

TRENDS AND DEVELOPMENTS

Alaska

COMMERCIAL FISHERY REGULATIONS FOR 1961 SEASON:

After a 10-day session, acting upon a wide range of proposals for the 1961 Alaska fish and game regulations, the Chairman of Alaska's 8-man Board of Fish and Game adjourned on December 7, 1960.

Proposals for the Board's consideration and action had been made by the staff of the Alaska Department of Fish and Game, members of the Board, Advisory Committees, and the general public. The proposals adopted by the Board will be incorporated into the 1961 regulations for Alaska's sport fish, game, and commercial fisheries. All three are issued separately.

The commercial fishery regulations were expected to be ready for distribution sometime in March 1961. The regulations will provide the rules under which several hundred million pounds of fishery resources can be harvested along a vast segment of the Alaskan Coast extending north through Southeastern Alaska, Yakutat, Prince William Sound, Cook Inlet, Kodiak, Alaska Peninsula, the Aleutian Islands, Bristol Bay, and the Yukon and Kuskokwim Rivers.

The Board approved a regulation which specifies that all subsistence fishing in Southeast Alaska be done under authority of a permit issued by the Department of Fish and Game.

The Board approved a regulation which specifies that king crabs may be taken in Southeast Alaska by pots only. The use of otter trawls with a ground line or head line less than 60 feet in length may be used to take king crab-pot bait.

Of considerable interest throughout Southeast Alaska was the opening date for the purse-seine fishery. The Board agreed to carry over the 1960 regulations to 1961. Accordingly, the Icy Strait, Eastern, and Western Districts will open on June 26, and the other districts will open as specified in the 1960 regulations.

All Southeast gill-net areas will remain the same in 1961 as in 1960, except for a minor change in the Portland Canal area where the line from Tree Point has been changed so that it extends in a true south direction to the International Boundary.

All salmon net fishing in the Yakutat Area shall be closed by field announcement. This is a change from the 1960 regulations in which all fishing was closed by dates specified in the regulations.

The Alsek River will open to fishing on May 15 instead of June 1.

The taking of herring spawn for commercial purposes in waters adjacent to Fish Egg, Clam, and Alber to Islands was approved by the Board. The combined weight of eggs and kelp shall not exceed 50 short tons.

Regulation changes in Prince William Sound do not provide for a purse-seine season in 1961, however, the door is left open to harvest the runs if they do develop.

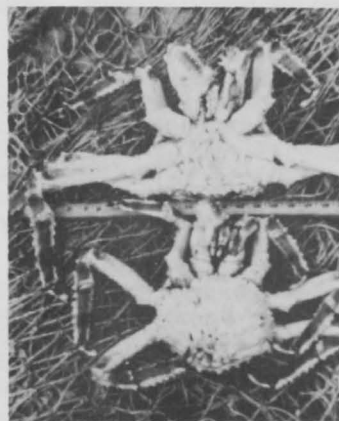
Changes also provide for a drift and set gill-net fishery in the Eshamy district and a drift gill-net fishery of the newly-created Coghill district of Prince William Sound.

The Board also included in the 1961 regulations provisions for control of the king crab fishery that has recently developed in Prince William Sound. New regulations provide for king crab registration in Area E, a 35-pot limit, and trawling limited to a 60-foot ground line for bait only.

Other changes give the Department field staff the flexible control for better management of the salmon runs. Prominent of these was the change to divide Prince William Sound into eight management districts.

The 1961 salmon season for Kodiak will extend from June 1 to September 30 with weekly fishing periods of three days during July and parts of June and August in some districts. A five-day period will be in effect the remainder of the season.

Troll fishing will be permitted in the Kodiak area in 1961.



Above: Male king crab with triangular-shaped abdomen; below: female with broad fan-shaped abdomen.

Set netting will be permitted by only those persons who have resided in the Kodiak fishing area for one year immediately prior to the date of fishing.

Beach seines 225 fathoms in length will be permitted in the area.

King crab fishermen must place the Alaska Department of Fish and Game vessel number on the upper half of each king crab pot buoy in numerals at least 3 inches high and $\frac{1}{4}$ inch in width. Otter trawls for king crab may have ground and lead lines

a maximum of 60 feet in length.

All waters in the immediate Kodiak vicinity that are closed to sport fishing for salmon during the pink spawning period will be closed to subsistence fishing. The

Kodiak channel from the Small Boat Harbor to Spruce Cape will be closed to commercial and subsistence fishing.

The Cook Inlet king salmon season will open, in the area north of Anchor Point, on June 8, with no mesh size requirement. The remaining districts in the area will be opened by field announcement.

During the 1961 season there will be no gear time table in effect in the upper Inlet.

Subsistence fishing regulations in Cook Inlet remain basically the same with the exception that no subsistence fishing will be allowed in the Susitna River.

Regulations for the 1961 commercial fishing season on the Alaska Peninsula, Chignik, and Aleutian Islands areas adopted by the Alaska Board of Fish and Game include major changes from the 1960 regulations; the opening of the area northeast of Port Heiden on July 17; the opening of Ilnik Lagoon to a gill-net fishery on May 1; the closure of a section between the Three Hills and Cape Seniavin; the opening of a section from the Black Hills to Moffet Point; the exclusion of drift nets between Kenmore Head and Kupreanof Point; the limitation to pots only for king crab fishing in State waters between Cape Pankof and Kilokak Rocks; the reduction of minimum distances between set nets to 900 feet (Nelson Lagoon excepted) and between a set net and a purse seine to 500 feet; exclusion of set nets in the Chignik area only; and a uniform June 12 opening throughout the Chignik area.

There are no changes from the 1960 regulations for the Aleutian Islands area.

Two changes of importance relating to the Bristol Bay area were adopted by the Board. The gear time table was revised downward in the Nushagak district from 225 to 200 units for $2\frac{1}{2}$ days fishing per week, while in the remaining districts the level of effort for $2\frac{1}{2}$ days fishing per week was raised as follows: Naknek-Kvichak, from 275 to 334 units; Egegik, from 60 to 68 units; Ugashik, from 35 to 43 units.

In the second major Bristol Bay action, the Board effectively served notice that its regulations on mesh size would be strictly enforced. A reduction in minimum size during the main part of the season from $5\frac{1}{2}$ " to $5\frac{3}{8}$ " was approved for the 1961 season only with the provision that the $5\frac{1}{2}$ " size be reinstated the following year.

A small portion of the Nushagak district known as the Snake River Section was also closed for the coming year.

In general, the regulations for commercial fishing in the Arctic-Yukon-Kuskokwim areas means the elimination of the quota system, substituting for it a flexible system of openings and closures at the mouths of both the Yukon and Kuskokwim. Above Marshall on the Yukon and Akiachak on the Kuskokwim Rivers small quotas on king and silver salmon are in effect. Below those points commercial fishing would be limited to king salmon only prior to August 1.

Subsistence fishing is regulated only in the areas of commercial fishing, below Marshall on the Yukon and Akiachak on the Kuskokwim, and in those spots is subject to the opening and closing regulations of the commer-

cial fishery. Outside of those two areas there is practically no regulation of subsistence fishing.

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MESH-SIZE REGULATIONS REVISED FOR NETS NOW IN USE:

The Alaska Board of Fish and Game in December 1960 reviewed two instances where mesh-size requirements for nets were considerably larger than many in present use. Although both of the regulations have been in effect many years, nets were purchased near to the minimum size and through shrinkage have become illegal.

The Board, through two regulations recently passed, effectively served notice that a reasonable period of time would be given to utilize the fishermen's present mesh so that no economic hardship will result, but that at a set future date nets must be in use, which after shrinkage, will conform to the legal mesh-size requirement.

Regulation 102.11 (b) now reads: "Where the use of leads is permitted, a purse-seine boat may have or use not more than one lead of legal length and depth, without purse rings attached, and with mesh at least 6 inches stretched measure, except that in 1963 the minimum mesh size requirement shall be 7 inches." This regulation is in the general section and refers to all purse-seine leads in Alaska.

In Bristol Bay under Section 104.12 the minimum mesh size for 1961 was changed to $5\frac{3}{8}$ inches. The regulation now reads: "(1) In all districts, stretched measure shall be not less than $5\frac{3}{8}$ inches during 1961; provided: (A) That stretched measure shall be not less than $4\frac{1}{2}$ inches after July 16 and (B) That stretched measure shall be not less than $5\frac{1}{2}$ inches during the 1962 season prior to July 16.

A new mesh-size regulation for purse seines in Prince William Sound was passed with provisions to utilize the present seines of larger mesh until 1963. Section 111.15 calls for mesh in the seine not greater than 4 inches stretched measure. If some present seines are of larger mesh, a permit may be obtained to utilize the old seines during 1961, 1962, and 1963.



Byproducts

A STUDY OF TRANSPORTATION OF FISH MEAL, SCRAP, AND SOLUBLES:

A study of transportation of fish meal, fish scrap, and fish solubles is being made by the Transportation and Public Utilities Service, U. S. General Services Administration, under a contract assigned to that agency by the U. S. Bureau of Commercial Fisheries. The study will be concerned mainly with the analysis and evaluation of railroad freight rates and services for the products from production points to various destinations.

The level of rates for competitive products will be studied, and analyses made of tariff structures, transportation characteristics, classification descriptions, exceptions to the classification, domestic versus import rates, motor versus rail rates, contract and private carriage, barge competition, and costs of delivery to the railhead. Included will be a review of services provided, such as switching and supply of cars.

Rates for fishery byproducts have evolved through a hit or miss process. In some territories they are categorized with grain in the grain tariffs. In others they are treated as fertilizer. In one territory no commodity rates have been established. Therefore, class rates and exceptions to the class rates are used. This situation complicates ascertaining rates and usually requires the use of a combination of rates rather than a through rate. With the change in predominant use of fish meal from fertilizer to a feed ingredient, its movement has changed but the rates have not changed.

The study will be useful to the many domestic fish-meal producers located along the Atlantic, Gulf, and Pacific coasts. It will enable producers to concentrate their sales effort on the most advantageous inland markets. Fish meal and scrap are used as a growth ingredient by poultry feed mixers. The mixers are located in many of the non-coastal states.

Transportation cost is an important part of total cost to the user amounting to 20 percent or more in many instances. Therefore, any reduction in transportation cost through better routing and selection of size of movement will be important to the producer, mixer, and consumer. The information will be useful for negotiations with carriers as an aid for improving rates where traffic has not been moving because of unrealistic rates.



California

ARTIFICIAL SALMON SPAWNING CHANNEL EXPERIMENT:

The results of California's first experiment with an artificial king salmon spawning channel are being watched closely by the State's Department of Fish and Game and the East Bay Municipal Utility District.

The Utility District agreed to build a channel or a hatchery downstream from the natural spawning areas

on the Mokelumne River which will be wiped out by the District's Comanche Dam to be completed in 1964. The spawning channel is less expensive than a hatchery and the present experiment is designed to see whether a channel can produce salmon more efficiently than a hatchery.

The channel is about $3\frac{1}{2}$ miles below Pardee Dam near the ghost town of Lancha Plana, near the Amador-Calaveras County line. The spawning area parallels the Mokelumne River. It is 200 feet long and 20 feet wide. Suitable spawning gravels form the bed of the channel. The first ripe fish placed in the channel began their spawning activities immediately; but the State fisheries managers are not yet ready to term the experiment a success. The ultimate fish hatch will determine that.

The spawning area, first experiment of its kind in the State, was built at a cost of over \$23,000. A screen was installed at the downstream end of the channel to catch the fry so they may be counted before they begin their migration to the sea. Gates at the upstream end regulate the level and rate of flow of the water.

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CRAB STUDIES CONDUCTED IN COASTAL WATERS:

M/V "Nautilus" Cruise 60-N-9-Crab: Crab fishing was conducted (Sept. 16-Oct. 6 and Oct. 15-31, 1960) by the California Department of Fish and Game research vessel *Nautilus* in California coastal waters from Half Moon Bay to the Russian River to obtain information on (1) a standard procedure for random sampling of crabs by commercial traps; (2) catch per unit effort for studies of recruitment as related to spawning stock; (3) age and growth for age determination studies; and (4) basic life history of the Dungeness crab.

A total of 30 40-inch commercial-type crab traps, without escape ports, were fished in depths of 9-35 fathoms in 129 randomly-selected settings of five traps each. Squid was used for bait.

A standard procedure for random sampling was followed. Blocks (one by two miles) and subblocks of the area surveyed, were selected randomly. Two subblocks (one-half mile square) were sampled in each block selected. The traps were emptied, rebaited, and set in new locations each day. The average fishing time per trap was 21 hours. The validity of this procedure and the actual adequacy of the samples are to be analyzed.

The catch per unit of effort of legal male crabs (width greater than 158 mm., excluding the most lateral spines), sublegal males, and females, was determined. The data on size and sex of crabs caught will be used in studies of the relationship of recruits to spawning stock.

The shoulder width of all crabs caught was recorded. These width frequencies are of great value in age studies. Widths of crabs caught ranged from 85 to 218 mm. for males and 103 to 180 mm. for females.

Nine females with orange egg masses were caught. These crabs had shoulder widths ranging from 112-154 mm.

Thirty-five percent of the legal crabs caught in each trap string were in soft-shell condition.

Note: Also see Commercial Fisheries Review, December 1960 p. 25.

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PELAGIC FISH POPULATION SURVEY CONTINUED:

M/V "Alaska" Cruise 60A8-Pelagic Fish: The coastal waters of Baja California from Turtle Bay northward to Cape Colnett were surveyed (September 9-28, 1960) by the California Department of Fish and Game research vessel Alaska. The objectives were: (1) to survey the sardine population to determine the survival from 1960's sardine spawning and to measure the density of older fish; (2) to sample adult sardines, Pacific mackerel, jack mackerel, and anchovies for age and distribution studies; (3) to participate with Scripps Institution of Oceanography and the U. S. Bureau of Commercial Fisheries in an ecological study of a body of water containing concentrations of sardine larvae (this study was an attempt to determine larvae mortality rates and describe the oceanographic and biological environment in a sardine spawning area); and (4) to collect samples of sardines for blood genetic studies in cooperation with the U. S. Bureau of Commercial Fisheries Biological Laboratory at La Jolla.

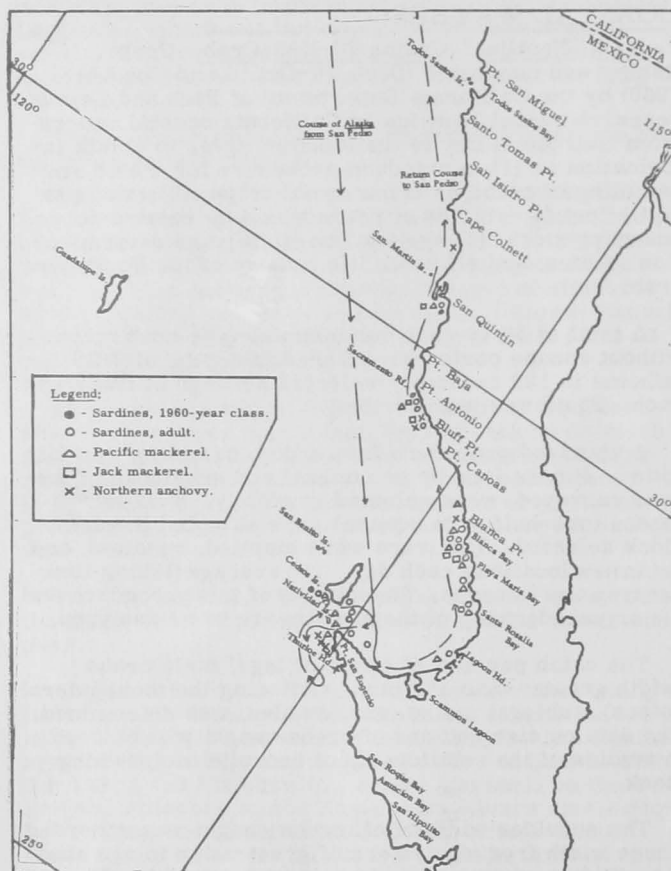


Fig. 1 - M/V Alaska Cruise 60A8-Pelagic Fish (Sept. 9-28, 1960).

Of the 74 night light stations occupied, sardines were taken at 15, Pacific mackerel at 13, anchovies at 9, and jack mackerel at 6. During 411 miles of scouting, 21 sardine, 12 anchovy, and 11 unidentified fish

schools were observed, although fog reduced scouting efficiency on six nights.

Sardines of the 1960 year class were collected on 8 stations and adult sardines on 14.

Live sardines were collected off Chester Rocks and in Playa Maria Bay. Blood tests indicated both samples consisted of southern type fish.

The joint ecological study was conducted in the southern end of Sebastian Vizcaino Bay. The U. S. Bureau of Commercial Fisheries' Black Douglas and the Hugh M. Smith of Scripps Institution of Oceanography were the other two participating vessels.

A total of 26 night light, 5 trawl and 4 set-line stations were occupied in the special study area. Stomachs from samples of all pelagic fish collected were saved for analysis ashore.

Sampling with trawl and longline revealed the bottom to be less productive of fish life than was anticipated. Longfin sanddabs, Citharichthys xanthostigma, was the most numerous fish captured in the trawl. Other flatfish collected were: bigmouth sole, Hippoglossina stomata; English sole, Parophrys vetulus; and hornyhead turbot, Pleuronichthys verticalis. Sculpins, Scorpaena guttata, occurred most frequently of the five rockfish species captured.

A male dogfish, Squalus acanthias, 78.5 cm. total length caught in 36 fathoms off Scammon Lagoon, extended the known range approximately 200 miles southward. Three additional male dogfish were collected off Punta San Rosarito.

Sea surface temperatures ranged from 77.5° F. at Chester Rocks to 57.9° F. at Punta Baja.

M/V "Alaska" Cruise 60A9-Pelagic Fish: The survey was continued (October 8-27, 1960) in the coastal waters and offshore islands from Los Coronados Islands, Baja California, to Point Conception, Calif.

Of the 119 night light stations occupied, sardines were collected at 6, jack mackerel at 10, anchovies at 6, and Pacific mackerel at 3. In 448 miles of scouting, 22 sardine, 9 anchovy, and 54 unidentified schools were observed. Many of the unidentified schools were composed of large fish which may have been bonito.

Sardines of the 1960 year class were taken on one station near Point Dume. Adult sardines were collected on 5 stations, 3 in the vicinity of Los Angeles Harbor. Most of the sardine schools sighted were around Santa Cruz Island, but only one night light sample was taken from that area.

Blood serological tests conducted by the U. S. Bureau of Commercial Fisheries were made on 2 samples of live sardines from different areas (Santa Cruz Island and Los Angeles Harbor). Each sample consisted of large adult fish (180 to 220 mm.). Results indicated the two samples were genetically different. The Santa Cruz Island sardines consisted of the "northern-type population" while the Los Angeles Harbor fish were characteristic of the "southern-type." Previously both types had not been found off Southern California at the same time during the fishery season. The two types differed markedly in gonad maturity. The "southern-type" was in an advanced stage of maturity (near

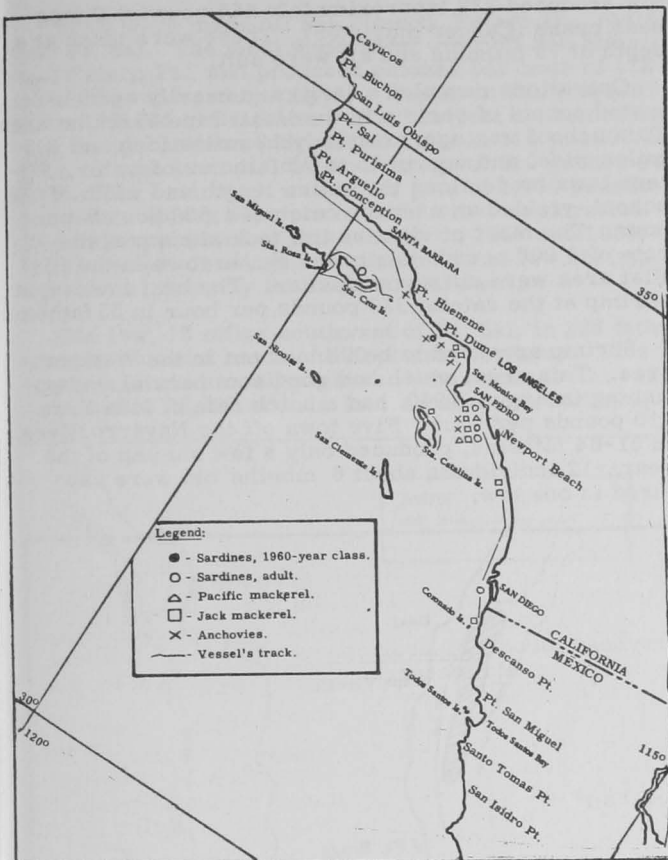


Fig. 2 - M/V Alaska Cruise 60A9-Pelagic Fish (Oct. 8-27, 1960).

spawning condition) while the northern group's gonads were in a resting stage.

Sea surface temperatures ranged from 58.8° F. at Santa Rosa Island to 66.3° F. at Santa Catalina Island. Temperatures between San Pedro and Point Conception were generally between 61° F. and 63° F. and those between San Pedro and Los Coronados Islands between 62° F. and 65° F.

M/V "Alaska" Cruise 60A10-Pelagic Fish: The survey was continued (November 5-23, 1960) in the coastal waters of central California from Point Reyes to Point Conception.

Of the 94 night light stations occupied, anchovies were collected on 6, jack mackerel on 4, Pacific herring on 3, and Pacific mackerel on one. No sardines were taken or observed.

The vessel scouted 420 miles during which 39 anchovy and 3 squid schools were observed. Visual scouting conditions were excellent over the entire area surveyed.

Sea surface temperatures ranged from 53.2° F. near Half Moon Bay to 59.2° F. off Cape San Martin. Fair weather prevailed during the entire cruise.

Airplane Spotting Flight 60-23-Pelagic Fish: The inshore area from the United States-Mexican border to the Russian River was surveyed from the air (November 14-17, 1960) by the Department's Cessna "182" 9042T, to determine the distribution and abundance of pelagic fish schools.

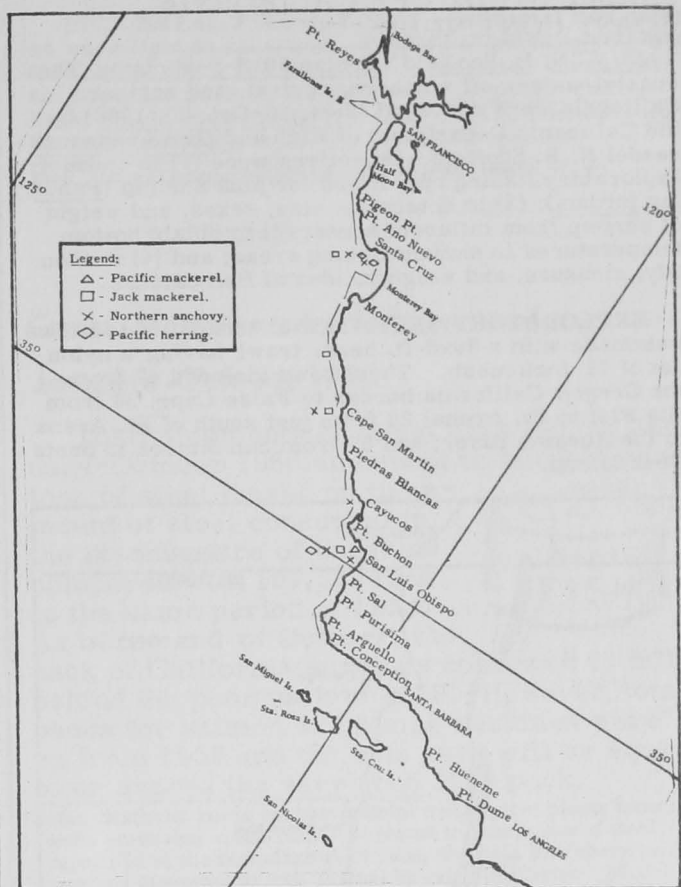


Fig. 3 - M/V Alaska Cruise 60A10-Pelagic Fish (Nov. 5-23, 1960).

Weather conditions ranged from fair to good and the entire survey area was covered. The inshore waters were generally turbid, with floating pieces of kelp in evidence throughout most of the northern portion of the area.

Relatively few fish schools have been sighted inshore since July 1960 when a moderate concentration of anchovies was observed near Santa Barbara. The November survey was no exception, and only 26 schools were sighted.

Only four fish schools were seen north of Point Conception, and these were about 1,000 feet off Ragged Point. None of these four were identified. The 22 remaining fish schools were between Oceanside and La Jolla. Of these, 13 were anchovies and 9 were unidentified.

About one mile off Torrey Pines 5 fish schools were spotted. After several passes over them with the plane shadow, they went deep and disappeared. Individual fish were visible from a very low altitude and appeared to be about a foot in length. Although they appeared to be mackerel, positive identification was not possible.

Red tide was observed off Seal Beach, Los Angeles-Long Beach Harbor, and along the beach from Malibu to Santa Monica.

Note: Also see Commercial Fisheries Review, January 1961 p. 19.

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SHRIMP STUDY OFF CALIFORNIA COAST CONTINUED:

M/V "N. B. Scofield" Cruise 60-S-5-Shrimp: The coastal waters off southern, central, and northern California were surveyed (Sept. 16-Oct. 30, 1960) by the California Department of Fish and Game research vessel N. B. Scofield. Objectives were (1) to conduct exploratory fishing operations for pink shrimp (Pandalus jordani); (2) to determine size, sexes, and weight of shrimp from different areas; (3) to obtain bottom temperatures in shrimp fishing areas; and (4) to identify, measure, and weigh incidental fish catches.

EXPLORATORY OPERATIONS: A total of 168 tows was made with a 20x8-ft. beam trawl having a nylon net of 1¼-inch mesh. These tows included 47 from the Oregon-California border to False Cape; 36 from Big Flat to Pt. Arena; 28 from just south of Pt. Arena to the Russian River; and 57 from San Simeon to Santa Cruz Island.

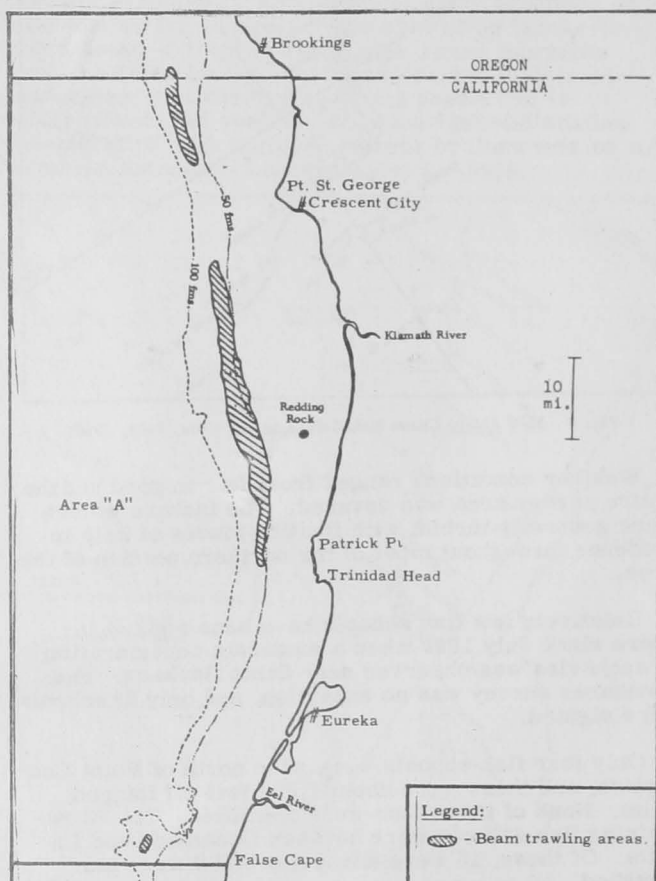


Fig. 1 - M/V N. B. Scofield Cruise 60-S-5-Shrimp.

The best shrimp catches in the northern area were made off Patrick Pt. in 50-55 fathoms, and west of Redding Rock in 54 fathoms. Tows in these areas produced catches at the rate of 1,650 and 1,080 pounds of heads-on shrimp per hour, respectively. Operations from the Oregon border to Pt. St. George produced shrimp at the rate of 275 pounds per hour in 58 to 68 fathoms. Although shrimp were taken in 44 of 45 tows between the Oregon border and Trinidad Head, only in 18 tows were they taken at a rate greater than 200 pounds per hour. No shrimp were caught in two tows south of the Eel River near False Cape, but one

tow produced 232 (approximately 464 pounds) Dungeness crabs (Cancer magister). These were taken at a depth of 75 fathoms and all were soft.

Operations revealed a large and heavily concentrated school of shrimp in the Usal-Cape Vizcaino area. This school was approximately 13 miles long and 2.5 miles wide, and was in 55 to 75 fathoms of water. Fifteen tows made along the entire length and width of the school, yielded an average catch of 1,598 pounds per hour. The most productive tow took shrimp at the rate of 3,000 pounds per hour. Seven tows in the Big Flat area were not as productive. The best tow caught shrimp at the rate of 330 pounds per hour in 55 fathoms.

Shrimp appeared to be thinned out in the Westport area. This area, which had good commercial shrimp fishing in August 1960, had a catch rate of less than 210 pounds per hour. Five tows off the Navarro River, in 51-64 fathoms, produced only a few shrimp of the year--12 individuals about 6 months old were captured in one tow.

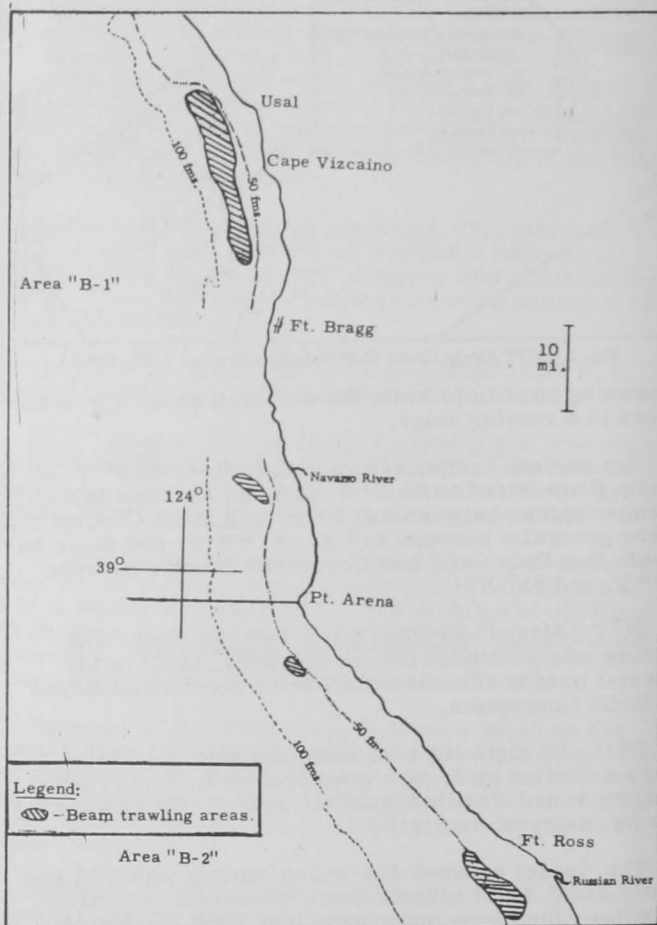


Fig. 2 - M/V N. B. Scofield Cruise 60-S-5-Shrimp.

A small shrimp school was located off Ft. Ross in 49 to 52 fathoms. The school was approximately 5 miles long and 1.5 miles wide. Five tows yielded an average catch of 622 pounds per hour. The most productive catch was at the rate of 1,000 pounds per hour. Shrimp were not found in commercial quantity off the Russian River in 40-47 fathoms. This is where shrimp were found in April 1960. Tows off Saunder's reef in 51 to 54 fathoms did not yield shrimp.

Tows were made off San Simeon, Estero Pt., Avila, and Pt. Sal. The most successful were off San Simeon and Estero Pt., and produced catches per hour of 172 and 174 pounds, respectively. Depths in these areas were 122 and 115 fathoms. The heaviest concentration was found 9 miles southwest of Avila in 110 to 120 fathoms. Three tows yielded an average of 910 pounds per hour. The best catch was at the rate of 1,650 pounds per hour. Heavy seas prevented further exploration. The fishery existed at this locality in 1952 and 1953, but since then landings have declined and few shrimp were found there by the commercial fleet.

One tow, 15 miles southwest of Pt. Sal, in 126 fathoms, produced a catch of 570 pounds per hour. This was the general locality where three commercial vessels landed 75,000 pounds last season. In addition,

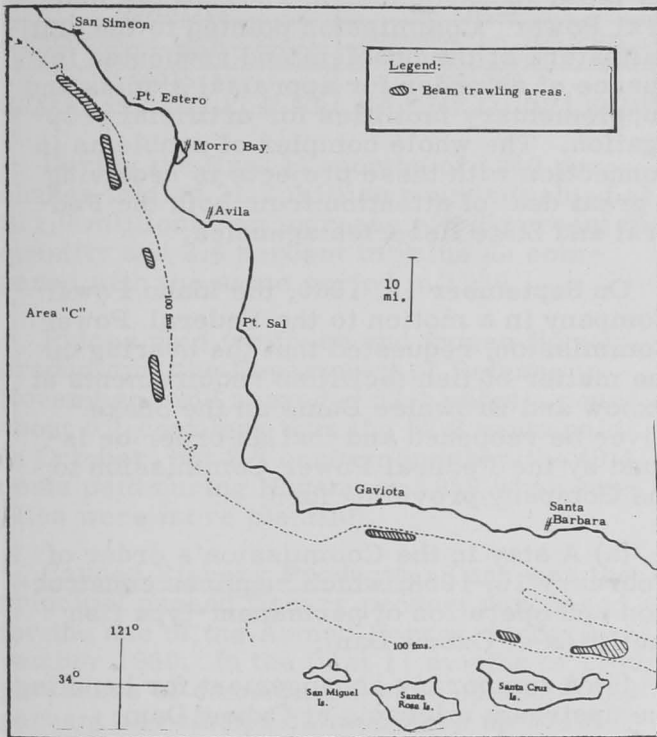


Fig. 3 - M/V N. B. Scofield 60-S-5-Shrimp.

six tows were made off Gaviota and 23 were made off the channel side of Santa Cruz Island. Although not in commercial concentration in those localities, shrimp were taken in every tow off Gaviota and in 14 of the 23 tows off Santa Cruz Island. The best tow off Gaviota (in 120 fathoms) produced 69 pounds per hour. The most productive tow off Santa Cruz Island was in 127 fathoms and yielded 75 pounds per hour.

SIZE, SEX, WEIGHT AND COUNT OF SHRIMP:

Samples of shrimp were obtained in all areas and in 130 of the 168 tows. Approximately 50 individuals from each of the samples were sexed, measured, and weighed. Many of the female shrimp contained head roe and a few were carrying spawn. Most of the 1½-year old females had head roe and would become first-year spawners during the winter. These shrimp had made the transition from male to female last summer.

BOTTOM TEMPERATURES: A total of 131 bathythermograph casts was made and bottom temperatures were obtained in all areas where shrimp were found.

INCIDENTAL FISH CATCHES: Incidental fish catches were light in all areas. Counts and average weight of all species from 163 tows were recorded. Unmarketable species such as slender sole, *Lyopsetta exilis*, hake, *Merluccius productus*, and juvenile rockfish, *Sebastes saxicola*, were the principal species.

Note: Also see *Commercial Fisheries Review*, August 1960 p. 17.

Cans--Shipments for Fishery Products, January-October 1960

Total shipments of metal cans during January-October 1960 amounted to 107,844 short tons of steel (based on the amount of steel consumed in the manufacture of cans) as compared with 101,537 tons in the same period of 1959.

As of the end of October, the pack of California sardines continued to fall behind the poor pack of 1959. However, total packs for salmon and Maine sardines were up from 1959 and the tuna pack will be equal to or exceed the very good 1959 pack.

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



Central Pacific Fishery Investigations

SKIPJACK TUNA BLOOD SAMPLES AID IN DISTRIBUTION STUDIES:

M/V "Charles H. Gilbert" Cruise 50: The Honolulu-based fisheries research vessel Charles H. Gilbert, of the U. S. Bureau of Commercial Fisheries, returned December 10, 1960, to Kewalo Basin from a two-months cruise in South Pacific waters. This voyage (Cruise 50) took scientists headed by a geneticist to Fanning and Christmas Islands in the Line group, to Tahiti, and then to the atoll of Rangiroa in the Tuamotu Archipelago, and to most of the major islands of the Marquesas. The crew caught bait fish at many of the islands for fishing skipjack tuna (aku), to provide material for the scientists' studies.

One of the major research objectives, as explained by the geneticist, was to compare the blood types of the skipjack tuna taken in each of the areas visited in order to determine whether the fish around each of the major island groups

of the Central Pacific are interrelated or form separate local populations. The skipjack, which supports Hawaii's largest commercial fishery, is strongly seasonal in nature, indicating that the fish are migratory. Tuna ex-



perts believe that the species may exist in such great numbers in the ocean as a whole as to provide the basis for a much greater commercial catch than is produced at present. In order to determine what these potentialities may be, and how best to go about developing them, the necessary first step is to learn whether the skipjack of the Central Pacific belong to only a few large, wide-ranging populations or whether they form a large number of separate stocks. According to the geneticist, the results of his work on this cruise indicate little relationship between the skipjack of Hawaiian waters and those found around the South Pacific archipelagoes. The blood studies further showed that the skipjack of Marquesan and Tuamotuan waters are of strongly differing types.

Other scientific work done during the cruise by fishery biologists included the collection of the very small larval and juvenile stages of tuna by means of special trawl nets towed below the surface. Observations and moving picture records of the behavior of skipjack were made through the windows in the unique underwater observation chambers in the stern and bow of the vessel. The reactions of the tuna to sounds produced by porpoise and squid were recorded and will be studied in comparison with similar behavior records taken in Hawaiian waters.

Skipjack were found in good numbers in the Marquesas and Tuamotu areas, where they were fished with good success. Schools also appeared numerous in Tahitian waters, but the skipjack there were moving fast and erratically and did not respond well to bait.



Dams

INADEQUATE FISH PASSAGE FACILITIES AT OXBOW AND BROWNLEE DAMS CAUSE CONCERN:

The problem of maintaining the salmon and steelhead runs at Oxbow and Brownlee Dams has reached a very critical point, particularly because of the apparent ineffectiveness of the downstream migrant facilities at Brownlee Dam consisting of a large net barrier in the reservoir and associated "skimmers."

The U. S. Department of the Interior in its letter of September 3, 1960, to the Federal Power Commission pointed to the critical nature of the problem and requested issuance of an order for appraisal studies and supplementary facilities for artificial propagation. The whole complex of problems in connection with these projects is receiving a great deal of attention from both the Federal and State fisheries agencies.

On September 16, 1960, the Idaho Power Company in a motion to the Federal Power Commission, requested that the hearing on the matter of fish facilities requirements at Oxbow and Brownlee Dams on the Snake River be reopened and that an order be issued by the Federal Power Commission to the Company providing for:

- (a) A stay in the Commission's order of February 12, 1958, which requires construction and operation of permanent-type fish facilities at Oxbow Dam;
- (b) A temporary arrangement for handling the upstream migrants at Oxbow Dam;
- (c) The development of a study program, to be financed by the Company, to appraise the effectiveness of the Brownlee and Oxbow Dam facilities;
- (d) The provision of supplementary facilities for the artificial propagation of the spawn from about 2,000 adult salmon below Oxbow Dam.



Federal Purchases of Fishery Products

DEPARTMENT OF DEFENSE PURCHASES,
JANUARY-NOVEMBER 1960:

Frozen Fishery Products: For the use of the Armed Forces under the Department

of Defense, 1.7 million pounds (value \$898,000) of fresh and frozen fishery products were purchased in November 1960 by the Military Subsistence Supply Agency. This was less than the quantity purchased in October by 2.4 percent, but was 19.4 percent more than the amount purchased in November 1959. The value of the purchases in November 1960 was lower by 2.5 percent as compared with October, but was up 25.9 percent from November 1959.

Table 1 - Fresh and Frozen Fishery Products Purchased by Military Subsistence Supply Agency, November 1960 with Comparisons

QUANTITY				VALUE			
November		Jan. -Nov.		November		Jan. -Nov.	
1960	1959	1960	1959	1960	1959	1960	1959
..... (1,000 Lbs.)			 (\$1,000)			
1,723	1,443	21,211	20,876	898	713	11,007	10,748

During the first 11 months of 1960 purchases totaled 21.2 million pounds (valued at \$11.0 million)--an increase of 1.6 percent in quantity and 2.4 percent in value as compared with the same period in 1959.

Prices paid for fresh and frozen fishery products by the Department of Defense in November 1960 averaged 52.1 cents a pound, about 0.1 cent less than the 52.2 cents paid in October, but 2.7 cents more than the 49.4 cents paid during November 1959 when supplies were more plentiful.

Canned Fishery Products: Tuna was the principal canned fishery product purchased for the use of the Armed Forces during November 1960. In the first 11 months of 1960, purchases of canned tuna were up about 20.5 percent and canned salmon were up 231.2

Table 2 - Canned Fishery Products Purchased by Military Subsistence Supply Agency, November 1960 with Comparisons

Product	QUANTITY				VALUE			
	November		Jan. -Nov.		November		Jan. -Nov.	
	1960	1959	1960	1959	1960	1959	1960	1959
 (1,000 Lbs.)			 (\$1,000)			
Tuna . .	422	355	3,563	2,957	196	154	1,589	1,357
Salmon .	-	414	3,593	1,085	-	267	2,436	737
Sardine .	2	1	126	1,026	1	1	52	166

percent as compared with the same period in 1959. However, purchases of canned sardines in January-November 1960 were down about 87.7 percent, as compared to the same period in 1959.

Note: Armed Forces installations generally make some local purchases not included in the data given; actual total purchases are higher than indicated because local purchases are not obtainable.



Florida

MIAMI UNIVERSITY MARINE LABORATORY RECEIVES GRANT FOR STUDIES OF MARINE LIFE:

A grant totaling \$263,984 has been made to the Marine Laboratory of the University of Miami by the National Heart Institutes of the U. S. Department of Health, Education and Welfare Public Health Service. The grant is to finance a five-year program of post-doctoral fellowships for biologists trained in inland institutions, but who wish to enlarge their experience through experimental studies of marine life.

According to the Director of the Laboratory, the investigation of marine animals is not only important from the point of view of marine biology but has also, in the past, contributed considerably to sciences basic to medical knowledge, such as embryology, physiology, and biochemistry. For this reason the new Marine Laboratory program has been designed to provide research facilities for scientists whose training and experience has been in medical and other branches of biology rather than in marine biology.

Each year during the five-year program as many as six biologists will be selected and will work at the Marine Laboratory for a period of one year. This activity will be under the general supervision of a member of the Marine Laboratory staff of scientists, aided by an advisory committee comprising a professor of biochemistry and a professor of physiology, both of the University of Miami School of Medicine.

The program will involve formal courses to familiarize the participants with the flora and fauna of the local marine areas. Following this, they will be encouraged to carry on their own researches under the supervision of one of the senior staff of scientists at the Marine Laboratory, or they may take a part in research programs already under way.



Great Lakes Fishery Investigations

LAKE MICHIGAN FISH POPULATION SURVEY ENDS FOR SEASON:

M/V "Cisco" Cruise 11: The fish population survey in Lake Michigan was continued during the November 22-25, 1960, cruise--

the last of the season--by the U. S. Bureau of Commercial Fisheries research vessel Cisco. All work was conducted off Grand Haven, Mich. Immediately after the cruise, the Cisco was sent to winter dockage at Bay City, Mich.

A 52-foot balloon trawl of the type used by Lake Michigan commercial fishermen was towed at 5-fathom-depth intervals from 10 to 40 fathoms. The best chub catches were only moderately large, but alewife catches were the largest of the season. Had the cod end of the trawl been made of smaller mesh, some of the alewife catches might have been much greater. On some occasions, many small alewives were seen escaping through the cod end when the net was brought in.

Concerning the vertical distribution of major species, the greatest catch of chub was taken at 25 fathoms, although some were taken at all depths; alewives were present also at all depths but were most abundant at 10-15 fathoms; yellow perch were most numerous at 15 fathoms with virtually none taken at other depths. Small numbers of slimy sculpins, deep-water sculpins, smelt, and spot-tail shiners were also taken in the trawl. A single 19-inch whitefish was caught at 10 fathoms.

Gangs of nylon gill nets (50 feet each of $1\frac{1}{4}$ - and $1\frac{1}{2}$ -, 100 feet of 2-, and 300 feet each of $2\frac{3}{8}$ -, $2\frac{1}{2}$ -, $2\frac{3}{4}$ -, 3-, $3\frac{1}{2}$ -, and 4-inch mesh) were set at 25 and 50 fathoms. The catch at 25 fathoms was 578 Leucichthys hoyi, 3 L. reighardi, 1 L. kiyi, 5 lake herring, 96 alewives, 22 smelt, and 7 yellow perch; at 50 fathoms the nets took 420 L. hoyi, 14 L. kiyi, 3 L. zenithicus, 3 lake herring, and 7 fourhorn sculpins. Most of the L. kiyi were ripe, but none had spawned.

Hydrographic observations and collections were made at the regular 25-fathom station off Grand Haven. Surface-water temperatures in the open lake averaged about 46.5° F. Vertically homothermous conditions prevailed to a depth of 35 fathoms.

Note: Also see Commercial Fisheries Review, Jan. 1961 p. 25.

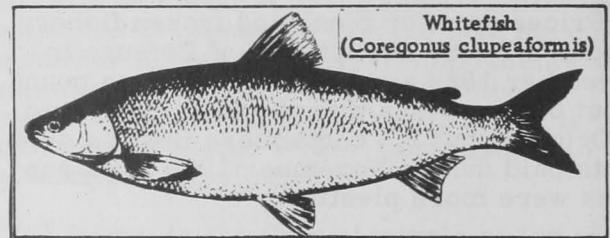
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WESTERN LAKE SUPERIOR WHITEFISH SPAWNING SURVEY:

M/V "Siscowet" Cruise 9: The annual assessment of whitefish spawning activities in the Apostle Island region of Lake Superior

was conducted (November 14-25, 1960) by the U. S. Bureau of Commercial Fisheries research vessel Siscowet. Large-mesh gill nets (4- to 6-inch mesh stretched measure) were set on four spawning reefs: Outer Island Shoal, Rocky Island Shoal, South Twin Island Shoal, and Cat Island Shoal. At each location except Cat Island, short gangs of nets were set just offshore, with the skiff in water 3 to 10 feet deep. Trawl tows were made with the Siscowet in waters adjacent to South Twin Island and Cat Island. In addition to the whitefish assessment studies, standard gangs of experimental gill nets (1- to 5-inch mesh by $\frac{1}{2}$ -inch intervals) were set south of Stockton Island.

Eighty-seven out of 105 spawning whitefish caught by gill nets in the Apostle Island area were tagged and released at the place of capture. Nearly all of the whitefish were males (only 10 females). All males were ripe but it was not until the end of the cruise that all of the females were ripe. No spent fish were observed. The average length of the white-



Whitefish
(*Coregonus clupeaformis*)

fish was only 18.3 inches (about 2.0 pounds). The smallest mature whitefish was a 15.3-inch male and the largest was a 23.1-inch male. The females averaged larger (20.2 inches) than the males (18.1 inches). The occurrence of small whitefish on the spawning grounds is further evidence that these fish mature at a smaller size in the Apostle Island region than whitefish in most other areas of the lake. However, the Apostle Island whitefish are older at first maturity than fish from other areas.

The catch of whitefish from the nets set in very shallow water was not appreciably different from the catch in deeper water.

One small-mesh net ($2\frac{1}{2}$ -inch mesh, 150 feet long) was attached to the large-mesh gangs to sample associated species found on the spawning grounds. Lake herring and menominee whitefish predominated in the catch. The lake herring were large (average weight: 0.9 pounds) and were nearly ready to spawn. Stomachs from the menomi-

nee whitefish were examined. Two contained fish eggs; the rest were empty. The eggs resembled menominee eggs.

Trawling in waters adjacent to the spawning reefs failed to capture spawning whitefish. Tows made east of South Twin Island (25 fathoms) and east of Cat Island (14-27 fathoms) yielded mainly slimy muddlers, ninespine sticklebacks, trout-perch, smelt, and pygmy whitefish. All of the pygmy whitefish were ripe but not yet spawning. Nine immature whitefish were taken by trawls at 27 fathoms at the Cat Island station. The stomachs of these fish contained large numbers of fish eggs. The eggs appeared to be either whitefish or menominee whitefish eggs.

Standard gangs of gill nets were set south of Stockton Island at 33 and 54 fathoms.

Most of the *L. hoyi* were nearly ripe but not as far advanced as the lake herring.

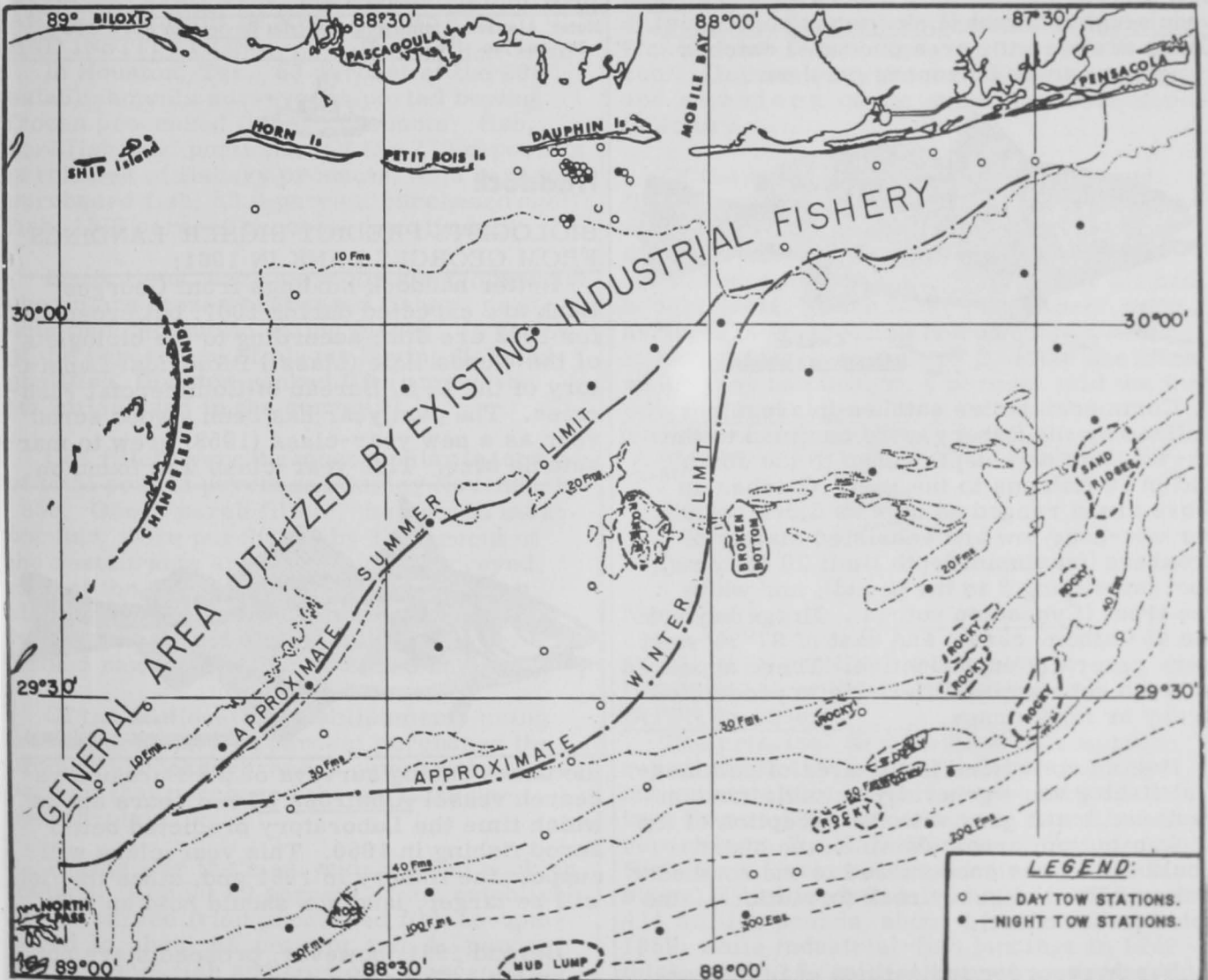
The water was homothermous vertically at all locations visited during the cruise. Surface temperatures ranged from 43.6° F. south of Stockton Island to 40.2° F. on Cat Island Shoal.



Gulf Exploratory Fishery Program

EXPLORATORY FISHING FOR INDUSTRIAL FISH CONTINUED:

M/V "Oregon" Cruise 72: A 12-day exploratory fishing survey of industrial fish concentrations off the Mississippi and Alabama coasts was completed by the U. S. Bureau of Commercial Fisheries exploratory

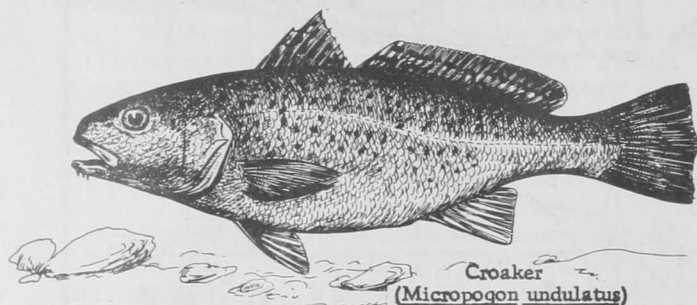


M/V Oregon Cruise 72 (November 18-December 4, 1960).

fishing vessel Oregon on December 4, 1960. The primary objective of this third cruise of a series was to assess the grounds south and east of the area (see chart) usually worked by the north Gulf industrial fish fleet in December. A secondary objective was to delineate and chart foul-bottom areas that are not indicated on navigation charts.

Trawling operations were conducted round-the-clock with 71 drags completed in the 4- to 225-fathom depth range. Geographical positions are indicated as day and night drags on the chart.

Commercial quantities of industrial fish were taken between 4 and 26 fathoms in the area utilized by the industrial fishery. Best fishing was found in 16 fathoms south of Dauphin Island where a 1-hour drag produced 6,000 pounds of croakers (*Micropogon undulatus*) and spot (*Leiostomus xanthurus*). Other drags in the area produced catches ranging up to 3,000 pounds per hour.



Croaker
(*Micropogon undulatus*)

Commercial-size catches in areas not utilized by the fishery were confined to the 35- to 42-fathom depth range to the south and in 20 fathoms to the east. Catches in those areas ranged as high as 3,000 pounds per one-hour tow and consisted mainly of croakers (maximum depth limit 20 fathoms), spot (averaging 3 to the pound), and white sea trout (*Cynoscion nothus*). Drags beyond the 40-fathom curve and east of 87°35' west were generally unproductive. There appeared to be no substantial difference in production in day or night drags.

Bottom conditions in the area of commercial fishing were generally suitable for conventional trawl gear with the exception of the broken-bottom areas shown on the chart. Foul bottom was encountered to the southeast and consisted of heavy rock formations (also noted on the chart).

Depth-recorder indications of midwater schools were notably absent during this pe-

riod. The absence of schools is possibly attributable to the unseasonably warm climatic conditions that have prevailed in the north Gulf. Surface water temperature along the 40-fathom curve averaged 73° F, as compared to an average temperature of 68° F. for the December period of 1959.

Standard "Gulf of Mexico"- and "New England"-type industrial fish trawls were used during the survey. The trawls were fished with 10-foot chain doors and single warp and bridle. Limited gear trials were conducted in the lee of Dauphin Island during a three-day period of strong northerly winds. The results suggest little difference in the fish-catching ability of the two types of trawls. It was found that the use of mud rollers on fairly firm bottom, although not affecting the fish catch, reduced the shrimp catch by approximately 50 percent.

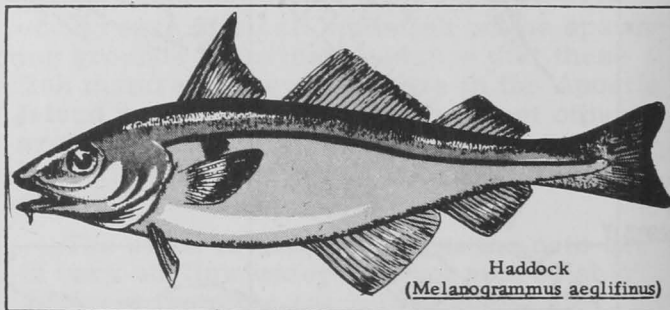
Note: Also see *Commercial Fisheries Review* for Nov. 1960 p. 34, and Jan. 1961 p. 27



Haddock

BIOLOGISTS PREDICT HIGHER LANDINGS FROM GEORGES BANK IN 1961:

Better haddock landings from Georges Bank are expected during 1961, but prospects for 1962 are dim, according to the biologists of the Woods Hole (Mass.) Biological Laboratory of the U. S. Bureau of Commercial Fisheries. The past year has been a good scrod year as a new year-class (1958) grew to marketable size. This year-class was found on



Haddock
(*Melanogrammus aeglefinus*)

the banks during surveys of the Bureau's research vessel *Albatross III* two years ago at which time the Laboratory predicted better scrod fishing in 1960. This year-class will support the fishery in 1961 and, since the fish will be larger, landings should hold up well.

Beyond 1961, however, prospects are not so bright. There are no new strong year-classes in the offing. Bureau research ves-

sels surveyed Georges Bank in the fall of 1959 and again in 1960 to assess the strength of the current year-classes. Neither the 1959 nor the 1960 group was as strong as that of 1958. Thus, we can expect poor scrod landings in 1962. Since the 1958 year-class, by that time, will be losing its importance in the catches, we can expect lower total landings of haddock in 1962.

Diversion of efforts to other banks will probably not alleviate the situation as no great abundance of young haddock are showing on other banks either.



Houston

CONSUMPTION OF FROZEN FISH AND SHELLFISH IN RESTAURANTS AND INSTITUTIONS:

In Houston, Tex., 83 percent of the 288 establishments surveyed reported buying frozen processed fishery products: fish, shellfish, and portions. Of the 239 reporting purchases of fishery products, 38.6 percent purchased fish; 33.0 percent purchased shellfish; 18.8 percent purchased portions.

Institutions, such as schools and hospitals used more frozen processed fishery products than did public eating places. In terms of the percentage of places buying fish and shellfish, Houston ranked fifth among the ten cities used in the survey.

Cod fillets were the most popular in terms of total pounds purchased during November 1958. Ocean perch fillets, the second most popular, were purchased by 14 percent of the restaurants and institutions surveyed. Half of the Houston purchasers of frozen shellfish bought breaded shrimp during the survey month and almost 40 percent purchased raw peeled and deveined shrimp.

Of the 59 Houston establishments using frozen portions, 65.1 percent purchased the product uncooked-breaded compared to 24.4 percent that purchased the portions uncooked-plain.

Frying was the most widely-used cooking method. Almost 80 percent of the establishments served fried processed fish as compared to about 68 percent and 91 percent serving shellfish and portions, respectively.

Five-sixths of the Houston users of portions cooked them while frozen.

Only a tenth of the Houston establishments using portions said they were more expensive than other forms of frozen processed fish. Half of the users of portions considered them less expensive and a third rated them about the same.



Restaurants and institutions in Houston tended to buy frozen processed fishery products from wholesalers, usually located less than 10 miles away. Fishery wholesalers supplied 58 percent of the establishments; frozen food distributors supplied 34 percent. Deliveries were made once a week and services of the suppliers were satisfactory.

Of the total users of frozen processed fishery products in Houston, 168 establishments were aware that they could buy Government-inspected or graded frozen processed fish and shellfish. Practically all had bought some. When these purchasers were asked if the inspection had affected the amount of frozen processed fish and shellfish which they had bought, 8 percent said the inspection had caused them to buy more.

Note: Also see *Commercial Fisheries Review*, December 1960 p. 38; November 1960 p. 26; May 1960 p. 27; January 1960 p. 32.



New England

FOOD-FISH LANDINGS UP BUT INDUSTRIAL-FISH LANDINGS DOWN IN 1960:

The principal New England fishing ports reported for 1960 more food-fish landings but substantially lower industrial fish landings than in 1959, according to a preliminary report from the U. S. Bureau of Commercial Fisheries Market News Service at Boston, Mass. Total food-fish landings in 1960 were 474 million pounds, about 2 percent above 1959; while industrial-fish landings in 1960 totaled only 101 million pounds as compared

with 229 million pounds the previous year.

Lower ex-vessel prices prevailed at all New England ports in 1960. The 1960 ex-vessel value of \$38 million for all landings was \$4 million less than the 1959 total. The largest drop was at New Bedford where scallop prices were down substantially. At Bos-

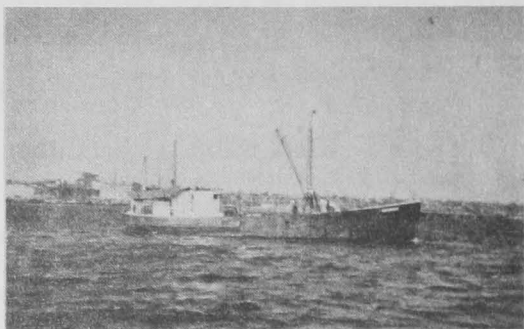


Fig. 1 - Scallop dragger entering New Bedford harbor.

ton and Gloucester the ex-vessel value was also down, due to lower dockside prices for haddock and ocean perch.

Landings at Boston, Gloucester, New Bedford, Provincetown, Woods Hole, Mass.; Portland, Rockland, Maine; Point Judith, R. I.; and Stonington, Conn.--represent about 75 percent of all New England fishery landings.

New England's fishing vessels and shore plants operated at capacity in 1960. However, vessel and plant replacements were few and the aging facilities were taxed heavily to maintain production. Continued use of the Bureau's Fisheries Loan Fund allowed many vessels to continue operation. The enactment of a Federal Vessel Construction Subsidy Program in 1960 offered some promise for the future.

Gloucester continued as the leading food-fish producing port in 1960 with 160 million pounds, followed by Boston with 108 million pounds, New Bedford with 75 million pounds, Portland with 52 million pounds, Rockland with 44 million pounds, Provincetown with 15 million pounds, Point Judith with 13 million pounds, Woods Hole with 4 million pounds, and Stonington with 3 million pounds.

Ocean perch was again the leading food species landed in 1960 at the principal New England ports--141 million pounds--7 million pounds more than in 1959. Haddock

landings totaled 102 million pounds, 5 million pounds more than in 1959. Landings of large haddock were lighter in 1960, but scrod haddock landings were up 6 million pounds. Whiting was next in volume with a total of 79 million pounds as compared with 83 million pounds in 1959.

The total landings of other important food species at the New England ports in 1960 were: flounders 56 million, cod 27 million, scallops 22 million, and pollock 19 million pounds. Of these, only flounder and scallop landings were higher in 1960 than in 1959.

Sea scallops continued to be landed in record volume. The 1960 total of 22 million pounds was 10 percent above the previous year. About 90 percent of the sea scallops were landed at New Bedford, the Nation's leading scallop port.

The industrial-fish fleets at New England's ports suffered from the depressed state of the fish meal market in 1960. Only 101 million pounds of industrial fish were landed as com-

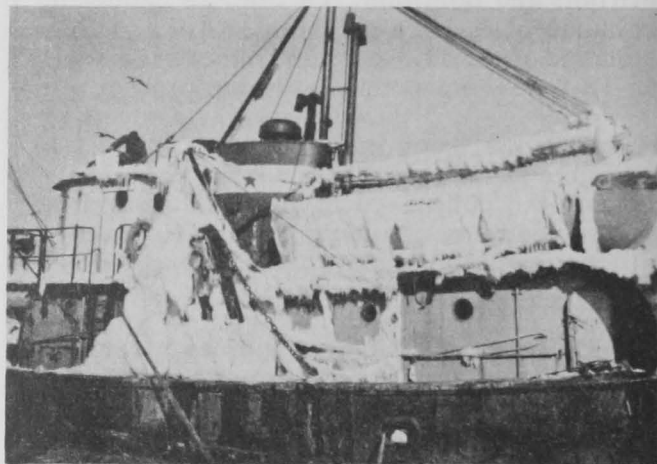


Fig. 2 - The fishing trawler Bonnie docked at Boston Fish Pier. Dangerous icing is usual for vessels fishing the North Atlantic in winter.

pared with 229 million pounds the previous year. Point Judith, R. I., Gloucester and New Bedford, Mass., were the hardest hit. Fish meal plants operated well below capacity and one plant at Gloucester was dismantled. Point Judith in 1960 continued as the leading producer of industrial fish, followed by Gloucester, Provincetown, and New Bedford, in that order. The greater part of the industrial fish is used in the manufacture of fish meal and oil, but good large quantities are also used for animal food.

As 1960 ended, stocks of frozen New England-produced fishery products were at good levels in warehouses throughout the Nation, but were about 10 percent under a year earlier. Domestic production was supplemented by imported fishery products that continued to arrive in record volume. Wholesale prices of most frozen fishery products were a shade higher than a year earlier as the year 1960 came to a close.

--By John J. O'Brien,
Supervisory Fishery Marketing Specialist,
Branch of Market News,
U. S. Bureau of Commercial Fisheries,
Boston, Mass.



Preservation

EXTENDING STORAGE LIFE OF FRESH FISHERY PRODUCTS BY USE OF RADIOISOTOPES TO BE STUDIED:

A long-sought objective of the fishing industry, the extension of the storage life of fresh fish and shellfish, was recently brought closer to realization when the U. S. Bureau of Commercial Fisheries and the U. S. Atomic Energy Commission joined forces in a series of studies designed to preserve the characteristics of fresh fishery products by ionizing radiation.

Most fish have a shelf life on ice of about 10 days from the time they are caught. Shucked clams and some other shellfish can be kept on ice for less than half this time. Extension of the shelf life of seafoods, particularly those not amenable to freezing, would open new and diversified markets for the sale of fresh fish.

It is the aim of scientists at the Bureau's Technological Laboratory at Gloucester, Mass., to double or triple the storage life of fresh fishery products by exposing them to small amounts of gamma rays from radioisotopes, and then storing the products at temperatures of 35° to 40° F. Low-level radiation of this type kills or injures bacteria. This treatment, combined with refrigerated storage, retards bacterial multiplication. Ultimately, those bacteria that were injured but not killed are able to grow again and to produce spoilage in the food products. But, by selecting the proper amount of radiation, it is possible to reduce the bacterial population to any predetermined level and

thus prevent the appearance of spoilage for any desired period of time.

One may then ask, why not apply radiation to kill all the bacteria and permit the storage of fresh fish for as long as we can now store canned fish? Chemists of the Bureau have found that they can easily apply levels of radiation sufficiently high to kill all the bacteria present in fish. When they do so, however, such high dosage may result in a loss of the delicate flavor and texture so characteristic of fish and shellfish at their best. Thus, a delicate relationship exists between the amount of radiation applied, the length of refrigerated storage life, and the degree of retention of these fresh flavor and texture properties.

Since fish and shellfish are so desirable for their vitamin and high protein content, as well as for their high degree of palatability, Bureau chemists will also study the effect of radiation on the protein and vitamins of the irradiated foods to insure that when they are ready for marketing, some time in the future, they will contain the same amounts of these essential nutrients as exist in the fresh product. They will also establish minimum radiation levels that will enable extension of the storage life of fishery products 2 or 3 times that of unirradiated products without affecting odor and flavor.



Shellfish

DUKE UNIVERSITY RECEIVES GRANT TO STUDY LARVAL DEVELOPMENT OF SHRIMP AND CRABS:

A \$40,000 grant for basic research on shrimp, crabs, barnacles, and other crustacea during the next three years has been awarded to Duke University by the National Science Foundation. The studies will be conducted at the Duke Marine Laboratory located near Beaufort, N. C.

The Laboratory will study under controlled laboratory conditions the larval development of shrimp, blue crabs, and barnacles. The purpose is to determine the best conditions for each species and the effect of constant salinity-temperature combinations on the frequency of molting and the time required for complete development. Secondary objectives are to find the effects of light and diet on the number of larval stages, the time

required for complete development, and the relationship of physical factors to survival.

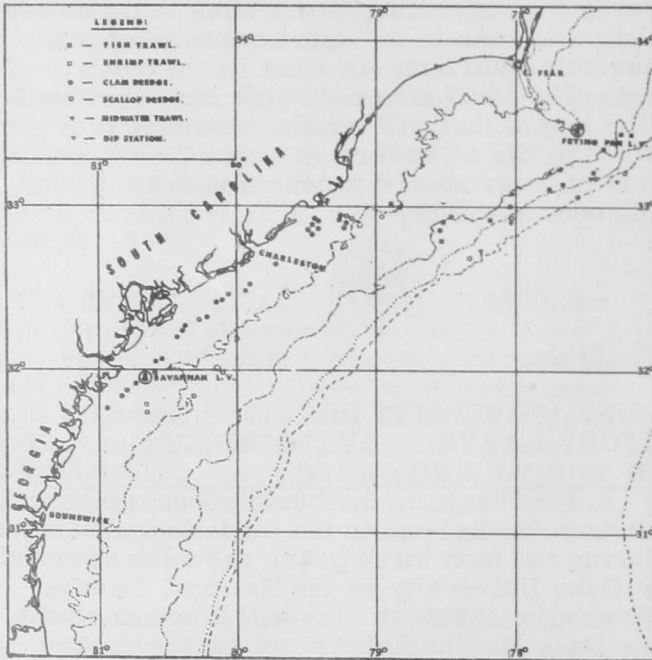
Duke researchers have already reared in the Laboratory certain species of blue crabs.



South Atlantic Exploratory Fishery Program

FISH AND SHELLFISH RESOURCES OFF COASTS OF NORTH AND SOUTH CAROLINA AND GEORGIA SURVEYED:

M/V "Silver Bay" Cruise 27: The U. S. Bureau of Commercial Fisheries chartered fishing vessel Silver Bay completed a 15-day exploratory fishing trip on December 16, 1960, off Georgia, South Carolina, and North Carolina. Scallop dredges, clam dredges, shrimp trawls, and fish trawls were used at 56 stations.



M/V Silver Bay Cruise 27 (December 1-December 16, 1960).

Trawling transects were completed between Port Royal Sound and Frying Pan Shoal light ship in depths of 5 to 115 fathoms. Numerous depth-recorder tracings of near-bottom fish schools were observed in the vicinity of 33°10' north latitude and 77°45' west longitude in depths of 20 to 50 fathoms. Attempts to sample these indications with fish trawls were uniformly unsuccessful with the exception of one 1-hour tow in 30 to 40

fathoms which caught 900 pounds of grunts, 750 pounds of goatfish, 440 pounds of vermilion snapper, and 130 pounds of mixed scrap species. One complete rig (trawl, bridle, and doors) was lost on a hang-up in this area.

Clam dredging was conducted between Cape Romain and St. Catherine Sound using a 14-tooth "Fall River" clam dredge in depths of 4 to 8 fathoms. A few live clams (Venus mercenaria) in the 3- to 5-inch size range were caught but no beds were noted. Large concentrations of dead Venus shells were dredged at some stations, possibly indicative of clam beds in shallower depths than could be reached by the Silver Bay.

Surface trolling between stations produced five little tuna (Euthynnus alletteratus) and one big-eyed tuna (Thunnus obesus).

Note: Also see Commercial Fisheries Review, October 1960 p. 42.



United States Fishing Fleet^{1/} Additions

OCTOBER 1960:

A total of 31 vessels of 5 net tons and over were issued first documents as fishing craft

Table 1 - U. S. Vessels Issued First Documents as Fishing Craft by Areas, October 1960

Area	October		Jan.-Oct.		Total
	1960	1959	1960	1959	
	(Number)				
New England	4	1	30	14	15
Middle Atlantic	1	1	13	11	12
Chesapeake	10	18	66	87	106
South Atlantic	1	2	42	71	76
Gulf	8	8	75	125	135
Pacific	5	4	105	88	97
Great Lakes	2	-	12	6	6
Alaska	-	-	23	31	32
Total	31	34	366	433	479

Note: Vessels assigned to the various areas on the basis of their home ports.

during October 1960--a decrease of 3 vessels as compared with the same month of 1959. The Chesapeake area led with 10 vessels. The Gulf area was second with 8, and the Pacific was third with 5 vessels. New England followed with 4, Alaska with 2, and the Middle Atlantic and South Atlantic areas with 1 each.

During the first ten months of 1960, a total

Table 2 - U. S. Vessels Issued First Documents as Fishing Craft by Tonnage, October 1960

Net Tons	Number
5 to 9	17
10 to 19	8
20 to 29	2
40 to 49	2
80 to 89	1
190 to 199	1
Total	31

^{1/}Includes both commercial and sport fishing craft.

of 366 vessels were issued first documents as fishing craft--67 less the same period of 1959. Most of the decline occurred in the Gulf area--a drop of 50 vessels as compared with the 1959 ten-months period.

NOVEMBER 1960:

During November 1960 26 vessels of 5 net tons and over were issued first documents as fishing craft--6 less than in November 1959. The Chesapeake led all other areas

Table 1 - U. S. Vessels Issued First Documents as Fishing Craft by Areas, November 1960

Area	November		Jan.-Nov.		Total
	1960	1959	1960	1959	
	(Number)				
New England	2	1	32	15	15
Middle Atlantic	-	1	13	12	12
Chesapeake	8	13	74	100	106
South Atlantic	2	3	44	74	76
Gulf	5	6	80	131	135
Pacific	5	7	110	95	97
Great Lakes	4	-	16	6	6
Alaska	-	1	23	32	32
Total	26	32	392	465	479

Note: Vessels assigned to the various areas on the basis of their home ports.

with 8 vessels, followed by the Gulf and Pacific each with 5, the Great Lakes with 4, while the New England and South Atlantic areas accounted for the remaining 4.

Table 2 - U. S. Vessels Issued First Documents as Fishing Craft by Tonnage, November 1960

Net Tons	Number
5 to 9	15
10 to 19	6
20 to 29	2
30 to 39	1
40 to 49	1
50 to 59	1
Total	26

A total of 392 vessels were issued first documents as fishing craft during the first eleven months of 1960--73 less than during the same period of 1959.



U. S. Fish Meal and Solubles Production and Imports, January-November 1960

During the first eleven months of 1960, the United States production of fish meal amounted to 251,200 tons, compared with 266,900 tons for the same period in 1959. There was a drop of nearly 4,000 tons of Alaska herring meal, 3,400 tons of tuna and mackerel meal, and 7,200 tons of meal from other countries. The production of menhaden meal during the 1960 eleven-months period declined only 1,000 tons.

Imports of fish meal totaled 116,000 tons for the period January-November 1960-- 11,400 tons less than in the same period of 1959. Imports from Peru (58,200 tons) made up 50 percent of the total, while Canada followed with the next largest amount (29,600 tons). The remaining 28,200 tons were received from Chile, Union of South Africa, Angola, and other countries.

U. S. Supply of Fish Meal and Solubles, 1960 and 1959			
Item	January-November		Total
	1960	1959	
	(Tons)		
Fish Meal:			
Domestic production:			
Menhaden	210,932	211,949	223,893
Tuna and mackerel	19,264	22,685	25,380
Herring, Alaska	4,126	8,094	8,094
Other	16,889	24,138	49,184
Total production	1/251,211	1/266,866	306,551
Imports:			
Canada	29,588	37,109	39,033
Peru	58,152	47,495	49,923
Chile	17,990	4,995	5,104
Angola	360	20,738	20,738
Union of South Africa	6,672	8,842	9,727
Other countries	3,235	8,238	8,400
Total imports	115,997	127,417	132,925
Available fish meal supply	367,208	394,283	439,476
Fish Solubles (Wet Weight):			
Domestic production ^{2/}	96,101	159,930	165,359
Imports:			
Canada	809	1,377	1,660
Denmark	1,858	18,723	18,723
Other countries	447	6,110	6,247
Total imports	3,114	26,210	26,630
Available fish solubles supply	99,215	186,140	191,989

^{1/}Based on reports from firms which accounted for 92 percent of the 1959 production.

^{2/}Includes production of homogenized-condensed fish.

During the first eleven months of 1960, the domestic production of fish-solubles amounted to 96,100 tons--a drop of 63,800 tons compared with the same period of 1959. Imports of fish solubles totaled 3,100 tons during the 1960 eleven-months period compared with 26,200 tons for the 1959 eleven-months period.



U. S. Foreign Trade

EDIBLE FISHERY PRODUCTS, OCTOBER 1960:

Imports of edible fresh, frozen, and processed fish and shellfish into the United States during October 1960 increased by 9.6 percent in quantity and 13.9 percent in value as compared with September 1960. The increase was due primarily to higher imports of frozen albacore tuna (up 3.6 million pounds) and frozen shrimp (up 6.0 million pounds), and to

a lesser degree, an increase in the imports of fresh, frozen, and canned salmon. The increase was partly offset by a 2.0-million-pound decrease in the imports of tuna other than albacore.

Compared with October 1959, the imports in October 1960 were lower by 13.6 percent in quantity and 1.3 percent in value due to a drop in the imports of frozen groundfish and other fillets (down 12.4 million pounds), canned tuna in brine (down 3.0 million pounds), and frozen tuna other than albacore (down 4.6 million pounds). Compensating, in part, for the decreases was an increase of about 4.2 million pounds in the imports of frozen albacore tuna and fresh and frozen salmon (up 1.6 million pounds).

Item	Quantity			Value		
	October	Year	Year	October	Year	Year
	1960	1959	1959	1960	1959	1959
Imports:						
Fish & shellfish:						
Fresh, frozen, & processed ^{1/}	97.4	112.8	1,070.5	29.5	29.9	309.6
Exports:						
Fish & shellfish:						
Processed only ^{1/} (excluding fresh & frozen)	6.1	6.3	68.0	2.8	1.9	22.8

^{1/}Includes pastes, sauces, clam chowder and juice, and other specialties.

United States exports of processed fish and shellfish in October 1960 were lower by 2.3 percent in quantity and 17.6 percent in value as compared with September 1960. Compared with the same month in 1959, the exports in October 1960 were lower by 1.7 percent in quantity, but were up about 47.4 percent in value. The lower volume of exports in October 1960 as compared with the same month in 1959 was due primarily to a drop of about 1.1 million pounds in the exports of California sardines. The increase in value from October 1959 to October 1960 was due to higher exports of relatively high-priced items such as canned salmon and frozen shrimp.

IMPORTS OF CANNED TUNA IN BRINE UNDER QUOTA:

The quantity of tuna canned in brine which may be imported into the United States during the calendar year 1960 at the 12½-percent rate of duty is 53,448,330 pounds. Any im-

ports in excess of the quota will be dutiable at 25 percent ad valorem.

Imports from January 1-December 3, 1960, amounted to 46,563,451 pounds, according to data compiled by the U. S. Bureau of Customs.

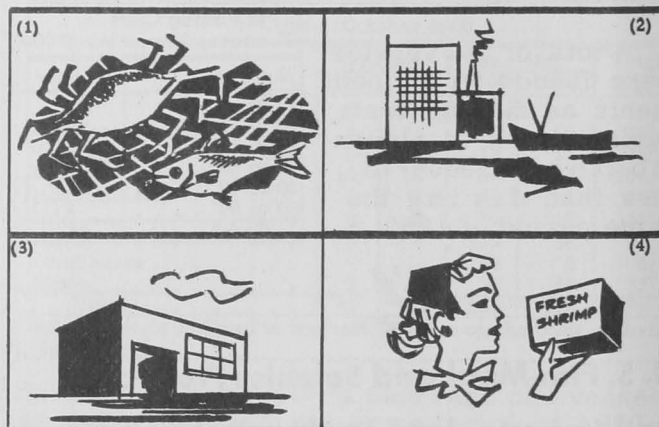
A total of 49,966,082 pounds had been imported from January 1-November 28, 1959.



Wholesale Prices, December 1960

The December 1960 wholesale price index for edible fishery products (fresh, frozen, and canned) at 133.2 percent of the 1947-49 average was up 1.3 percent from the preceding month and 8.6 percent above the same month of 1959. The December 1960 wholesale price index was at the highest point for the year and was the second highest (reached 134.8 in December 1958) for the 1951-60 period. The increase from November 1960 to December 1960 was due mainly to higher ex-vessel haddock prices at Boston following some severe weather. From December 1959 to December 1960, all prices in the fishery products wholesale index rose except those for frozen dressed halibut, fresh yellow pike, and Maine and California canned sardines.

The drawn, dressed, and whole finfish subgroup index in December 1960 was up 5.0 percent from the preceding



month. Mid-December 1960 price increases of 34.2 percent for large drawn haddock at Boston and 7.1 percent for fresh round whitefish at New York City were mainly responsible. From December 1959 to December 1960, the subgroup index rose 12.1 percent due to sharply higher prices for dressed whitefish at Chicago (up 61.2 percent), plus frozen dressed king salmon (up 18.0 percent), and fresh drawn large haddock at Boston (up 8.6 percent). The increases were partially offset by lower prices for frozen dressed halibut and fresh yellow pike at New York City.

The fresh processed fish and shellfish subgroup index increased 3.6 percent from November to December 1960--the short supplies of haddock on the Boston market in mid-December 1960 caused a spurt of 25.6 percent in

the prices for fresh haddock fillets, and fresh shrimp prices at New York City increased 4.3 percent. Prices for fresh shucked oysters at Norfolk continued unchanged from the preceding two months. From December 1959 to December 1960, prices in the subgroup increased 9.1 percent. All subgroup items were higher priced in December 1960 as compared with December 1959.

The frozen processed fish and shellfish subgroup index dropped 3.8 percent from November to December 1960 due to lower frozen shrimp prices at Chicago and slightly lower frozen flounder fillet prices at Boston, but prices for haddock and ocean perch fillets were unchanged. As compared with December 1959, December 1960 wholesale frozen fillet prices were higher due to lower inventories, also the frozen shrimp prices at Chicago were up about 8.2 percent.

Canned fish prices in December 1960 were about unchanged (down 0.3 percent) from the preceding month except for canned lightmeat tuna which was down 10 cents a case. However, December 1960 canned fish prices were up 5.8 percent from the same month of 1959 due to higher prices for canned pink salmon (up 12.3 percent) and canned lightmeat tuna (up 1.2 percent). Both canned salmon and canned California sardines are in very light supply until the 1961 packing season for each gets under way. At the end of December 1960, the annual pack of tuna set a new record. In spite of the excellent pack, good demand and canners' promotion efforts have maintained a reasonably steady market for canned tuna. In the early months of 1961 supplies of canned tuna will be liberal and supplies of Maine sardines will be moderate.

Table 1 - Wholesale Average Prices and Indexes for Edible Fish and Shellfish, December 1960 With Comparisons

Group, Subgroup, and Item Specification	Point of Pricing	Unit	Avg. Prices 1/ (\$)		Indexes (1947-49=100)			
			Dec. 1960	Nov. 1960	Dec. 1960	Nov. 1960	Oct. 1960	Dec. 1959
ALL FISH & SHELLFISH (Fresh, Frozen, & Canned)					133.2	131.5	129.4	122.7
Fresh & Frozen Fishery Products:					150.0	146.9	143.7	136.4
Drawn, Dressed, or Whole Finfish:					173.6	165.4	166.4	154.8
Haddock, lge., offshore, drawn, fresh	Boston	lb.	.18	.13	178.0	132.6	141.5	163.9
Halibut, West., 20/80 lbs., drsd., fresh or froz.	New York	lb.	.30	.30	92.8	92.3	94.4	96.4
Salmon, king, lge. & med., drsd., fresh or froz.	New York	lb.	.90	.90	202.2	202.2	202.2	171.3
Whitefish, L. Superior, drawn, fresh	Chicago	lb.	.75	.75	185.9	185.9	183.5	115.3
Whitefish, L. Erie pound or gill net, rnd., fresh	New York	lb.	.75	.70	151.7	141.6	149.7	177.0
Yellow pike, L. Michigan & Huron, rnd., fresh	New York	lb.	.50	.70	117.3	164.1	134.8	138.4
Processed, Fresh (Fish & Shellfish):					146.8	141.7	135.3	134.6
Fillets, haddock, sml., skins on, 20-lb. tins	Boston	lb.	.52	.41	175.2	139.5	103.8	166.7
Shrimp, lge. (26-30 count), headless, fresh	New York	lb.	.73	.70	114.5	109.8	102.7	101.9
Oysters, shucked, standards	Norfolk	gal.	7.50	7.50	185.6	185.6	185.6	173.2
Processed, Frozen (Fish & Shellfish):					115.0	119.6	115.7	106.8
Fillets: Flounder, skinless, 1-lb. pkg.	Boston	lb.	.39	.40	102.1	103.4	102.1	98.1
Haddock, sml., skins on, 1-lb. pkg.	Boston	lb.	.34	.34	106.7	106.7	91.0	97.3
Ocean perch, skins on, 1-lb. pkg.	Boston	lb.	.30	.30	118.8	118.8	112.8	108.8
Shrimp, lge. (26-30 count), 5-lb. pkg.	Chicago	lb.	.69	.74	106.5	114.2	114.2	98.4
Canned Fishery Products:					109.8	110.1	109.6	103.8
Salmon, pink, No. 1 tall (16 oz.), 48 cans/cs.	Seattle	cs.	27.50	27.50	143.5	143.5	140.9	127.8
Tuna, lt. meat, chunk, No. 1/2 tuna (6-1/2 oz.), 48 cans/cs.	Los Angeles	cs.	11.00	11.10	79.3	80.0	80.0	77.9
Sardines, Calif., tom. pack, No. 1 oval (15 oz.), 48 cans/cs.	Los Angeles	cs.	7.65	7.65	89.8	89.8	91.0	93.9
Sardines, Maine, keyless oil, 1/4 drawn (3-3/4 oz.), 100 cans/cs.	New York	cs.	8.50	8.50	90.5	90.5	93.1	93.1

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

