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COMMERCIAL FISHERIES REVIEW

A REVIEW OF DEVELOPMENTS AND NEWS OF THE FISHERY INDUSTRIES
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PRELIMINARY FISHERIES SURVEY OF THE HAWAIIAN-LINE ISLANDS AREA

PART I - THE HAWAIIAN LONG-LINE FISHERY

By Fred C. June*

PREFACE

This survey was undertaken for the purpose of gathering information on the tunas and tuna bait fishes of the Hawaiian-Line Islands region to be used in planning the operations of POFI research and exploratory fishing vessels in the waters of the tropical and sub-tropical central Pacific Ocean. Since commercial tuna fisheries now exist in this region only in the Hawaiian Islands proper, some emphasis has been placed on a study of the fisheries of this island group.

This report is based upon the information gathered between January 3 and June 30, 1949. The data were gathered from trips aboard fishing vessels, field trips to outlying islands, examination of catches landed at local markets, and discussions with fishermen and market personnel. There has been opportunity to study the tuna fisheries of a small section of the central Pacific Ocean. The data compiled on places of occurrence, abundance, species, and methods of capture of tunas, spearfishes and bait fishes include information which will be of value toward understanding the vertical and horizontal distribution, seasonal changes in occurrence, and habits of these fishes in this area.

It was originally planned that the results of the entire survey be presented in a single report; however, it seems desirable that certain phases of the work should be summarized at present in order that this information may be made readily available during the early stages of planning vessel operations. This paper is Part I of the complete report. Other parts will follow.

INTRODUCTION

The tuna long line has become an important fishing gear for exploiting the large pelagic tunas and spearfishes[1/] that enter the coastal and offshore waters of the Hawaiian Archipelago. This island group is the only region in the tropical central Pacific Ocean where a long-line fishery is now established.

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1/ Spearfishes include the marlins, swordfishes, and sailfishes.

NOTE: Many persons aided the reconnaissance survey of the Hawaiian-Line Islands region. Mr. Vernon Brock, Director of the Territorial Division of Fish and Game, made available the catch statistics of the tuna landings in Hawaiian waters and gave much valuable advice and assistance. Grateful acknowledgment must be made of the services extended by Mr. Paul Lexton, British District Officer at Canton Island and Mr. Walter Backus, Civil Aeronautics Administration Administrator at Canton Island. CAA and the U. S. Coast Guard provided transportation to the various islands visited. Besides these persons and government agencies, many fishermen, officials at the Honolulu Market Place and Service personnel offered their fullest cooperation.

Prior to World War II, Japanese tuna boats conducted similar operations in the waters south of Japan, including the former Mandated Islands region, and offshore from Japan to the longitude of Midway. The bulk of the tunas which were caught in these areas was landed at Japanese home ports. At present SCAP regulations do not permit the Japanese to fish south of 24° N. latitude or east of 180° E. longitude. Within the authorized area, however, an extensive long-line fishery is conducted.

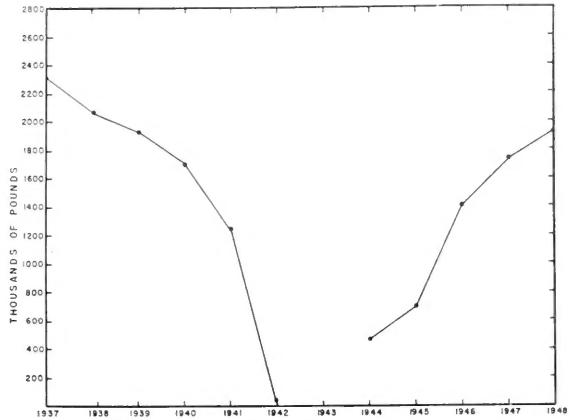


FIGURE 1 - TUNA CATCH (YELLOWFIN AND BIG-EYED TUNAS AND ALBACORE IN THE TERRITORY OF HAWAII, 1937-48. NO DATA AVAILABLE FOR 1943. CATCH FOR 1944 INCLUDES MARCH THROUGH DECEMBER ONLY. DATA OBTAINED FROM CATCH RECORDS OF TERRITORIAL DIVISION OF FISH AND GAME.

The waters about the Hawaiian Islands provide favorable conditions for a dependable concentration of these commercially important fishes throughout the year. Early Japanese immigrants recognized the potentialities of the Hawaiian Archipelago as a fishing ground for many of the oceanic fishes; however, it was not until the year 1917 that a Japanese fisherman by the name of Imose, began exploiting, by means of long lines, the sub-surface levels for the large tunas in the waters off the Waianae coast of Oahu. Following the introduction of the Japanese long-line technique, it became possible to exploit the coastal and offshore waters more efficiently. Thus, the Hawaiian tuna fishery, which had previously been limited to surface fishing by trolling and pole and line, expanded considerably, once it was demonstrated that these large oceanic fishes occurred in sufficient abundance to support the present existing commercial fishery.

Table 1 - Tunas and Spearfishes Landed at Hawaiian Ports, by Species, July 1945 through December 1948

Species	1945 1/	1946	1947	1948
	Pounds	Pounds	Pounds	Pounds
Yellowfin (Neothunnus macropterus)	455,972	1,342,767	1,314,349	1,159,598
Big-eyed (Parathunnus sibi)	12,379	126,445	340,118	677,430
Albacore (Thunnus germo)	10,426	43,116	114,672	106,065
Striped marlin (Makaira mitsukurii)	41,049	201,741	384,008	482,168
Black marlin (Makaira mazara)	69,732	163,993	445,191	700,465
Swordfish (Xiphias gladius) 2/	21,680	88,051	128,276	109,319
Sailfish (Istiophorus orientalis)	20,360	66,835	141,796	189,575
Total	631,598	2,032,948	2,868,410	3,424,620

1/For only 6 months - July to December.
2/Probably includes some marlins.
Source: Catch records of the Territorial Division of Fish and Game.

The main species exploited by the local long-line fishery include: Yellowfin tuna (Neothunnus macropterus), big-eyed tuna (Parathunnus sibi), black marlin (Makaira mazara), and striped marlin (Makaira mitsukurii). Albacore (Thunnus germo), white marlin (Makaira marlina), short-nose marlin (Tetrapterus brevirostris), and sailfish (Istiophorus orientalis) are taken with the other species but compose only a small part of the catch. Catches obtained by the long-line fleet constitute a large part of the offshore fishery production of the Territory. Total landings from Hawaiian waters in recent years are shown in Figure 1 and Table 1. For 1947, the Territorial Division of Fish and Game reported a catch of over 2,800,000 pounds of tunas and spearfishes. The 1948 production showed an increase, with total landings reaching nearly 3,400,000 pounds. Catch data already compiled for the early part of 1949 indicates an even greater production for this year.

THE LONG-LINE BOAT

The long-line boat used for taking the large tunas and spearfishes in Hawaiian waters has evolved from the Japanese sampan-type live-bait boat. The design includes such features as a high, narrow, clipper-type bow, angular lines, a modified V-bottom, with moderate freeboard aft. Boats range in size from 40 to 63 feet in over-all length; the most typical is about 60 feet over-all, with 12-foot beam, and 6-foot draft. The following description is, in general, typical of the local fleet; however, it must be borne in mind that considerable variations in detail exist from boat to boat.

General arrangement of the hull follows the lines shown in Figures 2 and 3. On the main deck is the pilot house, located slightly forward of amidships, housing the radio equipment, steering, and engine controls. A flying bridge is frequently installed above the pilot house and is fitted with additional steering and engine controls. The flying bridge may be completely enclosed or simply protected by means of a canvas wind-screen.

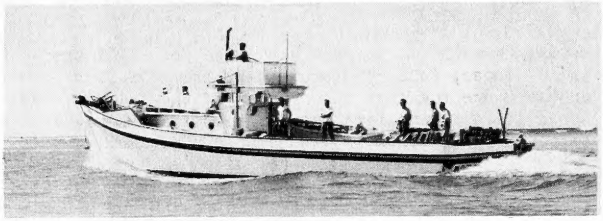


FIGURE 2 - TYPICAL LONG-LINE BOAT USED IN THE HAWAIIAN LONG-LINE FISHERY. (PHOTOGRAPH COURTESY A. G. HANSEN, TAKEN DURING TRIAL RUN.)

Forward of the pilot house is the raised trunk cabin, which generally provides storage space for fishing gear. The skiff, as a matter of convenience, is lashed along the starboard side of the raised trunk. The engine room is located directly below the trunk and houses the main engine, auxiliary generator, work bench, fuel tanks, and the outboard motor used to propel the skiff during baiting operations. The main engines of the long-line boats are diesel, varying from 115 to 165 horsepower, and are usually of the high-speed type, driving a single screw through a reduction gear. Engines with a reverse gear are preferred over the direct-reversible type because of the maneuvering necessary in handling the fishing gear.

On the starboard side of the main deck is a compartment, 3 by 2 feet and 2-1/2 feet high, that houses a gasoline stove used for cooking. A considerable amount of free deck space is provided aft of the pilot house to permit the

operation of gear. A rack, located on the starboard aft bulwark and consisting simply of two Y-shaped limbs, provides storage space for the flag poles. The rudder post projects from the aft deck, with a socket provided for insertion of the tiller. A plank rail extends completely around the main deck and functions as a bulwark. A bin rail, 8 inches high, extends along either side of the main deck, 18 inches inside the bulwark. The intervening space ordinarily provides storage for the floats. It also serves to retain the fish on deck during fishing operations, until they can be stowed below.

Forward of the engine room, but separated from it by a bulkhead, are sleeping accommodations for the crew, consisting simply of a tier of bunks. Abaft the engine room and similarly separated by a bulkhead, is the fish hold, which continues aft to the water tank and lazaret. The hold consists of three compartments, insulated along the sides and bottom with 2-inch cork laid between the beams and covered with galvanized sheet metal, and with a total fish capacity of from 15,000 to 20,000 pounds. Since none of the boats are equipped with any sort of mechanical refrigeration, ice is required in large quantities and is taken aboard in the form of cakes, weighing about 300 pounds; any resulting space may be filled with crushed ice to form a solid pack. An ice load of 25,000 to 30,000 pounds is considered to be adequate for a fishing trip, lasting about 14 days, and an average catch of about 7,000 pounds. The high ice to fish ratio is required because of tropical temperatures.

FIGURE 3 - DECK ARRANGEMENT OF A TYPICAL LONG-LINE BOAT USED IN HAWAIIAN LONG-LINE FISHING.

CREW

The crews that man the long-line boats are predominantly of Japanese extraction, though Filipinos and Hawaiians are represented in fair numbers. Most of the larger boats maintain a crew of five, while the smaller boats employ a crew of only two or three men. For various reasons, however, boats frequently put to sea with less than a normal complement.

A five-man crew comprises a captain and four fishermen. The captain, who is frequently a partner in the ownership of the boat, makes all decisions relating to the fishing operations, and in addition, ordinarily performs the navigation as well as the maintenance and repair work on all machinery. The fishermen operate the gear and share the duties of preparing the food; also stand a regular turn at the wheel and assist in the repair of gear and the performance of other maintenance work on deck.

Fishing is done on a share basis. Generally, the fish are sold at auction by the operators of the wholesale fish market, who render the additional service

of preparing a final settlement for the crew. Deductions for fuel, cartage, ice, market commission, and bait, if purchased, are made from the gross price received for the fish. After the deduction of these expenses, the net is then divided among the members of the crew and the boat owner as follows: the boat owner receives 30 percent and the captain receives 5 percent as a bonus; the remaining 65 percent is divided equally among the crew members and the captain. Expenses for food and provisions for the trip are paid out of the latter share.

DESCRIPTION OF GEAR

The tuna long line is designed for the purpose of catching tunas, spearfishes, and other species, by means of a series of baited hooks, placed below the surface of the water. It consists of a main line, which is supported at intervals by lines with attached surface floats or buoys, and which, in turn, supports a series of vertical branch or hook lines.

The description of the long line which follows is typical of the gear employed throughout the waters of the Hawaiian Islands. While certain variations in detail from boat to boat exist, the differences are a matter of preference with the individual fisherman. The long line (Figure 4, see page 6) is assembled by either splicing or tying together 13 to 15 lengths of main line, each varying from 1-1/3 to 25 fathoms. These, with attached float lines and branch lines, are designed to complete a basic unit 140 to 203 fathoms in length called a "basket."[2/] Twenty to 34 baskets are tied in a string, with two additional hook lines (end branch lines) attached at the ends, completing the set. The various assembled sections of one complete basket are coiled and are placed in a wooden box or a bamboo basket for stowage (Figure 5).

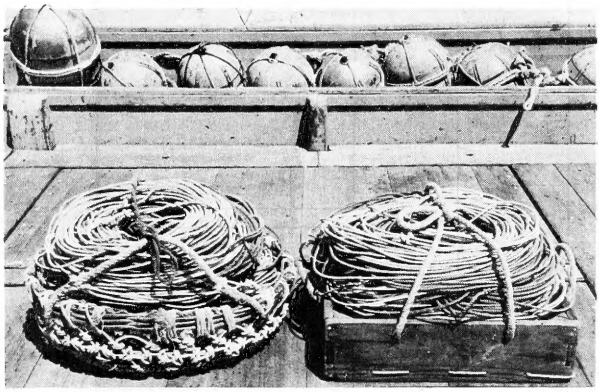


FIGURE 5 - WOVEN BAMBOO AND WOODEN CONTAINERS USED FOR STOWING THE COILED SECTIONS OF ONE COMPLETE BASKET OF LONG-LINE GEAR.

The "basket" is made up of the following parts:

(1) Main Line: The main line supports the pendant vertical branch lines, and is, in turn, supported by lines attached to floats. Medium-hard laid cotton twine, varying between 240 and 260 thread, is used almost exclusively for the main line.

(2) Branch or Hook Line: The branch line consists of four pieces: a length of cotton line, the "shanawa," the leader, and the hook. The upper end of this

2/ The term "basket" is derived from the special type container, woven of bamboo, in which the gear is stowed.

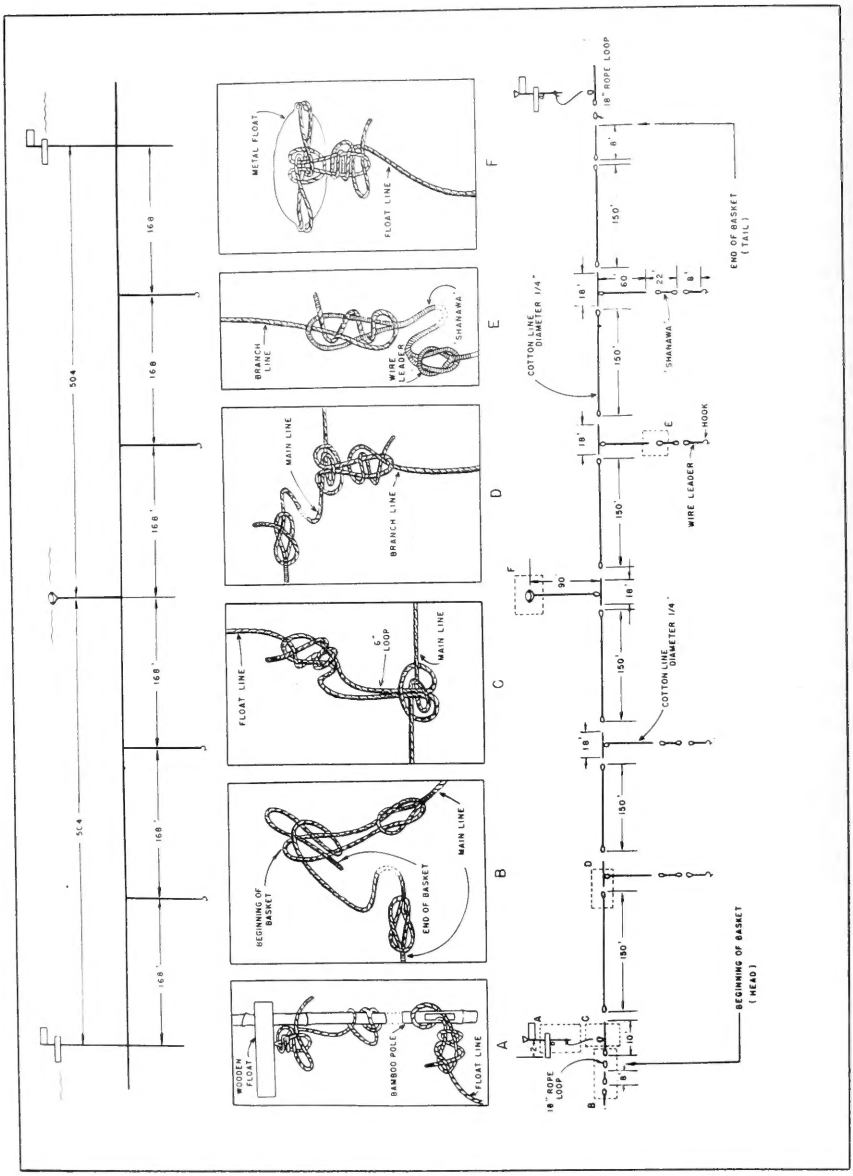


FIGURE 4 - DIAGRAMMATIC SKETCH SHOWING THE CONSTRUCTION OF A TYPICAL BASKET OF LONG-LINE GEAR.

line may be tied directly to the main line, or it may be fastened to a loop, 6 to 8 inches in length and of 1/4-inch cotton or 1/2-inch manila hemp, which is attached to the main line. The branch line may vary from 65 to 90 feet in length, and is usually of the same material as the main line. Many fishermen, however, prefer hard rather than medium-hard laid twine for the branch line.

"Shanawa" or "Sekiyama:" The "shanawa" is fabricated by hand from 15 strands of No. 8 Irish linen, twisted together, and tightly wrapped with No. 6 cotton thread which provides a fairly rigid length of line. The outer surface is coated with tar which acts as a preservative and further adds rigidity to this section. The "shanawa" thus prevents the lower section of the branch line from twisting and becoming fouled when the branch line carries a hooked fish. It has a finished diameter of 3/16 inch and may vary from 18 to 22 feet in length, depending on preference. At each end of the "shanawa" a served loop, about 6 inches in length, provides for the attachment of the lower end of the branch line and the upper end of the wire leader.

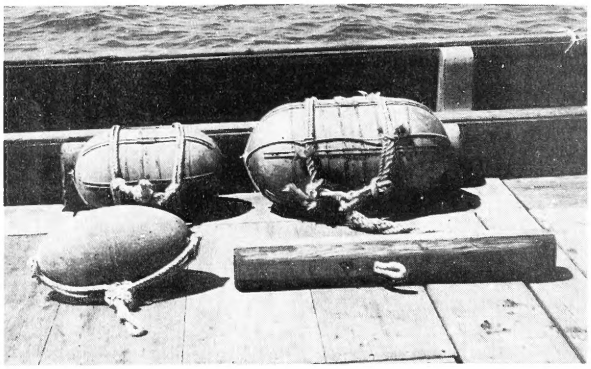


FIGURE 6 - FLOATS USED IN THE HAWAIIAN LONG-LINE FISHERY. THE ALUMINUM OXYGEN TANKS AND THE GALVANIZED METAL FLOATS ARE USED TO SUPPORT THE MAIN LINE AT THE CENTER OF A BASKET. THE WOODEN FLOAT IS FASTENED TO THE FLAGPOLE AND IS ATTACHED AT THE "HEAD" OF THE BASKET.

Leader: The leader is made of 3/32 inch diameter 1 x 7 galvanized steel wire. The end engaging the "shanawa" is fitted with a 6-inch served loop which prevents undue fraying of the "shanawa" and facilitates disassembling. The leader may vary from 8 to 10 feet in length and terminates in a 2 1/2-inch loop which passes through the eye of the hook.

Hooks: The hooks are made of approximately 1/4-inch diameter tempered steel. The two most common sizes are 9/0 and 8/0, having wire lengths (over-all length) of 5-5/8 and 4-5/16 inches, respectively. The latter is comparable to the Japanese 4-sun hook.

(3) Float or Buoy Line: The lower end of the float line is tied directly to the main line, or it may be attached to a 6-inch loop fastened to the main line. The twine used for the float lines is the same diameter as is used for the main and branch lines. Many fishermen use frayed or worn line from these sections, since it is not necessary that heavy twine be used for attachment of the floats.

Floats: Floats may be either Army surplus aluminum oxygen tanks of 1,000 to 2,100 cubic inches capacity or galvanized iron floats which are commonly used in the north Pacific otter trawl fishery (Figure 6). These metal floats are painted a bright color to increase visibility. Wooden floats, of California redwood,

4 x 4 x 30 inches, are used for attachment to the flagpole. The latter are less buoyant than the metal floats; however, they are adequate for supporting the pole and float line at the surface and at the same time occupy less space on board the fishing boat.

FIGURE 7 - ATTACHMENT OF WOODEN FLOAT TO THE FLAGPOLE. NOTE THAT THE LOOP ON THE FLOAT IS SET OFF CENTER; THIS FEATURE CAUSES ONE END OF THE FLOAT TO PROTRUDE ABOVE THE SURFACE WHEN A FISH HAS BEEN HOOKED ON A BRANCH LINE NEAR THE FLOAT.

Flagpole: The flagpoles are attached to the wooden floats at a point a little over 1/3 of the way up from the base of the pole (Figure 7). The upper end of the float line is attached to a 6-inch loop which is spliced through the base of the flagpole. Each pole and float is thus placed at the "head" or beginning of each basket and marks the union of the two ends of the main line between successive baskets. It serves as a marker to indicate the position of the main line, for in a rough sea the small floats are not easily seen at a distance. The flagpoles are made from Japanese bamboo, 14 to 16 feet in length. A piece of red or white cloth, tied to the upper end of the pole, makes a flag that can be readily seen. Usually the flags on one half of an entire set are red and on the other half are white, with a red and white flag tied to the pole located at the center of the set. A bit of frayed coconut husk is usually tied to the tip of the pole for ornamentation.

All lines are periodically treated with a "tanbark" solution--150 pounds, of either oak or cypress tanbark, are added to about 300 gallons of water, and this mixture is boiled until a chocolate-brown liquid is obtained. For a period of 24 hours the lines are then soaked in this solution.

Upon completion of each fishing trip, all lines are washed

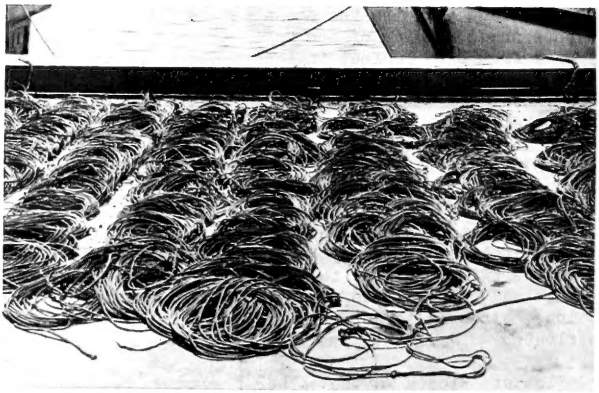


FIGURE 8 - DRYING LONG LINES IN PORT. HERE THE COILED SECTIONS HAVE BEEN REMOVED FROM THE BASKET AND SPREAD OUT ON THE DOCK FOR DRYING.

with fresh water. The various sections of each basket are either removed from the container and spread out for drying (Figure 8), or the lines are merely separated and allowed to dry in the containers (Figure 9).

FIGURE 9 - DRYING LONG LINES IN PORT. HERE THE COILED SECTIONS OF EACH BASKET HAVE SIMPLY BEEN SEPARATED AND ALLOWED TO REMAIN IN THE BASKET.

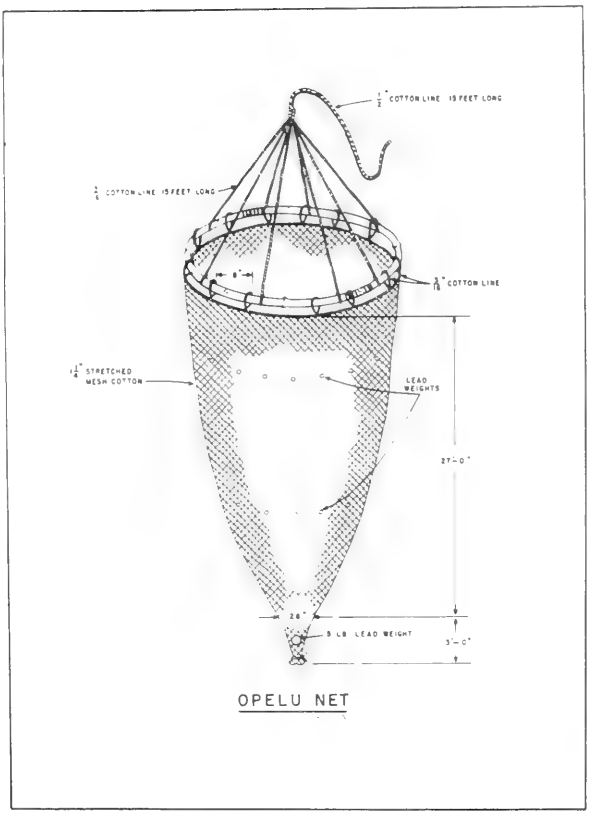
BAIT

The bait used for long-line fishing may be salted opelu, sardine, or akule, about 12 inches total length, or squid of approximately similar size. Most fishermen, however, prefer salted opelu (Decapterus sanctae-helenae Cuvier). This species is most satisfactory for use as bait, because of its availability. Another reason is that the fish may be freshly caught and then salted. Bait handled in this manner does not decompose as rapidly as frozen fish and may be used for several resettings of the gear. For the same reason, frozen sardines are not as desirable for bait. Fresh or frozen squid has proved to be a very satisfactory bait and several long-line fishermen use it almost exclusively.

Bait is not a problem of great concern in the long-line fishery. Opelu may be purchased in the fresh form on the commercial market, or it may be caught by the long-line fishermen prior to long-line operations. During the spawning season, which may extend from late May until early August, opelu are not taken in sufficient numbers to supply the boats and other bait is used to supplement the catch. Frozen sardines and squid are imported from the mainland, and while a small number of fishermen use this source of supply solely, the majority only use it as a supplement during the slack opelu season.

Long-line boats fish for opelu in waters 15 to 30 fathoms in depth, just outside the fringing reef of small bays and coves along the coastline of most of the Hawaiian Islands. Some of these more productive areas include the waters in the vicinity of Kaumuhonu Bay, Niihau, the waters lying between Lahilahi Point and Kaena Point along the Waianae coast of Oahu, Hilo Bay, and the numerous small coves and bays along the Kona coast of Hawaii. Generally, the opelu grounds exploited by the long-line fishermen are those which lie in the near vicinity of the areas where long-line fishing is to be conducted.

Inshore fishermen catch opelu by using a surround net, while long-line fishermen use a funnel-type hoop net when catching opelu for bait. The hoop net consists of two bamboo rods, each 30 feet in length, jointed together at the ends to form



OPELU NET

FIGURE 10 - THE OPELU NET IS USED FOR CATCHING LONG-LINE BAIT. THE NET IS LOWERED INTO THE WATER AND CHUM IS USED TO LURE THE FISH. WHEN THE NUMBER OF FISH ABOVE THE NET IS CONSIDERED SUFFICIENT, THE NET IS LIFTED.

the hoop, with a bag about 27 feet in depth and of 1 1/4-inch stretched mesh cotton netting supported by the rods. A steel rod is inserted in the core of the bamboo and runs the full length of the rods. The outer surface of the bamboo is wound with 1/8-inch cotton line and coated with tar. The entire framework is suspended by means of eight cotton lines, 3/16 inch in diameter and approximately 15 feet in length, fastened at the upper ends, to a cotton line about 15 feet long and 1/4-inch diameter (Figure 10). The various details and dimensions of the net may vary from boat to boat, though the principal design remains the same.

Ground vegetable matter is used to attract the opelu over the bait grounds. In earlier years the Japanese fishermen preferred ground "aku" (Katsuwonus pelamis) for use as chum, while the Hawaiians claimed that vegetable matter was more desirable. The objection to the use of animal chum was that it attracted various large-sized predatory fish that scattered the opelu from the chum and destroyed the bait species. It is now unlawful to take opelu with fish or animal bait within the waters of the Territory, except with hook and line. Taro (Colocasia antiquorum Schott) is most often used for vegetable chum, with potatoes and other vegetable sometimes added; all are thinly sliced and boiled until a thick paste is obtained.

It is interesting to note that in ancient days the Hawaiians would feed the vegetable chum to the fish at a designated place close to shore. After this feeding had been carried on for a period of time, generally some six months, the actual fishing operation, in which a surround net was used, was carried out. This method produced enormous catches of opelu.

The sampan is anchored outside the reef in waters where bait fishing is to be carried on. A skiff is secured a short distance off the stern of the sampan,

with the net piled along one side of the skiff and the rods disjointed. One of the fishermen chums from the skiff by pouring about a cupful of ground vegetable matter into a piece of heavy denim cloth that is folded into an envelope. The folded cloth, containing the chum, is cast over the side and carried downward by means of a small lead weight attached to the cloth. With a sharp pull on a retaining line, fastened to the upper corner of the cloth envelope, the contents are released at a desired depth. By means of a glass-bottom box, the chummer observes the concentrations of opelu about the chum.

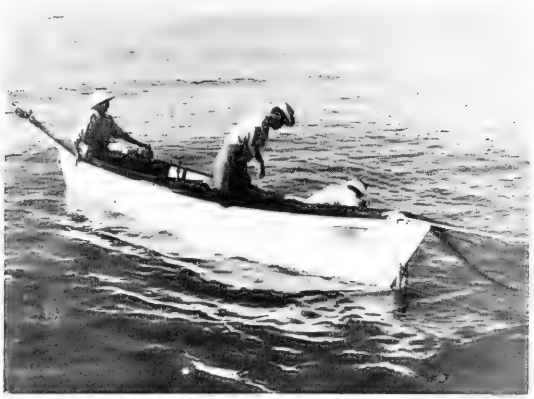


FIGURE 11 - BAIT FISHING FOR OPELU. THE SKIFF IS TIED OFF THE STERN OF THE LONG-LINE BOAT AND THE "CHUMMER" IS OBSERVING A SCHOOL OF OPELU LURED BY THE CHUM. NOTE ANOTHER LONG-LINE BOAT IN THE BACKGROUND.

This operation is repeated until sufficient numbers of opelu have been attracted by the chum. At a signal given by the chummer, two fishermen board the skiff; the skiff is cast off from the sampan and moved directly over the opelu school (Figure 11). Frequently, predatory species may cause the bait fish to move about rapidly, or a fast-moving current will carry the chum away, with the school in pursuit. In order to maintain contact with the fish, when such a condition exists, an outboard motor, attached to the skiff, may be used. As the skiff is brought into position directly over the opelu school, two of the fishermen lower the net into the water. The two bamboo rods are joined together at the ends and the entire framework is lowered to a depth slightly below the level at which the opelu are feeding. Chumming is continued as the net is brought to rest near the fish, with the chum directed toward the center of the hoop. The opelu follow the chum down into the lower end of the bag, and when sizable numbers of fish are concentrated in the bag, the net is quickly brought to the surface. The bamboo rods are dis-

FIGURE 12 - SALTING FRESHLY-CAUGHT OPELU FOR USE AS LONG-LINE BAIT. AFTER SALTING, THE FISH ARE PACKED IN WOODEN BOXES AND STOWED IN THE HOLD.

jointed as they reach the surface. The bag of the net is hauled upward until the bottom is brought aboard; the purse string is untied and the fish are released into a bait box, built in the center of the skiff. While the net is being emptied of its contents, chumming is continued in order to hold the opelu still milling about the chum. This operation may be repeated many times until sufficient numbers of bait fish have been caught. An estimate of the amount of bait needed for each day's long-line operation is from 150 to 200 pieces. About 1,000 pieces of bait are usually considered sufficient for the average long-line trip.

When the bait box in the skiff is filled, the opelu are transferred to the deck of the sampan. In preparation for salting, a slit is made along the belly, the entrails removed, and the fish placed in a large bucket of sea water. The fish then are rolled in coarse salt until the abdominal cavity is filled with salt and the outer body surface completely covered (Figure 12, see page 11). The fish are then packed in wooden boxes, bellyside up, with more salt added between successive layers of fish. The packed boxes of bait are stowed in the fish hold. Sardines that have been imported for use as bait are similarly prepared.

SETTING THE LINE

In preparation for the long-line operation, the crew assembles the baskets of gear on the main deck the night before fishing is to begin, or preparations take place during the trip to the fishing grounds.

The first three or four baskets to be set are placed in successive order on the mid-deck, in a row perpendicular to the port gunwale and the ends of the main lines between these adjacent baskets are fastened together (Figure 13). The wooden floats are fastened to the flagpoles and the poles are separated into two equal piles on the aft deck. One pile contains the white flags and the other the red flags with an additional pole, with both a white and a red flag. The latter is later used as a marker to indicate the center of the long line set. Bait is removed from the wooden boxes, in which it has been carried in the hold, and placed in buckets of water. The buckets are placed in a convenient position, along the port deck, so that the bait may be handled with speed and efficiency.

Upon reaching the fishing grounds, the captain reduces the speed of the boat to about 3 knots and proceeds on a straight-line course in the direction that the line is to be set (See page 17). This is the signal for the crew to commence laying the gear. These operations usually begin shortly after day break.

On boats carrying a crew of five, the four members of the fishing crew station themselves at various positions about the main deck. Number 1 stands forward of the first 3 or 4 baskets already laid out on the port side. He baits the hook of the first branch line (end branch line) and throws out the baited hook, leader, and "shanawa." In baiting, the hook is inserted through the top of the head of the fish and back up through the lower jaw. Number 2, in a position facing number 1, pays out the remaining coiled length of the first branch line and maintains tension on this line as it is paid out, in order to prevent fouling. Each succeeding branch line is similarly paid out. Meanwhile, number 3 has fastened the first flagpole and float to the first float line and as this section of the first basket is reached, he throws the flagpole and float over the side and pays out the coiled float line. Each succeeding pole and float together are handled in a similar manner. Number 3 also pays out each unit section of the coiled main line as the gear is being laid maintains a slight tension on the line as it is lowered into the water. Number 4 secures the floats to the respective float lines.

Thus, each unit section of a basket is similarly paid out until one basket has been completely set, at which time Number 2 moves the next basket up to the same position as the previous one occupied. Number 4 meanwhile, fastens together the ends of the main line of adjacent baskets. Boats carrying a crew of only 3 or 4 men handle gear in the same manner as described, each crew member, however, necessarily performs additional duties.

These operations are repeated for each basket until the entire line is set. The last complete basket (the end of the set farthest from shore) is called the "head" basket. It differs from the other baskets in that there are two flagpoles and floats attached to the main line--one pole and float is attached at the head of the basket; an additional pole and float is attached at the tail (offshore end), together with an end branch line. This last pole and float support the end of the set.

FIGURE 13 - SETTING THE LONG LINE. THE MAIN LINES OF THE THREE BASKETS SHOWN HAVE ALREADY BEEN TIED TOGETHER. THE FLOATS AND FLAG POLES HAVE ALSO BEEN ATTACHED TO THE FLOAT LINES. NOTE THE BAIT BOX; THIS PHOTOGRAPH WAS TAKEN NEAR THE END OF SETTING OPERATIONS AND THE EXTRA BAIT NEEDED WAS TAKEN DIRECTLY FROM THE BAIT BOX. THE BUCKETS ORDINARILY USED FOR HOLDING BAIT HAVE BEEN REMOVED.

An efficient five-man crew is able to set 33 baskets of gear in about 30 minutes. Upon completing the set, the captain moves the boat a short distance away from the line; the engine is cut and the boat is allowed to drift until the time for the first patrol of the line.

LANDING A HOOKED FISH

The long-line set is patrolled about every two hours during the time it is in the water, because sharks are fairly abundant in Hawaiian waters and frequently damage the hooked fish on the long lines. A submerged flag or float indicates to the fishermen that a fish has been hooked on a section of gear near the submerged float.

The port side of the boat is brought into position alongside the submerged float, and parallel to the main line. The float is retrieved with a gaff and brought aboard with the attached float line taken in over an outboard pulley, fastened to the port gunwale. Most boats commonly use an 8-inch pulley, extended 18 inches out from the gunwale by means of a 3/4-inch pipe fastened to a 4" x 4" or other suitable supporting member. The float line is pulled by hand and paid

back into the water as it comes in over the pulley.[3] As the main line is brought to the surface, the fishermen are able to determine which section of the main line holds the hooked fish. This section is taken in and simultaneously paid back into the water, until the branch line carrying the fish has been located. This branch line is hauled aboard until the fish has been brought to the surface (Figure 14). A gaff is hooked somewhere about the head, with two or three men lending assistance in bringing the fish aboard. The hook is removed from the fish, rebaited and thrown back into the water. The fish are allowed to remain on deck until the patrol has been completed, when the catch is stowed on top of the ice load and covered with burlap.

FIGURE 14 - LANDING A HOOKED FISH. THE MEN ARE PULLING THE BRANCH LINE CARRYING THE FISH. NOTE THE TWO MARLINS ALREADY LANDED DURING THE PATROL OF THE LINE.

The spear and flukes of the caudal fin of spearfish are usually removed before the fish are stowed. Most long line boats use a chain-fall assembly for landing spearfishes over 400 pounds. To further facilitate handling these large fishes, they are cut in two pieces near the anal fin prior to icing.

LIFTING THE GEAR

Most long-line boats are equipped with a power winch for pulling lines; however, on one or two of the smaller boats, lines are still pulled by hand. The winch may be a separate unit, powered by a 1-1/2 horsepower gasoline engine, or it may be connected to a power take-off from the main engine, by means of a line shaft and chain drive. The winch usually consists of a 10-inch drum mounted on an iron framework, and supported about 30 inches from the deck (Figure 15). The winch is located on the port deck, abaft the pilot house, and is mounted in position only during lifting operations.

The long line is taken in starting about 3 hours before dark, the end farthest from shore being pulled first. However, in the event of a strong current, the line is lifted in such a manner that the boat moves against the current to prevent fouling the lines. The boat is maneuvered into position, with the bow set about 30° to the main line, so that the line may be pulled from the port side. The captain controls the boat from the aft deck by means of a tiller (Kaji) inserted in the rudder post. Two lines leading from the stern are connected to the clutch lever by means of several small swivel-pulleys. With this arrangement the clutch may be engaged or disengaged from the aft deck. The throttle is set at the low position.

3/ When landing fish during patrols of the line, all line pulling is done by hand; a power winch is used only when lifting the gear at the end of the day.

As the boat comes alongside the first flag, the flagpoles and float are retrieved with a gaff and the float line brought aboard. The pole and float are untied from the float line and the line is brought over the outboard pulley, two turns being taken around the "nigger-head." Number 1 crewman operates the winch and pulls the lines (Figure 16). The first float line is coiled on the deck as it comes off the "nigger-head," until its junction with the main line is reached. As the first branch line (end branch line) comes aboard, Number 2 unfastens it from the main line and pulls it by hand. This line is coiled when about one half its length is aboard. When the hook is reached, the bait is removed; if the bait is still in satisfactory condition, it is placed in a bucket of water to be used again. The coiled end branch line is laid aside on the deck.

FIGURE 15 - WINCH USED FOR PULLING LINES WHEN THE GEAR IS LIFTED. NOTE THE LINE AT LOWER RIGHT; IT IS ATTACHED TO THE POWER TAKE-OFF AND CONTROLS THE OPERATION OF THE WINCH.

FIGURE 16 - LIFTING THE GEAR AT THE END OF THE DAY'S FISHING. NOTE THE TWO ROPES LEADING FROM THE ENGINE ROOM; THESE ARE ATTACHED TO THE CLUTCH LEVER AND ALLOW THE CAPTAIN TO CONTROL THE BOAT FROM THE AFT DECK.

Number 1 meanwhile, continues pulling the main line and allows it to coil on deck as it comes off the "nigger-head." Number 2 places the float line in the basket, after coiling, retrieves the coil of main line, and continues coiling the incoming line. As the junction of the main and branch lines comes over the outboard pulley, Number 2 places the coiled section of main line in the basket. To prevent fouling the lines, one turn of the main line is cast-off the drum as the junction of the main and branch lines comes in over the "nigger-head."

Number 3 meanwhile, pulls the branch line by hand, as Number 1 continues pulling the main line. About half the length of the branch line is pulled before Number 3 begins coiling the remaining length of line, "Shanawa," and leader. The bait is removed from the hook and the remaining upper length of the branch line is coiled. The coiled branch line is placed on top and to one side of the coiled section of main line and coiled float line already laid in the basket. Thus, each coiled unit section is separated, as it is placed in the basket, to prevent the lines becoming entangled. Several turns of the hook end of the leader are taken around the entire coil of branch line and the barb of the hook is inserted between strands of coiled line. Number 3 also pulls and coils the float lines when their juncture with the main line comes over the outboard pulley. Number 4 unties the floats and flagpoles from their respective float lines and stows all floats in the space provided inside the bin rail. The flagpoles are placed in the starboard aft rack.

Each unit section of a basket is similarly handled. As the end of one basket is reached, Number 1 unties the ends of the main line between adjacent baskets. An efficient five-man crew is able to lift 33 baskets of gear in about 2-1/2 hours.

The coiled unit sections of an individual basket are staggered as they are placed in the bamboo basket in the following order: (from the bottom up) (1) main line, (2) branch line, (3) main line, (4) branch line, (5) main line, (6) float line (detached from the metal float), (7) main line, (8) branch line, (9) main line, (10) branch line, (11) main line, (12) float line (detached from the flagpole and wooden float).

During lifting operations the boat may be stopped many times because of fouled lines. Fouled unit sections are removed and replaced with coiled sections that have already been assembled. These unit sections are quickly tied in place and the entangled lines are allowed to remain on deck until lifting operations have been completed.

Upon completion of lifting operations, most boats put into port for the night if fishing has been carried on in an area where docking facilities are available. If port facilities are not available, the boats are usually anchored in the protected waters of a bay or cove along the coast of one of the islands.

FISHING AREAS AND DEPTHS

Generally, long-line hooks are fished between 30 and 50 fathoms. Most long-line boats operating out of Honolulu set the lines at the same depth throughout the year. Only a few boats make adjustments in the lengths of the float lines, to allow changing the depth at which the gear is fished. Certain fishermen, operating along the Kona coast of Hawaii, shorten the float lines during the summer months when fishing for yellowfin tuna. The hooks are fished at 17 to 25 fathoms during this season, for the fishermen believe that yellowfin tuna swim closer to the surface. Conversely, when fishing for big-eyed tuna in Hilo waters during the winter months, the hooks are fished at deeper levels.

In general, long lining is carried on in waters varying in depth from 100 to over 1500 fathoms off the coasts of all of the major islands and from 2 to 20 miles from shore. Certain areas continually yield good catches and fishing is conducted over these grounds the year round. Certain other areas seem to yield good catches only during particular seasons. Through experience the fishermen

have become familiar with those waters producing fluctuating catches and fish such areas only during the periods that they may be expected to produce abundantly.

Table 2 - Total Long-Line Catch From 53 Boat Trips Landed at Honolulu Market, March through June 1949

Areas of Operations	No. of Trips	Total No. of Hooks Fished	Total No. of Fish Caught 1/	Catch Per 100 Hooks
Niihau Kauai	26	32,401	960	3.0
Oahu	13	9,358	290	3.1
Molokai Maui Lanai	11	12,058	396	3.3
Hawaii	3	1,668	47	2.8

1/Includes albacore, yellowfin and big-eyed tunas; and striped, black, short-nose, and white marlins.

The most productive fishing grounds for tunas and spearfishes include the waters south of Kauai, the areas north of Niihau, the Waianae coast of Oahu, the areas north of Molokai and Maui, and the Kona and windward coasts of Hawaii (Figure 17, page 18, and Table 2).

FISHING TIME

The length of time the lines are fished is determined by the number of daylight hours. During the winter months and under normal operating conditions, the maximum period of time that a hook is fished is about 12-1/2 hours, and the minimum time is 8-1/2 hours. The lines are set in the morning starting between 6:15 and 6:45 a.m. A five-man crew can handle 33 baskets of gear in about 30 minutes; lines are brought in starting at 4:00 p.m. and the operation is completed by 6:30 p.m. During the summer months, most boats set the lines starting at 5:30 a.m. The lines are taken in about 5:00 p.m. and the operation is usually completed by 7:30 or 8:00 p.m.

The number of days of fishing per trip varies from boat to boat and with each trip. Of 88 boat interviews during the period from March through June 1949, the largest number of fishing days during any one trip was 17 and the smallest was 6. The average number of fishing days per trip was 10.5.

CURRENTS ON THE FISHING GROUNDS

The waters in the vicinity of the Hawaiian Islands are subject to strong and variable currents throughout the year. In general, currents run northerly and westerly close inshore, but run southwesterly and westerly offshore. Rough seas prevail during most of the year in areas surrounding Niihau, Kauai, Molokai and Maui.

In certain areas, especially waters lying in the vicinity of Niihau and Kauai, current changes are unpredictable and often foul the set lines. Along the southern coast of Kauai, the current generally follows a clockwise circular pattern, extending a distance of about 30 miles offshore. This area in particular is given to suddenly changing currents. It is often necessary for boats operating in these waters to remove one or more complete baskets of gear, during a daily operation, when a convergent current causes the main line to buckle. Frequently a shifting current causes the main line to become taut to the point of breaking, and when this condition exists, the entire set is lifted.

Along the Kona coast of Hawaii, boats are able to operate in calm waters for at least 11 months of the year. During periods of prevailing south wind, it is occasionally necessary to suspend fishing operations. The currents in this region generally flow either north or south along the coast, however, during

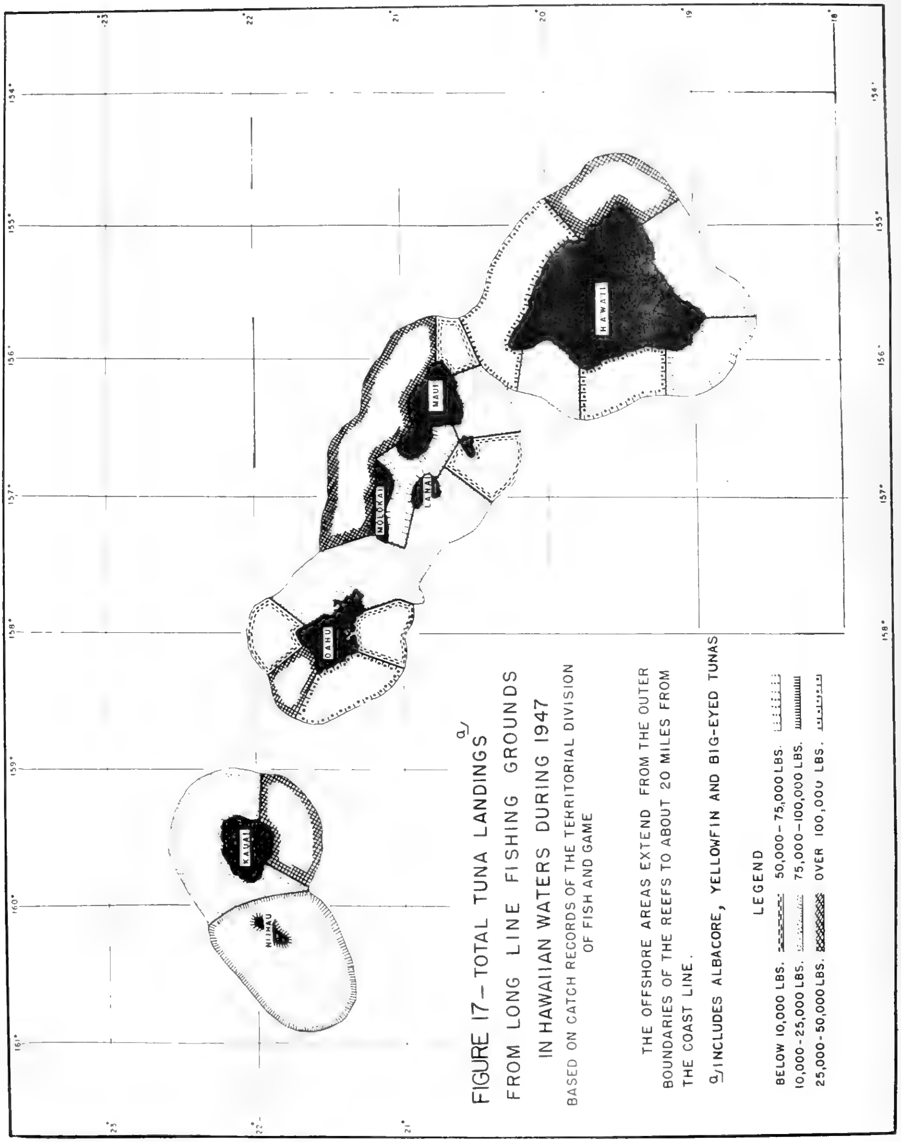


FIGURE 17—TOTAL TUNA LANDINGS a/ FROM LONG LINE FISHING GROUNDS IN HAWAIIAN WATERS DURING 1947

BASED ON CATCH RECORDS OF THE TERRITORIAL DIVISION OF FISH AND GAME

THE OFFSHORE AREAS EXTEND FROM THE OUTER BOUNDARIES OF THE REEFS TO ABOUT 20 MILES FROM THE COAST LINE.

a/ INCLUDES ALBACORE, YELLOWFIN AND BIG-EYED TUNAS

March and April, sudden changes are frequent. Several fishermen operating in this area have noted that 1949 conditions were extreme in this respect, and fishing proved to be poor during the month of March.

When the current flows parallel with the coast, the best conditions for long-line operations appear to be present. Most fishermen meet this condition by setting the line perpendicular to the shore, beginning at a point 2 to 10 miles from land. When strong offshore currents prevail, the set is made at an angle of 45° with the current to avoid fouling the lines.

AMOUNT AND THE EFFICIENCY OF GEAR FISHED

About 30 boats operate out of Honolulu and can be considered constant long liners. Similarly, 16 boats operate from the port of Hilo, Hawaii. During the winter months the Hilo boats fish in the vicinity of the port on daily runs; however, during the summer season, tunas are not abundant in Hilo waters and the vessels operate off the Kona coast on week-long trips. Only about 3 boats are based at Port Allen and make daily runs off the coast of Kauai.

Table 3 - Long-Line Catch From 45 Boat Trips Landed at Honolulu Market, March through June, 1949

Month	No. of Boat Trips	Total No. of Hooks Fished	Total No. of Fish Caught 1/	Catch Per 100 Hooks
March	15	17,709	581	3.2
April	11	13,946	434	3.1
May	6	9,830	226	2.3
June	12	15,218	364	3.3

1/ Includes albacore, yellowfin and big-eyed tunas; and striped, black, short-nose, and white marlins.

Most long line boats operating out of Honolulu fish between 30 and 34 baskets of gear through the entire season, with 4 to 6 hooks per basket. Two additional hooks are placed at either end of the entire set. Occasionally during the summer months fishermen who have been fishing 4 hooks per basket add one or more hooks to each basket to increase the length of the set. The distance between adjacent hooks is not altered, however, as more hooks are added, since the sections of main line, with attached branch lines, are of comparable lengths and are simply inserted in the main line of the individual baskets.

Table 4 - Long-Line Catch of Tunas and Spearfishes by Monarch, March through June, 1949

Area of Operation	Total No. of Hooks Fished	Total No. of Fish Caught	Catch Per 100 Hooks	Total Weight of Fish Caught
N and NW of Lehua (off the coast of Niihau)	1,787	97	5.4	9,264
S of Port Allen, Kauai	1,250	32	2.6	4,346
E of Hanamaula Bay and Kahala Pt., Kauai	313	5	1.6	587
S and W of Waianae, Oahu	522	18	3.4	1,621
SW of Kokole Pt., Kauai	402	18	4.5	2,551
NE of Ilio Pt., Molokai	268	12	4.5	1,701
NE of Laie Pt., Oahu	120	2	1.7	261
NE of Makanalua Pen., Molokai	360	7	1.9	781
N and E of Cape Halawa, Molokai	360	7	1.9	782
NE of Pauwalu Pt., Maui	480	7	1.5	1,042
W of Kailua, Hawaii	360	7	1.9	782
Totals	6,222	212	-	23,718
Average Catch Per 100 Hooks			3.4	

The average efficiency (catch per hundred hooks per day's fishing) of long-line gear, based on a sample of the

fleet, was found to remain fairly constant, both with regard to time of year and fishing area (Tables 2 and 3), over the four-month period (March through June 1949) for which data have been collected. The low efficiency figure for May was due to the inclusion of the catch data of two boats that fished in an area where current disturbances arose during the early part of the month and fishing proved to be poor. While other boats in the fleet moved to different areas during this period, these two boats operated in spite of adverse conditions. The efficiency was computed on the complete catch data for 53 boat trips, including all areas where long lining is carried on in Hawaiian waters. The average catch for these areas and months was 3 fish per 100 hooks. The fishing operations for a typical boat from the fleet (Table 4) shows an average catch of 3.4 fish per 100 hooks, which is slightly above the average for the entire fleet during the four-month period.

Table 5 - Tuna Catch by Long-Line Operations in Southwest Pacific and Indo-Pacific Regions

Area	Total Catch per 100 Hooks[1]
East of Formosa: 20°-25° N. and 120°-130° E.	1.91
East of Philippine Islands to 130° E.	6.35
Former Mandated Islands: 0°-12° N. and 130°-170° E.	5.23
South China Sea off Palawan	4.65
Sulu Sea	3.96
Celebes Sea	4.37
North of New Guinea and Solomon Islands: from 130°-160° E.	4.21
Banda Sea: southeast and south of Celebes	8.40
Neighboring waters of Timor Island	9.19
Southern coast of Java	3.89
Southern coast of Sumatra	10.64
Neighboring waters of Andaman and Nicobar Islands	6.23

1/ In Japanese waters, the total tuna catch per 100 hooks averages between 3 and 4 fish. (Reproduced in part from Table 1. The Japanese Tuna Fisheries, F. L. 297, Fish and Wildlife Service.)

The catch per 100 hooks in Hawaiian waters is about equal to the long line catch in Japanese waters, which averages between 3 and 4 fish per 100 hooks. Comparisons between Tables 3 and 5 show the average Hawaiian catch to fall below the Japanese catch obtained in various tropical and sub-tropical areas.

CATCH COMPOSITION

The pelagic species taken by sub-surface long-line gear occupy a position of major importance in the fishery resources of the Territory. Yellowfin tuna, big-eyed tuna, striped marlin, and black marlin compose the bulk of the catch obtained by this method. Occasionally, white marlin, short-nose marlin, broad-bill swordfish, and sailfish are taken with the other species. Big-eyed tuna, albacore, and marlins comprise the bulk of the catch during the winter months (November through April). Yellowfin tuna enter the fishery in sizeable numbers in April and constitute the largest component of the catch through the summer months (Figure 18).

The entire tuna catch is consumed in the islands and provides an important item in the diet of the Oriental peoples, who prefer it as raw fish (sashimi). The marlins account for about half the total long-line production. Most of these are processed as fish cake for local consumption.

The monthly landings by the long-line boats are not a true indication of the abundance of tunas and spearfishes available to the fishery. While the species composition of the catches show seasonal variations, total production does not show such marked fluctuations (Tables 6 and 7, page 22). This condition may be considered in relation to limiting factors that are operative in determining the

vigor and intensity of commercial operations. The amount of fish landed is limited by local market outlets. The largest Honolulu market, which handles about 80 percent of the total landings, is capable of absorbing a maximum of about 5000 pounds

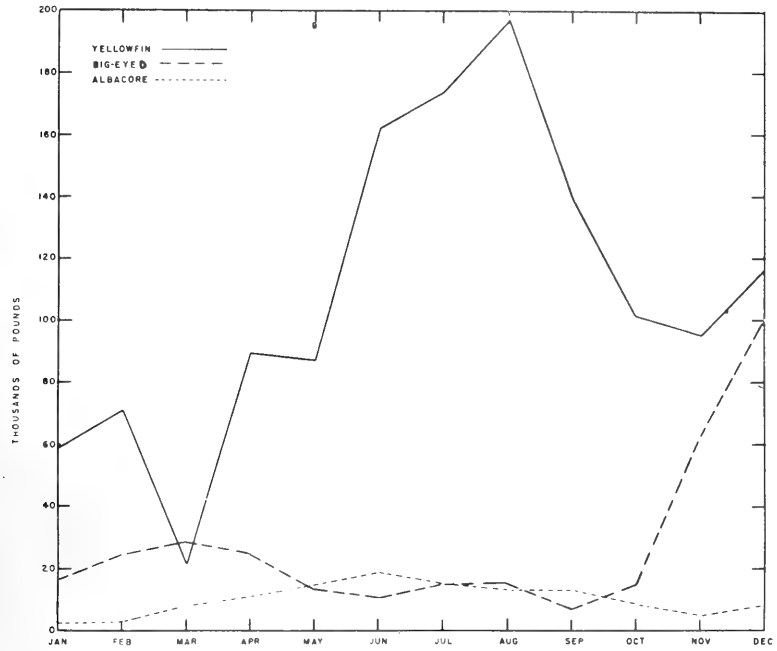


FIGURE 18 - TUNA LONG-LINE CATCH DURING 1947. DATA OBTAINED FROM THE CATCH RECORDS OF THE TERRITORIAL DIVISION OF FISH AND GAME.

of tunas and marlins each day. At present there are no facilities for disposing of large tunas except by local immediate use. Thus, the catch is about equal to

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Table 6 - Species Composition of Long-Line Catch from 87 Boat Trips Landed at Honolulu Market, March through June 1949

Month	March				April				May				June				Totals			
No. of Boat Trips	(32)				(22)				(13)				(20)							
Species	No. of Fish Caught	Pct. By No.	Lbs. of Fish Caught	Pct. By Wt.	No. of Fish Caught	Pct. By No.	Lbs. of Fish Caught	Pct. By Wt.	No. of Fish Caught	Pct. By No.	Lbs. of Fish Caught	Pct. By Wt.	No. of Fish Caught	Pct. By No.	Lbs. of Fish Caught	Pct. By Wt.	No. of Fish Caught	Pct. By No.	Lbs. of Fish Caught	Pct. By Wt.
Tuna:																				
Big-eyed	299	33.0	40,576	40.1	206	32.3	32,612	41.0	167	38.8	25,815	46.5	83	13.8	14,251	18.8	755	29.3	113,254	36.3
Yellowfin	12	1.3	1,323	1.3	49	7.7	4,502	5.6	41	9.5	5,303	9.6	220	36.6	31,549	41.7	322	12.5	42,677	13.7
Albacore	12	1.3	734	0.8	3	0.5	159	0.2	15	3.5	690	1.2	68	11.3	4,195	5.5	98	3.8	5,778	1.8
Marlin:																				
Black	64	7.1	20,491	20.3	54	8.5	18,501	23.2	25	5.8	8,648	15.6	34	5.7	10,126	13.4	177	6.9	57,766	18.5
Striped	505	55.8	37,438	37.0	302	47.3	22,061	27.5	163	37.9	13,496	24.3	175	29.1	13,788	18.2	1,145	44.5	86,783	27.8
Short-nose	13	1.5	507	0.5	22	3.4	826	1.0	17	4.0	658	1.2	17	2.8	683	0.9	69	2.7	2,674	0.9
White	0	-	0	-	2	0.3	1,226	1.5	2	0.5	860	1.6	4	0.7	1,061	-	8	0.3	3,147	1.0
Totals	905	-	101,069	-	638	-	79,887	-	430	-	55,470	-	601	-	75,653	-	2,574	-	312,079	-

Table 7 - Tunas and Spearfishes Landed at Hawaiian Ports, By Species, During 1947 and 1948

Month	Yellowfin Tuna		Big-eyed Tuna		Albacore		Striped Marlin		Black Marlin		Totals	
	1947	1948	1947	1948	1947	1948	1947	1948	1947	1948	1947	1948
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Jan.	58,277	83,257	14,496	65,161	2,327	376	15,690	33,017	17,013	17,559	107,803	199,370
Feb.	70,494	92,664	24,079	111,920	3,116	7,352	17,392	52,062	35,441	28,373	150,522	292,371
Mar.	21,955	89,162	28,472	78,764	801	3,328	20,318	46,266	29,782	29,557	101,328	247,077
Apr.	89,552	72,525	24,176	80,607	11,146	15,038	28,442	38,784	34,400	34,781	187,816	241,835
May	86,843	60,209	13,661	40,482	14,232	15,085	25,930	29,640	33,858	39,410	174,524	184,826
June	161,988	123,063	10,116	26,644	19,163	11,703	17,032	53,934	23,782	71,602	232,081	286,946
July	173,673	130,005	14,849	19,846	15,108	12,352	23,795	25,693	63,709	110,344	291,134	298,240
Aug.	197,949	132,643	15,646	15,616	13,452	11,848	56,768	27,064	77,009	94,677	360,824	281,798
Sept. ...	139,831	96,227	7,077	21,835	13,449	13,083	56,158	14,687	36,960	86,693	252,475	232,525
Oct.	101,675	71,807	14,451	40,901	8,454	9,523	42,041	22,913	39,104	65,045	205,725	210,189
Nov.	95,396	102,492	62,393	76,526	5,213	4,452	28,738	52,963	23,484	56,600	215,224	293,033
Dec.	116,616	100,444	110,702	99,128	8,211	1,925	51,804	85,155	41,649	65,760	328,982	352,412
Totals	1,314,349	1,159,598	340,118	677,430	114,672	106,065	384,008	482,168	415,191	700,435	2,568,358	3,125,726

Source: Catch records of the Territorial Division of Fish and Game.

the demand for the fresh fish. Further, since the bulk of the tunas landed are consumed as raw fish and are preferred in the fresh, unfrozen form for this purpose, fishing trips are of short duration; when several thousand pounds of fish are caught, the long-line boats immediately return to port to dispose of the catch.

Under present conditions there is little incentive to increase production, hence, there likewise is little incentive for increasing the efficiency of the gear. Certain modifications of the present gear, and the development of more refined fishing techniques, should potentially increase both the catch per unit of gear and the total catch.

The offshore fisheries appear to be capable of producing a greater catch of tunas than is presently the case. Since none of the present production is canned, or otherwise processed for shipment to other markets, there is need for outlets other than that provided by the local fresh fish market before the production of this fishery will warrant an increase. Cognizance should, however, be taken of several factors in relation to possible export marketing. The fact that marlins account for about 50 percent of the catch during the winter season means that, should a large-scale and wide-spread long-line fishery be developed: (1) gear must be devised which will select out the tunas and not catch the marlins (information on the distribution, migrations, and behavior of the species will undoubtedly be of aid in designing such gear), or (2) a market must be created for the disposal of the marlins, which, at present, are not in demand on the main land.

Tunas and spearfishes taken by long line in Hawaiian waters are almost all large fish (see cover picture). The average weights of the various species are shown in Table 8. Black marlins in excess of 1,500 pounds have been landed by the commercial boats. Brock (1949) reports that the maximum weight of the big-eyed tuna landed in these waters approaches or exceeds 300 pounds. Measurements taken on yellowfin tuna during this survey show recorded weights for this species in excess of 225 pounds. While fish of large bulk are preferred by local fresh fish markets, California canneries have a 150-pound limit on tunas. Large-sized tunas are undesirable for canning purposes because, (1) coarse muscle fibers and connective tissues produce a less fancy appearance in the pack,

Table 8 - Average Weights of the Species Taken by Long Line, Landed at the Honolulu Market, January through June 1949

Species	Average Weight
	Pounds
Big-eyed tuna	151.6
Yellowfin tuna	118.9
Albacore	61.3
Striped marlin	77.3
Black marlin	326.6
Short-nose marlin	37.1
White marlin	393.4

(2) processing of large fish tends to limit capacity of precooking equipment and complicates butchering, precooking, cooling, and cleaning procedures, since cooking time and subsequent stages of canning technique are dependant to a considerable degree upon the size of the fish, and (3) because of unfavorable quality differential with large fish, the cash return may be less per ton of raw material, and in some instances, the fish may actually be packed as chunk or grated tuna, selling at substantially less per case.

The local demand for fresh tuna is largely restricted to the Oriental peoples who prefer it as raw fish. The meat of the larger tunas generally has a higher oil content than does the meat of the smaller fish. For this reason, the large fish are more in demand for "sashimi," since it is maintained that this quality produces a superior flavor.

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SHAPIRO, SIDNEY

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REFRIGERATED LOCKER STORAGE OF FISH AND SHELLFISH

If fish are placed directly in the refrigerated locker without suitable protective treatment, several undesirable changes will take place during cold storage. A gradual loss of moisture will occur until the fish are shrunken and dried. This dehydration not only causes an unsightly appearance and alteration in texture, but also results in loss in weight and flavor. If fish with appreciable fat content are not protected from the air of the cold storage room, oxidation takes place, causing discoloration and eventually total spoilage due to rancidity.

--Fishery Leaflet 128

NOVEMBER 1949

BYPRODUCTS: Work was begun on the analyses of several hundred fish livers brought back by the Alaska exploratory vessel last spring from the northern Bering Sea area. These samples were made up largely of gray cod, lemon flounder, and yellowfin flounder but a few flathead flounder and other miscellaneous species were included. As far as is known, no vitamin A measurements have ever been made of livers from fish in this area.

REFRIGERATION: The last examination was made of 10 packs of frozen king crab after 68 to 72 weeks of storage at 0°F. Considerable variation existed in the quality of different pieces of crab meat within a single package. The presence of isolated pieces of poor quality crab meat was the limiting factor in governing the storage life of the samples.

* * *

Tests were conducted on the fillet samples processed at Gloucester for the freezing-fish-at-sea experiments after the first month of storage. Free drip, press drip, salt content, and taste tests were conducted on cod, haddock, hake, and pollock fillet samples from fish frozen round in brine and in an air blast. These samples were compared with other samples which were gutted and iced to serve as controls. From a taste standpoint the samples from frozen round fish were preferred with no preference indicated between either the freezing in brine or the freezing before an air blast. Apparently brine freezing did not materially effect the salt content of the processed fillet.

* * *

After 8 months of storage at 0°F., the fish that were first wrapped in vegetable parchment, then dipped in water, followed by wrapping in cellophane and freezing are still well coated with ice all over and show no signs of desiccation. The fish that were frozen first, then glazed and wrapped in cellophane show localized desiccation.

SANITATION: The U. S. Public Health Service has approved a grant of $10,000 to the Atlantic States Marine Fisheries Commission for the purpose of making a sanitary survey of the shellfish areas along the Atlantic Coast. The survey will be under the direction of the Fish and Wildlife Service, the primary research agency for the Commission. The industrial waste study will include: 1. Compilation and analysis of past efforts and surveys. 2. A determination of the economic value of the polluted shellfish areas. 3. Assembly of findings with recommendations.

PRESERVATION: Tests are being conducted on the use of chemical preservation for salmon eggs without the use of heat processing. Preservatives such as mono-

chloroacetic acid, sodium benzoate, chloroform, citric acid, sodium borate, salicylic acid, carbon disulfide, and sodium sulfite were tried. Sodium sulfite seems to be the most effective. Other chemicals will be tested such as the various quaternary ammonium compounds.

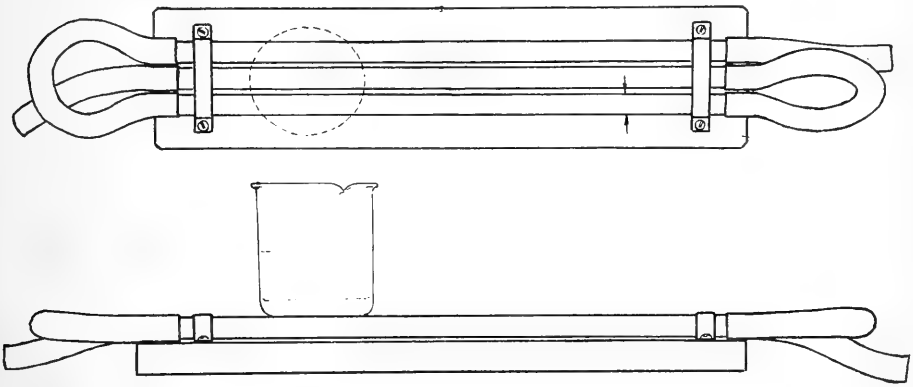
ANALYTICAL METHODS: Considerable progress was made in connection with microbiological assay of vitamin B_{12}. Reasonably good checks were obtained for the particular group of tests on samples run on different days and good recovery is being obtained when known amounts of vitamin B_{12} are added to the samples.

Work has begun on biotin assays.

* * *

TECHNICAL NOTE NO. 2-APPARATUS FOR EVAPORATION OF LOW-BOILING, INFLAMMABLE SOLVENTS

A device for evaporating low-boiling inflammable liquids, such as carbon disulfide, is shown in the figure.



DEVICE FOR EVAPORATING LOW-BOILING, INFLAMMABLE SOLVENTS.

It is made from pieces of glass tubing 3/8 inch in diameter and 15 inches long. These are connected together by rubber tubing, as indicated in the diagram. Heat for the evaporation of the solvent is supplied by passing hot water through the glass tubing.

Soft copper tubing can be used in place of the glass. The copper has the advantage that it can be bent easily to conform to the shape of the evaporating vessel. Thus, where a beaker is used, both the bottom and side of the container can be heated.

--Roberto Mercado, Graduate Student
University of Washington School of Fisheries
Seattle, Washington

Additions to the Fleet of U. S. Fishing Vessels

During October this year, 74 vessels of 5 net tons and over received their first documents as fishing craft--24 less than in October 1948, according to the Bureau of Customs of the Treasury Department. California led with 12 vessels, followed by North Carolina and Alaska with 8 vessels each. During the first 10 months of 1949, a total of 878 vessels were documented, compared with 1,060 during the same period in 1948.

Vessels Obtaining Their First Documents as Fishing Craft, October 1949

Section	October		Ten mos. ending with Oct.		Total
	1949	1948	1949	1948	1948
	Number	Number	Number	Number	Number
New England	3	1	30	43	52
Middle Atlantic	2	1	41	37	40
Chesapeake Bay	7	5	62	50	59
South Atlantic and Gulf	36	51	309	474	541
Pacific Coast	15	30	308	330	348
Great Lakes	2	6	35	42	51
Alaska	8	3	88	75	81
Hawaii	1	1	4	9	12
Unknown	-	-	1	-	-
Total	74	98	878	1,060	1,184

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

ECA Procurement Authorizations for Fishery Products

No fishery products were included among the procurement authorizations for commodities and raw materials announced by the Economic Cooperation Administration during November 1949. Authorizations for fishery products in November 1948 amounted to $4,752,000.

The total authorized for fishery products since the beginning of the ECA program on April 1, 1948, through November 30, 1949, was $33,961,911, somewhat lower than the total through October 31, 1949, due to several decreases in authorizations during the month. During November there was a decrease of $43,000 in an an authorization of $162,000 for the purchase of whale and fish oil from the United States and Possessions for delivery to Korea; a decrease of $1,000 in an authorization for salt fish procured from Canada for delivery to Italy; and a decrease of $335,000 in an authorization for salt fish to have been procured from Newfoundland for delivery to Italy. The last transaction involved a decrease in quantity while the other two were due to adjustments in prices.

ECA on November 6 announced plans for publishing a directory of the names and products of American small business firms for the attention of overseas buyers. Names and products of small independent firms desiring to enter or continue to export trade under the Marshall Plan will be listed in a directory which will be distributed by ECA overseas missions to European importers and other buyers, and will serve as a ready reference to available American sources of supply. To compile the directory, ECA asked small business firms to register by December 10, 1949. This directory is another step in ECA's five-point program to give small firms greater opportunities to share in European recovery orders placed by foreign buyers in the United States. ECA was instructed by Congress to make available to prospective purchasers overseas information regarding products and services produced by small U. S. independent enterprises.

A series of four regional meetings for the extension of the small business field counseling service to various parts of the country were held in Dallas, Los Angeles, San Francisco, and Boston by ECA the latter part of November and the early part of December. Objective of the meetings was to obtain the cooperation of business and banking leaders and export specialists who will act as volunteer, unofficial counselors to small businessmen interested in examining the possibilities of exporting under the Marshall Plan.

Although Western Europe took further strides towards economic recovery and political stability in the second quarter of 1949, ECA on November 15 in its fifth report to Congress asserted that Europe's inability to convert her growing output and increased volume of trade into a reduction of the dollar gap remained a basic problem. The report, covering the period April 3 to June 30, 1949, pointed out that total exports of Marshall Plan countries were at a postwar high but that shipments to the United States fell off and dollar earnings declined.

The November issue of ECA's Recovery Guides stated that following devaluation of their currencies at the end of September, the ERP countries now have the opportunity to undertake further measures required to achieve equilibrium and freedom in world trade. The report continues:

> "While these measures will take many and varied forms, they must all work towards:
>
> "(1) Reallocating resources and production away from the domestic market and towards the foreign market, and away from the soft currency areas and towards the hard currency areas, and
>
> "(2) Freeing world trade from tariff barriers, quota restrictions, exchange controls, price discrimination and inadequate production."

Federal Purchases of Fishery Products

DEPARTMENT OF THE ARMY, OCTOBER 1949: Purchases of fresh and frozen fishery products by the Army Quartermaster Corps during October 1949 for the U. S. Army, Navy, Marine Corps, and Air Force for military feeding totaled 1,650,325 pounds (valued at $559,252). This was a decline of 12 percent in quantity and 13 percent in value, compared with September 1949; and an increase of 9 percent in quantity, but a decline of 1 percent in value, compared with October 1948.

Purchases of Fresh and Frozen Fishery Products by Department of the Army
(October and totals for ten months, 1949 and 1948)

QUANTITY				VALUE			
October		January-October		October		January-October	
1949	1948	1949	1948	1949	1948	1949	1948
lbs.	lbs.	lbs.	lbs.	$	$	$	$
1,550,325	1,516,239	14,513,157	14,188,555	559,252	566,426	4,835,617	5,063,245

Total purchases for the first ten months this year were 3 percent higher in quantity, but 5 percent lower in value, compared with the corresponding period the previous year.

Fishery Biology Notes

"ALBATROSS III": Savings Gear Studies (Cruise 29): Studies of the size, number, and weight of fish of various species taken by the savings gear were continued on Cruise 29 (September 25-29, 1949) of the Albatross III, research vessel of the Service's North Atlantic Fishery Investigations.

Four mesh sizes were compared in these experiments, mainly on rosefish. Large numbers of rosefish were caught by the tows made on this trip.

THE ALBATROSS III, AT THE DOCK AT BOSTON, GETTING READY FOR A CRUISE.

This is the last cruise to be made by the Albatross III this year in the New England area.

"ALBATROSS III" TO OPERATE OFF NORTH CAROLINA: An increase of $20,000 was appropriated for the continued operation of the Albatross III this winter. The added operating time will be spent in a series of cruises for two months in waters off the North Carolina coast and in hydrographic and oceanographic studies on the trip to and from Morehead City, N. C.

Around 120 one-hour drags are planned, and an extensive tagging program is being arranged to provide knowledge concerning the migration pattern of fishes south of Cape Hatteras.

RHODE ISLAND HARD CLAM INVESTIGATION: A preliminary report has been made by the Service's Clam Investigations on a study of the intensive quahaug (hard clam) fishery operated by tonging, raking, and power dredging methods in Rhode Island's Narragansett Bay. The industry and the State Conservation Department asked the Service to settle the controversy over the merits of tonging versus dredging.

About 1300 diggers conduct tonging the year round in every unpolluted part of the Bay. Power dredging, permitted only in part of Sakonnet River from December 1 to March 31, supports less than 35 boats.

TONGING

Tongers claim that power dredges tear up the bottom, kill seed and break many marketable-sized clams. Dredgers contend that their operations cultivate the bottom, prevent silting, and increase setting. The latter want additional beds (those which are too deep for hand tongers) opened for use of power dredges.

To resolve the issue, three experimental areas were selected: one to be dredged; the second, raked or tonged; and the third, a control area.

Removal of the same quantity of quahaugs from each quarter of the two test plots (not the control plot) showed that fishing intensity was constant for the two areas. Observations were made of breakage by the tonging and dredging method, and of age and size composition of catches. Time records showed catch per unit of effort. Tests were completed in late September 1949 and will be repeated in 1950.

During the last quarter of 1949, underwater photographs were taken in each test area and in the control plot to determine relative effect of each harvesting method on the bottom and on bottom life. Samples were taken to determine setting in each quarter of each tract to see if dredging or raking, or both, hurt newly set quahaugs or if the bottoms had been cultivated and setting improved.

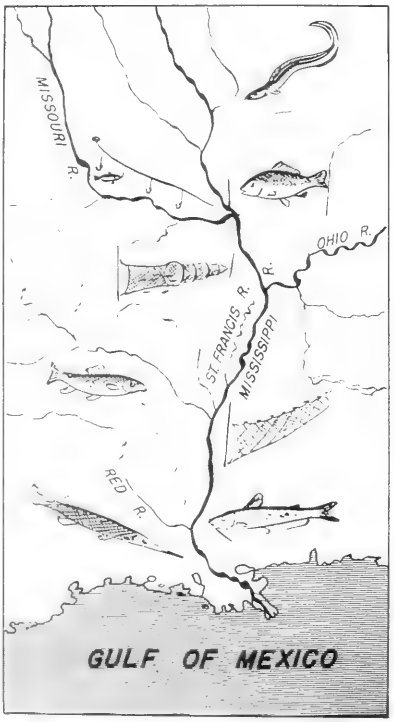
SHAD INVESTIGATION PROGRAM: A tentative program for the investigation of the shad fishery under the additional appropriation recently granted by Congress was presented by the Service's Middle and South Atlantic Fishery Investigations and was approved by the Atlantic States Marine Fisheries Commission on December 9,

substantially as presented, with the suggestion that it include a complete compilation of all published or unpublished material dealing with shad.

Major features of this program include determination of the size of the stock at various stages of life; measurement of the effect of natural conditions, fishing intensity or other man-made conditions on the stocks; measurement of mortality rates; and surveys of streams where shad populations are not now well known, particularly in the Southern States. Proposals for restoration of badly depleted runs include design of fishways for dams, recommendations for pollution abatement, and recommendations for management of the fisheries.

The first season's work will be concentrated principally in the Hudson River, but with some activity on Chesapeake Bay and in New England.

Missouri's Commercial Fish Catch, 1948



In 1948, the catch of fish taken from the Missouri sections of the Mississippi, Missouri, and St. Francis Rivers, was 962,718 pounds reports The Missouri Conservationist for September 1949. Of this amount, Missouri River fishermen reported 491,896 pounds; Mississippi River fishermen, 429,511 pounds; and St. Francis River fishermen, 41,311 pounds.

Carp composed the largest percentage of the take on the three rivers; 49.8 percent of the Mississippi catch, 64.0 percent of the Missouri catch, and 40.5 percent of the St. Francis catch. Buffalo ranked second in the catch on the three rivers. Flathead catfish ranked third in the Missouri and St. Francis Rivers, and fourth in the Mississippi. Drum ranked fourth in the Missouri and St. Francis catch, and third in the Mississippi River. Other species reported taken included bullheads, channel catfish, grindle, sturgeon, suckers, quillback, gars, eel, and paddlefish.

Although the hoop-net continued as the most-used type of gear on the three rivers, the trammel net is also used intensively on the Missouri River, where the catch by the latter gear almost equalled the hoop-net catch. More permits for commercial fishing were issued in 1948 than in 1947, and each type of gear, except the seine, was operated for a greater number of days in 1948 than in the previous year.

New Philippine Import Restrictions Will Affect United States Exports of Fishery Products

An analysis of the effect of the Philippine import quota restrictions (as revised November 30, 1949) on United States fishery products made by the Office of International Trade, U. S. Department of Commerce, indicates that the new restrictions will result in a reduction in the Philippine importations of United States fishery products.

Table 1 - Effect of Applying the New Philippine Quota Restrictions on that Country's Total Value of 1948 Fishery Products Imports from all Countries

Commodity	Actual Value of Imports, 1948	Value of Imports Under New Import Restrictions
	U.S. $ Value (in thousands of U. S. dollars)	U.S. $ Value Under New Quota
Canned:		
Abalone	126.0	25.2
Anchovies	729.0	145.8
Cuttlefish	1,158.5	231.7
Herring	501.5	100.3
Mackerel	6,510.5	1,302.1
Salmon	1,219.5	243.9
Sardines	3,195.0	1,597.5
Dried, smoked, salted, or cured:		
Codfish	50.5	10.1
Shrimp	201.0	40.2
All other dried	115.0	23.0
All other fishery products.	348.5	69.7
Total	14,155.0	3,789.5

Table 2 - Percentages of Certain U. S. Fishery Products Exported to the Philippines, January through October 1949 (based on quantity)1/

Commodity	% of Total Exports Consigned to the Philippines
Canned:	
Sardines	56
Mackerel	46
Squid	46
Herring	15
Salmon	6
Tuna	6
Other, except shellfish.	30
Dried:	
Shrimp	37

1/Based on U. S. Bureau of Census statistics.

Total imports of edible fishery products into the Republic of the Philippines during 1948 were valued at 28,310,000 pesos (approximately $14,155,000), according to that country's official import statistics. The new quota, effective December 1, 1949, will permit imports of 50 percent by value of the canned sardines and 20 percent by value of all the other edible fishery products imported during 1948. On this basis Philippine imports during the 12 months beginning December 1, 1949, may total only $3,789,500 from all sources (See table).

It is conceivable, under the new restriction, that United States exports of canned sardines to the Philippines will be held below 200,000 cases (9,000,000 pounds) annually, compared with exports during the first 10 months of 1949 of about 945,000 cases (42,534,593 pounds). (This estimate is computed by using 50 percent of the dollar value of U. S. exports to the Philippines in 1948 and a price of $6.00 a case of 45 pounds for 48 one-pound oval cans in tomato sauce. Total canned sardines imported into the Philippines in 1948 from the United States were valued at 4,500,000 pesos or $2,275,000.)

Canned sardines were also imported by the Philippines in 1948 from Canada ($561,500), Mexico ($320,500), and Portugal ($38,000), therefore, United States exporters must successfully meet the competition from these other countries if they expect to exceed the 200,000 cases.

The dollar value of other fishery products imported into the Philippines from the United States in 1948 was $9,455,000, and from other countries, $1,505,000.

NOTE: Conversion to United States dollars has been made on the basis of one Philippine peso equals 50 cents U. S.

New York State's Production of Salt-Water Fishery Products, 1948

The 1948 New York State commercial catch of fish and shellfish within the marine district and the State's offshore catch amounted to 308,770,150 pounds, valued at $15,088,507 to the fishermen. Among the fish, the catch of menhaden for reduction purposes exceeded that of all other species. The leading food fish landed in the State was scup. Landings of the leading shellfish in the order of their importance were: oysters, hard clams, and surf clams.

New York State Marine Landings of Fishery Products, Quantity, and Value to the Fishermen, 1948[1/]

Leading Species	Quantity	Total Value	Average Price	Leading Species	Quantity	Total Value	Average Price
FISH:	lbs.	$	¢ per lb.	FISH: (Cont.):	lbs.	$	¢ per lb.
Cod.....	1,740,239	242,633	13.94	Scup (Porgy) ..	6,073,885	485,711	8.00
Flounder ..	1,522,341	121,787	8.00	Sea bass	2,307,454	369,233	16.00
Fluke	2,307,052	507,551	22.00	Squid	1,053,899	105,390	10.00
Haddock ...	1,773,899	212,867	12.00	Yellowtail	2,680,250	375,225	14.00
Mackerel ..	2,497,602	349,664	14.00	Other fish	7,105,664	899,734	12.66
Menhaden ..	126,162,900	1,261,629	1.00	Total fish ..	155,225,185	4,931,424	3.18
SHELLFISH:				SHELLFISH (Cont.):			
Clams:				Oysters	69,319,005	4,621,265	6.67
Hard	53,547,320	2,679,416	5.00	Scallop meats .	3,283,209	1,824,005	55.56
Surf	23,525,200	588,130[2/]	2.50[2/]	Other shellfish	2,403,601	381,602	15.88
Mussels .	1,466,630	62,665	4.27	Total shellfish.	153,544,965	10,157,083	6.62
Grand Total					308,770,150	15,088,507	4.89

1/ Weights given are as landed. Weights for shellfish include shell, except for scallops. Only species with landings of over one million pounds are listed individually, with others groups under "other fish" or "other shellfish."
2/ Represents value after shucking.

Pacific Oceanic Fishery Investigations

"HENRY O'MALLEY" SHAKEDOWN CRUISE (CRUISE NO. 1): The exploratory fishing vessel, Henry O'Malley, departed on a shakedown cruise on November 28 after spending a day in Pearl Harbor to obtain a small supply of nehu for live-bait fishing operations. This vessel, the first of three fishery research vessels to be completed for the Pacific Oceanic Fishery Investigations, returned on December 7 after a cruise of 11 days in the vicinity of the Hawaiian Islands, the Director of the Service's Pacific Oceanic Fishery Investigations announced at Honolulu.

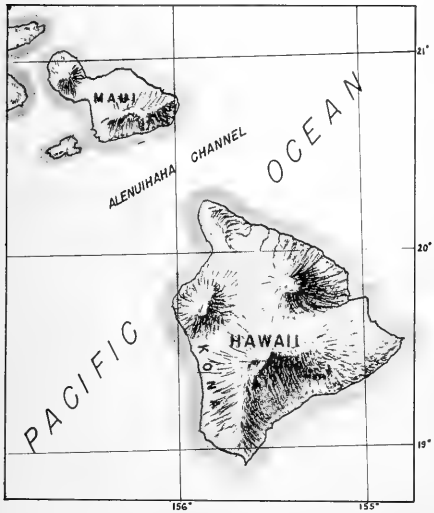
Unfavorable weather conditions hampered operations the greater part of the voyage, but the fishery engineers and crew of the vessel were able to extensively test the equipment aboard and to determine necessary modifications. These changes in design will be incorporated into the equipment before the vessel departs on a long-range exploration for tunas in the region of the Hawaiian Islands and the Equator.

On this voyage, the vessel and gear were tested on a semicommercial scale to determine if the equipment is ready for a prolonged exploratory fishing voyage to the vicinity of the Line Islands and Canton Island in the counter-equatorial current region.

Four types of bait nets and equipment for catching live bait both at night and during the day have been constructed. These have been designed to catch bait in the western part of the Hawaiian Archipelago and the Line Islands where explorations will be conducted to find new sources of bait.

The vessel is fitted with pole and line gear similar to that now used in the local aku fishery except that the rigs can be operated by one man or teams of two and three men to catch large fish. Since it is known that tunas frequently are found at subsurface levels, the vessel has also been fitted with gear for trolling at depths down to 100 fathoms. This method of fishing which has been developed in the Pacific Northwest for catching salmon, if successful, would be a revolutionary development in the methods of catching tuna since lures resembling the action of live fish can be trolled at intermediate depths and only a few men are required to operate the gear. The Henry O'Malley is also fitted with a bathythermograph for determining the depth of the thermocline which is the junction level of the relatively warmer upper layer of the ocean and the colder layers at greater depths. It is quite possible that a greater amount of food exists in this area than above or below it and the temperature observations may indicate favorable depths for exploratory fishing by trolling methods. The vessel will later be fitted with a string of flagline gear similar to that used by the local aku boats to further explore the subsurface levels of the ocean for new tuna fishing grounds.

The Henry O'Malley is 128 feet in length, with a 29-foot beam and a draft of 15 feet. Propelled by a 560 hp. diesel engine, it also has auxiliary electric power supplied by two 125 kw. diesel electric generator sets for operating various types of auxiliary machinery and providing refrigeration.



"HUGH M. SMITH" SAILS: The biological and oceanographical research vessel left December 8 for a training and shakedown cruise in Hawaiian waters.

This 16-day cruise is being conducted for the purpose of testing various special equipment for catching tunas and other fishes, equipment for taking water samples from the depths of the sea, and special equipment used in collecting fish eggs and larvae and other biological materials, and for training the ship's personnel in the operation of this gear.

Tests will be conducted in waters south of Maui and off the Kona Coast of Hawaii. In the course of this cruise, observations will also be taken at a series of stations to the southwest of Hawaii extending offshore to a distance of 120 miles, for the purpose of obtaining information on the ocean currents of that region which are presumed to be related to the occurrence of tuna.

After completion of the trial cruise, it is expected to send this vessel on an extended oceanographic cruise to the equatorial region in the vicinity of the Line Islands shortly after January 1.

Wholesale and Retail Prices

On November 15, 1949, the wholesale index for all foods was 151.5 percent of the 1926 average, 0.4 percent lower than on October 18 and 7.6 percent lower than on November 16 a year ago.

Canned pink salmon prices in November remained firm and were 32.3 percent lower than in November 1948. On the other hand, canned red salmon prices during the month were 5.0 percent higher than in October, but still 3.0 percent lower than in November a year ago.

Wholesale and Retail Prices

Item	Unit		Percentage change from--	
Wholesale: (1926=100)		Nov. 15, 1949	Oct. 18, 1949	Nov. 16, 1948
All commodities	Index No.	151.5	-0.4	-7.6
Foods	do	159.8	-0.4	-8.9
		Nov. 1949	Oct. 1949	Nov. 1948
Fish:				
Canned salmon, Seattle:				
Pink, No. 1 Tall	$ per doz. cans	3.94	0	-32.3
Red, No. 1 Tall	do	6.378	+5.0	-3.0
Cod, cured, large shore, Gloucester, Mass.	$ per 100 lbs	15.50	0	+3.1
Retail: (1935-39=100)		Nov. 15, 1949	Oct. 15, 1949	Nov. 15, 1948
All foods	Index No.	200.8	0.1	-3.2
Fish:				
Fresh, frozen & canned	do	300.6	-2.0	-8.4
Fresh and frozen	do	266.4	-0.7	-0.6
Canned salmon:				
Pink	¢ per lb. can	48.2	-4.6	-21.2

Retail food prices on November 15 showed an increase of 0.1 percent over October 15 this year, but were 3.2 percent below November 15, 1948. Fresh, frozen and canned fishery prices did not follow the same general trend and on September 15 were 2 percent lower than in mid-October and 8.4 percent below mid-November 1948. This is the third month that this index dropped below the corresponding period a year ago. In mid-November, the fresh and frozen fishery products index was 0.7 percent lower than mid-October this year, and 0.6 percent below November 15, 1948. Retail prices for canned pink salmon continued to decline and were 4.6 percent lower on November 15 compared to the previous month, and 21.2 percent lower than mid-November 1948.

Algeria

MODERN FISH CANNERY OPENED: One of the most modern fish canning factories in Algeria went into operation during October, according to a November 4 report from the American Consulate General at Algiers. It is expected that the cannery will produce some 40,000 cans of fish daily, and will utilize approximately 200 workers.

Australia

TUNA SURVEY IN NORTHERN AUSTRALIAN WATERS: A comprehensive pelagic fish survey in the waters of northern Australia has been carried out by two vessels of the Commonwealth Scientific and Industrial Research Organization of Australia, according to a November 23 announcement from that agency.

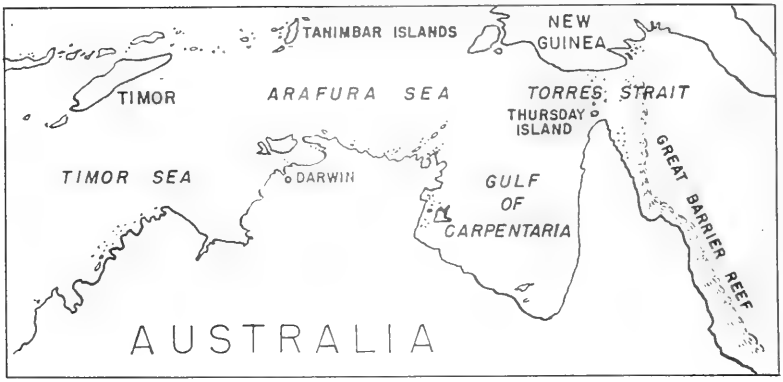
One vessel operated westwards from Thursday Island across the Gulf of Carpentaria to the 125th meridian, while the other worked simultaneously in the adjoining area westward, off the north-west coast of Australia. Both vessels have been at sea since mid-July.

The main objectives of the survey were to determine the occurrence and approximate abundance of tuna. Frequent schools of northern bluefin and mackerel tuna were at times encountered, principally between Darwin and Timor, and some of these were of considerable magnitude. Many were captured on the trolling lines, but the individual fish which were caught were smaller than those taken farther south on both the east and west coasts of Australia and they rarely exceeded 10 pounds in weight.

A most important biological discovery was the capture of a specimen of tuna about 1½-inches long, and it would appear that these northern waters constitute a breeding and nursery ground for this fish. Only two other tuna breeding grounds are at present known, these being in the Mediterranean and near Costa Rica.

Excellent weather, in which the large nets used elsewhere for the capture of tuna could be readily handled, was experienced to the west of Darwin throughout the period spent there, but in the Gulf of Carpentaria and eastwards conditions were rougher.

Reefs and banks yielded catches of pike, north-west snapper, three species of Spanish mackerel, red bass, sweetlips, sharks and many other kinds of fish. Of the big game fish, wahoo and swordfish were encountered.



At the conclusion of the tuna survey one ship spent four weeks at Thursday Island on work connected with investigations being undertaken there on pearl shell culture.

Canada

BRITISH COLUMBIA 1949 TUNA SEASON: Although British Columbia's 1949 tuna fishing season was shorter than 1948, the catch of 2,200,000 pounds was slightly higher and fishermen received $350 a ton, according to the Canadian Fisheries Department Trade News of October 1949. The previous year the catch amounted to 2,174,000 pounds, valued at $990,000 to the fishermen.

The 1949 price was much lower than in 1948 when packers suffered a substantial loss. Practically all of the 1949 tuna catch was sent to the United States for processing. Federal fisheries patrol vessels scouted wide areas of the Pacific, in the early days of the 1949 season. Several large areas of blue water, registering fairly high temperatures and showing signs of plenty of food, were discovered, indicating favorable tuna school conditions. While tuna were undoubtedly present, they seemed shy of the lures and few were taken.

Early in August, extensive runs were encountered off the West Coast of Vancouver Island. Between 60 to 70 Canadian vessels enjoyed excellent catches as weather conditions were ideal. On August 8 one boat landed 585 tuna.

This year the albacore tuna fishing showed a marked change from that of 1948. The tuna runs appeared at least two weeks later in the season and were of shorter duration. In 1948 the main catches were taken in offshore waters near the Queen Charlotte Islands with very light catches from more southerly waters. This year the bulk of the Canadian catch was taken in waters off the Washington and Oregon coasts. The tuna did not appear to any extent off the Queen Charlotte Islands in 1949.

Denmark

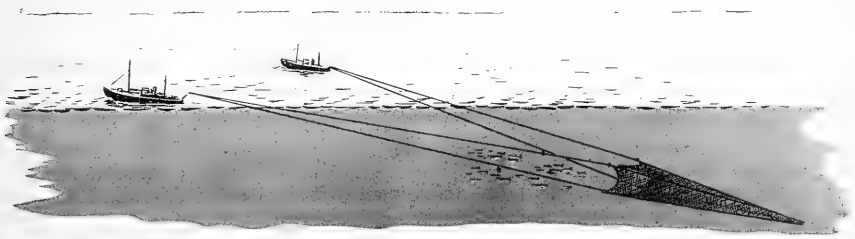
THE DANISH FLOATING TRAWL[1/] (A New Invention for Fishing in Middle Waters), by A. Strubberg*: The principal gear used in sea-going fishing all over the world is the trawl. It takes various forms, but generally speaking it is a large bag net that is dragged along the bottom by the vessel to which it is attached. Fishing in the upper or middle waters--pelagic fishing--on the other hand, has been carried out almost exclusively by hooks, long lines, and purse seines (ring nets). These are not moved forward but fish only at the place where they are set out. The same to some extent is true of the various types of drift net--another principal implement of pelagic fishing--because they move only passively with the current.

When the Danish scientific marine investigations began in the North Atlantic in 1903, the implement used for catching pelagic fish fry in the open ocean, during the first few years, was a small type of otter trawl. It was made of very light material and was kept open while the vessel was dragging by two small wooden boards. Later, this "young fish trawl" was replaced in investigation work by large conical bag nets, the mouth being held open by a circular iron ring 1-2 metres in diameter.

In practical fishing, however, the trawl has never been used for true pelagic fishing. Exceptions to this rule are very few places--e.g. in the Mediterranean--where a light bag-shaped net stretched between two vessels is dragged at or near the surface.

It is only in very recent years that the attention of several countries has been directed towards devising a practical gear for catching shoal fish in middle waters between the bottom and the surface. The first to succeed in constructing a pelagic drag net--the so-called floating trawl--was Mr. Robert Larsen, a Danish netmaker of Skagen. This floating trawl was first used in the winter and spring of 1948-49, when it contributed materially to the great yield from the Danish herring fisheries in the Skagerak that season.

The actual trawl or bag net used in the herring fisheries is 50-60 metres long with an opening at the front that is 15 metres high and about the same wide. The meshes of the bag diminish towards the end--from 70 mm. to 60-50-40 mm. aft, and 18 mm. (in herring trawling) and 11 mm. (sprat trawl) at the extremity. The "ground rope" is loaded with 6-8 kilos (13-17½ pounds). The floaters on the headrope are removable if desired. The net is dragged between two vessels by four warps fixed two to each side of the trawl mouth, the top warp going to the



THE TRAWL IN OPERATION

*of the Danish Ministry of Fisheries.

1/ This article appeared in the Danish Foreign Office Journal, July-September 1949, No. 3.

forward gallows of the towing vessel, the bottom warp at the same side of the bag mouth to the after gallows of the vessel. The warp is separated from the net bag by long ropes called "bridles." The top one is a 20-fathom, 3-4 inch Manila rope, the bottom one a 23-fathom rope loaded with chain or iron sinkers of about 60-70 kilos (132-154 pounds). The connection between warps and bridles is formed by slip hooks, which facilitate rapid unshackling when the vessels approach one another after about 15 minutes' towing. The bridles are taken aboard by the cutter which hauls the trawl. The actual hauling is effected by pulling in the bottom lines, whereupon the mouth of the trawl is closed and the gear rises to the surface.

The implement is towed between two cutters, which work side by side at a distance of 100-250 metres, and it is chiefly used at night. The gear is regulated to the depth of the herring shoal, as indicated by the vessel's echo-sounding device, by shooting the warps as required.

The depth at which the trawl works is greatly dependent on the length of warp employed and the speed at which the implement is towed. Experience gives some degree of certainty in assessing the approximate working depth from these factors, but a device has been produced which increases this certainty. This is an angle gauge which is attached directly to the warp and from which the angle between the surface and the position of the warp can be read. With the aid of a special table the depth of the implement can then be calculated with ease. The angle gauge is a relatively cheap instrument.

With the appliances, a floating trawl at present costs not quite Kr. 4,000 (approximately $579). The cost of an echo-sounding device and its installation is about Kr. 15,000 (approximately $2,172).

A number of cases have occurred where the floating trawl has been towed into a shoal of herring so large that it has burst and the catch has been lost. To avoid this loss of both catch and time a Danish fisherman has designed a "catch measurer." The increasing pull of the fish in the trawl is registered electrically, enabling a constant control to be kept on the amount of fish in the gear. This can then be hauled when a convenient catch has been made.

The measurer is placed on the boat deck, where the load in the trawl can be read at any time. It works on the principle that the pull in the trawl is transmitted to a compression spring which switches on an electric current when the pull has reached a certain strength.

This instrument, for which a patent has been applied for, has been tested out in only a few vessels as yet but seems to function as intended.

The good experience which Danish fishermen have had with the floating trawl so far has caused it to be installed in a large number of vessels, though up to now it has been used in practice for herring and sprat fishing only. Much interest has been shown in it in fishing circles in other countries.

It is probable that, with heavier material and larger meshes, the gear can be used for fishing other shoal fish — e.g. mackerel — but no experience is yet available. A floating trawl specially adapted for catching cod is being tested by Danish fishermen working this summer off West Greenland.

It will be necessary to change many details in the implement and the method of using it, when it is employed for catching fish other than herring and for fishing in other waters. But there is every sign that Danish ingenuity has succeeded once again in giving to sea fishing a new, practical and effective gear — a means of exploiting the wealth of fish in the ocean a great deal more efficiently than has been possible in the past.

NOTE: Values converted on the basis of one Danish kroner equals 14.4778 cents U. S.

France

NEW FISH MEAL PLANT UNDER CONSTRUCTION: A new factory is under construction on the coast of France about 40 miles northeast of Le Havre which will manufacture feed for livestock. Fresh fish will be the principal raw material, according to a December 5 report from the American Consul at Le Havre.

German Federal Republic

FISH OILS: For more than 10 years, the consumption of fats and oils in Germany has been restricted due to the insufficiency of supply, states a September 30 report from the American Consulate at Bremerhaven. Strenuous efforts have been made to develop domestic sources of edible fats and oils, and fish oil has become a highly prized commodity. Growing supplies of imported fats and oils are decreasing the demand for fish oil and fish fat, and black-market prices are little above the official prices. However, sea fish still are of importance in Germany's fats and oils supply, accounting for about 10 percent of the domestic production or about 2 percent of the total consumption.

Fish oil is produced in two ways. Fish liver oil is produced on the catching vessel at sea by the simple steam process which extracts between 70 and 80 percent of the oil contained in the livers. Ordinary fish oil is extracted by the fish meal factories ashore from inedible fish waste. From both types of fish oil, an edible, odorless and tasteless fat is being produced by several companies. According to the producers, the fat can be used unblended for any cooking purpose.

Only certain types of sea fish are used in Germany as a source of liver oil. The cod and haddock are the two principal sources, although ling and dogfish are also treated. When the extraction process is carefully and efficiently carried out, about 2.6 gallons of liver oil are obtained from a metric ton of cod or haddock. Yearly production of fish liver oil in Germany is estimated now to be around 317,000 gallons per year. Only a small proportion of this is used for medicinal purposes.

The ordinary fish oil is obtained as a byproduct by the fish meal factories and fish smoking plants, and is quantitatively more important as a source. This ordinary fish oil is obtained in the fish meal factories by grinding and pressing fish waste. During the herring season, additional quantities of oil are produced by collecting the drippings from the herring being smoked. The yearly production in Bizonal Germany is estimated to be around 1,321,000 gallons. Some of this oil is used in paint manufacture.

Despite processers' claims that unblended fish fat is suitable for all home-cooking uses, the average consumer does not seem to value fish fat very highly. When conditions return more to normal, it is expected that fish oils will be used either for paint or for blending into edible fats.

* * * * *

NEW TRAWLERS PLANNED: One Bremen trawler company has plans ready for the construction of a fishing vessel 560 gross registered metric tons, according to a December 2 report from the American Consulate at Bremen. Although German trawling circles successfully pressed their demand to build trawlers up to 650 metric tons, the fact that the trawler speed is still restricted probably will prevent German firms from building up to the 650-ton limit prescribed in the agreement of 1949 between the Allied High Commission and the German Government.

* * * * *

PRESENT RESTRICTIONS ON GERMAN SHIPBUILDING RELAXED:[1/] The terms of agreement reached by the three powers for the relaxation of the present restrictions on German shipbuilding were communicated by the High Commission to the Chancellor and are included in the text of protocol of agreements reacned between the Allied High Commissioners and the Chancellor of the German Federal Republic on November 22, 1949. This text was made public by the U. S. Department of State on November 24, 1949.

With reference to German shipbuilding, the main provisions now agreed upon are as follows:

> The construction of ocean-going ships excluding those primarily designed for passengers, and tankers up to 7,200 tons, fishing vessels up to 650 tons and coastal vessels up to 2,700 tons not exceeding 12 knots service speed may begin forthwith. The number of such ships to be constructed shall not be limited.
>
> The Federal Government may, with the approval of the High Commission, acquire or construct before December 31, 1950, six special ships exceeding these limitations of size and speed. Further particulars on this point were communicated to the Chancellor.

1/ Also see Commercial Fisheries Review, May 1949, page 41.

Republic of Haiti

UNITED NATIONS MISSION RECOMMENDS EXPANSION OF FISHERIES: Desiring to take advantage of United Nations technical asistance in planning for the economic development of Haiti, the Haitian Government on July 10, 1948, requested a United Nations Technical Mission to examine the problems of and the conditions affecting the economic development of Haiti primarily in the fields of agriculture, fisheries, industry, and related activities.

With reference to fisheries, the report of the United Nations Mission of Technical Assistance to the Republic of Haiti (Mission to Haiti) released in July 1949 contains the following recommendations:

As concerns fishing waters, both coastal and inland:

1. Appropriate regulation should be instituted to guard against pollution by industrial waste (such as pulp from sisal decortication and pulp and fermenting juices from the processing of coffee) causing destruc- of fish;

As concerns marine fisheries:

2. As the logical course for Haiti to pursue is to concentrate on raising the output of the present fishery industry within its traditional frame, measures should be taken, by means of gradual introduction of new methods, by making available better equipment, and by propagating the use of such methods and equipment, to improve the yield of that industry;

3. To assist in fostering the development advocated in recommendation 2, the Government may sponsor a modest project for experimental fishing, helpful in detecting needs and in testing modifications and improvements in methods, procedures and equipment which would be worth while trying in the local fishery; a model fishing vessel, power driven and relatively small in size should be provided for operating this project;

4. As reliable information on the occurrence in Caribbean open waters of oceanic migratory fish--a seafood resource of great potentiality--would be of value to all the countries in the region, the possibility of instituting a thorough survey, jointly sponsored by them, for seeking that information and for determining the characteristics and catchability of the species passing through these waters should be explored; while Haiti cannot alone undertake any large-scale experiment of this nature, judicious steps to encourage the reporting of relevant observations by operators in Haitian and adjacent waters may well be considered;

As concerns fish culture:

5. Since fish culture in ponds seems the only means capable of expanding the supply of fish from local resources (as distinct from supplies obtained through import) to a volume reasonably close to total consumption requirements, the Government should give full consideration to the feasibility of developing pond culture on an intensive scale (that very real difficulties would be encountered in the realization of that development must be fully recognized; considerable experimentation calling for expert advice would be needed);

6. Before deciding on a programme of pond culture development, the services of a first-rate specialist familiar with successful practices in other countries should be secured for making an extended survey; if in the light of such survey decision is taken to embark seriously on fish farming, the specialist should be retained for a number of years to lay out pilot operations and supervise their implementation; further, steps should be taken to train at least two local men in the principles of fish culture, these men to be responsible for following up the plans of the specialist;

7. As there is need for efficient pond culture throughout the Caribbean, the possibility of enlisting the co-operation of the various countries of the region in a jointly sponsored programme of research and experimentation under supreme guidance of one and the same specialist should be explored;

As concerns processing, handling and marketing of the fish:

8. Active steps should be taken for improving the quality of the processed fish supplied to the market--to this end a much better grade of local solar salt than is now used should be produced, which could, in fact, be done without any great increase in cost;

9. As salting is the cheapest and most acceptable method for processing fish under Haitian conditions, careful and continued experiments should be undertaken at once to determine the best methods for wet and dry salting of the various types of fish under the particular climatic conditions obtaining in the different parts of the country;

10. While there is little immediate need for additional facilities for the handling and marketing of the fish, organized measures should be taken for improvement of these facilities and for their amplification in the event of a substantial expansion of the fish production.

LOCALLY-BUILT BOATS USED IN FISHING AND TRANSPORT ARE MADE OF HEAVY ROUGH-HEWN TIMBERS.

Iceland

ICED FISH EXPORTS, 1948: Iced fish exports, Iceland's highest export commodity in value, accounted for 22.8 percent of the total exports from Iceland in 1948, according to a November 3 report from the American Legation at Reykjavik. A little more than 125,400 metric tons (valued at $13,888,900) were delivered to the United Kingdom and Germany. Of this total, the United Kingdom received 61,100 tons (valued, $7,174,964) and Germany 64,300 tons (valued, $6,713,936). Of the total amount of iced fish delivered to these countries, 95 percent was carried in Icelandic trawlers, while the balance was transported in trawl boats and carriers. Although the fish were generally delivered direct from the fishing grounds to the foreign ports, the trawlers did put into an Icelandic port to secure supplies and discharge about one-half of the crew before transporting their cargoes to Europe.

Icelandic trawlers in 1948 made a total of 504 trips--262 to the United Kingdom and 242 to Germany.

Trawler activities during 1948 on the whole were very successful, although several of the old vessels did not operate at a profit. Practically all of the iced fish that Iceland could supply and deliver was accepted by the United Kingdom and German markets.

Since fish production in other countries selling to the United Kingdom and Germany increased considerably during 1949, Iceland's trawler operations during this year were not so successful.

Outlook for 1950: It is believed that the United Kingdom and Germany, which have increased their own output, will not contract in 1950 for large quantities of iced fish as they did in 1948 and 1949. Consequently, a large part of the catches in 1950 probably will have to be salted since trawler fish generally is not quick-frozen (usually fresh fish, not over 24 hours old, is used for that purpose).

WOULD SEEK EXTENSION OF TERRITORIAL WATERS:[1] It is not unreasonable to assume that in the near future Iceland may carry its case for the extension of its territorial waters and the protection of sea life to one of the United Nations' agencies, according to an American consular report of December 1.

From Iceland's standpoint the country is justified in seeking international agreement on the protection of sea life, according to an article appearing in the newspaper Altnyduolaoid of November 16, 1949. During the past year, innumerable foreign vessels have engaged in demersal fishing and there are definite signs pointing to overfishing in Icelandic waters. Iceland is particularly concerned because its livelihood is almost entirely derived from the sea.

The following are translated excerpts from the newspaper article:

> First of all, territorial waters must be extended. The resigning cabinet took a bold step when it terminated the old Agreement with the British concerning territorial waters. This matter must be followed up and a great deal depends on the decision reached by the Permanent Court of International Justice at the Hague in the case of the British versus the Norwegians.[2]

1/See Commercial Fisheries Review, February 1949, p. 45
2/See Commercial Fisheries Review, November 1949, p. 56.

Furthermore, we must make use of the international organizations which deal with these matters and of which we are members. FAO arranged for a conference on the protection of fish stocks in the Western Pacific with good results. Why should not we, a small nation, approach the FAO with a request that the United Nations arrange for an international conference on the protection of fishing grounds off the Icelandic coast. If backed by such an organization, Iceland's position (with regard to the nations which are the most reluctant to consent to protective measures) would improve greatly.

Ireland (Eire)

PLANS ANNOUNCED FOR DEVELOPMENT OF FISHERIES: The Government's plans for assisting the sea fishing industry and for developing the brown trout sports fisheries were announced on November 6 by the Minister for Agriculture, according to a November 11 report from the American Legation at Dublin.

All commercial fishermen, the Minister said, could become members of the Sea Fisheries Association. The Association will be the only body in Ireland entitled to land fish in Ireland for sale on the domestic market-- it will guarantee prices, accept marketing responsibility, and supply suitable boats and gear on easy credit terms.

Markets will be developed for pelagic fish, fresh, cured or canned, as well as foreign markets for shellfish, using air transport where desirable.

It is also planned to supply, on easy terms, a recently invented radar apparatus for the location of fish shoals; to establish boatyards and expand existing yards; to develop net-weaving facilities and to experiment with new yarns for the manufacture of nets. A pilot fish freezing plant would be established to manufacture fish meal from the trimmings of fish which were put through a "deep-freeze" process.

Japan

FISHING AREAS EXTENDED BY SCAP: The Japanese authorized fishing area for fishing, whaling and similar operations was extended by a directive from the Supreme Commander for the Allied Powers issued on September 19, 1949, according to the Natural Resources Section's Weekly Summary of September 24.

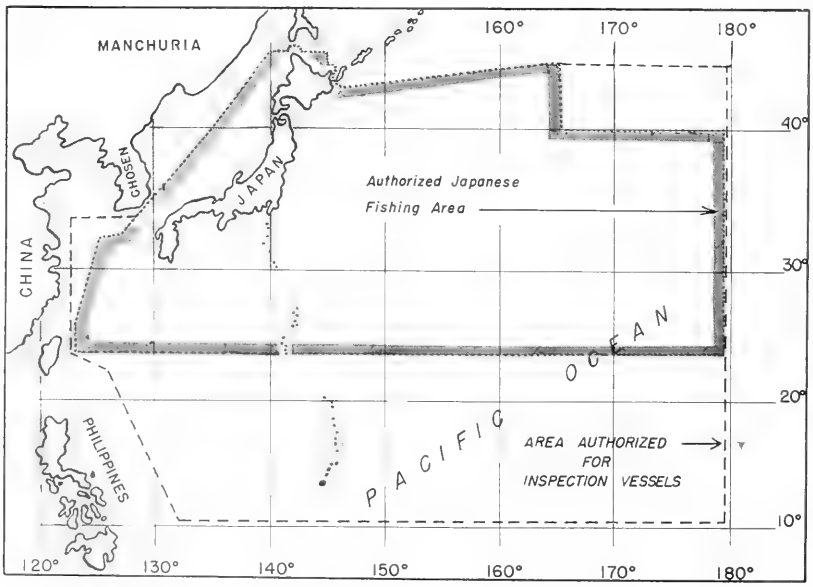
The new area extends from a point midway between Nosappu Misaki and Kaigara Jima at approximately 43°23'14" North Latitude, 145°50'30" East Longitude; to 43° North Latitude, 146°30' East Longitude; thence to 45° North Latitude, 165° East Longitude; thence south along 165th Meridian to 40° North Latitude, 165° East Longitude; thence east to 180° East Longitude and 40° North Latitude; thence south along the 180th Meridian to 24° North Latitude; thence west along the 24th Parallel to 123° East Longitude; thence north to 26° North Latitude, 123° East Longitude; thence to 32°30' North Latitude, 125° East Longitude; thence to 33° North Latitude; 127°40' East Longitude; thence to 40° North Latitude, 135° East Longitude; to 45°30' North Latitude, 140° East Longitude; thence east to 45°30'

North Latitude, 145° East Longitude rounding Soya Misaki at a distance of three (3) miles from shore; south along 145th Meridian to a point three (3) miles off the coast of Hokkaido; thence along a line three (3) miles off the coast of Hokkaido rounding Shiretoko Saki and passing through the Nemuro Kaikyo to a point 43°26'17" North Latitude, 145°48'03" East Longitude; thence in a southeasterly direction to the starting point midway between Nosappu Misaki and Kaigara Jima.

The new extension is subject to the provision that Japanese vessels will not approach closer than three miles (reduced from 12 miles) to any land area not under the present administration of the Japanese Government within the authorized area. Personnel from such vessels are not permitted to land on any such land areas, nor have contact with any inhabitants thereof, except in cases of serious emergency and provided permission to enter is obtained from local authority prior to such emergency entry.

A press statement on the extension of the authorized area stated that the new directive was issued in recognition of the effective work being done by the Japanese Government and industry to control violations and overfishing. It further states:

> "Further developments concerning relaxation of restrictions on Japanese fishing activities will depend primarily upon the actions of the Japanese Government and fishing industry. The course which they follow will determine their ability to convince the Supreme Commander and the people of interested nations that Japanese fishermen will respect national and international



REVISED AREA AUTHORIZED FOR OPERATION OF JAPANESE FISHING VESSELS.

regulations and agreements, will not endanger the productivity of aquatic resources, and will make good neighbors upon the high seas."

This action extending the area also made necessary a change in the area to be covered by the Japanese fishery inspection system, in order that inspection vessels might be permitted to operate to the eastward beyond the 180th meridian and up to, but not closer than, three miles of islands not under the administration of the Japanese Government, lying within the area authorized for the operation of inspection vessels. The changes made in the regulations governing the operation of the fisheries inspection system are as follows:

a. The purpose of the inspection system authorized by this Memorandum is to enable the Japanese Government to enforce the provisions of Memorandum for the Japanese Government, SCAPIN 2046, and any subsequent amendments or modifications thereof, as well as other pertinent fisheries regulations. Inspection vessels shall be responsible for assisting in the enforcement of instructions issued by the Supreme Commander for the Allied Powers and of laws and regulations of the Japanese Government in regard to Japanese fishery operations.

b. Available vessels of the type and size suitable for conducting inspection duties shall be put into immediate operation and provisions shall be made to increase the number of vessels used if the need for such is demonstrated to be necessary to insure effective enforcement.

c. Inspection vessels are authorized to operate within the area bounded as follows: From a point midway between Nosappu Misaki and Kaigara Jima at approximately 43°23'14" North Latitude, 145°50'30" East Longitude; to 43° North Latitude, 146°30' East Longitude; thence to 45° North Latitude, 165° East Longitude; thence east along the 45° parallel to 175° West Longitude; thence south along the 175th meridian to 10° North Latitude; thence west along the 10° North Parallel to 132° East Longitude; thence to 22° North Latitude, 126° East Longitude; thence to 24° North Latitude, 122°30' East Longitude; thence north to 34° North Latitude, 122°30' East Longitude; thence east to 34° North Latitude, 128°40' East Longitude; thence to 40° North Latitude, 135° East Longitude; thence to 45°30' North Latitude, 140° East Longitude; thence east to 45°30' North Latitude, 145° East Longitude rounding Soya Misaki at a distance of three (3) miles from shore; south along the 145th meridian to a point three (3) miles off the coast of Hokkaido; thence along a line three (3) miles off the coast of Hokkaido rounding Shiretoko Saki and following a mid-channel course through the Nemuro Kaikyo to a point 43°26'17" North Latitude, 145°48'03" East Longitude; thence in a south-easterly direction to the starting point midway between Nosappu Misaki and Kaigara Jima.

d. Japanese inspection vessels shall not approach closer than three (3) miles to the coast of any island within the area defined in the preceding paragraph not under the present administration of the Japanese Government.

e. The modified International E instead of the Japanese flag shall be used to mark inspection vessels.

f. Inspection vessels shall not engage in fishing operations of any kind.

g. Inspection vessels shall obtain authorization for each voyage from Commander, United States Naval Forces, Japan.

h. Inspection vessels shall not be vested with police powers.

In making these changes, it was pointed out that they do not establish a precedent for any further extension of authorized fishing areas or for the operation of inspection vessels in any other area for any subsequent period of time; nor is it an expression of Allied policy relative to the ultimate determination of national jurisdiction, international boundaries, or fishing rights in the area concerned or in any other area.

CONDUCT RESEARCH ON SARDINES: Considerable research on sardines is being done in Japan because of the great importance of this fishery and the abrupt decline in its production in recent years, according to the September 24 Weekly Summary. Most of this work is directed toward either discovering the reasons for the decrease in catch or finding new fishing areas where the fish are more abundant.

The principal sardine investigations are included in a cooperative program conducted by the Japanese Fisheries Agency of the central government and the fish-

eries research stations of the prefectures interested in sardines. Much of the work is coordinated and supervised by the scientists of the Fisheries Agency. Most of the data are collected by the research boats and staffs of the prefectures, and the analysis of the data is done chiefly by Fisheries Agency scientists. The Fisheries Agency has been reorganized recently, and most of the research is in a preliminary stage; therefore, few definite results have been achieved at this time.

The investigations include offshore sardine exploration to determine whether sardines inhabit waters 500 miles offshore and to find the optimum oceanographical conditions for sardines in open waters; to accumulate data and further research for population and management studies on sardines and anchovies; to determine catch per unit of effort; to determine recruitment; discover the reasons for the recent poor catches; to learn the proper mesh size of gill nets for sardines and herring in various regions and proper depths at which to fish for them; and location of sardine schools with vertical supersonic sonar. In addition, some work on special problems, including utilization and processing, is being done by prefectural stations and universities.

* * * * *

PRODUCTION OF FISH LIVER OILS: The average annual production of fish liver oil in Japan amounts to 15 or 16 trillion units, according to a recent report from Japan. The production for 1949 could be in the neighborhood of 17 trillion units, but inasmuch as the demand for fish liver oil has fallen off, it is felt that the production will be less than 17 trillion units and probably nearer the average.

Production seasons for low potency fish oil, such as that for cod and pollock livers, usually occur from December to March. The production of high potency oil, as obtained from shark and tuna livers, occurs the year round, but varies seasonally in accordance with geographic locations extending from the southern to the northern parts of Japan.

Statistics on the production of fish oils are inadequate and often inaccurate, influenced in part by production methods. Fish oil is produced in thousands of small home plants in the many fishing villages which dot the coast line of Japan.

The Japanese Fisheries Agency estimates a production of 8 thousand metric tons of crude fish oil for the fiscal year ending June 30, 1950.

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THREE TYPES OF FISHING OPERATIONS: Representatives of SCAP's Natural Resources Section observed three types of Japanese fishing operations in Shizuoka Prefecture, according to that agency's Weekly Summary of October 29.

Mullet Taking on Lake Hamatsu: A vertical net of small mesh is set surrounding a school of mullet. A net spread horizontally by bamboo poles about four feet long and six inches apart is laid along the water surface with the inside edge touching the float line of the vertical net. To confuse the fish the net is laid out along scalloped and irregular lines. In their efforts to escape, the mullet reach the vertical net, then leap into the air and attempt to pass the float line. They land on the horizontal net and are picked up with long-handled dip nets operated by crews of the small scull-propelled boats. The

operation observed included 30 boats with two to four men in each boat, with the entire area surrounded by the net about 200 yards in diameter. An operation of this size catches as much as 8,300 pounds a day.

Night Fishing for Horse Mackerel at Uchiura: Each fleet consists of two small boats for attracting the fish and a pair of haul seiners (kinchaku ami), each equipped with a net 250 fathoms long and 50 fathoms deep. The two small boats go to the fishing grounds on moonless nights and, taking up separate selected positions, each suspends an electric light of 350 watts operated by a 32-volt battery, just below the surface of the water. When a sufficient number of horse mackerel (aji) collect about a light, the small boat signals its seine boats which approach and set the seines around the boat in the center of the attracted fish. The seines, with coarse meshed wings and fine meshed bag, then are hauled to the two seine boats. Until the foot rope of the seine has been hauled aboard the light boat remains within the circle of the net. These operations begin in Suruga Bay in February when the fish are only one or two inches long, and continue until the following January with the fish becoming larger up to six inches in length. The best fishing is during September and October. A fleet of these boats catches about 83,000 pounds of fish a year.

Use of Lights to Increase Catch of Set Nets: The Japanese Fisheries Research Institute is continuing experiments to test the use of lights to increase the catch of fixed nets (See Commercial Fisheries Review, February 1949, page 48). They have made arrangements for this purpose with a group of 13 fishermen operating a small trap net near Atami. Objectives of the investigations are: (a) to determine the influence of electric lights on catch, (b) to determine whether a chain of lamps can be substituted for the lead of the trap net, (c) to study the durability and cost of the equipment, and (d) to work out improvements in the equipment and method.

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U. S. PRIVATE INTERESTS ESTABLISH FROZEN FOOD EXPORT COMPANY IN JAPAN: Permission to have $1,000,000 remitted to Japan by United States private interests has recently been granted by the Japanese Ministry of Finance for the purpose of building a frozen food export enterprise, states a November 14 American consular report from Kobe. The permit states specifically that the transactions and operations of the company are not exempt from the Japanese laws and regulations governing the acquirement by foreigners of property in Japan.

The company plans to operate a deep-sea fishing organization in Japanese waters and to produce chickens near Nagoya, Japan. It expects to export frozen sea food and chicken meat to America, with a portion of the company's food products to be sold in Japan. Capital allocation includes ¥145,400,000 (approximately $393,000) for fishery equipment, an operational fund of ¥96,750,000 ($261,000), a foreign trade fund of ¥72,000,000 ($195,000), and an agricultural department fund of ¥55,850,000 ($151,000).

Capitalized at ¥370,000,000 (approximately $1,000,000), almost all of the shares of the new company are held by Japanese in the United States (including Hawaii), with only a very small percentage in the hands of Japanese in Japan.

Mexico

CHANGES EXPORT TAX ON CERTAIN FISHERY PRODUCTS: In accordance with a decree published in the Mexican Diario Oficial of October 22 and effective three days after publication, the export tax on certain fishery products has been modified. an October 31 report from the American Embassy at Mexico, D. F., states.

The export tax tariff is modified by this decree so that Fresh or Frozen Fish, Unspecified (11-01) is now 3 centavos (approx. 0.35 cents U. S.) plus 10 percent ad valorem per net kilo (2.2 pounds); and Fresh, Raw, Dried or Peeled Shrimp (11-11) is now 30 centavos (approx. 3.5 cents U. S.) plus 10 percent ad valorem per 100 net kilos.

Actually the tariff remains the same on these two classifications, but the weight factor has been changed. Previously these items were taxed on the basis of gross weight; the new tax provides that the tariff shall be assessed on the basis of net weight.

This will make little difference on frozen or dried fishery products, but for those items which are shipped fresh and in ice there will be an appreciable reduction in the tax.

PROMULGATION OF INTERNATIONAL CONVENTION FOR THE REGULATION OF WHALING: The Presidential Decree, dated October 13, 1949, promulgating the International Convention for the Regulation of Whale Hunting which was signed in Washington on December 2, 1946, and adhered to by Mexico on June 17, 1949, was published in the Diario Oficial of December 6, 1949, reports the American Embassy on December 7.

Norway

EXPANSION OF SEAWEED PRODUCTS INDUSTRY PLANNED: A recent awakening in Norway to the possibilities in developing its seaweed resources has led to plans for expansion of existing companies and indications that many firms are keenly desirous of entering the field. A survey of export potential has begun. Tied in with these developments is the recent creation of a separate research institute for seaweed production which is to begin functioning early in 1950, states a November 21 report from the Oslo American Embassy.

The new institute will receive its financial support from the Norwegian Research Council, which in turn is jointly financed by grants from the Norwegian Government and contributions from private industries made through the Industri Forbund (National Manufacturers' Association). The beginnings of the institute will be small: it will be housed adjoining the University of Oslo, and will employ three botanists and one chemist in addition to an administrative director.

Professor Carl Henrik Oppegaard Printz, a botanist, who has been chosen administrative head of the institute, has indicated that one of the purposes of the institute will be to help increase Norway's commercial production of seaweed products from its present value of about $421,000 to at least $7,000,000 a year. This represents a utilization of only one percent of Norway's growth of seaweed each year. It takes on an average three years for a suitable new growth to take place.

Apparently Norway has one of the richest growth in Europe of brown algae (Phaeophyceae), a good source of alginic acid and other substances suitable for cattle feed. The institute will make tests of samples from different localities along the Norwegian coast to ascertain how much is available and the most economical means of harvesting it. Its director believes that the best growths are located along the coast of Finnmark, northern Norway, and that several new seaweed plants will probably be located in that area in the near future.

Much of the future development, however, hinges on markets as well as supply, and these in turn are greatly affected by developments of seaweed industries in other countries, and discoveries of new uses for seaweed products. Previously the utilization of brown algae seaweed was limited to extracting iodine and potash. Today modern seaweed industry extracts certain organic substances, such as alginic acid, mannitol, laminarin and fucoidine, as well.

There is a plant in Norway established in Drammen during World War II, which concentrates on alginic acid production. This firm produces only about 100 metric tons a year, but hopes in a year or two to increase production fivefold. Alginic acid and its salts are today widely used in production of textiles, plastics, cosmetics, films, ice cream, jam, paint, and other products. The firm, however, limits its production to the acid. It exports some to Sweden and Denmark. Reportedly the company obtains a c.i.f. price in the other Scandinavian countries of approximately $1.60 a pound as compared with only 64 cents a pound received for British-manufactured alginic acid.

The other producer of seaweed products in Norway has for 12 years been manufacturing meal for cattle and horses in Kristiansund N. The firm sells its meal under the registered name of "Algit," and has a capacity of 3,000 metric tons of "Algit" yearly. The meal is made from a type of brown algae known as "Bladder-Wrack," which is cut from the roots of the seaweed Ascophyllum nodosum. It is dried in the sun and stored in the factory. The excess salt is then removed and its sugar content is carmelized in order to eliminate the sea smell which cattle and horses dislike. The company claims that this meal prevents or cures most of the common mineral deficiency diseases in cows, sheep, horses, pigs, poultry, and foxes and states that it has a food value not far from that of oats. It is stated that better milk, eggs, meat and fur can be produced on a feed allotment of 2 to 3 grams per living kilo weight (2.2 pounds) to the stock per day. According to the company, analyses show that the meal contains 58.6 percent carbohydrates, and these in turn contain 23.7 percent alginic acid, 9.3 percent lamina, 8.3 percent sugar, 7.3 percent fucus as well as other chemicals such as nitrate, chlorine, sulphur, calcium, potash, sodium and traces of zinc, copper and nickel.

Packed in paper bags of 110 pounds each, the domestic market price is quoted at $34.35 per metric ton f.o.b., and the c.i.f. price, East or Gulf coast, U. S. A., is quoted at $69.30 per metric ton, provided 300 metric tons or more are ordered. For smaller quantities the price is $79.85 per ton. The firm is very much interested in entering the U. S. market and has gotten in touch with prospective agents.

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HERRING FACTORY SHIP: Conversion of the 354-foot English landing craft, which will be Norway's first specially-built floating herring reduction plant, is well underway, according to Fiskaren of November 10. The vessel, with a speed of 16 miles per hour, was taken over equipped with 5200 hp. engines. Of course, this speed is not needed for its new work.

The engines, bridge, and accommodations for officers, crew, workers, superintendent, and chemists, will be located aft. Staterooms will accommodate from 2 to 6 men each.

Reduction machinery, of Norwegian make, will be installed forward so that it can readily be added to, if necessary. Since there are yet many unsolved problems in the complete utilization of herring, it has been difficult to decide upon the reduction method to be used.

There is space on board for 1800 metric tons of herring, tank space for 3,000 metric tons of herring oil and fuel oil, and storage for about 1,000 metric tons of herring meal. Four unloading booms will be carried forward and four aft. There will be four bins for holding fresh herring with conveyors to the reduction equipment. Consideration has been given to elevators and pumps for unloading, but hoists will be used in the beginning.

If delivery of the needed foreign equipment is received on schedule, the factory ship should be ready to operate in February 1950. It will be stationed at Smørhavn in Bremanger as long as raw material is available.

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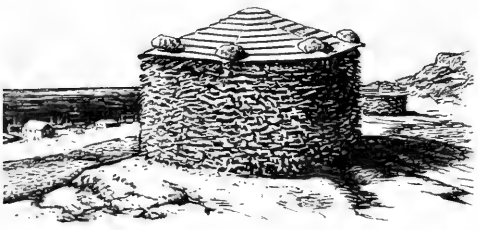
ICELANDIC HERRING FISHERIES: A total of 261 Norwegian vessels participated in the Icelandic herring fisheries in 1949, approximately the same as last year. Total catch is reported at 223,700 barrels (approximately 27,900 metric tons), according to a November 29 report from the American Embassy at Oslo.

GREENLAND FISHERIES: Norwegian vessels operating off Greenland yielded 6,000 metric tons of cod and 300 tons of fresh and frozen halibut during the 1949 season. All the cod has been made into klipfish for which demand is strong. It is planned next season to use 50 vessels in this expedition instead of the 30 used this year.



KLIPFISH STACKED DURING CLOUDY WEATHER, BUT LATER WILL BE LAID OUT FOR SUN DRYING.

KLIPFISH: The Klipfish Exporters Association has reported sales during the 1948-49 season of 750 metric tons to the United States; 450 tons to Trieste; 423 tons to Belgium; 681 tons to Switzerland; 500 tons to Holland; 1500 tons to Sweden; 180 tons to Finland; about 1900 tons to Africa; and about 100 tons to other markets.

The current season's production is scheduled to be delivered as follows: Italy, 2,800 metric tons; Belgium, 350 tons; Holland, 450 tons; United States, 500 tons; Switzerland, 200 tons; Trieste, 350 tons; France, 75 tons; West Africa, 475 tons; and the domestic market, 300 tons.

LARGEST HERRING MEAL FACTORY BEING CONSTRUCTED: Progress has been made on the construction of the largest herring oil and meal factory in Europe at Moltu.

The first section of the factory is scheduled to be completed in time for the herring season and will have a capacity at the end of the first year of 4,500 hectoliters (approximately 405 metric tons) per 24-hour day. A second section of the factory, for which all equipment has been contracted, is expected to be completed late in 1950 and will double this capacity.

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NYLON LINES AND HERRING TRAWL TESTED: A herring nylon trawl gave catches four to five times as large as a comparable cotton trawl, according to Fiskets Gang in a report on tests made by Norwegian fishermen. The trawls were identical in construction and used alternately in the same area. Despite the smaller thread, the nylon trawl had a high breaking strength and was otherwise easy to handle.

Tests with nylon lines were made in Lofoten in 1948 but detailed results are not available. Comments were to the effect that they were strong, elastic, supple, and fished well, but splices were apt to fail and they were very slippery when hauling in, especially if there was weight on the line. Some fishermen said nylon lines tangled easily, but one said it fished twice as well as other lines.

However, it was feared nylon would be costly because of the gear losses experienced by the present fishing methods.

A test of one nylon forerunner in small-whale fishing resulted in 16 whales being taken on one trip. It was reported to be very strong, easy to work, never broke, and withstood wear and tear as well as the usual forerunner.

TESTS ON BRINE- AND DRY-FROZEN BAIT HERRING: Practically all of the bait herring frozen in Norway is chilled-brine frozen--the brine is in direct contact with the herring during freezing, according to a report of the Norwegian Fishery Directorate's Chemical-Technical Research Institute published in Fiskets Gang. However, fishermen having access to dry-frozen bait herring have claimed it fishes better.

Tests made in 1946 and later with air-frozen herring and brine-frozen herring demonstrated that, on the average, air-frozen herring gave better catches despite the fact that it hardly was frozen as carefully as the brine-frozen type.

Tests in early 1949 with brine-frozen herring and a special pack of dry-frozen herring were too few to be conclusive, but resulted in a 68.5 percent greater catch with the use of the latter. There are strong indications that line catches could be increased considerably by using well prepared dry-frozen herring in place of brine-frozen herring, especially when the bait must be stored for some time before using.

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PLANS FLOATING FISH OIL FACTORIES:[1/] Based on the precedent set by open-sea whaling, where the catch is processed aboard huge factory ships, Norwegian fisheries experts are planning floating herring oil factories which can set up operations wherever the fish are found, states a November 19 report from the Norwegian Information Service.

1/See also Commercial Fisheries Review, June 1949, page 46.

Already an experimental vessel is being fitted out as a floating oil factory, and will be tested on the herring banks this winter. If rich herring schools were to appear in new fishing areas, as a number of specialists contend, the catch could be processed with a minimum of transport problems. This first plant, however, will be used primarily for testing new reduction machinery.

Serious consideration was given this subject at a recent meeting in Tonsberg of the Association of Norwegian Whaling Companies in view of a possible employment slump in the Norwegian whaling industry. Only slight modification would be required, it was pointed out, to fit present whaling factory ships for fish oil processing.

Pakistan

FISHERIES TO BE DEVELOPED: Following a recent visit by the head of the Danish Fisheries Biological Research Institute, Pakistan intends to develop its fisheries to yield five times the present catch, according to the November 26 issue of the British periodical, The Fishing News. This contemplated production will meet all internal needs and produce a surplus for export. An investigation of the possibilities of byproducts and shark liver oil industries also will be made.

A tentative scheme for the development of the Pakistan fisheries has been drafted and inquiries have been made in Australia as to possibility of obtaining boats, and equipment for fishing harbors. (See Commercial Fisheries Review, November 1949, page 57.)

Ryukyu Islands

STUDY OF FISH PRODUCTION IN RELATION TO FOOD REQUIREMENTS: In determining food requirements and production in the Ryukyus and to study fish production in relation to food requirements, a representative of Natural Resources Section visited the Ryukyu Islands to assist a United States Food Mission, states a November 5 Weekly Summary from SCAP.

Present basic ration requirement of the Ryukyuan people is 25.3 pounds of fish per capita a year. An estimated 45 pounds of fish per capita were consumed each year in 1935-37. On the basis of population and fish production in 1949, the yearly consumption of fish per capita probably amounts to 28.5 pounds, although this average does not apply uniformly for each of the three main regions of population, Okinawa, northern Ryukyus, and southern Ryukyus. The southern Ryukyus, because of its relatively large catch in proportion to its population, undoubtedly consumed more fish per capita than the northern Ryukyus and much more than Okinawa.

Fish production can be increased by 1951 to meet a requirement of 40 pounds per capita and to provide a small surplus of at least 1,000,000 pounds. Attainment of this production, however, will depend on procurement and distribution of fishing materials to meet seasonal requirements and the construction of new fishing boats to replace obsolete craft.

St. Pierre—Miquelon

PLANS TO STORE AND FILLET FRENCH TRAWLERS' FISH: St. Pierre and Miquelon may now have developed a plan in which they have been interested for years, according to an item in the September 16 issue of a French publication Le Marin reported in Fisket Gang.

A freezer, built to utilize the fish on the Newfoundland banks, was completed on St. Pierre in 1920 but operated thereafter with little success. With the new French trawlers now in operation and with the French more accustomed to frozen fish, an opportunity may now be present to utilize St. Pierre's strategic importance.

The situation has been under study by the French Government, especially the Minister for Overseas Possessions. In discussions with the vessel owners' association it has been proposed that French trawlers deliver regularly to the St. Pierre freezer. About six trawlers fishing for fresh fish would deliver two-thirds of the catch to the freezer and one-third to France. In this way the freezer would secure 1,200 metric tons of fish per month. Almost all of the tonnage would be filleted, producing 20 metric tons daily. A cargo vessel would transport the frozen fillets monthly to France.

Spain

FISH MEAL INDUSTRY: In spite of the availability of raw materials, the industrial processing of fish waste in Spain was not attempted until about 1935, when the manufacture of fish meal was undertaken by one of the largest fish packers in Vigo, states a November 16 report from the American Consulate in that city.

Until the opening of the plant, fish residue was disposed of in bulk for use as fertilizer or dumped into the sea.

At present the firm has two fish-meal-producing plants and is equipped for a daily production of 17,600 pounds; however, due to shortages of fish, production had been kept at less than 10 percent of capacity for the past two or three years.

While sardines constitute the bulk of the raw material used in the manufacture of the meal, the product cannot be properly labelled as "sardine meal" since other varieties are also used in the manufacture of the product, especially "jurel."

Two classes of fish meal are at present being manufactured by this firm, i.e., for animal feed and for use as agricultural fertilizer.

In the production of animal feed only fresh fish in the very best condition is being used, since the firm takes pains to guarantee a minimum of 63-percent protein. Price for first quality fish meal is quoted today at 4.00 pesetas per kilo (approximately $360 per metric ton) (in bags of 50 and 100 kilos), and 3.40 pesetas (approximately $306 per metric ton) for the second grade.

While the stepping up of production will of course depend on the availability of raw material, local manufacturers do not foresee any possibility of exporting the product in the next few years since production is below domestic demands.

Sweden

PRODUCTION OF FISHERY PRODUCTS, 1948: In 1948, the production of fresh and salt-water fishery products amounted to 215,000 metric tons, considerably above the normal production of about 160,000 tons per year of salt-water and 15,000 tons of fresh-water fish, states a November 26 American Consular report from Stockholm.

Foreign Trade in Fresh and Salted Fish, Fiscal Year 1948-49 with Comparative Data

1948-49		1947-48		Average 1938-49	
Imports	Exports	Imports	Exports	Imports	Exports
..... (In Thousands of Metric Tons)					
26.2	36.3	20.5	39.5	42.8	27.0

Imports of fresh and salted fish in 1948-49 (fiscal year ending August 31) amounted to 26,200 tons, while exports reached 36,300 tons. Direct landings in foreign ports reached 16,000 tons during the year. If these latter landings are included, Sweden had an export surplus of 26,000 tons in 1948-49.

Union of South Africa

FISHERIES OUTLOOK, 1949-50: The Union of South Africa's food supply position for 1949-50 is expected to be maintained satisfactorily, states an October 25 report from the American Embassy at Pretoria. Supplies of fishery products are plentiful and there is an exportable surplus of canned fish and crayfish.

South African Fishery Products Position, Consuming Year August 1, 1949, to July 31, 1950

Product	Unit	Production 1948-49 1/	Export Surplus 1/
Fish:			
Fresh	Pounds	86,000,000	-
Canned	"	23,000,000	15,000,000
Spiny lobsters (fresh or frozen, tails & canned)	"	7,000,000	6,000,000
Fish body oils	Short tons	6,000	2,000

1/ Estimated.

The increase in canned fish production during the last year is phenomenal and represents another important development in the postwar period. Canned pilchards production is increasing significantly. Exportable surpluses of canned fish are expected to continue to mount during the next few years.

Fishery products form an integral part of the average South African consumer's diet. The marketing of fishery products to every consuming center in the Union, including small interior villages, is so well organized that fish can be obtained freely and at almost any time. Fish is a standard first course for all meals at hotels and restaurants and in most homes.

Fish body oil production is expected to increase. Processors are examining the possibilities of markets in the United States for exportable surpluses. The United Kingdom has been a market for surpluses but it appears that prices may be better in the United States.

United Kingdom

SCOTLAND PLANS FISH EXPORTS TO U. S.: Leading fish firms in Aberdeen are interested in developing an export market in the United States, according to a November 22 American consular report from Edinburgh. Many years ago there was a considerable export business with the United States, but this trade gradually died out until exports at the present time, consisting mostly of frozen fish and canned fish, approximate only about £10,000 (approximately $28,000) per month. There would appear to be no reason why this volume should not be increased at least fivefold because of devaluation and an expansion of the canning and curing industry.

Aberdeen is prepared to export not only frozen herring and haddock, but also frozen sole. It also has available for export kippered herring, canned herring in tomato sauce, and canned soused herring.

Yugoslavia

NEW FISH AND SHELLFISH CANNERY: Yugoslavia's largest and most modern fish canning factory is under construction near Zadar and is to be completed by spring 1950, according to an August 31 newspaper account reported in an American consular report from Belgrade.

The factory, which will increase fish canning in Dalmatia by 60 percent, will not only can fish but will also utilize fish waste for the manufacture of livestock feeds. Products to be canned will include sardines, mackerel, tuna (packed in oil), and oysters.

Oysters come from artifical oyster beds at Novigrad, where 20 carloads are produced annually. Up to the present, oysters have been intended for local consumption on the Dalmatian Coast. But although the oyster industry on this coast represents only a minor aspect of the fishing industry, the new factory may make possible the export of canned oysters or their consumption in the interior of the country. In addition to projects for expanding the oyster beds, experiments are being carried on in the processing of salt-water fish and the production of fish paste.

Almost more than half completed, the factory will also contain a modern salting room capable of handling 792,000 pounds of salted fish. Mechanization of production is expected to result in a 40 percent reduction in production costs and a 25 percent reduction in manpower.

FEDERAL ACTIONS

Department of Commerce

BUREAU OF THE CENSUS

CANNED PILCHARDS AND OTHER SARDINES RECOMBINED IN EXPORTS STATISTICS: Since it appears impractical to require differentiation between exports of canned pilchards (California sardines) under Schedule B commodity number 008501 and other canned sardines under 008505, the use of separate Schedule B numbers has been terminated, states the Bureau of the Census in its November 1949 Foreign Trade Statistics Notes. Separate classifications for exports of canned sardines were adopted in January 1949.

With the approval of the Interdepartmental Committee on Foreign Trade Commodity Classification, a Public Bulletin (P.B. 142 B-I and II) was issued providing that shippers and exporters are to report both types of sardines under the old Schedule B commodity number 008500. This change is made retroactive to January 1, 1949, in the export statistics.

While there are reasons for believing that the separation of exports of the two types of sardines in the United States export statistics is a desirable objective, the difficulties of making this separation at this time apparently outweigh the benefits to be derived.

BUREAU OF FOREIGN AND DOMESTIC COMMERCE

CERTAIN COMMODITIES DELETED FROM POSITIVE LIST: Certain commodities were deleted from the Positive List effective November 10, 1949, and published in the Federal Register of December 14, 1949.

The deleted commodities of interest to the fishing and allied industries were as follows:

Schedule B No.	Commodity
98:900	Miscellaneous commodities, n.e.s.: Fishing nets, commercial
98:900	Seines, commercial

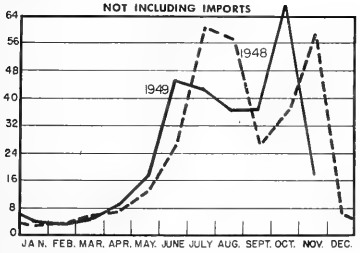
These commodities may now be exported under the general license GRO, which requires only that a shipper's export declaration describing the commodity to be exported be filed with the Collector of Customs at the port of exit or with the Postmaster at the place of mailing. (See Commercial Fisheries Review, November 1949, p. 68.)

LANDINGS AND RECEIPTS

In Millions of Pounds

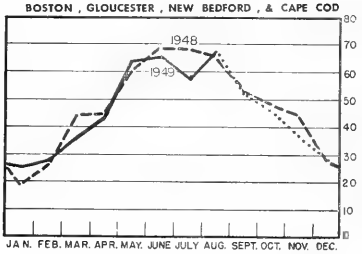
MAINE - LANDINGS

NOT INCLUDING IMPORTS



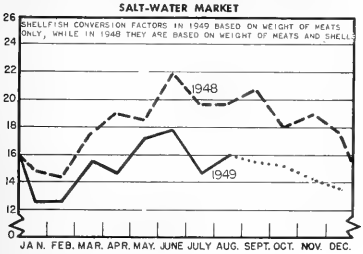
MASSACHUSETTS - LANDINGS

BOSTON, GLOUCESTER, NEW BEDFORD, & CAPE COD



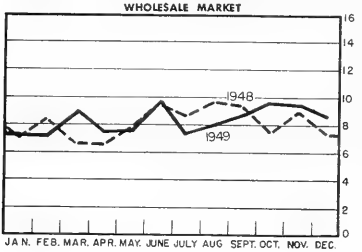
NEW YORK CITY-RECEIPTS OF FRESH & FROZEN FISH

SALT-WATER MARKET



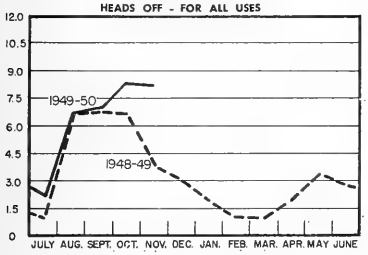
CHICAGO - RECEIPTS OF FRESH & FROZEN FISH

WHOLESALE MARKET



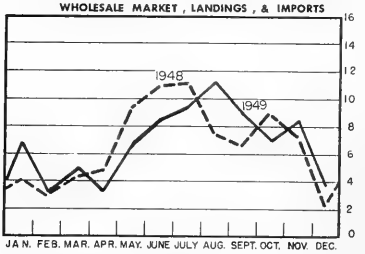
GULF - SHRIMP LANDINGS

HEADS OFF - FOR ALL USES



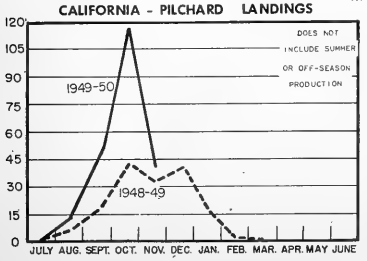
SEATTLE - RECEIPTS OF FRESH & FROZEN FISH

WHOLESALE MARKET, LANDINGS, & IMPORTS

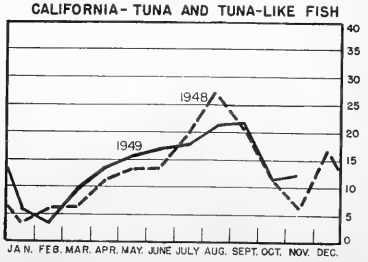


In Thousands of Tons

CALIFORNIA - PILCHARD LANDINGS



CALIFORNIA - TUNA AND TUNA-LIKE FISH

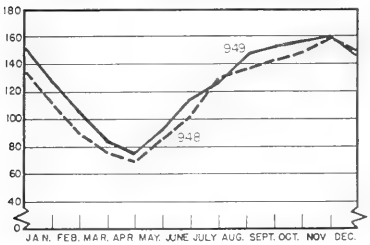


••••••• ESTIMATED

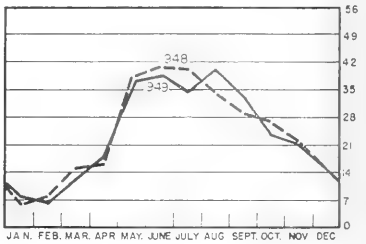
COLD STORAGE HOLDINGS and FREEZINGS of FISHERY PRODUCTS

In Millions of Pounds

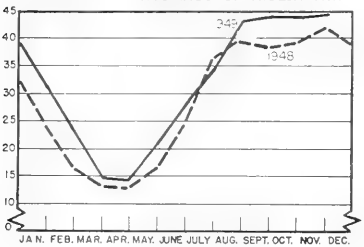
U.S. & ALASKA - HOLDINGS OF FROZEN FISH



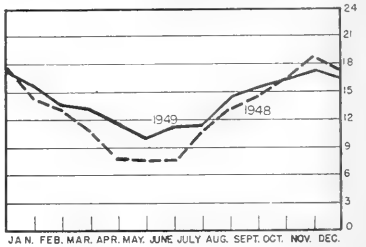
U.S. & ALASKA - FREEZINGS



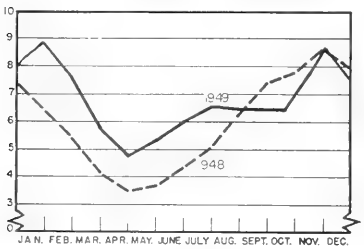
NEW ENGLAND - HOLDINGS OF FROZEN FISH



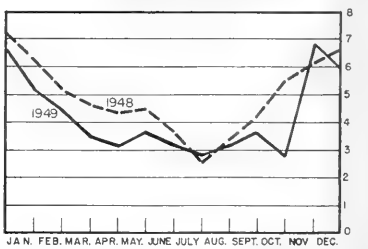
NEW YORK CITY - HOLDINGS OF FROZEN FISH



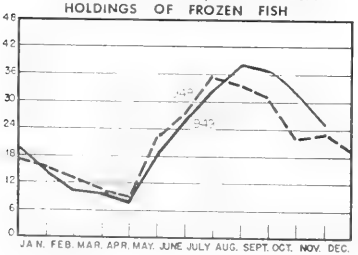
CHICAGO - HOLDINGS OF FROZEN FISH



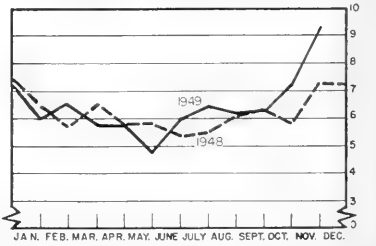
GULF - HOLDINGS OF FROZEN FISH



WASHINGTON, OREGON, AND ALASKA - HOLDINGS OF FROZEN FISH



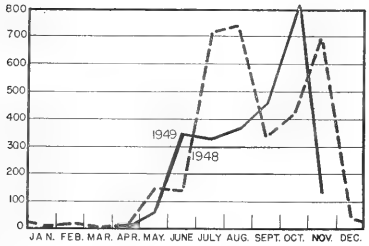
CALIFORNIA - HOLDINGS OF FROZEN FISH



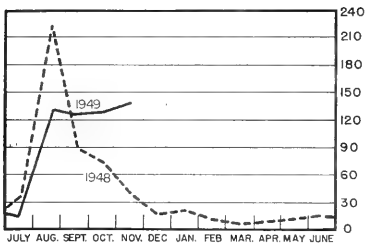
CANNED FISHERY PRODUCTS

In Thousands of Standard Cases

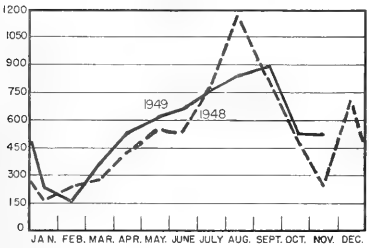
MAINE - SARDINES, ESTIMATED PACK



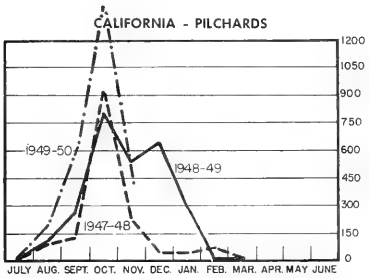
UNITED STATES - SHRIMP



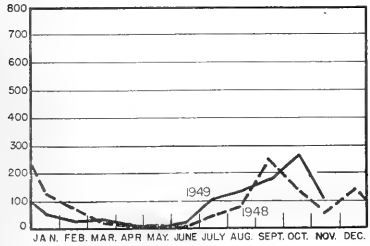
CALIFORNIA - TUNA



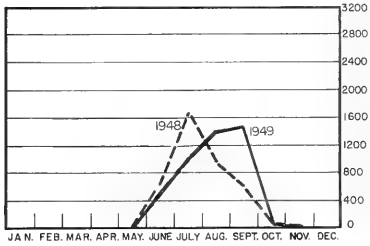
CALIFORNIA - PILCHARDS



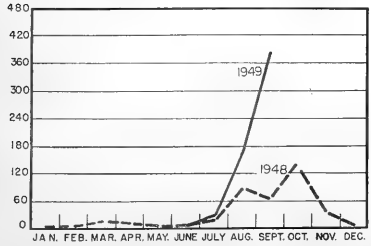
CALIFORNIA - MACKEREL



ALASKA - SALMON



WASHINGTON - PUGET SOUND SALMON

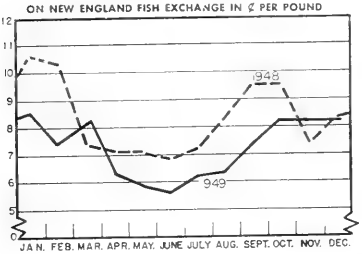


STANDARD CASES

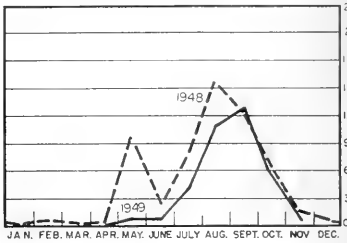
Variety	No. Cans	Can Designation	Net. Wgt.
SARDINES	100	1/4 drawn	3 1/4 oz.
SHRIMP	48	—	5 oz.
TUNA	48	No. 1/2 tuna	7 oz.
PILCHARDS	48	No. 1 oval	15 oz.
MACKEREL	48	No. 300	15 oz.
SALMON	48	1-pound tall	16 oz.

PRICES IMPORTS and BY-PRODUCTS

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

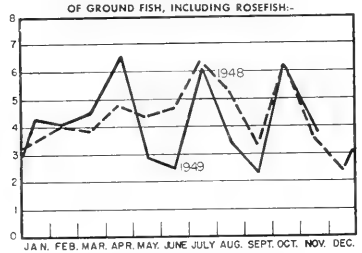


MAINE - IMPORTS OF FRESH SEA HERRING
IN MILLIONS OF POUNDS

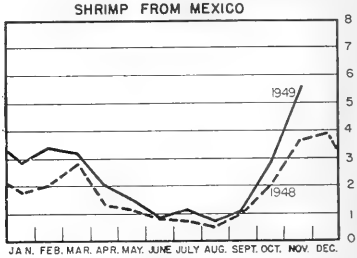


In Millions of Pounds

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

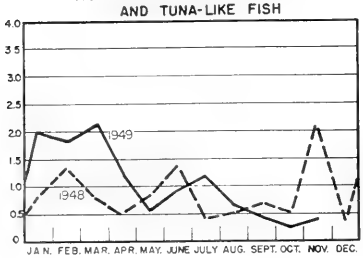


U.S.- IMPORTS OF FRESH AND FROZEN
SHRIMP FROM MEXICO

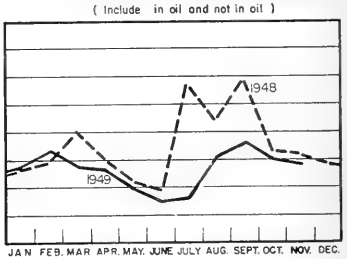


IN MILLIONS OF POUNDS

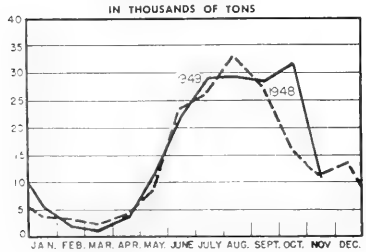
U.S.- IMPORTS OF CANNED TUNA
AND TUNA-LIKE FISH



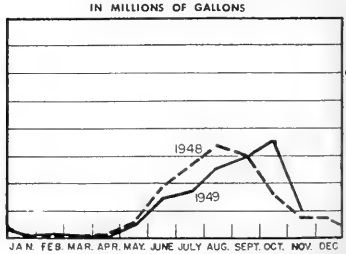
U.S.- IMPORTS OF CANNED SARDINES
(Include in oil and not in oil)



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.
SEP.- SEPARATES (REPRINTS) FROM COMMERCIAL FISHERIES REVIEW.
SL - STATISTICAL SECTION LISTS OF DEALERS IN AND PRODUCERS OF FISHERY PRODUCTS AND BYPRODUCTS.

Number	Title
CFS-510	- Fish Meal and Oil, October 1949, 2 p.
CFS-512	- Maine Landings, October 1949, 4 p.
CFS-513	- Texas Landings, November 1949, 4 p.
FL-348 (Revised)	- German Commercial Electrical Fishing Device, 16 p.
FL-358	- The Chesapeake Bay Crab Industry, 13 p.

Sep. 242 - Identification of the Commercial Common Shrimp Species
Sep. 243 - Fishery Products Production at Boston Fish Pier, 1948

SL-19 (Revised) - Wholesale Dealers in Fishery Products, Louisiana, 1949, 9 p.

MISCELLANEOUS PUBLICATIONS

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE AGENCIES ISSUING THEM.

Annual Report 1948, 163 p., printed, illus. Department of Fisheries, State of Washington, Seattle, Wash. Contains information on biological research, stream improvement, salmon hatcheries, construction projects, technological work, commercial fishing statistics for 1948 and taxes, and fisheries patrol program. Section on commercial fishing gives 1948 statistics and includes comparative annual landings of fish, shellfish and livers, all districts combined, by species, 1937-1948; and by months and species for 1948; fish oil and meal, 1945-1948; pack of salmon and other sea foods, 1948; Puget Sound District salmon pack, 1935-1948; total pack of salmon, 1935-1948; and detailed statistics for 1948 for Puget Sound, Columbia River, Grays Harbor, and Willapa Harbor. Section on biological research includes reports on investigations of the offshore troll fishery, otter trawl fishery, sport fishery on Puget Sound, Puget Sound salmon, oyster, and food of the chinook and silver salmon of Puget Sound. Section on stream improvement reports on major dam projects, fishways, culverts,

water rights, removal of dams and obstructions, fish screens, drainage problems, and a map of the Columbia River Water Shed. Section on salmon hatcheries gives data on Minter Creek experimental hatchery, salt water rearing, land acquisition, salmon egg take, salmon plantings, and salmon hatchery locations. Included in this bulletin is a summary of orders of the Director of Fisheries promulgated during 1948.

The Commercial and Game Fishing Industries of Bermuda, by Louis S. Mowbray, 19 p., illus., printed. Bermuda Government Aquarium and Museum, Hamilton, Bermuda, November 1949. A short summary of Bermuda's fishing industry. Contains data on catch, type of fish and shellfish species produced, fishing methods, imports, and game fishing. This paper was presented at the Second Gulf and Caribbean Fisheries Institute held at Miami Beach, Florida, November 1949.

Fish and Fish Inspection, by John D. Syme, 170 p., illus., printed. H. K. Lewis & Co., Ltd., London, England, 1949. Mainly planned for the use of student and practicing fish inspectors in England, this book contains a short account of the catching, processing, and distribution of fish in Great Britain. Included among the subjects discussed are the following: the modern trawler, fishing grounds, catching and treatment on trawlers, differentiation and characteristics of species with line drawings, inspection, preparation and transportation, quick-freezing, smoking, salting, canning, processing and distribution, and legislation concerning fish.

The Fishes and Fisheries of the Gold Coast, by F. R. Irvine (with Illustrations and Account of the Fishing Industry, by A. P. Brown, and Classification & Keys for the Identification of the Fishes, by the late J. R. Norman & by E. Trewavas), 367 p., printed. Published on behalf of the Government of the Gold Coast by the Crown Agents for the Colonies, 4 Millbank, London, England, 1947. A description of the fishing industry of the Labadi District of the Gold Coast contained in this book covers the history, organization, gear and methods, maintenance and life of gear, tanning, salt pans, custom and belief, and marketing. There are sections on the curing of fish (drying, smoking, salting and canning); fish products (fish meal, oil, manure, skins and other byproducts); and bionomics of marine, estuarine and lagoon, and fresh-water fishes, together with seasons and migrations and a seasonal distribution table. The major portion of the book is devoted to a description of the fishes of the Gold Coast: notes on the structure of a fish; classification; artificial key to the families of Gold Coast fishes; marine fishes; fresh-water fishes; and crustaceans, turtles, cetaceans, etc. A table of West African fish imports and exports; a general bibliography; and a technical bibliography on fish preservation are also included. Indexes are given in English and Latin; Ga and Adanme; Fante, Aowin, Ashanti and Twi names; Ewe; Nzima; and Yoruba, Guan, etc.

Guides for New World Traders, by Edmund F. Becker, 29 p., illus., printed, 10 cents. Office of International Trade, U. S. Department of Commerce, 1949. (For sale by the Superintendent of Documents, Washington, D. C. or Department of Commerce field offices.) This booklet points out some of the major problems of world trade today, and mentions methods for solving them. Cites valuable sources of information and advice. The list of informational aids in the booklet includes those essential in gaining a fundamental knowledge of the techniques of trading abroad. Specifically, it discusses analysis of products, areas, foreign sales, competition, and export costs; importing and exporting facilities; foreign and U. S. government restrictions; foreign credit and exchange; and government trade and

private organization publications, directories, and reference books. Included are sections on: (1) How to Analyze Your Product for Export Possibilities and (2) How to Analyze Possibilities of Importing Goods. Also briefly discussed are trade possibilities under the European Recovery Program and under the proposed "Point Four" Program.

Harvest of the Waters, by Lorne Manchester, (Reprinted from the Canadian Geographical Journal, July 1949), 16 p., illus. Department of Fisheries, Ottawa, Canada. A short popular review of Canada's fishing industry.

Mission to Haiti (Report of the United Nations Mission of Technical Assistance to the Republic of Haiti). 344 p., illus. with photos and maps, printed, $2.50. United Nations, Lake Success, New York, July 1949. This is the report of the United Nations Mission of Technical Assistance to the Republic of Haiti. It is a review of the various fields to be taken into consideration with reference to the over-all problem of Haiti's economic development, together with recommendations or suggestions. Included is a chapter on fisheries which discusses the condition of the Haitian fishing trade; fisheries laws; estimate of the catch; handling, marketing, and processing; the future of the marine fisheries; the fisheries requirements; fish culture; and recommendations of the Mission.

Pearl Culture in Japan, by Dr. A. R. Cahn, Report No. 122, 91 p., illus. with sketches, and tables, processed. Natural Resources Section, Supreme Commander for the Allied Powers, Tokyo, Japan, October 1949. Reports may be purchased in microfilm from the Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C., or may be obtained from the Division of Information, Fish & Wildlife Service, Department of Interior, Washington 25, D. C., without charge by requesting Fishery Leaflet 357. It presents the history and nature of pearl culture and a detailed discussion of the pearl oyster, the development of the pearl, the pearl industry, and related subjects. Discusses the history of the pearl culture, pearl oysters, biology of the pearl oyster, histology and function of the mantle, development of the pearl, pearl oyster culture, enemies and adverse conditions, the pearl, byproducts, organization of a pearl farm, control of the industry, production statistics, fresh-water pearl culture, and a glossary which contains technical terms and Japanese generic names. In addition it contains a summary of patents relating to pearl and pearl oyster culture.

Second Annual Report of the Fisheries Prices Support Board for the Year 1948-49, 13 p., printed, limited distribution. Fisheries Prices Support Board, Ottawa, Canada. The report shows that in addition to taking direct action to help East Coast canneries and Manitoba lakes fishermen, the Board maintained a staff of field men operating in all major fishing areas to ascertain background and current information on the levels of incomes to fishermen, the costs of fishing operations and other factors pertaining to the well-being of the Canadian fishermen in relation to the responsibility of the Board. Included in the report is an introduction giving a summarization of the Fisheries Prices Support Act, 1944, and organization of the Board; a discussion of the economic conditions in the fisheries in 1948-49; a summarization of the requests for Board action; support of prices of East Coast fish; support of prices of Manitoba lakes frozen fish; research activities; and appendices containing canned fish purchases by the Board for 1948-49 and a profit and loss account for 1948-49.

Technical Assistance for Economic Development (Plan for an expanded cooperative programme through the United Nations and the specialized agencies), 328 p., printed, $2.50. United Nations, Lake Success, N. Y., May 1949. This report, a cooperative product of the secretariats of the United Nations organizations, is divided into two parts. Part I sets out the objectives and nature of the program, the fields of work covered,

and the proposed organizational and financial arrangements; and it represents a text agreed by the heads of all the organizations concerned. Part II describes the kinds of technical assistance which the Secretary-General of the United Nations and the executive heads of the specialized agencies believe their organizations can undertake to provide, if the necessary funds are made available, during the first and second years of "an expanded co-operative programme of technical assistance for economic development." A program for fisheries is included, which contains the following projects: training and education, development of national fisheries services, expansion of fisheries advisory services, expansion of fisheries advisory services, experimental fishing craft, and fish production in small bodies of water.

"Transportation of Canadian Fishery Products," article, Trade News, October 1949, vol. 2, no. 4, pp. 27-39, illus., processed. Department of Fisheries, Ottawa, Canada. Discusses the transportation media (railway freight and express, ocean steamer, truck carrier and air transport) used in distributing Canadian fish and shellfish within the domestic market, the United States, and to numerous other export markets. Based on a survey, it reports on the use of the transportation media for fishery products. It covers the transportation services now utilized and the prospective pattern of use of these media.

Second Annual Report of the Fisheries Prices Support Board for the Year 1948-49, 13 p., printed, limited distribution. Fisheries Prices Support Board, Ottawa, Canada. The report shows that in addition to taking direct action to help East Coast canneries and Manitoba lakes fishermen, the Board maintained a staff of field men operating in all major fishing areas to ascertain background and current information on the levels of incomes to fishermen, the costs of fishing operations and other factors pertaining to the well-being of the Canadian fishermen in relation to the responsibility of the Board. Included in the report is an introduction giving a summarization of the Fisheries Prices Support Act, 1944, and organization of the Board, a discussion of the economic conditions in the fisheries in 1948-49, a summarization of the requests for Board action; support of prices of East Coast fish; support of prices of Manitoba lakes frozen fish; research activities; and appendices containing canned fish purchases by the Board for 1948-49 and a profit and loss account for 1948-49.

OUR OYSTER INDUSTRY

DO YOU KNOW--

That the oyster fishery is the leading shellfish industry from the standpoint of value of production, and that it is exceeded only by that of salmon and tuna among all our fishery products.

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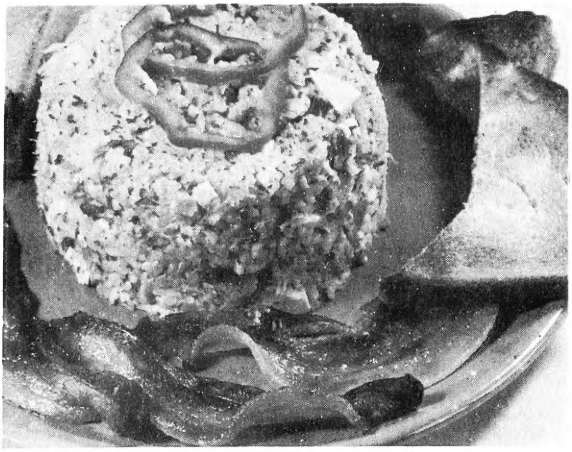
KEDGEREE



2 cups smoked fish, flaked
2 cups cooked rice
4 hard cooked eggs, chopped
1/4 cup butter or other fat, melted
1/4 cup finely chopped parsley
2/3 cup hot milk
1/8 teaspoon pepper

Combine the ingredients in the top of a double boiler and heat thoroughly over boiling water. Pack into an oiled mold and turn out onto a heated platter. Garnish with parsley and paprika and serve. Serves 6.

A Fish and Wildlife Service tested recipe. This is one in the series of recipes using fishery products tested and developed in the Service's test kitchens.

Processing -- Miscellaneous Service Division

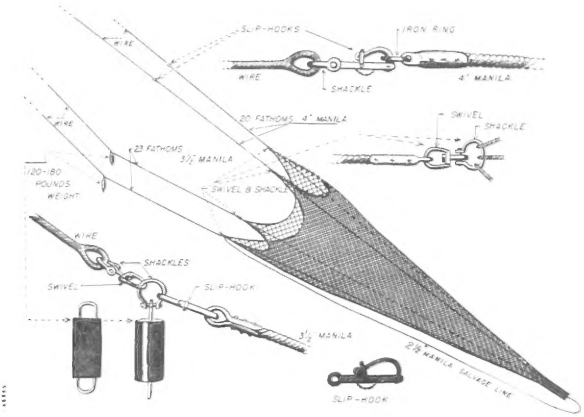
Illustrator -- Gustaf T. Sundstrom **Compositors -- Jean Zalevsky, Betty Cady**

69188

FLOATING TRAWLS

Fishery Leaflet 343, "Floating Trawls," is a description of the recently invented Danish floating trawl.

This 5-page report gives the specifications of the Danish floating trawl together with a brief report on its operation and construction. A number of sketches showing the construction of the trawl are included.



It is believed by foreign observers that with modifications the floating trawl could be employed in many coastal areas where herring have not been previously caught, and may act as an excellent substitute for the drift net. There is also reason to believe that the Danish trawl may be employed in the cod fishery, and with some slight adjustments in the trawl it could be utilized for catching whitefish.

Copies of Fishery Leaflet 343 may be obtained free upon request from the U. S. Fish and Wildlife Service, Washington 25, D. C.