

MARINE FISHERIES PROGRESS REPORT

February-June, 1949

Otter Trawl

Sampling of the otter-trawl landings has continued. The length-frequency samples for 1948 have been grouped and graphed for the English, petrale, and Dover soles. Figure 1 shows the length-frequency of the petrale sole for 1948. The females are larger and outnumber the males in the market samples by almost two to one. The fish are sorted for size at sea and since the males are usually smaller than the females of the same age more of them are discarded. This is at least partially the explanation for the preponderance of females in the samples.

The 50 percent maturity line of females at 39 centimeters was obtained by examining the gonads of fish during the spawning season. Otoliths were read to get the age at this length.

There is no sharp discard line indicated. Probably about 38 centimeters (15 inches) would be a close average discard size. Such a size at discard means that the majority of the female petrale brought to market have had a chance to spawn at least once. Almost all the females over 43 centimeters have spawned. (See Figure 4). However, it must be remembered that many small immature fish were sorted out at sea and returned to the water dead. Furthermore, the first spawning is not nearly so productive as later spawnings because of the small size of the egg-sack. The males mature at the somewhat smaller size of about 35 centimeters.

Figure 2 gives the length-frequency distribution of the Dover sole for the 1948 season. The 50 percent maturity line of females is at 38 centimeters

and the fish are six years of age at this length. The discard line is at about 36 centimeters (14 inches) and appears to be sharper than for the petrale. The females are again larger and more numerous than the males although the difference is not so great as in the petrale. There are about $1\frac{1}{2}$ females for every male in the market samples.

There is a very great difference in the size and numbers of female and male English sole in the market samples. The difference is shown graphically in Figure 3. There are almost seven females landed for every male. Very few males reach a length of over 36 centimeters yet over one-half of the females in the market samples are longer than 36 centimeters. The females mature at three years compared with six years for the other two species studied. Fifty percent of the females are mature at 30 centimeters, compared with 38 centimeters for the Dover sole and 39 centimeters for the petrale sole. The discard line is at about 33 centimeters (13 inches).

Most of the males are discarded as being too small. The males mature at a length in the mid-twenty centimeters. Thus any protection given the females by the use of savings gear would protect the males even more.

The species of flatfish which is probably most in need of protection from over-exploitation is the petrale sole. Any regulation of the mesh size in the otter-trawl should be designed to allow escapement of the immature female petrale sole. However, complications immediately arise because of the difference in size of the sexes and the difference in size and shape of the three important species of flatfish. The petrale sole are the broadest and longest at maturity of any of the more important flatfish. The females, which are most in need of protection, are larger at maturity than the males. Thus savings gear should be designed to protect the larger sex and the broadest species at maturity of the three most important flat fish. Such a mesh size might easily allow too great an escapement of, for example, Dover sole which are a great deal more pliable

and slippery than the petrale. Also a greater escapement of English sole might take place than would be necessary or advisable.

Experimental fishing with various mesh sizes will be conducted in order to find out what the escapement is of the various species of flat fish. For practical purposes a compromise mesh size will have to be arrived at which will allow a reasonable escapement of immature petrale females and yet not allow too great an escapement of mature English and Dover sole females and even more particularly males.

During the winters of 1947-1948 and 1948-1949 the condition of the gonads of petrale and English sole was recorded. The purpose of this was to determine the size and age at sexual maturity and the time of the spawning season. Figure 4 gives the percent of female petrale which are mature at each one centimeter length class. As mentioned before, about 50 percent are mature at 39 centimeters and almost all females are mature at 43 centimeters.

Figure 5 shows the percent of female Dover sole which are mature at various lengths. Because the Dover sole disappear in the winter there is no commercial fishery for them during the spawning season. Consequently data on the maturity of the gonads were collected during the summer. The female gonads were classified only as mature or immature and the spawning season of course was not determined. No attempt was made to classify the male gonads. About 50 percent of the females are mature at 38 centimeters and almost all are mature at 43 centimeters.

Figure 6 gives the maturity data for female English sole. Fifty percent are mature at 30 centimeters and practically all are mature at 35 centimeters. The English sole mature at a much smaller size than either the petrale or Dover.

The spawning season for female English and petrale sole is indicated in Figure 7. Unfortunately the very beginning of the season was not determined

because poor weather kept the fishing fleet in port. The heaviest spawning for both English and petrale sole takes place in late December and January.

At the same time that lengths were taken of English, petrale and Dover sole, some of the fish were weighed. Length-weight curves have been constructed for both sexes of the three species studied. The curves were fitted by inspection. Figure 8 gives the curve for the petrale sole, Figure 9 for the Dover sole, and Figure 10 for the English sole. The females of all three species are relatively heavier than the males with the possible exception of small petrale sole.

Otoliths were taken from a portion of the length-frequency market samples. A part of the English sole otoliths, almost all of the petrale, and all of the Dover sole otoliths collected in 1948 have been read. All otoliths were cleared in 50 percent glycerine. The otoliths were read under a wide-field binoculars using transmitted light. All otoliths were read twice and discrepancies between the two readings adjusted.

The average length of the male and female petrale sole at successive ages is shown in Figure 11. The females are larger and reach an older age than the males. Between the ages of five and ten the females grow about 11 centimeters which is an average of 2.2 centimeters a year. During the same period the males grow about nine centimeters, an average of 1.8 centimeters a year.

Figure 12 shows the length at various ages of male and female Dover sole. The females are larger and more long-lived than the males. The females grow about 14 centimeters between the ages of five and ten which is an average of 2.8 centimeters a year. The males grow about nine centimeters during the same period, an average of 1.8 centimeters a year.

The age-length relationship of the English sole is given in Figure 13. Between the ages of four and seven, the period of fastest growth, the females grow about six centimeters, an average of 2 centimeters a year. Not enough readings have been made of male otoliths to get a reliable age-length curve.

For easier comparison of all three species Figure 14 shows the age-length curves of the females on the same graph. Figure 15 shows the same for the males, the English sole being omitted because of too few age readings.

Figures 16, 17, and 18 give the percentage age composition by sexes of the three species studied. The female petrale show mostly five, six, seven, and eight annuli with a fair number of the older fish also included. The big majority of the male petrale are five, six, and seven years with a sharp drop in percent at eight and not many older fish.

Both the female and male Dover sole fall mostly in the six, seven, eight and nine year age groups. The percent of each of the sexes in the seven, eight, and nine year group is about the same, but there is a much greater percent of six year old males than females.

The English sole females fall mostly in the five, six and seven year age groups. There are not enough males to give a picture of the age composition.

For easier comparison, Figure 19 gives the age composition of the females of the three species and Figure 20 gives the age composition of the male Dover and petrale sole.

Tagging

Both the tagging of fish and the recovery of tags has continued. Table 1 gives a record of all recoveries up until May 1, 1949. Table 2 shows the number of each species tagged, the number of recoveries by species, and the length and direction of migration.

Tagging has been resumed again this season. Up until July 1, 1949 the following fish have been tagged near the mouth of the Columbia River.

Species	Number	Species	Number
English Sole	376	Skate	1
Dover Sole	717	Turbot	1
Petrals Sole	50	Halibut	1
Starry Flounder	8	Ling Cod	5
Black Cod	14	Ratfish	1

Continued:

<u>Species</u>	<u>Number</u>
<u>Sebastodes flavidus</u>	16
<u>Sebastodes melanops</u>	1
Dogfish	2
Rex Sole	2
Sand Dab	1
Total	1,195

Some tags have also been put out by Mr. Livingstone at Newport.

Beginning in the early spring of 1949 log books were distributed to otter-trawl skippers. At the present time there are 24 log books on Astoria boats and at least four more on Newport vessels. Soon after the log books were distributed the fish houses announced a cut in the price of fish to be paid to the fishermen. This was on April 18, 1948. The fishermen refused to accept these prices and at the present date (July 6) the situation is still unsettled. One company, San Juan, has continued taking in some bottom fish. Several of the fishing boats have formed a cooperative associate and have leased the Del Mar fillet line. This coop is processing bottom fish. The other companies have taken in practically no drag fish. This situation has made it very difficult to get a log book program underway. The tuna season will begin about the middle of July and most of the drag boats will seek albacore. As a consequence it appears that the season for bottom fish will be almost a complete failure, at least until after the albacore disappear.

The lack of bottom fish carcasses to be used for mink food has resulted in three or four boats in the Astoria area and at least one boat at Newport fishing exclusively for the mink farmers. These boats are bringing in whole food fish and also scrap fish to be used for mink food. Market samples are being taken of this mink food. It is hoped that the marketing of whole food fish as mink food will be only a temporary occurrence until the fillet market again becomes stabilized.

An important part of the study of the otter-trawl fishery is an analysis of the catch records to determine if any trends in the abundance of the various species are evident. The raw data for this analysis have been gathered and are now being organized so that they may be studied. As near as possible, a record has been obtained of every landing in Oregon by an otter-trawl boat since statistics were first gathered in 1941. This was done by copying the records from the fishermen's pass books and the daily record sheets. Since there was no important otter-trawl fishery before 1941, the data obtained fairly well cover the history of the otter-trawl fishery in Oregon.

Soupin Shark

At the last meeting of the Pacific Marine Fisheries Commission held in Portland, representatives of the shark fishermen agreed to cooperate with the research departments in the collecting of biological data. As a result of this agreement log books were made up and distributed to all of the Oregon soupin fishermen with possibly one or two exceptions. Also tags were distributed to the fishermen who agreed to tag the smaller sharks. Log books were given to 28 boats and about 700 tags were issued. As the shark boats return to port they are being contacted and the log books copied and a record made of all fish tagged. The boats contacted up to the present time (July 7) have tagged 87 soupin shark. Most of these fish were tagged between Point Conception and the San Francisco area where the majority of the boats went on the first trip of the season. Many of the boats have returned from California and will be fishing of Oregon, Washington, and British Columbia during the remainder of the season.

Albacore

A paper summarizing the albacore research work on the Pacific Coast has

been written and was presented at the recent meeting of the American Fisheries Society in Seattle.

Pilchard

A report of the Oregon pilchard fisher in 1948 was prepared and a summary given at the annual pilchard meeting held in Vancouver, B. C. This report is being published in the coming issue of Research Briefs.

George Harry,
Aquatic Biologist,
August, 1949

FISH COMMISSION OF OREGON

Research Laboratory
Route 3, Box 3
Astoria, Oregon

Early in the spring of 1948 the Department of Research of the Oregon Fish Commission began a tagging program on the bottom fish of Oregon. This was just one part of a broad, long-range study of the otter-trawl fishery. The main effort has been concentrated on the English, petrale and Dover soles, although a few of almost all of the marketable species have been tagged. During the 1948 season over 2000 bottom fish were tagged and, thanks to the cooperation of the fishermen and cannery workers, about fifty tagged fish have been recovered.

Immediately after receiving a tagged fish, we sent a post card to the person responsible for the recovery giving the history of the fish. However, in a few instances we did not receive tagged fish left at the canneries and sometimes it was not possible to determine which boat made the catch. In order that all interested persons may know the results of the tagging and migration of the fish, a list of all the tags recovered with the pertinent information is enclosed.

Tagging is being continued this season, and all fishermen and cannery workers are again requested to watch for tagged fish. It is especially important to get returns from the fishermen, since after the fish get to the fillet lines it is sometimes impossible to determine the location of the catch.

When tagged fish are found, please record on a small piece of paper the area caught, the date, and name of the boat or person finding the fish. Then insert the paper into the fishes' mouth and place the fish in cold storage at the first opportunity. A member of the Research Staff will collect the tagged fish at regular intervals, and the person responsible for the recovery will immediately be sent a post card giving the facts about the tag.

Another very important part of the research being carried out on the otter-trawl fishery is a program to determine the changes in abundance of the various species over a period of years. In order to do this, it will be necessary to know the average catch per drag of each species. If the average catch of any species declines, we can usually assume that the numbers are less abundant, especially if this decline continues over a period of time. Conversely, an increase in the average catch will indicate an increase in abundance.

Again the active cooperation of the fishermen is needed to gather the essential data. Log books have been printed, designed especially for the drag-boats of Oregon. Many of these books have already been distributed. The log books become the property of the skipper and make an excellent record of the year's activities. We would expect to be able to copy the data from time to time.

Any otter-trawl skippers who do not have log books and who would be willing to keep these important records for us may obtain logs by contacting the Research Department of the Oregon Fish Commission in Astoria. The phone is 1732 and the laboratory is located in the basement of the Seafood Laboratory. Log books may be obtained in Newport from the Fish Commission laboratory at the Port Dock (phone 332).

Occasionally fishermen tell us of strange marine animals of various sorts which they have caught. We would appreciate it very much if these specimens were brought in to us. Often rare or even entirely new marine animals are found by fishermen. Thanks again for the fine cooperation we have received and for your consideration of the above request.

Sincerely,

ARNIE J. SUOMELA,
MASTER FISH WARDEN,

George Harry
by George Harry,
Aquatic Biologist.

GH:ru

RECOVERIES OF TAGGED BOTTOM FISH

RELEASED

RECOVERED

DOVER

Tag No.	Date	Area	Fathoms	Date	Area	Fathoms	Recovered by	Migration Miles
D-564	7/13/48	Near Col. R. Ltship	46	7/31/48	Buoy #1 Col. R.	20	"Coolidge II"	3
E-263	8/11/48	Near Col. R. Ltship	20	10/1/48	Off Col. River	20	NEFCO	---
E-645	8/18/48	Near Col. R. Ltship	21-26	10/1/48	Off Col. River	20	NEFCO	---

ENGLISH

D-1	4/27/48	NW of Cape Disappointment	25	9/7/48	Off Col. River	26	"Harold J"	---
D-90	4/28/48	W of Willapa Bay	27	11/12/48	Off Cape Flattery	54	"Northern Light"	108
D-100	4/28/48	W of Klipsan	20	8/5/48	Off Buoy #1 Col. R.	7	"Kincheloe"	14
D-311	6/28/48	W of Hoh Head	44	10/2/48	SW Ozette Is.	27	"Prowler"	23
D-317	6/28/48	W of Hoh Head	44	12/20/48	W of Hoh Head	44	"Mars"	---
D-344	6/28/48	14 Mi. W of Hoh Head	44	1/18/49	Destruction Is.	24	Paragon Pkg. Co.	12
D-352	6/28/48	W of Hoh Head	44	8/14/48	Destruction Is.	22-25	"Majestic"	---
D-774	8/9/48	Off Buoy #1 Col. R.	10	4/15/49	Ltship to Tillamook Rock	26-32	"Stampede II"	10
E-111	8/9/48	W of North Hd	10	4/13/49	W of Tillamook Rock	50	"Capt. Ludvig"	20
E-127	8/9/48	W of Buoy #1 Col. R.	7	9/11/48	Near Col. R. Ltship	29	"Gen"	---
E-145	8/9/48	Off Buoy #1 Col. R.	10	9/20/48	Off Buoy #2 Col. R.	7	"Trego"	---

ENGLISH

RELEASED

RECOVERED

Tag No.	Date	Area	Fathoms	Date	Area	Fathoms	Rec'd Migration	
							by	Miles
E-163	8/9/48	West Buoy #1	17	9/1/48	Just W of Buoy #1	29	NEFCO Fillet Line	----
E-226	8/9/48	Near Buoy #1	17	9/18/48	Near Col. R. Ltship	55	"Madeline J"	---
E-230	8/9/48	NE of Ltship	17	9/18/48	Buoy #1 Col. R.	7	"Marion F"	----
E-239	8/9/48	Off Buoy #1 Col. R.	19	9/20/48	Off Col. R.	7	"Harold J"	----
E-283	8/11/48	Near Ltship	20	8/18/48	Off Col. R.	7	NEFCO	----
E-324	8/17/48	Near Buoy #1 Col. R.	7	12/19/48	Buoy #1 Col. R.	7	"Ida Mae"	----
E-348	8/17/48	Near Buoy #1 Col. R.	20	9/18/48	Buoy #1 Col. R.	20	"Marion F"	----
E-349	8/17/48	Buoy #1 Col. R.	20	9/8/48	Buoy #1 Col. R.	20	"Marion F"	----
E-351	8/17/48	Near Ltship	20	9/20/48	Off Mouth of Col. R.	20	"Oregonian"	---
E-362	8/17/48	Near Buoy #1 Col. R.	20	12/12/48	Probably off Coos Bay	---	Chas. Feller	178
E-410	8/18/48	Off Col. R. Ltship.	29	1/10/49	SW Of Quillayute	50	"Midway"	90
E-419	8/18/48	Off Col. R. Ltship	29	9/13/48	W of Newport	26	Fillet line Del Mar "Yaquina"	104
E-458	8/18/48	Near Col. R. Ltship	29	10/20/48	Buoy #1 Col. R.	7	"Warren H"	5
E-491	8/18/48	Off Col. R. Ltship	21-26	9/18/48	Buoy #1 Col. R.	7	"Marion F"	5
E-499	8/18/48	W of Buoy #1	26	4/14/49	Btwn Ltship and Peter Iredale	34	"Betty"	6
E-632	8/18/48	Off Col. R. Ltship	29	12/28/48	Off Crescent City	42	A. Paladini Eureka, Cal.	294
E-650	8/18/48	Near Col. R. Ltship	26	10/20/48	Off Buoy #1 Col. R.	7	"Warren H"	5

ENGLISH

RELEASED				RECOVERED			
Tag No.	Date	Area	Fathoms	Date	Area	Fathoms	Rec'd Migration by Miles
E-718	8/18/48	Off Col. R. Ltship	45	8/26/48	Off Mouth of Col. R.	19	"Harold J" or "Oregonian" ---
E-734	8/18/48	Off Col. R. Ltship	20	9/1/48	? Maybe off Col. R.	--	San Juan Fish Co. ---
E-744	8/18/48	Near Col. R. Ltship	29	10/20/48	Buoy #1 Col. R.	7	"Warren H" 5
E-749	8/18/48	Near Col. R. Ltship	20	4/24/49	Ltship to Peter Iredale	34	"Betty" 12
E-756	8/18/48	Off Col. R. Ltship	29	9/18/48	Buoy #1 Col. R.	7	"Marian F" 5
E-786	8/18/48	Off Col. R. Ltship	29	9/6/48	Buoy #1 Col. R.	7	"Ida Mae" 7
E-778	8/18/48	Off Col. R. Ltship	21	9/22/48	Probably Buoy #1 Col. R.	7	NEFCO Fillet Line ---
E-790	8/18/48	Off Col. R. Ltship	21	9/14/48	Off Col. R. Ltship	21	"Anna Louise" ---
Reedsport Tags:							
1419	8/11/48	Near Buoy #1 Col. R.	20	9/22/48	Off Buoy #1 Col. R.	7	"Kincheloe" ---
1439	8/12/48	Off Sunset Beach	7	8/15/48	Umatilla or Destruction	19	"Julia" 100-130
1434	8/12/48	Off Sunset Beach	19	8/30/48	W. of Buoy #1 Col. R.	7	NEFCO Fillet Line 11
1477	8/12/48	Off Sunset Beach	19	8/20/48	Buoy #2 Col. R.	21	"San Antonio" 9

LING COD

D-698	8/8/48	SE of Col. R. Ltship	26	8/18/48	Off Buoy #3 Col. R.	7	"Silverland" 5
PETRALE							
D-239	4/28/48	7 Mi. SW of Ltship	52	7/13/48	5 Mi. W of Newport	46	"Kincheloe" 90

<u>RELEASED</u>				<u>PETRALE</u>		<u>RECOVERED</u>		
Tag No.	Date	Area	Fathoms	Date	Area	Fathoms	Rec'd by	Migration Miles
D-280	4/29/48	7 Mi. SW of Col. Ltship	52	6/8/48	Destruction Is.	24	"Grace H"	94
D-290	4/29/48	7 Mi. SW of Col. Ltship	52	5/20/48	Willapa Bay	50-60	"Lee Rose"	30
E-193	8/9/48	Near Buoy #1 Col. R.	17	8/19/48	Btwn Newport and Col. R.		"Coolidge II"	
D-111	4/28/48	W of Willapa Bay	27	9/22/48	Off Buoy #1 Col. R.		20 Fillet Line NEFCO	22
D-179	4/28/48	W of Willapa Bay	27	11/21/48	W of Eel R. California	200	"Triest"	354

SAND SOLE

D-182	4/28/48	W of Willapa Bay	27	11/11/48	Off Klipsan Beach, 6 Mi. N. of North Head	18-20	"Prowler"	12
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Table 2
Tagged Fish Data
April 1948--May 1949

	No. Tagged	No. Recovered	Percent Recovered (Slide Rule)	Number migrating 15 miles or less	Percent	Number migrating over 15 miles	Percent	Percent	Direct Migrat
Sole	2	--							
a isolepis)									
fish	9	--							
es melanops)	3	1	33 1/3			1		60	Cells
mon	11	1	9.1						
	40	--							
	474	3	0.6	3	300				
	851	40	4.7	32	80	8		20	4M; 4S
under	10	--							
geon	17	--							
geon	3	--							
	32	1	3.0	1	100				
	172	6	3.5	1	17	5		83	3S; 2M
	7	--		unknown					
phalus									
s)									
	18	--							
	11	1	9.1	1	100				
thus									
tictus)	1	--							
ark									
ked	1	--							
	1	--							
	4	--							
	1	--							
hes stomiae)									
led									
led	44	--							
es Flavidae)	44	--							
	1,754	53	3.2						

lost at sea.

Almost all fish were tagged near mouth of C.