MARINE FISHERIES PROGRESS REPORT

February through April, 1951

Much of the time during this period was taken up by analyses of the otter trawl data collected during the last three years. Work was continued on the statistical analysis of the catch records. The data on the catch composition at sea have also been worked up. Considerable time has been spent trying to determine the time of annulus formation from small English, petrale and Dover sole otoliths. Samples of small fish for this annulus study are still being taken, although the results have not been as promising as was hoped for. Some sections of the forth-coming otter trawl report have been written.

The work on the age determination of the albacore has continued.

During this period Al Pruter returned to school winter term and was graduated. From March 8-10 Ed Holmberg, Jergen Westrheim, and George Harry took part in the staff meetings at Clackamas. Jergen Westrheim and Ed Holmberg attended the Pacific Fisheries Biologists meetings at Harrison Hot Springs from March 15-17.

Otter-Trawl Studies

Rosefish

A study of the rosefish, Sebastodes alutus, began during February of 1951. These fish are to be found in large numbers off the Oregon Coast in waters 100 to 200 fathoms in depth. The fishery began in 1945, but was prosecuted by only one boat until 1948. The 1949 landings approximated one million pounds, but the fishery was still limited to a few boats operating out of Newport. According to the fishermen there are considerable quantities of these fish along the coasts of Oregon and Washington, but an intense fishery has not developed due to the difficulty of finding a suitable trade name for the fillets which will prove attractive to the consumer. The name "ocean perch" was tried on the Atlantic Coast for Sebastes marinus and proved successful, but the approval of the Food and Drug Administration has not yet been obtained to apply that name to Sebastodes alutus. It is felt that should some suitable trade name be permitted for these fish, there may well be a considerable fishery in the near future.

Thus, the rosefish study has been started more or less in anticipation of an increase in fishing intensity in order to obtain as much basic biological information as is possible before this increase occurs.

The first step in the investigation has been to develop a successful method of age determination. The scales of the fish appear to be satisfactory, but otoliths, spines, and opercle bones will also be examined.

Approximately 327 scales have been mounted, 25 by the impression method, 249 with water glass (sodium silicate), and 54 by dry-mount

method. The dry-mount method is clearly superior when used with the Rayoscope. Unfortunately, preliminary tests, without the Rayoscope, indicated that the water glass method would be satisfactory, but when the water glass mounts were used with the Rayoscope (which arrived April 30) they did not show up well.

In addition to the scale work, length-frequencies, length-weights, and female maturity data have been collected but not summarized to date.

Statistical Analysis

The statistical analysis of the Astoria otter trawl landings has been refined and extended to include the period 1942 through 1947.

The procedure for grouping the data has been changed. Instead of computing catch-per-landing figures for paired years, e.g., 1942-43 and 1943-44, the catch-per-landing was calculated only for individual years. This change involved utilization of the landings of all boats which fished during the year in question and the previous and/or following year. The earlier method had been chosen for eventual use of link relatives, but the short time series involved did not warrant such an analysis. The trends of the catch-per-landing data remained unchanged with the new method.

The rockfish have now been analyzed for the same period, 1942-47, as the Dover, English, and petrale sole.

During the analysis it was noted that frequently the landings contained an entry entitled "sole". This category appeared in a decreasing frequency from 1942 through 1944 and then disappeared. Since these "sole" landings were often as large as 30,000 pounds or more, it was felt that perhaps some misunderstanding of the

classification system had taken place at the fish plants. Accordingly, the otter trawl landings containing "sole" were excluded from the statistical analysis until some information could be obtained as to what fish were included in this category. The original landing records of one Astoria plant for the period April through July, 1943 were examined to determine what species were recorded as "sole" in the Fish Commission records. The following different types of landings had been entered on the Fish Commission Landing Receipt Form as "sole": (1) mink sole; (2) mink sole and Dover sole; (3) mink sole and turbot; (4) turbot; (5) Dover sole; (6) Dover and turbot; (7) Dover, petrale, and turbot; (8) Dover, English, rex, and turbot. In most of the cases of mixed species the price had been the same for all the species so mixed, so that in all probability the fishermen had decided not to separate the species in the catch which were of the same price.

The other Astoria plants also reported "sole" landings during this same period, but their records have not been examined to date. It appears that it would be unwise to utilize landings containing "sole" since it is not known to what extent the other Astoria plants' records were similar to those of the plant studied.

Table 1 lists the pounds of Dover, English, and petrale sole and their respective numbers of landings which were excluded from the analysis. There were no "sole" landings after 1944.

A second, but less important, complication was the presence of albacore in the otter trawl landing. This indicated that at least for a few specific landings the fishermen did not devote their entire trip to bottom fish. Accordingly those landings which contained albacore were also excluded from the analysis. Tables 2

and 3 list the pounds of Dover, English, and petrale sole and rockfish with the respective numbers of landings which were thus excluded.

A brief summary of the statistical analysis is included in Tables 4, 5, 6, and 7 for the four principal species in the otter trawl fishery, i.e., Dover, English, and petrale sole and rockfish. The headings of these tables are explained as follows:

TOTAL OREGON LANDINGS (Jan.-Dec.)--the total Oregon landings as taken from the statistical summaries for Oregon bottom fish compiled by Harry Smith's office. For Dover and English, these landings are all made by the otter trawl boats. For the petrale and rockfish, a small, but unknown, portion of the landings come from the long-line fishery, but the vast majority of the landings are by the otter trawl fleet.

TOTAL ASTORIA LANDINGS (Jan.-Dec.)--the total Astoria landings are the otter trawl landings made in Astoria. These figures were obtained by totalling the landings on the punch cards for the period January, 1942 through March, 1947 and from the IBM summary sheets for the period April through December, 1947. There is a discrepancy in the Dover sole landings (Table 4) for 1943 where the Astoria landings exceed the Oregon landings. The error is however small (0.7%).

TOTAL ASTORIA LANDINGS (Apr.-Sept.)--the total Astoria landings for the period April through September of each year were compiled from the punch cards and IBM summary sheets.

TOTAL "SIGNIFICANT" LANDINGS (Apr.-Sept.)--the total "significant" landings made in Astoria during the period April through September of each year. A "significant" landing of one of the principal

species of otter trawl fish (Dover, English, or petrale sole and rockfish) is defined as one which constitutes more than 29 percent of the particular total landing in question.

NUMBER OF "SIGNIFICANT" LANDINGS--the total number of "significant" landings made.

CATCH PER LANDING--the total "significant" landings divided by the number of "significant" landings equals the catch-per-landing.

The catch-per-landing trends discussed in the previous progress report did not differ appreciably from those of the later analysis so no further discussion will be made at this time. It has been decided not to extend the present analysis to include the years 1948 and 1949 due to the limits imposed by the plants on the catches of the principal species from time to time.

Statistical System Alteration

Beginning April 1, 1951 the Oregon otter trawl industry was requested to cooperate in making the following additions and alterations to the Fish Commission landing statistics:

1. Area of Capture--the fishermen were asked to report the area in which they caught the majority of their fish for each trip to the fish receiver at the time of delivery. The areas used are those designated by number on Oregon Fisheries Chart No. 1. The fish plants were asked to place this information on their daily or monthly report sheets which are sent to the Fish Commission office.

2. Number of Drags--the fishermen were asked to report the total number of drags they make during each trip. This information is to be handled in the same manner as that on Area of Capture.

3. Rockfish--to be classified, by the plants, as black, red, or rosefish.

4. Ling Cod--to be classified as Dressed or Round.

5. Sablefish (Black Cod)--to be classified as Dressed or Round.

6. Mink Food--this classification is to be used for all whole fish landed for mink food.

It seems self-evident that location of the catches is of the utmost importance to a statistical study of a fishery. The information which will be obtained from the new system will not be best from an academic standpoint, but for the otter trawl fishery, it is the best obtainable at this time.

The number of drags per trip will considerably improve the accuracy of the measure of catch-per-effort (catch per landing) which was used in the statistical analysis for 1942-47. However, this improvement does not take into consideration the time element, i.e., how long were the drags. The drags can vary from 30 minutes to four hours, although most are about one and one half hours so that further refining may be necessary if it is found that there is considerable fluctuation in the time per drag within a season, or between seasons. Estimates of the length of time for a drag will be made by interviewing the skippers of the boats.

The rockfish have been inconsistently classified by a variety of common names and it is hoped that limiting the common names to three will help to classify the fish in a general manner at least. At the present time, the price is the same for the "red" and "black" and they are landed mixed, but for the most part the red is the preferred fish and usually has a slightly higher price. The "red" is mostly Sebastodes pinniger and the black is mostly Sebastodes

flavidus and occasionally S. melanops. The price differential will of course cause the fishermen to sort the catches by species before landing.

Although the ling cod and sable fish are usually landed dressed, it seems desirable to obtain accurate information on the landings, rather than rely on rumor, or conjecture.

Mink food, like rockfish, have been landed under a variety of labels and it is essential to maintain an accurate record of such landings.

1950 Sampling at Sea

From the data collected last year (1950) there remains to be discussed two items: species composition by area and the estimated discard of all fish usable as mink feed.

Species composition by Area: In Table 8 a break down of the samples by area is given. This has been made both by number sampled and percent.

Percentage wise an increase in any one species may simply be the reflection of declines in another or all other species. Conversely, a decrease in all species would result from a large single catch of one species. For example, the large catches of dogfish in area 1, the rosefish in area 2, the hake in areas 4 and 5, Table 8.

No method was devised to show the relative numbers of each species found in an area. This would require separate weights of the catches for each drag as the landings often represent drags from widely separated areas. Without the weight of each individual

drag it is impossible to determine the relative size of the samples and thereby adjust each sample to equal strength. This same difficulty arose in the presentation of the species composition by depth as discussed at the staff conference and the previous progress report.

Discard of species usable for mink feed: In this phase of the analysis we were interested in learning the potential mink feed production if the otter trawl vessels were to bring in not only the food fish discarded but also the other so-called scrap fish that normally goes overboard in the sorting.

The roundabout method of arriving at this estimation gives a rough idea of the actual discard. At various times throughout the experiments average weights were taken of the various trawl caught species. Step one was to convert the sample numbers to sample weight using these conversion factors. These were then converted to percentage. The next and most difficult step was to determine the total pounds of all species landed on the vessel. We have previously computed the total pounds caught and discard for various principal species in each experiment. For example, in one experiment both Dover and petrale total catches at sea were calculated (Table 9) of the 18,850 pounds of Dover sole caught, 6,369 pounds were discarded at sea. Using the sample weight percentage in the simple proportion: Dover sample weight percent is to 100 percent as Dover total catch is to total catch for all species.

$$27.2 : 100.0 = 18{,}850 : X$$
$$= 69{,}300 \text{ lbs. total catch}$$

The same procedure using the petrale catch gives:

$$36.6 : 100.0 = 21{,}645 : X$$
$$= 59{,}140 \text{ lbs. total catch}$$

The correct answer probably was somewhere between these figures, and the difference was therefore taken giving 64,220 pounds landed on the vessel. The individual weights for the separate species were determined using the sample weight percentages. The fish saved from the catch and eventually landed plus the obviously non-mink feed species were disregarded in totaling the poundage usable as mink food. The following list shows the total poundage discarded that would be usable as mink food.

Exp. No.	Total Landing	Potential Mink Food Discarded
1	33,726	30,777
2	28,202	36,282
3	34,052	12,550
4A	7,879	20,065* (20,201 actual)
5	5,069	17,577
7	2,476	13,444* (17,979 actual)
8	40,854	10,065
9	27,288	30,310
10	22,250	5,080
11	3,900	14,905
12	60,312	78,439
Newport 1	23,241	5,700
" 2	16,806	14,491

* Exp. No. 4A actual mink food landing was 20,201 pounds.
7 17,979

Besides the potential mink food possibilities shown here which are for practical purposes not feasible to bring in at the present low price, this analysis shows the great wastage of both food and non-food fish by the otter trawl fishery. To bring in this discarded fish would cut the length of trip in half in most cases and reduce the income per trip for the fishermen. We have also included some species such as hake which may not be desirable as mink food.

Age Determination of Flatfish

In order to prove that the otolith rings counted are true annuli, otoliths were collected from small Dover, English and petrale soles for approximately a year. We have read 312 small Dover sole otoliths, 346 small English sole otoliths, and 193 small petrale otoliths. All but a few months of the year are represented, and these will be filled in eventually.

The otoliths were cleared in 50 percent glycerine and read with the low power objective of the binocular microscope. The otoliths were read once by two individuals, and a third reading was made to clear up discrepancies. The edge formation (opacity) was indicated in tenths as follows:

0.0 no ring formation on edge

0.1 possible edge formation

0.2 to 0.8 definite edge formation estimated completion

0.9 possible complete ring formation

Various groupings were attempted to determine the time of year when the translucent area or annulus was laid down on the otolith. The analysis and readings are not at present complete and will be given more thoroughly upon completion.

Table 1. Pounds and Numbers of Landings, "Non-Significant" and "Significant", of Dover, English, and Petrale Sole excluded from the Statistical Analysis Due to Presence of "Sole" in the Landings.

	"NON-SIGNIFICANT"* (Jan-Dec)		"SIGNIFICANT"** (Apr-Sept)	
	POUNDS LANDED	NO. OF LANDINGS	POUNDS LANDED	NO. OF LANDINGS
DOVER:				
1942	581	3	9,772	1
1943	8,358	6	---	0
1944	2,620	1	---	0
1945	---	0	---	0
ENGLISH:				
1942	52,040	106	1,707	2
1943	83,182	46	11,315	1
1944	9,819	13	---	0
1945	---	0	---	0
PETRALE:				
1942	174,440	135	259,511	40
1943	95,050	69	16,731	5
1944	4,042	9	3,066	1
1945	---	0	---	0

* Includes "unlinked" landings for January through December, and "linked" landings which were less than 30 percent of their respective totals, for the period April through September.

** Includes "linked" landings for April through September which were greater than 29 percent of their respective totals.

Table 2. Pounds and Numbers of Landings, "Non-Significant" and "Significant", of Dover and English Sole excluded from the Statistical Analysis Due to the Presence of Albacore in the Landings.

	"NON-SIGNIFICANT"* (Jan-Dec)		"SIGNIFICANT"** (Apr-Sept)	
	POUNDS LANDED	NO. OF LANDINGS	POUNDS LANDED	NO. OF LANDINGS
DOVER:				
1942	---	0	49,427	3
1943	12,001	5	81,449	5
1944	1,465	2	5,600	2
1945	21,948	1	---	0
1946	---	0	---	0
1947	---	0	---	0
ENGLISH:				
1942	---	0	---	0
1943	692	1	---	0
1944	2,751	2	---	0
1945	---	0	---	0
1946	21,262	3	---	0
1947	---	0	---	0

* Includes "unlinked" landings for January through December, and "linked" landings which were less than 30 percent of their respective totals, for the period April through September.

** Includes "linked" landings for April through September which were greater than 29 percent of their respective totals.

Table 3. Pounds and Numbers of Landings, "Non-Significant" and "Significant", of Petrale Sole and Rockfish excluded from the Statistical Analysis Due to the Presence of Albacore Tuna in the Landings.

	"NON-SIGNIFICANT"* (Jan-Dec)		"SIGNIFICANT"** (Apr-Sept)	
	POUNDS LANDED	NO. OF LANDINGS	POUNDS LANDED	NO. OF LANDINGS
PETRALE:				
1942	294	1	---	0
1943	18,081	9	---	0
1944	7,806	6	---	0
1945	4,718	1	---	0
1946	3,074	3	---	0
1947	---	0	---	0
ROCKFISH:				
1942	1,516	5	---	0
1943	5,423	6	17,204	2
1944	5,821	2	38,082	3
1945	1,090	1	---	0
1946	743	2	2,181	1
1947	---	0	---	0

* Includes "unlinked" landings for January through December, and "linked" landings which were less than 30 percent of their respective totals, for the period April through September.

** Includes "linked" landings for April through September which were greater than 29 percent of their respective totals.

Table 4. Summary of Catch Analysis for Dover Sole with the Total Pounds, by Year, Landed in Oregon (Jan.-Dec.), in Astoria, (Jan.-Dec.), in Astoria (Apr.-Sept.), in Astoria ("Significant"); Numbers of "Significant" Landings; and Catch Per Landing.

	TOTAL OREGON LANDINGS (Jan-Dec)	TOTAL ASTORIA LANDINGS (Jan-Dec)	TOTAL ASTORIA LANDINGS (Apr-Sep)	TOTAL "SIGNIFICANT" LANDINGS (Apr-Sep)	NO. OF "SIGNIFICANT" LANDINGS (Apr-Sep)	CATCH PER LANDING
1942	3,745,236	2,100,708	1,875,064	1,304,098	82	15,904
1943	6,431,666	6,473,507	6,346,526	5,806,147	319	18,201
1944	2,019,162	1,292,155	1,111,903	955,736	70	13,653
1945	2,704,216	2,526,017	2,077,293	1,902,567	106	17,949
1946	2,984,092	2,969,746	2,953,387	2,678,838	217	12,345
1947	2,031,905	1,896,177	1,751,930	1,492,103	118	12,645

Table 5. Summary of Catch Analysis for English Sole with the Total Pounds, by Year, Landed in Oregon (Jan.-Dec.), in Astoria (Jan.-Dec.) in Astoria (Apr.-Sept.), in Astoria ("Significant"); Numbers of "Significant" Landings; and Catch Per Landing.

	TOTAL OREGON LANDINGS (Jan-Dec)	TOTAL ASTORIA LANDINGS (Jan-Dec)	TOTAL ASTORIA LANDINGS (Apr-Sep)	TOTAL "SIGNIFICANT" LANDINGS (Apr-Sep)	NO. OF "SIGNIFICANT" LANDINGS (Apr-Sep)	CATCH PER LANDING
1942	227,793	126,516	86,015	4,065	2	2,033
1943	898,639	615,725	364,267	93,678	17	5,510
1944	1,057,701	744,966	499,239	122,945	41	2,999
1945	1,096,601	726,084	444,218	182,553	28	6,520
1946	3,950,609	3,015,254	2,796,694	1,834,115	256	7,165
1947	1,883,438	1,584,552	1,351,403	750,826	93	8,073

Table 6. Summary of Catch Analysis for Petrale Sole with the Total Pounds, by Year, Landed in Oregon (Jan.-Dec.), in Astoria (Jan.-Dec.), in Astoria (Apr.-Sept.), in Astoria ("Significant"); Numbers of "Significant" Landings; and Catch Per Landing.

	TOTAL OREGON LANDINGS (Jan-Dec)	TOTAL ASTORIA LANDINGS (Jan-Dec)	TOTAL ASTORIA LANDINGS (Apr-Sep)	TOTAL "SIGNIFICANT" LANDINGS (Apr-Sep)	NO. OF "SIGNIFICANT" LANDINGS (Apr-Sep)	CATCH PER LANDING
1942	3,745,236	1,887,334	1,620,736	1,075,332	128	8,401
1943	3,805,094	1,569,160	1,289,143	673,153	79	8,521
1944	2,019,162	1,255,934	1,167,035	460,706	64	7,199
1945	1,574,143	884,332	715,820	280,120	47	5,960
1946	2,984,092	1,720,097	1,633,663	836,403	193	4,334
1947	1,443,936	1,139,141	965,092	440,481	96	4,588

Table 7. Summary of Catch Analysis for Rockfish with the Total Pounds, by Year, Landed in Oregon (Jan.-Dec.), in Astoria (Jan.-Dec.), in Astoria (Apr.-Sept.), in Astoria ("Significant"); Numbers of "Significant" Landings; and Catch Per Landing.

	TOTAL OREGON LANDINGS (Jan-Dec)	TOTAL ASTORIA LANDINGS (Jan-Dec)	TOTAL ASTORIA LANDINGS (Apr-Sep)	TOTAJ "SIGNIFICANT" LANDINGS (Apr-Sep)	NO. OF "SIGNIFICANT" LANDINGS (Apr-Sep)	CATCH PER LANDING
1942	1,898,488	1,580,314	1,131,806	535,330	88	6,083
1943	6,923,325	5,275,028	2,828,231	1,951,748	148	13,187
1944	11,367,169	7,275,969	4,984,947	3,968,244	299	13,272
1945	17,458,309	10,618,043	8,741,781	7,610,971	366	20,795
1946	10,867,187	5,072,271	3,385,971	2,522,573	263	9,592
1947	6,799,941	6,162,011	4,501,268	1,738,551	176	9,878

Table 8. Species Composition by Area

SPECIES	Coos Bay to Heceta Head NUMBER SAMPLED	%	Yaquina Head to Cape Lookout NUMBER SAMPLED	%	Cape Lookout to Tillamook Head NUMBER SAMPLED	%	Tillamook Head to Cape Disappointment NUMBER SAMPLED	%	Cape Disappointment to Grays Harbor NUMBER SAMPLED	%	Destruction Island NUMBER SAMPLED	%
Dover	1,588	27.4	34	3.9	122	6.3	965	22.0	763	11.3	477	10.7
English	340	5.9	107	12.1	346	17.9	588	13.4	2,839	41.9	2,259	50.8
Petrale	1,649	28.4	108	12.3	331	17.1	417	9.5	559	8.3	189	4.3
Bellingham Sole	5	0.1	2	0.2	2	0.1	10	0.2	189	2.8	540	12.1
Black Cod	70	1.2	39	4.4	159	8.2	101	2.3	7	0.1	62	1.4
Curlfin			2	0.2								
Dogfish	209	3.6	4	0.5			4	0.1	22	0.3	8	0.2
Eel pout							1	---				
Flounder	2	---					3	0.1	174	2.6	68	1.5
Hake	63	1.1	102	11.6	33	1.7	577	13.1	533	7.9	75	1.7
Halibut	3	0.1	3	0.3	4	2	18	0.4	3	---	4	0.1
Ling Cod	30	0.5	2	0.2	19	1.0	24	0.5	30	0.4	37	0.8
Ratfish	201	3.5	16	1.8	24	1.2	55	1.3	28	0.4	5	0.1
Rex Sole	1,083	18.7	81	9.2	293	15.1	794	18.1	1,029	15.2	270	6.1
Rock Sole			3	0.3								
S. alutus			155	17.6	38	2.0						
S. dalli					1	0.1						
S. elongatus	9	0.2	24	2.7	1	0.1	1	---				
S. flavidus	2	---	28	3.2	17	0.9	29	0.7	30	0.4	18	0.4
S. melanops	1	---			1	0.1			4	0.1	1	---
S. mystinus			65	7.4								
S. paucispinnus	57	1.0	10	1.1								
S. pinniger	59	1.0	6	0.7	15	0.8	17	0.4	18	0.3	5	0.1
S. rubrivinctus			4	0.5								
Sand Dab	106	1.8	60	6.8	366	18.9	503	11.4	127	1.9	177	4.0
Sand Sole							1	---	1	---	3	0.1
Sea Poacher											1	---
Seb. alascanus					11	0.6						

Table 8. (Continued)

SPECIES	Coos Bay to Heceta Head NUMBER SAMPLED	%	Yaquina Head to Cape Lookout NUMBER SAMPLED	%	Cape Lookout to Tillamook Head NUMBER SAMPLED	%	Tillamook Head to Cape Disappointment NUMBER SAMPLED	%	Cape Disappointment to Grays Harbor NUMBER SAMPLED	%	Destruction Island NUMBER SAMPLED	%
Shad	8	0.1					5	0.1	39	0.6		
Skate	92	1.6	11	1.2	26	1.3	60	1.4	133	2.0	97	2.2
Slender Sole	55	0.9			3	0.2	3	0.1	3	---	7	0.2
Sturgeon (green)											2	---
Tomcod					1	0.1	2	---	11	0.2	3	0.1
True Cod							10	0.2	33	0.5	74	1.7
Turbot	168	2.9	15	1.7	124	6.4	206	4.7	204	3.0	61	1.4
Wolf Eel											1	---
Miscellaneous											1	---
No. of Drags	29		8		14		21		30		26	
Total	5,800	100.0	881	99.9	1,937	100.3	4,394	100.0	6,779	100.2	4,445	100.0

Table 9. 1950 Boat Sample Estimation of Usable Mink Food Discard.

SPECIES	BOAT SAMPLE NUMBER	AVERAGE WEIGHT	SAMPLE WEIGHT	PERCENT	TOTAL POUNDS CAUGHT	POUNDS DISCARD
Dover	648	1.43	927	27.2	18,850	6,369
English	256	0.80	213	6.3	4,050	4,050
Petrale	867	1.44	1,246	36.6	21,645	4,050
Black Cod	11	2.00	22	0.6	390	390
Curlfin	2	0.80	1.6	---	---	---
Hake	11	3.00	33	1.0	640	640
Halibut	1	---	---	---	---	---
Lingcod	3	3.00	9.0	0.3	190	---
Rex Sole	790	0.60	474	13.9	8,930	8,930
S. flavidus	1	3.30	3.3	0.1	64	64
S. paucispinnus	29	3.30	96	2.8	1,800	1,800
S. pinniger	31	4.80	149	4.4	2,830	---
S. elongatus	3	3.30	10.0	0.3	190	190
Rock Sole	3	1.00	3	0.1	64	64
Sand Dab	96	0.60	57.6	1.7	1,090	1,090
Shad	3	3.00	9.0	0.3	190	190
Skate	31	---	---	---	---	---
Slender Sole	55	0.80	44	1.3	830	830
Turbot	56	2.00	112	3.3	2,120	2,120
Ratfish	120	---	---	---	---	---
			3409.5	100.2	63,873	30,777 pounds usable mink food