	6,805	38	1,174	28	11,713
Total	57,861	100	17,884	100	4,157	100	79,902

1/ Butter Sole, Curlfin, Flathead, Rock Sole, Sand Dab, Sand Sole, Slender Sole, Sole spp..

2/ Black Cod, Blennies, Dogfish, Eel Pout, Hake, Herring, Ling Cod, Ratfish, Sculpin, Sea Poacher, Shad, Smelt, Tom Cod, True Cod.

3/ Sebastodes aleutianus, S. alutus, S. brevispinis, S. crameri, S. diploproa, S. elongatus, S. flavidus, S. jordani, S. mystinus, S. pancispinis, S. pinniger, S. rhodochloris, S. rosaceus, S. ruberrimus, S. rubrivinctus, S. saxicola, S. spp., and Sebastolobus alascanus.

Table 4. Calculated Weight of Fish by Species in Mink Food Samples in Oregon in 1956.

Species	Astoria		Newport		Winchester Bay-Coos Bay Area		Total
	Pounds	Per Cent	Pounds	Per Cent	Pounds	Per Cent	Pounds
Dover Sole	5,910	11	1,939	8	1,373	22	9,222
English Sole	3,998	7	151	1	79	1	4,228
Petrale Sole	764	1	211	1	209	3	1,184
Bellingham Sole	631	1	14	Trace	3	Trace	648
Flounder	2,892	5	---	---	---	---	2,892
Rex Sole	13,448	24	845	3	334	5	14,627
Turbot	21,570	39	4,729	19	1,709	27	28,008
Misc. Sole	1,756	3	654	2	101	2	2,511
Misc. Fish	1,036	2	654	2	225	4	1,915
Rockfish	4,140	7	16,082	64	2,228	36	22,450
Total	56,145	100	25,279	100	6,261	100	87,685

The mink food landings at 3 plants in Newport were sampled. A total of 17,884 fish (25,279 pounds) was counted in 29 samples. Forty species of fish were noted. Rockfish, consisting of 14 species, comprised the dominant group both by weight and numbers of fish sampled. Turbot and rockfish made up 83 per cent by weight of the samples. The rex sole found in the Newport samples were smaller than those landed at Astoria or in the Winchester Bay and Coos Bay samples. Dover, English, and petrale sole accounted for 16 per cent by numbers, and 10 per cent by weight of the fish sampled at Newport. Dover sole was the most numerous of the 3 species.

Eleven samples of mink food were taken at three plants in the Winchester Bay-Coos Bay areas. Twenty-seven species were encountered in the 4,157 fish examined. Rockfish, turbot, and Dover sole, in that order of importance, comprised 85 per cent by weight of the fish sampled. Dover, English, and petrale sole made up 26 per cent by weight of the sampled fish, of which English and petrale sole accounted for only 4.0 per cent of the total.

Effective June 1, 1956, the mink food regulation was modified to the effect that the 20 per cent tolerance by weight of Dover, English, and petrale sole be applied to each landing, rather than each trip, as specified in the 1955 regulation.

In Table 5 are listed the numbers of samples taken in each port, by month, together with the numbers of samples in which Dover, English, and petrale sole exceeded 20 per cent by weight. The May landings were, of course, subject to a slightly different regulation, and for the Astoria area, where fillet landings are still appreciable, this complicates the table somewhat. At the other Oregon ports the term "landing" or "trip" means virtually the same, since little fillet fish is landed in these ports.

In Astoria, 32 of our 85 samples contained more than 20 per cent Dover, English, and petrale sole, although with adjustments for May, this total would be 28.

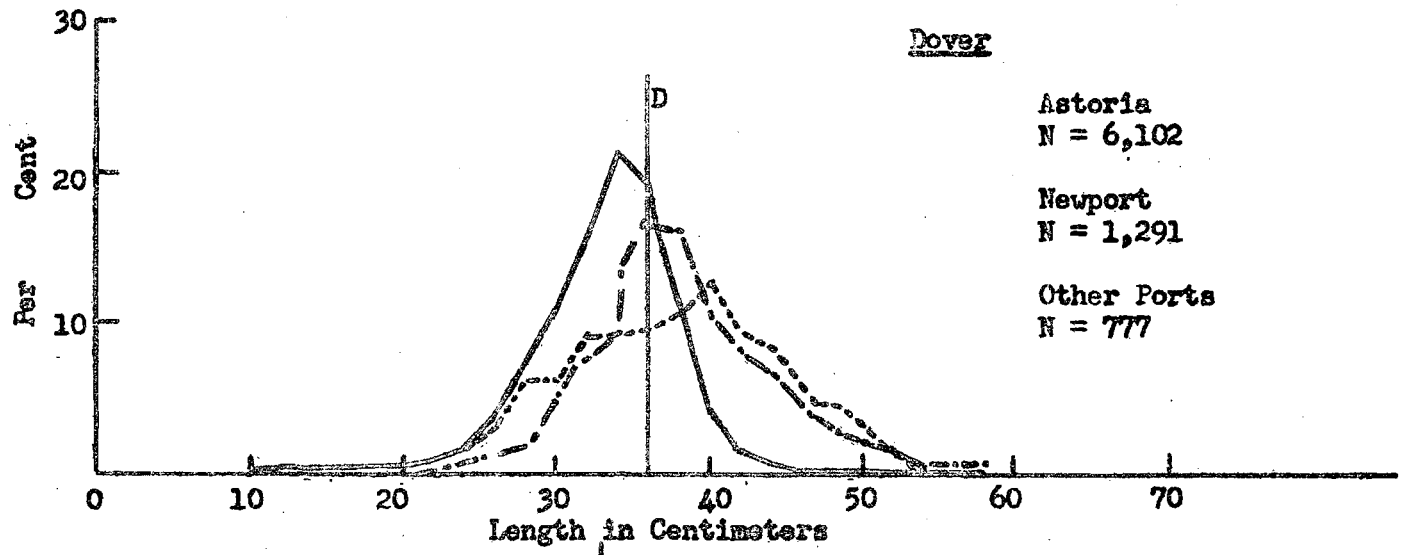
In Newport only 1 out of 29 samples contained excessive quantities (greater than 20 per cent) of these sole. For the Winchester Bay-Coos Bay samples 7 of the 11 samples contained more than 20 per cent Dover, English, and petrale sole.

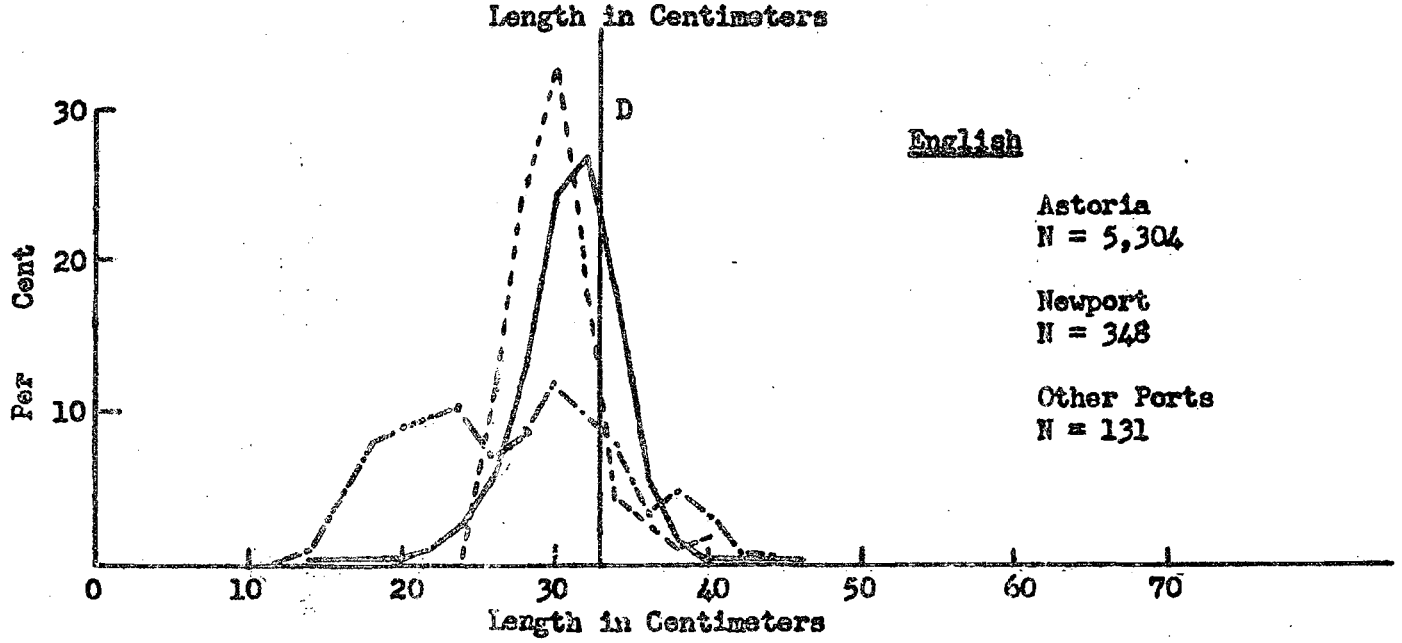
Table 5. Incidence of Dover, English, and Petrale Sole Exceeding 20.4 Per Cent by Weight in Mink Food Samples in Oregon in 1956.

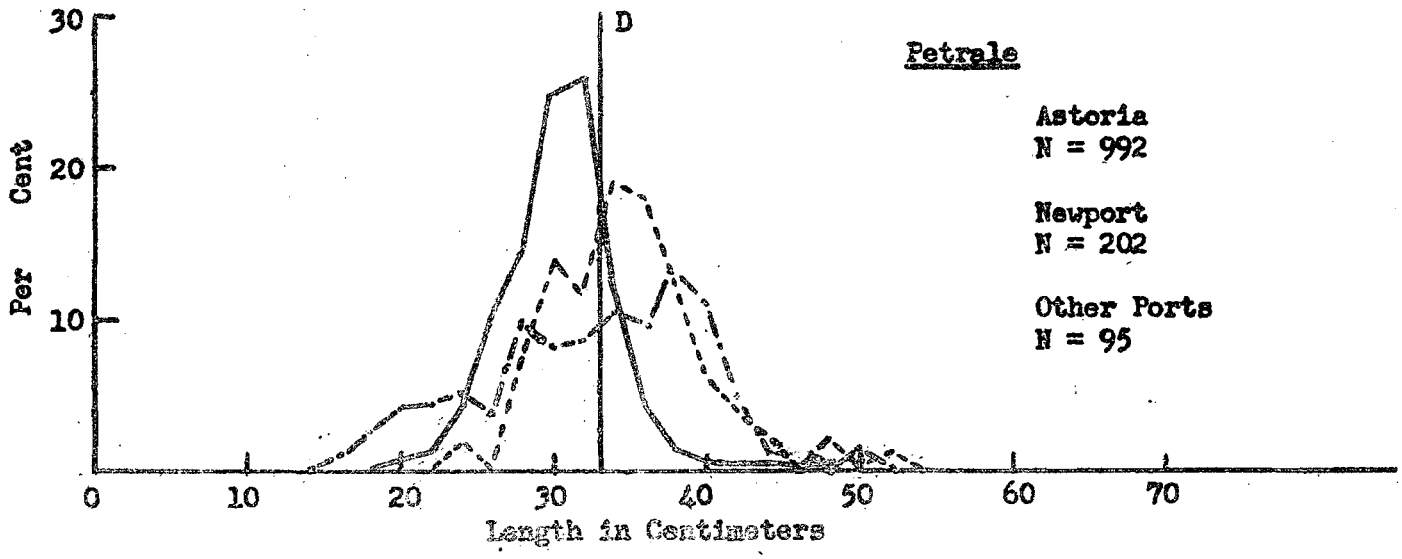
Month	Astoria		Newport		Winchester Bay-Coos Bay Area		Total	
	Total Nos. of Samples	Nos. of Samples D.E.P. > 20.4%	Total Nos. of Samples	Nos. of Samples D.E.P. > 20.4%	Total Nos. of Samples	Nos. of Samples D.E.P. > 20.4%	Total Nos. of Samples	Nos. of Samples D.E.P. > 20.4%
May	15	*6 10	3	1	0	0	18	6 11
June	27	5	8	0	1	0	36	5
July	23	6	10	0	4	4	37	10
Aug.	16	9	6	0	5	2	27	11
Sept.	4	2	2	0	1	1	7	3
Total	85	32	29	1	11	7	125	40

*Number of samples in which D.E.P. was greater than 20.4 per cent of the total landings from one trip.

Figure 1. Length-Frequency Distribution of Dover, English, and Petrale Sole from Mink Food Samples in Oregon in 1956.







The size composition of the Dover, English, and petrale sole measured in the mink food samples are shown in Figure 1. The solid vertical line "D" drawn through the frequency curves represents the minimum size limit that the fillet plants impose on fish they purchase. These minimum sizes are 36 cm. for Dover sole, and 33 cm. for English and petrale sole. In Astoria there is generally a good market for filletable fish. As a result the great majority of the fish of these species landed for mink food are smaller in size than at the other ports. In Newport, the fillet market is limited, and the fishermen attempt to stay away from areas where these fish concentrate. However, certain quantities of these species are unavoidably caught and, of course, appear in our samples, and cause the Newport sole size composition to be larger than that found at Astoria.

There is even less of a fillet market in the Winchester Bay-Coos Bay area for the three species than at Newport. As a result their size composition from this area closely resembles that for Newport.

Juvenile Dover Sole Study

A preliminary juvenile Dover sole study took place during September, unfortunately with negative results. Through the cooperation of the state police, we obtained the services of their offshore patrol boat, "Elena N", for two days in September to investigate the feasibility of catching Dover sole with a miniature otter trawl (try-net). Our first cruise on September 10 was limited to the Columbia River due to adverse weather, but test fishing in the river with the try-net proved very satisfactory at depths up to 30 feet. We caught appreciable quantities of tom cod, blennies, and juvenile flounder. Our second cruise on September 14 took us offshore. We trawled along north Clatsop Beach (near the "Peter Iredale") in 5, 10, and 15 fathoms of water. The net operated satisfactorily in 5 and 10 fathoms, but not so in 15. The results seemed to indicate that serious alterations in our equipment would have to be made in order to successfully fish the try-net in waters deeper than 10 fathoms. No Dover sole were encountered at any depth fished.

Tagged Fish Returns

Tagged fish have appeared in the trawl landings more or less regularly since 1948. Some of these originate from experiments by other agencies such as the Washington State Department of Fisheries, and the Fisheries Research Board of Canada. All of these tags were forwarded to the proper agency.

We have also recovered tagged fish from three of our own experiments; two of which involve Dover sole, and one, the flounder.

Dover Sole Tagging: 1955

The 1955 Dover sole tagging experiment in the Willapa Deep was described in the last two progress reports. The following table brings the tag recovery information to date through October 1956. One correction has been included.

Recovery Time	Recovery Areas			Total
	Inshore 1/	Offshore 2/	Unknown	
1955				
Apr.	4	0	0	4
May-June	5	12	0	17
July-Aug.	0	7	0	7
Sept.-Oct.	5	1	2	8
Nov.-Dec.	0	2	0	2
Total	14	22	2	38
1956				
Jan.-Feb.	10	0	0	10
Mar.-Apr.	4	0	5	9
May-June	5	11	0	16
July-Aug.	0	5	0	5
Sept.-Oct.	0	3	0	3
Total	19	19	5	43

1/ Waters shallower than 150 fathoms. All recoveries but one were taken in depths shallower than 70 fathoms.

2/ Waters deeper than 150 fathoms. All but one recovery came from the Willapa Deep where the fish were originally tagged.

Dover Sole Tagging: 1956

During April of 1956 one of the Astoria trawlers, A. L. Anderson, asked for some tags to use on Dover sole he was catching in some new deep areas south of the Astoria Canyon. He tagged some 63 Dover sole over an area extending from Tillamook Head south to Cape Lookout. During the summer, 2 of these tagged fish were recaptured on the inshore grounds (68-70 fathoms) between Tillamook Head and the Columbia River. Both fish had been tagged off Tillamook Head in 176 fathoms.

Flounder Tagging: 1951-53

The flounder tagging experiment has also been discussed in earlier progress reports. The table of recoveries has been extended to include all recoveries through October 1956.

Recovery Year	Inside Columbia River	Outside Columbia River
1951	4	4
1952	12	2
1953	56	15
1954	13	5
1955	11	6
1956 1/	0	13
Total	96	45

1/ January-October.

It is interesting to note that no tagged flounder were recovered inside the Columbia River during the first 10 months of 1956, and that the numbers recaptured outside the Columbia River has increased appreciably in 1956 over the numbers recovered in 1954 and 1955.

The area of recovery for the 13 "outside" recoveries in 1956 included; the local trawl grounds off the Columbia River (6 tags); Grays Harbor ocean sport fishery (1 tag); Umatilla-Cape Flattery trawl grounds 140 miles north of the Columbia River (5 tags); and Rose Spit trawl grounds 470 miles north of the Columbia River (1 tag).

Landing Records

The 1955 landing records for trawl-caught fish were processed during this period. These records arrived in June, and processing was completed in October. For each species the total landing by month was compiled. For Dover sole, English sole, petrale sole, and Pacific Ocean perch, landed in Astoria, a more detailed treatment was accorded the data. Previous progress reports have dealt with these details, and the May-October 1955 report brought the records of these four species up to date through 1954. The following supplemental table provides the pertinent information for 1955:

Astoria Landings of Dover, English, and Petrale Soles, and Pacific Ocean Perch for 1955.

Species	Area	Total Pounds Landed	Calculated Nos. of Significant Landings	Pounds Per Significant Landing
Dover Sole		2,946,239	302	9,744
	North	900,338	58	15,438
	Local	1,776,741	217	8,179
	South	269,160	33	8,128
English Sole		882,976	251	3,517
	North	94,523	12	7,680
	Local	757,159	229	3,306
	South	31,294	16	1,910
Petrale Sole		1,179,624	168	7,029
	North	382,433	35	10,785
	Local	657,828	149	4,421
	South	139,363	11	13,009
Pacific Ocean Perch		1,554,132	131	11,860
	North	190,301	17	11,365
	Local	820,484	80	10,242
	South	543,347	35	15,514

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