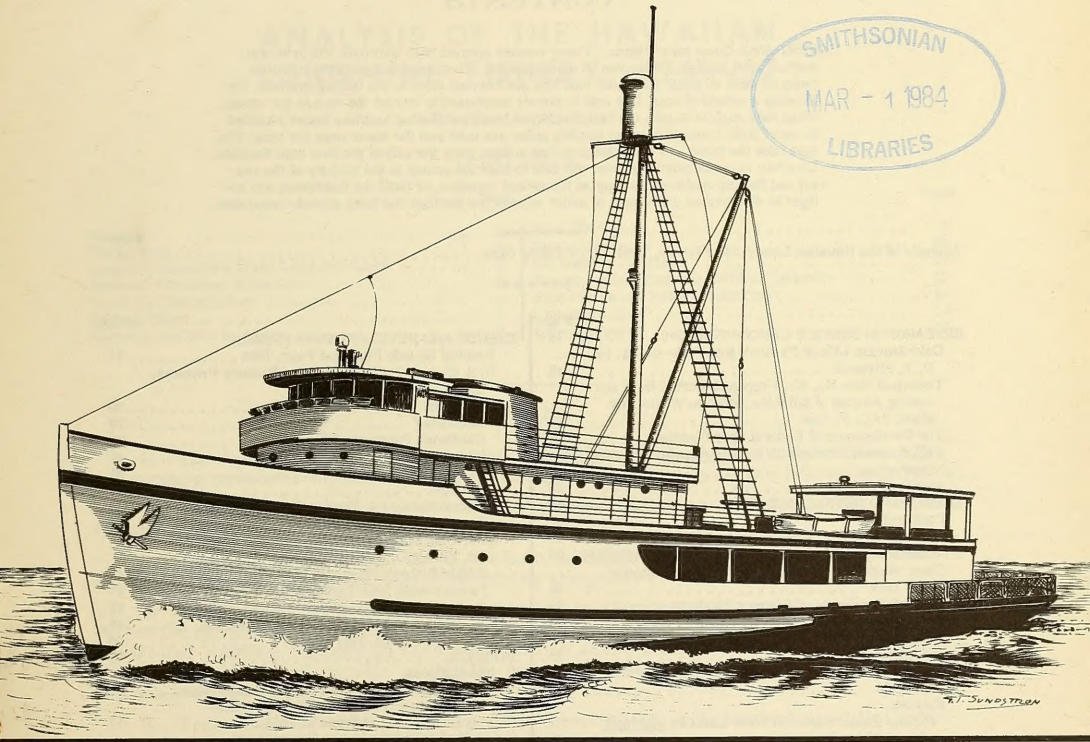
COMMERCIAL FISHERIES REVIEW

TUNA CLIPPER

LENGTH 150 FEET



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FISH and WILDLIFE SERVICE
United States Department of the Interior
Washington, D.C.

UNITED STATES
DEPARTMENT OF THE INTERIOR
DOUGLAS McKAY, SECRETARY

FISH AND WILDLIFE SERVICE
JOHN L. FARLEY, DIRECTOR

COMMERCIAL FISHERIES REVIEW

A review of developments and news of the fishery industries
prepared in the BRANCH OF COMMERCIAL FISHERIES

A. W. Anderson, Editor F. F. Johnson, Associate Editor
J. Pileggi and J. J. O'Brien, Assistant Editors

Mailed free to members of the fishery and allied industries. Address correspondence and requests to the: Director, Fish and Wildlife Service, U. S. Department of the Interior, Washington 25, D. C.

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CONTENTS

COVER: West Coast tuna clipper. These vessels operate with live-bait, the principal method used by U. S. fishermen in catching tuna. They are equipped with live-bait tanks on deck in which the small bait fish are carried alive to the fishing grounds. On locating a school of tuna, live bait is thrown overboard to attract the tuna to the vessel. When they rush in to take the bait, feathered lures concealing barbless hooks attached to short lines fastened to stout bamboo poles are cast into the water near the tuna. The tuna take the lures and the fishermen heave them over the rail of the boat onto the deck. Live bait is continually cast over the side to hold the school in the vicinity of the vessel and fishing continues as long as the school remains, or until the fishermen are obliged to discontinue operations in order to care for the fish that have already been taken.

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ANALYSIS OF THE HAWAIIAN LONG-LINE FISHERY, 1948-52

By Tamio Otsu*

CONTENTS

SUMMARY

1. The long-line method is presently the only means of efficiently catching the subsurface resource of tunas and spearfishes in the vicinity of the Hawaiian Islands.

2. The tuna landings have steadily increased following a period of restricted fishing during World War II.

3. The species composition of the tuna landings have changed from a predominance of yellowfin to one of big-eyed during the postwar years.

4. There is a marked seasonal variation in abundance among the tunas, with yellowfin occurring in greater numbers during the summer and the big-eyed during the winter months. There is less variation in seasonal abundance among the spearfishes, with the black marlin generally more abundant during the summer months and the striped marlin in the winter.

5. This seasonal variation in species composition is dependent upon the movements and local abundance of the fish. Both of these factors may be influenced by any of a number of environmental factors; e.g., sea temperature is frequently believed to be important, however, the available data are too scanty to be conclusive.

6. There is a possibility that the occurrence of yellowfin in greater numbers during the summer is related to spawning.

7. The possibility also exists that yellowfin are responding to a slightly more abundant food supply during the summer months in island waters.

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8. The average total catch rate (catch per 100 hooks fished per day) is about 3.0, which compares favorably with the Japanese catch in their home waters but falls below their catch in various tropical and subtropical areas.

9. The amount of effort expended by the fleet from year to year did not vary significantly during the years surveyed.

10. There appears to be a seasonal shifting of the more productive fishing grounds. Windward waters are said to be more productive during the winter months.

11. Noticeable variations in boat efficiency may be attributed to differences in the productivity among various areas, since certain of the low-catch boats fish exclusively in one area regardless of productivity.

12. The long-line fishery catches yellowfin over 90 pounds in weight, with the bulk of the catch falling between 100 and 160 pounds. The big-eyed are somewhat larger, with the bulk falling roughly between 100 and 200 pounds. Yellowfin average around 140 and the big-eyed around 160 pounds.

13. The sex ratio among long line-caught yellowfin and big-eyed tuna differs significantly from 50:50 (or 1:1) with males predominating in both species.

14. There is a possibility that yellowfin spend their first year or two at the surface before descending to subsurface levels. This may be a basis for a method of predicting the abundance of subsurface yellowfin a few years in advance.

15. The limited market makes the price especially sensitive to supply and consequently serves to limit fishing intensity.

BACKGROUND

The long-line fishery of Hawaii catches the deep-swimming pelagic tunas and spearfishes in the coastal and offshore waters of the Hawaiian Islands. Having had its beginning in 1917, when a Japanese immigrant introduced the Japanese technique of fishing subsurface levels in waters off Waianae, Oahu, this fishery has rapidly developed into a major source of fish in the Territory; its landings are valued at over a million dollars annually.

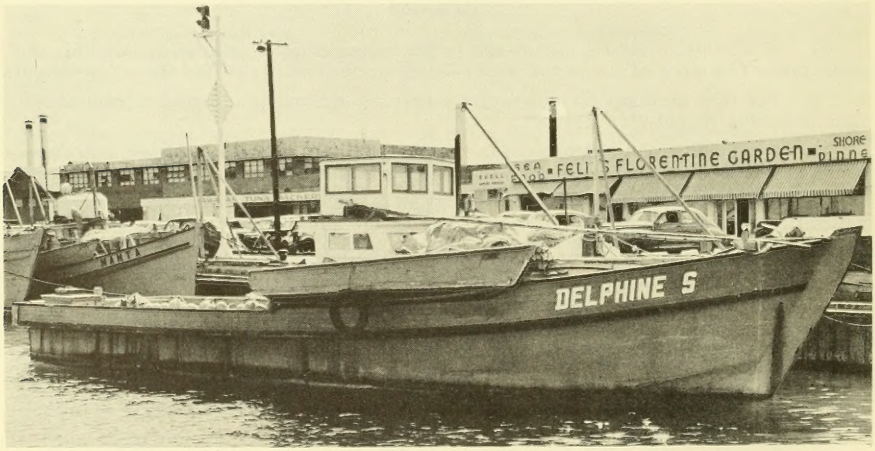

Fig. 1 - A long-line vessel (sampan) of the Honolulu fleet.

Since this is the only tuna long-line fishery in the central Pacific Ocean, a thorough understanding of it is important in evaluating data gathered from equatorial regions which the Service's Pacific Oceanic Fishery Investigations (POFI) has been exploring. June (1950) described the fishery in some detail; this report is intended as a supplement and includes data on the catch and its trends and some observations on the biology of the tunas.

This report, which covers the period from 1948 to 1952, is based largely on statistics provided by the Division of Fish and Game, Board of Agriculture and Forestry, Territory of Hawaii. These have been supplemented by information gathered through discussions with fishermen and dealers and by examination of catches landed at the local markets.

The principal center of the long-line fishery is Honolulu, where a fleet of 31 to 33 boats operates throughout the year and accounts for approximately 70 percent of the Territory's long-line landings. Next in importance is Hilo, on the island of Hawaii, with a fleet of about 10 boats. Smaller fleets are based at Kona on the island of Hawaii and at Port Allen, Kauai.

The Hawaiian long-line boats are built along the lines of the Japanese sampan-type live-bait boats, with a high and narrow bow, a modified V-bottom, and a moderately low freeboard aft (fig. 1). The after deck has sufficient space for handling the fishing gear efficiently. They range in size from 40 to 63 feet in over-all length, with about a 12-foot beam and a 6-foot draft on 60-foot boats. They are powered with a Diesel main engine of 115 to 165 horsepower, usually of the high-speed type, driving a single screw through a reduction gear. Since none of the boats are equipped with any sort of mechanical refrigeration, the fish are stored in crushed ice. At the outset of a trip the fish holds are packed with the necessary amount of cake ice, generally in a ratio of about four pounds of ice to each expected pound of fish. The larger boats carry a crew of 4 or 5 while the smaller boats employ a crew of only 2 or 3 men.

The gear is a drifting long-line made up in units referred to as "baskets" (June 1950, Niska 1953). Each "basket" consists of a main line 140 to 200 fathoms long suspended at intervals by floats and supporting in turn a series of 5 or 6 vertical branch lines. The hooks are usually baited with frozen sardines (Sardinops caerulea) or herring (Clupea pallasii). From 20 to 35 "baskets" of gear are connected in a set, thus covering a considerable expanse of water.

SPECIES COMPOSITION OF THE LONG-LINE CATCH

The catches of the long-line boats include an interesting variety of tunas, spearfishes, and miscellaneous pelagic fishes. Among the tunas, which constitute approximately 65 percent of the landings, the yellowfin (Neothunnus macropterus) and the big-eyed (Parathunnus sibi) are the two principal species. Albacore (Germo alalunga) makes up from 1 to 4 percent of the total landings, whereas the long-line catch of skipjack (Katsuwonus pelamis) is negligible and is practically never landed at the markets. Among the spearfishes, the black marlin (Makaira mazara) and the striped marlin (Makaira mitsukurii) are the most abundant. Other species taken in lesser quantities are the sailfish (Istiophorus orientalis), short-nosed spearfish (Tetrapturus brevirostris), white marlin (Makaira marlina), and broadbill swordfish (Xiphias gladius). During the period studied, the several species of spearfishes together have constituted from 24 to 45 percent by weight of the annual long-line landings in the Territory. In addition to the tunas and spearfishes, small quantities of wahoo (Acanthocybium solandri), dolphin (Coryphaena hippurus), and sharks also appear in the landings.

Among the numerous types of fishing methods employed in Hawaiian waters, the long-line is responsible for practically all the landings of yellowfin, big-eyed,

and albacore tuna, and the various species of spearfishes. The skipjack pole-and-line fishery accounts for a few tons of small yellowfin which are taken at the surface when occurring in mixed schools with skipjack or in independent schools (table 14), but these amount to less than 4 percent of the annual landings of this species. Hand-line fishermen, operating in waters to about 50 fathoms in depth, contribute about 10 percent to the yellowfin landings (10- to 30-pound fish). A considerable number of spearfishes are also landed by the sport fishery, but here again, these constitute only a small percentage of the total spearfish landings.

Table 1 - Annual Landings by the Long-line Fishery in the Territory of Hawaii 1/

Species	1952	1951	1950	1949	1948	1947	1946	1945 2/
	(Thousands of pounds)							
Yellowfin tuna ...	719	661	605	817	1,006	1,314	1,343	456
Big-eyed tuna ...	2,193	2,031	1,842	1,086	640	340	126	12
Albacore tuna ...	101	55	60	70	94	115	43	10
Black marlin	534	597	536	512	679	445	164	70
Striped marlin ...	371	382	570	431	453	384	202	41
Other spearfishes 3/	47	138	171	206	283	270	155	42
Total 4/	3,965	3,864	3,784	3,122	3,156	2,868	2,033	632
	(Percentage Composition)							
Tunas	76.0	71.1	66.3	63.2	55.2	61.7	74.4	75.9
Spearfishes	24.0	28.9	33.7	36.8	44.8	38.3	25.6	24.1

1/From records of the Territory of Hawaii Fish and Game Division. Landings shown for 1945-47 include catches made by other than long-line fishery.
2/1945 is considered a "war year" in which a restricted fishery operated and includes the July to December landings only.
3/Includes the sailfish, short-nosed spearfish, white marlin, and broadbill swordfish. Also included here are spearfishes which were not identified in the fishermen's reports. Detailed figures are not given for each species because they are frequently misidentified.
4/Totals may not be exact due to rounding off of figures.

Perhaps the most significant observation to be made from the records of the annual landings of the long-line fishery is the shift in dominance between the yellowfin and big-eyed tuna. The yellowfin, which reportedly was the dominant species of tuna in the prewar fishery, 1/ declined in the catch from 1,343,000 pounds in 1946 to a low of 605,000 pounds in 1950 (table 1). Subsequently there was a small increase to 719,000 pounds in 1952. Meanwhile, the catch of big-eyed tuna increased tremendously and steadily from 126,000 pounds to 2,193,000 pounds. Thus the species composition of the tunas has changed from a predominance of yellowfin to that of big-eyed in 5 years (fig. 2).

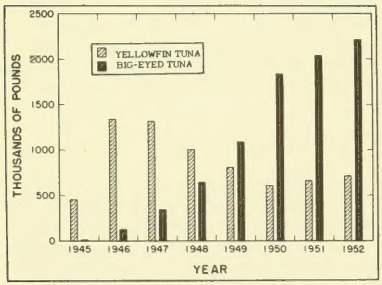

Fig. 2 - Annual landings of yellowfin and big-eyed tuna by the Hawaiian long-line fishery, 1945-52 (thousands of pounds).

SEASONAL VARIATIONS IN THE CATCH

A prominent feature of the Hawaiian long-line fishery is that its total production is relatively steady throughout the year. Although there are seasonal variations in abundance of the several principal species, the decline in abundance of one species is usually followed by an increase of another. Among the tunas, the big-eyed occur in greatest numbers during the winter months from October to May and the yellowfin from May to September (fig. 3 and table 16). Such seasonal variations in abundance are also seen among the spearfishes, although not as distinct as in the case of the tunas (fig. 3). The black marlin are generally abundant between July and October, while the striped marlin are plentiful during the winter months.

1/Detailed catch records are not available for prewar years.

Seasonal variation in species composition of the long-line catch is dependent upon the movements and local abundance (or availability) of the fish rather than upon any changes in the practice of the fishermen. These movements may be influenced by any of a number of environmental factors, of which sea temperature is frequently believed to be of importance. Bathythermograph observations between January 1941 and November 1947 in Hawaiian waters show that the months of March and September have respectively the lowest and highest average temperatures (Leipper and Anderson 1950). June and December are typical transition months. The maximum average surface temperature recorded for this period was 82° F. and the minimum 66° F. Since the landings of yellowfin show a marked increase during the summer months, becoming greater as the water warms, and since the big-eyed tuna is captured in greatest numbers during the winter months, the implications are that the yellowfin prefers warm water and the big-eyed tuna cooler water.

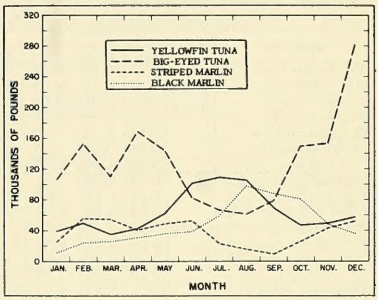

Fig. 3 - Average monthly landings (1948-52) of the four principal species by the Hawaiian long-line fishery (from catch statistics of the Territory of Hawaii Fish and Game Division).

However, not much reliance can be placed in a simple temperature relationship because yellowfin have been found in a much wider range of temperatures than occurs in Hawaii. In Japanese waters yellowfin have been taken by long line when the surface temperature ranged from 14° C. (57.2° F.) to 27° C. (80.6° F.) (Takayama and Ando 1934). It is possible that the race of yellowfin occupying the central Pacific could, through adaptation, have different temperature limitations or preferences than fish of the same species farther to the westward. Further research is necessary before it can be established whether or not sea temperature is at least partly responsible for the marked seasonal changes in catch for these two species. We should not overlook the possibility, however, that temperature may merely be a function of more complicated environmental factors, such as currents, chemical nutrients, or food organisms which influence the distribution of the fish.

June (1953) points to the possibility that the long-line fishery for yellowfin tuna is based on a "spawning run," since the period of spawning of the Hawaiian yellowfin coincides with its peak fishing season. A similar study being conducted on the big-eyed tuna indicates that this species does not spawn in Hawaiian waters. Their appearance in greater numbers during the winter months is probably not directly related to spawning.

Further mention should be made here of food as a possible factor influencing the seasonal distribution of these species. The occurrence of yellowfin in greater numbers during the summer is in all probability not a response to a particular type of food present in the area during that season. Reintjes and King (1953) have shown that this species feeds on a great variety of animal food from small plankton to fish one-third the length of the tuna, taking advantage of whatever food is most abundant in the area at the time. Since it has been found, however, that plankton is slightly more plentiful during summer than in winter in Hawaiian waters (King and Hida 1954), the possibility remains that yellowfin are responding to a more abundant food supply.

CATCH PER UNIT OF EFFORT

Total landings may not indicate directly the magnitude of the population available to the fishermen. Instead, landings tend to reflect the relation between the num-

ber of fish in the available population and the amount of effort expended. To measure changes in abundance of the fish population or to compare the relative abundance

Table 2 - Catch Rates (Numbers of Each Species per 100 Hooks Fished) of Tunas and Spearfishes in the Territory of Hawaii, 1949-1952[1] (Honolulu-based Long-line Fleet)

Species	Year	Month												Annual Average
		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
Yellowfin tuna ...	1952	0.07	0.26	0.11	0.14	0.47	1.36	1.19	0.92	0.33	0.08	0.05	0.16	0.43
Big-eyed tuna ...		3.71	2.58	2.08	4.98	2.60	0.38	0.29	0.25	0.45	0.95	1.47	1.82	1.80
Albacore tuna ...		0.01	0.01	0.00	0.00	0.12	0.67	0.42	0.26	0.28	0.22	0.06	0.15	0.18
Black marlin		0.05	0.08	0.05	0.06	0.09	0.07	0.12	0.40	0.34	0.40	0.16	0.07	0.16
Striped marlin ...		0.66	0.72	1.43	0.37	0.56	0.46	0.18	0.08	0.06	0.39	0.57	0.74	0.52
Other spearfish .		0.00	0.02	0.02	0.07	0.07	0.01	0.01	<0.01	0.00	0.00	0.02	<0.01	0.02
Total		4.50	3.66	3.69	5.62	3.92	2.96	2.20	1.90	1.45	2.05	2.33	2.95	3.10
Yellowfin tuna ...	1951	0.25	0.19	0.15	0.34	0.56	0.86	0.51	0.52	0.52	0.30	0.10	0.03	0.36
Big-eyed tuna ...		2.12	1.65	1.69	2.19	1.27	0.82	0.63	0.32	0.64	2.12	2.28	4.40	1.68
Albacore tuna ...		0.00	0.00	0.01	0.00	0.03	0.05	0.10	0.07	0.14	0.13	0.11	0.00	0.05
Black marlin		0.05	0.12	0.07	0.09	0.13	0.14	0.22	0.56	0.58	0.63	0.40	0.05	0.25
Striped marlin ...		0.76	0.98	0.91	0.84	0.82	0.77	0.26	0.05	0.03	0.14	0.19	0.36	0.51
Other spearfish[2]		0.00	0.09	0.04	0.13	0.12	0.03	0.02	0.03	0.05	0.11	0.10	0.00	0.06
Total[3]		3.18	3.03	2.87	3.54	2.93	2.67	1.75	1.56	1.97	3.43	3.18	4.84	2.92
Yellowfin tuna ...	1950	0.07	0.12	0.05	0.06	0.04	0.63	0.79	1.00	0.55	0.13	0.27	0.20	0.33
Big-eyed tuna ...		2.95	1.53	1.31	1.08	2.11	1.11	0.83	0.19	0.57	1.24	1.15	1.95	1.33
Albacore tuna ...		0.00	0.00	0.00	0.01	0.06	0.05	0.07	0.18	0.15	0.52	0.24	0.27	0.13
Black marlin		0.20	0.04	0.10	0.10	0.09	0.10	0.25	0.31	0.49	0.28	0.30	0.15	0.20
Striped marlin ...		1.47	1.15	2.06	1.16	0.54	1.25	0.65	0.09	0.06	0.50	1.29	1.15	0.95
Other spearfish ..		0.00	0.01	0.04	0.07	0.10	0.07	0.03	0.06	0.02	0.12	0.07	0.09	0.06
Total		4.69	2.86	3.56	2.49	2.94	3.21	2.63	1.83	1.85	2.78	3.32	3.81	3.00
Yellowfin tuna ...	1949	-	-	0.04	0.32	0.08	1.01	1.21	0.76	0.36	0.31	0.08	0.06	0.42
Big-eyed tuna ...		-	-	1.03	1.26	1.27	0.46	0.20	0.16	0.29	1.01	1.98	3.06	1.07
Albacore tuna ...		-	-	0.04	0.02	0.11	0.37	0.17	0.15	0.24	0.44	0.17	0.01	0.17
Black marlin		-	-	0.15	0.24	0.13	0.14	0.22	0.45	0.38	0.36	0.28	0.09	0.24
Striped marlin ...		-	-	2.07	1.33	0.65	0.81	0.37	0.03	0.10	0.42	0.59	0.50	0.69
Other spearfish[2]		-	-	0.06	0.13	0.05	0.09	0.02	0.03	0.02	0.07	0.13	0.20	0.08
Total[3]		-	-	3.40	3.29	2.30	2.88	2.19	1.58	1.39	2.61	3.24	3.91	2.68

1/Based on information obtained through interviewing randomly-selected Honolulu fishermen.
2/Includes sailfish, short-nosed spearfish, white marlin, and broadbill swordfish.
3/Columns may not agree exactly with the totals because figures were rounded off.

of fish in different areas, it is necessary to rely on some other measure, such as the catch per unit of effort, which in the case of the long-line fishery may conveniently be the catch per 100 hooks fished per day. Table 2 lists the catch rates (catch per 100 hooks per day) of tunas and spearfishes for the years 1949-52. These rates are based on information obtained by interviewing randomly-selected Honolulu fishermen at the termination of their trips.

Table 3 - Average Catch Rates of the Japanese Tuna-Mothership Expeditions, June 1950 to October 1951[1]

Species	Number of Fish Per 100 Hooks
Yellowfin tuna ...	2.14
Big-eyed tuna ...	0.62
Albacore tuna ...	0.07
Skipjack tuna	0.05
Black marlin	0.53
Striped marlin ...	0.01
Other spearfish[2]	0.04
Total tunas and spearfishes[3] ..	3.45

1/Reproduced in part from table 2 (Van Campen 1952).
2/Largely sailfish and short-nosed spearfish.
3/The total catch rate was 4.10, including sharks and other miscellaneous species.

The monthly catch rates in this table clearly indicate the seasonal variation in abundance of the principal species already mentioned in a foregoing section. Also notable is the fact that the total annual average catch rate has remained fairly constant during the years for which data are presented. The average long-line catch rate in Hawaiian waters of tunas and spearfishes combined is about 3 fish per 100 hooks, which compares favorably with the Japanese catch in their home waters, but falls below their catch in the various tropical and subtropical areas (June 1950). The Japanese tuna expeditions to the western equatorial Pacific waters between 1° and 13° N. latitude, 134° and 179° E. longitude, between June 1950 and October 1951, averaged 4.10 fish per 100 hooks, including sharks and other miscellaneous species (Van Campen 1952, also partly reproduced as table 3). Considering only the tunas and spearfishes, the average catch rate for the Japanese expedition was 3.45, somewhat higher than the Hawaiian catch rate.

FISHING EFFORT

The Honolulu long-line fleet consists of 31 to 33 boats which operate throughout the year. These boats remain at sea for a period of 10 to 12 days, fishing an average of 8 or 9 days per trip. Data on the number of trips made each month by these boats (table 4) have been obtained from records kept by the two auction markets and therefore include only trips on which some fish were caught and marketed.

Table 4 - Number of Boat Trips by Months, 1949-52 1/

Month	Year			
	1952	1951	1950	1949
January	40 (24)	26 (22)	32 (26)	15 (14)
February	51 (28)	47 (26)	49 (28)	42 (29)
March	56 (29)	57 (27)	50 (29)	37 (25)
April	60 (27)	38 (26)	43 (27)	35 (26)
May	51 (28)	54 (28)	54 (30)	44 (27)
June	61 (31)	49 (29)	50 (28)	45 (27)
July	48 (30)	49 (27)	52 (27)	42 (28)
August	56 (29)	55 (30)	61 (30)	50 (28)
September	56 (30)	49 (29)	53 (29)	46 (28)
October	53 (31)	55 (30)	54 (31)	49 (29)
November	50 (30)	53 (28)	52 (30)	37 (27)
December	78 (31)	67 (30)	76 (30)	54 (28)
Total	660	599	626	496
Average number of trips per boat per year	21	18	20	16

1/The number of boats which participated during the month is enclosed in parentheses.

The number of trips made each month of the year is relatively steady with the exception of the holiday season. More trips are generally made in December to take advantage of the great demand for fish, and fewer trips are made in January because a large part of the fleet remains in port on an extended celebration of the New Year's holiday. The total trips made each year have increased from 496 in 1949 to a high of 660 in 1952. Additional data obtained by interviewing fishermen permit a closer scrutiny of the fishing effort (table 5). The average number of days fished per trip showed a steady decrease from 9.4 days in 1949 to 8.2 in 1952, tending to offset the increase in total trips made. As a result, the average number of days fished per boat did not vary significantly from year to year.

Table 5 - Effort Expended by the Honolulu Long-Line Fleet, 1949-1952

Item	Year			
	1952	1951	1950	1949
Total boat trips	660	599	626	496
Average number of fishing days/trip	8.2	8.9	9.0	9.4
Total fishing days	5,412	5,331	5,634	4,662
Number of boats in fleet	32	33	31	32
Average number of fishing days per boat	169	162	182	146

The relatively high total of 660 trips in 1952 with a low average of 169 fishing days per boat reflects the following abnormal circumstances. In April 1952 the catch rate of big-eyed tuna reached the unusually high average of 4.98 per 100 hooks (table 2). As a consequence, the boats returned to port with capacity loads, flooding the local market. The price of tuna fell from the March average of 36.8 cents per pound to 22.2 cents in April (fig. 8). Faced with this situation, the boat owners voluntarily limited the larger boats to catches of 45 tuna and the smaller ones to 20. This action often resulted in trips of shorter than normal duration, since the boats catching their limits were forced to return to port regardless of whether or not they had provisions or capacity left for any more fishing.

In general, the data do not indicate any great changes in effort from year to year. The amount of effort being exerted by the fleet is by no means the maximum of which the fleet is capable, as it is generally agreed among the fishermen that the present limited market does not warrant the exertion of greater effort. In other words, the fishing effort is greatly regulated by market conditions so as to remain fairly constant from year to year as shown in table 5.

VARIATION IN CATCH BY AREAS

While some of the smaller boats of the Honolulu long-line fleet fish regularly in waters off Oahu, others travel 150-200 miles in quest of fish. In fact, boats from Honolulu often range from the waters off Hilo and Kona in the east to the waters off Kauai and Niihau in the west. Generally, however, all fishing is confined to waters within 20 miles from land (fig. 4). There are indications that the most productive areas of fishing tend to change with the season, and the majority of the boats shift their operations accordingly. However, for various reasons, such as the small size of the vessels, the small number of fishermen in the crews, and a desire to work in calm waters near home, some boats fish exclusively in the leeward waters of Oahu, regardless of the higher productivity of more distant areas.

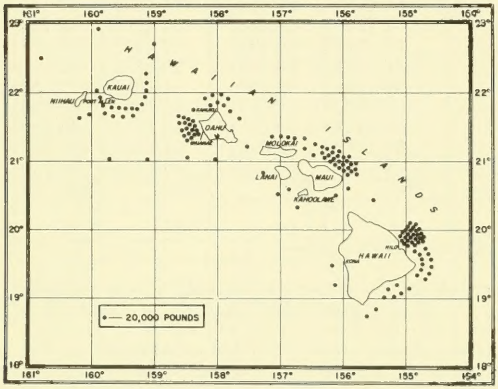

Fig. 4 - Total yellowfin and big-eyed tuna landings from Hawaiian waters during 1952. (From catch statistics of the Territory of Hawaii Fish and Game Division.)

Usually the area off Waianae, Oahu, provides the fishermen with fairly good catches for the greater part of the year. In 1952 over 50 percent of the total effort, in terms of number of trips made between June and September, was centered

Table 6 - Distribution of Effort by Honolulu Long-line Boats in 1952 in Percentage of Trips Made Each Month to the Various Areas 1/

Month	Hawaii	Maui	Molokai-Lanai	Oahu		Kauai-Niihau
				Waianae	Kahuku	
	(Percent)					
January	-	-	20.0	-	80.0	-
February	-	26.7	26.7	26.7	6.7	13.3
March	11.1	33.3	-	44.4	-	11.1
April	6.7	20.0	26.7	13.3	-	33.3
May	-	55.0	-	5.0	-	40.0
June	-	8.0	-	56.0	-	36.0
July	-	3.7	-	59.3	-	37.0
August	2.0	9.8	-	54.9	-	33.3
September	7.4	20.4	-	53.7	1.9	16.7
October	15.4	21.2	-	28.8	28.8	5.8
November	10.9	32.6	4.3	34.8	15.2	2.2
December	11.9	9.0	26.9	23.9	28.4	-
Annual Average	7.2	18.4	7.7	37.1	13.0	16.6

1/Calculated from information obtained by interviewing randomly-selected Honolulu fishermen at the termination of their trips. The number of trips on which these percentages are based are shown in table 7.

in this area (table 6). Towards the latter part of the year, beginning around October, the major effort shifted to waters off windward Oahu, Hawaii, and to the Maui-Molokai-Lanai area, where better catches were experienced. Windward waters are said to be more productive than leeward waters during the winter months.

In studying variations in catch with areas, the 1952 data have been examined inasmuch as these are the most complete. Detailed records of randomly-selected boat trips are available only for the Honolulu fleet, as this information has been gathered solely by interviewing fishermen in Honolulu. There are no comparative data on the activities of long-line boats based on Hawaii and Kauai.

Table 7 - Average Monthly Tuna Catch Rates1/ (Number per 100 Hooks) in the Six Principal Areas in the Territory of Hawaii, 1952

Month	Hawaii	Maui	Molokai-Lanai	Oahu		Kauai-Niihau
				Waianae	Kahuku	
January	-	-	4.46(2)	-	3.34(8)	-
February ...	-	5.40(4)	2.73(4)	1.80(4)	1.02(1)	1.56(2)
March	1.84(1)	3.67(3)	-	1.57(4)	-	1.41(1)
April	2.89(1)	6.09(3)	9.00(4)	2.63(2)	-	3.86(5)
May	-	3.79(11)	-	4.42(1)	-	2.79(8)
June	-	2.43(2)	-	2.10(14)	-	2.88(9)
July	-	3.78(1)	-	1.90(16)	-	1.76(10)
August	0.99(1)	2.32(5)	-	1.02(28)	-	1.65(17)
September ..	0.76(4)	1.33(11)	-	1.03(29)	1.02(1)	2.14(9)
October	1.72(8)	1.35(11)	-	0.90(15)	1.21(15)	1.03(3)
November ..	3.00(5)	2.43(15)	1.56(2)	0.57(16)	1.24(7)	1.13(1)
December ..	2.97(8)	2.20(6)	2.79(18)	1.12(16)	1.90(19)	-
Annual Average ...	2.02	3.16	4.11	1.73	1.62	2.02

1/The tunas include yellowfin, big-eyed, and albacore. These catch rates are derived from data obtained by randomly interviewing Honolulu boat captains at the termination of their trips. The number of boat trips on which these monthly average rates are based is given in parentheses.

Table 7 shows the average monthly catch rates of tuna at the six principal fishing areas. The seasonal shifting of the more productive areas is indicated. In general, the Maui-Molokai-Lanai waters are seen to be most productive, while the waters off Oahu show the lowest catch rates.

BOAT EFFICIENCY

Fishermen the world over depend, in part, upon chance in making good catches. However, it is more than pure luck alone. There are certain factors which are responsible for consistent differences in the catches made by the various boats of a fleet. These differences may lie in the intrinsic ability of the boat captains in locating good fishing grounds, the skill and experience of the fishermen, or perhaps in certain gear differences. The differences may also arise when certain boats consistently fish in more productive waters than the others. The latter appears to be particularly true of the situation existing in the Hawaiian long-line fishery.

Table 8 - Analysis of Variance of Monthly Catch Rates of 27 Boats for September to December 1952 1/

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F	P
Boats	26	58.4788	2.2492**	3.11	< 0.01
Months	3	24.6993	8.2331**	11.37	< 0.01
Discrepancy	78	56.4703	0.7240		
Total	107	139.6484			

**Indicates a significant ($P < 0.01$) mean square value.
1/These months were selected because the most complete data are available for analysis. Four boats which did not fish regularly during this period were omitted from the analysis.

In a test to determine differences in boat efficiency, the average catch rates (as tunas per 100 hooks) of 27 Honolulu boats for the months of September through December 1952 were used. A two-way analysis of variance (Snedecor 1948) was used to test differences between boats, eliminating differences due to season (months). The data are presented in table 17. The test indicated highly significant differences between boats as well as between months (table 8).

Table 9 - Comparison of the Areas of Operation of Boats With High- and Low-Catch Rates During the Period September-December 1952 1/

Boats With High-Catch Rates 2/ (13 in Number)			Boats With Low-Catch Rates 3/ (14 in Number)		
Area	Number of Trips	Percent	Area	Number of Trips	Percent
Maui-Molokai	48	49	Oahu	78	77
Oahu	26	27	Maui-Molokai	11	11
Hawaii	18	19	Kauai	8	8
Kauai	5	5	Hawaii	4	4
Total	97	100	Total	101	100

1/High- and low-catch boats were determined by the grand mean for this period of 1.62 tunas per 100 hooks fished.
2/Above 1.62 tunas per 100 hooks.
3/Below 1.62 tunas per 100 hooks.

A further examination of the data reveals that the significant between-boat differences are largely attributable to differences in the areas of operation. This is shown in table 9, which gives a comparison of the areas of operation between high- and low-catch boats. Each boat was classed either a high- or low-catch boat according to its mean catch rate for the 4-months period, high if the mean rate was greater than the grand mean of 1.62 tunas per 100 hooks (the grand mean of the 27 boats for the 4-months period) and low if less. Of 101 trips carried out by the 14 low-catch boats during the period, 77 percent were made in waters off Oahu, with the major concentration of effort in the leeward waters of Waianae. Furthermore, the data showed that five of these low-catch boats which had the lowest catch rates fished exclusively in Waianae waters. On the other hand, the 13 boats which experienced higher than average catch rates fished only 27 percent of the total of 97 trips in Oahu waters during the same period, having concentrated their efforts in the Maui-Molokai waters. Thus, some of the differences in catch rates between boats of the Hawaiian long-line fishery arise because certain boats consistently fish in one area, whether productive or not, while others operate in areas which are known to be most productive at any particular season.

SIZE OF THE TUNAS

The tunas taken in Hawaiian waters by long line are usually large fish. In general, the fishery has been catching fish over 90 pounds in weight with the bulk of the yellowfin falling between 100 and 160 pounds and the big-eyed between 100 and 200 pounds. Yellowfin in excess of 250 pounds and big-eyed weighing around 300 pounds are sometimes taken. The annual average weights of these two species are given in table 10. The weight-frequency distributions of these two species for 1952, by months, 2/ are shown in figures 5 and 6, and these may be considered typical of those covering the period 1949-52.

Table 10 - Annual Average Weights of the Hawaiian Tunas

Species	Year			
	1952	1951	1950	1949
	..... (Pounds)			
Yellowfin tuna .	144.8	139.7	140.3	138.7
Big-eyed tuna .	162.1	158.5	157.3	160.1

A more detailed examination of the yellowfin weight data is presented in table 11. Here the yellowfin landings are broken down into components of various sizes, which are shown as percentages of the total landings. For this study the months of June,

2/Table 18 shows the monthly average weights of the tunas.

July, and August have been selected for each year, 1948 to 1952, as these are the months when the greatest yellowfin catches are recorded. The several components

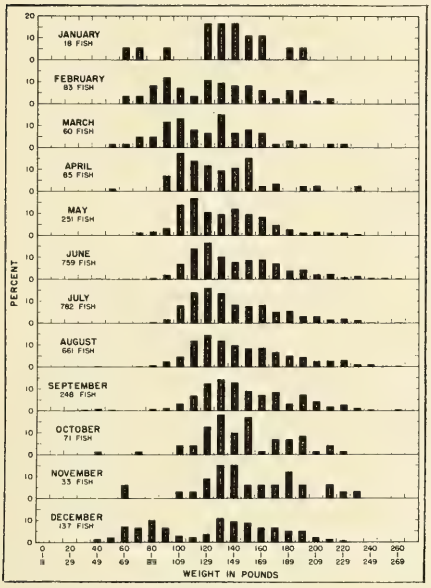

Fig. 5 - Monthly percentage weight-frequency distribution of yellowfin tuna landed in Honolulu in 1952.

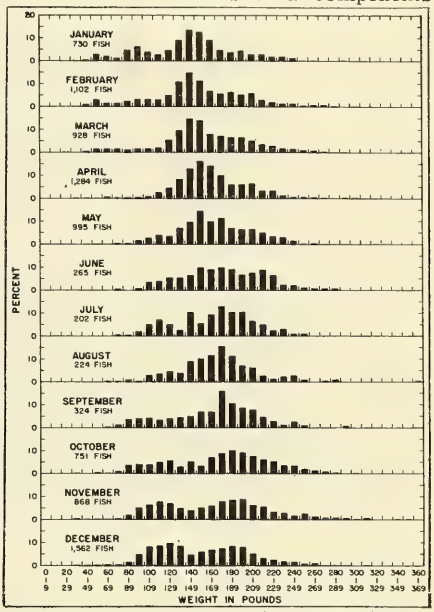

Fig. 6 - Monthly percentage weight-frequency distribution of big-eyed tuna landed in Honolulu in 1952.

of the landings indicate a regular distribution of size classes in the yellowfin catch from year to year, with a marked predominance of the 100- to 150-pound group, which constitutes approximately 60 percent of the total. Less than 5 percent of the catch is made up of fish weighing less than 100 pounds.

Table 11 - Size Composition of the Yellowfin Catch, 1948-52 1/

Year	Size Groups in Pounds					
	1-50	50-100	100-150	150-200	200-250	250-300
	(Percent)					
1952	0.1	2.7	56.2	32.3	8.3	0.4
1951	0.0	2.6	58.4	31.8	6.5	0.6
1950	0.2	3.9	67.2	23.5	5.0	0.1
1949	0.0	3.9	55.1	33.6	7.4	0.0
1948	0.0	3.9	56.0	33.2	6.8	0.1

1/Only the months of June, July, and August are represented here since these are the peak months of yellowfin landings.

SEX RATIO OF THE TUNAS

Examination of the landings at the Honolulu Market during 1949 and 1951 revealed a predominance of males in both yellowfin and big-eyed tuna (table 12). Chi-square tests (Snedecor 1948) indicated significant deviations from the expected 50:50 sex ratio.

This situation appears to be common also in other areas where long-line fishing is carried on. During the first Japanese postwar mothership tuna expedition in the western equatorial Pacific, the proportion of males in the yellowfin landings was usually found to be greater than that of females, the sex ratio sometimes running as high as 80 males to 20 females (Shimada 1951). Similar findings were made during several long-lining cruises of POFI vessels in the central Pacific equatorial waters (Murphy and Shomura 1953).

Table 12 - Sex Composition of Hawaiian Yellowfin and Big-eyed Tuna

Year	Tuna Species	Male	Female	Percentage of Males
		No.	No.	No.
1951	Yellowfin	547	313	63.6
	Big-eyed	733	542	57.5
1949	Yellowfin	114	65	63.7
	Big-eyed	346	238	59.2

The significance of these findings is not clear. We do not have sufficient evidence of seasonal changes in the sex ratios such as may be expected if these seasonal changes are directly related to the spawning cycle of the fish. As pointed out by Murphy and Shomura (1953), it may indicate such phenomena as differential growth or mortality. There are data which show that the sex ratios of both yellowfin and big-eyed tuna change with the size of fish, suggesting the possible occurrence of either differential growth or mortality in the populations. Shimada (1951) observed that female yellowfin tuna occurred more frequently among fish below 130 cm. in length (about 95 pounds) than among larger size groups, although at no time did he find the proportion of females exceeding that of males. Nakamura (1949) shows similar findings for the yellowfin taken in the East Philippine Sea between June and September 1937. He found 63 or 50.8 percent of 124 fish less than 37 kg. (81.4 pounds) to be males, or nearly a 50:50 sex ratio. For fish above this size he found 164 or 73.9 percent of 222 fish to be males. During the fifth Japanese mothership expedition in the western Pacific between March and June 1951, the author sampled a total of 1,293 big-eyed tuna, of which 70.5 percent were found to be males (table 13). Here again it was noticed that the predominance of males was especially pronounced among the larger fish. Out of 949 fish measuring over 120 cm. in total length (about 80 pounds), 77.3 percent were males. In the other group of smaller fish, males constituted only 51.7 percent of a total of 344 individuals examined. Thus the sex ratio in the catch below 80 or 90 pounds is about equal, whereas the males predominate among the larger big-eyed and yellowfin tuna.

Table 13 - Sex Determination on 1,293 Big-eyed Tuna Captured During the Fifth Japanese Mothership-Type Tuna Expedition in the Western Equatorial Pacific Ocean April-June 1951

Month	<120 cm. (80 pounds)			>120 cm. (80 pounds)		
	Males	Females	Percentage of Males	Males	Females	Percentage of Males
	No.	No.	%	No.	No.	%
April	31	29	51.7	111	43	72.1
May	93	89	51.1	454	143	76.0
June	54	48	52.9	169	29	85.4
Total .	178	166	51.7	734	215	77.3

PREDICTING THE LONG-LINE CATCH OF YELLOWFIN

Yellowfin smaller than 50 pounds are seldom taken by the Hawaiian long-line fishery and those below 20 pounds are practically never caught (fig. 5). Smaller fish, on the other hand, are frequently taken by the skipjack pole-and-line fishery, which finds them at the surface either mixed with schools of skipjack or in independent schools. The absence of small fish in the long-line catch may result either from a selective action of the gear or from a general absence of small fish in the subsurface

population. The second alternative appears to be more plausible as Murphy and Shomura (1953) have pointed out that there is no reason to believe that the long line is selective as to sizes of fish taken since skipjack as small as 10 pounds have often been captured by this method. In addition, small yellowfin have been taken by long line in the vicinity of the Line Islands in the central Pacific, indicating that small fish will be caught if present in the population.

Fig. 7 - POFI scientists examining tunas and spearfishes on the auction floor of the Honolulu Market.

The surface-caught yellowfin are generally small- to medium-sized fish and appear to be a segment of the yellowfin population which is ecologically separated into surface and subsurface groups. The surface fish may descend to deeper levels after attaining a certain age or size. If this assumption is true, it may be reasonable to expect the abundance of surface fish in one year to indicate the abundance of subsurface fish a few years later. Such a relationship, if real, would be of some value to the fishery in predicting the abundance of yellowfin a few years in advance. Since the long-line catches of yellowfin are largely made up of a few year-classes, with fish believed to be in their third year (Moore 1951) contributing the largest percentage to the fishery, the size of this year-class, at least, may be a reflection of the abundance of surface fish two years previous.

Table 14 - Monthly Landings of Surface Yellowfin by the Hawaiian Skipjack Fishery, 1948-52 1/

Month	1953	1952	1951	1950	1949	1948
	(Pounds)					
January	-	-	1,598	7,131	763	6,911
February	-	2,372	632	1,618	1,301	387
March	-	554	40	1,061	3,073	6,810
April	-	4,892	4,087	7,672	1,303	5,620
May	-	1,663	1,552	3,151	1,532	1,183
June	-	238	118	6,549	139	1,892
July	-	11,946	117	1,017	3,342	838
August	-	985	7,379	6,798	13,141	638
September	-	1,090	8,502	7,224	-	1,323
October	-	5,148	98	132	12,071	396
November	-	2,413	83	3,416	-	531
December	-	146	891	26	185	-
Annual total	-	31,447	25,097	45,795	36,850	26,529
Yellowfin landings by long-line fishery	2/535,000	719,000	661,000	605,000	-	-

1/From records provided by the Territory of Hawaii Fish and Game Division.
2/Approximate long-line landings of yellowfin for 1953. Data not available by months.

The landings of surface yellowfin by the skipjack fishery for the years 1948 to 1952 are presented in table 14. Also listed in the same table are the yellowfin land-

ings by the long-line fishery for 1950 through 1953. There appears to be some relationship between the total landings of surface fish in one year with the catch of subsurface fish two years later; e.g., the 1948 landings of 26,529 pounds of surface fish with the 1950 catch of 605,000 pounds of subsurface fish; the 1949 landings of 36,850 pounds with the 1951 catch of 661,000 pounds; and the 1950 landings of 45,795 pounds with the 1952 catch of 719,000 pounds. The catch statistics for the year 1953 indicate estimated yellowfin landings by the long-line fishery of 535,000 pounds, a drop from previous years, which again agrees with the reduced surface yellowfin landings of 25,097 pounds in 1951. Unfortunately, available data are far too scanty to draw any conclusions. Even if such a relationship actually exists, we cannot expect to find perfect correlations as there are numerous factors which tend to make surface sampling inadequate and probably inaccurate. In the first place, the total landings may not indicate the true abundance of surface yellowfin in these waters as the skipjack fishermen may often forego schools of yellowfin when skipjack schools are numerous. Again, the amount of effort expended by the skipjack fleet from year to year might vary so much that total landings would not be indicative even of relative abundance of the species.

FISH PRICES AND VALUE OF LANDINGS

The catch of a Honolulu long-line boat is unloaded at one of two auction markets where buyers from the several fresh fish markets, as well as individual fish peddlers, bid for the fish (fig. 7). Since at the present time there are no outlets for canning of these large tunas, the only markets are those for fresh fish. Fresh tuna is in great demand, especially by the island's oriental population, for consumption as sashimi (raw fish). Fortunately for the fishing industry, big fish are preferred for sashimi because of the higher oil content, which supposedly improves the flavor. The bulk of the spearfishes is sold to processors for use in making fish cakes (kamaboko), while a small part is handled as fresh fish.

While the local skipjack fishermen enjoy a relatively steady contract price because their catches are canned, the prices realized by the long-line fishermen fluctuate very widely. Only in times of extremely good catches are the canneries not able to absorb all of the fish which are landed by the skipjack fishery. These fish may be canned and held in warehouses, but the large tunas and spearfishes which are presently handled only as fresh fish are highly perishable, and consequently the prices paid for them are largely controlled by the factors of supply and demand. It is therefore not unusual that prices paid for long line-caught fish vary from day to day or even between the two auction markets on the same day.

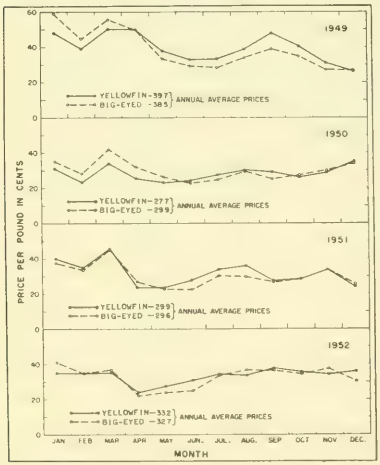

Fig. 8 - Average monthly prices paid to the fishermen for yellowfin and big-eyed tuna, 1949-52 (from records of the Territory of Hawaii Fish and Game Division).

Figure 8 presents graphically the monthly average prices of yellowfin and big-eyed tuna at the auction markets between 1949 and 1952. These prices are essentially what the fishermen receive for their catches, although some deductions are made by the auction firms for services rendered. Annual average prices for both species do not differ significantly although yellowfin generally commands a slightly higher price than big-eyed tuna. The prices are determined more by the size of the fish and condition of the meat (such as color and texture) than by species.

The ever-fluctuating fish price is an important factor which tends to influence the intensity of fishing. As shown in table 15, the annual values do not show any significant trend but remain rather steady at slightly over a million dollars. This is not in keeping with the steadily increasing annual landings (table 1), but appears to be the result of a limited market capacity which controls the price of fish according to supply and demand. As seen in figure 8, the annual average price for both species of tuna dropped markedly from about 40 cents per pound in 1949 to less than 30 cents in 1950, and has not shown any appreciable recovery since.

Table 15 - Value of Fish to the Fishermen Landed by the Long-line Fishery in the Territory of Hawaii, 1948-1952 1/

Species	1952	1951	1950	1949	1948
	$	$	$	$	$
Yellowfin tuna	230,412	206,038	178,111	313,024	438,611
Big-eyed tuna	684,726	600,361	548,526	376,135	294,422
Albacore tuna	22,611	13,933	11,591	23,894	32,541
Spearfishes	309,030	335,092	322,114	412,157	504,422
Total	1,246,780	1,155,424	1,060,342	1,125,210	1,269,995

1/Compiled from records of Territory of Hawaii Fish and Game Division.

Although all or nearly all of the fish are presently being absorbed by the buyers, the prices paid for them are often very low. While it is generally agreed that the coastal and offshore waters of the Hawaiian Islands contain a dependable supply of tunas and spearfishes to sustain a much more intensive long-line fishery, the limited market constitutes a serious block to any such expansion.

Table 16 - Monthly Landings (In Thousands of Pounds) by the Hawaiian Long-line Fishery, 1948-52 1/

Species	Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Yellowfin tuna ...	1952	28	41	34	49	78	113	120	128	64	28	14	22
Big-eyed tuna ...		167	196	133	357	224	96	71	69	116	216	182	366
Albacore tuna ...		1	1	1	10	4	19	15	14	16	11	2	8
Spearfishes		30	86	66	52	64	69	64	119	121	124	79	79
Total		225	324	233	468	370	297	270	330	317	379	277	475
Yellowfin tuna ...	1951	10	18	30	41	76	98	80	60	83	53	45	67
Big-eyed tuna ...		142	172	131	197	204	110	115	105	109	200	177	370
Albacore tuna ...		1	1	1	1	1	3	5	3	4	6	6	26
Spearfishes		37	46	90	79	135	104	88	136	114	121	108	59
Total		190	236	252	317	416	315	288	304	310	380	336	522
Yellowfin tuna ...	1950	14	22	13	23	39	73	100	121	66	54	45	35
Big-eyed tuna ...		135	212	138	154	191	148	114	90	103	150	136	272
Albacore tuna ...		-	1	2	1	2	4	9	10	6	8	6	13
Spearfishes		44	111	118	90	113	111	87	116	123	137	120	108
Total		193	346	271	267	344	335	310	338	299	349	307	428
Yellowfin tuna ...	1949	67	79	34	49	69	120	128	91	49	31	40	60
Big-eyed tuna ...		33	74	78	62	69	42	16	23	49	136	200	304
Albacore tuna ...		6	11	4	7	3	6	5	5	7	8	6	2
Spearfishes		55	141	108	108	110	93	80	113	66	104	89	83
Total		161	305	224	226	251	261	230	232	172	278	335	448
Yellowfin tuna ...	1948	77	89	64	50	42	99	114	121	85	67	99	99
Big-eyed tuna ...		55	108	73	76	35	19	19	16	22	41	77	99
Albacore tuna ...		1	6	2	15	13	11	5	12	13	9	4	2
Spearfishes 2/ ...		46	99	96	84	76	142	157	159	122	111	133	191
Total 3/		179	302	236	225	166	271	295	308	242	228	313	391

1/Compiled from catch statistics of the Territory of Hawaii Fish and Game Division.
2/Includes black marlin, striped marlin, and lesser quantities of sailfish, white marlin, broadbill swordfish, and short-nosed spearfish.
3/Totals may not be exact due to rounding off figures.

Table 17 - Analysis of the Catch Rates (as Tunas per 100 Hooks) of 27 Boats (September to December) by Months

Boat	Month				Mean	Boat	Month				Mean
	Sept.	Oct.	Nov.	Dec.			Sept.	Oct.	Nov.	Dec.	
1	0.67	0.52	0.99	0.47	0.66	15	0.91	1.38	2.27	1.97	1.63
2	0.97	0.55	0.20	1.22	0.74	16	1.83	1.90	0.86	1.98	1.64
3	0.64	1.05	0.31	1.24	0.81	17	1.38	1.48	2.32	1.64	1.70
4	0.80	1.12	0.36	1.02	0.82	18	0.76	1.29	1.77	3.13	1.74
5	1.08	0.98	0.37	1.18	0.90	19	1.52	1.19	2.03	2.48	1.80
6	1.02	0.54	0.66	1.86	1.02	20	0.78	1.08	2.90	3.33	2.02
7	1.09	1.26	0.31	1.53	1.05	21	0.67	0.72	4.74	2.09	2.06
8	0.67	0.90	1.15	1.57	1.07	22	1.34	1.60	3.48	1.96	2.10
9	1.61	1.02	0.68	1.17	1.12	23	1.71	2.01	2.56	2.61	2.22
10	1.22	1.56	0.87	0.92	1.14	24	1.46	1.67	2.16	4.03	2.33
11	0.57	0.84	1.20	2.11	1.18	25	1.72	1.20	5.06	3.65	2.91
12	0.92	0.89	1.92	1.78	1.38	26	1.32	1.78	3.63	5.71	3.11
13	0.80	1.50	1.32	2.37	1.50	27	1.92	1.79	5.69	5.08	3.62
14	1.64	0.41	0.22	3.89	1.54	Grand mean of 27 boats					1.62

Table 18 - Monthly Average Weights of Yellowfin and Big-eyed Tuna in the Landings of the Hawaiian Long-line Fishery

Month	Yellowfin tuna				Big-eyed tuna			
	1952	1951	1950	1949	1952	1951	1950	1949
	(Pounds)							
January	136.7	152.3	98.8	104.2	147.5	152.2	156.3	175.0
February	131.5	125.5	107.0	117.8	153.4	150.2	151.7	150.0
March	126.0	105.4	120.2	113.5	159.5	144.5	153.4	141.0
April	133.1	116.2	117.5	122.7	165.6	152.1	154.6	156.1
May	136.3	126.3	117.0	131.8	168.2	160.3	157.1	153.7
June	146.7	140.4	136.4	144.0	176.4	164.1	165.0	171.3
July	145.3	141.5	136.6	143.5	167.3	168.3	163.7	184.0
August	149.5	151.6	144.5	138.1	170.7	157.6	158.5	183.4
September	152.6	151.1	158.4	145.7	169.8	151.8	149.3	170.5
October	150.8	142.1	146.8	140.2	172.3	152.8	155.1	168.7
November	155.1	139.1	143.3	150.0	167.8	170.5	155.0	167.0
December	129.2	154.5	136.2	119.7	155.7	165.5	159.6	159.3
Annual average ..	144.8	139.7	140.3	138.7	162.1	158.5	157.3	160.1

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The Fish and Game Division of the Territory of Hawaii, Board of Agriculture and Forestry, has provided much of the data on which this paper is based. The generous cooperation of the various dealers and officials of the Honolulu Market Place, the Kyodo Fishing Company, the United Fishing Agency, and the Hawaii Fishing Company in allowing examination and sampling of their fish is gratefully acknowledged. The captains and crews of the Honolulu long-line boats have been very cooperative in supplying information pertaining to fishing operations. The interview method of obtaining information was initiated in 1949 by Fred C. June, Fishery Research Biologist, formerly with the staff of the Service's Pacific Oceanic Fishery Investigations. Many others have helped in the collection of data, including fishery research biologists Isaac I. Ikehara, Richard Shomura, and Heeny Yuen. The figures were prepared by Tamotsu Nakata, draftsman for POFI.

UNUSUAL SALMON MIGRATIONS

Several unusual recoveries of salmon marked in Oregon Fish Commission hatcheries were made during 1953 as part of the research program being coordinated by the Pacific Marine Fisheries Commission. On August 1, 1953, a marked silver salmon from the Klaskanine hatchery (lower Columbia River) was caught by a troller near the Farallon Islands off San Francisco. This fish was about 520 nautical miles from its home stream when captured.

At the other extreme, two marked spring chinook salmon from the Willamette River were taken by the Alaskan troll fishery and landed at Pelican during July 1953. One of these was taken at Lituya Bay, at the northern limit of the present troll fishery, which is over 1,000 miles from the Willamette River.

--Fish Commission Research Briefs, March 1954

COLD-STORAGE LIFE OF FRESH-WATER FISH--NO. 1

Very little information is available on the cold-storage life of fresh-water fish. Landings of these fish contribute substantially to the domestic supply of fishery products. Cold-storage life data are of value to the producer in adopting proper packing procedures and in evaluating the marketing problems, and to the sport fisherman for preserving a portion of his catch. Furthermore, studies of the freezing and cold-storage keeping characteristics of species not now being extensively used may ultimately lead to their wider utilization. This project was initiated at the Seattle Technological Laboratory about two years ago. The results to date are presented in this report.

EXPERIMENTAL PROCEDURES

Collecting samples in the Great Lakes and other areas and shipping them in good condition to the Seattle Laboratory limited the scope of the study. The fish

Table 1 - Cold-Storage Life of Certain Fresh-Water Fish Stored as Round (Whole) Fish at 0° F.

Description of Samples					Condition of Samples Stored at 0° F. 2/					Estimated Cold-Storage life of the Test Samples
Species		Source	Date Caught	Method of Handling, Shipping, & Packing 1/	Initial Examination Just Prior to Storage	After 3 months' Storage	After 6 months' Storage	After 9 months' Storage	After 12 months' Storage	
Common Name	Scientific Name									Months
Yellow perch	Perca flavescens	Lake Erie	October 1951	A	Good; body meat mild-flavored, firm, and flaky	Good, but belly-flap portions of some fish slightly off-flavored	Good, but somewhat rubbery-textured and belly-flap portions slightly off-flavored	(Same as at six months)	(Same as at six months)	More than 12
Yellow pike	Stizostedion vitreum	Lake Erie	October 1951	A	Good; body meat mild-flavored, moist, and tender	Good	Good	Good	Good	More than 12
Blue pike	Stizostedion glaucum	Lake Erie	October 1951	A	Good; body meat mild-flavored, moist, and tender	Good, but belly-flap portions slightly off-flavored	(Same as at 3 months)	(Same as at 3 months)	(Same as at 3 months)	More than 12
Whitefish	Ceregonus clupeaformis	Lake Erie	November 1951	A	Raw meat extremely soft, but cooked meat firm	(No significent change)	(No significent change)	Fatty portions rancid, dark meat somewhat strong flavored	Poor; fatty portion and dark meat rancid	9
Sheepshead	Aplodinotus grunniens	Lake Erie	October 1951	A	Body meat varied greatly in flavor and texture	Varied	Varied	Varied	Varied	Varied from 0 to more than 12
Carp	Cyprinus carpio	Mississippi River	June 1952	B	Body meat tasteless, moist, and soft	Dark meat disagreeably off-flavored	(Same as at 3 months)	Meat poor in appearance and firmer than originally	Meat poor in appearance and in flavor	9
Bullhead	Ameivrus melas	Lake Benten, Minnesota	August 1952	C	Body meat moist and soft	Dark meat some what strong-flavored	Poor, dark meat off-flavored; body meat slightly off-flavored and mushy	-	-	6

1/ Method A. Whole fish were frozen, packed in dry ice, and shipped to Seattle by railway express. At the laboratory they were ice-glazed, wrapped by moisture- and vapor-proof cellophane, and stored at 0° F
Method B. Whole fish were frozen, packed in dry ice, and shipped to Seattle by air freight. At the laboratory they were ice-glazed, wrapped in moisture- and vapor-proof cellophane, and stored at 0° F.
Method C. Whole fish were iced and shipped to Seattle by railway express. At the laboratory the fish were washed, frozen, ice-glazed, wrapped in moisture- and vapor-proof cellophane, and stored at 0° F
2/ Factors determining quality were appearance, odor, flavor, and texture.

collected were used both for storage tests and for chemical analyses for proximate composition (protein, fat, moisture, and ash content). Round (whole) fish whenever obtainable in sufficient amounts were used for cold-storage tests, otherwise, only fillets or dressed fish were used.

The fish were handled and shipped by two general methods. Deviations are indicated in the tables showing the cold-storage keeping quality. The fish used had been out of the water no longer than 12 hours before shipment.

ICED FISH: Whole fish were properly iced and shipped to Seattle by railway express. The fish were continuously maintained in a chilled condition until delivered to the laboratory. The fish were in ice no longer than 5 days from the time they were initially prepared for shipment until delivered to the laboratory. At the laboratory the fish were (1) washed in tap water, (2) placed in a blower-type freezing unit, (3) frozen at a temperature of -20° F., (4) properly glazed by dipping in water at a temperature of 34° F., (5) wrapped in moisture- and vapor-proof cellophane, (6) packed in fibreboard boxes, and (7) stored at 0° F. (Use of the fibreboard boxes was an extra precaution to prevent dehydration of the samples during storage. Since the fish were stored in a room with a blower-type refrigeration unit, the extra protection was needed to eliminate frequent reglazing of the fish.)

Fillets were cut from washed whole fish, wrapped in moisture- and vapor-proof cellophane, frozen, packaged, and stored in the same manner as the whole fish.

FROZEN FISH: Whole fish were frozen, ice-glazed, and packaged, (as previously described), in commercial freezers, packed in suitable containers with dry ice, and shipped solid-frozen to Seattle by railway express or by air freight.

Fillets, cut from frozen fish which had been thawed in cold running water only until soft enough to handle, were packaged in moisture- and vapor-proof cellophane, frozen, packed in fibreboard containers, and stored at 0° F.

RESULTS

Data on the cold-storage life of fresh-water round fish are shown in table 1; data on fillets or dressed fish, in table 2.

Table 2 - Cold-Storage Life of Certain Fresh-Water Fish Stored Either as Dressed Fish or as Fillets at 0° F.

Description of Samples					Condition of Samples Stored at 0° F. 2/			Estimated Cold-Storage Life of the Test Samples
Species		Source	Date Caught	Method of Handling, Shipping, & Packing 1/	Initial Examination Just Prior to Storage	After 3 to 4 Months of Storage	After 5 to 6 Months of Storage	
Common Name	Scientific Name							Months
Smelt	Osmerus mordax	Lake Michigan	March 1952	A	Good; mild and sweet-flavored; tender and moist	Belly flaps off-flavored	Belly flaps off-flavored	6
Eulachen	Thaleichthys pacifious	Cowlitz River, Wash	April 1952	B	Good; distinctive-flavored; soft and moist	Nape discolored; belly flaps slightly off-flavored	Fish pungent in ordor and slightly sour and slightly rancid in flavor	5
Lake trout	Cristivomer namaycush namaycush	Lake Superior	June 1952	C	Good; mild-flavored; tender and moist	Some fillets discolored and slightly off-flavored; one sample rancid in flavor	Fatty portions somewhat rancid; body meat slightly sour; fillets discolored	3 to 6
Buffalofish	Ictiobus species	Mississippi River	June 1952	D	Light meat flat-flavored; dark meat strong-flavored; portions of belly flap off-flavored	Dark meat faded in color and rancid in flavor	Fillets badly discolored, rancid in odor, and mushy	Less than 3

1/ Method A. These fish commercially packed. They were headed, eviscerated, packed in one-pound waxed cartons with a cellophane overwrap, frozen, and then shipped in dry ice to Seattle.
Method B. These fish commercially packed. They were headed, eviscerated, packed in one-pound waxed cartons with a wax overwrap, frozen, and then shipped in dry ice to Seattle.
Method C. Eviscerated fish were iced and shipped by railway express to Seattle. At the laboratory, they were filleted; each fillet was wrapped in moisture- and vapor-proof cellophane, frozen, and stored at 0° F.
Method D. Whole fish were frozen, packed in dry ice, and shipped to Seattle by air freight. At the laboratory they were thawed and filleted; each fillet was wrapped in moisture- and vapor-proof cellophane, refrozen, and stored at 0° F.
2/ Factors determining quality were appearance, odor, flavor, and texture.

DISCUSSION

The results of the cold-storage life studies are limited to the conditions of this experiment. Additional studies on such variables as seasonal variation, method of handling, and methods of packaging and storing are necessary before general conclusions can be made on the cold-storage life of fresh-water fish. Furthermore, those species stored as fillets or dressed fish probably would show a much longer cold-storage life if stored as round fish.

Of the species studied, yellow pike had exceptionally long storage life. Even after one year, it lost little of its original flavor, developed no off-flavors, and showed little or no change in texture.

The quality of sheepshead varied from good to poor. The body meat was variously described by the taste-panel members as mild, moldy, muddy, oily-rancid,

and/or similar to animal meat. The texture varied from tender to extremely tough. As it was not possible to segregate and use only the better-quality fish for cold-storage purposes, this variation in quality was found among the samples throughout the 12 months' storage period. At the end of the 12 months, some of the sheepshead still rated good in flavor and in texture.

Species Currently Undergoing Storage Tests

In addition to the species listed in tables 1 and 2, the following species of fish, all caught in 1953, are currently undergoing storage tests:

1. Squawfish (Ptychocheilus grandis) caught in Drano Lake, Washington, in February and June.

2. Sheepshead (Aplodinotus grunniens) caught in Lake Winnebago, Wisconsin, in July.

3. White bass (Lepibema chrysops) caught in Lake Winnebago, Wisconsin, in July.

4. Utah Chub (Gila atraria) caught in Hebgen Lake, Montana, in July.

5. Crappie (Pomoxis annularis) caught in Two Rivers Lake, Minnesota, in October.

6. Chub (Leuchichthys) caught in Lake Michigan in August.

--D. T. Miyauchi, Fishery Products Technologist, and
M. E. Stansby, Chief Pacific Coast and Alaskan Technological Research,
Fishery Technological Laboratory,
U. S. Fish and Wildlife Service,
Seattle, Washington

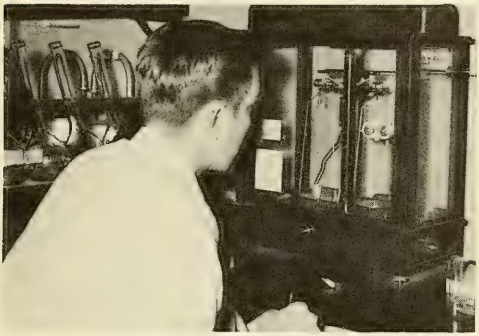
GLAZING FROZEN SALMON

Experiments have been carried out to confirm the reported beneficial effect of glazing frozen salmon in ascorbic acid solutions and solutions of cellulose thickening agents (Tylose, Modocol, etc.). Because of favorable storage conditions, no improvement was found by glazing in Tylose and Modocol solutions. Glazing in a 1-percent ascorbic acid solution was found to delay onset of rancidity.

--Arsberetning fra Fiskeriministeriets
Forsogslaboratorium,
Copenhagen 1953

TECHNICAL NOTE NO. 30--PROPOSED METHOD FOR ESTIMATING AMOUNT OF SOLUBLES ADDED TO WHOLE FISH MEAL

"Whole fish meal" is a term commonly used to describe a mixture of regular fish meal with solids from stickwater, usually added in the form of condensed fish solubles. A Norwegian herring-research group has done considerable work with this type of product, studying methods of manufacture, vitamin content, storage properties, etc. Quite recently plans were announced for the large-scale recovery of stickwater by the South African pilchard industry. These plans indicated that the entire production of condensed solubles would be returned to the meal to make whole meal. This process does, of course, materially increase the output of meal. There are indications that this whole fish meal will soon be offered for sale on the United States market. However, at the present time, most members of the byproducts industry in this country prefer to market condensed solubles as a separate product.



Weighing samples for nitrogen analyses.

One explanation for the general lack of interest in the production of whole meal in this country may be related to the lack of a good method for estimating with reasonable accuracy the amount of solubles solids that have been added to a whole meal. The proximate composition is of little value for this purpose, since the differences between condensed solubles on a dry matter basis and the related fish meals are generally within the range of the naturally large variability in proximate composition which is characteristic of each. This is a matter of no great concern as long as whole meal and unmixed fish meal are sold at the same price. However, there is some possibility that whole meal might sell for a premium price if the important nutrients of condensed solubles can be shown to be retained in whole meals, and if a method for estimating the solids from added condensed solubles in the whole meal were available.

Heretofore, the only method suggested for estimating the amount of added solubles solids is that given in Meldinger fra Sildolje og Sildemelindustriens Forskningsinstitutt, Bergen, Norway, no. 1-3, pp. 15-16, 1950. An abstract of this article has been published in FAO World Fisheries Abstracts, vol. 1, no. 5, p. 23, 1950. The method is based on the fact that the major part of the solids contained in stickwater or fish solubles consists of proteins and other nitrogenous components which may be removed from the whole meal by water extraction. Thus the content of water-soluble protein can be used to distinguish whole meal from ordinary herring meal. The method is as follows: a 10-gram portion of whole meal is mixed with some 200 milliliters of hot water in a 250-milliliter volumetric flask and held in a boiling-water bath with occasional shaking for 30 minutes. After the contents of the flask have been cooled and diluted to volume, a portion is filtered through a folded filter paper and the nitrogen content is determined on a 50-milliliter aliquot. In Norway it was found that a minimum of 20 percent of the total crude protein of the whole meals from herring was soluble in water when all of the stickwater was returned to the meal. This was therefore selected as a tentative qualification for a meal to be designated "whole meal."

This method is satisfactory for the purpose of distinguishing between a meal with admixed solubles solids and a regular meal, or as a measure of the percentage

of the total protein present in a water-soluble form. For the method to indicate the actual amount of solubles solids that have been added to a mixture of this type, it would be required that the protein of the added solubles should be entirely soluble and the protein of the regular meal should be entirely insoluble under the test conditions.

In order to test the validity of these premises, a number of menhaden meals with no added solubles were tested by this method and found to contain appreciable amounts of soluble protein. The reason for this is readily apparent since the presscake before drying contains about 50 percent solids (including residual oil) and 50 percent water. A typical lot of 1,000 pounds of menhaden (or herring or pilchard) contains roughly 200 pounds of solids, which will form the meal, and a highly variable amount of oil, most of which can be expressed. When these whole fish are cooked and pressed, approximately 400 pounds of presscake and 600 pounds of oil and stickwater (disregarding the water condensed from steam used in cooking) are produced. This mixture then goes through screens, decanters, and centrifuges to separate fine solids and oil from the stickwater. For purposes of illustration, it will be assumed that 100 pounds of oil are obtained, leaving 500 pounds of stickwater which contains approximately 6 percent of solids, or a total of 30 pounds. This is evaporated to give 60 pounds of condensed solubles. But 200 pounds of stickwater are left in the presscake. This stickwater contains at least as large a proportion of solubles solids as did the stickwater which was pressed out of the presscake, or a total of 12 pounds. This soluble material then remains in the scrap and meal, and repeated washing of the presscake with hot water would be required to obtain a fish meal free of this soluble fraction. The actual amount of the water-soluble fraction present in any meal will depend upon the condition of the fish before cooking and upon the efficiency of the pressing operation.

Analyses performed at the College Park laboratory of the U. S. Fish and Wildlife Service demonstrated that the average amount of soluble protein in menhaden meals is slightly less than 6 percent, or about 10 percent of the total protein content of the meal. Any fish meal prepared by the wet-rendering process would probably not differ greatly from this value. However, when the percentage of the total protein that is water-soluble is used as an indicator of the amount of added condensed solubles in the whole meal, it is evident that a somewhat erroneously high estimate will be obtained since there is in effect a 10-percent bias from the soluble protein that is in the regular meal.

If this bias were the only factor involved, it could be compensated for by simply subtracting 6 percent from the analyzed value for soluble protein before using this value as the basis for estimating added solubles. However, analyses of some samples of pure dried menhaden solubles showed that the protein in them was not 100 percent water-soluble. Instead the soluble portion averaged only about 85 percent of the total protein. This also is understandable since the screens and decanters are not 100 percent efficient in removal of insoluble solids, and these insoluble solids, whether derived from plankton or fine meat particles, are highly proteinaceous.

The effect of the insoluble protein in the solubles is partially to compensate for the soluble protein in the basal meal, and both must be taken into account if an accurate estimate is to be made of the amount of condensed solubles added to the whole meals. The percentage of added solubles solids in the whole meal (X) can be estimated when the percentage of the total protein that is water-soluble for the basal meal (A) and for the solubles (B) for the specific type of meal is known, and when the percentage (C) of the total protein of the specific whole meal that is water-soluble has been determined by analysis. Since the whole meal contains only basal meal and solubles solids, 100 - X is the percentage of basal meal solids, and $A(100 - X) + BX = 100C$. Hence, the percentage of added solubles solids, $X = \frac{100(C-A)}{B-A}$.

In the case of menhaden meal-solubles mixtures, A = 10 and B = 85, so $X = \frac{100(C-10)}{75} = 1.33C - 13.3$. One example will illustrate the application of this formula. A whole meal mixture is found on analysis to have 25 percent of the total protein soluble in hot water. Then X = 1.33 x 25 - 13.3 = 20 percent as the modified estimate of the percentage of added solubles solids in the mixture, rather than 25 percent as indicated by the simple ratio.

It has been impractical to prove the accuracy of the proposed method of estimate, because no commercial whole meals could be obtained for which accurate information was available regarding the amount of solubles solids added in their manufacture. However, fairly satisfactory estimates were obtained when the method was applied to experimental mixtures of menhaden meal containing high levels of some atypical samples of added solubles. There is every reason to believe that the formula will give a quite accurate estimate for mixtures containing lower levels of more typical condensed solubles.

Since herring meal and herring solubles, or pilchard meal and pilchard solubles, might have slightly different average values for (A) and (B) of the above formula, somewhat greater accuracy would be attained in work with pilchard and herring whole meals if these values were known. At present most of these meals are imported. Consequently the average user of whole meal will not have this information available. Lacking the specific data for each species, the values determined for menhaden meal in the above formula will probably give a more accurate estimate of the amount of solubles solids added to a whole meal mixture than will be obtained when the simple ratio of soluble protein to total protein is used.

--Charles F. Lee, Chemical Engineer,
Fishery Technological Laboratory,
Branch of Commercial Fisheries,
U. S. Fish and Wildlife Service,
College Park, Maryland

WHALE OIL EXTRACTION BY PRESSURE

Japanese experiments in extracting whale oil by pressure instead of cooking are said to have produced oil of better quality; in addition, the residual tissues can be used to manufacture synthetic textiles.

--La Peche Maritime, La Peche Fluviale et La Pisciculture, June 15, 1953.

THE DEVELOPMENT OF FEDERAL SPECIFICATIONS

ASSIGNMENT: A new method of developing Federal specifications was put into effect on July 6, 1954. By this method the responsibility for the development of specifications will be assigned by the General Services Administration to other Federal agencies with their consent. Normally the assigned agency will also be responsible for maintaining the specification.

SCOPE: The assignment will include responsibility for:

1. Development and coordination with Federal agencies and the industry.

2. Amendment, revision, or further development as found to be necessary.

BASIS: An important factor in the assignment of the specifications projects is the technical staff and facilities of agencies and their competence in the science and technology of the item. Most of those projects on fishery products, therefore, have been assigned to the Fish and Wildlife Service. The actual work is being carried out by the Technological Section of the Branch of Commercial Fisheries.

DEFINITION: A specification is a clear and accurate description of the technical requirements for a material, a product, or service, including the procedure by which it will be determined that the requirements have been met.

1. Federal. A specification covering those materials, products, or services, used by two or more Federal agencies (at least one of which is a civil agency), or new items of potential general application, promulgated by the Administration for mandatory use by all Federal agencies.

2. Interim Federal. A specification intended for final processing as either a new or revised Federal Specification, issued in interim form for mandatory use by the agencies specified in the preamble to the specification, but which may be used by other agencies; or issued to cover immediate procurement needs of one agency but which may be of interest to another Federal agency.

BASIC REQUIREMENTS: The basic requirements observed in the development of a specification are:

1. The requirements of all Federal agencies having an interest in the items shall be considered.

2. The number of types, grades, colors or finishes, and varieties specified shall be held to the minimum consistent with optimum over-all efficiency and economy of the operations or services to be performed.

3. Wherever practicable, functional or performance requirements, rather than design, construction, or compositional requirements, shall be specified.

4. Requirements shall be written to give full consideration to end use and economy and to encourage maximum participation by industry in the Government supply program.

5. Nationally recognized industry, technical society, and other commercial specifications and standards shall be used and adopted to the maximum extent practicable.

6. Specification requirements which can be met by products of standard commercial construction, manufactured by business enterprises for general commer-

cial use, shall be adopted to the maximum extent consistent with Government requirements.

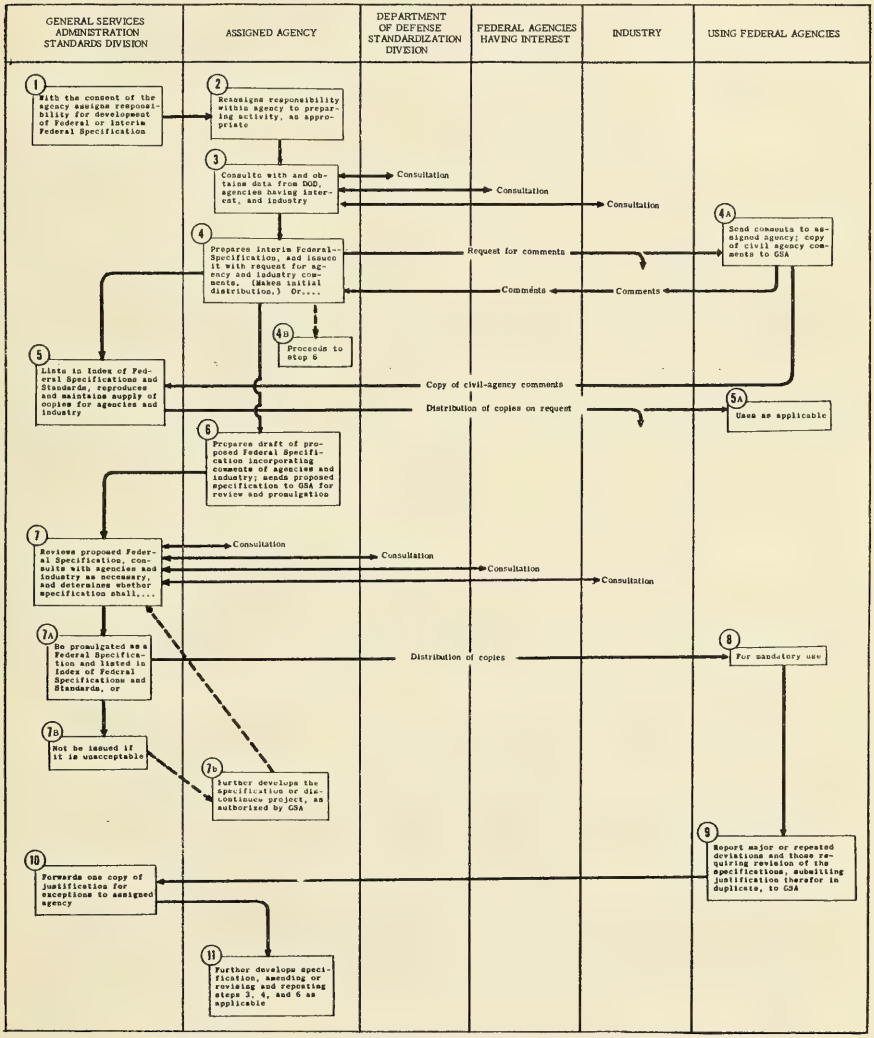


Figure 1 - Flow chart for development of Federal and interim Federal specifications.

7. The preservation, packaging, packing, and marking requirements in specifications shall be uniform to the greatest extent practicable consistent with the varying needs of Federal agencies for domestic and export shipment.

8. Consideration shall be given to the conservation of critical materials.

RESPONSIBILITY:

1. That the specification is adequate for use by the Federal agencies.

2. That representatives of industry properly concerned are afforded an opportunity to make recommendations.

3. The methods of sampling, inspection, and test required have been tried and found to be satisfactory.

INTERIM SPECIFICATIONS: As a rule, Federal Specifications shall be issued initially as Interim Specifications. Except when GSA approves issuance for the immediate procurement needs by an agency, Interim Specifications shall be coordinated with Federal agencies and with industry to the extent the assigned agency determines to be necessary.

PROCEDURE: Figure 1 shows the flow chart for the development of Federal and interim Federal specifications.

BREEDING OYSTERS FOR SPECIAL CHARACTERISTICS

Oysters bred for special characteristics, as cattle, hogs, and horses are bred, are now believed possible as a result of an experiment at the Virginia Fisheries Laboratory, Gloucester Point, Va.

Oysters that grow rapidly and reach maturity a year or two earlier than the average commercial oyster now does is one possibility foreseen; oysters bred to resist disease is another.

Successful artificial spawning of oysters and their larvel development to the setting stage under artificial conditions has been achieved by a Virginia biologist assisted by a U. S. Fish and Wildlife Service biologist. This is the first time this has been done in Virginia.

Biologists throughout the world have maintained that it is possible, through hybridization, to produce special oysters to meet special needs. Investigations leading to a solution of the many problems involved in producing oysters artificially are being made not only at the Virginia Fisheries Laboratory but at several other laboratories in this country and other parts of the world.

--Science News Letter, June 19, 1954

EXPERIMENTAL FREEZER-TRAWLER DELAWARE RESUMES OPERATIONS

The Service's experimental freezing vessel Delaware, operating out of East Boston, started its initial cruise of the season on June 29. This was its first trip since completion of fire-damage repairs and restoration of the galley and after crew's quarters. The purpose of the cruise was (a) to brine freeze in-the-round and store in the frozen-fish hold all commercial species of fish taken in the Georges Bank area, (b) to further test the operation of the freezing equipment, particularly in relation to certain automatic controls that had been recently installed, and (c) to prepare sample lots of iced, gutted fish of various species for use in projects under way in the laboratory.

The vessel returned to the laboratory on July 4 with a catch of 11,500 pounds of fish, principally haddock, cod, and yellowtail. Approximately 2,500 pounds of this total were frozen.

While fishing, mechanical equipment replaced or overhauled during the winter was tested under full operating loads. As a result of these sea trials, certain adjustments and replacements were made in the equipment prior to the next cruise.

The Delaware again went to sea on July 14. The purpose of this cruise was essentially the same as that for the first one. After a trip of about 13 days, the vessel returned to the laboratory on July 27. Fishing was done mostly in the Georges Bank area. The catch of 50,000 pounds of fish was largely haddock and scrod haddock, with the remainder consisting of cod, whiting, ocean perch, and other fish. About 43,000 pounds of the catch were brine-frozen in-the-round, and 7,000 pounds were gutted and iced.

Considering that the vessel operated only during daylight hours because a full crew of fishermen was not taken on these cruises, the quantity of fish brought in by the Delaware is believed to be very satisfactory. Translated into around-the-clock fishing, which is the normal commercial operating schedule, the catch would have been something over 100,000 pounds of fish. While all of the brine-frozen fish were in excellent condition, the fish caught during the first part of the trip and stored in ice were not of the best quality when landed. The second cruise demonstrated that frozen fish held aboard the vessel for two weeks can be landed in excellent condition.

A technologist from the Army Quartermaster Corps Food and Container Institute, Chicago, Illinois, was aboard on both cruises to select lots of both iced and frozen fish for later use in the preparation of frozen fillets, fish squares, and fish sticks for consumer acceptance tests under the direction of the Institute. The laboratory staff assisted him in handling the fish upon the arrival of the vessel at East Boston and in the processing of the fish into the desired types of samples.

On both cruises lobsters, caught incidental to the trawling operations about 200 miles at sea, were placed in a tank of circulating sea water. A total of 35 lobsters, weighing up to 12 pounds each, were brought in alive. They were turned over to the Division of Marine Fisheries, Massachusetts Department of Natural Resources, Boston, Massachusetts, for tagging and release in inshore waters for studies on migratory habits and survival rates.

NEW FORMAT

NOTE: Recent surveys of readers of Commercial Fisheries Review indicate that more detailed and complete reports of progress are desirable. Therefore, the content of the section "Research in Service Laboratories" has been changed with this issue of Commercial Fisheries Review. This will permit a prompt and more suitable means of reporting progress on projects carried out in the Service's four technological research laboratories. The section will, as in the past, be devoted principally to current progress on technological research projects. However, these reports will be prepared in more detail by the principal investigators or project leaders and will represent definite progress or phase reports on the projects. Complete reports of this type should prove to be of greater value in following the research work and in the prompt practical application of the results.

Such items as test cruises of the research trawler Delaware and other miscellaneous observations made by the research staff will be included as before.

The progress reports will be abstracted in the Service journal Commercial Fisheries Abstracts. Users of the abstract journal will have a ready reference file to the material appearing in the "Research in Service Laboratories" section of Commercial Fisheries Review.

The new format will not alter the present practice of issuing reports of completed research as feature articles in Commercial Fisheries Review, other Service reports, and in trade or scientific journals. The Technical Notes will not be changed and will consist of observations made in the course of study on research projects or other incidental technical observations that may be of interest to the industry.

152-YEAR-OLD LAKE STURGEON CAUGHT IN ONTARIO

A 152-year-old lake sturgeon (Acipenser fulrescens), caught in Lake of the Woods, Ontario, in 1953, has caused a mild furor in scientific circles. The age of the remarkable fish has been established by biologists of the Fish and Wildlife Division of the Ontario Department of Lands and Forests at Maple, Canada, according to an April 6 release by that Agency.

The fish was caught in July by a fisherman. It measured 81 inches in length and weighed 215 pounds. At time of capture, a pectoral fin was removed from the fish and later forwarded to Maple by Kenora District Wildlife Officers. It was from a microscopic examination of a cross-section of this fin ray that the age of the fish was determined.

To assess its great age, annual rings similar to those found in trees were counted. In fact, the figure arrived at appeared so fantastic that a section was sent to the Chief Limnologist of the Canadian Wildlife Service at Ottawa, and he reaffirmed the findings.

It is interesting to realize that this piscatorial curiosity was swimming the waters of Lake of the Woods at least ten years before the War of 1812 and had managed to escape commercial fishing gear and natural enemies until 1953.

California

PACIFIC MACKEREL FISHING OUTLOOK DISMAL: Pacific mackerel fishing off the California coast has slowed up considerably and purse seiners have been catching only a few loads of small young fish hatched in 1953. Most of these fish would not normally have laid their first eggs until 1956. California marine biologists say that as long as the fishery continues to operate on such young fish the hope for recovery of the Pacific mackerel is most dismal, according to the June Outdoor California, a Department of Fish and Game bulletin.

* * * * *

COMMERCIAL FISHING LICENSE SALES DOWN IN 1953/54: The sales of commercial fishing licenses in California have dropped for the fourth consecutive year, according to the June Outdoor California, a Department of Fish and Game bulletin. A total of 11,367 licenses were issued for the 1953/54 series--a decrease of 31 percent from the 1949/50 high of 14,967 licenses.

Cans--Shipments for Fishery Products, January-May 1954

Total shipments of metal cans for fish and sea food during January-May 1954 amounted to 29,842 short tons of steel (based on the amount of steel consumed in the manufacture of cans), compared to 33,257 short tons for the same period last year.

Note: Statistics cover all commercial and captive plants known to be producing metal cans. Reported in base boxes of steel consumed in the manufacture of cans, the data for fishery products are converted to tons of steel by using the factor: 23.0 base boxes of steel equal one short ton of steel.

Federal Purchases of Fishery Products

FRESH AND FROZEN FISHERY PRODUCTS PURCHASED BY DEPARTMENT OF DEFENSE, May 1954: Fresh and frozen fishery products purchases for the military feeding of the U. S. Army, Navy, Marine Corps, and Air Force by the Army Quartermaster Corps in May 1954 amounted to 2,125,243 pounds, valued at $894,789

Table 1 - Purchases of Fresh and Frozen Fishery Products by Department of Defense (May and the First Five Months of 1954 and 1953)

QUANTITY				VALUE			
May		January-May		May		January-May	
1954	1953	1954	1953	1954	1953	1954	1953
Lbs.	Lbs.	Lbs.	Lbs.	$	$	$	$
2,125,243	3,124,176	9,071,418	8,951,048	894,789	1,183,404	3,896,689	4,308,587

(table 1). This was an increase of 16.4 percent in quantity and 18.6 percent in value as compared with April purchases, but lower by 32.0 and 24.4 percent, respectively, than in May 1953.

Prices paid for fresh and frozen fishery products by the Department of the Army in May 1954 averaged 42.1 cents per pound as compared with 46.9 cents in April.

June 1954: The Army Quartermaster Corps in June 1954 purchased 2,966,264 pounds (valued at $1,191,632) of fresh and frozen fishery products--39.6 percent greater in quantity and 33.2 percent higher in value than purchases in May (table 2). When compared with a year earlier, June purchases were down 36.2 and 29.8 percent, respectively.

Table 2 - Purchases of Fresh and Frozen Fishery Products by Department of Defense (June and the First Six Months of 1954 and 1953)

QUANTITY				VALUE			
June		January-June		June		January-June	
1954	1953	1954	1953	1954	1953	1954	1953
Lbs.	Lbs.	Lbs.	Lbs.	$	$	$	$
2,966,264	4,648,870	12,037,682	13,599,918	1,191,632	1,696,864	5,088,321	6,005,451

Army Quartermaster Corps purchases of fresh and frozen fish during the first six months of 1954 amounted to 12,037,682 pounds (valued at $5,088,321)--a decrease of 11.5 percent in volume and 15.3 percent in value as compared with the similar period in 1953.

An average price of 40.2 cents per pound was paid by the Department of the Army for fishery products purchased in June 1954, compared with 43.7 cents per pound in June 1953.

Fillet and Fish Stick Advertising Test

A joint fish fillet and fish stick advertising test program in Columbus, Ohio, in the fall of 1954 was agreed upon by firms in Canada, Iceland, Norway, and the United States. Agreement was reached at a meeting in Boston, Mass., August 5. The purpose of the test will be to determine how successful such a joint program is in increasing the consumption of fish fillets and fish sticks.

Film to Show Role of Outboard Motors in Fishing Industry

Work on an educational motion picture featuring the use of outboard motors in commercial fishing operations has been started by the U. S. Fish and Wildlife Service.

The film is being produced by MPO Production, Inc., New York City, for the Outboard, Marine and Manufacturing Co., Milwaukee, with Fish and Wildlife Service specialists serving as technical advisors, helping in the selection of locations, and participating in the preparation of the script.

Cited as an excellent example of teamwork between industry and Government, the project is designed to acquaint commercial fishermen and the general public with the important role outboard motors play in getting high-quality sea foods and fresh-water fish to the American dinner table.

The following commercial fishing operations have been selected by the Service as likely material for the film: 1. Lobster and sardine fishing in Maine. 2. Scallop fishing in Massachusetts. 3. Oyster harvesting in Maryland, or Virginia. 4. Clamming in New Jersey. 5. Crabbing in North Carolina, or Louisiana. 6. Mullet fishing in Florida. 7. Shrimping in Louisiana. 8. Salmon fishing in Alaska. 9. Pound or gill netting for herring, lake trout, and whitefish in the Great Lakes. 10. River fishing for shad, carp, and other fish in the Hudson or the Mississippi rivers.

The picture will be a 16 mm. sound and color production with a showing time of about 25 minutes. Due to the seasonal nature of commercial fishing, the film will require about 18 months for completion. A wide distribution of prints for public showings and television use is planned.

Fishery Products Marketing Prospects, July-October 1954

CONSUMPTION AND RETAIL PRICES: U. S. civilian consumption of fishery products per person during the first half of 1954 was slightly smaller than a year earlier. The reduction came mostly in canned fish. Consumption of frozen fishery products was maintained at the year-ago rate in large part due to expansion in the use of frozen "fish sticks." Retail prices of fish and shellfish, as a group, averaged close to those of the first half of 1953, judging from wholesale prices in principal markets. Civilian consumption of fishery products in the next few months is not expected to differ much from the rate of a year earlier, while retail prices for these commodities probably will be about the same.

CATCH: Commercial landings of fish and shellfish through about midyear were at least as high or perhaps slightly higher than in the same months of 1953. Heavier landings of tuna fish this year than last was the outstanding feature in the over-all production situation during the first half of 1954. Total landings of fishery products are close to the seasonal peak, and will decline as winter approaches.

FREEZINGS AND HOLDINGS: Commercial freezings of fishery products in the United States and Alaska through the end of June totaled 112 million pounds, only one percent higher than in the first half of 1953. Cold-storage holdings of frozen fish and shellfish on June 30 totaled 140 million pounds, slightly less than a year earlier. Although the volume of fishery products frozen will be declining seasonally as the year progresses, total cold-storage stocks (which include imports) will continue to build up during the fall. The out-of-storage movement of frozen fishery products is generally heaviest during the winter months when landings are at the low point for the year.

CANNED FISH: Less canned fishery products are available now than last summer, but the 1954 packs will start moving to market in volume in a few weeks. Tuna is the only popular canned fish item for which a large pack is in prospect for this year. Thus far in 1954 more tuna has been canned than a year earlier, and indications are that it will continue ahead of last year unless the volume of imports of frozen tuna or of domestically caught tuna landed for canning drops sharply. The canned salmon pack probably will decline for the third year in a row because of the shortage of pink salmon in the Puget Sound area and conservation restrictions on fishing in some Alaskan waters. The size of the packs of mackerel and California sardines (pilchards) probably will be small again this year.

FOREIGN TRADE: Imports of fishery products through April were somewhat larger than a year earlier. Most of the increase was in the major canned fishery products, which were up more than 25 percent. Although receipts of the important fresh and frozen fishery products during this period were only moderately higher

than in the same part of 1953, those of frozen groundfish and ocean perch fillets were up almost 20 percent. The increase was due mainly to stepped-up use of imported fillets by domestic producers of frozen "fish sticks." Exports of fishery products from January to April were smaller than a year earlier. Outgoing shipments of the major canned fish items were down about 18 percent. A considerable increase in canned salmon exports was more than offset by declines in sardines and mackerel. Trade prospects for the year as a whole are for somewhat heavier imports and smaller exports than in 1953.

This analysis appeared in a report prepared by the Bureau of Agricultural Economics, U. S. Department of Agriculture, in cooperation with the U. S. Fish and Wildlife Service, and published in the former agency's August 2, 1954, release of The National Food Situation (NFS-69).

Florida

SHRIMP EXPLORATIONS OFF WEST COAST BY "GOODWILL" (Cruise 1): Over the past several months decreasing shrimp production with a reduction in shrimp prices has caused an economic decline in the Florida shrimp industry. As a result of this serious economic situation a program was established by the Tampa Shrimp Producer's Association for the systematic exploration for shrimp off the western Florida coast.

Diesel Engine Sales of St. Augustine loaned the trawler Goodwill to the Association for a period of four months to carry out this exploratory work. The cost of operating the vessel is being shared by members of the Tampa Shrimp Producers's Association. At their request scientific personnel are being provided by the Marine Laboratory of the University of Miami, official research body of the State Board of Conservation, for the purpose of collecting data and making reports on the various cruises.

The first of these cruises by the Goodwill consisted of two trips to explore for shrimp in the area between Tampa and Cape San Blas off the west coast of Florida.

The Goodwill departed from St. Augustine for the first trip on June 17, 1954. After making a port call at Miami for provisions and gear it proceeded to Tampa and started its exploratory operations. A port call for repairs to the automatic pilot was made in Apalachicola on June 28-29. Explorations were resumed off Cape St. George. The Goodwill returned to Tampa on July 1 for reprovisioning.

The second trip of this cruise took place between July 4-10. On this trip the Goodwill operated in the area between Tampa and Anclote Light.

During the first trip, the Goodwill made 29 trawling stations in depths of 10 to 60 fathoms. The majority of the drags were made inside the 20-fathom curve. This area was unsuitable for trawling due to the presence of large quantities of loggerhead sponges and live and dead coral which littered the bottom.

No commercial concentrations of shrimp were discovered on this trip. One to six shrimp per 10- to 15-minute try-net drag were found in 11 to 14 fathoms at position 28°20' N. latitude and 83°30' W. longitude. These shrimp ranged from 15 to 30 count heads off. The small number of shrimp caught by the try net did not warrant the use of larger gear. The six try net stations in this position show the area to be trawlable and more extensive than any located east of Cape St. George.

A series of 6 stations off Cape San Blas in 21 to 60 fathoms did not yield any shrimp of commercial interest. In 25 fathoms at position 29°05' N. latitude and 85°25' W. longitude, a scallop bed covering some six miles in length was discovered. Three 15-minute drags with a 150-mesh try net yielded 60, 95, and 50 commercial scallops. These scallops are the desirable commercial species similar to Pecten gibbus and ranged from $1\frac{3}{4}$ to 3 inches in size. This scallop bed is large enough to be of commercial importance.

While the Goodwill was in Tampa on July 1-3, information was obtained concerning catches of commercial shrimp made in 10 to 14 fathoms northwest of Tampa. It was decided to investigate the extent and catch rate of this area.

Twenty-one try-net sets and eight sets with a 375-mesh flat trawl with extended wings were made on this trip. Three nights were spent in exploring before a suitable concentration of shrimp was discovered off Tarpon Springs at 28°07' N. latitude and 83°10' W. longitude.

The catch rate with the 375-mesh flat trawl was 275 pounds (heads on) pink shrimp (Penaeus duorarum) per hour. The total catch for two nights' fishing was 1,700 pounds of 41- to 45-count shrimp (heads off).

The area in which the Goodwill fished was not extensive, possibly $\frac{1}{2}$ mile in length and $\frac{1}{4}$ mile in width. Radio contacts with other boats indicate that many such sections of trawlable bottom with commercial concentrations of shrimp had been located in the general vicinity.

On these cruises no extensive trawlable mud bottom, similar to the Dry Tortugas and Campeche Banks, was found. Rather, the shrimp appeared to be isolated in small compact pockets which have to be bouyed off to prevent destruction of gear.

From 10 to 20 shrimp trawlers are currently operating in the waters off Tampa. Many of these boats have sustained severe gear damage, even complete loss of nets.

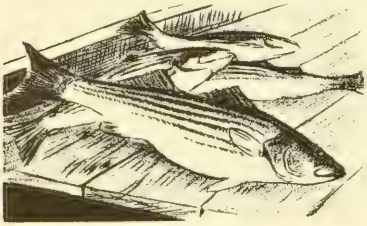
The trawlers working adjacent to the Goodwill had rigged their gear with a tickler chain attached to the bottom trailing edge of the trawl door. The length of the tickler chain varied, being either equal in length to the cork line or two feet shorter than the cork line. Other boats were fishing without the drop link chain. However, the Goodwill made good catches by leaving the drop link chain attached to the net.

An electronic fishing aide, the "Shrimplupe," was installed on the Goodwill. The apparatus operates as a depth recorder as well as an indicator of the presence of marine organisms. An additional feature of this instrument is its ability to select any two fathoms of water for detailed study. No positive identification of shrimp were made on the first trip. This may have been due to the inexperience of the operator in identifying the objects on the screen of the "Shrimplupe" or to the lack of sufficient concentrations of shrimp.

Maryland

CHESAPEAKE BAY FISHERIES, 1946-50: The general condition of Maryland's Chesapeake Bay fisheries from 1946-50 appeared to be excellent, according to the Maryland Department of Research and Education at Solomons, Maryland. This conclusion is based on the results of a study of detailed records of the commercial fish catch of the State published in a bulletin, Maryland Commercial Fisheries Statistics, 1946-1950, issued recently from the Chesapeake Biological Laboratory.

The statistics set forth in the report were derived from records obtained only from licensed commercial fishermen; the bulletin contains no data pertaining to small unlicensed units of fishing gear, or to the sports fishery. While it is recognized that these figures do not represent the total finfish removal from Maryland waters, they do have very definite merit and usefulness. The stability of the commercial fishery makes it an excellent source of catch statistics suitable for critical comparison and analysis. The numbers of men, boats, and units of gear vary only slightly from year to year.


Striped Bass

Prices for fish were relatively stable, averaging generally about 9 cents per pound for all species during the 5-year period. Total landings in 1950, for example, increased over 42 percent, and most of the major fish species followed an upward trend. Striped bass or rockfish catches increased 94 percent over the 1946 level, shad gained 101 percent, alewives 69 percent, and white perch landings rose 74 percent. All of these important commercial species reproduce in Maryland waters.

Croakers (hardheads) suffered a slight recession, but production in 1950 rose again to a point 3 percent above the 1946 figure. The only major species that failed to show stable or increased production is gray sea trout, which went steadily downward, resulting in a reduction of 84 percent.

In contrast to these Chesapeake Bay landings, the Atlantic Ocean catches indicate rather discouraging trends. The decline in total production was attributed in some measure to marketing difficulties, but to a greater extent resulted from phenomenal decreases in certain individual species. The following species of fish showed spectacular drops in production: king whiting, gray sea trout, croaker, and red (squirrel) hake. The declines in croakers and gray sea trout were reflected in both the trawl and pound-net catches, but king whiting and hake are more typically taken by trawls. The lower yields of these last two species resulted in a greater total reduction in the trawl fishery than in pound nets.

Altogether, 95 percent coverage of licensed commercial fishing was obtained during the five years included in the survey, entirely on a voluntary basis. The returns indicated seasonal patterns of fishing that were strikingly constant for each of the various types of gear.

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FOOD FISHERIES PRODUCTION DROPS IN 1953: The general condition of Maryland's Chesapeake Bay fishery in 1953 was not encouraging, according to Maryland Landings 1953, CFS No. 1029. This is a special bulletin containing preliminary data published recently by the Service's Branch of Commercial Fisheries in cooperation with the Maryland Department of Research and Education and the Maryland Department of Tidewater Fisheries. Although the total landings were well above the 1952 level and slightly above the 1944-52 average, this was due primarily to a noticeable increase in the catch of menhaden. A drop in the production of the major species of food fish occurred from 1952 to 1953. Sea trout, striped bass, and alewives increased slightly over the 1952 catch, but croaker, shad, and white perch failed to reach the 1952 level. Striped bass, shad, and alewives were above the average catch for 1944-52, while landings of croaker, white perch, and sea trout were below the average for the nine-year period.

The State's Atlantic Ocean fishery continued to decline during 1953. Pound-net catches totaled less than 6,000 pounds for the entire year. Total landings for all

other types of gear were only slightly above $3\frac{1}{2}$ million pounds, of which more than $1\frac{1}{2}$ million pounds were shucked meats of surf clams.

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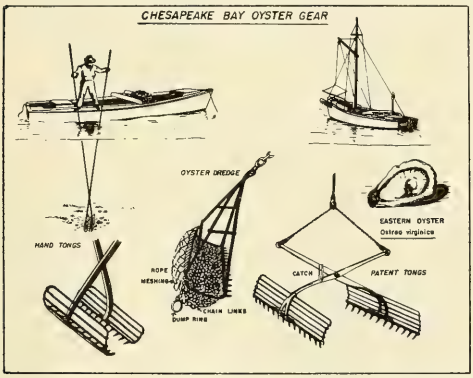
OYSTER-SHELL PLANTING IN 1953/54 ONE OF LARGEST IN HISTORY: One of the largest oyster shell-planting operations in the history of the Maryland Tidewater Fisheries Department was being completed by that agency in the Maryland portion of Chesapeake Bay, according to the July 1954 Maryland Tidewater News. On the average, about 150,000 bushels of oyster shells per week have been planted during the recent spring period. Plantings from Baltimore have been made since the oyster-shucking period began in the fall of 1953 through the early summer of 1954.



The shell-planting measure is designed to make old shells available as anchorage for baby oysters. A shell scow carries from 2,500 to 4,000 bushels, and the shells are trucked to the scows from packing plants which supply them to the State.

Under a new law, packers must surrender 50 percent of their shells without cost. The Department has planted about 1,750,000 bushels during the season and has a goal of 2,000,000 bushels per year.

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SPOT FISHERY INCREASES: The commercial fishery for spot (Leiostomus xanthurus), a small full-bodied member of the drumfish family, relative and fellow traveler with the croaker or hardhead in Maryland waters, has enjoyed a slight prosperity in increased harvest during the past decade, according to biologists of the Maryland Department of Research and Education at Solomons.

In addition to being a staple sports fish throughout Chesapeake Bay and a delicately-flavored species for human consumption, the spot is caught in relatively large numbers; but the fishery is much smaller than that for alewives, carp, croakers, eels, sea trout (weakfish), shad, and striped bass. Although large numbers are caught in late spring (when they come from the ocean), summer, and autumn, the financial returns to fishermen are not large.

The spot fishery started off two decades after the Civil War at a high level, but by the turn of the century it declined to a very low level. After World War I the landings and value increased to their present level. This change is demonstrated by the average annual landings for the following periods and the price per pound: (1) 1887-1891, 295,000 pounds at 4 cents per pound; (2) 1897-1908, 10,000 pounds at 2 cents per pound; (3) 1920-1938, 110,000 pounds at 3 cents per pound; and (4) 1939-1951, 151,959 pounds at 7 cents per pound. The conditions are about the same for the spot fishery in Virginia waters where it is eight times the size of the Maryland industry.

The changes in the types of gear used for catching spot are of interest. Between 1887 and 1891 most spot were caught on hand lines and sold commercially; secondary catches were made in haul seines, pound nets, gill nets, fyke nets, and weirs.

From 1929 to 1931 a few were caught in purse seines, but the largest percentage was taken in pound nets from 1929 to 1950, followed by haul seines. A small amount are taken in otter trawls in the ocean off Maryland. Although spot is not a Bay fish, it is quite important to the commercial and sports fisheries so that its future in the over-all fishery economy of Chesapeake Bay will be studied with great interest.

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HAKE CAUGHT IN CHESAPEAKE BAY: During the last few months the Chesapeake Biological Laboratory at Solomons has been deluged with mysterious fishes caught by sports fishermen in Chesapeake Bay and the lower estuaries. In almost every case these queer fish have turned out to be hake, curious cod-like ocean-dwellers that are visiting the Bay for the summer, according to biologists of the Maryland Department of Research and Education.

All fish examined have been less than 10 inches long, indicating that they are members of a dominant year-class that have migrated to the rich nursery grounds of the Bay. They probably arrived in late spring from the ocean as fingerlings, and have since grown large enough to be caught by fishermen.

The most commonly recorded form is the spotted hake, *Urophycis regius*, but one red (squirrel) hake, *Urophycis chuss*, was caught in a pound net at Hunting Creek, a tributary of the Patuxent River. Fishermen call them "ling" and "cod." The Chesapeake Biological Laboratory has recorded hake of such small size almost every year, but this year they are more frequent than usual. Hake of marketable size are too scarce in Chesapeake Bay to excite attention.

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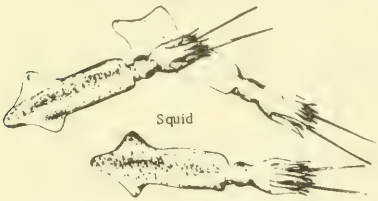
SQUID PRODUCTION OFF OCEAN CITY DECREASES SLIGHTLY: The commercial fishery for squid, a close relative of the octopus, has decreased slightly off Ocean City, Maryland, according to the Maryland Department of Research and Education's bulletin *Maryland Tidewater News*. The incidental fishery for squid, principally *Loligo Pealii*, is over a half century old. Squid, also known as "sea arrows," "cuttlefish," and "calamaries," do not occur in the Maryland portion of Chesapeake Bay.

The catch and value of squid have fluctuated over the years from 1904 to the present. The average annual yield in pounds and price per pound for the following periods indicate clearly this change: (1) 1904-1925, 14,842 pounds at 5 cents per pound; (2) 1929-1939, 59,400 pounds at 2 cents per pound; and (3) 1949-1951, 51,109 pounds at 3 cents per pound. By contrast the much larger fishery for squid off Virginia shows the following statistics: (1) 1929-1939, 206,674 pounds at 2 cents per pound; and (2) 1940-1951, 117,218 pounds at 4 cents per pound.



The demand for squid seems to be growing due to the fluctuating availability of this mollusk to pound-net and otter-trawl fishermen. Most squid are used as bait by commercial and sports fishermen, although many of the best restaurants in metropolitan areas serve it on their menu.

The Maryland squid fishery may be the source some day of live animals for use in medical research. The squid is important in nerve physiology and, hence, of potential value in medical research, because of the presence of a single giant nerve fiber rather than a complete bundle of nerve fibers. Squid are delivered alive daily from the ocean to scientists in an especially designed truck to points as far as

Cambridge, Massachusetts. The giant nerve fibers are easily dissected and handled, and the study of their properties, heretofore quite difficult with other experimental animals, has yielded a great deal of basic information that will benefit mankind.

Squid are caught in pound nets set in the ocean and in otter trawls operating near Ocean City during the summer months. During the earlier days of the fishery most squid were taken in pound and trap nets exclusively, but since the advent of the otter-trawl fishery off the Maryland coast, almost all squid are taken by that type of gear.

New England Tuna Explorations

WEST COAST PURSE SEINER FISHING TUNA OFF NEW ENGLAND: Bluefin tuna fishing on a commercial scale in waters off New England is being tried this summer. Based on results of tuna explorations conducted by the Service over the past three years in that area, experimental fishing by a California purse seiner commenced about the end of July in the Gulf of Maine and nearby waters. Considerable industry interest has been shown in this undertaking, as it will be the first commercial seining for North Atlantic tuna since an attempt was made by industry to establish such a fishery in 1938-40.

Captain Nick Mezin sailed late in June from San Pedro, California, with his purse seiner Western Pride and an experienced West Coast crew. The Western Pride was scheduled to arrive in the Cape Cod area on July 28. Mechanical difficulties caused a later start than was planned, but the vessel will purse seine for bluefin tuna in New England waters until the end of September or until it is apparent that the run of tuna is over for the season.

The Service's bluefin tuna exploratory program, which began in 1951, successfully showed that North Atlantic tuna could be taken by the purse-seine method in commercial quantities within a 100-mile radius of New England fishing ports. The catch that year was 180,000 pounds of prime tuna of a size ideal for canning. In 1952 and 1953 explorations the Service used long-line gear. Although catches were smaller with this type of gear than with the purse seine, the project in both years continued to demonstrate that good canning-size bluefin tuna could be caught over a wide area in the Gulf of Maine and adjacent waters during the summer months. Considerable information on the habits and movements of the tuna was obtained. However, additional exploration of offshore waters, in and beyond the Gulf Stream, is necessary before any extensive evaluation of the potential fishery can be made.

An experienced observer from the staff of the U. S. Fish and Wildlife Service has been assigned to accompany the Western Pride on all fishing trips in New England waters this year. Complete records of the scouting and seining activities will be maintained and made available to interested parties.

Pribilof Islands Fur-Seal Take, 1954

A total of 63,882 fur-seal skins was taken in 1954 in the Government-administered sealing operations on Alaska's Pribilof Islands. The annual sealing operations conducted by the Fish and Wildlife Service began June 22 on St. Paul Island and June 27 on St. George Island. Operations were terminated on July 27.

This year's yield was 2,496 skins under the 1953 take of 66,378. The average annual yield over the past 10 years has been around 65,000 skins.

Although the fur-seal industry on the Pribilofs is the responsibility of the United States Government, 20 percent of this year's take will be delivered to the Canadian Government under the terms of the Provisional Fur-Seal Agreement of 1942. The remaining skins will be delivered to a private concern in St. Louis for processing and sale at public auction under a Government contract.

Approximately 80 percent of the world's fur seals go to the Pribilof Islands each summer to breed. During the winter these seals range southward as far as southern California.

At one time the Alaskan seal's numbers diminished to such an extent that the herd's existence was threatened. The depletion was due principally to pelagic sealing--the indiscriminate killing of seals at sea.

Under the protection of international agreements, the herd has been restored and is being maintained at its original level of abundance. Since the annual take is limited primarily to three-year old males considered surplus from the standpoint of breeding, the species is assured of survival under present conditions.

U. S. Canned Packs of Selected Fishery Products, 1953

ALEWIVES: The 1953 United States pack of canned alewives amounted to 111,391 standard cases, valued at $507,925 to the canners (table 1). This is an increase of 39 percent in quantity and 36 percent in value as compared with the previous year.

Table 1 - U. S. Pack of Canned Alewives by States, 1953 1/

State	Quantity	Value to Canners	Canners' Avg. Price Per Std. Case
	Std. Cases 1/	$	$
Maryland and North Carolina ...	39,463	184,807	4.68
Virginia	71,928	323,118	4.49
Total	111,391	507,925	4.56

1/ Preliminary.
2/ Cases of various sizes converted to the equivalent of 48 cans per case, each can with a net weight of 15 ounces. Practically the entire pack was canned in 15-ounce cans.

Alewives were canned in 1953 by 5 plants in Maryland, 11 in Virginia, and 1 in North Carolina.

Table 2 - U. S. Pack of Canned Alewives, 1948-1953

Year	Quantity	Net Weight	Value to Canners	Canners' Avg. Price Per Std. Case 2/
	Std. Cases 2/	Lbs.	$	$
1953 1/	111,391	5,012,595	507,925	4.56
1952	79,861	3,593,745	374,680	4.69
1951	127,760	5,749,200	604,314	4.73
1950	69,568	3,130,560	316,993	4.56
1949	111,994	5,039,730	469,398	4.19
1948	123,134	5,541,030	639,356	5.19

1/ Preliminary.
2/ Cases of various sizes converted to the equivalent of 48 cans per case, each can with a net weight of 15 ounces.

Alewife runs were reported to be heavy during 1953 and more could have been canned if market conditions had justified a larger pack.

Canners received an average of $4.56 per standard case for the 1953 pack, 3 percent less than the $4.69 received in 1952. From 1948 through 1953, only in 1949 ($4.19) did lower prices prevail (table 2).

* * * * *

ANCHOVIES: The United States pack of canned anchovies in 1953 totaled 1,061,995 standard cases, valued at $7,661,173, or an average price of $7.21 per standard case to the canners (table 1). California was the only state where anchovies were canned; 33 plants packed this product in 1953. Anchovies in tomato sauce comprised the bulk of the pack; the remainder was put up natural style.

Table 1 - California Canned Anchovy Pack by Style of Pack, 1953[1/]

Style of Pack	Quantity	Value to Canners	Canners' Avg. Price Per Std. Case
	Std. Cases[2/]	$	$
Natural, without sauce or oil	3,571	22,988	6.43
In tomato sauce	1,058,424	7,638,185	7.22
Total	1,061,995	7,661,173	7.21

1/Preliminary.
2/Cases of various sizes converted to the uniform basis of 100 cans, each can containing 5 ounces net.

Table 2 - California Canned Anchovy Pack by Size of Can and Case, 1953[1/]

Can and Case Sizes	Quantity	Value to Canners	Canners' Avg. Price Per Case
	Actual Cs.	$	$
5 ounces net (100 cans)	479,513	3,359,754	7.01
7½ ounces net (48 cans)	427,648	2,775,051	6.49
15 ounces net (48 cans)	190,678	1,526,368	8.00
Total	1,097,839	7,661,173	-

1/ Preliminary.

The 1953 pack of anchovies, which was the largest ever reported, increased 57 percent in quantity and 62 percent in value as compared with the 1952 pack (table 2).

Table 3 - California Canned Anchovy Pack, 1947-53

Year	Quantity	Value to Canners	Canners' Avg. Price Per Std. Case
	Std. Cases[2/]	$	$
1953[1/]	1,061,995	7,661,173	7.21
1952	674,286	4,737,391	7.03
1951	63,060	489,062	7.76
1950	38,096	227,496	5.97
1949	5,771	34,184	5.92
1948	102,903	755,458	7.34
1947	199,863	1,377,275	6.89

1/Preliminary.
2/Cases of various sizes converted to the uniform basis of 100 cans, each can containing 5 ounces net.

From a high of $7.76 per standard case in 1951, the average price to the canner dropped to $7.21 per standard case in 1953 (table 3).

* * * * *

CALIFORNIA SARDINES (PILCHARD): The 1953 pack of California sardines (pilchard) of 63,612 standard cases was valued at $653,131 to the canners (table 1). This was the smallest pack since the inception of the fishery. As recently as 1950 the pack of these fish amounted to over 5 million cases. Sardines were canned in 18 plants in California during 1953.

Table 1 - California Pack of Canned Sardines (Pilchard) by Style of Pack, 1953[1/]

Style of Pack	Quantity	Value to Canners	Avg. Price Per Std. Case[3/]
	Std. Cases[3/]	$	$
Natural, without sauce or oil	18,523	151,029	8.15
In tomato sauce	36,146	405,050	11.21
In mustard sauce sauce[2/]	8,943	97,052	10.85
Total	63,612	653,131	10.27

1/Preliminary.
2/Includes a small specialty pack of sardines (pilchards) in soy sauce.
3/Cases of various sizes converted to the uniform basis of 48 cans to the case. Each can containing 15 ounces net.

Canners received an average price of $10.27 per standard case in 1953 (table 3), an increase of $1.67 over the 1952 price. The 1953 average price was the highest on record--slightly above

that received by the canners in 1947 when the average price reached $10.01 per case.

Table 3 indicates the trend in production in the period since 1948. As a result of the disappearance of the sardines from California waters, the pack declined to 2,864,984 cases in 1951, and to only 106,746 cases in 1952.

Table 2 - California Pack of Canned Sardines (Pilchard), by Size of Can and Case, 1953 1/

Can and Case Size	Quantity	Value to Canners	Canners' Avg. Price Per Case
	Actual Cs.	$	$
1 pound cans:			
15 ounces net, oval (48 cans)	42,822	479,252	11.19
15 ounces net, tall (48 cans)	18,897	154,021	8.15
Other sizes converted to 15 ounces net (100 cans)	1,893	19,858	10.49
Total	63,612	653,131	-

1/ Preliminary.

Table 3 - California Pack of Sardines (Pilchards), 1948-53

Year	Quantity	Value to Canners	Canners' Avg. Price Per Std. Case
	Std. Case 1/	$	$
1953 2/	63,612	653,131	10.27
1952	106,746	918,072	8.60
1951	2,864,984	19,362,744	6.76
1950	5,070,805	26,345,609	5.20
1949	3,768,212	21,334,825	5.66
1948	2,654,149	21,892,893	8.24

1/ Cases of various sizes converted to the uniform basis of 48 cans to the case. Each can containing 15 ounces net.
2/ Preliminary.

* * * * *

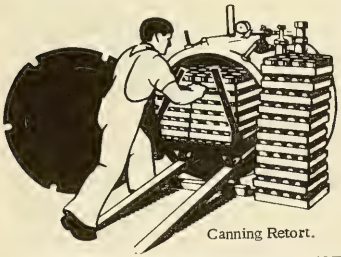
CLAMS AND CLAM PRODUCTS: The 1953 United States and Alaska pack of canned clams and clam products amounted to 1,645,335 cases, valued at $12,629,803

Table 1 - U. S. and Alaska Pack of Canned Clams and Clam Products by Type and Area, 1953 1/

Species and State	No. of Plants	Whole and Minced			Chowder, Juice, Broth, Bouillon, & Nectar			Total		
		Quantity	Value to Canners	Canners' Avg. Price Per Std. Case 2/	Quantity	Value to Canners	Canners' Avg. Price Per Std. Case 2/	Quantity	Value to Canners	Canners' Avg. Price Per Std. Case 2/
		Std. Cases 2/	$	$	Std. Cases 2/	$	$	Std. Cases 2/	$	$
Soft clams:										
Maine	5	20,002	345,595	17.28	287,825	1,804,888	6.27	307,827	2,150,483	6.99
Razor clams:										
Washington	4	6,759	135,497	20.05	-	-	-	6,759	135,497	20.05
Oregon	2									
Alaska	8	31,391	607,059	19.34	-	-	-	31,391	607,059	19.34
Total Razor Clams	14	38,150	742,556	19.46	-	-	-	38,150	742,556	19.46
Hard clams:										
Rhode Island	1									
New York	4									
New Jersey	2	228,711	2,494,795	10.91	1,037,447	6,910,198	6.66	1,226,158	9,404,993	7.67
Pennsylvania	2									
Delaware	1									
Maryland	1									
Washington	4									
California	1	27,008	307,507	11.39	6,061	21,968	3.62	33,069	329,475	9.96
Alaska	1	131	2,296	17.53	-	-	-	131	2,296	17.53
Total Hard Clams 4/	11	255,850	2,804,598	10.96	1,043,508	6,932,166	6.64	1,299,358	9,736,764	7.49
Grand Total	35	314,002	3,892,749	12.40	1,331,333	8,737,054	6.56	1,645,335	12,629,803	7.68

1/ Preliminary.
2/ Cases of various sizes converted to the equivalent of 48 No. 1 picnic cans, each can of whole or minced clams containing 5 ounces of meat, drained weight; and each can of chowder, juice, broth, bouillon, or nectar, 10 ounces net.
3/ Includes the pack of surf clams in Maine.
4/ Includes the pack of surf clams in New York, New Jersey, and Delaware; pismo clams in California; cockles in Alaska.

(table 1). This was a decrease of 53,656 cases, but an increase of $420,245 as compared with the previous year's production. The pack of canned clam chowder, juice, broth, bouillon, and nectar comprised 81 percent of the total pack; canned whole and minced clams accounted for the remaining 19 percent, compared with 78 and 22 percent, respectively, in 1952.



Canning Retort.

The 1953 production of canned clams and clam products is the second highest on record, being exceeded only by 1952 (table 2); while the total value received by the canners in 1953 was the highest ever.

Table 2 - U. S. and Alaska Pack of Canned Clams and Clam Products, 1943-53

Year	Whole and Minced			Chowder, Juice, Broth,	Total	
	Soft Clams 3/	Hard Clams 4/	Razor Clams	Bouillon, & Nectar	Quantity	Value to Canners
	Std. Cases 2/	Std. Cases 2/	Std. Cases 2/	Std. Cases 2/	Std. Cases 2/	$
1953 1/	20,002	255,850	38,150	1,331,333	1,645,335	12,629,803
1952	27,020	318,358	35,803	1,317,810	1,698,991	12,209,558
1951	58,550	277,100	55,097	1,110,861	1,501,608	11,773,909
1950	200,889	198,451	47,154	1,072,225	1,518,719	10,839,889
1949	155,129	101,191	41,657	888,083	1,186,060	8,779,018
1948	107,177	29,085	36,932	1,006,580	1,179,774	8,329,639
1947	33,968	24,852	47,406	1,151,424	1,257,650	8,642,235
1946	167,987	108,638	79,394	1,171,770	1,527,789	11,145,047
1945	64,425	238,475	63,703	533,429	900,032	7,391,098
1944	72,434	71,771	40,450	363,041	547,696	3,820,612
1943	47,746	28,344	40,340	348,364	464,794	2,802,420

Note: For explanation of footnotes see table 1.

* * * * *

CRAB MEAT: The United States and Alaska pack of canned crab meat in 1953 amounted to 114,886 standard cases, valued at $2,898,016 to the canners (table 1). East Coast and Gulf States packers canned 61 percent of the production; while the

Table 1 - U. S. and Alaska Pack of Canned Crab Meat by States and Species, 1953 1/

State	Species	Quantity	Value to Canners	Canners' Avg. Price Per Std. Case 2/
		Std. Cases 2/	$	$
Atlantic and Gulf States:				
Maine, North and South Carolina, and Alabama	Rock & Blue	54,714	1,324,399	24.21
Mississippi, and Louisiana	Blue	15,620	270,011	17.29
Total Atlantic and Gulf States		70,334	1,594,410	22.67
West Coast States:				
Washington	Dungeness	15,842	410,109	25.89
Oregon and California	Dungeness	8,044	207,867	25.84
Alaska	Dungeness	14,547	470,785	32.64
	King	6,479	210,845	32.54
Total West Coast States		44,552	1,303,606	29.26
Grand Total		114,886	2,898,016	25.22

1/ Preliminary.
2/ Cases of various sizes converted to the equivalent of 48 cans to the case, each can containing 6-1/2 ounces net.

remainder was put up in West Coast and Alaskan plants. A total of 39 plants packed crab meat in 1953: 2 plants each in Alabama and Mississippi; 3 plants in Louisiana; 4 in Oregon; 9 in Washington; 15 in Alaska; and 1 plant each in Maine, North Carolina, South Carolina, and Oregon.

The $6\frac{1}{2}$-ounce can continued as the most popular size can used for packing crab meat in 1953 (table 2).

Compared with previous years, the 1953 pack was the second lowest since 1945--the 1952 pack was the lowest. Production in 1953 was up 33 percent in quantity and 39 percent in value as compared with 1952, due mainly to increased production on the East Coast.

Packing crab meat for canning.

The canners' average price for canned crab meat in the Atlantic Coast and Gulf States was $22.67 per standard case in 1953, 10 percent higher than in 1952; while in the Pacific Coast States and Alaska the average price again reached a new high of $29.20, 4 percent above the previous year.

Table 2 - U. S. and Alaska Pack of Canned Crab Meat by Can and Case Size, 1953 1/

Can and Case Size	Quantity	Value to Canners	Canners' Avg. Price Per Case
	Actual Cases	$	$
5 ounces net (24 cans)	33,935	442,577	13.04
6-1/2 ounces net (24 cans)	48,591	467,988	9.63
6-1/2 ounces net (48 cans)	35,203	897,959	25.51
13 ounces net (24 cans)	2,323	63,409	27.30
Other sizes converted to standard cases (6-1/2 oz.--48 cans)	40,112	1,026,083	25.64
Total	160,064	2,898,016	-

1/ Preliminary.

Table 3 - U. S. and Alaska Pack of Canned Crab Meat, 1943-53

Year	Atlantic Coast and Gulf States			Pacific Coast States and Alaska			Total		
	Quantity	Value to Canners	Canners' Avg. Price Per Std. Case 1/	Quantity	Value to Canners	Canners' Avg. Price Per Std. Case 1/	Quantity	Value to Canners	Canners' Avg. Price Per Std. Case 1/
	Std. Cases 1/	$	$	Std. Cases 1/	$	$	Std. Cases 1/	$	$
1953 2/	70,334	1,595,410	22.67	44,552	1,303,606	29.26	114,886	2,898,016	25.22
1952	44,474	913,808	20.55	41,584	1,173,211	28.21	86,058	2,087,019	24.25
1951	60,592	1,280,342	21.13	89,353	2,306,216	25.81	149,945	3,586,558	23.92
1950	58,958	1,252,589	21.25	78,532	1,868,680	23.80	137,490	3,121,269	22.70
1949	46,975	943,120	20.08	114,854	2,547,765	22.18	161,829	3,490,885	21.57
1948	33,382	581,872	17.43	187,420	4,264,622	22.75	220,802	4,846,494	21.95
1947	33,696	667,487	19.81	106,120	2,037,904	19.20	139,816	2,705,391	19.35
1946	120,150	2,536,405	21.11	78,928	2,183,714	27.67	199,078	4,720,119	23.71
1945	29,788	484,869	16.28	25,726	398,898	15.51	55,514	883,767	15.92
1944	36,386	560,735	15.41	50,556	800,723	15.84	86,942	1,361,458	15.66
1943	26,716	412,310	15.43	48,592	782,173	16.10	75,308	1,194,483	15.86

1/ Cases of various sizes converted to the equivalent of 48 cans to the case, each can containing 6-1/2 ounces net.
2/ Preliminary.

* * * * *

OYSTERS: The United States pack of canned oysters in 1953 totaled 488,908 standard cases, valued at $6,559,309 to the processors (table 1). This was a decrease of 8 percent in quantity and 7 percent in value as compared with the 1952 pack. The Atlantic and Gulf States processed 77 percent of the pack, and the States

Table 1 - U. S. Canned Oyster Pack, by States, 1953 1/

State	Quantity	Value to Canners	Canners' Avg. Price Per Std. Case 2/
	Std. Cases 2/	$	$
South Carolina and Georgia . . .	53,911	683,441	12.68
Alabama	14,469	209,829	14.50
Mississippi	123,624	1,713,525	13.86
Louisiana.	182,217	2,515,046	13.80
Washington	109,704	1,377,037	12.55
Oregon	4,983	60,431	12.13
Total	488,908	6,559,309	13.42

1/ Preliminary.
2/ Cases of various sizes converted to the equivalent of 48 cans to the case, each can with 4-2/3 ounces (drained weight) of oyster meats.

Table 2 - U. S. Canned Oyster Pack, by Can and Case Size, 1953 1/

Can and Case Size	Quantity	Value to Canners	Canners' Avg. Price Per Case
	Actual Cases	$	$
4-2/3 ounces (24 cans)	415,437	2,857,268	6.88
4-2/3 ounces (48 cans)	171,147	2,405,932	14.06
6-1/2 ounces (24 cans)	136,492	1,115,086	8.17
6-1/2 ounces (48 cans)	2,127	36,819	17.31
Other sizes converted to standard cases	12,024	144,204	11.99
Total	737,227	6,559,309	-

1/ Preliminary.

Table 3 - U.S. Canned Oyster Pack, 1943-53

Year	Atlantic and Gulf States	Pacific Coast States	Total
	..... (Standard Cases 2/)		
1953 1/	374,221	114,687	488,908
1952	416,728	112,415	529,143
1951	334,194	132,140	466,334
1950	371,648	120,742	492,390
1949	338,929	113,989	452,918
1948	273,591	83,489	357,080
1947	318,550	91,937	410,487
1946	261,622	129,213	390,835
1945	220,847	5,117	225,964
1944	273,556	-	273,556
1943	344,931	937	345,868

1/ Preliminary.
2/ Cases of various sizes converted to the equivalent of 48 cans to the case, each can with 4-2/3 ounces (drained weight) of oyster meats.

of Washington and Oregon the remaining 23 percent. Oysters were canned in 16 plants in Mississippi, 12 in Louisiana, 5 in Washington, 4 in South Carolina, 3 plants each in Alabama and Oregon, and 1 in Georgia.

Eighty percent of the pack was put up in the 4-2/3 ounce size, 19 percent in the 6-1/2 ounce size, and the remaining 1 percent in other sizes (table 2).

A large drop in the 1953 pack on the Atlantic and Gulf coasts was offset slightly by a small increase on the Pacific Coast (table 3).

The packers received an average price of $13.42 per standard case for the 1953 pack, compared to $13.28 in 1952, $12.72 in 1951, and $14.41 in 1950 and 1949.

* * * * *

SALMON CANNED IN PACIFIC COAST STATES: The 1953 pack of canned salmon in the Pacific Coast States of California, Oregon, and Washington amounted to 1,049,547 standard cases, valued at $24,067,839 to the canners (table 1). The Puget Sound district of Washington canned 84 percent of the pack, the Columbia River districts of Oregon and Washington 15 percent, and the coastal districts of the 3 states the remaining 1 percent. Salmon were canned at 30 plants in Washington, 9 in Oregon, and 1 in California.

The 1953 pack was 18 percent greater in quantity and 10 percent higher in value as compared with 1952 (table 2). This was due to the fact that 1953 was a pink salm-

Table 1 - Pacific Coast States Canned Salmon Pack by Species and Area, 1953 1/

Species	Puget Sound			Columbia River			Coastal			Total	
	Quantity	Value to Canners	Canners' Avg. Price Per. Std. Case	Quantity	Value to Canners	Canners' Avg. Price Per. Std. Case	Quantity	Value to Canners	Canners' Avg. Price Per. Std. Case	Quantity	Value to Canners
	Std. Cases 2/	$	$	Std. Cases 2/	$	$	Std. Cases 2/	$	$	Std. Cases 2/	$
Chinook or king	3,985	83,394	21.43	97,320	3,267,303	33.57	987	16,995	17.22	102,292	3,368,692
Chum or keta	154,476	2,149,803	13.92	9,775	130,062	13.30	11,255	143,519	12.75	175,506	2,423,384
Pink	452,054	8,296,849	18.35	251	5,318	21.19	-	-	-	452,305	8,302,167
Red or sockeye	216,984	7,287,895	33.59	3,014	127,791	42.40	442	17,559	39.73	220,440	7,433,245
Silver or coho	54,943	1,237,717	22.53	24,219	676,237	27.92	442	8,776	20.80	79,584	1,922,730
Steelhead	-	-	-	19,420	616,621	31.75	-	-	-	19,420	616,621
Total	882,442	19,057,658	21.60	153,999	4,823,332	31.32	13,106	186,849	14.26	1,049,547	24,067,839

1/Preliminary. Does not include Alaska salmon pack.
2/"Standard cases" represent cases of various sizes converted to the equivalent of 48 1-pound cans, each can containing 16 ounces net.

on year (pink salmon have a two-year cycle and are taken in volume in Puget Sound only in odd-numbered years), and in spite of a decrease in all other varieties except steelhead. The largest decreases were for silver or coho (62 percent) and chum or keta (46 percent).

The average price of all salmon packed in the Pacific Coast States in 1953 was $22.93 per standard case to the canners as compared with $24.61 in 1952. Columbia

Table 2 - Pacific Coast States Canned Salmon Pack, by Species, 1943-53

Year	Chinook or King	Chum or Keta	Pink	Red or Sockeye	Silver or Coho	Steelhead	Total
	Standard Cases 1/						
1953 2/	102,292	175,506	452,305	220,440	79,584	19,420	1,049,547
1952	105,208	326,251	4,711	225,160	209,847	18,979	890,156
1951	157,231	262,037	441,605	163,657	121,882	14,862	1,161,274
1950	151,928	539,982	2,277	136,741	160,625	10,266	1,001,819
1949	157,861	219,652	553,987	107,801	85,143	8,881	1,133,325
1948	285,266	276,158	4,480	97,907	125,647	20,617	810,075
1947	300,029	185,178	628,300	37,095	155,842	22,782	1,329,226
1946	164,898	68,762	160	283,935	25,505	17,029	560,289
1945	139,262	1,214	301,376	53,130	43,580	19,207	557,769
1944	167,070	1,669	490	38,061	17,809	20,489	245,588
1943	134,225	9,387	62,025	21,610	32,383	16,259	275,889

1/ Cases of various sizes converted to the equivalent of 48 1-pound cans, each can containing 16 ounces net.
2/ Preliminary

River canned salmon had the highest average price--$31.32 per standard case--due to the large percentage of chinook salmon in the pack from that area. The 1952 average on the Columbia River was $33.55 per case. Salmon canned in the Puget Sound area averaged $21.60 per standard case to the canner in 1953 and coast salmon averaged $14.26, compared with $22.68 and $18.46, respectively, in 1952.

* * * * *

Canning tuna.

TUNA AND TUNALIKE FISH: The pack of canned tuna and tunalike fish in the United States, Hawaii, and Puerto Rico during 1953 set a new record of 9,580,026 standard cases, valued at $126,257,608 to the canners (table 1). This is the first year that tuna was canned in Puerto Rico.

Yellowfin tuna was the leading species canned with 3,058,985 cases, valued at $40,097,135. The second most important species was albacore (white-meat tuna) with 2,690,635 cases, valued at $37,460,824; followed by skipjack with 2,529,539 cases, valued at $32,982,103 (table 2).

California, which packed 86 percent of the total, continued as the leading state canning tuna. The balance was

Table 1 - Canned Tuna and Tunalike Fish Pack by Species and Area, 1953 1/

Species	California			Washington, Oregon, and Hawaii			Atlantic Coast and Puerto Rico		
	Quantity	Value to Canners	Canners' Avg. Price Per Std.Case2/	Quantity	Value to Canners	Canners' Avg. Price Per Std.Case2/	Quantity	Value to Canners	Canners' Avg. Price Per Std.Case2/
	Std. Cases2/	$	$	Std. Cases2/	$	$	Std.Cases2/	$	$
Tuna:									
Albacore	2,100,115	29,025,314	13.82	590,520	8,435,510	14.28	-	-	-
Yellowfin	3,058,985	40,097,135	13.11	-	-	-	-	-	-
Bluefin	218,865	2,888,125	13.20	-	-	-	-	-	-
Skipjack	2,529,539	32,982,103	13.04	-	-	-	-	-	-
Tonno	186,068	2,639,125	14.18	-	-	-	-	-	-
Miscellaneous	12,135	127,543	10.51	3/ 464,143	3/5,844,981	12.59	4/246,689	4/2,704,359	10.96
Total Tuna	8,105,707	107,759,345	13.29	1,054,663	14,280,491	13.54	246,689	2,704,359	10.96
Tunalike fishes:									
Bonito	70,853	624,172	8.81	-	-	-	-	-	-
Yellowtail	102,114	889,241	8.71	-	-	-	-	-	-
Total Tuna-like Fishes	172,967	1,513,413	8.75	-	-	-	-	-	-
1953 Grand Total	8,278,674	109,272,758	13.20	1,054,663	14,280,491	13.54	246,689	2,704,359	10.96
1952 Grand Total	7,969,866	98,021,745	12.30	940,824	12,623,184	13.42	204,512	2,355,904	11.52
1951 Grand Total	7,454,315	88,830,304	11.92	645,232	8,653,963	13.41	137,178	1,561,939	11.39

1/ Preliminary. Includes dietetic and baby food packs.
2/ Cases of various sizes converted to the equivalent of 48 No. 1/2 tuna cans to the case, each can 7 ounces net weight for solid meat, 6-1/2 ounces net weight for chunks, or 6 ounces net weight for flakes or grated.
3/ Includes mostly yellowfin and skipjack; and some albacore, bluefin, and big-eyed tuna.
4/ Includes albacore, yellowfin, bluefin, skipjack, and little tuna.

Table 2 - Canned Tuna and Tunalike Fish Pack by Species, 1951-53

Species	1953 Total 1/			1952 Total			1951 Total		
	Quantity	Value to Canners	Canners' Avg. Price Per Std.Case2/	Quantity	Value to Canners	Canners' Avg. Price Per Std.Case2/	Quantity	Value to Canners	Canners' Avg. Price Per Std.Case2/
	Std. Cases2/	$	$	Std. Cases2/	$	$	Std.Cases2/	$	$
Tuna:									
Albacore	2,690,635	37,460,824	13.92	2,588,326	34,129,900	13.19	1,563,753	19,958,605	12.76
Yellowfin	3,058,985	40,097,135	13.11	4/4,016,878	4/48,540,195	12.08	4,070,995	48,365,425	11.88
Bluefin	218,865	2,888,125	13.20	94,898	1,179,701	12.43	5/ 71,922	797,817	11.09
Skipjack	2,529,539	32,982,103	13.04	1,641,278	20,379,405	12.42	2,126,800	25,238,212	11.87
Tonno	186,068	2,639,125	14.18	146,567	1,990,523	13.58	160,626	2,180,231	13.57
Misc.	3/ 722,967	8,676,883	12.00	3/ 400,255	4,842,975	12.10	3/ 137,178	1,561,939	11.39
Total Tuna	9,407,059	124,744,195	13.26	8,888,202	111,062,699	12.50	8,131,274	98,102,229	12.06
Tunalike Fish:									
Bonito	70,853	624,172	8.81	47,213	415,165	8.79	14,469	134,364	9.29
Yellowtail	102,114	889,241	8.71	179,787	1,522,969	8.47	90,982	809,613	8.90
Total Tuna-like Fish	172,967	1,513,413	8.75	227,000	1,938,134	8.54	105,451	943,977	8.95
Grand Total	9,580,026	126,257,608	13.18	9,115,202	113,000,833	12.40	8,236,725	99,046,206	12.02

1/ Preliminary. Includes dietetic and baby food packs.
2/ Cases of various sizes converted to the equivalent of 48 No. 1/2 tuna cans to the case, each can 7 ounces net weight for solid meat, 6-1/2 ounces net weight for chunks, or 6 ounces net weight for flakes or grated.
3/ Includes some albacore, yellowfin, bluefin, skipjack, little tuna, and big-eyed tuna.
4/ Includes small production of light meat and dark meat packed from mixed tuna species.
5/ Includes small production of skipjack tuna.

canned in Washington and Oregon, and a small pack in Massachusetts, Pennsylvania, Maryland, South Carolina, and Puerto Rico. Dietetic and baby food tuna packs are included in these totals.

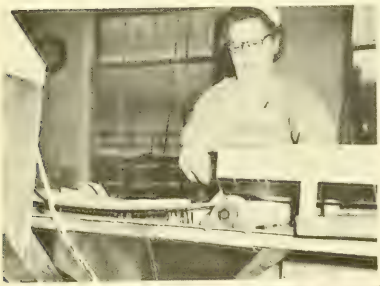
Table 3 - Canned Tuna and Tunalike Fish Pack, 1942-53 1/

Year	Quantity	Value to Canners	Canners' Avg. Price Per Std. Case 2/	Year	Quantity	Value to Canners	Canners' Avg. Price Per Std. Case 2/
	Std. Cases 2/	$	$		Std. Cases 2/	$	$
1953 3/	9,580,026	126,257,608	13.18	1947	5,894,495	90,609,175	15.37
1952	9,115,202	113,000,833	12.40	1946	4,784,484	59,135,823	12.36
1951	8,236,725	99,046,206	12.02	1945	4,531,565	47,407,451	10.46
1950	9,016,541	112,830,094	12.51	1944	3,560,020	40,836,117	11.80
1949	7,290,320	97,710,325	13.40	1943	2,696,073	31,430,189	11.66
1948	7,037,758	112,612,296	16.00	1942	2,484,749	30,742,493	12.37

1/ Data for years prior to 1952 do not include pack in Hawaii.
2/ Cases of various sizes converted to the equivalent of 48 No. 1/2 tuna cans to the case, each can 7 ounces net weight for solid meat, 6-1/2 ounces net weight for chunks, or 6 ounces net weight for flakes or grated.
3/ Preliminary. Includes dietetic and baby food packs.

The average price per standard case in 1953 ($13.18) was 6.3 percent higher than in 1952 ($12.40), but 17.7 percent below the record high of $16.00 per case in 1948 (table 3).

U. S. Fish Stick Production, January-June 1954



Pouring batter on fish sticks prior to breading in a leading Gloucester fishery products plant.

The United States production of cooked and uncooked fish sticks in June 1954 amounted to nearly 4½ million pounds--the largest ever reported for any one month. The data in table 1 include the yield of 33 plants, many of which packed for more than one company, and the figures are believed to represent practically the entire United States pack of fish sticks.

Fish sticks were produced throughout 1953, but quantity production did not begin until July of that year. Revised data on the monthly production during 1953 are presented in table 2.

Table 1 - U. S. Production of Fish Sticks, January-June 1954

Month	Cooked	Uncooked	Total
	(Pounds)		
January	2,491,000	335,000	2,826,000
February	2,920,600	321,300	3,241,900
March	3,650,300	439,800	4,090,100
April	3,357,900	450,600	3,808,500
May	3,463,000	445,700	3,908,700
June	4,072,500	361,200	4,433,700
Total	19,955,300	2,353,600	22,308,900

Table 2 - U. S. Production of Fish Sticks (Cooked and Uncooked) by Months, 1953

Month	Lbs.	Month	Lbs.
January	115,000	July	416,600
February	133,000	August	454,400
March	148,000	September	809,500
April	34,900	October	1,434,900
May	21,800	November	1,901,800
June	30,800	December	2,001,200
		Total	7,501,900

U. S. Foreign Trade

EDIBLE FISHERY PRODUCTS, MAY 1954: United States imports of fresh, frozen, and processed edible fish and shellfish during May 1954 totaled 69.4 million pounds (valued at $18.2 million), according to the May United States Foreign Trade, a Department of Commerce publication (see table). This is a decrease of 10 percent in quantity and 8 percent in value as compared with April imports of 76.7 million pounds (valued at $19.7 million). Compared with a year earlier, May imports were higher by 39 percent in quantity and 25 percent in value.

UNITED STATES FOREIGN TRADE IN EDIBLE FISHERY PRODUCTS, MAY 1954 AND COMPARISONS

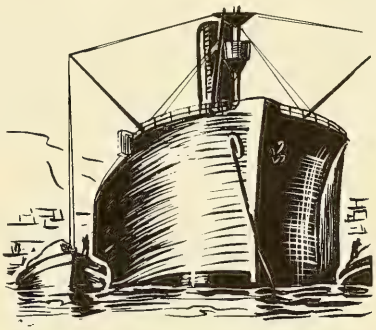
Item	May 1954		May 1953		Year 1953	
	Quantity	Value	Quantity	Value	Quantity	Value
	1,000 Lbs.	Million $	1,000 Lbs.	Million $	1,000 Lbs.	Million $
IMPORTS:						
Fish & shellfish: Fresh, frozen, & processed1/	69,368	18.2	49,904	14.6	724,656	193.2
EXPORTS:						
Fish & shellfish: Processed1/ only (excluding fresh and frozen)	3,081	0.7	6,645	1.5	58,920	14.4

1/ Includes pastes, sauces, clam chowder and juice, and other specialties.
SOURCE: UNITED STATES FOREIGN TRADE (Trade by Commodity), Summary Report FT 930, May 1954, U. S. Department of Commerce.

Exports of processed edible fish and shellfish (excluding fresh and frozen) in May 1954 totaled over 3.0 million pounds (valued at $0.7 million)--lower by 4.7 percent in quantity but unchanged in value as compared with April exports of 3.2 million pounds (valued at $0.7 million). May exports were down 54 percent in quantity and 53 percent in value as compared with a year earlier.

* * * * *

JANUARY-MAY 1954 TRENDS: Imports: Substantial increases in most of the leading fishery products imports during the first five months of 1954 over the similar period of 1953 are shown by preliminary data compiled by the Fish and Wildlife Service from data collected by the Bureau of Census.



United States imports of groundfish (including ocean perch) fillets during January-May 1954 were 39 percent above those of the same period a year ago. This gain was accounted for principally by greater imports from Iceland.

Among the tuna and tunalike items, imports of fresh and frozen tuna showed an increase of 48 percent above the 5-months' period of 1953, tuna canned in brine was 64 percent greater, and bonito canned in oil increased by 44 percent.

Fish-meal imports showed additional gains during May with the result that the total imports for the first 5 months of 1954 were 28 percent larger than those during the same period a year earlier.

Imports of sardines canned in oil were 7 percent below those of January-May of a year ago, but imports of sardines canned not in oil were up 142 percent.

U. S. Fish-Oil Exports by Country of Destination, 1953 With Comparisons

Country of Destination	1953 1/	1952 1/	1951	1950	Average 1935-39
	. . . . . (Short Tons)				
NORTH AMERICA:					
British West Indies	-	-	113	-	12
Canada	2,108	488	1,734	1,696	458
Cuba	87	100	71	181	155
Mexico	114	122	63	128	45
Other	1	3	5	8	59
Total	2,310	713	1,986	2,013	729
SOUTH AMERICA	63	38	110	60	96
EUROPE:					
Bel.-Luxem.	764	8	282	20	8
France	7	149	1,162	47	19
Western Germany	36,155	2/ 6,232	6,050	5,645	126
Italy	28	220	14	7	15
Netherlands	8,913	11,967	6,024	20,705	15
Norway	1,606	-	4,514	-	10
Switzerland	3,115	3,140	4,027	8,891	15
Other	322	43	-	34	92
Total	50,910	2/21,759	22,073	35,349	300
ASIA:					
Phil., Rep. of	860	546	744	540	66
Other	37	20	7	25	24
Total	897	566	751	565	90
OTHER	53	3	-	-	19
Grand total	54,233	2/23,079	24,920	37,987	1,234

1/ Preliminary. 2/ Revised.

Shrimp imports were 16 percent greater during January-May 1954 than those of the similar period of 1953. Among items showing declines were canned crab meat imports which declined by 34 percent and tuna canned in oil which declined by 75 percent.

Exports: Exports of canned salmon during the first 5 months of 1954 were 160 percent above those of the same period of 1953, reflecting increased shipments to the United Kingdom made early in 1954.

Fish-oil exports were 89 percent greater than those during the 5-months' period of 1953. Fish-oil exports in 1953 reached record levels. Exports of canned sardines and mackerel were below those of the same period a year ago.

* * * * *

FISH-OIL EXPORTS AT RECORD HIGH IN 1953: United States exports of fish oil in 1953 totaled 54,233 short tons (see table), more than twice the quantity exported in the preceding year, and 43 percent above the previous record exportation in 1950. About 94 percent of the total was sold to Europe with the largest single volume--36,155 tons--going to Western Germany. The large export to Western Germany last year was responsible for the over-all increase, as shipments to that country in 1952 were only 6,232 tons. The Netherlands, Switzerland, Canada, and Norway also took significant quantities, states the March 22 Foreign Crops and Markets, a Department of Agriculture publication.

U. S. Tuna Catch Can Be Greatly Increased

The United States catch of tuna could be greatly increased by adoption of methods for taking subsurface stocks not now exploited and by fishing new areas in the mid-Pacific, the Fish and Wildlife Service reports as the result of a comprehensive study made about a year ago.1/

Tuna constitutes one of the world's leading fishery resources and the United States catch, which has averaged about 350 million pounds annually in recent years, is one of the most valuable products taken by fishermen.

Since the war, increased demand for canned tuna in the United States has stimulated world interest in the

1/Special Scientific Report: Fisheries No. 104 (Survey of the Domestic Tuna Industry).

tuna fisheries. The tuna fleet consists of craft on which little improvement can be made to increase the present efficiency of production. Unless some revolutionary means of catching tuna is developed to a practical stage, there appears to be little chance of curtailing production costs through increased effectiveness per-unit-of-crew effort.

An important aspect of the tuna fishery is live bait, since 70 percent of the total catch of tuna by United States vessels is made with it. Between 85 and 90 percent of the bait supply is found in foreign countries. A limited amount of research concerning synthetic bait has been started. Development of a suitable synthetic bait or substitute source of natural bait would benefit the tuna industry.

At least 50 percent of the weight of the whole tuna, as landed, is not canned. The so-called "waste" material is used to produce liver oils, solubles, liquid fertilizer, oil, and meal.

The two leading canned fish products for human consumption, tuna and salmon, show divergent consumption trends--the demand for tuna is increasing while that for salmon has declined.

Wholesale Prices, July 1954

Although production continued liberal, an improvement in demand caused an over-all upward movement in July wholesale prices for fishery products. The July 1954 over-all edible fish and shellfish (fresh, frozen, and canned) wholesale index was 103.5 percent of the 1947-49 average (see table)--6.3 percent more than the June index and 1.0 percent above a year earlier.


Wrapping fillets.

Lighter groundfish landings in New England and a good demand boosted July ex-vessel prices for offshore drawn large haddock at Boston 99.0 percent above June and 36.3 percent above July 1953. But prices for scrod haddock (not included in the index) did not fare as well. At New York during July, slackening off of arrivals strengthened the prices for fresh Western halibut; but heavier seasonal receipts accounted for the lower salmon prices. The market for fresh-water fish at New York and Chicago in July was somewhat stronger than in June, but it was not up to the level reported a year earlier. The drawn, dressed, or whole finfish subgroup index for July was 21.3 percent above June and 17.7 percent higher than in July 1953.

In spite of the higher prices for offshore large haddock, July fresh haddock fillet prices remained steady at the June level. A drop in fresh shrimp prices at New York City was principally responsible for the decline of 2.0 percent in the fresh processed subgroup from June to July, The index for this subgroup was 14.8 percent lower than in July 1953.

A steady demand for frozen processed fish and shellfish during July stabilized prices for these products at June levels. Compared with July 1953, however, the subgroup index for frozen processed fishery products this July was 13.1 percent lower principally because of substantially lower prices (down 37.0 percent) for frozen shrimp and flounder fillets (down 7.3 percent) which were not completely offset by higher prices for frozen haddock (up 21.3 percent) and ocean perch (up 15.5 percent) fillets.

A break in canned tuna and Maine sardine prices accounted for the decline of 1.3 percent from June to July in the canned fishery products subgroup index. This

Table 1 - Wholesale Average Prices and Indexes for Edible Fish and Shellfish, July 1954 and Comparisons

Group, Subgroup, and Item Specification	Point of Pricing	Unit	Avg. Prices1/ ($)		Indexes (1947-49=100)			
			July 1954	June 1954	July 1954	June 1954	May 1954	July 1953
ALL FISH & SHELLFISH (Fresh, Frozen, & Canned)					103.5	97.4	103.7	102.5
Fresh & Frozen Fishery Products:					109.7	2/ 98.8	2/106.9	107.2
Drawn, Dressed, or Whole Finfish:					119.0	2/ 98.1	107.1	101.1
Haddock, lge., offshore, drawn, fresh	Boston	lb.	.12	.06	119.0	59.8	102.1	87.3
Halibut, West., 20/80 lbs., drsd., fresh or froz.	New York	lb.	.34	.33	106.0	100.6	97.5	102.9
Salmon, king, lge. & med., drsd., fresh or froz.	New York	lb.	.57	.63	128.4	140.5	120.8	110.7
Whitefish, L. Superior, drawn, fresh	Chicago	lb.	.43	.43	105.4	105.4	114.0	112.8
Whitefish, L. Erie pound or gill net, rnd., fresh	New York	lb.	.55	.45	111.2	91.0	123.3	91.0
Lake trout, domestic, No. 1, drawn, fresh	Chicago	lb.	.51	.49	104.5	99.4	79.9	107.6
Yellow pike, L. Michigan, rnd., fresh	New York	lb.	.61	.38	143.0	2/ 89.1	84.4	143.6
Processed, Fresh (Fish & Shellfish):					98.7	100.7	107.8	115.9
Fillets, haddock, sml., skins on, 20-lb. tins	Boston	lb.	.22	.22	74.8	74.8	107.2	93.6
Shrimp, lge. (26-30 count), headless, fresh	New York	lb.	.59	.60	93.3	94.8	99.6	124.9
Oysters, shucked, standards	Norfolk	gal.	4.50	4.63	111.3	114.4	117.5	111.3
Processed, Frozen (Fish & Shellfish):					97.6	97.6	104.5	112.3
Fillets: Flounder (yellowtail), skinless, 1-lb. pkg.	Boston	lb.	.39	.39	100.8	100.8	96.9	108.7
Haddock, sml., skins on, 1-lb. pkg.	Boston	lb.	.32	.32	100.4	100.4	105.1	82.8
Ocean perch, skins on, 1-lb. pkg.	Boston	lb.	.29	.29	116.8	116.8	117.8	101.1
Shrimp, lge. (26-30 count), 5-lb. pkg.	Chicago	lb.	.55	.55	84.1	84.1	99.5	133.4
Canned Fishery Products:					94.2	95.4	98.8	95.5
Salmon, pink, No. 1 tall (16 oz.), 48 cans/cs.	Seattle	case	18.70	18.70	99.1	99.1	99.1	100.4
Tuna, lt. meat, chunk, No. 1/2 tuna (6-1/2 oz.), 48 cans/cs.	Los Angeles	case	13.05	13.25	94.1	95.5	102.4	92.4
Sardines, Maine, keyless oil, No. 1/4 drawn (3-1/4 oz.), 100 cans/cs.	New York	case	6.50	6.95	69.2	74.0	81.9	71.3

1/Represent average prices for one day (Monday or Tuesday) during the week in which the 15th of the month occurs. These prices are published as indicators of movement and not necessarily absolute level. Daily Market News Service "Fishery Products Reports" should be referred to for actual prices.
2/Revised.

index was 1.4 percent below July 1953. Although salmon prices were unchanged from June to July, they were 1.4 percent lower than a year earlier. Compared with July 1953, prices this July for canned tuna were up 1.8 percent and for canned Maine sardines were down 2.9 percent.

DO YOU KNOW:

That Billingsgate has been the fish market for the population of London for hundreds of years. It is impossible to say how many people were catered to when the market started as no census was taken then, but it is known that 300 years ago the figure was a quarter of a million. Today, with Greater London, it is about 10 to 12 million people.

Billingsgate handles from 400 to 600 metric tons of fishery products per day, but on occasions the amount is considerably larger.

--Fish Trades Gazette, July 24, 1954,

International

BENELUX COUNTRIES EASE IMPORT RESTRICTIONS

The Benelux countries--Belgium, the Netherlands, and Luxembourg--have freed most commodities for import from the United States and other dollar areas without quantitative restrictions, the Bureau of Foreign Commerce, U. S. Department of Commerce, reported in a June 11 release.

Canned fish are among the commodities which now may be freely imported from the dollar areas.

The Netherlands Government has estimated that items covered on the common list of freed commodities represent about 85 percent of Netherlands imports from the United States in 1953. Although no corresponding estimates have been made for Belgium and Luxembourg, their percentage of liberalized U. S. imports probably is close to that of the Netherlands.

Formalities to be observed in connection with the importation of commodities on the common list are few. The Netherlands Government requires that a license application must be submitted to appropriate authorities, but licenses will be granted automatically and will carry with them the right to foreign exchange. Ordinarily, only a declaration to an authorized foreign-exchange bank to the effect that specified dollar goods are to be imported is required to obtain the necessary foreign exchange in Belgium-Luxembourg.

Once the commodities have been imported into the territory of one of the Benelux countries they will be allowed to move freely within the entire area.

Omission of commodities from the common list does not necessarily mean their importation will be restricted. It is expected that many nonlisted commodities will be admitted freely, and that import restrictions will be applied only in relatively few instances.

Information as to whether a specific commodity is included on the list may be obtained from the European Division, Bureau of Foreign Commerce, U. S. Department of Commerce, Washington 25, D. C.

INTERNATIONAL CONGRESS OF REFRIGERATION

NINTH MEETING AT PARIS IN 1955: The Ninth International Congress of Refrigeration was scheduled to meet at Paris, France, August 31 to September 15, 1955. Working sessions were to be held in the conference rooms and the lecture halls of the Sorbonne in Paris. The Eighth Congress was held in London in 1951.

The program was to cover all phases of the refrigeration industries, including the freezing and storing of fish.

NORTH PACIFIC FISHERIES COMMISSION

JAMES APPOINTED TEMPORARY DIRECTOR: Milton C. James has been appointed temporary director of the International North Pacific Fisheries Commission,

effective August 1, according to Commission Chairman Bates. James is a former Assistant Director of the U. S. Fish and Wildlife Service, having retired from Federal Government service in 1952. He also served as U. S. Commissioner on the International Pacific Halibut Fisheries Commission; and more recently, since his retirement from Federal service, acted as consultant to the Department of Fisheries of Washington State.

WHALING

WORLD WHALE- AND SPERM-OIL PRODUCTION, 1953/54: World production of whale and sperm oils during 1953/54 is forecast at 455,000 and 60,000 short tons, respectively, as compared with 420,000 and 55,000 tons in 1952/53. The increase in both of these oils is due mainly to larger returns from Antarctic pelagic (open sea) operations, according to the June 14 Foreign Crops and Markets, a Department of Agriculture publication.

Antarctic production of both whale and sperm oil in the recent 1953/54 whaling season was around 392,000 tons, according to provisional data, or 5 percent larger than the corresponding outturn of the preceding season. Whale-oil output increased by 4 percent to 366,793 tons and sperm oil by 19 percent to 25,369 tons. The larger production of whale oil can be attributed to the fact that in the past season the catch of baleen whales closely approximated the permissible catch limit of 15,500 blue-whale units (established by international agreement), while in 1952/53 the total catch amounted to only 14,855 units, or considerably short of the 16,000-unit quota allowed. Since no maximum quota has been established for the catch of sperm whales, the increased output of sperm oil in 1953/54 was due largely to a more favorable price and demand situation than that which prevailed during the previous season.

There were 17 expeditions operating in the 1953/54 Antarctic season, or one more than in 1952/53. Norway, with 9 factoryships, was again the leading producer of whale oil followed by the United Kingdom, Japan, the Soviet Union, the Union of South Africa, and the Netherlands.

Antarctic Pelagic Whale- and Sperm-Oil Production, 1953/54 (Preliminary)

Country	Whale Oil		Sperm Oil		Total	
	1953/54	1952/53	1953/54	1952/53	1953/54	1952/53
	(Short Tons)					
Norway	173,427	138,226	5,812	5,125	179,239	143,351
United Kingdom	79,081	73,623	8,899	10,230	87,980	83,853
Japan	41,220	37,443	5,946	1,259	47,166	38,702
Union of South Africa	25,929	26,299	1,557	1,786	27,486	28,085
The Netherlands	16,919	19,001	1,299	358	18,218	19,359
U. S. S. R.	30,217	28,201	1,856	782	32,073	28,983
Panama	-	28,924	-	1,717	-	30,641
Grand total1/	366,793	351,717	25,369	21,257	392,162	372,974

1/Does not include production of South Georgia shore stations. In 1952/53 this production totaled 21,161 tons of whale oil and 1,239 tons of sperm oil.

Antarctic production of whale oil, including that which is produced by 3 South Georgia shore-stations, usually accounts for around 90 percent of the world supply. Output of whale oil by the South Georgia stations in 1953/54 is believed to have increased by as much as 75 percent from the 21,161 tons produced in 1952/53. It is expected that this year's production of whale oil from the numerous shore stations operating in scattered parts of the world will be at least as large as in 1952/53 when some 46,000 tons were produced.

Sperm-oil production during 1953/54 from Antarctic operations amounted to about 27,000 tons against 22,500 tons in 1952/53. Production from other areas of

the world can only be roughly estimated as data regarding normally extensive North Pacific sperm whaling by the Soviet Union are not yet available for 1953. In the 3 years 1950-52, Soviet Union output of sperm oil from this area averaged about 12,000 tons, according to reports.

As of April 2, 1954, the entire pelagic production of whale oil had been sold at prices ranging from £67-10-0 to £81-10-0 per long ton (US$169-204 per short ton). At that time only the Argentine South Georgia land-station outturn, estimated to be around 11,000 tons, was still unsold. In addition, there was a carryover from the 1952/53 Antarctic season of about 17,000 tons which was in storage in the Netherlands. The forthcoming Australian summer production (in 1953 Australia produced 19,100 tons of whale oil) has been sold in advance at prices between £72-10-0 to £86-0-0 per long ton (US$181-215 per short ton). It is reported, also, that a large part of other summer production, including that of Norway and Iceland, has been contracted for at similar prices.

* * * * *

SIXTH CONFERENCE OF INTERNATIONAL WHALING COMMISSION AT TOKYO: The International Whaling Commission opened its sixth conference on July 19 in Tokyo, Japan, and was attended by representatives of the contracting parties, including the U. S. S. R., according to a July 16 U. S. Embassy dispatch from Tokyo.

The United States delegate was Dr. Arthur R. Kellogg, Director of the U. S. National Museum, with Mr. William M. Terry, U. S. Fish and Wildlife Service, and Commander J. P. Martin, U. S. Coast Guard, as advisers.

JAPANESE PEARL FISHING IN AUSTRALIAN WATERS IN 1954

Details of the conditions under which Japanese pearling vessels would be permitted by the Australian Government to operate on a limited scale were announced May 8 by the Australian Minister for Commerce and Agriculture. These conditions will be in effect during the 1954 season and subsequently until a decision is given by the International Court of Justice in the legal proceedings on the Japanese claims.

The Minister in his press statement recalled that in November 1953 the Australian Government had agreed, subject to certain stipulated conditions, that it would not attempt to prevent the Japanese from having access to the International Court of Justice in regard to issues arising from the Australian Pearl Fisheries Act. The issues related to the contention of the Japanese Government that the Australian Pearl Fisheries Act and related measures affecting pearling operations were not applicable to Japanese vessels outside the limits of Australian territorial waters. Because some time would no doubt elapse before the case could be heard and a decision be given by the Court, the Australian Government had informed the Japanese Government that its willingness for the matter to go to the Court was subject to the Japanese Government's undertaking that, pending the Court's decision, pearling by Japanese in waters within the scope of the Pearl Fisheries Act would be in conformity with the Australian Government's requirements.

The Minister stated that the Japanese Government had now advised the Australian Government of its acceptance of the conditions laid down by the Australian Government limiting the extent of operations by Japanese pearling vessels during the 1954 and subsequent pearling seasons until the legal position was clarified by the International Court's decision.

He further explained that the Japanese vessels will conform with all the provisions of the Australian Pearl Fisheries Act and Regulations. During the 1954 season Japanese vessels will not take any greater quantity of pearl shell than was taken by the Japanese pearling fleet in the 1953 season. The Australian Government will be prepared to issue licenses to no more than 25 Japanese pearling luggers and a mothership--the same number as operated in Australian waters in 1953--and for divers and divers' tenders who would engage in pearling operations on these vessels.

Pearl Oyster (Avicula margaritifera)

The Minister stated further that the Japanese vessels will operate only in specified areas off the Northern Territory designated by the Australian Government, and nowhere less than 10 miles from land. The areas in which the Japanese will be permitted to dive for pearl shell will be those generally farthest removed from Darwin and in which consequently Australian pearling vessels based on Darwin are not dependent to any large extent for their take. Further, Japanese vessels will be permitted to anchor for weathering purposes only at locations specially designated by the Australian Government, and will not land at all except for very special reasons and with the prior approval of the Australian Government.

Under the Australian legislation the Japanese vessels will observe any catch limits imposed in specific areas; will not take pearl shell smaller than the prescribed minimum sizes; will furnish regularly the prescribed returns giving details of take from time to time in the specified areas; and will be subject to inspection on the same basis as Australian pearlers.

The Minister stressed that observance by the Japanese of the provisions of the Australian Pearl Fisheries Act and Regulations will insure that the conservation requirements of the Australian pearling legislation will be fully observed. In finalizing these arrangements the Australian Government had taken action which will safeguard Australia's interests in the pearling industry in waters adjacent to its coasts.

Note: See Commercial Fisheries Review, July 1954, p. 38.

TRADE AGREEMENTS

ICELANDIC-RUSSIAN BARTER AGREEMENT INCLUDES FISH: In accordance with the two-year agreement signed by Iceland and the U. S. S. R. in 1953, negotiations took place recently regarding the commodities involved in the coming months. During the next 18-months' period, Iceland will ship to Russia one-third of its total production of frozen fish. Icelandic exports of frozen fish and salted herring will be increased from 34,000 metric tons in 1954 to between 40,000 and 50,000 tons in 1955. No fishery products will be shipped from Russia. The total trade in each direction is estimated at US$17 million. In 1953 the total Icelandic exports to all countries amounted to US$43 million.

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NORWEGIAN-DANISH AGREEMENT INCLUDES FISHERY PRODUCTS: A Commodity Exchange Agreement including fishery products was signed at Copenhagen, Denmark, on April 9 to cover trade between Norway and Denmark in the year ending March 31, 1955.

Norwegian-Danish trade is to a large extent in items on each country's OEEC free list. The agreement provides, however, for somewhat larger imports by each country of certain nonfree-listed items. Danish imports will include fish and fish products. Norway will import miscellaneous commodities, but no fishery products.

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SOUTH KOREAN-PHILIPPINE AGREEMENT INCLUDES FISHERY PRODUCTS: South Korean representatives and a Philippine trade mission in Seoul have reached tentative agreement on barter trade amounting to US$3 million a year each way, according to the May 21 issue of The Fishing News, a British trade paper.

South Korea plans to export to the Philippines US$2 million worth of salted dried fish, dried sea weed, canned food, agar-agar, and the remaining US$1 million in other materials. No fishery products are involved in shipments from the Philippines.

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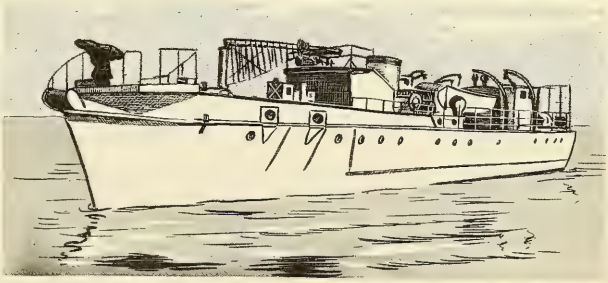
U. S.-PHILIPPINE NEGOTIATIONS PLANNED: The U. S. Department of State announced on July 14 the appointment of a United States delegation for negotiation with the Philippines regarding possible revision of the 1946 Agreement on Trade and Related Matters between the two countries. Represented on the delegation were the Departments of State, Agriculture, Treasury, Commerce, the Foreign Operations Administration, and the Tariff Commission.

Full opportunity will be provided for interested United States business firms and individuals to make known their views regarding possible modifications of the agreement. The holding of public hearings and an invitation for the submission of written briefs will be announced in due course.

The discussions with the Philippine delegation were scheduled to commence upon its arrival in this country, probably in the latter part of August or early September. Liaison will be maintained with the U. S. Government departments and agencies having an interest in these negotiations.

Australia

SHORE-BASED WHALING SEASON OPENS: The West Australian whaling season opened on June 1 at Albany with the capture of two humpback whales, a U. S. consular dispatch (June 4) from Perth reports. The Australian Whaling Commission's station at Carnarvon was scheduled to open on June 8 with 3 whale catchers to take the quota of 600 humpback whales. No word had been received of operations at the Norwegian-financed station on the north coast of Australia.



An Australian whale chaser. Note folded mast to get under low bridges and on foredeck the tractor which serves as a winch for playing whales.

The Carnarvon station opened the season with a new plant for spray-drying whale solubles for stock feed. The new equipment was designed in Denmark, but largely fabricated on the spot at a cost of ŁA50,000 (US$112,000). The dried solubles will be packed in moisture-proof bags instead of the drums used previously, thus cutting shipping costs by more than half.

The Commission announced in late May that both the whale oil and byproducts from the coming season had been sold in advance for a total estimated return of about ŁA700,000 (US$1.6 million). The whale meal has been sold to Western Australian purchasers. The average price for the whale oil to be delivered to Europe was reported as LA96/17/6 (US$217) per short ton.

Barbados Island

FLYING FISH TO BE CANNED: A flying fish canning industry is to be started with pioneer status in the Barbados Islands, according to the March 1954 Monthly Information Bulletin of the Caribbean Commission.

Flying fish.

Flying fish is a very popular food in Barbados, but at times there is a glut on the market and prices fall. Furthermore, the improvements being carried out in the fishing industry are likely to make more fish available.

It is expected that all the surplus flying fish will be canned as soon as the industry gets under way. According to the Barbados press, the Minister of Trade, Industry and Labour has stated that this new industry, as well as the canning of other fish products, will be given pioneer status.

Proposals call for the canning of surplus quantities, and after the needs of the Island are met, efforts will be made to export the canned fish to Canada, the United States, and Venezuela. It is estimated that the cannery will employ between 100 and 150 workers.

Bermuda

ELECTRICAL FISHING ITEMS EXEMPT FROM DUTY: Imports into Bermuda of electrical apparatus or equipment intended for installation and operation in vessels ordinarily used by fishermen are now exempt from duty regardless of the originating country, reports the May 24 Foreign Commerce Weekly, a Department of Commerce publication. These items include echo or sonar equipment used for sounding or locating fish shoals, as well as transmitting and receiving radios of a pattern approved by the Bermuda Board of Trade.

These exemptions were put into effect by amendments of items No. 30 and 84 of the Bermudan customs tariff act of 1953, dated January 27, 1954.

Fishermen are required to furnish bond to the Colonial Treasurer to provide that in event of sale or disposal locally of any such apparatus or equipment for other than for the aforementioned purpose, the duty ordinarily payable on like goods at time of sale will be duly paid thereon.

British Guiana

FISHERIES EXPANSION ENCOURAGED: Various types of fishery cooperatives are being encouraged and sponsored by the British Guiana Fisheries Division, according to the March 1954 Monthly Information Bulletin of the Caribbean Commission. Cooperative groups for the bulk purchasing of gear, among other things, is one of the recent developments. A dried shrimp industry is also being formed and a factory for this purpose was recently registered.

The processing of the byproducts of the dried shrimp industry, including shrimp meal for stock feed and fish glue, is being carried out and the products are being sold on the British market.

A recent review of the Acting Fisheries Officer disclosed that plans to create a fish dock along the lines of those of Hull and Grimsby in England--but on a smaller scale--have already been initiated. These plans include provisions for a wholesale market, processing facilities, cold storage plant, and fishermen's shelter. An ice plant has already been completed.

British West Indies

CERTAIN FISHERY PRODUCTS IMPORTS PLACED UNDER OPEN LICENSE: Acting as a result of negotiations relating to the British West Indies trade liberalization plan, all British Colonies in the Caribbean area, including British Honduras and British Guiana, have placed certain fishery products under open license. These include dried, smoked, pickled, salted, and canned fish, according to the July 5 Foreign Commerce Weekly, a Department of Commerce publication.

Importers in these Colonies no longer will be required to obtain individual or specific licenses for import of these items from any country, according to individual announcements appearing in the respective official gazettes.

Canada

ITALY TO BUY SALTED COD AND CANNED SALMON: Italy has agreed to make dollars available again in 1954/55 for Canadian salted cod and canned salmon, the Canadian Minister of Trade and Commerce announced. The understanding reached between officials of the two countries will permit Canadian exports to Italy of C$2.5 million worth of Newfoundland- and Labrador-type cod, C$600,000 worth of Gaspe-type cod, and C$2.0 million worth of canned salmon.

This is not a formal trade agreement but an understanding which is a renewal of arrangements made last year, a June 18 U. S. Embassy dispatch from Ottawa points out. Canada exported to Italy in 1953 salted cod and canned salmon valued slightly over C$2 million.

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NEW SASKATCHEWAN FISHERIES REGULATIONS FOR IMPROVED QUALITY: Provincial fisheries regulations designed to protect Saskatchewan consumers by insuring that they receive fish of high-quality standards went into effect with the opening of the summer commercial fishing season in May.

The regulations are in line with the policy of the Fisheries Branch to bring fish production and marketing in Saskatchewan up to standards on a par with any on the North American continent, according to the Saskatchewan News (June 1), a Provincial news bulletin.

Commercial fishermen and fish dealers shipping fish considered unfit for human consumption may have their licenses cancelled under one of the regulations. Other regulations call for the proper dressing and handling of fish, and the labeling of boxes containing whitefish. The boxes must have the lake of origin and the words "dressed whitefish" or "round whitefish" stamped or stencilled on them.

Fisheries violations may result in the seizure of fish shipments, along with equipment used in committing the violation.

Ceylon

NEW FISHERY HARBOR: A new fishery harbor will be built at Mutwal, Ceylon, costing Rs. 5.7 million (US$1.2 million), and will have berthing facilities for six trawlers and other small fishing vessels, according to The Fishing News (May 21), a British fishery periodical. There are only two trawlers operating there now. The harbor is expected to be completed by December 1955.

The harbor will adjoin the port of Colombo, but it will be completely independent of it and facilitate the distribution and marketing of fish. When the trawlers unload catches the fish will be carried on conveyor belts, which will be built on the breakwaters, direct to the 550-ton capacity refrigerating plant. This refrigerating plant is to be built with Canadian funds and is due to be completed by September 1955.

A byproducts factory will be built alongside the harbor. Canadian aid is being negotiated to finance the construction of this byproducts factory also. The factory will convert the waste material into fish meal and oil.

Chile

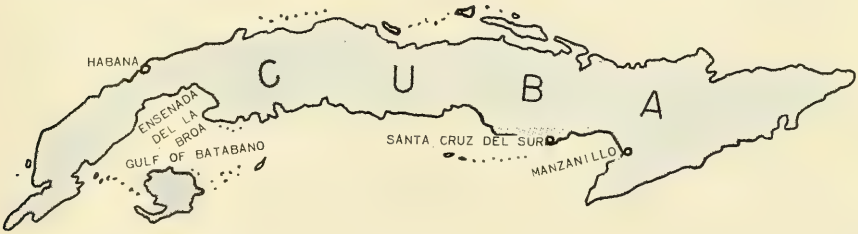
NEW SPECIES OF SHRIMP DISCOVERED: Chilean fishermen have discovered a succulent and high-priced shrimp of what may be an entirely new species, reports the latest Fisheries Bulletin of the Food and Agriculture Organization. It appears to be a close relative of a species of shrimp which was last reported in 1895 to be living at a depth of about a mile in the ocean between Panama and the Galapagos Islands.

The fishermen discovered the shrimp when they started deep trawling along the edge of Chile's continental shelf on the recommendation of a fisheries biologist sent by FAO under its Expanded Technical Assistance Program. Some of the fishermen who followed the advice of the biologist made hauls of half a ton of the unknown species of shrimp.

A sample of these shrimp was received by the FAO Regional Office for Western South America in Santiago and the shrimp was identified by a professor of the Chilean Museum of Natural History and the FAO Regional Officer as belonging to the genus Heterocarpus of the family Pandalidae. The shrimp does not seem to agree with any of the Heterocarpus species reported in the available literature and a detailed study of it is being made. Specimens sent to the United States National Museum, Washington, D. C., were identified as belong to a species closely allied to Heterocarpus hostilis (Faxen).

Cuba

SHRIMP BEDS DISCOVERED: Extensive shrimp beds were discovered in December 1953 near the Ensenada de la Broa in the Gulf of Batabano, Cuba, and subsequently in shallow waters around Santa Cruz del Sur and Manzanillo. By the end of May 1954 some 50 large shrimp boats and at least 30 other small craft were reported to be engaged actively in shrimping in the Batabano Gulf alone, a June 11 U. S. Embassy dispatch from Habana states.



To cope with the presently inadequate refrigeration facilities, additional equipment will soon be installed through assistance of the Agricultural Bank (BANFAIC). Meanwhile the Bank is lending financial and technical assistance to the fishermen's cooperatives. It is also pushing further shrimp-bed explorations in a fully-equipped research vessel Don Carlos, acquired recently in the United States.

French Morocco

SARDINE INDUSTRY OUTLOOK GOOD: The outlook for the French Moroccan 1954 sardine season which opened in May was encouraging, a June 23 U. S. consular dispatch from Casablanca points out. French Moroccan exports of sardines in 1953 totaled over 2 million cases as sales increased in many markets, including the United States.

Because of the Protectorate Administration's encouragement of an effective concentration in the fish-canning industry which led to the creation of production and marketing associations, operating costs have been reduced. This has enabled French Moroccan sardines to compete with Portuguese sardines in foreign markets. Also, French Moroccan sardines have been able to supply a large portion of the over-all yearly increase in world demand for the product.

Since accumulated French Moroccan stocks were disposed of during 1953, it was believed that production this year and next will be stabilized at about 1,600,000

cases annually, of which over 600,000 cases will be sold in France, 400,000 cases to the French Union and the French armed Forces overseas, and the remaining 500,000 to 600,000 cases to other foreign markets.

Another favorable index for sardine exports was the placing of this commodity under the Open General License regulations in Great Britain, a development which will permit the free importation of French Moroccan canned fish into that country. Controlled imports of French Moroccan sardines by Great Britain were virtually halted after 1951 owing to the accumulation of stocks in that country which remained unsold due principally to the unattractive presentation of the cans and the occasional shipment of low-quality products. It was too early to estimate the buying potential of the British market, but the French Moroccan industry intends to recapture a part at least of its former strong position in that country.

Encouraged by brightening exportation prospects and bolstered by production cost decreases made possible through industrial and commercial concentration, the representatives of the French Moroccan sardine canning industry decided to attempt to broaden their market in metropolitan France. In February of this year a delegation of the Committee of French Moroccan Fish Canners visited the various chambers of commerce in France and the representatives of the French fish-canning industries to outline a proposal whereby the duty-free quota for the importation of French Moroccan sardines into France would be increased from 600,000 cases to at least 700,000 cases. This proposal, which was advanced in the face of demands by French fishermen and canners for a reduction in the duty-free quota to 400,000 cases or below, was based on the fact that the French sardine-canning industry presently falls short of filling its French market quota of 800,000 cases by roughly 100,000 cases, and that French Moroccan sardines have been entering France duty-paid over and above the free quota allotted to them. The plan of the Moroccan producers was to permit their lower-priced sardines to fill the 100,000-case deficit and to turn over 80 to 100 million francs (US$230,000-290,000) of the 140 million francs (US$400,000) which would have been paid as duty on this extra contingent to the French industry to be placed in a perequation fund to be used to reduce the cost of producing French sardines.

A corollary to this plan for close collaboration between the rival industries would be the profitable use of lower-priced Moroccan sardines in compensation agreements between France and other countries. While it was reported that the plan aroused considerable interest in industrial and commercial circles in France, it has not yet been formally presented for the approval of the French Governmental agencies responsible for the establishment of duty-free quotas for French Moroccan products.

Greenland

DENMARK BUILDS FISHING VESSELS: In an attempt to interest Greenlanders in modern fishing methods, the Royal Greenland Trading Company in Copenhagen has had built six modern vessels at a Danish yard. These consist of three 26-foot and three 30-foot boats, capable of carrying between 5 and 6 metric tons each, full-decked, with living accommodations for the crews. All six are equipped with line winches, making it possible to use lines of up to 1,000 hooks. They will be sold to interested Greenlanders on the installment plan, according to the June 26 Foreign Trade, a Canadian Government publication.

Iceland

TERRITORIAL LIMITS REGULATIONS TO BE DISCUSSED BY COUNCIL OF EUROPE: The Council of Europe at its recent session in Strassbourg has agreed to place on its agenda the extension of the territorial limits surrounding the Icelandic coast. The resolution was introduced by representatives of Belgium, the United Kingdom, the Netherlands, and France, according to a June 14 U. S. legation dispatch from Reykjavik reporting on an editorial in the June 4 issue of Althydubladid.

The resolution placed on the Council agenda is as follows:

"With reference to the desirability of taking up for consideration the changes which have been made in fisheries rights within the territorial waters of the Icelandic State, and also with reference to the political and economic consequences of these changes, the assembly resolves to place the following matter on its agenda: CHANGES WHICH HAVE BEEN MADE IN THE REGULATIONS ON FISHERIES RIGHTS IN THE TERRITORIAL WATERS OF THE ICELANDIC SOVEREIGN STATE."

The Icelandic representatives on the Council had no objection to discussion on the matter by the assembly, but they reserved the right to discuss it from all angles, including...measures such as the British landing ban.

The resolution was approved and referred to the Legal Committee and the Political and Economic Committee. The legal aspects of the matter will be discussed by the Legal Committee after which it will probably be given consideration by the Political and Economic Committee. It is therefore uncertain that committee reports will be submitted in time to permit discussion of the matter by the Council's next session.

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TRAWLER OWNERS MAKE NEW PLANS TO PROCESS AND MARKET THEIR CATCH IN BRITAIN: Icelandic trawler owners have been investigating the possibility of establishing and operating their own organization at a British port to process and market their fish after it is landed. This will include the building of a processing factory and an ice-making plant, according to a June 15 U. S. Legation dispatch from Reykjavik.

The first stage of what will be a long-term policy was carried out in May by the Icelandic Fisheries Attache in Britain in a visit to Newcastle-on-Tyne to investigate the suitability of that port as a center of operations. Earlier the Attache had visited the port of Goole, where he was particularly impressed by the facilities that were offered there. However, before any decision is reached the trawler owners feel it is necessary to explore other ports where officials have offered them every help in resuming trade in Britain.

This new move by the trawler owners is in retaliation to the boycott of Icelandic fish at the ports of Hull and Grimsby. It is designed to prevent the possibility of a future ban such as occurred at these ports.

Japan

TRAWLERS TO FISH FOR COD AND SOLE IN BERING SEA: The Japanese Fisheries Agency has granted permission to 2 fishing companies to trawl for cod and sole in the Bering Sea between 57°30' and 63° N. latitude and between 180° and 164° W. longitude.

The 100-ton trawler Asama Maru will make 3 trips from early in July to mid-October 1954. The 7,500-ton mothership Eijin Maru with 475-ton trawlers will operate from September 15 to October 30. Vessels are authorized to use only trawl nets and return to the sea any halibut, salmon, and crabs caught in the trawling operations, a U. S. Embassy dispatch from Tokyo (July 9) points out.

Permission has been granted under the following conditions: (a) trawl nets only to be used; (b) halibut, salmon, and crab caught in the nets to be thrown back; (c) no operation in foreign territorial waters; (d) no entry into foreign ports without authorization.

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CANNED SALMON EXPORTS TO BRITAIN: Japan expects to export in 1954 to the United Kingdom 200,000 cases of canned salmon and salmon trout, valued at £1.5 million (US$4.2 million), under the Anglo-Japanese Payment Agreement. This will represent about 90 percent of the production target for the year. During the prewar years 1937-39, the average Japanese exports of canned salmon to the United Kingdom amounted to 1,668,000 cases a year out of a total production of about 2,700,000 cases.

Malaya

NEW FISHERIES LABORATORY: A new fisheries laboratory is to be built at Changi to chart the movements of fish in Malayan waters and to find out the best method of catching them, a June bulletin from the Pacific Science Association states.

The Director of the Regional Fisheries Research Station stated that the laboratory would have a team of five scientists from the Colonial Scientific Research Service. Research work was to begin in March 1954 with the arrival of a 28-foot vessel from England for inshore work. Another vessel, the 100-foot Manihine, will be used for deep-sea work and was expected by July.

The entire project is a five-year Colonial Development and Welfare Scheme. All capital costs and half the annual expenditure will be borne by British funds. The other half will be shared by the five territories: Singapore, the Federation of Malaya, Sarawak, North Borneo, and Brunei.

Norway

1954 HERRING MEAL AND OIL PRODUCTION SOLD: All of the herring meal and oil produced by Norwegian processing plants from January 1 to May 1, 1954, has been sold, the Chairman of the Norwegian Herring Meal Export Committee reported recently. The total value of the domestic and foreign sales amounts to about Kr. 350 million (US$49.0 million), of which approximately Kr. 240 million (US$33.6 million) will be paid in foreign exchange. Adding the value of the herring that will be processed during the rest of the year, plus the large quantities that have been sold fresh, frozen, or salted, the Norwegian herring fisheries can safely be estimated to produce total sales of Kr. 500-600 million (US$69.9-83.9 million) this year.

The 1954 winter herring fisheries off the coast of western Norway produced an all-time record catch of 1,160,910 short tons as against only 747,408 short tons last year. Subsequently, up to May 1 fishermen have landed 59,757 short tons of fat

herring and 62,551 short tons of small herring. As of the same date last year they had caught only 11,609 gross tons of fat herring and 25,345 short tons of small herring. The total catch of winter, fat, and small herring as of May 1 was 1,282,308 short tons as compared with 744,363 short tons in the same period of 1953, or an increase of nearly 538,000 short tons.

From the herring landed between January 1 and May 1, Norwegian processing plants have produced about 200,000 tons of herring meal, all of which has been sold. About 30 percent of the production went to domestic buyers, and the rest is being exported. A substantial quantity of the exported herring will be paid for in dollars. None is being traded as part of barter arrangements. In the same four-month period, Norwegian reduction plants produced about 90,000 tons of herring oil, all of which has been sold, mainly to domestic buyers. Altogether, about 85 percent of the total herring landings are delivered to meal and oil plants, reports a May 27 bulletin from the Norwegian Information Service.

The major part of the herring meal is classed as "extra quality," with a minimum protein content of 70 percent, a maximum of 10 percent fat, and about 10 percent moisture. The stickwater, which in former days was dumped into the sea as worthless, is now utilized to make vitamin-rich condensed fish solubles and whole herring meal, a valuable animal feed. Thus, the reduction plants utilize virtually 100 percent of the herring.

More and more Norwegian reduction plants are installing special evaporators to utilize the stickwater. All of the major plants in north Norway are now equipped with such machinery. The same trend is notable in western Norway, too.

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FREEZING HERRING IN ALGINATE JELLY: The development of a new method of freezing herring in alginate jelly was announced recently by a leading seaweed processing firm in Drammen, Norway, the Norwegian Information Service (May 27) reports. Preserving the herring from one season to another, the patented method is receiving practical application at four Norwegian herring plants. Formerly, because of the high fat content, herring could be kept fresh no longer than half a year at the most.

At a demonstration in Kristiansund recently, herring frozen in alginate jelly for 12 months was served to a critical gathering of herring experts, chemists, housewives, and representatives of the firm which has tested the new method. The consensus, according to the Norwegian Journal of Commerce and Shipping, was that the year-old herring tasted better than fresh. For one thing, the new product is devoid of the characteristic herring odor.

Packed in alginate jelly and wrapped in cellophane, the filleted herring will be introduced to Norwegian consumers next year. The fillets will be available in ½-kilogram packages (1.1 pounds) for retail distribution, and in 2- to 8-kilogram (4.4 to 17.6 pounds) packages for larger families and institutions. Experiments have also been made with freezing whole herring and mackerel in alginate jelly. The frozen mackerel has attracted considerable interest among foreign importers.

The demonstration in Kristiansund was held at Industrilaboratoriet A/S, a research institution sponsored by the Klippfish Exporters National Association and Norwegian Frozen Fish A/S. For more than a year scientists of this laboratory checked the condition of the frozen herring at regular intervals. Similar tests have been made by the Norwegian Fisheries Directorate's Chemical-Technical Research Institute. In no instance has it been possible to detect any trace of rancidness or deterioration of flavor.

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FISHERIES FAIR: The first large-scale fisheries fair to be held in Norway took place in Aalesund during two weeks in June, the Norwegian Information Service reported in a June 24 bulletin. Covering an area of nearly 110,000 square feet, the Norwegian Fisheries Fair gave a complete picture of the history, development, and scope of this important industry. There were 150 stands sponsored by organizations and manufacturers, including a number of foreign companies. Among other highlights was a historical section and Norway's biggest aquarium.

In an opening address the Fisheries Minister observed that the postwar development of Norwegian fisheries has wrought far-reaching changes in the coastal districts. He added: "This fair is a review of our achievements as a fishing nation. But its most important function is to give impulses that may lead to further progress. I sincerely hope it will stimulate the spirit of enterprise and daring that is the hallmark of our fishing industry."

Primarily a sales fair, the Aalesund event assembled an impressive lineup of products related to the fishing industry. One of the main exhibits featured a streamlined ocean-going fishing craft, equipped with radar, echo sounder, and a new type of ASDIC (sonar) that effectively locates fish shoals. Others showed modern fishing gear, including the superefficient purse seine; and a long line of marine engines. In the machinery section, raw fish is fed into technical wonders, coming out again as deep-frozen, cellophane-wrapped fillets, or delicate herring snacks.

FAO recognized the importance of the Norwegian Fisheries Fair by sponsoring an international course in fish processing at Aalesund, with 40 participants from 10 European countries. Lectures in four languages, Norwegian, English, French, and German, were given by leading specialists.

The rapid postwar development of Norwegian fisheries, emphasizing rationalization, mechanization, and scientific location of shoals, has reduced the number of fishermen to about 85,000. Of these, some 16,000 have fishing as their sole livelihood and nearly 52,000 derive their main income from the fisheries. The fishing fleet now comprises some 14,000 decked vessels and 26,000 open boats. The annual catch, of which 90 percent is exported, varies from 1.2 to 1.6 million metric tons. Since the war, Norwegian frozen fish fillets have found a growing market abroad, both in Europe and the United States.

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WHALE-OIL PRODUCTION, 1953/54--(with correction): Norwegian Antarctic production of both whale and sperm oil in 1953/54 is estimated at 191,300 short tons, an increase of more than one-fourth from the corresponding 1952/53 output. Antarctic pelagic operations, as usual, accounted for the bulk of the total output. Nine Norwegian factory ships operating in the 1953/54 season rendered 173,400 and 5,800 tons of whale and sperm oil, respectively. The increase in the total production is due to the fact that two more floating factories operated in 1953/54 than in 1952/53. Later information received regarding Norway's Husvik Harbour, South Georgia, whaling station indicates that the combined production of whale and sperm oil from this source amounted to 64,789 barrels (12,100 short tons) rather than the 173,000 barrels (32,290 tons) reported in Commercial Fisheries Review, July 1954, page 55.

Peru

SHRIMP EXPORTS INCREASE IN 1953: Shrimp fishing in Panama continued to expand in 1953 and total exports of shrimp for the year amounted to 2,083 metric tons as compared with 1,096 tons in 1952 (see table).

The total catch of fish other than shrimp in the Gulf of Panama in 1953 was 2.1 million pounds as compared with 2.7 million pounds in 1952. However, the total 1953 catch of fish (including shrimp) was substantially higher than in any other previous year, according to a recent report from the American Embassy at Panama City.

Panamanian Shrimp Exports, 1950-53

Year	Quantity	Value
	Metric Tons	US$
1953	2,083	1,916,000
1952	1,096	1,350,000
1951	563	705,000
1950	138	168,000

Panama

STATUS OF THE FISHERIES, 1953: The Peruvian fishing industry enjoyed much more favorable conditions in 1953 than in the immediate preceding years and the season was considered moderately favorable. This was in spite of a late start awaiting the appearance of bonito and other fish in commercial quantities, according to an April 19 U. S. Embassy dispatch from Lima.

More than 35 fish canners were reported in production at the end of the year with an output in excess of one-million cases (48 7-oz. cans), 80 percent of which was exported. Some 15 fish-meal factories have been established, exporting about 10,000 metric tons annually. Refrigeration facilities for fishery products along the coast were estimated to have a capacity of about 4,500 metric tons. Increasing numbers of large foreign (including U. S.-flag) fishing vessels were brought under contract to Peru to fish for local companies.

Portugal

NEW COLD-STORAGE WAREHOUSES FOR COD: Additional cold-storage warehouses for dried cod will be constructed at various points in Portugal under the direction of the Regulatory Commission of Trade in Codfish, according to a June 18 U. S. Embassy dispatch from Lisbon. A June 14 order of the Ministry of Economy delegated the responsibility to the Commission.

The new installations will be built at Lisbon, capacity 1,800 metric tons; Figueira da Foz, 600 tons; Aveiro, 1,200 tons; Oporto, 960 tons; and Viana do Castelo, 900 tons. Existing installations total 10,500 tons--Lisbon, 6,300 tons; Oporto, 3,000 tons; and Aveiro, 1,200 tons.

Spain

REVIEW OF THE FISHERIES, 1953: A general scarcity of sardines and cod, high operating costs, antiquated fishing vessels, and shortages in certain lines of ship fittings continued to hamper the Spanish fishing industry in 1953. As a consequence the total catch of 620,026 metric tons was only about 6 percent above the unsatisfactory 1952 level of 583,647 tons.

Government loans to the fishing industry through the Caia Central de Credito Maritima in 1953 amounted to 19,593,620 pesetas (US$503,000), a decline of almost 47 percent from the 36,682,852 pesetas (US$925,000) in 1952.

Other than a promised reduction in certain grades of coal for fishing vessels, there was little prospect of immediate improvement in the distressed condition of the industry. Fuel oil and tin plate remained under strict control and fishing gear was under a system of voluntary rationing at the end of the year, a June 14 U. S. Embassy dispatch from Madrid points out.

Note: Values converted on the basis: 1953--38.95 pesos =US$1; 1952--39.65 pesos = US$1.

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VIGO FISH CANNING TRENDS, APRIL 1954: Fish canneries in the Vigo area of Spain purchased 324,000 pounds of fish during April--4.5 percent of the total catches entered through the Vigo Fish Exchange. This compares to 166,000 pounds in March and 35,000 pounds in April 1953. In spite of more purchases by canneries, fish for canning was still being landed in below-normal quantities. Stocks of oil, tin plate, and other raw materials, while below normal for this time of year, were reported to be adequate, a May 10 U. S. Consular dispatch from Vigo reports.

With the off-season for the fishing of jurel and castaneta (brama-raii) approaching, the short-range fishing fleet must look to the bonito runs. Some of the vessels were being equipped for the albacore runs that were due to start about the middle of May, but shortages of capital handicapped the owners in the purchase of necessary equipment.

While in many respects the fish canners are now in a better position than a year ago, the shortage of liquid capital to buy albacore and sardines should heavy runs appear during the coming months continued to be one of their main concerns.

The industry anxiously awaited any measures that the Government may take on the proposals made by the National Fishing Syndicate after the national assembly held in Madrid during April. The Syndicate proposed a study to be made of industry problems.

Thailand

JAPANESE-TYPE FISH TRAP TESTS SUCCESSFUL: Excellent catches were made by a Japanese-type trap net introduced into Thailand by STEM and operated by the Thai Department of Fisheries, a June 18 U. S. Embassy dispatch from Bangkok points out. In a recent 31-day demonstration under commercial fishing conditions this net averaged more than 1,200 pounds of fish daily; peak production was 13,200 pounds in one day. What makes this record even more impressive is that the traditional local type of bamboo stake traps were producing very little or no fish during the same period.

This is the second season of practical demonstrations; during the first season the imported trap caught twice as much fish as comparative local traps. The value of the fish caught was about three times greater.

Fishermen in the neighborhood of the Ban Phae Marine Fisheries Station, where the demonstrations were made, are enthusiastic about the new trap. Costs for the imported gear are slightly less than those needed for the present type. Utilization of locally-obtainable materials will cut the original cost by 30 to 40 percent under

the existing type. Other advantages are greater mobility, easier removal of the catches, easier setting and hauling, greater flexibility, and a greater variety of catches including more valuable market species.

The first stages of expansion will commence this year in nearby fishing villages. Since the Thai fisherman is traditionally conservative in adopting new methods, it will probably be necessary to operate on a cooperative extended-risk basis in which the Thai Government will participate by providing some materials for trap construction. After one season of this type of arrangement it is probable that Government participation can be minimized.

The results of use of the new traps will be important. Larger catches at less cost, more valuable species, and a longer fishing season with less risk to the fisherman may be expected.

Union of South Africa

WHOLE FISH-MEAL EXPORTS TO UNITED STATES PLANNED: The South African fish-meal industry recently has been thoroughly testing fish processing equipment designed to produce "whole meal." There are reported to be three factories already being equipped for this operation and a fourth is approaching completion.

"Whole meal" is fish meal containing fish solubles. In the United States condensed fish solubles are marketed as a separate product from fish meal and the former are sold strictly on their own merits. The plan of the South African producers is to offer "whole meal" on the United States market as a fish meal for the animal-feeding trade in competition with domestically-produced fish meals. The Norwegians have also gone into this type of production.

Although opinion is divided on the relative merits of "whole meal" versus fish meal and condensed fish solubles, the advent of additional supplies of the "whole meal" in the United States will be a factor to be reckoned with as a potentially competitive item once its relative merits are established by actual test in the market place and on the feed lot.

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FISHERIES SURVEY BY MINISTER OF ECONOMIC AFFAIRS: The South African Minister of Economic Affairs visited the West Coast fishing harbors for discussions with fishermen on matters affecting the industry, reports the May 21 issue of The Fishing News, a British trade paper.

He travelled with the Director of Fishing and other officials in the Department's research vessel Africana II, and was able to study the research methods en route.

At Velddrif he said the Fisheries Development Corporation had made important proposals that, if accepted, would greatly expand research work on fisheries. These proposals involved the Union Government, the South-West African Administration, fishermen, and the fish factories, as well as the Corporation.

To avoid serious depletion of the rich pilchard shoals off the coast of South Africa, the Union Government is imposing control by declaring "closed" seasons, besides restricting the number of canneries in the industry.

Negotiations are proceeding for the erection of a quick-freezing plant for the production of frozen fillets.

The Minister said also that the purchase price of fish would be dealt with and that a Board would be appointed to control the building of fishing boats intended for catching fish for processing.

During 1953 the total landings of pilchards and maasbankers in South Africa waters totalled 288,155 metric tons, an increase of 3,704 tons over the previous year.

The heavier catch was achieved, however, with an expanded fleet, while the unit of effort per ton landed showed a significant increase. According to the Division of Fisheries the greater effort required is accounted for by the decreased availability of fish not by a decreased supply, the heavy shoals appearing in areas farther away from bases than in previous years.

A special committee is to be appointed with statutory powers to limit the number of fishing boats allowed to operate in the pilchard and maasbankers waters on the west coast of South Africa, according to a statement by the Minister. He said this was part of the proposed intensified program to conserve and improve the fishing grounds of the west coast. No more than the number of boats operating at the beginning of 1953 would be allowed on the fishing grounds.

The Fisheries Development Corporation has conducted experimental netting operations in South African waters to discover whether Norwegian methods were suitable for catching species now caught by hand line. It was shown that the Norwegian system was not suited to this section of the coast.

Gansbaai (South Africa) fishermen have registered the Gansbaai Cooperative Fisheries, Ltd., operated independently under the management of a member of the Fisheries Development Corporation's staff. Its products include crude shark-liver oil, dried shark fins, and shark meat, which are exported; and fresh fish sold locally.

Note: Also see Commercial Fisheries Review, February 1954, p. 53.

United Kingdom

GRIMSBY PLANT SUPPLIES FISH TO U. S. AND BRITISH ARMED FORCES: Considerable quantities of quick-frozen fish are being supplied to the U. S. Armed Forces by a Grimsby processing plant, according to the July 3 Fish Trades Gazette, a British trade magazine. The plant is supplying mainly cod, haddock, and bream, and payment is made in dollars. The U. S. Forces in Europe have bought large quantities of fish from Denmark, Norway, Germany, Iceland, and Holland, but they will buy only from firms which process in plants inspected and passed by U. S. Armed Forces officials. A high standard is required and the finished product is inspected by a qualified inspector.

The same Grimsby firm is sending fish to British Armed Forces all over the world. Grimsby fish has been shipped to British soldiers in Hong Kong, Singapore, Australia, and South Africa.

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FISHING PRIVILEGES OFF RUSSIAN COAST AGAIN EXTENDED: The Russian Government has agreed to a one-year extension--to June 30, 1955--of the Pact granting British fishing privileges off the Murman coast of Russia, states a U. S. Embassy dispatch (June 22) from London. A year ago the pact had also been extended one year, to the end of June 1954. It was believed in Britain that it would be necessary to send a negotiating body to Moscow to get some concession, but this latest temporary extension was secured without doing so. During the period of this extension the British Government hopes to negotiate a more permanent agreement.

The Pact, which has been in force since 1930, allows British trawlers to fish up to within 3 miles of the Russian White Sea coast instead of the 12-mile limit imposed on all other countries. Involved are some 3,000 square miles of fishing grounds from which the British produce about 28 million pounds of plaice and haddock each year.

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MINIMUM EX-VESSEL PRICES RAISED AS OPERATING COSTS INCREASE: Minimum ex-vessel prices for fish landed by British trawlers will be increased on September 1 by about 7s. 6d. per 10-stone kit ($\frac{3}{4}$ U. S. cent per pound). The present minimum prices were set in February 1952 and since then operating costs have risen an average of £20 (US$56) per day at sea for distant-water vessels fishing from Humber ports. This increased the annual cost of the fleet operating from these ports an additional £1.5 million (US$4.2 million) per year.

It is reported that this does not mean increased prices for the consumer, according to the May 28 issue of The Fishing News, a British fishery paper. The minimum price is merely the basic price below which trawler owners do not sell to fresh fish dealers; it is designed to prevent the bottom dropping out of the market and is generally well below the cost of catching the fish.

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TRAWLER LAY-UP REDUCED: The lay-up of British distant-water vessels was reduced from 25 percent to 20 percent, effective August 1 to September 11, according to the June 25 issue of The Fishing News, a British fishery periodical. This will mean an effective tie-up of 10 percent, compared to the present 12.5 percent, when allowances have been made for vessels which would normally be tied up at this time of year for overhaul and other reasons.

This reduction in the tie-up of distant-water vessels was influenced by an expected strengthening of the markets late in the summer.

The lay-up scheme applies only to distant-water vessels, totaling about 270 craft in the ports of Hull, Grimsby, and Fleetwood.

Venezuela

CANADIAN FIRM TO BUILD FISH CANNERY: A Canadian packing firm plans to build a fish cannery in eastern Venezuela, a June 17 U. S. Embassy dispatch from Caracas reports. The company was completing a cannery at Cartagena, Colombia.

A representative of the firm said the company in Venezuela would act in partnership with the fishermen who would receive half the profits of the operation after the deduction of 20 percent for various contingencies. It was not mentioned how

losses would be apportioned. He also stated: "We believe that with our democratic system we will obtain most of the fish for our industry."

These negotiations have been rumored for more than a year but the optimistic views as to the probable monopoly of the fish catch will not advance the project before the Venezuela authorities.

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MARINE BIOLOGICAL LABORATORY PROPOSED: Officials of the recently-organized Venezuelan Association for the Advancement of Science have been studying a site for a marine biological laboratory near Higuerote, Miranda. A well known businessman has reputedly offered a substantial sum if the laboratory is located at Higuerote. Some industries and individuals have indicated a similar willingness to contribute to this particular project, according to a June 23 U. S. Embassy dispatch from Caracas.

The marine life off Higuerote should offer some unusual features as the sewage from Caracas reaches the sea via the Rio Tuy, the mouth of which is just east of Higuerote. The prevailing winds and ocean currents are from east to west so that the nitrogenous content of the sea water in the Higuerote region should be somewhat higher than normal.

FOREIGN TRADE LISTS

Trade Lists, prepared by the Bureau of Foreign Commerce, U. S. Department of Commerce, are listings of foreign importers, distributors, manufacturers, processors, agents, service organizations, professional groups, and institutions, classified under approximately 75 major commodity and service groups.

Data include name and address, relative size, method of operation, lines handled, number of salesmen, and territory covered by each organization listed.

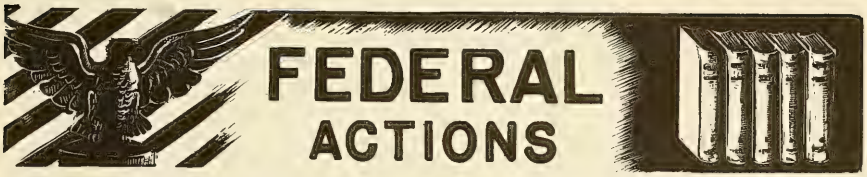
Each list is prefaced by a paragraph outlining market potentialities for United States products together with basic import or export pattern, pertinent regulations, and general conditions existing in the market.

Lists are used extensively in locating and selecting trade connections abroad, locating sources of supply, direct advertising campaigns, market surveys, etc.

Some of the classifications of interest to the fishery and allied industries include the following:

Advertising Agencies & Concessionaires
Boat & Ship Builders, Repairers & Chandlers
Canneries
Cooperage - Importers, Dealers or Distributors, and Exporters
Feedstuffs - Importers, Dealers or Distributors, Manufacturers, and Exporters
Machinery - Importers and Dealers or Distributors
Oils (Animal, Fish & Vegetable) - Importers, Dealers or Distributors, Producers, Refiners and Exporters

Copies of these lists may be obtained by firms in the United States from the U. S. Department of Commerce, Washington 25, D. C., or from that Department's field offices, at $1 per list.



Civil Service Commission

FISHERY METHODS AND EQUIPMENT SPECIALIST EXAMINATION ANNOUNCED: The U. S. Civil Service Commission on August 3 announced unassembled examinations for the position of Fishery Methods and Equipment specialist, grades GS-5 to GS-12. Entrance salaries range from $3,410 to $7,040 per year. THE CLOSING DATE IS SEPTEMBER 28, 1954.

The Fish and Wildlife Service requires Fishery Methods and Equipment Specilists for exploratory fishing and for improving methods of fishery operations. Only commercial fishermen with the required specialized experience, or men trained in fishery engineering, technology, or biology should apply for this examination. The positions require sea duty in varying localities, chiefly in the Atlantic and Pacific Oceans.

The duties include studying the occurrence and behavior of fish at sea and the best methods of locating them by visual, sonic, electronic, or other techniques; identifying species; and recording the number and weight of fish and the weather conditions at time of capture; studying the effectiveness of various kinds of bait and oxygen concentrations; temperature, salinity, and other water conditions affecting survival of bait fishes; making tests on the effectiveness of varied types of fishing gear and studying the influence of weather, currents, and other conditions on their efficiency; analyzing data obtained at sea and designing new equipment or methods or recommending modification of those presently used, for promoting the economical capture of ocean fish.

Except for the substitution of education for experience as provided for, applicants must have had experience of the length and of the kind commensurate in quality with the grade level for which application is made. The total experience must have been of a progressively responsible nature in the fishery exploration and production area and must be such as to demonstrate the applicant's ability to perform the duties of the position. The amount of experience ranges from 3 years of general plus 1 year of specialized experience for the GS-5 grade, 3 years of general plus 4 years of specialized experience for the GS-12 grade.

The following are examples of the types of general experience that are considered qualifying: Mate or engineer on a fishing vessel, net loft supervisor, commercial fisherman, licensed deck officer, and simlar or closely related types of experience.

The following are examples of the types of specialized experience that are considered qualifying: Port captain or fleet supervisor of a fishing fleet, master of fishing vessel over 25 net tons, navigator of fishing vessels operating offshore, designer of fishing vessels and equipment, cannery superintendent including supervision of fish production, technical employment in conducting fishery exploration or in developing fishery gear or equipment, and other closely related types of experience.

Competitors will not be required to report for a written test, but will be rated on the extent and quality of their experience and training relevant to the duties of the positions. Such ratings will be based upon competitors' statements in their applications and upon any additional evidence secured.

To apply for this examination, file Card Form 5001-ABC, Form 57, and Standard Form 15. These forms, as well as a copy of Announcement No. 413 (b) giving the particulars of this examination, may be obtained from the U. S. Civil Service Commission, Washington 25, D. C., or from any of its Regional Offices, or from any first- or second-class post office. Applications are to be sent to the Executive Secretary, Board of U. S. Civil Service Examiners, Fish and Wildlife Service, De-

partment of the Interior, Washington, D.C. Applications must be received in that office, or post marked not later than September 28, 1954.

Department of Defense

ARMY QUARTERMASTER CORPS

SURPLUS TRAWLERS OFFERED FOR SALE: Invitation for bids on five surplus large fishing trawlers located at Bremerhaven, Port of Embarkation, Germany, was issued by the Army Quartermaster Corps on August 3. The closing date for bids was September 2, 1954.

The following trawlers were offered for sale: Pan Trades Andros, Tern, Swell, Pacific, and Josephine Ess.

Foreign Operations Administration

INDO-CHINA AUTHORIZED TO BUY FISHING NET MATERIAL: Indo-China has been authorized by the Foreign Operations Administration to spend $96,000 for the purchase of fishing net twine and weights. No contract period or terminal delivery date is specified as procurement will be carried out through the Emergency Procurement Service, General Services Administration. Indo-China is authorized to make these purchases in the United States and possessions and Japan.

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INDONESIA AUTHORIZED TO BUY FISHING GEAR: Indonesia has been authorized by FOA to purchase fishing gear totaling $9,000 ($8,000 for flat shrimp trawls, balloon trawls, trawl doors, and spare parts for trawls; also $1,000 for wire rope), according to a July 8 bulletin from that agency. No contract period or terminal delivery date was announced as procurement will be carried out through the Emergency Procurement Service, General Services Administration. Indonesia is authorized to make the purchases in the United States and possessions, Canada, European participating countries, and Japan.

Department of Health, Education, and Welfare

FOOD AND DRUG ADMINISTRATION

PROCEDURE FOR ESTABLISHING FOOD STANDARDS: A statement of interpretation of the procedures prescribed by the Federal Food, Drug and Cosmetic Act for establishing food standards was announced in the July 27 Federal Register as follows:

PART 3—STATEMENTS OF GENERAL POLICY OR INTERPRETATION

PROCEDURE FOR ESTABLISHING FOOD STANDARDS UNDER THE FEDERAL FOOD, DRUG AND COSMETIC ACT

Under the authority vested in the Secretary of Health, Education, and Welfare by the provisions of the Federal Food, Drug, and Cosmetic Act (secs. 401, 701, 52 Stat. 1046, 1055, as amended 68 Stat. 54; 21 U. S. C. 341, 371) and pursuant to the provisions of the Administrative Procedure Act (sec. 3, 60 Stat. 237, 238; 5 U. S. C. 1002), the following statement of interpretation is issued:

§ 3.36 *Procedure for establishing food standards under the Federal Food, Drug, and Cosmetic Act.* The procedure prescribed in the Federal Food, Drug, and Cosmetic Act for the issuance, amendment, or repeal of standards for foods has recently been modified by Congress. The new amendment permits any interested person showing reasonable grounds therefor to petition the Secretary of Health, Education, and Welfare to initiate action.

(a) If the petitioner shows that he is an interested person and furnishes reasonable grounds for his proposal, it is the duty of the Secretary to publish the proposal and afford opportunity for other interested persons to comment on it. After a study of all the facts available and of the comments received, the Secretary will act upon the proposal and publish an order, to which objection may be taken by persons who would be adversely affected. Thus the issues in controversy are singled out for a public hearing.

(b) Practical administration of the law requires that there be a substantial showing of merit before any proposal is published. In passing on proposals submitted by petitioners for initiating actions, it will be the policy of the Department of Health, Education, and Welfare to consider that reasonable grounds have been furnished when:

(1) The proposal includes or is accompanied by a statement of the facts that the petitioner asserts he is in a position to substantiate by evidence in the event the proceedings lead to a public hearing.

(2) The facts declared furnish substantial support of the proposal and warrant a conclusion that the proposal is reasonable.

(3) The proposal, if adopted, would promote honesty and fair dealing in the interest of consumers.

(c) Opportunity will be given to amend petitions regarded as inadequate.

(Sec. 701, 52 Stat. 1055; 21 U. S. C. 371. Interprets or applies sec. 401, 52 Stat. 1046, as amended 68 Stat. 54; 21 U. S. C. 341)

Dated: July 21, 1954.

[SEAL] OVETA CULP HOBBY, *Secretary.*

Department of the Interior

FISH AND WILDLIFE SERVICE

DR. O. LLOYD MEEHEAN APPOINTED ASSISTANT TO THE DIRECTOR: Dr. O. Lloyd Meehean has been appointed Assistant to the Director of the Fish and Wildlife Service, in charge of technical staff services. He has been chief of the Service's Branch of Game Fish and Hatcheries since October 1945.

The establishment of the position is part of the administrative reorganization of the Washington Office of the Service as recently recommended in a report by a survey team which studied the organization and operations of the Service for several months. Secretary of the Interior Douglas McKay approved the report on July 2.

In his new post Meehean will direct the activities carried on by the Service's branches of engineering, lands, river basin studies, and Federal aid.

As chief of the Branch of Game Fish and Hatcheries, Meehean was responsible for the administration and maintenance of Federal fish hatcheries.

Meehean has been associated with the Fish and Wildlife Service and its predecessor agency, the former Bureau of Fisheries, since 1930 when he became a biologist at the Fairport, Iowa, station. Prior to entering Federal service, Meehean in 1927 was an investigator of lakes and streams for the Minnesota Game and Fish Department, and for two years was in charge of a stream pollution survey for Duluth, Minnesota.

Meehean was recently appointed by the President as a member of the Water Pollution Control Advisory Board, United States Public Health Service. He is also one of the three Federal representatives on the Ohio Valley Water Sanitation Commission which is an interstate compact of eight states in the Ohio Valley. In October 1952 Meehean headed the United States delegation to the Indo-Pacific Fisheries Council meeting in Manila.

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DR. COTTAM RESIGNS AS ASSISTANT TO THE DIRECTOR: The resignation of Dr. Clarence Cottam as Assistant to the Director of the Fish and Wildlife Service was announced on July 20 by Secretary of the Interior McKay. Cottam will assume the post of dean of the College of Biology and Agriculture at Brigham Young University in Provo, Utah, at the beginning of the new fall term.

Cottam joined the former Bureau of Biological Survey in 1929 as a biologist in the Section of Food Habits Research. In 1934 he was placed in charge of a section devoted to research on economic wildlife problems in the Division of Wildlife Research. Ten years later he became chief of that Division. In April 1946 Cottam succeeded Albert M. Day as Assistant Director of the Service when the latter was appointed as Service director. In April 1953, when the Service was being reorganized, Cottom was reassigned as an assistant to Director John L. Farley.

Eighty-Third Congress (Second Session)

AUGUST 1954

Listed below are public bills and resolutions introduced and referred to committees or passed by the Eighty-Third Congress (Second Session) and signed by the President that directly or indirectly affect the fisheries and allied industries. Public bills and resolutions are shown in this section only when introduced and, if

passed, when signed by the President; but also shown are the more pertinent reports, hearings, or chamber actions on some of the bills shown in this section from month to month.

CUSTOMS SIMPLIFICATION ACT: The Senate Committee on Finance on August 6 favorably reported H. R. 10009, Customs Simplification Act of 1954, with amendments (S. Rept. 2326). The bill authorizes the Tariff Commission to review customs tariff schedules, and transfers from the Treasury Department to the Tariff Commission the task of deciding whether dumping of goods by foreign countries in the United States market has resulted in injury to domestic producers. The bill requires the Tariff Commission to report to Congress by March 15, 1955, indicating the significant problems that have developed and suggesting standards and methods which might be adopted for simplification of existing tariff schedules without significant changes in tariff levels. H. R. 10009 was introduced in the House on July 22 and passed by the House on July 26.

The Senate on August 12 passed with amendment H. R. 10009 and sent it back to the House.

Customs Simplification Act of 1954, Senate Report No. 2453 (July 22, 1954, 83d Congress, 2nd Session), 25 pp., printed. The House Committee on Ways and Means reported favorably on H. R. 10009, without amendment, and recommended passage of the bill. The report explains the purpose of the bill; includes a general statement on the bill, a section-by-section analysis of the bill, and changes to be effected in the existing law.

DUTY ON FISH STICKS: A duty on fish sticks and similar products is under consideration by Congress in view of an amendment offered by Senators Saltonstall and Kennedy to H. R. 8628, a bill to amend the Tariff Act of 1930 to insure that crude silicon carbide imported into the United States will continue to be exempt from duty and with respect to the duties applicable to certain prepared fish. The amendment was agreed to and inserted at the end of the bill as follows:

Sec. 2. (a) Paragraph 720 of title I of the Tariff Act of 1930 (U.S.C., 1952 edition, title 19, sec. 1001, par. 720), is amended by adding at the end thereof the following subparagraph:

"(d) Fish sticks and similar products of any size or shape, fillets, or other portions of fish, if breaded, coated with batter, or similarly prepared, but not packed in oil or in oil and other substances, whether in bulk or in containers of any size or kind, and whether or not described or provided for elsewhere in this act, if uncooked, 20 percent ad valorem; cooked in any degree, 30 percent ad valorem."

(b) The foregoing amendment shall enter into effect as soon as practicable on a date to be specified by the President in a notice to the Secretary of the Treasury following such negotiations as may be necessary to effect a modification or a termination of the international obligations of the United States with which the amendment would be in conflict.

The bill was passed with amendment by the Senate on August 11 and sent back to the House.

The Senate amendment to H. R. 8628, was adopted by the House on August 16, clearing the bill for the President.

DUTY ON SHRIMP: H. R. 10170 (Boykin), a bill to provide for an ad valorem duty on the importation of shrimp; to the Committee on Ways and Means. Introduced on August 4, the bill would provide a 35-percent ad-valorem duty on shrimp, shrimp tails, and shrimp meat, fresh and frozen (whether or not packed in ice), or prepared, canned, or preserved in any manner.

Also H. R. 10171 (Grant), H. R. 10173 (Hebert), H. R. 10174 (Long), H. R. 10175 (Lyle), H. R. 10176 (Morrison), H. R. 10177 (Passman), H. R. 10179 (Thompson of Louisiana), H. R. 10180 (Thompson of Texas), similar to H. R. 10170.

LABELING OF FOREIGN-PRODUCED TROUT: The House on August 10 passed with committee amendments and returned to Senate, S. 2033, relating to the labeling of packages containing foreign-produced trout sold in the U. S., and requiring certain information to appear on a placard in public eating places serving such trout. Adopted an amendment removing the requirement of labeling such foreign-produced trout on menus but require such information to be exhibited on wall signs or placards.

Senate on August 12 concurred in House amendments to S. 2033, thus clearing bill for White House.

Senator McCarron on August 13 entered motion to reconsider vote by which Senate on August 12 concurred in House amendment with a perfecting amendment, and House was requested to return the bill to the Senate.

S. 2033, was cleared for the President on August 19 when the House agreed to Senate amendments to House amendments to the bill.

NORTH PACIFIC FISHERIES CONVENTION: The House on July 28 passed and returned to Senate S. 3713, to give effect to the International Convention for the High Seas Fisheries of the North Pacific Ocean, signed at Tokyo, May 9, 1952, after adopting committee amendments.

The President on August 12 signed S. 3713 (P. L. 579).

PHILIPPINE TRADE ACT: The President on July 5 signed H. R. 9315, to provide for an extension on a reciprocal basis of the period of the free entry of Philippine articles in the United States (P.L. 474). The law reads:

AN ACT

[41] 68 Stat. 448.

To provide for an extension on a reciprocal basis of the period of the free entry of Philippine articles in the United States

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the duty-free Philippine retreatment provided for in section 201 of the Philippine Trade Act of [Extension.] 1946 (60 Stat. 143) shall apply in lieu of the treatment specified in paragraphs (1) and (2) of subsection (a) of section 202 of that Act, 22 USC 1251, to Philippine articles entered, or withdrawn from warehouse, in the 1252. United States for consumption during such period after July 3, 1954, but not after December 31, 1955, as the President may declare by proclamation to be a period during which United States articles, as defined in that Act, will be admitted into the Republic of the Philippines free of ordinary customs duty, as such duty is defined in that Act. Notwithstanding any such proclamation, paragraph (2) of such subsection shall be considered as having been in effect for the purpose of applying the provisions of paragraph (3) of such subsection.

Approved July 5, 1954.

PROTECTION OF U. S. FISHERMEN ON HIGH SEAS: The Senate Committee on Interstate and Foreign Commerce on August 4 favorably reported without amendment, H. R. 9584, protecting the rights of U. S. fishermen and others on the high seas and in territorial waters of foreign countries. (S. Rept. 2214).

Protecting the Rights of Vessels of the United States on the High Seas and in Territorial Waters of Foreign Countries.

Senate Report No. 2214 (August 4, 1954, 83d Congress, 2nd Session), 7 pp., printed. The report explains that the bill provides that in case of seizure of any privately-owned vessel of the United States, large or small, by a foreign country on asserted rights or claims to territorial waters or on the high seas, which rights or claims are not recognized by the United States, the Secretary of State shall take appropriate action to attend to the welfare of the vessel and its crew while it is held by such country and to secure the release of the vessel and its crew.

The traditional policy of the United States is to support the principle of the freedom of the seas, and to this end this country does not recognize claims to jurisdiction over alleged territorial waters greater in breadth than 3 marine miles from the coast, since it is the view of the United States, acting through the State Department, that under international law it is not required to recognize such claims.

The protection offered by this bill includes all documented United States vessels, as well as smaller vessels, including pleasure craft, of less than five tons which are not documented but are certificated by the Coast Guard. Specifically, however, the need for this legislation at this time has developed from seizures of American-flag fishing vessels which have taken place in the last several years as the result of extravagant territorial claims by foreign countries; claims which are strictly contrary to the traditional position of the United States with regard to the seaward limits of national jurisdiction. Some of these seizures have been made where there was no dispute of material facts with respect to the location or activity of the fishing vessels at the time of the seizure. In this connection, the committee was apprehensive lest the situations which have occurred to date shall be enlarged in scope and gradually work to the detriment of the long-established principle of the freedom of the seas which has stood for all of our national life as a guiding principle in international affairs.

Section 2 is the heart of the bill. It provides authority for the Secretary of State to take such action as he deems appropriate to secure the prompt release of a vessel of the United States which has been seized on the sea by a foreign country on the basis of rights or claims asserted by that country but not recognized by the United States. The Secretary of State shall take these actions where there is no dispute of material fact between the two countries with respect to the location or activity of the vessel at the time of its seizure.

No definition is made of the rights on the sea which shall be recognized by the United States. Consequently this bill does not affect in any way the flexibility with which the United States can deal with problems arising in this field of foreign affairs. If, as a result of needs not now foreseen, it becomes necessary for the United States to recognize under international law or policy rights or claims by foreign nations on the sea which it does not now recognize, it can do so with no impediment provided by this legislation. But whatever rights on the sea that the United States understands it has under international law at any particular time or place become, under this legislation, rights which its private vessels can exercise with the benefits of protection of United States law provided by the bill. Thus the fisherman and any American operator can know where and how he can operate on the sea without being molested in those operations by a foreign government.

Section 3 of the bill provides for the reimbursement to the owners by the Secretary of State of fines actually paid to secure the prompt release of the vessel and its crew. The bill, as introduced, provided in section 2 that the Secretary of State should "pay any fines or post any bonds that may be required by such country for such release." This provision was deleted by your committee at the suggestion of the Department of State to avoid any appearance of recognizing to any extent the validity of foreign claims by thus subjecting itself to the jurisdiction of foreign courts. Accordingly, following the Department's suggestion, the bill is amended as here reported, leaving the Secretary of State completely free, as provided in section 5 of the bill, to make and collect on claims against a foreign country because of the seizure of a United States vessel by such country.

Section 4 excepts two sorts of seizures from the provisions of this bill: (1) Seizures made by a country at war with the United States; (2) seizures made in accordance with the provisions of any fishery convention or treaty to which the United States is a party. The first is self-explanatory. With respect to the second, it may be stated that the United States is already a party to several fishery conservation treaties with several foreign countries.

More important than the desire to protect present treaties from the effect of this legislation, however, is the desire to provide even further flexibility to the Executive in the conduct of this branch of foreign affairs. If for any reason it becomes desirable for the United States to restrict its fishermen's activity off the shore of another country or countries, or to prohibit them entirely, either for a stated period of time or forever, this can be readily accomplished by engaging to do so under treaty with such country or countries.

It is the hope and expectation of your committee that the effect of the passage of this legislation will be even to reduce the number of seizures per year that have been made in recent years, and to deter possible extension of claims to territoriality on the high seas which would affect the rights of other classes of American-vessel operators.

The Report also contains correspondence from various U. S. Government agencies explaining their views on the bill, and a section-by-section analysis.

H. R. 9584 was passed without amendment by the Senate and cleared for the President on August 11.

RETURN OF FISHING VESSELS: The President on August 13 signed S. J. Res. 67, to repeal certain World War II laws relating to return of fishing vessels (P. L. 580).

Repealing Certain World War II Laws Relating to Return of Fishing Vessels, House Report No. 2550 (July 27, 1954, 83d Congress, 2nd Session), 5 pp., printed. The House Committee on Merchant Marine and Fisheries, to whom was referred the joint resolution (S. J. Res. 67) to repeal certain World War II laws relating to return of fishing vessels, and for other purposes, having considered the same, report favorably thereon without amendment and recommend that the joint resolution do pass.

The purpose of the joint resolution is to effect the repeal of two laws governing the return of fishing vessels requisitioned by the Martime Commission during the last war. The laws to be repealed set up a priority system in favor of the former owners of fishing vessels and other small craft and were designed to aid the fishing industry in providing a source of food. That they have long since served their purpose is demonstrated by the fact that at present but two applications are pending for vessels covered and these would be handled under existing law.

Congress, in the Federal Property and Administrative Services Act of 1949 (Public Law 152, 81st Cong.), established a uniform system for the disposal of Government surplus property and the enactment of this joint resolution will bring the handling of small-vessel disposal into conformity with the generally applicable procedures.

The Report contains comments from the offices of the Comptroller General of the United States and the Secretary of Commerce, and lists the changes in the existing law.

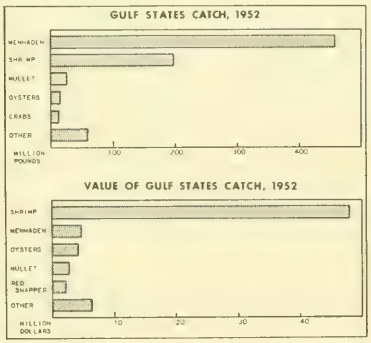
SOCIAL SECURITY FOR FISHERMEN: Senate passed on August 13 H. R. 9366, providing for expanded coverage and an improved old-age and survivors insurance program. Bill would cover employed fishermen, clam diggers, etc., who are now excluded under the present law.

The Senate on August 20 adopted conference report on H. R. 9366, clearing bill for President.

Social Security Amendments of 1954, Senate Report No. 1987 (July 27, 1954, 83d Congress, 2nd Session), 183 pp., printed. The Report gives considerable detail in the following sections: I. Purpose and scope of the bill. II. Summary of principal provisions of the bill (extends coverage to include about 50,000 employees engaged in fishing and related activities, on vessels of 10 net tons or less or on shore). III. Extension of old-age and survivors insurance coverage. IV. Average monthly wage. V. Earnings base. VI. Increase in old-age and survivors insurance benefits. VII. Improvement of the retirement test. VIII. Insured status. IX. Preservation of benefit rights for disabled. X. Miscellaneous provisions. XI. Actuarial cost estimates for old-age and survivors insurance system. XII. Public assistance. The report also contains a section-by-section analysis of the five sections of the bill; the amendments to Internal Revenue Code contained in the bill; and changes in the existing law on social security.

GULF FISHERIES--1952

Gulf Fisheries--1952, C.F.S. No. 1005, is an annual summary of the fisheries of the Gulf States (Florida west coast, Alabama, Mississippi, and Texas) for 1952. It includes tables summarizing the catch by species and by states, catch of certain shellfish in numbers and bushels, operating units by states, and lists the pounds of meats per bushel for certain shellfish. The bulletin also contains supplementary tables showing the operating unit and catch data by districts for the entire State of Florida.

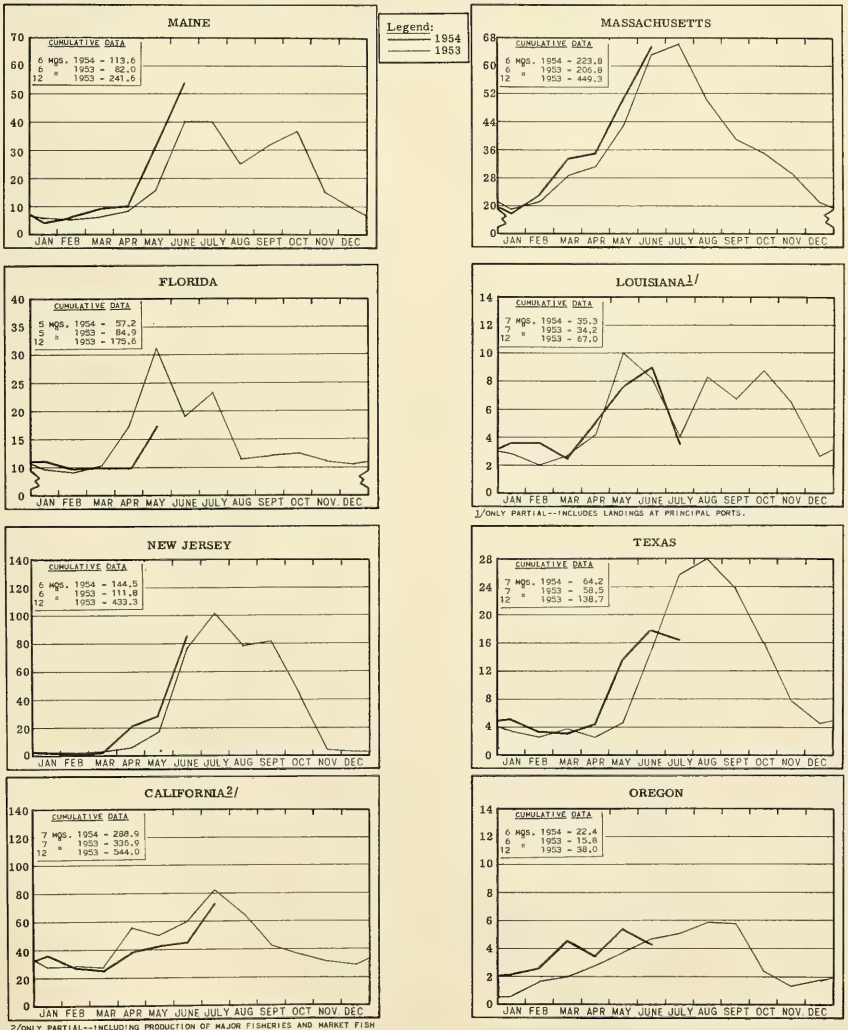


The 1952 catch of fish and shellfish in the Gulf area amounted to 759,507,000 pounds, valued at $68,221,000 ex-vessel. This represents an increase of 17 percent in quantity and 7 percent in value, compared with the landings of the previous year. Menhaden amounted to nearly 460 million pounds and comprised 61 percent of the total landings. Shrimp receipts (198 million pounds) accounted for 26 percent of the total poundage but 71 percent of the total value. Supplementary tables showing the operating unit and catch data by districts for the entire State of Florida are shown at the end of the bulletin.

Copies of C.F.S. No. 1005 are available free upon request from the Division of Information, U. S. Fish and Wildlife Service, Washington 25, D. C.

CHART 1 - FISHERY LANDINGS for SELECTED STATES

In Millions of Pounds

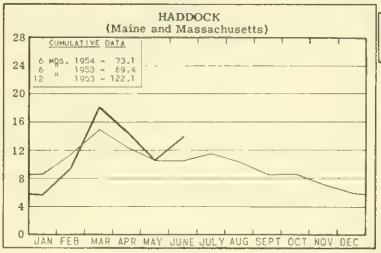


1/ONLY PARTIAL--INCLUDES LANDINGS AT PRINCIPAL PORTS.

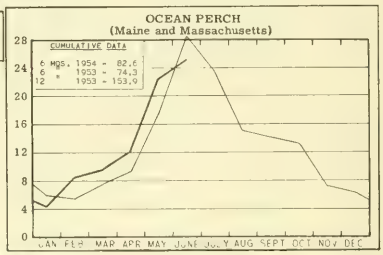
2/ONLY PARTIAL--INCLUDING PRODUCTION OF MAJOR FISHERIES AND MARKET FISH LANDINGS AT PRINCIPAL PORTS.

CHART 2 - LANDINGS for SELECTED FISHERIES

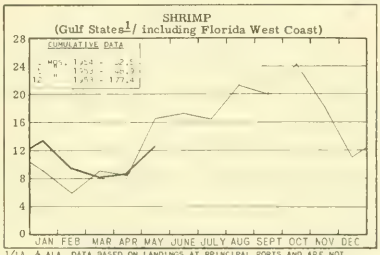
In Millions of Pounds



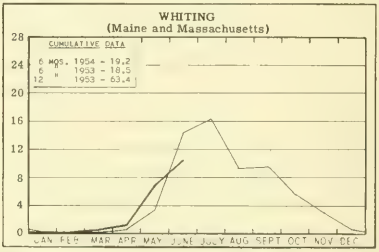
Legend:
1954
1953



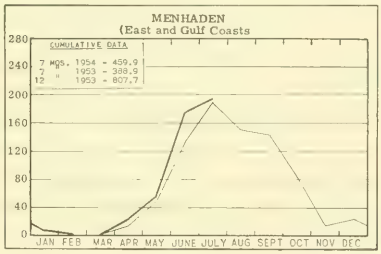
In Millions of Pounds

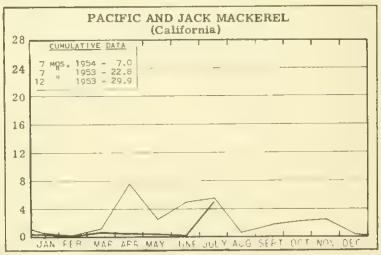


1/LA. & ALA. DATA BASED ON LANDINGS AT PRINCIPAL PORTS AND ARE NOT COMPLETE.

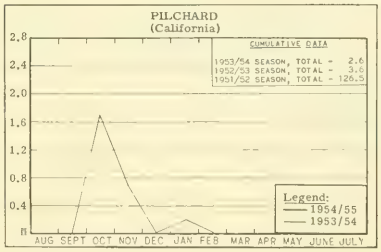


In Thousands of Tons





In Thousands of Tons



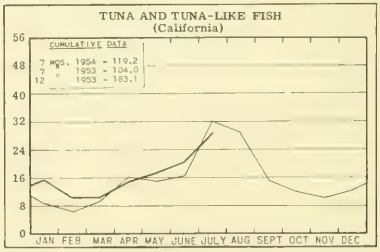
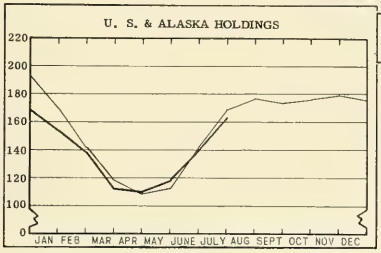
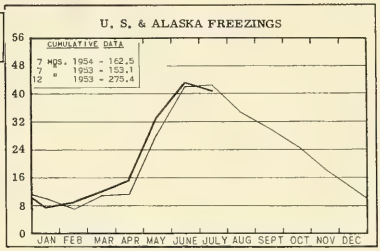
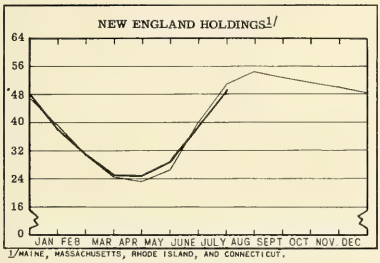


CHART 3 - COLD-STORAGE HOLDINGS and FREEZINGS of FISHERY PRODUCTS *

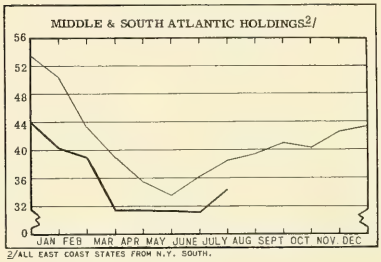
In Millions of Pounds



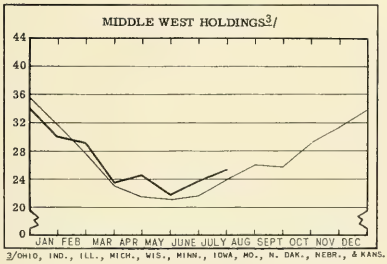




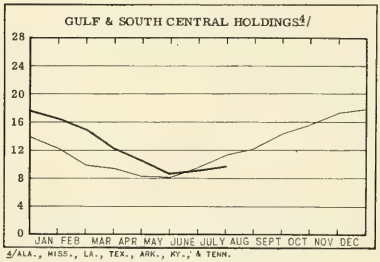
1/MAINE, MASSACHUSETTS, RHODE ISLAND, AND CONNECTICUT.



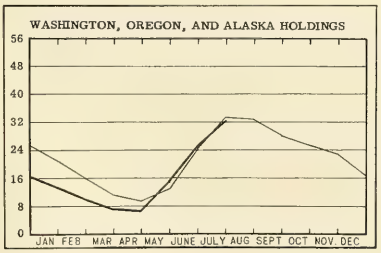
2/ALL EAST COAST STATES FROM N.Y. SOUTH.

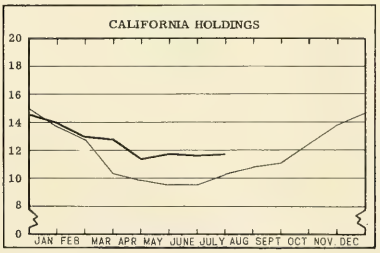


3/OHIO, IND., ILL., MICH., WIS., MINN., IOWA, MO., N. DAK., NEBR., & KANS.



4/ALA., MISS., LA., TEX., ARK., KY., & TENN.

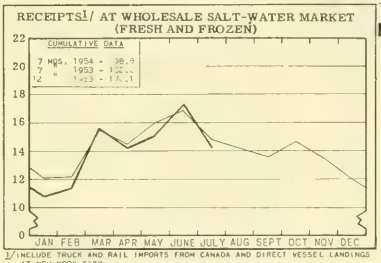




*Excludes salted, cured, and smoked products.

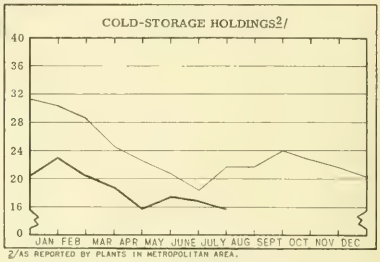
CHART 4 - RECEIPTS and COLD-STORAGE HOLDINGS of FISHERY PRODUCTS at PRINCIPAL DISTRIBUTION CENTERS

In Millions of Pound

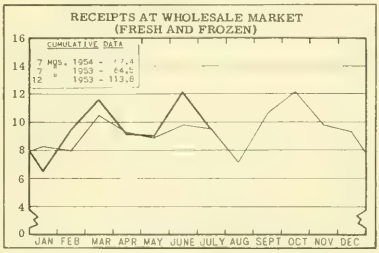


1/INCLUDE TRUCK AND RAIL IMPORTS FROM CANADA AND DIRECT VESSEL LANDINGS AT NEW YORK CITY.

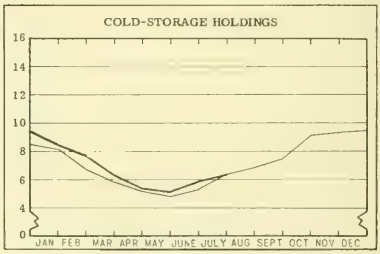
NEW YORK CITY



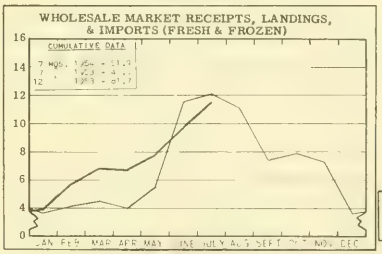
2/AS REPORTED BY PLANTS IN METROPOLITAN AREA.



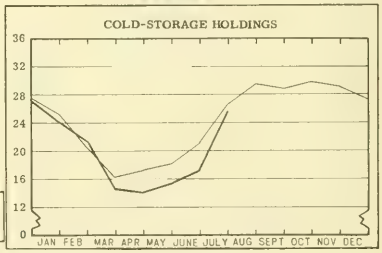
CHICAGO



SEATTLE

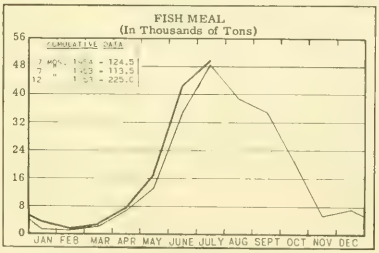


BOSTON



Legend:
1954
1953

CHART 5 - FISH MEAL and OIL PRODUCTION - U.S and ALASKA



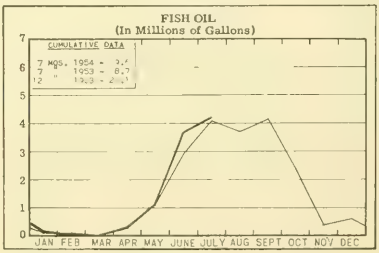
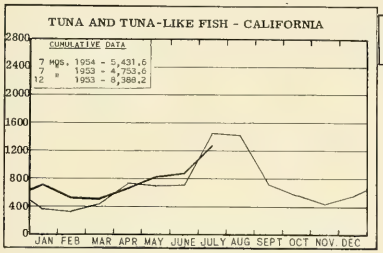
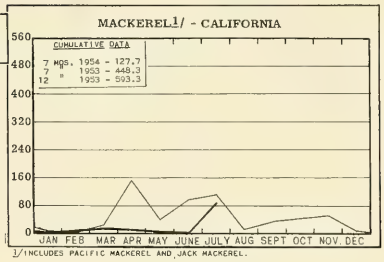


CHART 6 - CANNED PACKS of SELECTED FISHERY PRODUCTS

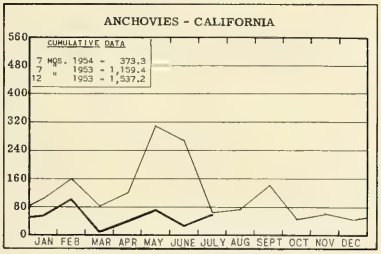
In Thousands of Standard Cases

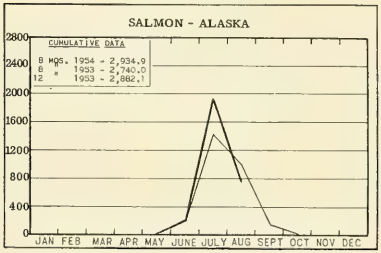


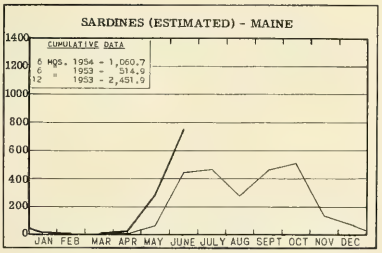
Legend:
1954
1953



1/ INCLUDES PACIFIC MACKEREL AND JACK MACKEREL.

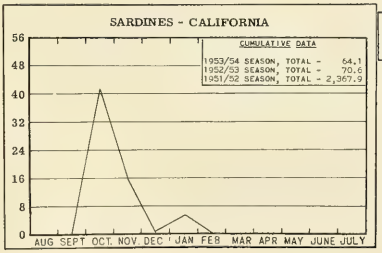






STANDARD CASES

Variety	No. Cans	Can Designation	Net Wgt.
SARDINES	100	¼ drawn	3¼ oz.
SHRIMP.....	48	--	5 oz.
TUNA	48	No. ½ tuna	6 & 7 oz.
PILCHARDS	48	No. 1 oval	15 oz.
SALMON	48	1-pound tall	16 oz.
ANCHOVIES	48	½ lb.	8 oz.



Legend:
1954/55
1953/54

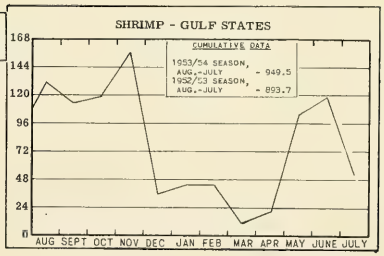
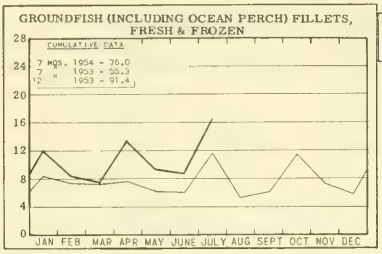
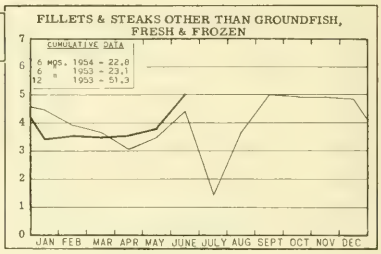


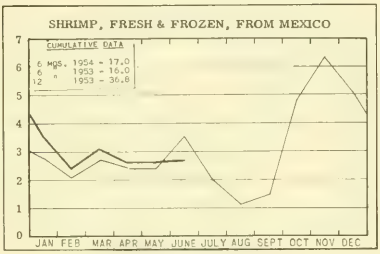
CHART 7 - U.S. FISHERY PRODUCTS IMPORTS

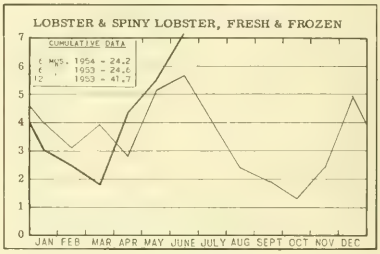
In Millions of Pounds

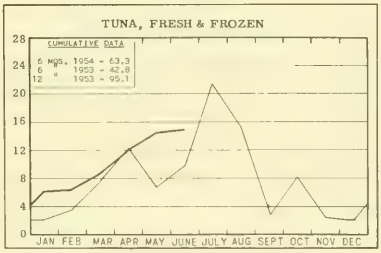


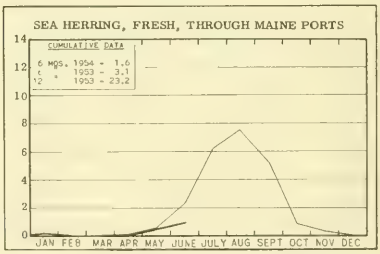
Legend:
1954
1953

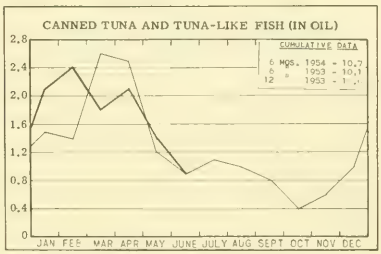


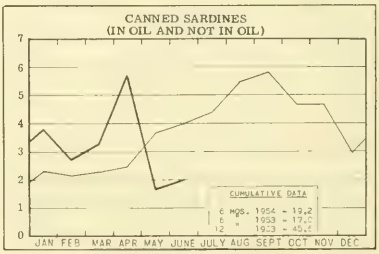












FISH AND WILDLIFE SERVICE PUBLICATIONS

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CFS - CURRENT FISHERY STATISTICS OF THE UNITED STATES AND ALASKA.
FL - FISHERY LEAFLETS.
SL - STATISTICAL SECTION LISTS OF DEALERS IN AND PRODUCERS OF FISHERY PRODUCTS AND BYPRODUCTS.
SSR.- FISH. - SPECIAL SCIENTIFIC REPORTS--FISHERIES (LIMITED DISTRIBUTION).
SEP.- SEPARATES (REPRINTS) FROM COMMERCIAL FISHERIES REVIEW.

Number	Title
CFS- 966	New England Fisheries, 1952, Annual Summary (revised), 7 pp.
CFS- 990	Florida Landings, February 1954, 6 pp.
CFS- 997	New Jersey Landings, April 1954, 2 pp.
CFS- 999	Florida Landings, March 1954, 6 pp.
CFS-1004	Canned Fish & Byproducts, 1953 Annual Summary, 20 pp.
CFS-1007	Frozen Fish Report, May 1954, 8 pp.
CFS-1008	Maine Landings, May 1954, 4 pp.
CFS-1011	Mississippi Landings, May 1954, 2 pp.
CFS-1013	Fish Meal and Oil, May 1954, 3 pp.
CFS-1014	Texas Landings, May 1954, 3 pp.
CFS-1016	Florida Landings, 1953 Annual Summary, 10 pp.
CFS-1017	New York Landings, January 1954, 4 pp.
CFS-1018	New York Landings, February 1954, 4 pp.
CFS-1019	New York Landings, March 1954, 4 pp.
CFS-1020	New York Landings, April 1954, 4 pp.
CFS-1022	Alabama Landings, May 1954, 2 pp.
FL -336u	Quarterly Outlook for Marketing Fishery Products, July-September 1954, 29 pp.
FL - 416	Little Tuna Recipes, 6 pp. Describes the little tuna, an Atlantic Coast member of the popular tuna family, and contains recipes developed in the Service's test kitchens for preparing this fine game fish.
SL - 152	Firms Manufacturing Oyster Shell Products, 1953 (revised), 2 pp.
SL - 161	Producers of Packaged Fish, 1953 (revised), 6 pp
Sep. No. 375	Freezing Fish at Sea--New England: Part 8 - Some Factors Affecting the Salt (Sodium Chloride) Content of Haddock During Brine-Freezing and Water Thawing.

SSR-Fish. No. 118 - Variations in Zooplankton Abundance in Hawaiian Waters, 1950-52, Joseph E. King and Thomas S. Hida, 71 pp., illus., processed, March 1954.

SSR-Fish. No. 119 - Variability of Long-Line Catches of Yellowfin Tuna, by Garth I. Murphy and Keith C. Elliott, 33 pp., illus., processed, March 1954. Describes a study of the variability of long-line catches of yellowfin tuna conducted (1) to establish a means of estimating the variance of catches made with different amounts of gear in a single set or station, and (2) to suggest a method of estimating the variance of a catch rate derived from the average catches of several stations. Pursuant to this the existence of schooling was investigated and the suitability of two transformations was tested empirically.

SSR-Fish. No. 126 - Creel Census and Expenditure Study, Madison River, Mont., 1950-52, 44 pp., illus., processed, April 1954.

THE FOLLOWING SERVICE PUBLICATIONS ARE AVAILABLE ONLY FROM THE SPECIFIC OFFICE MENTIONED.

Landings and Receipts of Fishery Products at Seattle--1953, by Charles M. Reardon, 30 pp., processed, June 1954. (Available free from Market News Service, U. S. Fish and Wildlife Service, 421 Bell Street Terminal, Seattle 1, Wash.) The Pacific Northwest fisheries trends and their effect upon Seattle fishery products receipts for 1953 are discussed in the first part of this report. Discussed by the author are the factors affecting receipts of fishery products at Seattle; the sources of supply for fresh and frozen fishery products; the trends in the salmon, halibut, tuna, long-line, and otter-trawl fisheries; shellfish receipts; and receipts of livers, liver oils, herring meal and oil, and other miscellaneous fishery products. The tables present fishery landings and wholesale receipts (including approximate values) at Seattle for 1953 by species, source of origin, and by months; monthly index of receipts of certain fishery products at Seattle; carload shipments of fishery products from Seattle by months; and names, classifications, and approximate standards for fresh and frozen fishery products sold on the Seattle market.

Oyster Bulletins, processed. (Available free from the Fishery Biological Laboratory, U. S. Fish and Wildlife Service, Milford, Conn.) As in previous years, a series of bulletins are issued

during the summer with information of practical importance and interest to the oyster growers of Long Island Sound. These bulletins describe the progress of accumulation and quantity of spawn in oysters during the prespawning and spawning periods, report on the intensity of spawning of the oyster population at different depths of Long Island Sound, and report on the beginning and intensity of setting in different sections of Long Island Sound. Also included is information on the survival and rate of growth of recently set oysters, and other facts that may be of interest to oyster culturists, especially concerning the behavior of the oyster enemies, starfish, and drills.

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"New Method of Artificially Planting Salmon Eggs," by Clinton Stockley; article, The Progressive Fish-Culturist, vol. 16, no. 3 (July 1954), pp. 137-138, illus., processed (annual subscription $1.25 domestic, US$1.65 foreign).

MISCELLANEOUS PUBLICATIONS

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM. CORRESPONDENCE REGARDING PUBLICATIONS THAT FOLLOW SHOULD BE ADDRESSED TO THE RESPECTIVE ORGANIZATION OR PUBLISHER MENTIONED. DATA ON PRICES, IF READILY AVAILABLE, ARE SHOWN.

The Behaviour of Juvenile Pacific Salmon, with Particular Reference to the Sockeye (ONCORHYNCHUS NERKA), by William S. Hoar, 29 pp., illus., printed. (Reprinted from Journal of the Fisheries Research Board of Canada, vol. 11, no. 1, 1954). Pacific Biological Station, Fisheries Research Board of Canada, Nanaimo, B. C., Canada. Behavior patterns of juvenile sockeye salmon in fresh water are compared with those of chum and coho salmon. Both sockeye and chum fry are schooling fish, responding positively to currents and avoiding shallow waters. Of the two species, chums, however, form more active schools, travel more rapidly, have a less marked cover reaction and prefer stronger light and shallower water. Sockeye smolts, in contrast to coho smolts, are more active, show little thigmotactic and territorial behavior and a more persistent response to current. The experimental findings are discussed in relation to the migratory behavior of these fish. It is suggested that sockeye fry, emerging from cover as the light intensity falls are displaced downstream after dark. Moderate activity and a marked preference for deep water are mechanisms postulated for continued residence of sockeye fry in lakes. Further it is suggested that the smolt exodus is due to heightened general activity, both day and night, associated with strong response to current. This brings sockeye smolts into the outflow from the lake where they hold position during the day but are displaced down the river after dark. Coho smolts, responding less vigorously to currents and maintaining a measure of contact with specific objects in their environment, move seaward more slowly than sockeye.

Bulletin of the Faculty of Fisheries, Hokkaido University, vol. 4, no. 3, 46 pp., illus., printed in Japanese with summaries in English. Hakodate, Japan, November 1953. Contains among others the following scientific papers: "Studies on Insulin of the Marine Mammals (III);" "Studies on the Herring Fishery by the Use of Square Nets in the Sea Near Hokkaido. I--On the Square Nets at Yagishiri Island of Hokkaido;" and "On the Fishing Boats Prescribed in the Revised International Regulations for Preventing Collisions at Sea."

Bulletin of the Faculty of Fisheries, Hokkaido University, vol. 4, no. 4, 128 pp., illus., printed in Japanese with summaries in English. Hakodate, Japan, February 1954. In addition to many others, this bulletin contains the following articles: "On the Efficacy of Net Preservatives (5);" "Fundamental Studies on Spherical Glass Floats for Fishing Nets (II)--On Water Resistance of Glass Floats;" "Mechanical Studies of Fishing Net Materials. I--Some Information on the Tensile Strength of Netting Cord (1);" and "Mechanical Studies of Fishing Net Materials. II--A Method of Estimating the Least in the Ten Thousand Tensile Strengths of Netting Cord."

Bulletin of Hokkaido Regional Fisheries Research Laboratory, no. 10, 65 pp., illus., printed in Japanese with summaries in English. Hokkaido Regional Fisheries Research Laboratory, Yoichi, Hokkaido, Japan, March 1954. Contains the following articles: "On the Normal Development of the Fish, Theragra chalcogramma (Pallas), Alaska Pollack;" "Holding Experiments of Tagged Fishes: Common Mackerel (Scomber japonicus Houttuyn) and Anchovy (Englauris japonicus T. & S.);" "Biochemical Studies on Protein Components of Squid Muscle;" "On the Seasonal Variation of Pollack Liver Oil in Monbetsu District;" "Studies on Containing States of Vitamin A in Fish Viscera;" "A Study on the Extraction Method of the Vitamin A from Pyloric Caeca of Cod;" and "Studies on the Freshness Test of Fishes. I."

Bulletin of the Japanese Society of Scientific Fisheries, vol. 19, no. 11, 1954, 62 pp., illus., printed in Japanese with summaries in English. The Japanese Society of Scientific Fisheries, Tokyo, Japan. Contains among others the following articles: "Some Properties of Oxidizing Fish Oil Concerning to its Condition of Oxidation;" "The Behaviors of the Sardine Schools by Fish-Detector--II. Influences of the Water Temperature when Attracting the Fish Schools by Fishing Light;" "Mechanical Properties of Fish Jellies (Renseihin);" "Studies on Growth Process of Sardine, (Sardinia melanosticta (F&S.)--I. Growth of Sardine in Inlets, Yosanaikai and Kumihama Bay;" "Biochemical Studies of the Salmon, Oncorhynchus keta--II. The Changes in the Components of Depot Fats During the Spawning Migration;" "Biochemical Studies of the Salmon, Oncorhynchus keta--III. The Changes in the Components of Liver Fats During

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the Spawning Migration;" and "How do Fish Select Positions and Kind of the Bags When Entering into 'Masu-Ami'?--III. Field Tests with Flatfishes, Eels, and Other Marine Animals."

Bulletin of the Japanese Society of Scientific Fisheries, vol. 19, no. 12, 1954, 108 pp., illus., printed in Japanese with summaries in English. The Japanese Society of Scientific Fisheries, Tokyo, Japan. Contains among others the following articles: "The Behaviors of the Sardine Schools by Fish-Detector--III. Behavior of Sardines When Attacked by Dolphins;" "Studies on Electrical Sterilization--II. Electrolysis of Sodium Chloride Solution Through Alternating Current;" "Physico-Chemical Studies on the Skin and Leather of Marine Animals--IX. Swelling of Shark Skin;" " Studies on Vitamin B_{12} of Aquatic Animals--IV. The Vitamin B_{12} of the Starfish;" "On the Removing of F.F.A. of Liver Oil;" and "Studies on the Prevention of Emulsifying in Alkali-Digestion Process."

(California) Statistical Report of Fresh, Canned, Cured, and Manufactured Fishery Products (Year 1953), Circular No. 28, 15 p. (mostly tables), printed. Marine Fisheries Branch, Department of Fish and Game, San Francisco, Calif., 1954. The tables in this publication show the California commercial landings of all fish and shellfish by species and by main fishing areas; the general origin of the commercial catch (in pounds) of each species and the volume of shipments into the State; a list of canning and reduction plants; a list of plants curing and manufacturing fishery products; and the production of canned, cured, and manufactured fishery products and byproducts (including fish meal and oil). Historical data are also included for the more important species--anchovies, sardine, tuna, yellowtail, and bonito.

(Canada) Fisheries Statistics of Canada, 1952 (New Brunswick), 8 pp., printed, French and English, 25 Canadian cents. Dominion Bureau of Statistics, Ottawa, Canada, 1954. Consists of tables giving the production and landed and marketed values of the principal species of fish and shellfish landed in New Brunswick in 1950-52; quantity and value of manufactured fishery products for 1951-52; vessels used in the sea fisheries; capital equipment in the primary fisheries operations; and the number of persons engaged in the fisheries.

(Canada) Fisheries Statistics of Canada, 1952 (Nova Scotia), 8 pp., printed, French and English, 25 Canadian cents. Dominion Bureau of Statistics, Ottawa, Canada, 1954. Consists of tables giving the production and landed and marketed values of the principal species of fish and shellfish landed in Nova Scotia in 1950-52; quantity and value of manufactured fishery products for 1951-52; vessels used in the sea fisheries; capital equipment in the primary fisheries operations; and the number of persons engaged in the fisheries.

(Canada) Fisheries Statistics of Canada, 1952, (Ontario, Prairie Provinces and Northwest Territories), 8 pp., printed, French and English, 25 Canadian cents. Dominion Bureau of Statistics, Ottawa, Canada, 1954. Consists of tables giving the production and landed and marketed values of the principal species of inland fish landed in Ontario in 1950-52; capital equipment in the primary fisheries operations; and the number of persons engaged in the fisheries. Similar data are also given for the Prairie Provinces (Manitoba, Saskatchewan, and Alberta) and the Northwest Territories.

(Canada) Fisheries Statistics of Canada, 1952 (Quebec), 6 pp., printed, French and English, 25 Canadian cents. Dominion Bureau of Statistics, Ottawa, Canada, 1954. Consists of tables giving the production and landed and marketed values of the principal species of fish and shellfish landed in Quebec in 1950-52; quantity and value of manufactured fishery products for 1951-52; vessels used in the sea fisheries; capital equipment in the primary fisheries operations; and the number of persons engaged in the fisheries.

Commercial Trawling Tests in the Great Australian Bight, by T. W. Houston, Division of Fisheries Technical Paper No. 2, 18 pp., illus., printed. Commonwealth Scientific and Industrial Research Organization, Melbourne, Australia, 1954.

Effects of Compensatory Mortality Upon Population Abundance, by W. E. Ricker, F.R.B. No. 359, 7 pp., illus., printed. (Reprinted from The Journal of Wildlife Management, vol. 18, no. 1, January 1954). Pacific Biological Station, Fisheries Research Board of Canada, Nanaimo, B. C., Canada.

Food Composition Tables--Minerals and Vitamins (for International Use), by Charlotte Chatfield, FAO Nutritional Studies No. 11, 117 pp., printed, US$1. Food and Agriculture Organization of the United Nations, Rome, Italy, March 1954. (For sale by Columbia University Press, International Documents Service, 2960 Broadway, New York 27, N. Y.) This publication is in sequence with Food Composition Tables for International Use published by FAO in 1949. The earlier tables showed the calorie value and the protein, fat, and carbohydrate content of foods commonly used throughout the world. The present tables give the figures for vitamin A, ascorbic acid (vitamin C), thiamine (vitamin B_1), riboflavin and niacin, and for two minerals--calcium and iron. These are all nutrients in which human diets are often deficient. Knowledge of their distribution in foods is therefore of considerable practical value.

The relevant figures can be used in calculating the nutrient content of diets in surveys of selected groups which provide reasonably accurate information about the intake of food. The author indicates, contrary to the popular belief, that the nutrient content of foods varies widely from place to place, that "similarities have been more conspicuous than discrepancies in the values reported for a food when a sufficiently large number of observations under varying conditions have been available from several countries."

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There are three tables: 1. Food Composition in Terms of Retail Weight. 2. Composition of the Edible Portion and Refuse in the Material as Purchased. 3. Composition of the Edible Portion and Refuse in the Material as Purchased: Proximate Composition of New Items. A bibliography of 539 references is given.

--Charles Butler

Foreign Trade Practice (Reference Sources), Business Information Service World Trade Series No. 578, 22 pp., processed, 25 cents. Bureau of Foreign Commerce, U. S. Department of Commerce, Washington 25, D. C., June 1954.

The Freezing and Cold Storage of Fish, by G. A. Reay, A. Banks, and C. L. Cutting, Food Investigation Leaflet No. 11, 20 pp. printed, 6d. (7 U. S. cents). Food Investigation Organization, Department of Scientific and Industrial Research, Cambridge, England, 1952. (For sale by Her Majesty's Stationery Office, London.) The age-old practices for fish preservation by salt-curing or salt-curing coupled with drying or smoking have been superseded in some countries by an enormous expansion in the supply and distribution of fresh fish. The limitations of ice as a preservative of fresh fish are, however, a serious drawback, especially when fishing is done on banks distant from the consuming centers. Under normal commercial conditions of handling and stowage in ice, nonfat fish such as cod remain reasonably fresh for about one week. Fatty fish such as herring are usually landed in satisfactory condition even when not iced during the eight hours they are aboard the vessel. Even with adequate icing during the two or more days required for distribution, the fish frequently reach the consumer in an inferior condition.

Fresh herring and "white" fish if well smoke-cured will keep in first class condition for several days in storage at 60° F. If stale raw materials are used for these lightly-smoked products, their palatable life seldom exceeds at ordinary temperatures the two days required for distribution.

By contrast the principles of freezing and cold storage, if properly applied, afford practically perfect preservation of fresh and of lightly smoke-cured fish of all kinds for several months. This leaflet outlines the basic principles of proper freezing and cold storage of fish and then details their application to the products normally marketed in Britain.

Fish stowed with or without ice are attacked by bacteria, and by the enzymes in the meat of the fish. Most of the stale and later the putrid odors and flavors associated with spoiling and spoiled fish arise from bacterial activity. The enzymes act much more slowly to digest the protein of the meat, softening it and altering the physical characteristics; they attack the fat or oil to form substances with undesirable odors, flavors, and appearance. Commonly recognized examples are a rancid smell and flavor, a "rusty" appearance, and a gummy consistency.

The rate of bacterial activity is progressively slowed by lowering the temperature of fish. Chilling in ice affords brief protection. Fish brought to 20° F. are more effectively protected and bacterial spoilage is actually under control at 15° F. or lower. Two factors bring about this result. The fish at 15° F. have about 91 percent of the water in their cells turned into ice. Into the 9 percent of remaining liquid has been concentrated the various salts of the meat. Since bacteria require much fluid water to exert maximum destructive action, this solid state of the water slows their activity. The concentrated salt solution likewise strongly inhibits their activity.

Once bacterial activity has been checked by freezing fish to 15° F., the slower but undesirable changes attributable to enzymic action become apparent. Another deteriorative type that occurs in frozen fish includes the oxidation of oil in fat fish and of some unidentified constituent of lean fish to produce "salt-fishy," "cold storage," and rancid odors.

During the freezing of fish an important type of deterioration (denaturation) can cause changes in the texture and appearance of even the freshest fish. These changes occur most rapidly at temperatures just below the freezing point of fish, 27° F., and continue quite rapidly at 15° F. A few weeks' storage at such a high temperature can result in inferior quality. The meat becomes, on thawing, opaque and white, spongy and friable, and juice exudes freely. The cooked meat is "sloppy" at first and dry and fibrous on further chewing.

To minimize these undesirable changes the recommended procedure is that: (1) the fish be so frozen that it passes through the "zone of maximum crystallization," 30° F. to 23° F., as rapidly as possible; (2) cold storage is at temperatures of subzero levels, e.g. -5° F. to -20° F.

Even under these most favorable conditions frozen fishery products must be protected from the relatively slow deterioration from oxidation and evaporation. The use of a glaze or a moisture-vapor proof wrapping material, if properly applied and maintained, will accomplish this protective function.

In the second section dealing with the application of the information now known about the basic principles for the proper freezing and cold storage of fish, several pertinent subjects are covered.

Raw materials for freezing should be fresh. Inshore fish, as herring, must be iced aboard the vessel, and the total elapsed time from capture to freezing should not exceed 12 to 18 hours. Fish taken at greater distances from port should be promptly iced (or frozen at sea) and delivered to the freezer within 1 to 4 days.

Freezing of fish should be done immediately as they are received. Brining of white-fish fillets for 20 to 60 seconds in 40° to 60° salinity

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brine (10 to 15 percent by weight of salt) is recommended to minimize drip. Freezing rates suggested as satisfactory are approximately one inch per hour for blocks of fish of fillets up to $3\frac{1}{2}$ inches in thickness. Freezing is considered completed when the center of the fish or block is at 0° F.

Fish to be glazed should be sufficiently cold to allow for the rise in temperature during this process. For example, a 7-pound block of fillets 2 inches thick and at -15° F. in the center may rise to 8° F. in taking on a glaze of $1\frac{1}{2}$ to 2 percent by weight. Use of a precooling room is important to bring glazed fish or any frozen fish to the actual storage temperature before they are put into the cold-storage holding room.

Storage-room conditions and temperatures recommended include: (1) use of airlocks at entry points; (2) adequate and maintained glaze or wrapping material; and (3) constantly maintained low temperatures (white fish -5° F. for 4 months or -20° F. for 8 months or longer; herring -5° F. for up to 3 months and -20° F. for 6 months or longer).

Thawing should be carried out at temperatures below 60° F. The rate depends on the thickness of the fish, the temperature of the thawing agent, and the rate of movement of this agent. For example, fish 2 inches thick thaw in still air at 60° F. in 6 hours; in running tap water at 60° F. in $1\frac{1}{2}$ hours; and in running tap water at 45° F. in 3 hours. The hazard of loss in flavor from prolonged water thawing is stressed, especially for fillets. Small fish or fillets may be cooked without thawing, and even a "batter" can be added for deep fat frying. The cooking time for frozen fish must be longer than for thawed fish, but there is less loss of juiciness and full flavor using frozen fish.

The temperature of frozen fish in transport should never be allowed to rise above 0° F. If limited storage of not over a few weeks is contemplated at the retailer's or consumer's premises, a holding temperature of 5° F. or lower is satisfactory. The guiding principle throughout the distribution chain must be to insure that the initial quality of the fish at the time of freezing is not thrown away by carelessness in the final stages of distribution.

--Charles Butler

Indo-Pacific Fisheries Council--List of Scientific & Other Periodicals Published in the Indo-Pacific Area (2nd Edition, Revised), 51 pp., printed. Food and Agriculture Organization of the United Nations, Regional Office for Asia and the Far East, Bangkok, 1953.

Investigations of the Black Mullet, MUGIL CEPHALUS L., in Northwest Florida, by Gordon C. Broadhead, Technical Series No. 7, 34 pp., illus., printed. Marine Laboratory, University of Miami, Coral Gables 34, Florida, 1953. This bulletin reports results of the mullet investigation in northwest Florida undertaken by the Marine Laboratory of the University of Miami in 1948 at the request of the Florida State Board of Conservation. According to the author, "Northwest Florida produces about one-sixth of Florida's supply of mullet, with an average annual value of about $450,000. Since 1941 there has been a drop in the mullet catch in northwest Florida to 40 percent of the former level and this is thought to reflect a corresponding drop in the abundance of the fish." More details are given in the section on production trends in the fishery. The author also discusses the mullet fishery in northwest Florida in general, the general biology of the black mullet, sampling the commercial fishery, weight-length relationship, time of maturity, size at maturity, spawning, migrations, and growth of the mullet. Nets used in the commercial fishery are selective as to the size of fish taken. Gill nets are the most selective, followed by trammel nets, with seines the least selective of the three types of gear. There are discussions of net selectivity in the mullet fishery and management of the fishery.

"Lamprey Control," article, Trade News, May 1954, vol. 6, no. 11, pp. 6-7, illus., printed. Department of Fisheries, Ottawa, Canada. This article describes a Federal-provincial research program aimed at further developing the fisheries of the Canadian side of the Great Lakes. A Great Lakes Fisheries Research Committee, established by the Canadian Government and the Ontario provincial government, will coordinate all phases of Great Lakes fishery research, but lamprey control in Lake Superior has been designated as the priority project. Twenty major lamprey-control installations are expected to be completed during 1954. Field headquarters for lamprey control have been set up; electrical barriers and a physical barrier are now in operation and their efficiency in controlling lamprey will be studied. A search is being carried out to find a suitable poison and a method for its application to eliminate young lamprey and ammocoetes in the rivers. A survey to determine the size of the lamprey runs and the use made of the streams for spawning is to be made. Three million lake trout eggs from Great Slave Lake in the Northwest Territories will be obtained to insure the continued planting of lake trout in Lake Superior and these will be hatched and planted in the upper Great Lakes. Scientists will collect statistics of the existing lake trout fishery of Lake Superior. Continuation of the experimental commercial fishery operation, and other operations like the planting of fish, census of sport fishing, examination of the experimental catch, and release of marked fish will be carried out. Similar work being carried out in Lake Erie will also include a tagging program and analysis of commercial catches to provide data for population estimates and movements of fish in that lake. The Lake Ontario part of the program will have three chief projects: (1) continuation of the whitefish study, (2) lamprey observations, and (3) preliminary observations directed to eventual better fish processing.

Marine Laws--Navigation and Safety, 1954 Supplement, by Frederick K. Arzt, 40 pp., printed,

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$1.50. Equity House, Equity Publishing Corporation, Stony Brook, New York, 1954. This is a supplement to the more comprehensive volume published in April 1953 and reviewed in Commercial Fisheries Review, July 1953. It brings up to date (May 6, 1954) all amendments by Congress affecting marine matters within the scope of its chapter headings. Nineteen chapters are affected by the revisions, covering such items as inspection of vessels, documentation, federal ship mortgage insurance, radio, pilotage, rules to prevent collisions, etc. Two comprehensive notes on "Development of the International Ice Patrol" and "History and Court Constructions of Light Money" are included. Author's comments on many of the recent administrative and court decisions should be helpful to the reader. Also included are a table of contents, distribution tables, and index by means of which the reader may quickly find the latest information in the various sections.

--D. E. Powell

"Maritime Oyster Research," article, Trade News, May 1954, vol. 6, no. 11, pp. 4-5, illus., printed. Department of Fisheries, Ottawa, Canada. This article describes a joint program of the Fisheries Research Board of Canada and the Federal Department of Fisheries to develop oyster farming in Canada's Maritime provinces. This program was carefully reviewed in an attempt to assure that policies and experimental farming were both planned in the best interests of the industry. Attempts were made to find cheaper production methods and to develop cheaper and more effective means of collecting spat and rearing small oysters. Describes the construction of a tidal pool for oyster studies. Experiments are also being conducted to find the best methods for the control of eel grass, which interferes with oyster growth.

Maryland's Sunken Treasure, Conservation Series Book Two, 52 pp., illus., printed. Maryland State Department of Education, Baltimore, Md., 1953. This publication, the second of the Maryland Conservation Series, deals with the life story, the uses, and misuses of the Maryland oyster. It describes oyster farming, types of boats and gear used in catching oysters, methods of preparing oysters for market, and how to increase the oyster supply. It is presented in a graphic and readable style in response to a need for authentic, interesting, and nontechnical instructional materials on conservation in Maryland. It is intended to give a broader understanding of the problems in oyster conservation.

The New England Fishing Industry (A Study in Price and Wage Setting), by Donald J. White, 222 pp., printed, $4.00. Harvard University Press, Cambridge, Mass., 1954. The problems of the New England fishing industry are comprehensively treated in this book. Policy makers in business, unions, state and Federal government agencies, and other individuals interested in the fishing and allied industries will find the contents of inestimable value. This is a study in the interrelations of wages and prices and factor and product markets as the subtitle indicates. Specific proposals for the New England fishing industry are presented, as well as a theoretical analysis and a report on the operation of collective bargaining. A reappraisal of its techniques, methods, and organization are essential if the historic New England fishing industry is to survive, the author points out. The four major economic problems of the industry in recent years are discussed in detail: (1) "profit-sharing" controversies between the fishermen and the fish dealers, and the attempt of the fishermen's union to influence production, prices, and wages which have developed out of these controversies; (2) the effect of the decline of key species of fish, and possibilities for correctives; (3) marketing difficulties, particularly the severe competition with meat and meat products; and (4) foreign competition, particularly from the Canadian Maritime Provinces, but also on a growing scale from Iceland and other northern nations. The historical development of present-day fishing operations in the leading ports of Boston, Gloucester, New Bedford, Portland, and Rockland is adequately reviewed. The pricing mechanisms and the unique arrangement by which the fishermen share directly in both the revenues and expenses of operations under a historic pay arrangement called the "lay" are clearly analyzed. The growth of organized groups are traced and collective bargaining experience and union policies are described. Concrete recommendations are given by the author for bettering collective bargaining, union policies, production and marketing, and wage-price determination. In his preface the author points out that his study is concerned with but one of the industry's major divisions--the fresh and frozen finny fish phase concentrated in Boston, Gloucester, and New Bedford, Mass.; and in Portland and Rockland, Maine. In focusing the spotlight on operations in these ports, continues the author, we are purposely excluding from coverage such other prominent branches of the trade as sardine canning in Maine, shellfish and lobster fishing in all the coastal states (particularly in Maine and Massachusetts), and brokerage in all kinds of fish specialties, which is centered in Boston. The analysis focuses upon the union, relations between the union and vessel owners and fish buyers, and the policies these groups have develped and carried forward. The discussion is developed in the light of the basic economic characteristics and problems of the industry. Included in the study is an examination of the key problems of fish scarcity, fish marketing, and foreign competition which harass fishermen, vessel owners, and fish buyers alike. Some suggestions are offered by the author with the hope that they might help the parties minimize their internal differences and overcome their common problems. Prospects for progress are also reviewed. The material in this study runs for the most part up to 1952 when the study was finished. However, the author has added a postscript to bring the story more nearly up to date. An important part of the book is the "Theoretical Supplement" which will be of interest to economists as it constitutes a contribution in the application of theory to interrelated labor and product markets. Interesting is the author's

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finding that coordinated systematic research, market development, and improved industrial practices are the steps which should provide an answer to the industry's fish scarcity, marketing, and foreign competition problems.

--Joseph Pileggi

Oceanography--Science of the Sea, by John P. Tully, 19 pp., illus., printed. (Reprinted from the Canadian Geographical Journal.) Department of Fisheries of Canada, Ottawa, Canada, 1953. A description of oceanographic research in Canada. Briefly discussed are processes in the sea; ocean currents; coastal currents; tides; climate and temperature of the sea; taking water samples; food in the sea; salt and other chemicals in the sea; and the development of oceanography.

Our Underwater Farm, Conservation Series Book Three, 52 pp., illus., printed. Maryland State Department of Education, Baltimore, Maryland, 1953. This publication, the third of the Maryland Conservation Series, discusses fish, crabs, and oysters--three main "crops" of our "farm," the Chesapeake Bay. It describes the habits of these three "crops," their economic importance, and the conservation practices employed in Maryland and Virginia to maintain the rich resources of the Chesapeake Bay. As with the other booklets in this Series, it is written in response to a need for authentic, interesting, and nontechnical instructional materials on conservation in Maryland.

"The Preservation of 'Wet' Fish--Part I," article, FAO Fisheries Bulletin, vol. VII, no. 2, April-June 1954, pp. 49-65, printed, single copy 30 cents. Food and Agriculture Organization of the United Nations, Rome, Italy. (For sale by International Documents Service, Columbia University Press, New York 27, N. Y.) This is the first report of Working Group 3 of the FAO Interim Committee on Fish Handling and Processing (in two parts). Reviews experiments on cooling and handling of wet fish and on the use of preservatives and disinfectants. Stress has been laid on the principles of the methods of fish handling and chilling, and not on the technical details. Effects on spoilage of chilling, handling, and preservatives are discussed. The physiology of spoilage bacteria and the physiology of the fish are also mentioned. Part 2 of the Group's report will deal with the construction of fish holds.

Production of Fish in the Colonial Empire, Revised Edition-1953 (A Review by the Fisheries Adviser to the Secretary of State for the Colonies), by C. F. Hickling, Colonial No. 300, 22 pp., printed, 9d. net (10 U.S. cents net). Her Majesty's Stationery Office, London, England, 1954. A brief account of the fishery development and research in each territory of the Colonial Empire.

Research in Salmon Migration Over High Dams--The Nature of the Biological Problem, by J. R. Brett, FRB No. 356, 6 pp., printed. (Reprinted from the Sixth British Columbia Natural Resources Conference Transactions, 1953.) Pacific Biological Station, Fisheries Research Board of Canada, Nanaimo, B. C., Canada. Discusses the nature of migrating salmon, their particular responses and capabilities, and the work being done relative to safeguarding downstream migrants.

Review of Kenya Fisheries, 1952, by Hugh Copley, 117 pp., illus., printed. The Government Printer, Nairobi, Kenya, 1953. Reviews the Kenya fisheries for 1952, with special reference to the river fisheries, hatchery work, a fish-culture farm, and the marine fisheries. The report on the marine fisheries discusses production, prices, distribution and marketing, and exploratory and experimental work. It describes a study of markets; the storing and sale of fresh fish; the processing and sale of dried salted fish; the collection and disposal of shell in various forms; and the catching, preparation, and sale of turtles, crustacea, and beche-de-mer. Also includes statistical data on the yield of trout by river and area for the period 1938-52, and fish trap results.

(Scotland) Industry and Employment in Scotland, 1953, Cmd. 9102, 74 pp., printed, 2s. 6d. (35 U. S. cents). Scottish Home Department. (Available from Her Majesty's Stationery Office, Edinburgh, Scotland), 1954. Contains, among others, a chapter on the fisheries of Scotland in general. It also discusses the whitefish, shellfish, herring, salmon, and fresh-water fisheries, fishery harbors, exports, and fisheries research.

Shrimp Prospecting in Regions of the British Columbia Coast, November 1953 to March 1954, by T. H. Butler and H. E. J. Legare, Circular No. 31, 42 pp., illus., processed. Fisheries Research Board of Canada, Pacific Biological Station, Nanaimo, B. C., April 1954. A program to locate new shrimp grounds and to study effectiveness of shrimp gear was conducted by the Pacific Biological Station from November 10, 1953, to March 10, 1954. Favorable marketing conditions have occasioned an increased interest in British Columbia's unexplored shrimp resources during the past year. The Station's trawler Investigator No. 1, and a chartered vessel, the Yuri M, were employed in this survey. To increase the range of shrimp vessels, experiments were also conducted on holding shrimp in refrigerated sea water (a separate report on this phase has been released). A total of 114 exploratory tows were completed using a small otter trawl (diagram given). Tows generally lasted 15 to 20 minutes, and the shrimp catch was coverted to a pounds-per-hour basis. A catch of 25 pounds of shrimp or more was considered to be of commercial fishing value. Fishing depths ranged from 14 to 115 fathoms, with commercial quantities found between 29 and 75 fathoms. Results of the tows are listed in tables, and the locations are shown on maps of the areas covered. In the Strait of Georgia six localities yielded catches considered of commercial significance. "Smooth pink" shrimp, a new type found over a year ago, made up most of the

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catch in this region. Of 23 tows made in Chatham Sound near Prince Rupert, 16 contained commercial quantities, indicating the region will support a moderate shrimp fishery. In Queen Charlotte Strait and inlets near Johnstone Strait, the trawling area was found to be quite limited and only five tows yielded commercial quantities of shrimp. Food fish (lemon sole, starry flounder, and grey cod) were caught in commercial quantities in this area. An experiment to compare the efficiency of otter trawls and beam trawls in shrimp fishing indicated an advantage for the otter trawl in total catch, both for shrimp and fish. The beam trawl apparently fished better with increasing depth, but additional work is necessary in the comparison of the two types of gear. The cost for materials and operations is greater for the otter trawl.

--D. E. Powell

Some Aspects of the Dynamics of Populations Important to the Management of the Commercial Marine Fisheries, by Milner B. Schaefer, Bulletin, vol. 1, no. 2, 32 p., illus., printed. Inter-American Tropical Tuna Commission, La Jolla, Calif., 1954. Presents the results of investigations by the Inter-American Tropical Tuna Commission, which has the task of gathering and interpreting factual information to facilitate maintaining the populations of the tropical tunas and of the tuna-bait fishes at levels which permit maximum sustained catches year after year. Attention is directed to the collection and compilation of reliable data on the total catch and catch per unit of fishing effort of each tuna species over the period of growth and development of the fishery in the Eastern Tropical Pacific. The next step in the investigation is to employ these data together with such ancillary vital statistics as may be required and may be obtainable, to the estimation of the level of maximum sustained yield of each tuna stock and the determination of the present condition of the fishery with relation thereto. This requires the employment of a suitable mathematical model, describing the effect of fishing on tuna stocks. This paper reports the investigations undertaken to develop a suitable model, and of methods of its application to fisheries data, which can be applied to the data of the tuna fishery. This investigation attempts to indicate the manner in which the fundamental laws of population growth operate in the case of a commercial fishery and to clarify some of the important considerations basic to the management of the oceanic fisheries. This is shown by means of mathematical models. The subjects discussed in this paper are as follows: the law of population growth in populations which tend to stability; effects of fishing; catch per unit of effort; maximum equilibrium catch; determination of the status of the fish population and estimation of equilibrium yields; an application to the halibut fishery of the North Pacific; the nature of the growth of the amount of fishing; stabilization of an unregulated fishery; the course of development of an unregulated fishery and the manner of approach to stable equilibrium; examples from the commercial fisheries; Pacific halibut; California sardine (Pacific pilchard).

The South African Fishing Industry Handbook and Buyers' Guide, 1954, 244 pp., illus., printed, £2 2s. (US$6.00). South African Shipping News and Fishing Industry Review, Box 2598, Cape Town, South Africa, 1954. This is the second edition of a handbook originally issued in 1951 and designed to acquaint readers with the various aspects of the South African fishing industry. The book is divided into several sections. "Marine Resources of South Africa" discusses South Africa's fishing industry and its relation to world fisheries; the pilchard industry; the trawling industry; the rock lobster industry; snoeking; fishing in South-West Africa; and South African fish species. The list of species in this section gives the English, Afrikaans, and scientific name for each species caught in South Africa. In the section "Organizations Serving the Industry," the following are described: the Division of Fisheries, the Fishing Industry Research Institute, the Fisheries Development Corporation, the South African Food Canners' Council, the South African Bureau of Standards, and the Food and Agriculture Organization, as well as a description of the control of fisheries in South-West Africa and fishing harbors in South Africa. Brief biographical notes on the leading personalities professionally connected with the industry are to be found in the section "Who's Who in the Fishing Industry of South and South-West Africa." "Guide to Companies in the Fishing Industry" is a section which lists the names, functions, addresses, factories, capital, directors, and affiliations of companies operating in South and South-West Africa. A classified list of fish products with brand and producers' names is contained in the section "Products of the Fishing Industry." "Suppliers to the Fishing Industry and Buyers' Guide" is a classified list of products offered to the fishing industry. Details on South African motor fishing boats, motor trawlers, steam trawlers, and South-West African fishing boats, and other miscellaneous craft are given in the section "Fishing Craft Operating in South and South-West Africa." The last section--"Marine Engines"--is a detailed list of engines offered for installation in South and South-West African fishing boats.

--J. Pileggi

"Studies on the Manufacture of Canned Crab," article, Bulletin of the Faculty of Fisheries, Hokkaido University, vol. 4, no. 2, pp. 123-131, illus., printed in Japanese with summaries in English. Hakodate, Japan, August 1953. Includes the following reports under Part I--On the Manufacture of Canned Crab from Erimacrus isenbeckii (Brandt): Report 2--The Difference of Quality of Canned Crab Made From Different Parts of Crab Body; Report 3--Studies on the Influences upon the Quality of Canned Crab of the Kinds of Water used and Number of Times of Change of Water for Boiling Crab Removed from Carapace; and Report 4--Studies on B. coli in Canning Water. This Bulletin contains these articles: "Studies of Shark Muscle: Part 4--On Histamine in Shark Meat;" "On the Biochemical Changes of Fish Muscle after Death (1);" "Studies on the Manufacture of Conserva-

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tive Marine Food Products: XII--Preservation of Marine Food Products in Dupont Paper Sac;" "Studies on Coli Group Distributed in Marine Foods: I--Coli Score in Squid (Ommastrephes sloani Pacificus) Caught in the Sea near Hakodate;" and other articles.

A Survey of the Tampa Bay Area, by Charles E. Dawson, Jr., Technical Series No. 8, 40 pp., illus., printed. Board of Conservation, Division of Oyster Culture, Tallahassee, Florida, June 1953.

(Washington) State of Washington Commercial Fishing Statistics--1953, 47 pp., printed. Washington State Department of Fisheries, 4015 20th Ave. W., Fishermen's Terminal at Salmon Bay, Seattle 4, Wash. Consists almost entirely of tables showing landings of fish and shellfish in the State of Washington by districts, species, and gear. Comparative data on the catch of most items are shown for the years 1935 through 1953. The report also contains information on the value of landings, vessels, and plants; and the operating expenses of processors, boatyards, and related information. Data are shown on the Washington salmon pack from 1900 to 1953, as is information on the United States and British Columbia Fraser River sockeye pack arranged by cycle years from 1900 to 1953. Data on the canned pack of other fish and shellfish and the production of oil and meal are also shown. In addition, the report contains data on the monthly salmon escapement over Bonneville Dam during the years from 1938 to 1953; the number of commercial fishing licenses issued by districts from 1938 to 1953; and a comparative statement of receipts from licenses, taxes, fines, and other sources.

--E. A. Power

Western North Atlantic Bluefin Tuna Cooperative Research Program, (Final Report, the Charles F. Johnson Foundation), by Luis Rene Rivas, 5 pp., processed. The Marine Laboratory, University of Miami, Coral Gables, Florida, January 1953. The report summarizes results of the western North Atlantic bluefin tuna investigation for the two-year period 1952-53. Various phases of the life history are covered including systematics, anatomy and physiology, distribution, migrations, spawning grounds and season, development, behavior, and air and surface explorations for tuna. Taxonomic studies and discovery of separate breeding grounds show that bluefin tuna from the western North Atlantic are of the same species as those from the eastern North Atlantic, but that they are distinct breeding populations and there is no wholesale exchange of individuals through transoceanic migrations. Study of the stomach contents from tuna taken in the Bahamas during May and June showed that the fish feed very little if at all during spawning. New records of occurrence have extended the known range of bluefin to the north (Caribbean) coast of South America. A northward migration in summer and return to southern waters in winter is strongly indicated. Water temperatures, ocean currents, and configuration of the coastline probably affect migration habits. Tagging in the Bahamas in May and June was begun in order to definitely confirm that the tuna migrate to New England after leaving the Straits of Florida, but no tag recoveries have been made to date. Spawning tuna and eggs and larvae were found during May and June along the eastern edge of the Florida current from Cuba to the Bahamas. Age studies indicate that bluefin tuna reach a weight of about seven pounds in the first year of life. Observations on schooling behavior indicate that the schools each have a "leader," which is usually the fish taking the bait first. Two large tuna were kept alive in pens at the Lerner Marine Laboratory for about 10 days, during which time much was learned of their swimming habits. A total of 13,522 nautical miles were flown in aerial observations for tuna schools off Bermuda and over virtually the entire Bahama and Caribbean areas. Six other publications on the tuna study are listed.

--D. E. Powell

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Pp. 2 and 13--Staff of the Pacific Oceanic Fishery Investigations; p. 21--N. B. Wigutoff; p. 46--J. Pileggi; p. 73--Wm. Schmidtman.

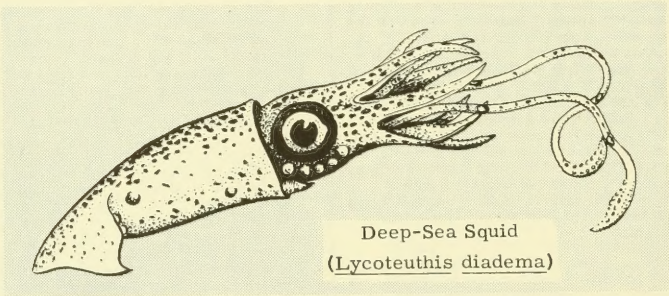
GIANT SQUIDS, AMBERGRIS, AND SEA SERPENTS

In the waters of the North Pacific Ocean is found the largest octopus in the world--a creature that may attain a spread of 25 feet from arm tip to arm tip. Much less well known is the giant squid, a true monster of the deep that reaches a total length of 50 or 60 feet.

Very few giant squids have ever been seen. They are known mostly from the occasional dead ones that are cast ashore. For some reason more have been found on the beaches of Newfoundland than any other place in the world.

The giant squid is preyed upon by the sperm whale, and some titanic struggles must occur deep below the surface when these huge animals meet. Suction cup scars as big as dinner plates have been found on the bodies of sperm whales, and the large, horny beaks of these squids have been taken from the stomachs of the whales.

Ambergris, the precious waxy substance used as a fixative in expensive perfumes, is formed in the stomach or intestines of sperm whales apparently as the result of a digestive disorder caused by these indigestible bodies. At any rate, squid beaks are sometimes found imbedded in masses of ambergris.



Deep-Sea Squid
(Lycoteuthis diadema)

Most squids and octopuses are, of course, very much smaller than these giant forms. The smallest ones measure less than two inches when they are full grown.

Many people do not have a clear idea of the difference between the octopus and the squid. Both are cephalopods (the word means "head-foot" and refers to the fact that the arms or tentacles are actually part of the head), and both belong to the group that includes clams, oysters, and snails. But octopuses have eight arms and lack any sort of internal skeleton, whereas squids have eight arms plus two longer tentacles, and possess a celluloid-like "pen" that acts as a stiffening rod in the elongate body. Octopuses are solitary bottom-living forms, but the squids are swift and active swimmers that often go in schools.

The giant squid has probably been responsible for many of the sea-serpent reports that appear in newspapers from time to time. Certainly the appearance of 35-foot tentacles writhing at the surface would be an awesome sight. It is even possible that old-time whalers may occasionally have been plucked from their small boats by long snake-like arms that rose suddenly out of the sea alongside.

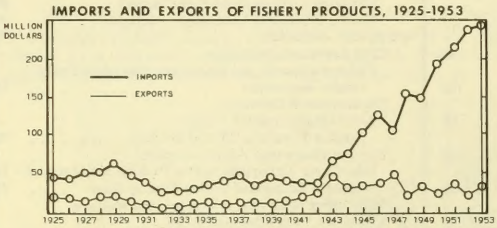
--The Mariner, June 1954

CONTENTS CONTINUED

INT.-DUP. SEC., WASH., D.C. 67573

IMPORTS AND EXPORTS OF FISHERY PRODUCTS, 1949-1953

Imports and Exports of Fishery Products, 1949-1953, C.F.S. No. 1003, is a bulletin containing annual summaries of the United States foreign trade in edible and nonedible fishery products. It contains tables summarizing the imports and exports by species for each of the years in both quantity and value; and a table listing the duty collected on U. S. imports of fishery products for the years 1936 to 1952, inclusive.



Imports of edible fishery products into the United States in 1953 amounted to 726 million pounds, valued at $195 million--both new records. Among the important items received in much greater volume than in 1952 were fresh or frozen smelt, tuna, spiny lobster, and shrimp; canned salmon, sardines, and tuna in brine.

Imports of inedible products in 1953 totaled 49.6 million pounds--13 percent less than the record receipts of these products during the previous year.

Exports of edible fishery products in 1953 amounted to 69.3 million pounds, valued at $17.1 million. With the exception of 1952, when exports of these products amounted to 62 million dollars, shipments of fishery products to foreign countries from the United States were the smallest since 1924, the first year data on these exports were compiled by the U. S. Fish and Wildlife Service.

Exports of inedible fishery products in 1953 were valued at $10.8 million--an increase of 68 percent as compared with the previous year. This is a new record. The increase was due largely to greater shipments of fish oils to foreign countries. These shipments amounted to 108.7 million pounds, valued at $7.8 million.

Copies of C. F. S. No. 1003 are available free from the Division of Information, U. S. Fish and Wildlife Service, Washington 25, D. C.