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COMMERCIAL FISHERIES REVIEW

A REVIEW OF DEVELOPMENTS AND NEWS OF THE FISHERY INDUSTRIES
PREPARED IN THE BRANCH OF COMMERCIAL FISHERIES

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COMMERCIAL FISHERIES REVIEW

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STORAGE LIFE OF WHOLE AND SPLIT ROCKFISH FILLETS

By Maurice E. Stansby and John Dassow*

ABSTRACT

Utilizing newly developed fish skinning machines, fish fillets can be cut into two or more split fillets. When rockfish fillets are split, or when a small portion of the dark fatty flesh just beneath the skin is removed, an increase in the cold-storage life of the frozen product of from two to four times can be obtained. Splitting of the thick rockfish fillets (or presumably other similar species) has several other advantages, including production of fillets of uniform thickness, ability to cut fillets to a thickness suitable for any type of cookery, and improvement in texture of the fish.

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INTRODUCTION

When a customer enters a meat market, she is not expected to depart with a side of beef just because that is the way it is delivered to the butcher. She has a large choice of cuts. If a roast is desired, a cut is available for such means of cookery. If she desires something for broiling or frying, a steak or chop of convenient dimensions is available. Yet when purchasing fish, very little consideration is given to such matters. If the customer desires a thin piece of fish for frying, she is restricted to certain species such as flounder or "sole". Fillets from fish which yield thicker cuts are not available in any other form.

SLICING OR SPLITTING FISH FILLETS

This lack of variety in available cuts of fish is due, in part, to lack of suitable slicing machines which can handle fish. Recently several fish skinning machines have been introduced, which, by a minor adjustment, can be adapted to slicing fish fillets into segments of any desired thickness.

Fish are filleted and fed into such machines to remove the skin, usually by means of some sort of a band saw or continuous knife cutting between the skin and fillet. If the skinned fillet is passed through the machine a second time, a very thin segment of fillet of the same thickness as the skin is removed. By adjusting the depth of cut, this thickness can be increased to the point where the fillet is split into two portions of more or less equal thicknesses. Since such machines are quite expensive, it would be unlikely that a retail fish store would be interested in installing one. However, special fillet cuts could easily be prepared by the producer after the fillets are cut.

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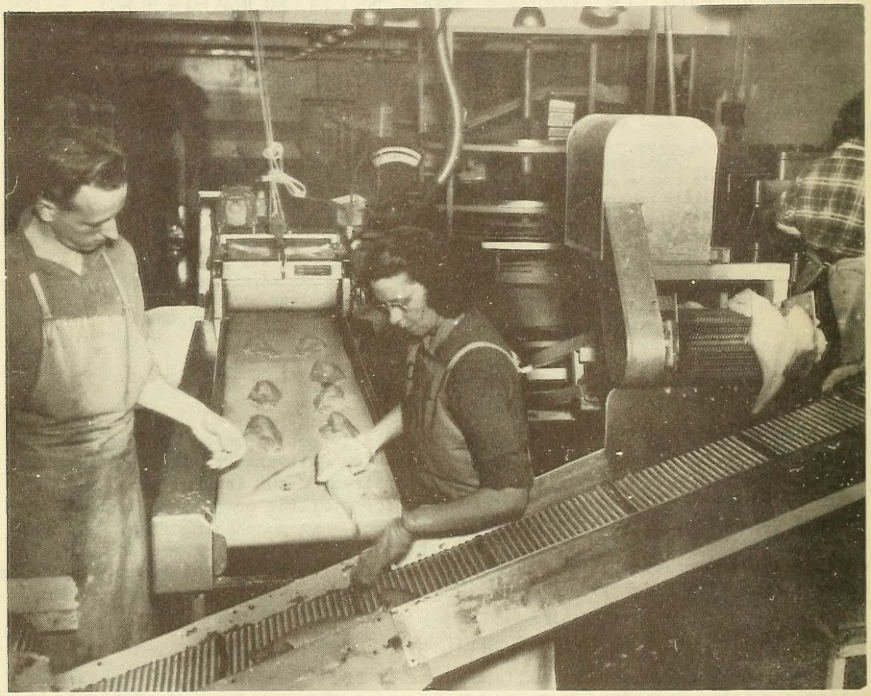
POTENTIAL ADVANTAGES IN SPLITTING FILLETS

There are a number of potential advantages in splitting fillets. The most obvious of these is the possibility of producing the more desirable thin sections of fish from thick fillets. When fish fillets are fried, it is customary to dip the fillet in corn meal, bread crumbs, or other similar material, and fry in fat until a crisp brown exterior results. The desired characteristic fried fish flavor is due as much to this crisp exterior coating as to the fish itself, and unless the fish is very thin, it will tend to affect the crisp fried coating with moisture from the fish so that the desired flavor and texture are not obtained.



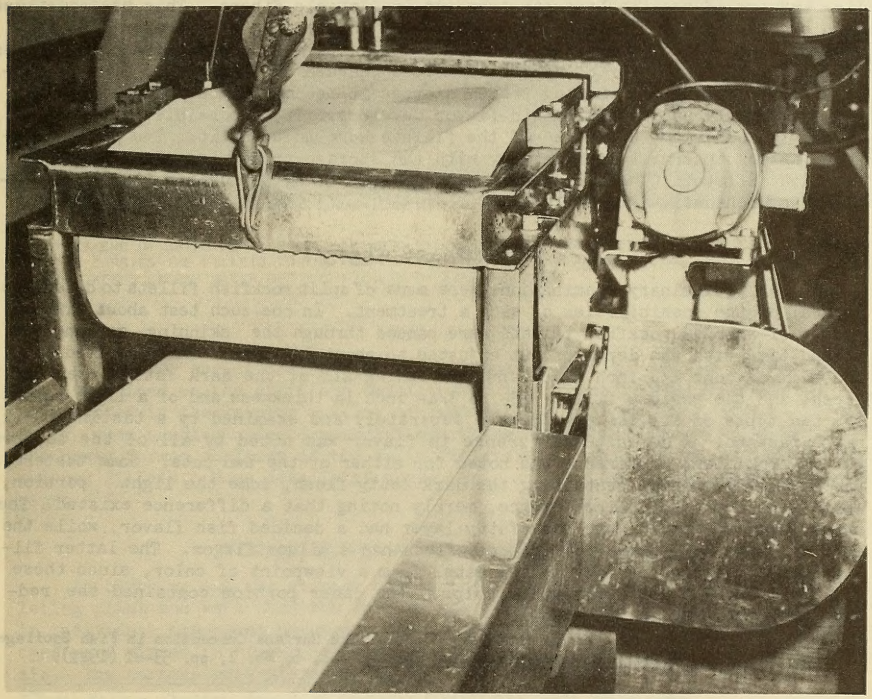
INLET END OF FISH SKINNING MACHINE. FILLETS ARE LAID SKIN SIDE DOWN ON THE BELT AND ARE CARRIED THROUGH ROLLERS WHICH HOLD THE FISH AS THE SKIN IS REMOVED BY THE CONTINUOUS KNIFE.

A second advantage of split fish fillets lies in the possibility of obtaining fillets of uniform thickness. This is a valuable property for several reasons. It facilitates the packaging of fillets to be frozen by making possible a package of uniform thickness in which there will be a minimum of air voids. Such air spaces should be eliminated in order to reduce oxidation during storage, which will result in discoloration and rancidity. Fillets of uniform thickness have certain advantages for restaurant, hotel, and institutional users. It is much easier to divide uniformly thick fillets into portions of equal weight, and

as a result, equal-sized portions will then be of equal area. Of even greater advantage is the fact that each member of a group of equally thick fillet portions requires the same cooking time and can thus be handled with the least attention.

A third advantage to split fillets is the possibility of dividing the fillets into two or more grades, each grade having a different flavor, and possibly a different cold-storage life. Many fish fillets have a layer of fatty dark flesh immediately beneath the skin. This dark flesh has a different flavor than does the bulk of the lighter colored flesh. In some instances, at least, the dark fatty flesh is more susceptible to oxidative rancidity in cold storage than is the lighter meat. This raises the possibility of splitting the fillets into two or more segments in such a way as to increase the cold storage life of a portion of the fillets.

A fourth possible advantage is the probability that splitting the fish fillets might, in some cases, favorably alter the texture of the fish. It is well known that the proper carving of meat, by cutting across the grain, improves palatability by avoiding stringy texture because the muscle fibers are shortened. Some species of fish have a tendency to be tough, and proper cutting might reduce this toughness.



CLOSE-UP VIEW OF INLET END OF SKINNING MACHINE.

A fifth potential advantage of split fillets lies in the possibility of increasing the storage life of unfrozen fillets by removing the surface layer in which a large part of the bacteria are concentrated. It has been shown by Wood, Sigurdsson, and Dyer[1] that spoilage of fish starts at the surface where bacteria enter the fish from the outside, and that by far, the greatest bacterial population is concentrated at the surface. The possibility exists that removal of this surface layer would reduce the susceptibility of the fish to bacterial spoilage and thus prolong the storage life of the fish when stored at temperatures above freezing.

A sixth advantage of being able to split fish fillets lies in the possibility of developing special recipes if very thin fillets were available. For example, thin fillets cut into individual portions could be coated with a bread crumb or corn meal mixture, packed four or any number of portions to the package, and frozen. The advantages in marketing such a uniform product are readily conceivable.

APPLICATION TO PACIFIC COAST ROCKFISH FILLETS

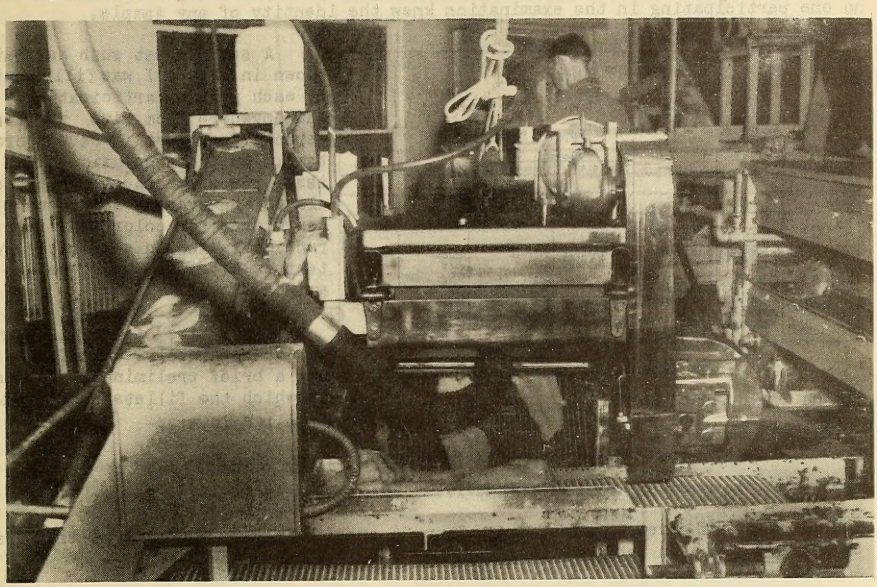
Pacific Coast rockfish (Sebastodes) lends itself especially well to preparation of split fillets. The normal rockfish fillets are unusually thick, a property which has retarded popular acceptance of the species. A certain peculiar texture of rockfish results from the long muscle fibers. This has sometimes been considered an advantage when the stringy texture has been compared to that of crab meat, while others have described the texture as an undesirable toughness. Rockfish contain a layer of dark fatty flesh beneath the skin which is very susceptible to oxidation. During frozen storage it becomes almost black in color and a decidedly unpleasant rancid flavor develops. It is possible that all of these problems might be solved if the fillets were to be split. The present investigation concerns itself chiefly with the storage properties of such split rockfish fillets. (The fillets were prepared by using the Jensen Fish Splitting-Skinning Machine.)

PRELIMINARY TESTS

A few preliminary examinations were made of split rockfish fillets to determine several of the possibilities of such a treatment. In one such test about fifteen pounds of skinned rockfish fillets were passed through the skinning machine a second time with the depth of cut adjusted to about 1/4 inch. This resulted in two fillets, one 1/4-inch thick and containing all of the dark fatty layer of flesh, and the residue fillet 3/8- to 3/4- inch in thickness and of a light color. The two types of fillets were cooked separately and examined by a tasting panel of 13 tasters. A definite difference in flavor was noted by all of the tasters, but no consistent preference was noted for either of the two cuts. Some tasters preferred the portion containing the dark fatty flesh, some the light portion, while some expressed no preference, merely noting that a difference existed. The upper layer containing the dark fatty layer had a decided fish flavor, while the portion containing only light-colored flesh had a milder flavor. The latter fillets were preferred by most of the panel from a viewpoint of color, since these fillets were of a uniformly white color. The other portion contained the reddish brown streaks on one side.

1/ Wood, A. J.; Sigurdsson, G. J.; and Syer, W. J. - "The Surface Conception in Fish Spoilage," Journal of the Fisheries Research Board of Canada, Vol. 6, No. 1, pp. 53-62 (1942).

In another preliminary test, one batch of split rockfish fillets was compared with a batch of unsplit fillets with particular reference to texture. The split rockfish fillets had a somewhat more tender texture. The difference was not great but was definite.



OUTLET END OF SKINNING MACHINE. SKINNED FILLETS EMERGE AND DROP ON A METAL CONVEYER BELT WHICH CARRIES THE FILLETS TO THE INSPECTION, WEIGHING AND PACKING LINE. THE AIR HOSE SHOWN KEEPS EXCESS WATER OFF THE FILLETS BY AIR PRESSURE.

ICED FILLETS

In another series of tests,[2/] the subsequent keeping quality of iced fillets was determined on the split and unsplit product. No noticeable difference could be detected in the keeping quality of iced fillets whether split or not. Apparently when handled under commercial operating conditions, fresh contamination of the newly formed surfaces of the split fillets was equal to that of the original skinned fillets. More details of these tests will be described in a subsequent paper.

STORAGE EXPERIMENTS ON FROZEN FILLETS

In carrying out the storage tests, the fillets were cut at a commercial filleting plant and were then run through the skinning machine. They were wrapped in individual one-pound packages, using #300 MSAT cellophane. The individual packages were placed in five-pound waxed cartons and frozen at -20° F. in circulating air. The cartons were stored at 0° F.

2/Frank Piskur, Chemist, Branch of Commercial Fisheries, made these tests.

Fillets for a storage examination were thawed in air and then brined for four minutes in a 5 percent sodium chloride brine (to give uniform seasoning to all samples). The samples were baked in an oven at 350° F. for twenty minutes. In conducting the examination of the cooked fish, each sample was given a code so that no one participating in the examination knew the identity of any sample.

EVALUATION OF QUALITY

Product: Code: Date: Taster:

Note: Rate samples so as to indicate preferences, if any.

Sample Number	Odor	Color	Flavor		Texture	Edible?
			Rancidity	Over-all		
Terminology	5-normal 4-flat 3-sl. off 2-def. off 1-extr. off (describe off odor)	5-original 4-sl. discol. 3-mod. discol. 2-consid. " 1-extreme "	5-palatable 4-incipient 3-sl. rancid 2-rancid 1-extremely rancid	5-fresh 4-flat 3-sl. off 2-def. off 1-inedible (describe off flavors)	normal soft tough dry moist spongy (describe any other)	yes no

SCORE SHEET USED IN EXAMINATION OF COOKED ROCKFISH

A score sheet such as that shown in Figure I was filled out by each person participating, and anywhere from five to ten persons took part in each storage test. At the conclusion of a test, the score sheets were tabulated and average scores were calculated for color and for rancidity, and in some cases the texture of each sample was examined.

Two series of rockfish were put up separately. The first was a brief preliminary series in which the fillets were split into two layers:

1. A 1/4-inch surface layer containing nearly all the dark fatty layer.
2. The remaining light-colored fillet.

This series was given examinations after 36 and 42 weeks. Results of the first series are given in Table 1.

A second, more comprehensive series was run on two segregated species of rockfish. These were Sebastodes ruberrimus, commonly known as the red rock-

Table 1 - Storage Characteristics of Frozen Split Rockfish Fillets (Series 1)

Sample Examined	Rancidity	Color	Texture
Description	Numerical Value		Description
Surface fillet after 36 weeks' storage	3.0	3.0	Slightly tough
Inner fillet after 36 weeks' storage	4.8	5.0	" "
Surface fillet after 42 weeks' storage	2.8	2.0	Tough
Inner fillet after 42 weeks' storage	4.1	5.0	"
Commercial fillet purchased on open market	3.7	4.0	"

fish, and on Sebastodes flavidus, popularly known as brown rockfish and also referred to as yellowtailed rockfish and sometimes as "black bass". Each species was cut in three ways:

1. The regular whole, skinned fillet.
2. The skinned fillet with 0.1 inch of the flesh beneath the skin removed.
3. The skinned fillet with 0.2 inches of flesh beneath the skin removed.

In the second series a measurement of the yield was made when the skin, the skin plus 0.1 inches of flesh, and the skin plus 0.2 inches of flesh were removed from the whole fillet. Yields (based on the fillet with skin on) from brown rockfish were, respectively, 82.3 percent, 59.6 percent, and 43.4

percent. Comparable yields for the larger fillets from red rockfish were 81.5 percent, 61.3 percent, and 51.8 percent, respectively.

A summary of the results of examinations of series 2 after storage periods of 6, 14, 22, 34, and 55 weeks is given in Tables 2 and 3. In this series all samples had normal texture after storage up to 14 weeks. After 22 weeks, texture varied from normal to slightly tough, and at 34 weeks and thereafter, all samples were tough.

DISCUSSION AND OBSERVATIONS

There seemed to be a definite tendency for the red rockfish fillets to stand up somewhat better in cold storage than the brown ones. The color of red rockfish fillets was superior after 22 weeks' storage to that of the brown rockfish after 14 weeks. Both species were extremely discolored after 34 weeks, and at that time and thereafter there was no difference in color. The rancidity of the brown rockfish was as great after 14 weeks as that of the red rockfish after 22 weeks. After 34 weeks there was no difference in the uncut fillets of either species. It would appear that the red rockfish fillets, cut in the normal way, have a storage life somewhat better than 50 percent in excess of the brown rockfish fillets.

The samples which had a portion or all of the dark fatty flesh removed had far greater storage life than the uncut fillets. If a fillet is considered unmarketable when the rancidity rating reaches 3.0 (slightly rancid), then the uncut brown rockfish fillets had a storage life of only about 14 weeks as compared with a storage life of 56 weeks for the brown rockfish fillets with 0.1 inches of surface flesh removed. Storage life with reference to rancidity development has thus been increased by a factor of four. An equal increase in storage life of the brown rockfish fillets with respect to discoloration is obtained if we consider 2.5 to be the numerical rating at which the fillets became unmarketable. Red rockfish fillets had an increase of storage life of at least two times (compared to the regular skinned fillet) when split or when a portion of the fatty layer was removed.

The development of a tough, rubbery texture during storage may well be the factor limiting the storage life of split rockfish fillets. After 34 weeks, all

Table 2 - Color of Frozen Rockfish Fillets (Series 2)

Storage Period	Brown Rockfish			Red Rockfish		
		Dark Flesh Removed			Dark Flesh Removed	
Weeks	Uncut	1/10 inch	1/5 inch	Uncut	1/10 inch	1/5 inch
6	4.6	4.8	4.9	4.0	5.0	4.6
14	2.5	3.5	4.5	2.7	3.8	4.5
22	2.3	4.5	4.2	3.0	3.7	4.6
34	1.0	4.0	4.5	1.0	3.5	4.0
55	1.0	2.5	3.0	1.0	2.5	3.0

(Numerical color rating: 5.0 = original color
1.0 = maximum discoloration)

Note: Color ratings are averages of from 5 to 10 individual ratings.

Table 3 - Degree of Rancidity of Frozen Rockfish Fillets (Series 2)

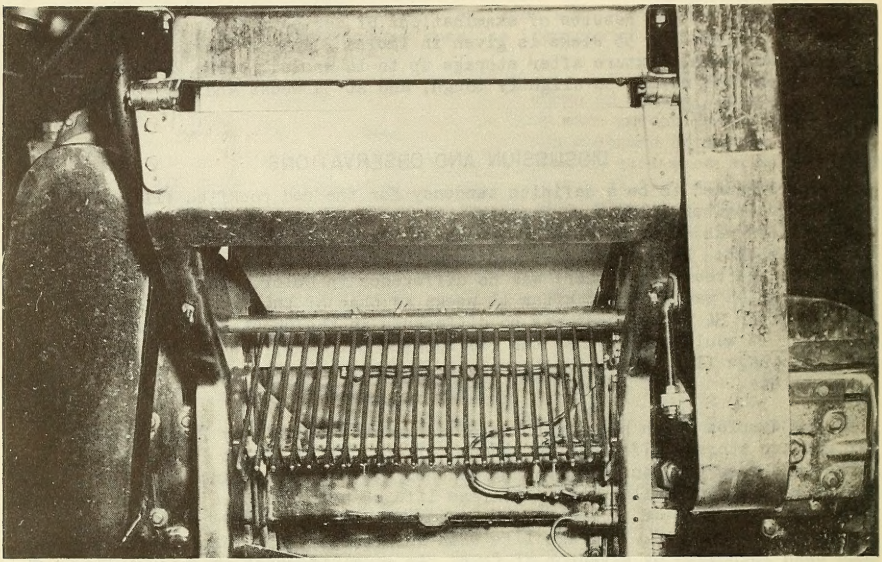
Storage Period	Brown Rockfish			Red Rockfish		
		Dark Flesh Removed			Dark Flesh Removed	
Weeks	Uncut	1/10 inch	1/5 inch	Uncut	1/10 inch	1/5 inch
6	4.8	4.7	4.9	4.4	4.9	4.9
14	3.1	3.7	4.8	4.5	4.4	4.7
22	2.2	4.3	4.0	3.6	3.9	4.4
34	1.0	3.5	4.0	1.0	4.0	5.0
55	1.0	3.0	3.5	1.0	3.0	3.5

(Numerical rancidity ratings: 5.0 = fresh
1.0 = extremely rancid)

Note: Rancidity ratings are averages of from 5 to 10 individual ratings.

fillets exhibited a considerable amount of this toughness, although they were no tougher than a commercial frozen rockfish fillet purchased on the open market (Table 1).

It should be emphasized that differences in rancidity and in color were very striking and clear-cut between the split and unsplit fillets. After storage for



CLOSE-UP OF OUTLET END OF SKINNING MACHINE WITHOUT AIR HOSE.

any length of time there was unanimous agreement by the tasting panel in favor of the split or cut fillets.

It is, of course, obvious that the 0.1 or 0.2 inches of skin side flesh removed in Series 2 could not be discarded in any commercial operation. The purpose of this series was to determine how much flesh must be cut away to give maximum storage life. Results indicated that while very definite improvement was obtained with removal of 0.1 inches, maximum improvement did not result until at least 0.2 inches or approximately half the rockfish fillet was removed. Some individual variation was noted, since in the larger and thicker fillets the fatty layer extended deeper than that of smaller fillets.

It is suggested that it would be possible to split rockfish fillets into two segments and to market the top (skin) side on the fresh market without freezing it, or if frozen, to market such fillets where rapid turnover is assured and where the maximum time in cold storage will never exceed three months. The deeper cut would then have a much longer storage life, certainly of at least six months duration, limited mainly by loss in texture. If texture is not of great importance, then a storage life of up to one year could be anticipated.

CHICAGO RECEIPTS OF FISHERY PRODUCTS, 1948

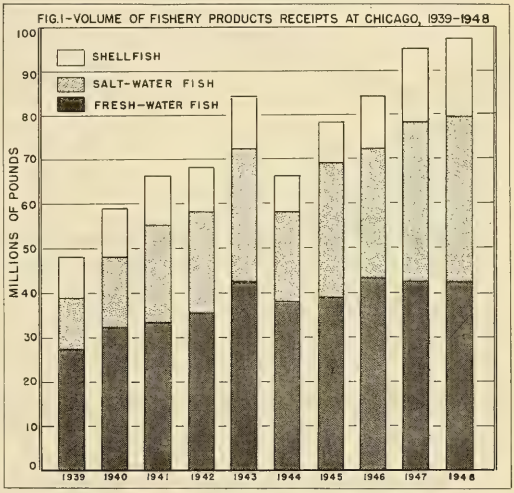
By C. M. Reardon*

INTRODUCTION

The total 1948 receipts of fresh and frozen fishery products in the Chicago wholesale fish market was the highest on record, surpassing the previous record in 1947 by three percent. Receipts in 1948 amounted to 97,311,000 pounds, compared to 94,650,000 pounds in 1947. The gain was in the salt-water fish and shellfish arrivals, an increase of 5 percent and 6 percent over 1947, respectively. Fresh-water fish receipts in 1948 were less than one-half of 1 percent greater than in 1947 (Figure 1).

SOURCES OF RECEIPTS

For the first time in recent years Massachusetts, with an increase of 40 percent over 1947, surpassed British Columbia as Chicago's leading source of fishery products. The 16,223,000 pounds received from Massachusetts comprised 17 percent of the total Chicago receipts.



The second important source was British Columbia with 13,209,000 pounds, or 14 percent, but as usual, included fish caught by United States fishermen and shipped through Canada to the United States in bond. United States-caught fish shipped from British Columbia in bond made up 55 percent of the total receipts from that Province.

Wisconsin ranked third in importance, accounting for 10 percent of the total receipts, but it was first among the States shipping fresh-water fish. This State was followed closely by Michigan (9 percent). States contributing 3 million pounds or more to the total receipts were, in the order of their importance: Texas, Louisiana, Washington, and Iowa. In addition to British Columbia, other Canadian provinces that shipped important quantities were: Manitoba, Nova Scotia, and Alberta.

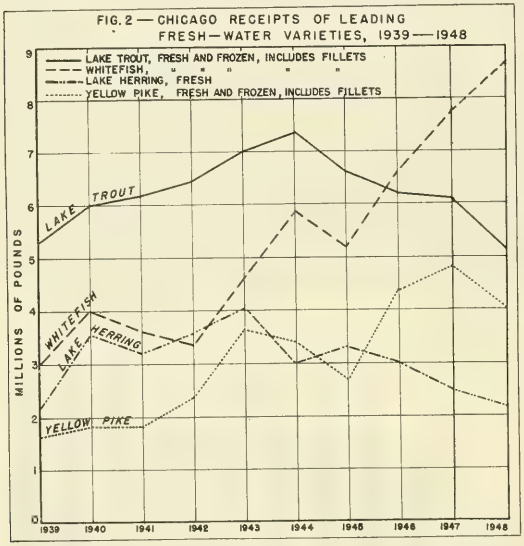
There was also an unindentifiable amount of fish which originated in Alaska but was shipped to Chicago from Washington; therefore, Alaska is not listed as a source.

*Fishery Marketing Specialist, In Charge, Fishery Market News Service Office, Branch of Commercial Fisheries, Chicago, Illinois.

Fish and shellfish shipments from domestic sources, including American-caught fish shipped via British Columbia, accounted for 80 percent, or 77,898,000 pounds, of the total Chicago receipts. Direct imports into Chicago accounted for 20 percent, or 19,413,000 pounds. Certain imports, such as, shrimp from Mexico, spiny lobster tails, and frozen fillets from Iceland and Norway have been credited to the State from which the shipment originated in the United States. Attempting to identify the country of origin for some of the imported fishery products after they reach Chicago would be a time-consuming task.

RECEIPTS BY SPECIES

With each species divided into classifications of fresh, frozen, fillets, steaks, etc., the number of varieties of fishery products received at Chicago totaled 146, divided into 48 fresh-water, 70 salt-water, and 28 shellfish and related aquatic varieties.



Of the fresh-water species received, whitefish was the most important, followed by lake trout and yellow pike (Figure 2). These three accounted for 43 percent of the fresh-water total of 41,654,000 pounds. Following these were carp, chubs, buffalofish and yellow perch.

Halibut receipts led all salt-water varieties, and exceeded the former highest total (1947) by a little over 1 percent; rosefish fillets were next followed by cod and salmon (all species). These four varieties accounted for 73 percent of the salt-water total of 37,512,000 pounds (Figure 3).

Shrimp receipts accounted for 60 percent of the shellfish arrivals. This was slightly higher than the former highest total in 1947. Oysters (shell and shucked), spiny lobster tails, and scallops followed shrimp in importance. There were also substantial arrivals of lobsters, clams, and squid.

METHODS OF TRANSPORTATION

During 1948, motor trucks handled 34 percent, or 32,560,000 pounds of Chicago's 1948 fishery receipts, 14 percent more than in 1947. Beginning shortly after the war, when more equipment and fuel became available for civilian use, truck transportation of fishery products made steady gains. Flexibility in delivering LCL shipments and the time saved on short hauls are the two most important features of motor transportation (Figure 4).

Railway express transported 31 percent, or 30,648,000 pounds, a decline of 5 percent compared with 1947.

Rail freight handled 35 percent, or 34,103,000 pounds, a gain of less than one-half of one percent compared with 1947. A larger gain was not made in rail freight shipments because of the inroads made by motor trucks in the transportation of frozen salt-water fish from the East Coast. Most West Coast shipments continue to be made by rail freight due to the long hauls, and have not yet been affected by the encroachment of motor transportation.

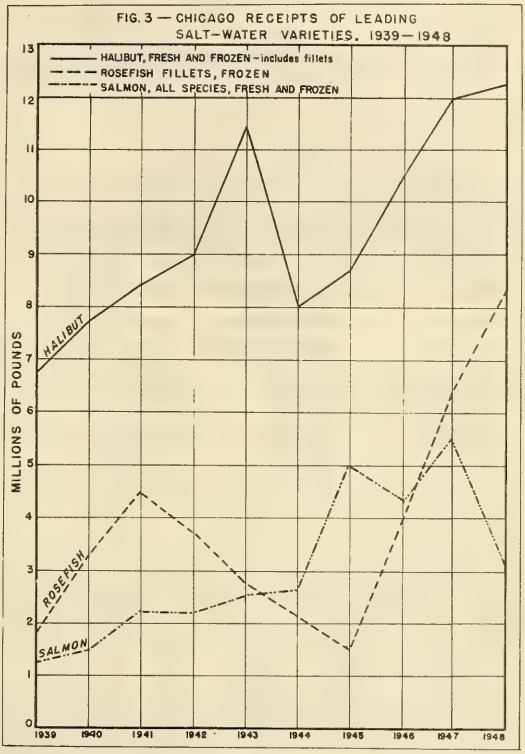


FIG. 3 — CHICAGO RECEIPTS OF LEADING SALT-WATER VARIETIES, 1939-1948

The bulk of the domestic receipts was handled by motor truck while the major portion of the imports was moved by rail freight. Some arrivals of fishery products were received by air express, but the total was relatively unimportant.

SEASONS

Receipts of fishery products in 1948 reached their highest monthly pack during August, although June and September were not far behind. During 1947, receipts were the heaviest in October.

The greatest quantity of fresh-water varieties was delivered in February with June second, and September third. Contributing to the heavy February arrivals were, in the order of their importance: whitefish, saugers, yellow pike, buffalofish, carp, lake herring, and smelt.

Salt-water arrivals were greatest during August, with June second, and September third. The chief reason for the heavy salt-water deliveries during August was the heavy receipts of frozen rosefish fillets from the East Coast. While arrivals of other varieties of frozen fillets were below normal during August, those for rosefish fillets (nearly 1,500,000 pounds) were the highest in the history of the Chicago wholesale market.

Halibut was second in importance in August and with rosefish composed 59 percent of August's salt-water receipts. June was the month with the heaviest receipts of halibut (1,451,000 pounds).

Receipts of salmon (all species) reached a maximum in September, followed by November, August, and February.

Shrimp arrivals reached their peak in December, followed by October, November, and June.

MARKET CONDITIONS AND PRICES

Market conditions during 1948 proceeded much along the same lines as in 1947. There were no outstanding developments. Increased arrivals of fishery products did not affect the market as definitely as in 1947 or in the preceding three years, receipts were not curtailed by any labor and transportation difficulties, and shipments arrived steadily and more uniformly. Transportation differences on the West Coast did not affect frozen halibut arrivals as most shipments originated in Prince Rupert, British Columbia, which was undisturbed by the labor dispute in progress during the greater part of the halibut season.

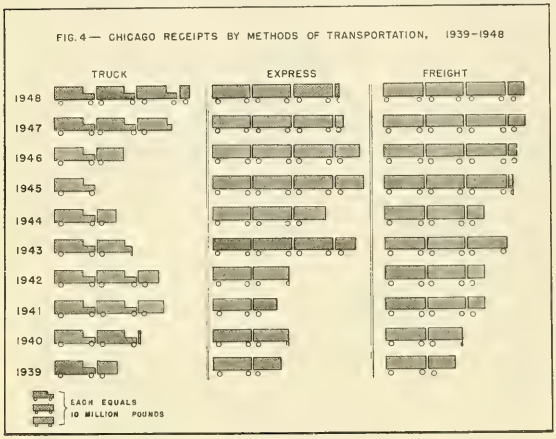


FIG. 4 — CHICAGO RECEIPTS BY METHODS OF TRANSPORTATION, 1939-1948

Prices on most varieties fluctuated far less than in 1947. Both buying and selling were more settled in the two preceding years. Halibut and salmon prices remained steady all year as cold-storage holdings of these varieties declined normally, and at a rate which indicates that the holdings will be light by the time the season opens in 1949. Large halibut holdings late in 1947 caused a slump in prices seriously affecting local dealers who were forced to move their stocks at a loss.

Shrimp prices were steadier than at any time since the lifting of OPA controls, and never approached the high prices so evident during the two preceding years. A growing demand for Mexican shrimp on the local market was noted during 1948.

Demand for fishery products did not increase noticeably during the Lenten Season and the Jewish holidays. For the third successive year the dealers, in anticipation of these holidays, made larger purchases, but they were unable to move all of their supplies. Prices, which usually followed an upward trend during these periods, declined on most items due to the heavy supplies and a dull market.

LEADING VARIETIES AND MARKET FORMS

Whitefish, the most important fresh-water item on the Chicago wholesale market, totaled 8,694,000 pounds, with 13 percent shipped frozen. Most of the whitefish were dressed, and only a small amount (chiefly from Lake Erie) arrived round at certain times of the season. Some of the frozen receipts were filleted. Of the states shipping fresh whitefish, Wisconsin led with 28 percent and Michigan ranked

second with 27 percent. Arrivals from other states were comparatively unimportant. Of the Canadian provinces, Alberta led with 14; followed by Manitoba, 7 percent; and Ontario, 3 percent. Manitoba accounted for 80 percent of the frozen whitefish.

Receipts of lake trout were second in importance among fresh-water varieties, with 14 percent shipped frozen. Michigan led with 40 percent, followed by Wisconsin with 24 percent. Arrivals from other states were comparatively unimportant. Among the Canadian sources, fresh lake trout shipments from Manitoba contributed 7 percent, and Alberta only 5 percent of the total.

VIEW OF CHICAGO'S SKYLINE.

Yellow pike receipts, the third most important fresh-water variety, totaled 4,010,000 pounds, with 10 percent shipped frozen. Minnesota shipped 15 percent of the fresh yellow pike; Ohio, 13 percent and Michigan, 12 percent; while Manitoba led all sources with 42 percent. The latter was also the source of 78 percent of the frozen receipts of this species.

Chub arrivals amounted to 3,025,000 pounds—a new high, according to available data. Nearly all chubs are utilized for smoking, and commanded the most consistent price in the past five years. Michigan, Illinois, and Wisconsin shipped 93 percent of the chubs with Indiana and Minnesota the balance.

Receipts of yellow perch amounted to 2,603,000 pounds, with less than one percent frozen. Ohio was first with 28 percent, followed by Michigan, 22 percent; Minnesota, 12 percent; Manitoba, 11 percent; and Illinois, 8 percent.

Arrivals of lake herring totaled 2,263,000 pounds, of which 70,000 pounds (from Wisconsin) arrived frozen. Wisconsin led with 48 percent of the shipments; Minnesota was second, 29 percent; followed by Michigan, 21 percent. Most of the bluefin herring received in Chicago were from Minnesota. Nearly all herring arrived dressed and were sold fresh as there is little demand for salted or smoked fresh-water herring. Some of the herring were smoked as "bay chubs".

CHICAGO'S WHOLESALE FISH MARKET (CORNER OF FULTON AND UNION STREETS).

Sauger receipts totaled 1,064,000 pounds, and 41 percent were received frozen in the round and as frozen fillets. Manitoba accounted for 83 percent of all shipments. Saugers were usually sold round, with a few small fish dressed or filleted.

For the fourth consecutive year smelt arrivals have shown a substantial increase.

In 1948, the smelt receipts totaled 921,000 pounds (5 percent frozen), the highest amount received in the Chicago market since 1943. Wisconsin, the leading source of supply, shipped and accounted for 69 percent of the receipts, while Michigan, the only other State of importance, shipped 30 percent.

Among rough fish, carp led with 3,838,000 pounds, mainly coming from Iowa (40 percent), Wisconsin (33 percent), and Illinois (17 percent). They were nearly always marketed round, although a very small amount was fleeced for special orders. Prices remained low throughout the year, except during the Jewish holidays, but prices during the latter periods did not approximate the prices paid during the past few years.

Receipts of buffalofish, the second important variety among the rough fish, totaled 2,867,000 pounds. The chief sources of buffalofish in this country were Iowa, Wisconsin, and Illinois, which accounted for 79 percent of the total. Saskatchwan was the only Canadian province that shipped any amount of buffalofish, and accounted for another 15 percent. Prices on buffalofish were consistently high all during the year.

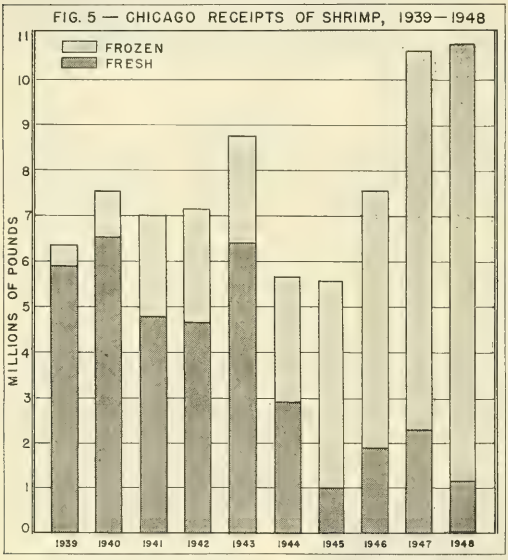


FIG. 5 — CHICAGO RECEIPTS OF SHRIMP, 1939—1948

Substantial deliveries of buffalofish and carp were, for the most part, due to planned fishing by the three State Conservation Departments of Illinois, Iowa, and Wisconsin.

Sheepshead receipts totaled 1,967,000 pounds, with a negligible amount shipped frozen. Iowa shipped 28 percent of this; Michigan was second, with 26 percent; and followed by Wisconsin and Ohio, 20 percent each. Iowa's receipts consisted mostly of the soft-meated variety. Due to the demand for it, soft-meated sheepshead will usually sell at from two to three times the price of the hard-meated fish. Nearly all Ohio sheepshead are hard-meated, while Illinois and Wisconsin ship both kinds, with the hard-meated fish predominating. All sheepshead are marketed round.

Arrivals of suckers (all fresh), totaled 1,178,000 pounds. Wisconsin and Michigan shipped 84 percent of the suckers. Suckers are usually sold dressed, while those sold round are called "mullet" on the Chicago market.

While relatively unimportant among the items received at the Chicago wholesale market, the continued increase of blue pike arrivals in the past three years should

not be overlooked. Of very minor importance in 1946 when only 120,000 pounds were received, the 1948 arrivals have risen to 661,000 pounds. This total, however, is far below the 1944 receipts of 2,237,000 pounds.

RECEIPTS OF FROZEN FISHERY PRODUCTS CONTINUE TO INCREASE

Probably the greatest development in Chicago's receipts of fishery products has been the annual increase in frozen varieties, and an almost corresponding decrease in fresh varieties. Arrivals of frozen shrimp amounted to 9,585,000 pounds compared with 1,151,000 pounds of fresh shrimp. In 1947, frozen shrimp receipts amounted to 8,330,000 pounds and fresh shrimp totaled 2,269,000 pounds. This shows frozen shrimp increasing in almost direct ratio to the decrease in fresh shrimp arrivals. During the years 1939 through 1943, frozen shrimp formed approximately 25 percent of the total shrimp arrivals; were about equally divided in 1944; but after 1944, frozen shrimp arrivals increased rapidly and during 1948 composed 89 percent of the total shrimp receipts.

MINNESOTA CREWS REMOVE ROUGH FISH FROM THE STATE'S LAKES UNDER THE SUPERVISION OF THE DEPARTMENT OF CONSERVATION.

What is true of shrimp is also true of halibut to a lesser degree. From 1943, when 58 percent of the halibut receipts arrived fresh, frozen receipts have gained steadily and in 1948 made up 92 percent of the total halibut arrivals.

Although the total was not impressive, there was an increased amount of frozen halibut arriving as fillets and steaks during 1948. This method of handling part of the catch is comparatively new, with the processing being done at the initial landing point. Dealers are unanimous in declaring fresh halibut will never again be an important factor in this market.

Continuing the trend which started to take shape in 1945, frozen receipts of other species, such as, cod, haddock, rosefish fillets, and whiting, have almost totally displaced the fresh on the Chicago market. In 1948, fresh receipts of these species were negligible, and consisted almost entirely of fresh fillets.

BOILING NETS TO REMOVE SLIME AT NAUBINWAY, MICH.

The year 1948 also saw the appearance of more fishery items in small or consumer-size packages. Some of these were 12-ounce, some 10-ounce, but the bulk was one-pound packages. All of these packages were designed to provide a convenient portion for family use. Frozen fillets, shrimp, scallops, spiny lobster tails, and crab meat were the leading items merchandized in consumer-size packages in this area. However, frozen salmon loaf, shrimp Creole, fish and chips, and others were also of some importance.

The concerted movement to increase the attractiveness of the packages, which started in 1946, progressed to a point in 1948 where fishery products were appearing in more stores and in deep-freeze cabinets. Alongside fruits and vegetables, the attractive packages were convenient, moderate in price, and contained instructions for cooking on the wrapper. This method of merchandising is definitely overcoming the average housewife's reluctance to make use of fishery products.

There was a growing tendency among some of the local dealers to cover some distant areas with refrigerated trucks, basing at important points in their territory and carrying a full line of frozen and processed fishery products, permitting instant deliveries to the small stores on the route. As a definite weekly schedule is maintained, in some cases biweekly, this method of merchandising allows the retailer to inspect the purchases before buying, and allows limited purchasing to fit estimated needs.

WASHING NETS AT ROGERS CITY, MICH. IN BACKGROUND (RIGHT) IS A TYPICAL NEW-TYPE GREAT LAKES COMMERCIAL FISHING VESSEL.

May 1949

Boston, Mass.

The initial studies on freezing fish at sea have been terminated with the examination of fillets of fish frozen at sea and the control samples which have been stored for seven months. The fillets of fish frozen at sea were found to be of better general quality than the fillets of fish iced at sea, although both sets of samples would be acceptable commercially. The specifications for a laboratory freezer to aid in the continuation of freezing studies have been completed, and the process for purchasing part of the equipment during the current fiscal year has started.

Cod were procured from a gill-net fisherman for tests on freezing, thawing, filleting, and refreezing the fillets. Also, the fillets from gill-net cod were compared with fillets from trawler-caught fish to determine differences in salt content. The salt content of the unbrined fillets showed the fillets from the frozen fish to have almost twice the amount of salt as the fillets from the iced fish.

College Park, Md.

Data from rat feeding tests indicate that baked haddock, broiled mackerel and roast beef were evacuated from the stomach at about the same rate. The greater amount of fat in the mackerel did not seem to have any influence on slowing down the time of evacuation. Three to five hours seemed to be needed for stomach evacuation. A single experiment with baked haddock indicated that the method which was developed quantitatively accounted for the emanations when radioactive phosphorus was used as a physical marker. The radioactive phosphorus, however, passed through the digestive organs at a greater rate than the food, so it was not a satisfactory marker under the conditions of the experiment.

Ketchikan, Alaska

Air shipments of samples of Alaska abalone were made to an interested California concern. Tests on quality and marketability of this species are to be made.

Seattle, Wash.

Control and refrozen fillets of three flounder species were examined after a total storage period of 11 months at 0° F. The maximum storage life at 0° F. for yellowfin and rock sole fillets is approximately 11 to 12 months, judged on the basis of commercial acceptability. Rancidification of the surface fatty flesh appeared to be the limiting factor in the storage life of lemon sole fillets. Lemon sole should be heavily glazed for storage in order to minimize development of incipient rancidity in the fatty flesh before the fish are thawed, filleted and

refrozen. The maximum storage life of these fillets at 0° F. is approximately 8-9 months. The 11-month examination has confirmed the conclusions drawn from previous ones that refreezing, in itself, does not result in significant changes of the color, texture, or flavor of the refrozen fish.

* * *

In the project on development of improved analytical methods for extraction of oil and vitamin A from fish livers, some tests indicated that during the prolonged solvent extraction and other manipulation considerable decomposition of the oil may take place. Thus, in one instance, free fatty acid of over 50 percent was present in the final oil after extraction and drying, and the iodine number was lower than would have been the case with a fresh oil.

* * *

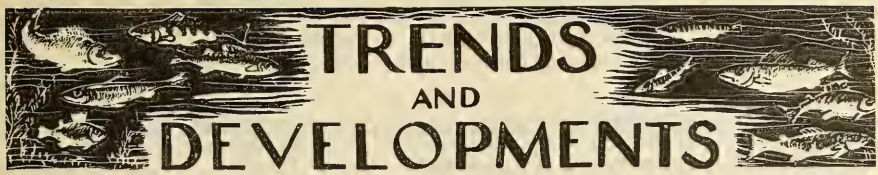
Assay of a sample of brook lampreys (whole) showed only 0.8 percent oil present and less vitamin A than could be detected by spectrophotometric methods.

Crab Meat Salad

2 cups flaked crab meat
1/2 cup mayonnaise or salad dressing
1 cup celery, diced
2 tablespoons sweet pickle, chopped
2 tablespoons onion, chopped
2 hard cooked eggs, diced
1/2 teaspoon salt
1/8 teaspoon pepper
Lettuce

Remove any shell or cartilage from the crab meat, being careful not to break the crab into too small pieces. Combine all ingredients and serve in lettuce cups. Garnish with tomato wedges. Serves 6.

Shrimp, lobster or flaked fish may be used in the above recipe.



Additions to the Fleet of U. S. Fishing Vessels

A total of 85 vessels of 5 net tons and over received their first documents as fishing craft during April 1949—37 less than in April 1948, according to the Bureau of Customs of the Treasury Department. Alaska led with 24 vessels, followed by Washington with 15, and Texas with 8. During the first four months of 1949, a total of 260 vessels were documented, compared with 293 during the same period in 1948.

Vessels Obtaining Their First Documents as Fishing Craft, April 1949

Section	April		Four mos. ending with Apr.		Total
	1949	1948	1949	1948	1948
	Number	Number	Number	Number	Number
New England	1	7	3	10	52
Middle Atlantic	7	8	21	13	40
Chesapeake Bay	2	3	17	11	59
South Atlantic and Gulf	23	47	108	123	541
Pacific Coast	22	34	52	91	347
Great Lakes	6	11	21	14	51
Alaska	24	12	36	28	81
Hawaii	-	-	2	3	12
Total	85	122	260	293	1,183

Note: Vessels have been assigned to the various sections on the basis of their home port.

ECA Procurement Authorizations for Fishery Products

During June 1949, the Economic Cooperation Administration announced authorizations totaling $300,000 for the purchase of fishery products for ECA countries, compared with $12,704,000 during May. The amount authorized during June was the smallest since the beginning of the ECA program in April 1948.

During June, ECA cancelled an authorization for $450,000 for the purchase of canned fish from the U. S. and Possessions for shipment to Ireland; and an authorization for $100,000 for the purchase of canned fish from the U. S. and Possessions for shipment to Belgium-Luxembourg.

An authorization of $97,000 for freight was added to a $350,000 authorization for the purchase of canned fish from the U. S. and Possessions for shipment to Italy.

At the beginning of the ECA program in April 1948, it was estimated that the value of shipments of edible fishery products from the United States to the 16 participating ECA countries would total $51,800,000 for the 15-month period (April 1, 1948-June 30, 1949). A total of $8,646,800 was authorized through June 30, 1949,

for purchases of fishery products in the U. S. and Possessions. Of this amount, $6,710,800 was for the purchase of canned fish, and the balance was for fish and whale oils and Vitamin A (for stock feed). Thus, the value of edible fishery products was only 13 percent of the estimated total.

ECA Procurement Authorizations for Fishery Products, June 1949

Product	Country of Origin	Procuring Agency 1/	Recipient Country	Amount Authorized
Fish, canned	U.S. & Possessions	Greece	Greece	$ 300,000
Total ECA Procurement Authorizations for Fishery Products, April 1, 1948-June 30, 1949				
Fish, canned	U.S. & Possessions & Canada	United Kingdom, Ireland, Belgium-Luxembourg, Greece, & Italy	United Kingdom, Ireland, Belgium-Luxembourg, Greece, & Italy	13,957,800
Fish, salted	Newf. & Canada	Italy & Fr.W.Indies	Italy & Fr.W.Indies	5,179,000
Fish meal	Canada, Iceland, Norway, & Angola	Denmark, Austria, & U.S.Dept.Army	Denmark, Austria & Bizonia	3,957,361
Oil, herring	Iceland	U.S.Dept.Army	Bizone Germany	1,694,000
" , seal	Newfoundland	France	France	257,600
" , shark liver	Latin America except Argentine & Brazil	France	France	250,000
" , fish	U.S. & Possessions	U.S.Dept.Army & Bur.Fed.Supply	Bizone & Fr. Zone of Germany & Korea	487,000
" , technical fish	U.S.	U.S.Dept.Army	Bizone Germany	100,000
" , whale (includes sperm oil)	Netherlands, Belgium, Norway & U.S.	Austria, France, & U.S.Dept.Army	Austria, Bizone & Fr.Zone of Germany	7,160,150
Vit.A (Commercial grade, for stock feed)	U.S.	Netherlands	Netherlands	567,000
Grand Total Authorized				33,609,911

1/ Where the recipient country is shown as the procuring agency, the government of the participating country or its authorized agents or importers do the purchasing.

On June 14, the ECA announced that it was issuing "commodity determinations" to Marshall Plan countries to indicate the purchase program the agency intends to approve when additional funds are appropriated by Congress. The determinations tell the countries the amounts expected to be authorized for the purchase of certain commodities when funds become available, and permits the foreign governments to continue planning and procurement on a forward basis, but does not obligate ECA to finance purchases which are made. It also lets U. S. exporters know what they can get ready to offer.

Problems of markets, trade, prices and distribution are taking the place of those of production, allocation and rationing in European countries, according to a report on the recovery program issued by ECA on June 30.

Experimental Fishing in Alaskan Waters by the Service

The first experimental fishing of the present season in Alaska waters by the U. S. Fish and Wildlife Service started on June 24. The Service concluded a contract with the owners of the vessel Deep Sea to conduct experimental fishing in Bering Sea. A Service staff of four (2 fishery engineers, 1 technologist, and 1 biologist) accompanied the vessel and directed its exploratory activities. This work was carried out to continue the explorations begun last year by the vessel Washington.

The purpose of the operation is to locate new fishing areas which are sufficiently populated to sustain a commercial fishing operation. A major part of the work will be directed toward locating king crab and devising means of making profitable catches.

Fishing operations started in the St. Matthews Island area on June 24, thence northward to St. Lawrence Island, and continued to Nome, Norton Sound, and southward on the Alaska mainland side of Bering Sea. The vessel was operated in the regular commercial manner by its usual crew. The Service personnel obtained a great amount of valuable information concerning migrations and dispersal of fish, trawling conditions, and ocean temperatures.

Cod and flatfish of fine quality and size were located. While indications were encouraging, further work will be necessary to ascertain the extent of this resource.

King crab of the platypus species were located in the northern area but the quantity taken was small and the size considerably smaller than the king crab found in the southern area of the Bering Sea.

Federal Purchases of Fishery Products

DEPARTMENT OF THE ARMY, April 1949: During April 1949, the Army Quartermaster Corps purchased 1,386,475 pounds (valued at $487,851) of fresh and frozen fishery products for the U. S. Army, Navy, Marine Corps, and Air Force for military feeding compared with 1,588,166 pounds (valued, $510,200) for March 1949, and 1,327,665 pounds (valued, $457,540) for April 1948. Purchases for the first four months in 1949 totaled 5,340,704 pounds (valued, $1,820,823), compared with 5,253,060 pounds (valued, $1,984,434) for the corresponding period the previous year.

Fisheries of Certain Pacific Islands

GUAM: Every encouragement is given to the Guamanians to develop their fishing resources, according to the 1949 Annual Report for Guam to the Food and Agriculture Organization. To date, Guamanians have not realized the commercial potentialities of the local waters. Their fishing is confined to subsistence requirements and is conducted almost entirely within the coral reefs which fringe the island.

Since the war a renewed interest has been shown in the fishing industry and lisenses (20 issued during 1949) to operate fishweirs have shown a marked increase since the secession of military activities connected with immediate postwar rehabilitation and reclamation. Reconditioning of fishing boats damaged by the war has begun and it is felt that very shortly the fishing industry will be able to satisfy the demands of the local market.

During the first three months of 1948, 49,033 pounds of fish, 2,500 pounds of shellfish, and 2,700 pounds of turtles were produced.

Scientific experimentation has been carried on to give local aid and assistance to those Guamanians who are endeavoring to reestablish the fishing industry.

The U.S.S. Oregon, an exploratory fishing craft, arrived in Guam in 1948 to survey the entire reef and adjacent ocean area and to report live bait conditions, fish feeding grounds and other information, including suggestions as to improved methods of lagoon and deep-sea fishing.

U. S. TRUST TERRITORY OF THE PACIFIC ISLANDS: During the Japanese regime, an important commercial fishing industry was developed in the Territory but it was conducted entirely by non-indigenous personnel, according to the 1949 Annual Report for the Trust Territory of the Pacific Islands of FAO.

The production techniques are not known to the natives who have been content to use hand lines, spears and nets inside lagoons or close ashore. Fishing of this kind has yielded no more than a fraction of the local subsistence needs. With the encouragement and assistance of the Administration, commercial fishing has been organized at several points which has not only augmented the local food supply but returned in 1948 a small exportable surplus of dried fish (4.8 metric tons) and trepang. Recently the administration has financed the purchase of sampans, ranging in size from 3-1/2 to 19 tons, completely equipped for fishing. It is expected that this type of equipment will stimulate further interest.

Currently local catches are sold directly to consumers when the boat reaches the beach or are prepared for sun drying. Neither freezers nor canneries are now available but such installations are in prospect experimentally.

Reliable data are not available on either production or consumption. However, statistics on food imports in 1948 for the Territory, less the Northern Marianas District (i.e. for all except 12 percent of the indigenous population), include 29 metric tons of canned fish.

Insofar as foreign trade is concerned, it is planned to develop, in addition to other commodities, an exportable surplus of dried, canned, and frozen fishery products.

AMERICAN SAMOA: Local fishing consists of subsistence fishing on reef shelves with occasional deep water fishing for bonito and shark. A fish cannery has recently been built in this area and is expected to begin operation approximately June 1, 1949, according to the 1949 Annual Report for American Samoa to FAO. No information is available on production methods. It is expected that the fish (tuna and bonito) will be brought in by fishing boats operating out of Fiji. New jobs have been created in the fitting out of a fish cannery and additional jobs will be provided upon the opening of this operation.

No data are available on fish caught by individuals for home consumption. However, statistics on canned fish indicate a pack of 1,361 metric tons, imports of 75 tons, and the consumption of 90 tons during 1948. Prospective exports of 1,346 metric tons are visualized.

Fishery Biology Notes

ALBATROSS III - CRUISE NO. 23: The North Atlantic Fishery Investigations, of the Branch of Fishery Biology, Woods Hole, Massachusetts, reports that from June 23 to June 29 (Cruise No. 23) the research vessel, Albatross III, occupied stations on Georges and Browns Banks in 30 to 50 fathoms of water where small haddock are now abundant.

Studies were continued to determine how many of the haddock which escape through the savings cod end actually survive. The savings cod end used has 4 5/8-inch stretched mesh. A bag of fine mesh was placed outside of this to capture the haddock which passed through the mesh, and these were tagged as well as those which did not pass through. Survival of the two groups will be compared by recording the number of tags returned by fishermen and fish processors.

In addition, haddock were tagged on these Banks for the purpose of determining migrations.

SEA LAMPREY IN INDIANA STREAMS: The Service's Section of Inland Fisheries reports that the sea lamprey is continuing its spread in the Great Lakes. A considerable number has now invaded Indiana streams. A report was received last year of the invasion of a spawning individual in one of these streams; specimens were not taken until this spring. The first one was taken April 8 in Trail Creek near Michigan City. In May several specimens were taken from the Little Calumet River, which is connected with the Mississippi River drainage. The lampreys entered the Calumet River via Burns Ditch connecting this river with Lake Michigan. Reports indicate that a sizeable run entered the Little Calumet in late May.

SOUTH PACIFIC FISHERY INVESTIGATIONS OCCUPIES ADDITIONAL STATIONS: The Service's South Pacific Fishery Investigations, Stanford, California, reports that the research vessel Black Douglas left San Francisco on May 31 and in the next two weeks occupied 40 stations in the area between Cape Mendocino to the Columbia River and extending 400 miles offshore. The work included net hauls for zooplankton (including sardine eggs and larvae), phytoplankton collections, and observations on the temperature, salinity, etc., of the sea water.

Halibut Season on West Coast Closed

The closing of the halibut season in Areas 1A 3, and 4 at 12 midnight, July 12, 1949, was announced on June 17, 1949, by the International Fisheries Commission. This will terminate all halibut fishing on the Pacific Coast of Canada and the United States, including Alaska, except for incidental halibut catches. Permits for the retention and landing of halibut caught incidentally to fishing for other species with set lines in any area will become invalid at 12 midnight, November 15, 1949, when the closed season for all halibut fishing starts.

This year's closing date was only one day later than the 1948 date, The 1949 halibut season was 73 days long, compared with 72 days in 1948 and 109 days in 1947.

Areas 1B and 2 were closed at midnight June 3, 1949 (see Commercial Fisheries Review, June 1949, page 25).

Pacific Oceanic Fishery Investigations Continues Tuna Research

The Section of Biology and Oceanography of the Pacific Oceanic Fishery Investigations, stationed at Honolulu, continued during May to gather data to de-

termine the efficiency of vessel and gear operation and the length-weight frequencies of tuna and marlin species landed by local sampans. The species composition of fish landed during the month has shown a slight change, as indicated by the increased numbers of albacore and yellowfin tunas entering the catches. However, big-eyed tuna and marlins form the bulk of the species landed by the long-line vessels.

Morphometric measurements on the long-line catches landed at the local Honolulu markets were continued and arrangements were made with the tuna packing firm in this area for measurements to be taken at the canning plant during cutting operations.

The skipjack fishing improved immensely during May. Fishing vessels are now able to deliver regular loads and the commercial cannery in Honolulu is in operation. Three tons comprised the largest one-day catch. The vessels caught bait, fished and discharged the catch within a 24-hour period. While there is an admixture of yellowfin and big-eyed tuna, the bulk of the catch is skipjack. The very small fish that were landed earlier in the year have disappeared; fish landed during the month weighed from 15 to 25 pounds. In early May, the local tuna industry was crippled by a severe bait shortage.

Two fishery biologists during the month made a 4-day trip aboard the U. S. Coast Guard vessel Iroquois to French Frigate Shoals (about 350 miles west of the main Hawaiian Islands). Their purpose was to determine whether the area could serve as a source of live bait for tuna clippers operating throughout the mid-Pacific area, and they reached a favorable conclusion. However, frequent and extended observations would have to be carried on at various intervals over the entire area in order to arrive at definite conclusions. If it could be shown that bait fishes occur in numbers sufficient to provide an adequate supply of bait for intensive live-bait fishing operations, a live-bait fishery could easily be established and maintained on one of the islands. This practice has met with favorable success in Japan and in certain areas in the Philippine Islands.

Trust Territory Research Program Includes Sponges and Poisonous Fish

Among six United States scientists en route to Pacific areas, to continue a research program designed to supply basic scientific data required in the administration of islands of the United States Trust Territory of the Pacific, is a professor of zoology from the University of Hawaii, who will conduct a sponge survey of several island areas, according to a June 22 news release from the National Military Establishment. His study is being made to assist in the possible development of this resource for the economic benefit of the inhabitants of the Trust Territory. He will survey certain islands of the Marshalls and Caroline Islands.

Also, a member of the American Museum of Natural History, whose research in the Palaus will supply data to assist in the study of poisonous fish, will study the classification, distribution, ecology, natural history and embryology of plectognath fish. Operations will be based on Koror.

The new research program, (Scientific Investigations in Micronesia), is administered by the Pacific Science Board of the National Research Council, and largely supported by the Office of Naval Research.

Virginia Menhaden Industry Uses Plane to Spot Fish

An attempt to locate schools of menhaden by plane started on the last Monday in May, the legal opening date for purse netting in Virginia waters, according to a June 15 report from the Service's Marketing Specialist at Weems, Va. The plane spots the fish and notifies ships by radiotelephone. The pilot, who usually flies about 5 hours a day, is paid only for actual flying time, with no bonus provisions for locating the fish. It is estimated that he is able to discern schools 25 feet beneath the surface. Five out of the six Virginia menhaden firms are participating.

There is a plane locating menhaden in the North Carolina area and others are reported to be in use north of Virginia. Results to date are said to be encouraging, although it is too soon to give an adequate appraisal of the experiment.

U.S. Pack of Canned Alewives

The 1948 pack of canned alewives amounted to 123,134 standard cases, valued at $639,356 to the canner—a decline of 12 percent in volume and 18 percent in value compared with the previous year. Although the pack was the smallest since 1943, it was much greater than for any year prior to 1943.

Table 1 - Pack of Canned Alewives, 1948 (Quantity and Value to the Canners)

State	Standard Cases	Value
Maryland	76,340	$410,447
Virginia	46,794	228,909
Total	123,134	$639,356

Note: "Standard cases" represent the various-sized cases converted to the equivalent of 48 cans of 15 ounces each. Practically the entire pack was canned in 15-ounce cans.

The entire 1948 pack of canned alewives was canned in 7 plants in Maryland and 12 plants in Virginia. In the previous year these fish were also packed in Massachusetts, North Carolina, and Florida.

Table 2 - Pack of Canned Alewives, 1939 - 1948 (Quantity and Value to the Canners)

Year	Standard Cases	Value
1948	123,134	$ 639,356
1947	139,816	779,150
1946	193,980	1,180,197
1945	131,062	753,769
1944	135,995	793,254
1943	112,472	619,213
1942	77,232	399,555
1941	42,156	153,269
1940	24,486	72,070
1939	22,882	74,804

The average price per case at the canners' level rose from a low of $2.94 in 1940 to $5.83 in 1944, dropped slightly to $5.75 in 1945, and then rose in 1946 to a high of $6.08 per standard case. In 1947 it dropped to $5.57 and in 1948 dropped even lower to $5.19 per standard case. The shortage of protein foods accounted for the unusually heavy pack and the high price in 1946.

U.S. Pack of Canned Groundfish Flakes, 1948

The 1948 pack of canned groundfish flakes amounted to 35,014 standard cases, valued at $548,113 to the packers. This was an increase of 89 percent in volume and 80 percent in value compared with 1947. Although the pack was larger than in the previous year, it was only about 20 percent as large as either the 1945 or 1946 production which amounted to over 150,000 cases. Groundfish flakes were canned in 4 plants in Maine and 4 in Massachusetts.

Table 1 - Pack of Canned Groundfish Flakes, 1948 (Quantity and Value to the Canners)

State	Standard Cases	Value
Maine	8,616	$137,423
Massachusetts	26,398	410,690
Total	35,014	$548,113

Note: "Standard cases" represent the various-sized cases converted to the equivalent of 48 14-oz. cans to the case.

The average price per case at the canners' level rose from a low of $8.70 in 1939 to $14.94 per standard case in 1943. In 1944, the price dropped to $14.18 and rose again in 1945 to $14.84. In 1946, another decline took place to $13.88 and in 1947 reached a peak of $16.37. However, the price dropped again in 1948 to $15.65 a standard case. The 1948 value of the Maine production averaged $15.95 a standard case compared with $15.56 for the Massachusetts production.

Table 2 - Pack of Canned Groundfish Flakes, 1939 - 1948 (Quantity and Value to the Canners)

Year	Standard Cases	Value
1948	35,014	$ 548,113
1947	18,560	303,831
1946	151,886	2,107,446
1945	157,135	2,332,176
1944	92,950	1,318,167
1943	33,318	497,815
1942	83,729	1,011,382
1941	34,661	371,699
1940	32,477	345,938
1939	30,406	264,613

Pack of California Sardines, 1948

The 1948 pack of California sardines (pilchards) amounted to 2,654,149 standard cases, valued at $21,892,893 to the canners. Compared with the previous year, this

Table 1 - Pack of Calif. Sardines, 1948 (Quantity & Value to the Canners)

Style of Pack	Std. Cases	Value
Natural, without sauce or oil[1]	1,216,919	$ 8,153,851
In tomato sauce	1,296,750	12,256,841
In mustard sauce	93,300	844,127
Other[2]	47,180	638,074
Total	2,654,149	21,892,893

1/ Includes the pack canned in Oregon.

2/ Includes special packs of sardines (pilchards) in soybean oil; in olive oil and tomato sauce; fillets, natural, in soybean oil, in olive oil, and in tomato sauce.

Note: "Standard cases" represent the various-sized cases converted to 48 No. 1 tall cans (15 ounces net).

Table 2 - Pack of Calif. Sardines, 1948, By Size of Can & Case (Quantity & Value to the Canners)

Size of Can and Case	Actual Cases	Value
1-pound cans:		
15 oz. net, tall (48 cans)	1,137,424	$ 7,120,710
15 oz. net, oval (48 cans)	967,130	8,170,637
½-pound cans:		
8 oz. net, tall (48 cans)	61,150	315,618
8 oz. net, oblong (48 cans)	698,946	4,353,342
8 oz. net (96 cans)	81,214	886,505
5 ounces net (100 cans)	127,200	1,046,081
Total	3,073,064	21,892,893

was an increase of 61 percent in volume and 32 percent in value. While the 1948 pack was the most valuable in the history of the fishery, the production was only slightly over half as great as the record 1941 pack (5,007,154 cases, valued at $18,091,873). Sardines (pilchards) were canned in 51 plants in California and 3 plants in Oregon.

Table 3 - Pack of Calif. Sardines (Pilchards) 1939-48 (Quantity & Value to the Canners)

Year	Cases	Value
1948	2,654,149	$21,892,893
1947	1,652,592	16,538,375
1946	2,977,170	19,895,649
1945	3,765,981	15,346,472
1944	3,650,919	15,225,919
1943	3,354,697	14,352,359
1942	3,744,624	15,509,964
1941	5,007,154	18,091,873
1940	2,945,882	8,975,257
1939	3,108,082	9,553,663

The average standard case price at the canners' level was $8.25 in 1948, $1.76 per case lower than in 1947. The lowest average case price during the past ten years was $3.05 in 1940. From $4.08 in 1945, the average case price increased sharply in 1946 to $6.68, and rose in 1947 to $10.01 per standard case, the highest price ever paid for California sardines. During 1948 the natural pack averaged $6.70 per standard case; tomato-sauce pack, $9.45; mustard-sauce pack, $9.05; and other special packs, $13.52.

Pack of Maine Sardines, 1948

The pack of Maine sardines in 1948 amounted to 3,060,842 standard cases, valued at $26,921,926 to the packers. Compared with the previous year, this was an increase of 8 percent in volume, but a decline of 3 percent in value. The 1948 pack was the second largest and the second most valuable in the history of the industry. The record pack of canned Maine sardines (3,131,276 cases, valued at $12,475,991) was canned in 1941. The most valuable pack was in 1947 when 2,834,690 cases were canned, valued at $27,677,704.

Table 1 - Pack of Maine Sardines, 1948 (Quantity & Value to the Canners)

Style of Pack	Std. Cases	Value
In soybean or other vegetable oil (regular pack)	2,733,367	$23,898,248
In soybean or other vegetable oil (fillets)	21,302	199,020
In mustard sauce	231,572	2,444,298
In tomato sauce	18,045	104,015
In soybean oil, smoked or kippered	51,985	236,445
Other 1/	4,571	39,900
Total	3,060,842	26,921,926

1/Includes special packs of sardines (sea herring) in olive oil, spiced oil, peanut oil and soybean oil.
Note: "Standard cases" represent the various-sized cases converted to 100 ¼-oil cans (3¾ ounces net) to the case.

Table 2 - Pack of Maine Sardines by Size of Can & Case, 1948 (Quantity & Value to the Canners)

Size of Can & Case	Actual Cases	Value
3¾ oz. net (100 cans)	2,885,909	$25,915,234
10 oz. net (48 cans)	86,308	721,718
Other sizes converted to 3¾ oz. net (100 cans)	47,463	284,914
Total	3,019,680	26,921,926

Table 3 - Pack of Maine Sardines, 1939-48 (Quantity & Value to the Canners)

Year	Std. Cases	Value
1948	3,060,842	$26,921,926
1947	2,834,690	27,677,704
1946	3,018,597	19,548,531
1945	2,513,751	11,520,387
1944	3,035,825	14,223,706
1943	2,353,273	10,686,471
1942	2,720,126	11,691,981
1941	3,131,276	12,475,991
1940	1,117,748	3,736,394
1939	2,210,466	7,075,096

Rising steadily from a low of $3.20 per standard case in 1939 to a high of $9.76 per standard case in 1947, the canners' average price in 1948 dropped to $8.80 per standard case or $0.96 per case below the previous year.

Sardines (sea herring) were canned in 44 plants in Maine, 3 in Massachusetts, 1 in New Hampshire, and 1 in Maryland.

U.S. Pack of Atlantic Coast Sea Herring, 1948

The 1948 production of Atlantic Coast sea herring, packed in cans with net contents of over 10 ounces each, amounted to 280,388 standard cases, valued at $2,437,188 to the canner. Compared with the 1947 production, this was an increase of 247 percent in volume and 285 percent in value. Canning of large sea herring on the Atlantic Coast is a comparatively new development. In 1941, a pack of only 16,125 standard cases was produced, and since that year the production has ranged from 68,497 cases in 1943 to last year's record pack of 280,388 cases.

Table 1 - Pack of Atlantic Coast Sea Herring, 1948
(Quantity & Value to the Canners)

Style of Pack	Std. Cases	Value
Natural or in soybean or other vegetable oil 1/	88,960	$ 649,092
In mustard sauce	48,528	485,429
In tomato sauce	142,900	1,302,667
Total	280,388	2,437,188

1/Includes a small quantity kippered, jellied or pickled.

Note: "Standard cases" represent the various-sized cases converted to 48 No. 1 tall cans, each can containing 15 oz., net weight, of fish.

Table 2 - Pack of Atlantic Coast Sea Herring, 1948, By Size of Can & Case
(Quantity & Value to the Canners)

Size of Can & Case	Actual Cases	Value
15 oz. net (48 cans)	275,645	$2,392,557
Other sizes converted to 15 oz. net (48 cans).	4,743	44,631
Total	280,388	2,437,188

Table 3 - Pack of Atlantic Coast Sea Herring, 1941-48
(Quantity & Value to the Canners)

Year	Cases	Value
1948	280,388	$2,437,188
1947	80,848	632,970
1946	116,270	727,059
1945	95,394	556,814
1944	102,023	596,097
1943	68,497	418,099
1942	69,074	470,470
1941	15,117	114,967

Sea herring were canned in 13 plants in Maine, 4 in Massachusetts, 1 in New Hampshire, 3 in Maryland, and 1 in New Jersey.

The canners' average price per standard case dropped from $7.61 in 1941 to a low of $5.84 in 1944 and 1945, and then rose steadily to $8.69 in 1948. Atlantic Coast sea herring packed in natural, soybean, or other vegetable oil averaged $7.30 per standard case; in mustard sauce, $10.00; and in tomato sauce, $9.12.

U.S. Pack of Pacific Coast Sea Herring, 1948

Pacific Coast canners packed 46,060 standard cases of sea herring during 1948, valued at $386,806 to the canners. This was an increase of nearly 40,000 cases compared with the previous year. The entire 1948 pack was produced in the San Francisco and Monterey districts of California, where canning of these fish was begun in 1947 as a result of the failure of the pilchard fishery. In 1945 a small pack of sea herring was canned in Alaska. About 30 years ago large packs of sea herring were canned in Alaska, but this production was discontinued in 1920.

Table 1 - Pack of Pacific Coast Sea Herring, 1948
(Quantity & Value to the Canners)

Style of Pack	Std. Cases	Value
Natural 1/	12,092	$ 98,772
In tomato sauce	33,968	288,034
Total	46,060	386,806

1/Includes a small pack in soybean oil.

Sea herring were canned in 13 plants in California.

The average price per standard case increased steadily from a low of $6.80 in 1945 to a high of $8.40 in 1948. The price in 1948 was $1.40 per case higher than in 1947.

Table 2 - Pack of Pacific Coast Sea Herring, 1948, By Size of Can (Quantity & Value to the Canners)

Can & Case Size	Actual Cases	Value
15 oz. net (48 cans) ...	30,699	$226,696
Other sizes converted to 15 oz. net (48 cans)	15,361	160,110
Total	46,060	386,806

Table 3 - Pack of Pacific Coast Sea Herring, 1945-48

Year	Cases	Value
1948	46,060	$386,806
1947	6,861	48,008
1946	-	-
1945	2,308	15,694

Note: "Standard cases" represent the various-sized cases converted to 48 No. 1 tall cans, each can containing 15 ounces, net weight, of fish.

U.S. Pack of Canned Shad, 1948

The United States pack of canned shad in 1948 amounted to 14,773 standard cases, valued at $136,851 to the canners. This was a decline of 35 percent in volume and 31 percent in value compared with the previous year. Over 80 percent of the 1948 pack was canned on the Pacific Coast, principally in the Columbia River district of Oregon. During World War II, the production of canned shad on the Atlantic Coast increased, but since the War, the production has dropped off considerably.

Table 1 - Pack of Canned Shad, 1948, (Quantity & Value to the Canners)

State	Std. Cases	Value
Maryland[1/]	1,371	$ 14,172
Va., N. C., & Fla.	1,494	12,483
Oregon	8,923	84,480
Wash. & Calif. .	2,985	25,716
Total	14,773	136,851

1/Principally fillets.

Table 2 - Pack of Canned Shad, 1948, By Size of Can (Quantity & Value to the Canners)

Can & Case Size	Std. Cases	Value
15 oz. net (48 cans)	11,870	$104,402
Other sizes converted to 15 oz. net (48 cans)	2,903	32,449
Total	14,773	136,851

Table 3 - Pack of Canned Shad, 1939-48[1/] (Quantity & Value to the Canners)

Year	Pacific Coast		Atlantic Coast		Total	
	Std. Cases	Value	Std. Cases	Value	Std. Cases	Value
1948	11,908	110,196	2,865	26,655	14,773	136,851
1947	18,808	169,777	3,910	29,496	22,718	199,273
1946	2/	2/	2/ 24,403	2/ 224,387	24,403	224,387
1945	4,983	110,210	17,345	182,554	22,328	292,764
1944	17,820	103,003	23,548	243,239	41,368	346,242
1943	14,171	78,762	3,860	48,618	18,031	127,380
1942	28,693	156,077	7,764	80,123	36,457	236,200
1941	3,637	16,221	926	14,226	4,563	30,447
1940	18,421	54,108	234	2,999	18,655	57,107
1939	13,437	42,182	-	-	13,437	42,182

1/Does not include the production of smoked shad.
2/A small pack of shad on the Pacific Coast has been included with the Atlantic Coast production.

The canners' average price per standard case in 1948 was $9.26 compared with $8.77 in 1947. During the past ten years, the highest average price was $13.11 in 1945 compared to the lowest of $3.06 in 1940.

Note: "Standard cases" represent the various-sized cases converted to 48 No. 1 tall cans to the case, each can containing 15 ounces of fish.

The average price per standard case in 1948 for Atlantic Coast canned shad was $9.30 compared with $9.25 for the Pacific Coast pack, while in 1947 the Atlantic Coast average was $7.54 compared with the Pacific Coast average of $9.03.

In 1944, the canning of smoked shad was undertaken and 9,867 cases of 48 No. 1 tall cans, valued at $207,365 were packed. In the following year the pack amounted to 4,357 cases, valued at $93,264, and in 1946, it totaled 23,843 cases, valued at $714,243. Since 1946, only a single firm has continued to process smoked shad and the pack has been negligible.

U.S. Production of Menhaden Products, 1948

Receipts of menhaden by manufacturers of menhaden products in 1948 amounted to 1,007,888,840 pounds (1,504,311,700 fish). This total was the largest record-

Table 1 - Receipts of Menhaden & Production of Menhaden Products, 1948
(Quantity & Value to the Manufacturer)

States	Menhaden utilized	PRODUCTS MANUFACTURED				
		Dry Scrap and Meal		Oil		Total
	Pounds	Tons	Value	Gallons	Value	Value
New Jersey	162,046,000	17,119	$ 1,810,903	1,694,939	$ 1,807,915	$ 3,618,818
N. Y. & Del.	224,843,290	1/ 22,224	1/ 2,265,161	2,518,835	2,970,399	5,235,560
Virginia	152,744,590	16,086	1,853,922	812,764	1,131,540	2,985,462
North Carolina	198,270,420	20,939	2,546,596	1,304,732	1,355,009	3,901,605
Florida	80,276,720	1/ 8,410	1/ 988,374	274,859	301,684	1,290,058
Mississippi	68,636,140	6,780	797,413	779,810	883,028	1,680,441
S. C., La., & Tex.	121,071,680	12,500	1,298,545	1,378,000	1,682,604	2,981,149
Total	2/ 1,007,888,840	104,058	11,560,914	8,763,939	10,132,179	21,693,093

1/ A small production of acidulated scrap has been included with dry scrap and meal production.
2/ 1,504,311,700 fish.

ed in the history of the fishery, and the first time it exceeded one billion pounds. The production of menhaden dry scrap and meal (104,058 tons, valued at $11,560,914) exceeded the previous record established in 1947. In 1948, the oil content of the fish was lower and the yield of oil (8,763,939 gallons, valued at $10,132,179) was less than in 1946. Menhaden dry scrap, meal and a portion of the oil are used in animal feeds; however, the major portion of the oil is used

Table 2 - Menhaden Utilized and Production of Menhaden Products, 1939-48
(Quantity & Value to the Manufacturer)

Year	Menhaden utilized	PRODUCTS MANUFACTURED						
		Dry Scrap and Meal		Acidulated Scrap		Oil		Total
	Pounds	Tons	Value	Tons	Value	Gallons	Value	Value
1948	1,007,888,840	1/ 104,058	1/ 11,560,914	1/	1/	8,763,939	$10,132,179	$21,693,093
1947	948,155,592	98,602	10,883,852	632	26,863	8,473,371	11,425,497	22,336,212
1946	916,013,079	94,622	8,605,118	2,022	78,475	9,758,648	9,033,032	17,716,625
1945	759,073,820	77,451	5,483,377	1,577	62,200	8,335,094	5,656,550	11,202,127
1944	685,980,170	69,170	4,913,224	2,922	111,104	6,067,111	3,725,498	8,749,826
1943	615,554,460	66,357	4,766,672	1,555	58,821	5,734,668	3,892,142	8,717,635
1942	482,643,880	50,504	3,362,279	2,594	80,520	5,128,760	3,200,129	6,642,928
1941	775,086,820	75,316	4,008,355	11,029	242,792	6,034,050	2,829,441	7,080,588
1940	634,589,000	56,249	2,423,229	15,520	271,533	5,774,671	1,304,720	3,999,482
1939	514,135,800	52,950	2,224,920	15,853	265,850	6,005,414	1,624,024	4,114,794

1/ A small production of acidulated scrap has been included with dry scrap and meal.

in the production of soap, paint, linoleum and in many other manufacturing industrial processes.

Menhaden products were manufactured in 3 plants in New Jersey, 6 in Virginia, 8 in North Carolina, 5 in Florida, 3 in Mississippi, 2 in Delaware, and in 1 plant each in New York, South Carolina, Louisiana and Texas.

The price of dry scrap and meal at the manufacturer's level climbed steadily from a low of $42.02 in 1939 to a high of $111.10 per ton in 1948 the price was only $0.72 per ton higher than in 1947, while in the latter year it was $19.44 per ton higher than in 1946.

Oil Prices at the manufacturer's level also increased steadily from a low of $0.27 to a high of $1.348 per gallon in 1947. The price in 1948 was $0.192 per gallon lower than in 1947, due to a sharp decline the latter part of the year.

U.S. Production of Oyster and Marine-Clam Shell Products, 1948

The production of oyster and marine-clam shell products in 1948 totaled 345,075 tons, valued at $2,474,492 to the manufacturer. This represents a decrease of 31 percent in quantity and 24 percent in value, compared with 1947.

Production of Oyster & Marine-Clam Shell Products, 1948

State	Crushed Shell for Poultry Feed		Unburned Shell Lime		Total	
	Tons	Value	Tons	Value	Tons	Value
New Jersey	5,344	$ 77,546	1,319	$ 6,424	6,663	$ 83,970
Pennsylvania and Maryland	26,766	263,141	17,308	73,518	44,074	336,659
Va., Fla., La., and Tex.	242,874	1,592,047	1/ 25,472	224,064	268,346	1,816,111
Wash., Ore., and Calif.	21,586	207,971	4,406	29,781	25,992	237,752
Total	296,570	2,140,705	48,505	333,787	345,075	2,474,492

1/Includes a small quantity of burned lime produced in Virginia.

Oyster shell products were prepared in 5 plants in New Jersey, 4 plants in Pennsylvania, 3 plants each in Virginia and Washington, 2 plants each in Maryland Texas, and California, and 1 plant each in Florida, Louisiana and Oregon. Marine-clam shell products were produced in 1 plant in Washington.

Wholesale and Retail Prices

As of May 17, 1949, the wholesale index for all foods once more started to drop and was 0.5 percent lower than on April 12, 1949, and 7.9 percent below May 18, 1948, according to the Bureau of Labor Statistics of the Department of Labor.

During May this year, wholesale prices for canned salmon remained steady and were exactly the same as in April. No doubt, this is due to the fact that offerings of last year's pack were light and no new stocks were yet available.

The retail price index for all foods declined 0.2 percent from mid-April to mid-May as lower prices were reported for nearly all groups including fish and shellfish. The food index on May 15 was 202.4 percent of the 1935-39 average, 4 percent lower than a year ago but 39 percent above the level of June 1946. Chiefly responsible for the decline during the month were decreases of over 1 per-

Wholesale and Retail Prices

Item	Unit		Percentage change from--	
Wholesale: (1926 = 100)		May 17,1949	Apr.12,1949	May 18,1948
All commodities	Index No.	156.0	-1.0	-4.8
Foods	do	163.4	-0.5	-7.9
Fish:		May 1949	Apr.1949	May 1948
Canned salmon, Seattle:				
Pink, No. 1, Tall	$ per doz. cans	5.664	0	+9.5
Red, No. 1, Tall	do	6.402	0	0
Cod, cured, large shore Gloucester, Mass.	$ per 100 lbs.	15.500	0	+6.9
Retail: (1935-39 = 100)		May 15, 1949	Apr.15,1949	May 15, 1948
All foods	Index No.	202.4	-0.2	-4.0
Fish:				
Fresh, frozen and canned	do	315.4	-1.8	+3.4
Fresh and frozen	do	254.5	-2.6	-2.6
Canned salmon:				
Pink	¢ per lb. can	60.1	-0.5	+14.7

cent for the dairy products and meat, poultry and fish groups with fresh, frozen and canned fish declining 1.8 percent from mid-April to mid-May. The fresh and frozen fish index on May 15 this year was 2.6 percent lower than mid-April 1949 and mid-May 1948, while canned pink salmon prices dropped 0.5 percent below mid-April 1949, but were still 14.7 percent higher than on May 15, 1948.

RECORDING COLOR CHANGES IN FROZEN PINK SALMON

In studying the progress of deterioration in frozen pink salmon, it was found that there was a considerable change in color of the cut surface of the steaks. During storage studies with frozen fish, Stansby and Harrison (1942) found that the normal pink to red color of the surface of pink salmon (Oncorhynchus gorbuscha) fillets would fade, turn yellowish, and otherwise assume discolored tints of various degrees of intensity until the fillets were no longer marketable. Inasmuch as these alterations in color indicate a corresponding deterioration of the flavor and odor of the flesh, it may be a highly important index to both the processor and the consumer.

As a part of an investigation (authors, 1946) on the keeping qualities of frozen packaged pink salmon steaks, a study was made of the effect of treatment of steaks with brine and brine-sodium nitrate mixture on changes in surface color. These two kinds of steaks and an untreated control were observed at intervals during a 9-month storage period. The method employed for recording and evaluating the color of the flesh was that previously described by the authors (1942) in which color photographs are taken, the transparencies placed in a spectrophotometer, and the spectral distribution curves are obtained.

--Fishery Leaflet 332

Bahama Islands (British West Indies)

SPONGE INDUSTRY, 1948: Production: The gathering of sponges was prohibited by Governmental order from July 1947 until April 1, 1948, when fishing was resumed. However, the sponge beds proved to be in such poor state that the closing order was put into effect again at the end of July 1948, and is still effective, according to a March 11 report from the American Consulate at Nassau. There are rumors that the order will be set aside again this year.

Table 1 - Sponge Production 1/ - April through July 1948

Grass	1200 lbs.
Hardhead	900 "
Reef and glove	6000 "
Sheeps-wool	1600 "
Yellow	100 "
Velvet	-

1/Approximate.

It is doubtful if there are any stocks remaining on hand. The outlook for 1949 is very discouraging.

Exports:

Table 2 - Sponge Exports from the Bahamas, 1948

Country	United Kingdom		Canada		Bermuda		United States		Total	
Type	lbs.	value	lbs.	value	lbs.	value	lbs.	value	lbs.	value
Grass	1,100	$6,000	100	$524	-	-	100	$220	1,300	$6,744
Hardhead	900	5,868	-	-	-	-	-	-	900	5,868
Reef	1,600	7,164	50	180	-	-	700	4,080	2,300	11,424
Wool	300	2,500	600	4,504	50	$636	100	1,532	1,050	9,172
Refuse and Clippings	6,700	544	-	-	-	-	600	24	7,300	568
Unclassified	1/	12	-	-	1/	48	1/	336	1/	396
Total	-	22,088	-	5,208	-	684	-	6,192	-	34,172

1/Not available.

Current Prices: There has been a decline of approximately 20 percent in the current prices.

Demand: Demand is small, owing to the Mediterranean sponges being offered in all markets. The outlook for 1949 is very poor.

Table 3 - Approximate Current Prices for Sponges Gathered and Exported

Type	Grass	Hardhead	Reef and Glove	Sheeps-wool
Grade	$	$	$	$
No. 1	6.40	Forms - 6.40 Cuts - 4.80	6.40-7.20	9.60
No. 2	5.60	4.00	4.16	8.00
No. 3	4.80	-	3.20	7.20
No. 4	2.40	-	.80	4.80
No. 5	1.60	-	-	.80
Slates	2.80	-	2.40	-

COLONY NOT TO REOPEN SPONGE BEDS: The Colonial Government's Agricultural and Marine Products Board decided that it was not in the interests of the Colony to reopen the sponge beds at this time, according to a May 11 report from the American Consulate at Nassau.

Several persons interested in the sponge business recently made a tour of the beds at Andros and Abaco Islands, and reported that it would be folly for the Government to acquiesce in the demands for the reopening of the beds.

Bizone Germany

NEW CONSTRUCTION FOR BREMERHAVEN'S FISHERIES: Since the end of World War II, several new buildings have been completed in the Bremerhaven Fischereihafen, more buildings begun, and many damaged buildings repaired, according to a March 9 report from the American Vice Consulate at Bremerhaven. Bremerhaven fisheries are important to the German economy.

Two companies operating fishing vessels out of this port are erecting buildings, and it is hoped that other ship-owning firms will be settled here later. A fish importing and processing firm is building the largest single plant in this area. Another firm is constructing a factory to produce packing boxes for sending fish inland. In addition, a new ice plant also is now under construction. An attempt is being made to attract fishery concerns formerly established in the Polish- and Russian-occupied regions of Germany to Bremerhaven. Since suitable land in the presently improved section of the port no longer is available for settling new firms or for the expansion of old firms, it is planned to develop a further area of land. The entire project will cost about $1,900,000.

A 656-foot extension is planned for the main auction building. In the future, auction halls will be built on piers or quays jutting out into the water with berths on each side for ships. Construction along this line will enable more discharging berths to be accomodated in the limited expanse of water available.

Provided the fisheries are not caught between rising costs and fixed fish prices, and provided the German meat ration remains low, the next decade will see an expansion in Bremerhaven as a fishing port.

Canada

BRITISH COLUMBIA WHALING SEASON OPENS: The Canadian Department of Fisheries has issued licenses to three boats operated by one company for the hunting of whales in Northern British Columbia waters, according to the May 1949 Trade News of the Canadian Fisheries Department.

Last year, the Company's three whalers accounted for the catching of 184 whales, and this year with an improvement in vessels it is expected that the catch will be greater. A fully equipped processing plant at Coal Harbour, Vancouver Island, will handle the expected increased production. Hunting for the whales got under way early in May.

"LONG-LINING" PROVES OF VALUE ON EAST COAST: Canadian East Coast inshore fishermen are improving their catching efficiency by adopting mechanical gear to haul in their lines, a method used on West Coast halibut boats. Interest in "long-lining" was stimulated by Fisheries Research Board scientists at the Atlantic Biological Station, St. Andrews, N. B., who carried out demonstrations with the power gear on the fisheries research vessel, the J. J. Cowie, according to the June 1949 Canadian Fisheries Department Trade News.

"Long-lining" involves the use of a powered hauler or gurdy which is operated directly from the main engine or from an auxiliary engine and hauls back the gear. The method is best adapted to the Atlantic coast cod fishery on boats of from 30 to 50 feet in length. Advantages of using "long-lining", according to the Fisheries Research Board of Canada, are that the tiring job of hauling by hand is lessened; gear hauling in rough weather and strong tides is easier; rapid, even hauling saves time and reduces gear parting, and more fish can be handled with the same effort.

Four small gurdies for test purposes were distributed by the Department of Fisheries to fishermen in four Atlantic ports. This, together with demonstrations by the J. J. Cowie, led to increasing interest in the greater efficiency of power hauling. Fishermen using gurdies at Shelburne, Liverpool, Lockeport and Clark's Harbour now vouch for its efficiency.

At Caraquet a gurdy was installed in one of eight similar boats. As a result, this boat increased its season's catch from 183,000 to 243,000 pounds, and increased its rating in the fleet from seventh to third place. Complete gurdy, ready for installation, costs approximately $125. This can be reduced considerably by fitting an old motor car differential and axle with a gurdy head.

Emphasizing the advantages of "long-lining", the Atlantic Biological Station scientists say that offshore and inshore fishing each produces about one-half the Canadian groundfish catch. The efficiency of offshore fishing is advancing through use of otter trawls. To compete, the inshore fishery must strive continuously for better efficiency and one method of improving this efficiency is through conversion to "long-lining."

RENEWS TUNA PATROL OFF BRITISH COLUMBIA COAST: Active assistance to the tuna fishery off the British Columbia coast by the Canadian Department of Fisheries is again underway this year. The Laurier, one of the larger vessels of the Department, left Victoria early in June to begin the first leg of its patrol.

The plan called for early scouting for tuna in the area southeast of the Queen Charlotte Islands. Following pre-determined courses, the Laurier proceeded up-coast and after refueling at Prince Rupert, retraced the up-coast pattern generally and arrived at Victoria again on June 26.

Daily broadcasts to the fleet will be made from the Laurier, following the character and timing used in 1948. When tuna are located, the vessel will follow a pattern of patrol which will take care of the considerations of the scientific investigators, and at the same time permit adequate tests and experiments with fishing gear to be carried out.

The United States Fish and Wildlife Service also is conducting an exploratory tuna survey to be carried on principally in southeastern Alaska waters by the USFWS Oregon, equipped with bait tanks and trolling gear. In order to avoid duplication of effort, this program is to be coordinated with the albacore

tuna survey by the Canadian Department of Fisheries. Through the current exchange of information between the two agencies, daily broadcasts are to be made to the fishery fleet from the vessel Oregon in order to keep the fishermen advised of the albacore movements.

SPONSORS CONFERENCE ON EAST COAST SALMON: The Canadian authorities have offered to cooperate with the East Coast provinces in a program to rehabilitate the Atlantic salmon fishery. At a meeting in Ottawa on April 28, representatives of Quebec, New Brunswick, Nova Scotia, Prince Edward Island and Newfoundland discussed with Department of Fisheries officials the need for such a program and agreed that the best way of carrying it out would be through regular meetings of a Dominion-Provincial conference.

There was general agreement among the representatives of the five provinces that there was need for a body with representation of Provincial Governments and of the Federal Government to consider from time to time salmon policy on regulation, development work and research, and to recommend to the various Governments lines of attack.

The Federal Government has already accumulated a large amount of information and has started to do some additional work. The Fisheries Research Board is gathering all information on salmon and is contemplating expanding salmon work where information is needed. This also applies to Newfoundland. The Fish Culture Development Branch is stressing the problem of rehabilitation by removal of obstructions in streams and the building of fishways. In Newfoundland, the Department of Natural Resources is carrying on its work of expanding spawning areas for salmon this year.

The Fisheries Department is also attempting to improve the statistics on salmon catches. To this end an officer has been assigned to act as a liaison with the provinces to obtain better statistics.

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ESTIMATED 1949 BRITISH COLUMBIA SALMON PACK: The British Columbia salmon canning industry anticipates a pack of approximately 1,800,000 cases of salmon this season, according to a June 30 report from the American Consulate General at Vancouver. However, they may have difficulty selling at satisfactory prices notwithstanding an announcement early in June that Great Britain would purchase 410,000 cases of salmon, consisting of sockeye, coho, and pinks, at a price of $7,000,000.

To further the sale of canned salmon in the domestic market, salmon canners have agreed to spend $500,000 in the next eight months in an advertising effort to sell their product throughout Canada.

Ceylon

DANISH FISHERIES EXPERT RECOMMENDS EXPANSION OF FISHERIES: A Danish fisheries biologist, who has been in Ceylon since February investigating that country's fisheries, returned to Denmark the early part of May, according to a May 24 report from the American Embassy at Copenhagen. He recommended a modernization of the entire

island's fishery industry. Two Danish fishery cutters are being sent to Ceylon to assist in the training of the local fishermen.

A large Danish industrial firm of Copenhagen located in Ceylon has prepared for the Government a report concerning the establishment and construction of canneries, refrigerated plants, etc. (See Commercial Fisheries Review, March 1949, page 51).

Chile

FISHERIES UNDEVELOPED: Chile's rich sea resources continue to be relatively untapped, according to Economic Review of Chile, 1948, of the Office of International Trade.

Production of fish in 1947 amounted to 46,000 metric tons and of shellfish, 14,300 metric tons. The output in 1948 probably was somewhat larger. In the North there are canneries and freezers, mainly for the preparation of swordfish and tuna for export, but the potential demand for fish in the population centers of Chile remains undeveloped. Inadequate cold storage and transportation facilities limit the distribution of fresh fish. Even in Santiago and coastal towns the chronic low supply and resulting high prices have made fish something of a luxury food. The meat crisis has directed attention to fish as a logical and readily available substitute for meat, and plans have been announced for improving refrigerated storage and transportation facilities.

France

TRADE AGREEMENTS INCLUDE FISHERY PRODUCTS: A commercial agreement signed August 1, 1948, provides for France to import from the Netherlands 2,100 metric tons of salt herring and 6 million francs ($24,000) of fresh fish, according to a February 28 report from the American Embassy at Paris.

Under the Franco-Danish commercial agreement of November 1, 1948, France has allotted 100,000 Danish crowns ($20,840) for the import of trout from Denmark.

The Franco-Norwegian commercial agreement of June 4, 1948, provides an allotment of 3,900 metric tons and a credit of 350,000 Norwegian crowns ($70,420) for the import of various sea fish, frozen and fresh, from Norway.

Indonesia

FISHERIES REVIEW, 1948: Both sea and inland fisheries showed favorable progress in 1948, with a total movement of dried and salted fish of 19,000 metric tons during the first nine months, valued at $7,980,000. The Indonesian Fishery Service supplied about $1,520,000 worth of sail cloth, nets, line, and other supplies during 1948 as compared with $646,000 in 1947. The fishing industry is now about 65 percent of prewar, according to a January 31 report from the American Con-

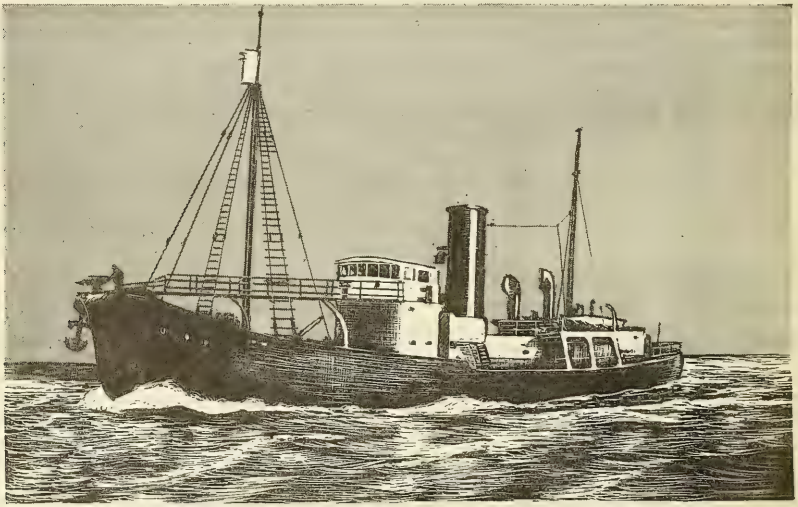
sulate General at Batavia, Java. Fish is a very important item in the native diet and strenuous efforts are being made to increase domestic production in order to cut down import requirements.

In the Federal Territory (area under Dutch control), 764,000 metric tons of canned fish were distributed officially during the Third Quarter, 1948, compared to 1,279,000 tons in the Second Quarter, 529,000 tons in the First Quarter, and 280,000 tons in the Fourth Quarter of 1947.

Note: Values converted on basis of official exchange rate of 1 guilder equals $0.38 U. S.

Japan

EQUIPMENT AND PROCESSING METHODS USED BY JAPANESE ANTARCTIC WHALING EXPEDITIONS: Factory equipment and processing methods being used on the 1948-49 Japanese Antarctic whaling expedition are as follows, according to the January 22 Weekly Summary of the Natural Resources Section of SCAP.



A TYPICAL JAPANESE WHALE CATCHER OR KILLER BOAT (385 GROSS METRIC TONS) USED IN ANTARCTIC WHALING.

The floating factory ships Nisshin Maru No. 1 and Hashidate Maru, 11,781 and 10,798 gross tons, respectively, are equipped almost identically. Each contains seven oil extraction boilers and eight separators for the extraction of whale oil from blubber, bone, and internal organs. All the units were manufactured in Japan from prewar European designs. Both ships are equipped with plants of Japanese design and manufacture for the extraction of vitamin oil from whale livers and for the recovery of bone meal from the residue. Both plants employ standard machinery, such as cutting and chopping machines, cooking kettles, cyclones, washing drums, dehydrators, and screw driers. In addition, the ships contain centrifugal separators, fabricated in Japan, for the purification of whale and liver oil.

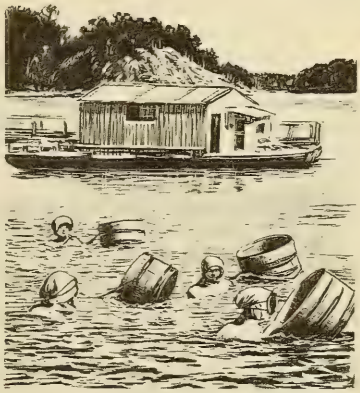
All bone, the greater part of the blubber, and the stomachs, kidneys, and intestines are processed for whale oil on the factory ships. The raw material is digested in the boilers and is passed to separators, where the oil is drawn off. The oil is then run through centrifugal separators for final purification and stored in the ship's tanks. A limited quantity of the residue from the bone processing apparatus, consisting of bone meal, glue, and a quantity of oil and sea water, is piped to the bone meal plant where it is washed and the liquids removed in a centrifugal dehydrator. The remaining bone meal is then passed through a steam jacket screw drier and bagged. Livers are chopped and ground into small pieces, mixed with fresh water, and cooked with caustic soda. After cooking, the vitamin oil is extracted by centrifugal separators.

All meat, a small amount of blubber, and the ventral grooves (the striated blubber from the ventral side of the carcass and the accompanying layer of meat extending from the tip of the lower jaw to the flippers) are transported from the factory ships to salting and refrigerator ships in small launches, for preservation and transportation to Japan for human consumption. Products to be frozen are precooled with sea water on the decks of the refrigerator ships, then placed in wood or metal trays, and frozen between metal plates which are in direct contact with refrigerated brine. The frozen products are stored in refrigerated holds at temperatures of -15°-20° C. Products to be salted are washed with sea water on the decks of the salting ships and then wet-salted in open holds.

Certain internal organs, such as testes, ovaries, pancreases, and livers, are frozen and returned to Japan for extraction of hormones, insulin, and vitamin oil.

Mandated Islands

PREWAR PEARL OYSTER CULTURE IN THE SOUTH SEAS: Little information is available on Japanese prewar experiments with pearl oyster culture in the South Seas, because records, which were kept locally on the islands, were lost during World War II, according to the March 5 Weekly Summary of Natural Resources Section of SCAP. The following information on pearl culture in the South Sea islands has been obtained in Japan.



DIVING FOR PEARL OYSTERS

Boetoeng (Celebes): A series of experiments was made on the artificial production of pearls at Boetoeng, the southeastern extremity of Celebes, in 1920. The golden-lipped pearl oyster, Pinctada maxima Jameson, locally called "shirocho-gai," was used. These experiments resulted in the production of some fine culture pearls in 1928. The stock used in this station was collected by pearling luggers from the great pearl oyster grounds of the Arafura Sea, lying between New Guinea and Australia, especially near Aroe Island.

Palau (Caroline Islands): The success in the culture of pearls in Japan prompted experimental work at a station estab-

lished at Palau in 1920. Starting with the more readily available black-lipped pearl oyster, Pinctada margaritifera, the "kurocho-gai", the work was later extended to include the yellow-lipped pearl oyster, Pinctada maxima or "shirocho-gai". Quantities of the former were readily available at Palau, and arrangements were made to import live "shirocho-gai" from the Arafura Sea. In 1935 and 1936, Pinctada martensii, the Japanese pearl oyster, was successfully introduced and planted at Palau.

The experiments were successful in a measure, and some good pearls were produced. Two other companies began operations at Palau, in 1936 and 1937, and activities continued until the outbreak of World War II in 1941.

Apparently as a result of unfavorable environmental conditions, the Palau pearl enterprises were not highly successful from a commercial standpoint and the projects are now regarded as failures.

Morocco

EXPORTABLE SURPLUS OF OLIVE OIL: At least 5,000 short tons of high-quality Moroccan olive oil appear to be available for export this year, according to an early 1949 report from the American Consulate at Rabat. The Moroccan target for commercialization of olive oil is 6,600 tons, of which the canners are entitled to 1,100 tons for use in canning sardines for export to the United States.

All production of the refineries has been blocked for export to the dollar zone, either in the form of pure olive oil or as packing for sardines. Moroccan authorities currently are considering a price of 43-46 cents per pound f.o.b. Casablanca, approximately the same price as last year.

Netherlands

FISHERIES REVIEW: Importance of the Fishery Industry: Fishing is a very old means of livelihood in the Netherlands, according to a March 17 report from the American Embassy at The Hague. The country has west and north coasts on the North Sea, while the land area is traversed by many large and small rivers, estuaries, and canals. Further, there are a number of lakes scattered all over the country, mainly in the western, northern and central eastern parts.

All this water has given rise to a flourishing, widespread industry. At present, there are still some 30 municipalities where sea fishing firms are established, some 90 where coast fishing trades are situated, and several dozens of places where lake and river fishing trades are located. The most important fishery ports in the Netherlands are Ijmuiden, Scheveningen, Katwijk, on the sea coast, Vlaardingen on the New Waterway near Rotterdam, and Urk on the Ijsel Lake (the former Zuider Zee).

Fishery Enterprises: The great majority of the fishery enterprises are very small. The limited number of large fishing enterprises are concentrated in the most important fishery ports.

Fishing Fleet: In the ten years preceding the war, the Netherlands fishery trade declined by roughly one-third in the number of vessels and approximately 28 percent in the total tonnage. During the war, the Germans looted the greater part of the Netherlands fishery fleet, an important percentage of which was not returned to the former owners. Although energetic efforts were made to restore the fleet after the liberation, official figures give the total sea and lake fishery fleet on January 1, 1948, as only 2,838 ships with a total tonnage of 88,774 metric tons, compared with 3,201 ships and 247,728 tons in 1939.

The present fleet is composed of 69 percent motor vessels, 3 percent steam trawlers, and 28 percent mostly sailships.

Production: Official statistics give the total catch brought to markets in the Netherlands in 1948 as 239,000 metric tons, valued at almost $31,920,000, of which 163,000 metric tons were sea fish, valued at $23,180,000; 66,000 tons of coast fish, valued at $3,420,000; and some 10,000 tons of Ijsel Lake fish (the biggest inland lake), valued at $5,320,000.

Fishing Methods: The coast and lake fishermen usually make trips of no longer than one or two days duration. Their ships are small and they have generally no facilities on board to keep the fish fresh. The sea fishermen, however, leave ports for much longer periods; they keep the fish fresh in ice. In the case of herring, ships sometimes remain on the high seas as long as two or three months, in which case the fish are salted on board and delivered ashore ready for further shipment. The North Sea is the most frequented fishing ground for Netherlands fishermen.

The herring fishing season in the Netherlands starts in May and lasts through November. There is no period of the year when the ships do not go out for other fish, except occasionally on account of bad weather. For most species of fish in domestic waters there are "closed seasons", during which it is prohibited to store and transport as well as catch fish. This season depends on the kind of fish, the territory, the kind of nets used, and international agreements (for rivers entering the Netherlands from Germany and Belgium). For instance, pike and perch may not be caught from March 16 to June 1, brook trout from October 1 to April 1, while for eel there is no prohibited season at all. Generally, however, no inland fishing (either professional or sport) is allowed during the period March 16 to June 1 to protect stocks during the breeding period.

For sea fishing, the two biggest types of nets used are said to be drift nets and drag nets; cast nets are also used occasionally. For inland fishing, bow nets, cotton fish traps, and bag nets are mostly used. The majority of the nets used are made of cotton, but manila and sisal are also used, especially for coarse nets. Each sea-going ship may only take with it the number of nets prescribed by the Fishery Trade Control Board. Larger ships usually take over one hundred gill nets.

FISH NETS: Production: It is estimated that production of fishing nets will amount to 1,000 metric tons valued at about $3,040,000. This estimate is based on the fact that the 1948 export figures of fishing nets aggregated 603 metric tons valued at $1,941,420, and that the domestic demand is estimated to be only a little less important than exports.

The Netherlands industry produces primarily cotton nets, especially prepared and unprepared cotton nets for herring fishing. The twine for making these nets, ranging from 30/6 to 30/16, is usually made by the net manufacturers themselves.

Some factories even have occasional twine surpluses available for sale to other net manufacturers, although small quantities of twine have been imported, some from the United States. Local manufacturers have difficulties, however, in obtaining an adequate supply of the specific type of yarns required (30 count) due to the limited foreign exchange available for imports. As netting mills have a backlog of orders and exports are given preference, domestic customers often have to wait six months or more for delivery.

Imports: The imports of fishing nets in the postwar period were negligible until in 1948 when quantities of cotton herring and trawler nets (142 metric tons) were again imported from Germany. These imports were a resumption of prewar business, when the Netherlands also used to buy certain kinds of nets from Germany. The Netherlands authorities further considered (in spite of the prevailing foreign exchange shortage) that imports of these nets would be justified to help supply the fishermen who are unable to get deliveries from local manufacturers who have a backlog of orders. Fishermen still remember the prewar Japanese cotton nets, which although not of the best quality, were exceptionally low in price, and some of them hope that with the revival of Japanese trade, these imports will be resumed some time in the near future.

Exports: Exports of Netherlands fishing nets increased considerably in 1948 and even exceeded prewar exports in quantity and greatly exceeded prewar exports in value. The destination was practically limited to six countries, one of which was the United States which imported some quantities of herring nets made of raw materials other than cotton, and some netting for other fishing made of cotton. The importance of fishing net production for export (565 metric tons) is indicated by the fact that this product has been included in bilateral trade agreement negotiations between Netherlands and a number of other countries. For instance, the Netherlands is to supply $400,000 worth of inland fishing nets to Germany in 1949, which country at the same time, as noted above, is the Netherlands largest supplier of cotton herring and trawler nets.

Prospects for United States Nylon Fishing Nets: The Netherlands fishing industry has recently expressed an interest in reports about the application of nylon in the fishing industry of the United States.

It appears that the maintenance of the fishing nets now used is a costly and cumbersome affair, and raises the price of the net some 50 percent. Drying and repairing of nets is usually done by women, many of whom are engaged in this work throughout the summer. Recent heavy catches and underwater obstacles, such as ships sunk during the war, have resulted in especially important losses when presently used cotton nets have broken.

Some Scheveningen fishermen now desire to give nylon netting a serious trial. They have investigated some samples of nylon netting twine and would like to try out a complete net in the full fishing season which started in May. Two leading fishing firms in Scheveningen are prepared to extend full cooperation for making serious experiments with nylon netting and to make expert personnel available for such experiments.

If nylon netting should prove to have the advantages with which it is credited, a good market should be available in the Netherlands. Although the initial outlay would be higher than for the cotton nets, and the use of nylon nets will require larger amounts of foreign exchange than the domestic cotton nets, fishermen believe

Note: Values converted on basis of 1 Dutch guilder equals approximately U. S. $0.38.

that they will succeed in convincing the Government that import would be in the national interest as the fishing industry is an important source of foreign exchange. Due to foreign exchange limitations, it is likely that imports will be restricted to nylon twine from which the nets may be made.

It is likely that consideration will be given to the establishment of a new factory for nylon nets or the adapting of existing net factories to the new manufacture. This would be a project worthwhile considering due to the relatively large demands of the Benelux area and the traditional position of the Netherlands as an exporter of nets. The potential demand for nylon ropes might also be very important. According to reports received from the trade, a London firm engaged in the manufacture of nylon netting and ropes may soon make a determined effort to get a foothold in the Netherlands market.

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REQUESTS CLAMS FROM UNITED STATES FOR PROPAGATION: The Fish and Wildlife Service Laboratory at Milford, Connecticut, has prepared and shipped to the Netherlands, at the request of that Government, a quantity of marine hard clams (Venus mercenaria). The Netherlands used these clams to attempt to establish a fishery for the species in local waters.

New Zealand

FISH LIVER OILS: Production of fish liver oils from sharks, grouper, and ling in 1946 was estimated at 31,224 gallons, of which 22,608 gallons were exported. In 1945, two companies produced for export 27,162 gallons, but no data are available on total output. Processing of fish liver oils for vitamin content was inaugurated in 1943, according to the report, "New Zealand as a Source of Crude Drugs and Essential Oils," issued January 1949 by the Office of International Trade, Department of Commerce.

Oils of excellent quality and high vitamin content can be produced on a large scale in New Zealand from the livers of locally-caught fish. The content of vitamin A in the different batches of shark oil varies from 2,000 to 55,000 international units per gram--the livers supplied to the processors by fishermen are entirely unsorted and the different species have very different characteristics. The vitamin D content is found to be low, usually less than 25 international units per gram.

The oil from the ling liver varies between 8,000 and 15,000 international units of vitamin A, while vitamin D content remains fairly constant at about 500 international units per gram. Vitamin A content of grouper oil ranges from a minimum of 35,000 to as high as 88,600 international units per gram, based on potency tests in a 12-month period. Some estimates of its vitamin D content range from 2,400 to 4,000 international units per gram. The extent to which grouper and ling liver oils have been used for human nutrition is not known.

The processing of livers is generally done by mixing and digestion with steam; in the case of grouper livers, it is necessary to use an acid pepsin digestion followed by neutralization. The digested materials are centrifuged to give clear oils.

Under a 2-year agreement (ending December 1948) between the Government of New Zealand and the United Kingdom, surpluses of fish liver oils were automatically purchased by the British Ministry of Food (see table).

AGAR SEAWEED: Agar seaweed gathered in the 1946 season in New Zealand yielded a record total of 246,400 pounds, nearly twice that obtained during 1942, the first year of commercial collection. This was initiated to compensate for the loss of sources of supply during the war years. The two species collected, Pterocladia (P. ludica and P. copillacea) come from the North Island. Total production for the years 1943-45 was 547,951 pounds. Of this total, 123,648 pounds were marketed the first year, 199,584 pounds the second year, and 224,719 pounds the third year.

Exports of Fish Liver Oils, New Zealand, 1944-46

Country of Destination	1946		1945		1944	
	Gals.	Value	Gals.	Value	Gals.	Value
United Kingdom ...	17,145	$121,335	11,895	$62,548	6,578	$69,049
Australia	2,217	45,336	14,740	176,942	226	3,893
Canada	1,652	41,539	526	11,890	276	3,731
United States	1,594	16,938	-	-	-	-
Total	22,608	225,148	27,161	251,380	7,080	76,673

Note: The value has been converted from New Zealand pounds to U. S. currency on the basis of one New Zealand pound equals $3.2263 for 1946; $3.2346 for 1945; $3.2442 for 1944.

Additional good beds of seaweed exist in various areas off the New Zealand coast. Whether or not these beds will be exploited depends chiefly upon the world price of agar and the availability of labor for collecting.

The present supply of seaweed and the existing plant installations provide an exportable surplus of from 35,000 to 50,000 pounds of refined granulated agar, which is reported to be of quality equal to the Japanese agar, and conforms to British and United States Pharmacopoeia standards. Agar is packed for export in 20-pound cannisters.

Carrageen moss grows prolifically on the coasts of Southland and Stewart Island. Supplies are reported sufficient for local consumption and are being sold to Dominion druggists and manufacturers of various products. Before the war, domestic demand was supplied by foreign producers, chiefly Irish.

Republic of the Philippines

NORTHERN PHILIPPINE AREAS BEING EXPLORED FOR FISHING: The exploratory work of the Philippine Fishery Program in the waters of Luzon Strait and northern Luzon generally indicate that this area is an important resource that is awaiting exploitation by Filipinos, according to the Administrator of the U. S. Fish and Wildlife Service and the Director of the Bureau of Fisheries.

The Spencer F. Baird, research vessel, is planning additional work in that locality. Work in this region is timely because of the great demand on foreign markets for tuna canning purposes. These waters have long been known as a source of black tuna, a particularly valuable species, and they have previously been taken in large quantities by the neighboring foreigners. Development of these resources by the Filipinos will demand larger vessels than are now being operated in the islands and will probably call for special techniques that are only partially understood at the present time.

Spain

REVIEW OF FISHING INDUSTRY: Introduction: The year 1948 was unfavorable for the Spanish fishing industry and was the fourth consecutive year of unsatisfactory returns, according to a January 18 report from Vigo.

During the Spanish Civil War from 1936 to 1939, fish became an increasingly important item in the food supply of this country. Throughout World War II, the domestic consumption of fish rose and the per capita consumption increased from an average of 19.8 to 46.2 pounds. The increased demand for fish, both fresh and preserved, created unreal prosperity for the commercial fishing industry and attracted investments of large sums of money for additions to and renovations of the existing fleet on the part of promoters who were impressed by the abundant catches and the excellent financial returns. During this boom period with inflation in full swing, new vessels were built and old ones were converted to fuel burners and modernized without any appraisal having been made of the future prospects of the industry. In its desire to expand the fishing fleet in order to secure a greater food supply, the government indiscriminately granted long-term loans at low interest rates. The government also had in mind the possibility of exports of fresh fish as a source of foreign currency.

The industry, however, did not continue to prosper as was anticipated, and about four years ago financial difficulties began to arise. It now is facing one of its most serious crises.

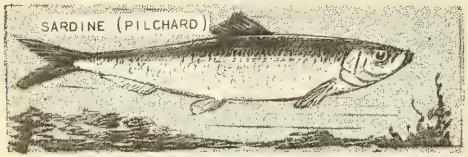
Fishing Fleet: The authorities have realized that Spain's fishing fleet is greater than it requires and, consequently, certain restrictions on its further expansion have been imposed. The latest available statistics (December 1947) show that the fleet totals 37,832 units having a net tonnage of 233,885 metric tons. However, a good portion of the fleet is now outmoded and is in constant need of repair. The long periods of forced inactivity while the ships are in dry dock represent a heavy financial loss.

Factors Retarding Growth of Industry: The shortage of supplies and equipment (under government control and seldom obtainable through regular channels), the requirement that a certain percentage of the catch be turned over to the authorities, the fixing of ceiling prices for fish, and the labor legislation which requires that fishermen be paid monthly wages, instead of a percentage of the value received for the catch at first auction, have retarded the normal development of the industry. The fishing industry is the principal source of income of a large mass of Spaniards along the country's extensive littoral. If transportation were better and if adequate refrigeration were available, more fish could be shipped to the interior but it is unlikely that these necessary improvements will be made in the future. The fishing interests, therefore, are directly dependent to a large extent on the export of fresh fish and, indirectly, on the export of preserved fish by the canning industry.

Fishing Activities, 1948: The past fishing season was one of the worst on record. Catches of deep-sea fish off the coast of Ireland were smaller than in 1947, which was also an abnormal year. The small catch in 1947 was attributed to an increased number of other foreign fishing craft then operating in those waters, but now it is realized that fish have disappeared from those grounds.

Decreased catches were much more noticeable in the second half of 1948. From July to the end of the year, vessels were forced to remain for longer periods in the fishing grounds and the catch was only about half of normal. Fishing boats

operating off the coast of Ireland grounds usually work in pairs. Their stay at sea in the first half of the year averaged from 18 to 20 days and their catches averaged between 30 to 60 metric tons of fish, the value of which permitted the profitable operation of the fleet even with the ceiling prices fixed by the government. In the second half of the year, the fleet found it necessary to prolong its stay in the fishing grounds from periods of from 50 to 60 days and their catches averaged about 30 tons which barely paid operational costs.



National fish landings, according to preliminary trade estimates, will be slightly less than 50 percent of the previous year. The 1948 catch at Vigo, the most important fishing port of Spain, was far below 1947.

Small boats operating near their home ports were also reported to have experienced unfavorable conditions during the year. The profitable operation of this branch depends largely on its catches of preservable varieties of fish, principally sardines and bonito (albacore), which are always in great demand by the important canning industry. However, seasonal sardine runs did not occur and the catch was the lowest for the past six years.

The bonito (albacore) catch was also reported to have been a failure, due principally to inclement weather which drove the fish out of range of seiners which are unable to remain away from their base for more than 30 or 40 hours. In spite of high prices, the bonito catch barely paid for operating expenses.

Quantity of Sardines & Bonito Auctioned at Vigo, 1947-48		
Species	1948	1947
	Lbs.	Lbs.
Sardines	2,183,000	20,828,000
Bonito	1,819,000	5,097,000

The total landings at the port of Vigo totaled 109,204,000 pounds having a sales value of $15,505,000[1/] and represent a reduction of 20 to 29 percent, respectively, as compared with 1947. The unusually large catches of jurel (mackerel) helped to keep the weight figure at a rather high level, but this was not profitable since jurel realizes a very low price and must be disposed of in a fresh condition.

Fish Packing Industry: Production of the industry increased three-fold during the past 20 years and it was expected that the termination of World War II would offer an excellent opportunity to expand by exporting its products to all countries. However, a series of complex financial factors severed its normal international markets and reduced the activities of the industry to a minimum. Consequently, under present circumstances, it is now almost entirely dependent upon the limited possibilities of the domestic market which has never been able to absorb but a small percentage of the total output.

It is evident from reports received from canners that the year 1948 showed no improvement for the industry, which has been deteriorating progressively since the end of the Spanish Civil War in 1939, and that the situation at the end of 1948 was worse than at the close of 1947.

Shortages of tin-plate and other essential materials, as well as government restrictions, continued to hamper the industry. Scarcity of preservable varieties

Note: Conversion based on rate of exchange of 10.95 Spanish pesetas equal $1.00 U. S.

of fish also had an important bearing on the small output during the year, but the major problem which still confronts the canners is the loss of foreign markets due to the unreal fixed value of the Spanish peseta.

An important canner who has a plant capable of producing 100,000 cases (100 cans 30mm) annually produced 6,000 cases of all kinds of preserved fish in 1948. A considerable portion consisted of "chicharro" (a young tunny fish) of inferior quality and not suitable for export.

Exports: Exports in 1948 were slightly higher than in the preceding year despite the fact that Argentina, Spain's principal market, has restircted Spanish canned fish importations in order to protect its own recently established industry.

The necessity of export markets is, of course, of vital importance to the canners. The prosperity of the industry is also contingent upon the availability of supplies of suitable varieties of fish. Had the 1948 catches been of normal size, the canners would not have been able to have handled all of it because stocks of imported tin-plate were exhausted (domestic tin-plate has not always met with foreign food and drug requirements, therefore, canners have not found its use profitable).

In the absence of sufficient supplies of sardines, canners kept their factories working at part time for some periods of the year by preserving jurel for the home market. However, it was not a success and considerable financial loss was suffered since a large portion of the output spoiled in the cans. New packing processes are being studied to avoid a repetition should there be another shortage of sardines and bonito in the present year.

Outlook: The outlook of the industry for 1949 is discouraging. It is the consensus of those engaged in it, that if the industry does not receive governmental assistance, it can carry on for only another year or so. If the government authorizes an export peseta between 23 and 25 pesetas to the dollar and better supplies of tin-plate can be obtained (the normal national requirements are placed at 1,000 metric tons), the industry believes it will be able to recuperate its losses and embark on an export program which will materially benefit this area and the country as a whole.

Union of South Africa

PRODUCTION OF FISH OILS, 1948: The South African fish oil industry produced an estimated $3,400,000 of vitamin A concentrate and crude oil (three months production of concentrate and nine months production of crude oil), $360,000 of processed (refined bleached and winterized) oils, and $480,000 of crude oils, or a total of $4,240,000, according to an April 5 consular report from Capetown.

Vitamin A Concentrates and Crude Oil: Because of the peculiar financial and cartelized structure of the South African fishing industry, one plant possesses a virtually complete monopoly over the entire production of vitamin-bearing oils in the Union. These oils come largely from three types of fish:

(a) The soupfin shark (Vaalhaai), which yields from 20,000 to 40,000 international units per gram; other varieties of shark, primarily the "dogfish," yield from 5,000 to 25,000 international units per gram.

(b) Hake (stockfish): livers yield from 10,000 to 20,000 international units per gram.

(c) Snoek: livers have a low oil content, but when other extractive oils are added the yield becomes between 20,000 and 40,000 international units per gram.

Production of vitamin A in the 1948 calendar year was 12 x 10^{12} (12 trillion) international units (14.205 x 10^{12} U.S.P. units). The entire output of vitamin A oils in 1948 was sold to the British Ministry of Food except for small amounts channelled to Europe.

Fish Body Oils: Fish body oils processed in the Union of South Africa are taken primarily from two classes of fish:

(a) Horse mackerel (maasbanker): The season is short--November to March--and production in 1948 was only 1,000 short tons; there were only two plants producing oil from this fish during last year.

(b) Pilchards: Production of pilchard oil in 1948 was 1,000 short tons. Expansion in the catching of pilchards both for canning and for the production of oil has been so dramatic in the past year that the Fisheries Development Corporation is making strenuous efforts to bring about legislation to limit the number and sizes of factories and to regulate the quantities of fish that may be produced.

Industrial Oils: Industrial oils are processed in the Union of South Africa from the maasbanker and the pilchard. Total production in calendar 1948 was:

(a) Semi-crude oil 400 short tons (used for general industrial purposes)

(b) Refined (bleached and winterized) oil 400 short tons (used for paint, varnish, linoleum, etc.)

Outlook for 1949: VITAMIN A OILS: The expected production of vitamin A for calendar 1949 is 13 x 10^{12} (13 trillion) international units which at present prices would bring a gross of $5,000,000. While sales will continue to be made to the British Ministry of Food with small quantities going to Western Europe and South Africa, one company is making a strong drive to expand their United States market. They expect to export to the United States "a large percentage" of their vitamin A concentrates in potencies of 200,000 to 1,000,000 U.S.P. They have a sales goal of $4,000,000.

Fish Body Oils: The expected production of fish body oils in 1949 is 4,000 short tons from maasbanker and 6,000 short tons from pilchard or a total of 10,000 short tons. Of this production 5,000 tons are expected to be sold as crude oil and to bring an estimated gross return of $1,700,000 at current prices.

Industrial Oils (Bleached and Winterized): The expected production of bleached and winterized oils in 1949 is 5,000 short tons; the expected return at present prices would be $2,000,000.

Markets: Less emphasis is being placed upon industrial oils for 1949, not only because of the marked recent drop in prices but also because ECA deliveries of vegetable oils to Europe has reduced that market for industrial oils.

United Kingdom

SEA FISH INDUSTRY BILL: A Sea Fish Industry Bill was introduced in the British House of Commons on May 12, 1949, according to a June 7 report from the American Embassy at London. The purpose of the Bill is stated as being:

> "To provide for giving financial assistance to persons engaged in or desiring to engage in the sea-fishing industry, for regulating the crew accommodation provided in fishing boats, for safeguarding the quality of sea fish intended for human consumption and otherwise securing the best use of supplies of sea fish, for the licensing of fishing boats and of persons engaged in processing or wholesale dealing in sea fish, for appointing sea-fishery officers, for amending the Merchant Shipping Act, 1894, with respect to fishing boats engaged in the Newfoundland cod fisheries, for repealing certain provisions of the Sea Fish Industry Act, 1938, and for purposes connected with the matters aforesaid."

On May 20, at the close of the debate, the Bill was read a second time and sent to Committee.

Uruguay

STATUS OF FISHERIES: Despite huge potential fishing resources and a general liking for fish by Uruguayans, fish products constitute only a small part of the national diet of the inhabitants, according to the January 22 Foreign Trade, a Canadian periodical. Nevertheless, Uruguay is far from self-sufficient in fishery products. Only recently has there been any concerted interest displayed by both the people and the Government in the development of their fishery resources. The shrinkage in imports of fish during the Second World War was a determining factor in focussing attention on the development of the domestic fishing industry.

The coastline of Uruguay extends for about 250 miles, and the main fishing area is located between Montevideo, the capital, and Punta del Este, some 150 miles to the east. The next major fishing area is the Uruguay River, the ports of Paysandú and Neuva Palmira being the principal centers for western Uruguay. In addition, a number of small rivers traverse the country in various directions, among them the Rio Negro, Rio Queguay, Rio Cebollati, and the Rio Santa Lucia. Fish is also abundant in the estuary of the Rio de la Plata, due to the many sand banks.

Fresh-water Fish Not Exploited Commercially: Fresh-water fishing has been investigated extensively in the shallow lakes near the coast and in other lagoons of southeastern Uruguay, which are reported to be good areas for developing smelt (pejerrey) fisheries, the preferred fresh fish in the area. However, fresh-water fish is not yet exploited commercially to any great extent.

There are no trout or salmon in Uruguay, due to the waters of the streams being muddy. The most common lake and river fish is the corvina negra, which weigh from 20 to 50 pounds and even more. The flesh is poor in quality but it is substantial and, when dried and cured, will pass for cod. Dorados and tarariras abound in the large streams and up rivers, but they are a game fish rather than a commercial variety.

The chief fresh-water fish are the corvina negra (Pogonias chromis), the dorado (Salaminus platensis), the mandubi (Ageneiosus valenciennesis), the pacu (Myletes orbignyanus), the sabalo (Prochilodus platensis), and the tararira (Hoplias malabaricus).

Many Varieties of Salt-water Fish Available: Nearly all the salt-water fish are caught close to shore, and the most common types are the following: the anchoa (Pomatomus saltatrix), the bonito (Sarda sarda), the brotula (Urophycis brasiliensis), the burriqueta (Ophioscion adustus), the congrio (Leptocephalus conger), the criolla (Pogonias chromis), the corvina blanca (Micropogon opercularis), the lenguado (Xystreuris notatus), the lisa (Mugil brasiliensis), the merluza (Merluccius gayi), the mero (Acantristius patagonicus), the palometa (Parona signata), the pargo colorado (Pargus pargus), the pejerrey (Menidia bonariensis), the pescadilla (Macrodon ancylodon), and the sargo (Diplodus argenteus).

Among the better-known species are the corvina (croaker), which accounts for 78 percent of the total catch, the pescadilla (sea trout) with 12 percent of the catch, and the bagre (catfish) and the merluza (hake) with 1 percent each. Other species are: the congrio (conger eel), the pejerrey, the menhaden, the mullet, the flounder, the bluefish, the shad, and the shark. During the past season, 14,000 sharks were caught and the liver oil, amounting to some 1,100 pounds, was sold locally for vitamins. In 1943, the total annual fish catch of Uruguay was reported to be 7,334,000 pounds.

The only official statistics available on the fish catch in Uruguay are for the period 1937-41 and make no distinction between salt- and fresh-water fish (Table 1).

Table 1 - Production of Fishery Products

	Lbs.
1941	6,520,254
1940	6,419,717
1939	7,185,924
1938	7,614,759
1937	7,560,142

It is estimated that the total catch is, at present, between 7.7 million and 8.8 million pounds a year.

Government Participates in Fishing Industry: The fishing industry of Uruguay is divided between private enterprise and a competitive government-operated fishing service known as Servicio Oceanografico y de Pesca. The S.O.Y.P. operates offshore from Montevideo and Punta del Este and accounts for approximately 40 percent of the catch. This government organization owns a large steam trawler and several small craft. It has a warehouse for cleaning and storing fish, one ice factory, another factory for the preparation of fish meal and fish oil, and a canning plant. Production of canned fish was 148,000 pounds in 1942 and, with present equipment, maximum production might reach half a million pounds. The S.O.Y.P. is now being reorganized, and it is proposed to spend several million dollars on new equipment, such as cold-storage plants and more and better trawlers. The service is already experimenting in the production of dried and smoked fish and hopes in time to can fish for export.

Private fishermen, operating from Montevideo and Piriapolis, confine their activities to inshore fishing and specialize in taking the common types such as the corvina and pescadilla. Fishing on the Uruguay River, from Paysandú and Nueva Palmira is also a private enterprise. In 1947, the total number of fishermen in Uruguay was estimated at 400.

Establishment of Cannery Proposed: A company has recently been incorporated with an authorized capital of 2.5 million pesos (approximately $1,645,750). It

is now being organized and proposes setting up a large fish, meat, and vegetable cannery. Fifty percent of the capital is reported to be owned by French interests with whom the company has a 20-year contract for the output of canned foodstuffs. It is reported that the French interests are sending out their own technicians.

Factors hindering production in Uruguay are:

1. Most of the fish is caught by individual fishermen operating on a small scale.
2. The number of large-scale producing units is insufficient.
3. There is a general shortage of all types of fishing gear, particularly boats and tackle needed for deep-sea fishing.

However, it is expected these last two factors will be largely eliminated by the new government subsidy to S.O.Y.P. and by the establishment of the new large-scale producing unit mentioned above.

Seal Rookery: The Government owns a seal rookery at Isla de Lobos, near Punta del Este. There are over 300,000 seals on the island, and the annual slaughter is approximately 7,000. These produce some 88,000 pounds of oil plus, of course, the skins. The business is under the control of S.O.Y.P. (Servicio Oceanografico y de Pesca), a Government organization.

Imports: The greater part of the population is of Spanish and Italian descent and, prices and quality being equal, the preference will always be for canned fish produced in the mother countries.

Salt cod is the most important variety of fish imported into Uruguay, and Norway is the leading supplier. Only the highest grade is imported.

Table 2 - Leading Imports of Fishery Products

Year	Cod and Similar Fish	Sardines in Oil	Pressed Sardines	Anchovies, in Oil, Barrels & Brine
	Lbs.	Lbs.	Lbs.	Lbs.
1948 1/..	343,207	-	-	-
1947	575,689	-	-	-
1946	561,682	-	-	-
1939	1,128,816	441,126	10,569	260,821
1938	1,068,085	460,728	43,912	206,149
1937	875,384	447,938	58,797	140,815

1/Only first six months of the year.

The present trade for canned sardines, anchovies, and herring is about the same as 1937 through 1939 as regards volume and countries of origin.

A fair demand exists for sardines in oil, the principal suppliers being Spain, France, and Norway. Pressed sardines are also imported from Portugal and, to a lesser extent, from Spain. Anchovies are supplied mainly by Spain, Portugal, and Argentina.

During the 1937-39 period, imports of dried herring totaled 11,246 pounds and came from Norway. During the same period, imports of oysters and lobsters amounted to 21,360 pounds, the United Kingdom being the principal supplier.

International

ANTARCTIC WHALING PRODUCTION, 1948-49 SEASON: The 1948-49 pelagic whaling season, the fourth since the war, opened December 15, and since the season's quota of 16,000 blue whale units[1] (about 30,000 whales) set by the International Whaling Convention was reached on March 26, the season closed 12 days before the scheduled closing date of April 7. The whales affected by the limit are baleens (which include the world's largest mammal, the blue whale), the fin whales (which yield some of the best whale meat), and the smaller sei whales of which only a few have been caught this season. (Sperm whales are not included with baleens).

Table 1 - Whale Oil: Southern Hemisphere Production[1], 1948-49 and 1947-48 Seasons Compared with Average Season 1933-34 to 1936-37

Country	SEASON 1948-49[2] Whale	Sperm	Total	SEASON 1947-48 Whale	Sperm	Total	Average 1933-34 to 1936-37 Total
	(1,000 short tons)						
Argentina	12.0	.4	12.4	7.9	.5	8.4	11.3
Chile[3]	2.0	2.9	4.9	1.9	2.4	4.3	1.5
Japan	21.9	-	21.9	19.6	-	19.6	15.3
Netherlands	19.6	.8	20.4	14.6	1.3	15.9	-
Norway	4/184.0	21.4	4/205.4	185.7	10.5	196.2	226.2
Union of South Africa	24.9	4.1	30.0	29.0	4.8	33.8	5/
U.S.S.R.	4/12.0	1.0	4/13.0	10.4	.5	10.9	3.1
United Kingdom	115.9	14.1	130.0	129.2	12.7	141.9	233.5
Total	392.3	45.7	438.0	398.3	32.7	431.0	6/529.5

1/Approximately 90 percent produced is Antarctic catch and balance mainly shore station catch from herds en route or departing from Antarctic; comprises 95 percent of total world production of whale oil.
2/Preliminary.
3/Calendar years 1947 and 1948.
4/Unofficial estimate.
5/Included in United Kingdom production.
6/Including others - 38,600 tons.

Production: The Southern Hemisphere production accounts for over 95 percent of the world output of whale oil, and about 90 percent of this is from whales caught in the Antarctic with the balance from the catch of shore stations that hunt herds moving to and from the Antarctic (Table 1). The shore stations operate for six months and their season ended April 16. They operate independently of the quota of 16,000 blue whale units which applies to pelagic expeditions only. Whale oil production makes up over two-thirds of the world production of all marine oils. Seven countries participated in Antarctic pelagic whaling this season. (Table 2, also see Commercial Fisheries Review, February 1949, page 66.)

Table 2 - Antarctic Whaling: Countries Participating and Equipment in Use, 1947-48 and 1948-49 Seasons

Country	Floating Factories 1948-49	1947-48	Shore Stations 1948-49	1947-48	Catches 1948-49	1947-48
Argentina	-	-	1	1	7	7
Japan	2	2	-	-	14	12
Netherlands	1	1	-	-	10	8
Norway	10	9	1	1	108	91
Union of South Africa	1	1	-	-	14	14
United Kingdom	3	3	1	1	46	44
U.S.S.R.	1	1	-	-	12	8
Total	18	17	3	3	211	184

1/Two fin whales or six sei whales are counted as one blue whale unit.

Outlook: The whaling industry is expected to maintain its present capacity and production of oil for some years to come. The quantities of oil produced probably will vary between the participating countries from year to year but the total output will remain about the same. Demand probably will continue strong for whale oil, as production will remain limited, whereas the markets for it will remain steady in those countries which traditionally use whale oil. Demand may increase in Germany, formerly one of the largest consuming countries.

Norway, in the 1948-49 season, regained her prewar strength in whaling equipment. This country in the last two seasons has produced almost half of the total output of whale oil in the Southern Hemisphere. During the 1948-49 Antarctic season, Norway produced an estimated 205,400 short tons or about 45 percent of the total production, compared with 196,200 tons in the 1947-48 season, also about 45 percent of the total world production.

The United Kingdom is the second largest producer of Antarctic whale oil with an estimated 130,000 short tons in 1948-49, and 141,900 tons in 1947-48. This season's production was about 40 percent below the prewar average.

* * * * *

INTER-NORDIC FISHERIES COOPERATION: The Ministers of Fisheries of Denmark Norway, and Sweden met in Copenhagen on May 15 and 16, 1949, to discuss problems of mutual Nordic interest in the fisheries industry, according to a May 19 consular report from Copenhagen.

It was agreed at the meeting to establish a joint Nordic Committee composed of representatives and biologists of the respective Governments whose primary task would be to investigate herring fisheries in Nordic waters. A five-year plan was approved.

It was further agreed to take joint action in the matter of affording professional education facilities for fishermen, but more detailed information regarding the attitude of the individual Governments will be presented at a future meeting.

The representatives favored greater Nordic collaboration at future international conferences in the field of fisheries.

Finally, it was decided that the next Nordic fisheries conference should be held in Sweden some time during the summer of 1950, and that biologists, government representatives and representatives of the industry of the several countries should be invited to participate.

At the Nordic Fisheries Conference at Hindsgaul, which preceded the Copenhagen meeting, the following matters were discussed: development of fresh water fishing, Greenland fisheries, utilization of Marshall aid for the benefit of the industry, and export policies and problems. Present at the Hindsgaul meeting were representatives of the fishing industry, government officials and biologists from all the above-mentioned countries.

* * * * *

TUNA RESEARCH IN EUROPE: A meeting of the Atlantic Committee for the Study of Tunas was held May 23-27 at Malaga, Spain. This Committee was organized under the International Council for the Study of the Sea at its meeting in Copenhagen in October 1948. Its purpose is to assemble all knowledge about tunas and to plan

and coordinate tuna research. The Chief of the Service's Branch of Fishery Biology attended the meeting.

In the discussions, attention was focused on what Americans call yellowfin, big-eyed, bluefin, and albacore, and to some extent, also the skipjack, the frigate mackerel, and the black skipjack.

The yellowfin occurs in the Gulf of Gascony, off Spain and Portugal, off Morocco, Mauritania, the Canary Islands, Senegal and Angola. It does not occur in the Mediterranean.

The big-eyed occurs off Morocco, in the open sea off Mauritania during July; it is occasionally taken in Senegal and Angola, and is abundant at Madeira and the Azores.

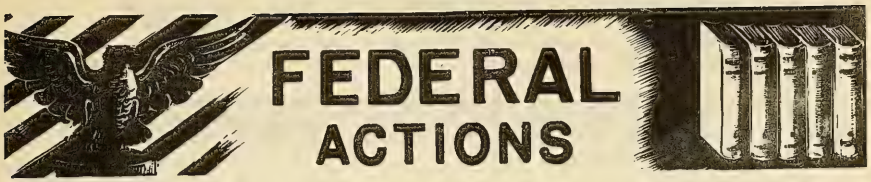
The seasonal occurrence of the albacore, the most valuable commercial tuna of France, varies according to locality. It appears variously from April to December from the coast of Brittany southward off Spain, Portugal and Madeira. About December it vanishes. Most specimens of albacore caught in Europe are immature; their spawning place is unknown.

The bluefin, most important in the southern European countries and in the Mediterranean, characteristically has two seasons. One as it moves toward the spawning grounds; the other after it has spawned. The prespawning migration, observed from airplanes, seems to come in waves, each composed of different sized fish. The largest fish generally come in first; these are followed by smaller ones, and those in turn by larger ones.

The problem of what oceanographic conditions are associated with the occurrence of albacore and bluefin are being studied by the French. For albacore, the optimum salinity is believed to be 35.5, and temperature 14° C. at 50 meters, 18°-20° C. at the surface. The fish are most likely to occur where Atlantic water mixes with continental water.

Fishing methods used on the Mediterranean coast of Spain were observed by those who attended the meeting, and in one net of the special type net used, around 500 tons of bluefin tuna (mostly of fish weighing 300 pounds each) were taken.

A luncheon was given those attending the meeting at which tuna was served in many different ways. Nearly all parts of the fish seem to be used. The baked tuna tongue looked and tasted somewhat like meat. The meat from the belly was the best. Salted tuna meat and roe were also served.



Eighty-first Congress (First Session)

JUNE 1949

Listed below are all the public bills, joint resolutions, etc. introduced, referred to committees, and passed by the Eighty-First Congress during June 1949 (unless otherwise specified) which affect in any way the fisheries and fishing and allied industries.

PUBLIC BILLS AND JOINT RESOLUTIONS INTRODUCED AND REFERRED TO COMMITTEES:

House of Representatives:

H. R. 5041 (Multer) - A bill to amend the Act entitled "An Act to promote export trade, and for other purposes", approved April 10, 1918, to provide that no export trade association shall restrict any foreign buyer from dealing, directly or through an agent of his own selection, with any producer, manufacturer, or seller; to the Committee on the Judiciary.

H. R. 5044 (Maybank) - A bill to continue for a temporary period certain powers, authority, and discretion in respect to tin and tin products conferred upon the President by the Second Decontrol Act of 1947, and for other purposes; to the Committee on Banking and Currency.

H. R. 5067 (King) - A bill to give effect to the convention between the United States of America and the Republic of Costa Rica for the establishment of an Inter-American Tropical Tuna Commission, signed at Washington, May 31, 1949; to the Committee on Foreign Affairs.

H. R. 5089 (Byrnes) - A bill to encourage the prevention of water pollution by allowing amounts paid for industrial waste treatment works to be amortized at an accelerated rate for income-tax purposes; to the Committee on Ways and Means.

H. R. 5091 (Chatham) - Same as H.R. 5089; to the Committee on Ways and Means.

H. R. 5228 (Doyle) - A bill to give effect to the convention between the United States of America and the Republic of Costa Rica for the establishment of an Inter-American Tropical Tuna Commission, signed at Washington, May 31, 1949; to the Committee on Foreign Affairs.

H. R. 5280 (Celler) - A bill relating to the rights of the several states in lands beneath inland navigable waters and to the recognition of equities in submerged coastal lands adjacent to the shores of the United States, and for other purposes; to the Committee on the Judiciary.

H. R. 5322 (Peterson) - A bill to provide price support for natural sponges; to the Committee on Agriculture.

H. R. 5365 (Larcado) - A bill to provide for the transfer of the vessel Black Mallard to the State of Louisiana for the use and benefit of the department of wildlife and fisheries of such State; to the Committee on Public Lands.

H. R. 5395 (Fulton) - A bill to encourage the prevention of stream pollution by allowing amounts paid for plants for the treatment of industrial waste as a deduction in computing net income; to the Committee on Ways and Means.

The following bills introduced prior to June 1, 1949, were not previously shown under this section:

H. Res. 233 (Bland) - Resolution authorizing expenses of conducting investigation of certain matters pertaining to the merchant marine and fisheries of the United States; to the Committee on House Administration.

H. R. 2634 (Bartlett) - A bill to provide transportation of passengers and merchandise on Canadian vessels between Skagway, Alaska, and other points in Alaska, and between Haines, Alaska, and other points in Alaska, and between Hyder, Alaska, and other points in Alaska or the continental United States, either directly or via a foreign port, or for any part of the transportation; to the Committee on Merchant Marine and Fisheries. (Introduced February 14, 1949).

H. R. 4538 (Granger) - A bill to amend the Agricultural Act of 1948 by adding thereto a new section to establish an average parity price for fats and oils (includes marine fats and oils) and to aid in maintaining such parity price to producers; referred to the Committee on Agriculture. (Introduced May 5, 1949).

Senate:

S. 1988 (Wherry for Cain) - A bill to provide for the holding of referendums among the citizens of the States to determine their wishes with respect to the establishment of valley authorities which would include their States; to the Committee on Public Works.

S. 1994 (Maybank) - A bill to continue for a temporary period certain powers, authority, and discretion in respect to tin and tin products conferred upon the President by the Second Decontrol Act of 1947, and for other purposes; to the Committee on Banking and Currency.

S. 2036 (Kefauver for himself and 19 others) - A bill to provide for the admission of Alaska into the Union, to the Committee on Interior and Insular Affairs.

S. 2080 (Johnson) - A bill to authorize the regulation of whaling and to give effect to the International Convention for the Regulation of Whaling signed at Washington under date of December 2, 1946, by the United States of America and certain other governments, and for other purposes; to the Committee on Interstate and Foreign Commerce.

S. 2097 (Pepper and Holland) - A bill to provide price support for natural sponges; to the Committee on Agriculture and Forestry.

S. 2133 (Downey) - A bill to give effect to the convention between the United States of America and the Republic of Costa Rica for the establishment of an Inter-American Tropical Tuna Commission, signed at Washington, May 31, 1949; to the Committee on Foreign Relations.

S. 2153 (O'Mahoney) - A bill relating to the rights of the several states in lands beneath inland navigable waters and to the recognition of equities in submerged coastal lands adjacent to the shores

of the United States, and for other purposes; to the Committee on Interior and Insular Affairs.

TREATY RECEIVED:

Convention between U. S. and Costa Rica for establishment of Inter-American Tropical Tuna Commission was received (Exec.P).

RESOLUTIONS PASSED:

House of Representatives:

H. Res. 174 (Weichel), amended, requesting the Secretary of State, the Secretary of Commerce, and the Tariff Commission to investigate the domestic fishing industry. Passed on the call of the consent calender, June 20, 1949. Provides for a study of the effect of imports on the domestic fishing industry, with a report and recommendation to be made by September 15, 1949. No further action is required on H. Res. 174, and the agencies have commenced the task of studying and reporting.

BILL SIGNED BY THE PRESIDENT:

H. R. 2361 (P. L. 109) - An act to provide for the reorganization of Government agencies, and for other purposes. "Reorganization Act of 1949." Signed and approved June 20, 1949.

CONVENTION RATIFIED:

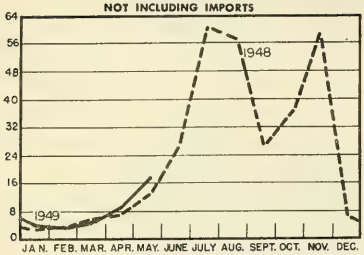
Senate:

International Convention for the Safety of Life at Sea (1948): Was ratified by the United States Senate in April 1949 without amendment. Signed in June 1948, at London, it will come into force January 1, 1951, provided, at least 12 months before that date, that not less than 15 acceptances including 7 by countries with at least 1,000,000 gross tons of shipping each, have been deposited. (See Commercial Fisheries Review, September 1948, page 34-35). The Convention itself consists of 15 articles accompanied by 6 chapters of technical regulations.

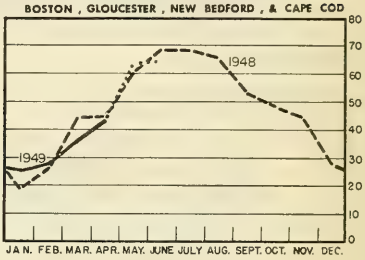
LANDINGS AND RECEIPTS

In Millions of Pounds

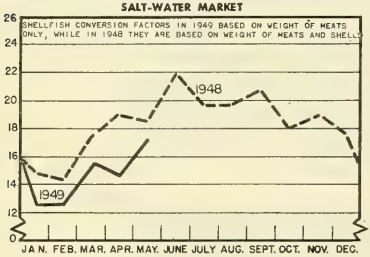
MAINE - LANDINGS
NOT INCLUDING IMPORTS



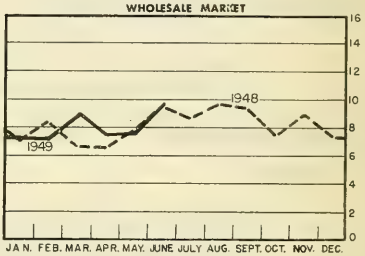
MASSACHUSETTS - LANDINGS
BOSTON, GLOUCESTER, NEW BEDFORD, & CAPE COD



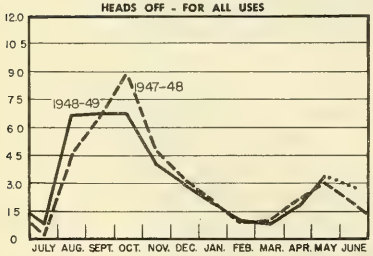
NEW YORK CITY-RECEIPTS OF FRESH & FROZEN FISH
SALT-WATER MARKET



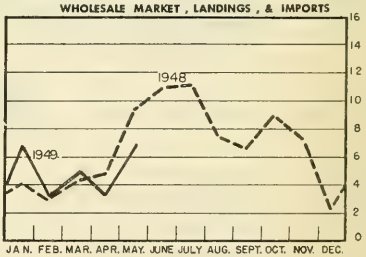
CHICAGO - RECEIPTS OF FRESH & FROZEN FISH
WHOLESALE MARKET



GULF - SHRIMP LANDINGS
HEADS OFF - FOR ALL USES

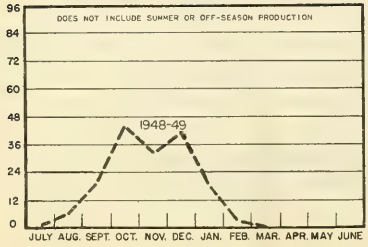


SEATTLE - RECEIPTS OF FRESH & FROZEN FISH
WHOLESALE MARKET, LANDINGS, & IMPORTS

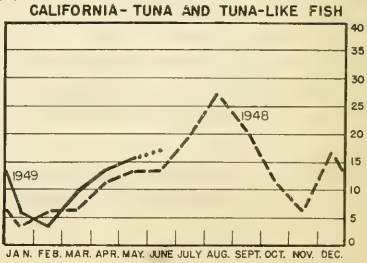


In Thousands of Tons

CALIFORNIA - PILCHARD LANDINGS
DOES NOT INCLUDE SUMMER OR OFF-SEASON PRODUCTION



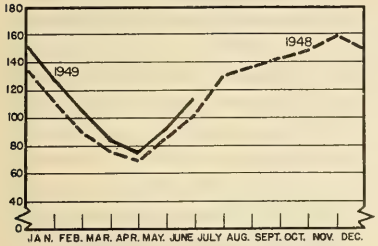
CALIFORNIA - TUNA AND TUNA-LIKE FISH



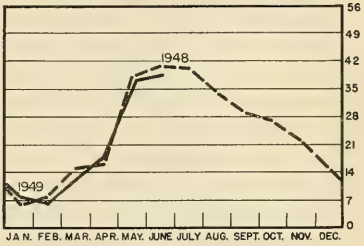
COLD STORAGE HOLDINGS and FREEZINGS of FISHERY PRODUCTS

In Millions of Pounds

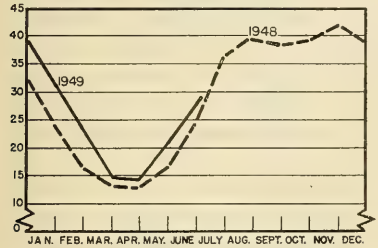
U.S. & ALASKA - HOLDINGS OF FROZEN FISH



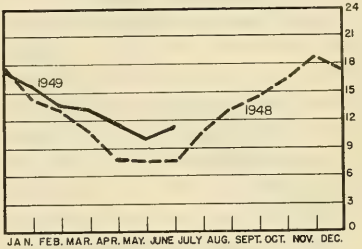
U.S. & ALASKA - FREEZINGS



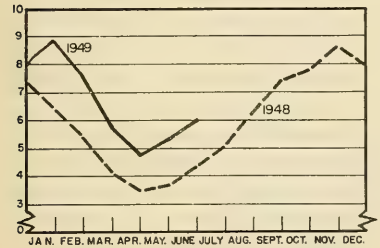
NEW ENGLAND - HOLDINGS OF FROZEN FISH



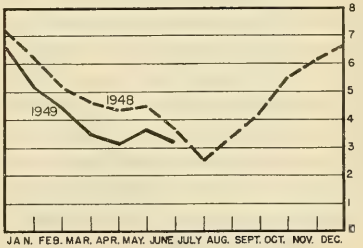
NEW YORK CITY - HOLDINGS OF FROZEN FISH



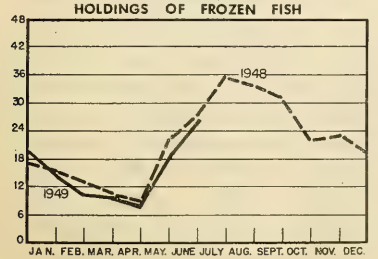
CHICAGO - HOLDINGS OF FROZEN FISH



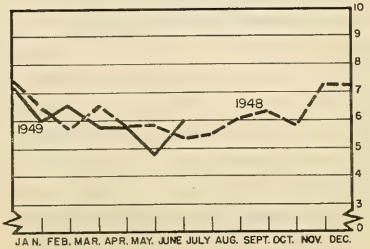
GULF - HOLDINGS OF FROZEN FISH



WASHINGTON, OREGON, AND ALASKA - HOLDINGS OF FROZEN FISH



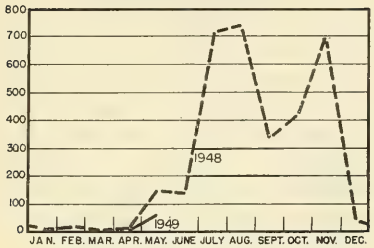
CALIFORNIA - HOLDINGS OF FROZEN FISH



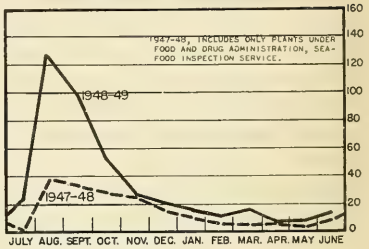
CANNED FISHERY PRODUCTS

In Thousands of Standard Cases

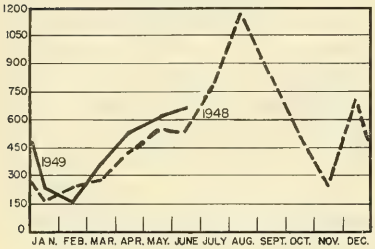
MAINE - SARDINES, ESTIMATED PACK



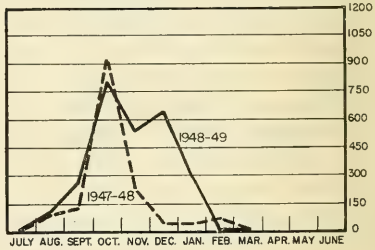
UNITED STATES - SHRIMP



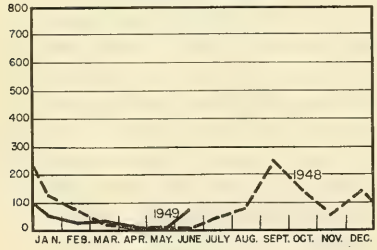
CALIFORNIA - TUNA



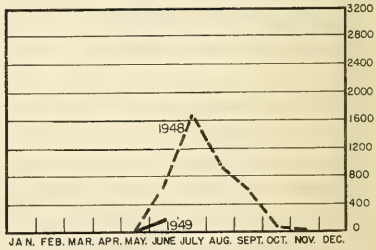
CALIFORNIA - PILCHARDS



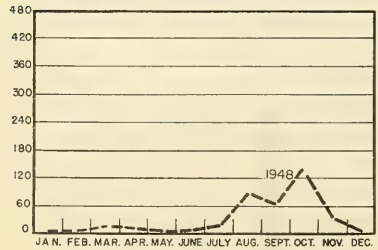
CALIFORNIA - MACKEREL



ALASKA - SALMON



WASHINGTON - PUGET SOUND SALMON

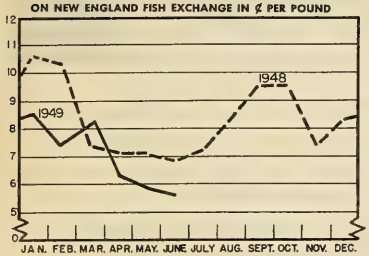


STANDARD CASES

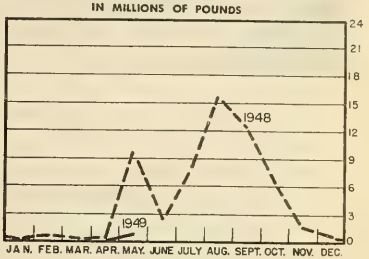
Variety	No. Cans	Can Designation	Net. Wgt.
SARDINES	100	1/4 drawn	3 1/4 oz.
SHRIMP	48	No.1 picnic	7 oz.
TUNA	48	No. 1/2 tuna	7 oz.
PILCHARDS	48	No. 1 oval	15 oz.
MACKEREL	48	No. 300	15 oz.
SALMON	48	1-pound tall	16 oz.

PRICES . IMPORTS and BY-PRODUCTS

BOSTON - WEIGHTED AVERAGE PRICE
ON NEW ENGLAND FISH EXCHANGE IN ¢ PER POUND

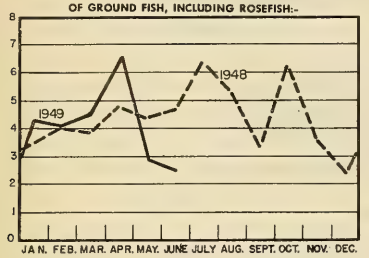


MAINE - IMPORTS OF FRESH SEA HERRING
IN MILLIONS OF POUNDS

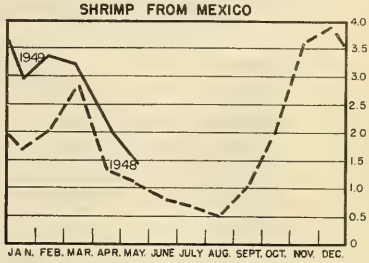


In Millions of Pounds

U.S. - IMPORTS OF FRESH & FROZEN FILLETS
OF GROUND FISH, INCLUDING ROSEFISH:-

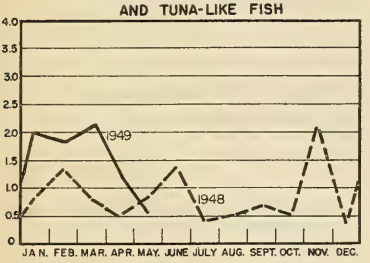


U.S. - IMPORTS OF FRESH AND FROZEN
SHRIMP FROM MEXICO

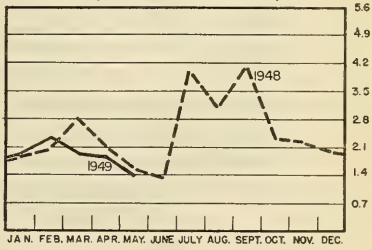


IN MILLIONS OF POUNDS

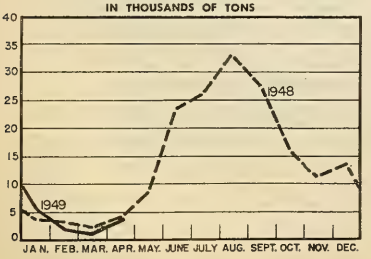
U.S. - IMPORTS OF CANNED TUNA
AND TUNA-LIKE FISH



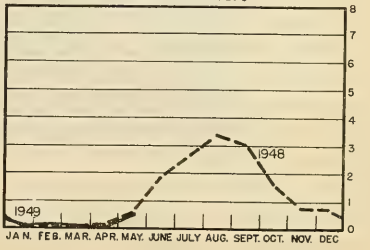
U.S. - IMPORTS OF CANNED SARDINES
(Include in oil and not in oil)

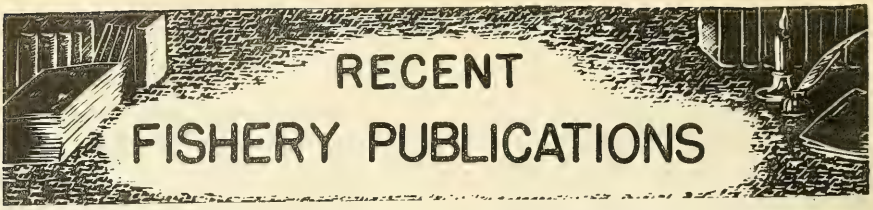


U.S. & ALASKA - PRODUCTION OF FISH MEAL
IN THOUSANDS OF TONS



U.S. & ALASKA - PRODUCTION OF FISH OIL
IN MILLIONS OF GALLONS





Recent publications of interest to the commercial fishing industry are listed below.

FISH AND WILDLIFE SERVICE PUBLICATIONS

THESE PUBLICATIONS ARE AVAILABLE FREE FROM THE DIVISION OF INFORMATION, FISH AND WILDLIFE SERVICE, DEPARTMENT OF THE INTERIOR, WASHINGTON 25, D. C. TYPES OF PUBLICATIONS ARE DESIGNATED AS FOLLOWS:

CFS - CURRENT FISHERY STATISTICS OF THE UNITED STATES AND ALASKA.
FL - FISHERY LEAFLETS.
MDL - MARKET DEVELOPMENT SECTION LISTS OF DEALERS, LOCKER PLANTS, ASSOCIATIONS, ETC.
SL - STATISTICAL SECTION LISTS OF DEALERS IN AND PRODUCERS OF FISHERY PRODUCTS AND BYPRODUCTS.
SEP.- SEPARATES (REPRINTS) FROM COMMERCIAL FISHERIES REVIEW.

Number		Title
CFS-438		- Alaska Fisheries, 1947, Annual Summary
CFS-468		- Chesapeake Fisheries, 1946, Annual Summary
CFS-469		- New York Fisheries, 1946, Annual Summary
CFS-470		- Massachusetts Landings, February 1949
CFS-471		- Frozen Fish Report, May 1949
CFS-472		- Massachusetts Landings, 1948, Annual Summary
CFS-473		- Maine Landings, March 1949
CFS-474		- Fish Meal and Oil, April 1949
CFS-475		- Massachusetts Landings, March 1949
CFS-476		- Imports and Exports, 1944 to 1948, Annual Summary
CFS-477		- Frozen Fish Report, June 1949
CFS-479		- Maine Landings, April 1949
FL-128	(Revised)	- Refrigeratad Locker Storage of Fish and Shellfish
FL-254	(Revised)	- List of Fishery Associations in the United States and Alaska
FL-339		- The Mexican Fisheries Industry
FL-340		- Contribution to the Biology of the King Crab
FL-341		- The Sponge Fishing Industry in Libya (Africa)
FL-346		- U. S. Special Mission Reviews Japanese Fisheries Situation
SL-21	(Revised)	- Wholesale Dealers in Fishery Products, California
SL-102	(Revised)	- Firms Canning Sardines and Sea Herring, 1948
SL-103	(Revised)	- Firms Canning Tuna and Tunalike Fishes, 1948
SL-104	(Revised)	- Firms Canning Mackerel, 1948

Sep. 231 - Fishery Exploration in the Hawaiian Islands (Aug. to Oct. 1948, by the Vessel Oregon of the Pacific Exploration Company)

Sep. 232 - Receipts of Fishery Products at Seattle, 1948

* * * * *

Observations on Gonad Development, Spawning and Setting of Oysters and Starfish in Long Island Sound, Bulletin No. 4, vol. 13, June 15, 1949, 3p., mimeo., free. Available upon request from Fishery Biological Laboratory, Fish and Wildlife Service, Milford, Conn. First of a series of special bulletins issued periodically each oyster season for information of oyster growers on conditions existing in the oyster-producing section of Long Island Sound. The bulletins will offer information on the accumulation of spawn in the oysters, beginning of spawning, numbers of oyster larvae, occurrence of first oyster set, and intensity of oyster set during the entire summer. Similar observations will be made on starfish.

ARTICLES BY FISH AND WILDLIFE SERVICE AUTHORS IN OTHER PUBLICATIONS

"Early Stages in the Life History of the Common Marine Shrimp, Penaeus setiferus (Linnaeus)," by William W. Anderson, Joseph E. King, and Milton J. Lindner. The Biological Bulletin, April 1949, vol. 96, no. 2, pp. 168-72. Marine Biological Laboratory, Woods Hole, Mass., $1.75 per issue. The purpose of this report is to assemble information concerning the early stages in the life history of the shrimp, Penaeus setiferus (Linnaeus), which supports the most valuable commercial fishery of the South Atlantic and Gulf of Mexico regions of the United States.

"Notes on the Little Piked Whale," by Leslie W. Scattergood, The Murrelet, January-April, 1949, vol. 30, no. 1, pp. 3-16. Pacific Northwest Bird and Mammal Society, Washington State Museum, University of Washington, Seattle, Wash., 95 cents per issue. In this report, the author supplements the data of Scheffer and Slipp (1948) and summarizes the knowledge of this species.

"Pacific Oceanic Fishery Investigations," by Oscar E. Sette, Copeia, April 15, 1949, no. 1, pp. 84-5. American Society of Ichthyologists and Herpetologists, Museum of Zoology, University of Michigan, Ann Arbor, Mich. (No reprints available.) A historical summary of the activities of the Pacific Oceanic Fishery Investigations to date and its purpose.

MISCELLANEOUS PUBLICATIONS

THE FOLLOWING PUBLICATIONS MAY BE OBTAINED, IN MOST INSTANCES, FROM THE AGENCIES ISSUING THEM.

The Clam Situation in South Carolina, by G. Robert Lunz, Contributions from Bears Bluff Laboratories No. 6, 7 p., printed. Bears Bluff Laboratories, Wadmalaw Island, South Carolina, June 1949. This bulletin gives the production, value, and demand for South Carolina clams. It discusses briefly the South Carolina laws dealing with clam production, and concludes with certain recommendations for the clam fishery.

Food Consumption of Urban Families in the United States Spring 1948, 1948 Food Consumption Surveys, Preliminary Report No. 5, 34 p., processed, free. Bureau of Human Nutrition and Home Economics, Agricultural Research Administration, U. S. Dept. of Agriculture, Washington 25, D. C., May 30, 1949. This is the fifth of a series of preliminary reports on studies of family food consumption to estimate present and potential family utilization of agricultural (including fishery) products and to obtain information on the nutritive content of diets in postwar United States. Almost 1,600 housekeeping families of two or more persons living in 68 cities with population of 2,500 or more gave information on their food consumption during one week in (April-June) 1948. One table includes the average quantity and expense for purchases of fish and shellfish used at home per household per week, and percentage of households using these commodities by annual income class. Fish were divided into the following categories: fresh, canned salmon, other canned fish, smoked and cured fish; and shellfish into the following: fresh and frozen in shell, fresh and frozen shelled, canned and cooked shellfish.

Information for American Business-men on the Marshall Plan, 32 p., printed, free. Economic Cooperation Administration, Washington, D.C., July 1949. One section of this booklet outlines ECA's procedure in providing dollar credits for European economic recovery. Other sections include names and addresses of foreign government purchasing missions procuring goods with ECA financing, with lists of commodities and services procured; names and addresses of foreign government missions engaged in the administrative details of the Marshall Plan, but doing no buying; a list of U. S. Government agencies which upon occasion have purchased commodities with ECA financing, together with a list of commodities procured; a chapter on "The Prospective Exporter;" and a list of "Some Basic Information Sources" for prospective exporters.

"Newfoundland's Fisheries," article, Fisheries Department Trade News, April 1949, vol. 1, no. 10, pp. 9-16. Director of Information, Department of Fisheries, Ottawa, Canada. This article presents a review of the production and marketing structure of the fisheries of Newfoundland. The 1948 data are given as far as they are available. It concentrates on analyzing the impact of Newfoundland's entry as the tenth province on Canadian fisheries production and trade.

Oyster Culture in Florida, by Robert M. Ingle and F. G. Walton Smith, Educational Series No. 5, 22 p., illus., printed, free. Division of Oyster Culture, Florida Board of Conservation, Tallahassee, Fla., 1949. The objective of this booklet is to provide the information necessary for the successful development of the oyster industry throughout the State of Florida. It contains information on the life of the oyster, the oyster industry, oyster cultivation, and a section giving data on the food value of the oysters with recipes for cooking them.

Principles of Food Freezing, by Willis A. Gortner, Frederick S. Erdman, and Nancy K. Masterman, 297 p., printed, illus., $3.75. John Wiley & Sons, Inc., New York, N. Y., 1948. This book deals with all aspects involved in freezing from the raw materials to the finished products. It emphasizes the principles which underlie the handling of the various foods, including fishery products; explains the biochemical and nutritional aspects concerned in the freezing, storage, and cooking processes; and deals with the engineering principles involved in the construction and operation of the equipment. The material presented is divided into three general sections: I. The Product: Frozen Food; II. The Consumer and His Needs; III. The Engineering of Food Freezing.

The Red Tide, Educational Series No. 1, 14 p., illus., free. Marine Laboratory, University of Miami, Coral Gables, Fla. Florida State Board of Conservation, Tallahassee, Fla., 1948. This booklet discusses the red tide of 1946-47, its effects, its causes, when and where it is likely to return, what can be done to combat it, and the steps that can be taken to prevent or alleviate future attacks.

Regional Consumption of Fish in Canada, by W. Van Vliet and W. E. Snaith, 71 p., processed. Economics Division, Department of Fisheries, Ottawa, Canada, March 1949. This is an extensive study which attempts to bring out some of the differences in fish consumption between classified regions in Canada. It measures statistically the consumption of the major species of fishery products in various regions of Canada; points out the relationships existing between consuming areas relative to: (1) the intensity of consumption, (2) the impact of fish producing areas, and (3) the importance of the major species and forms of species; and indicates some of the major factors that influence the differences in consumption between regions.

Report of the Joint Brazil-United States Technical Commission (with appendixes), Publication 3487, International Organization and Conference Series II, American Republics 5, 328 p., printed, $1.00. Department of State, Washington, D. C., June 1949. (For sale by the Superintendent of Documents, Washington, D. C.). The Commission was created by authority of President Truman and President Dutra pursuant to the request of Brazil for the assistance of technicians of the United States Government to collaborate with technicians of the Brazilian Government in an analysis of the factors in Brazil which tend to promote or retard the economic development of the country. The Commission has completed its task and submitted this report. Brazil's fisheries, in addition to agriculture, transportation, and other subjects, were studied by the Commission. A sub-Commission drew up a long-range fisheries program with a goal for a three-fold increase in the production and distribution of fresh, canned and salted fish. This program envisages operation of an expanded fishing fleet, of receiving ports, and of refrigerated transportation and marketing facilities, with Government financial aid and supervision. It includes also technical and educational work to promote the sound development of the fishing industry.

The Sea Fishes of Southern Africa, by J. L. B. Smith, 720 p., illus., with charts and color plates, printed, £2 12s 6d (approx. $10.50). Central News Agency, Ltd., Johannesburg, South Africa. A comprehensive and critical scientific revision of the marine fishes of South Africa. The book contains a key for identifying any fish found in the area covered.

Studies on the Biology of the Cod in Greenland Waters, by Paul M. Hansen, 83 p., illus., in English, with a summary in Danish. Bianco Lunos Bogtrykkeri, Copenhagen, Denmark. This work, a summary of what is known at present regarding the biology of the cod in Greenland waters, is based on continuous investigations over several years undertaken by the Greenland Administration; the marking experiments in collaboration with "Kommissionen for Danmarks Fiskeri-og Havundersøgelser." The principal subjects dealt with are: the occurrence of cod in Greenland waters, the influence of temperature and currents on migration of cod, and fluctuations in the occurrence of cod. It deals at length with spawning habits, numerical characteristics (number of vertibrae and rays), growth and development of the cod, marking experiments, feeding habits, etc.

Tagging Experiments on the Pacific Mackerel (Pneumatophorus diego), by Donald H. Fry, Jr., and Phil M. Roedel, Fish Bulletin 73, 64 p., illus., printed. California Bureau of Marine Fisheries, Division of Fish and Game, San Francisco, Calif., 1949. This report gives a summarization of the Pacific mackerel fishing methods and tagging techniques.

Tide Tables West Coast North and South America (Including the Hawaiian Islands), 1950, 206 p., printed, 25 cents. Coast and Geodetic Survey, U. S. Department of Commerce, Washington, D. C., 1949. This publication contains full daily predictions for 37 reference ports and differences and constants for about 1,000 stations in North America, South America, and the Hawaiian Islands. It also has a table for obtaining the height of the tide at any time, a table of local civil time of sunrise and sunset for every fifth day of the year for different latitudes, or moonrise and moonset for 5 places, and a table of the Greenwich civil time of the moon's phases, apogee, perigee, greatest north and south and zero declination, and the time of the solar equinoxes and solstices.

Trawling Gear in California, by W. L. Scofield, Fish Bulletin No. 72, 60 p., illus., printed. California Bureau of Marine Fisheries, Division of Fish and Game, San Francisco, Calif., 1948. Describes in detail the trawling gear used in California and gives an account of the development of the otter-trawl fishery.

"Whale Oil Production in 1948-49 Approximates Last Season's Level," article, Foreign Crops and Markets, May 16, 1949, vol. 58, no. 20, pp. 476-78, free. Office of Foreign Agricultural Relations, Department of Agriculture, Washington 25, D. C. Summarizes the data on the production of whale oil in 1948-49. Compares Southern Hemisphere production by countries with previous seasons and gives the equipment used in the 1948-49 season in Antarctic whaling by countries and type of equipment.

Whale Oil: World Production and Trade, FFO-10-49, 10 p., mimeo., free. Office of Foreign Agricultural Relations, Department of Agriculture, Washington 25, D. C., June 2, 1949. Discusses the world production of whales and oil and trade in whale oil by countries; types and uses of whale oil; and exports by specified countries. Also contains an outlook summary.

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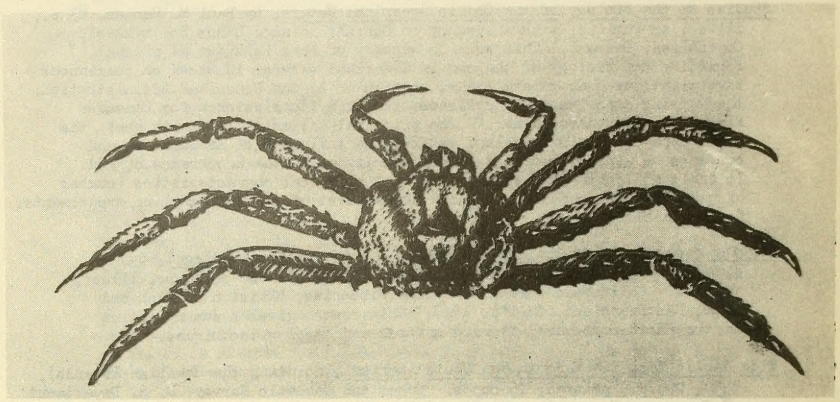
CONTRIBUTION TO THE BIOLOGY OF THE KING CRAB

Fishery Leaflet 340, "Contribution to the Biology of the King Crab (Paralithodes camtschatica Tilesius)," recently issued by the Service, gives the distribution of the king crabs Paralithodes camtschatica and P. platypus, as encountered on the Alaska King Crab Investigation of 1940-41.



Observations made on the general biology of P. camtschatica during this time are presented, including mating and moulting habits, egg laying methods and frequency, development, size occurrences, and migratory, habitat, and food studies. It is emphasized that the king crab fishery, because of inherent biological reasons, should have certain definite protection measures.

Copies of this Fishery Leaflet 340 can be obtained free upon request from the U. S. Fish and Wildlife Service, Washington 25, D. C.

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