Alaska

FOREIGN FISHING ACTIVITIES IN THE BERING SEA AND GULF OF ALASKA:

The month of August 1963 marked a further reduction in foreign fishing activities off the coast of Alaska. By the end of that month, all Japanese whaling fleets had returned to Japan and the Soviets had made a very substantial reduction in the size of their trawl fleet fishing for Pacific ocean perch. It was estimated that there were about 80 Russian and 150 Japanese vessels fishing in the Bering Sea and Gulf of Alaska as August drew to a close.

U.S.S.R.: The Soviet trawl fleet continued to operate on the Portlock-Albatross Banks area near Kodiak. The fleet, however, was drastically reduced to about 50 vessels during August. The reason for the sudden reduction in fleet strength was somewhat surprising to United States observers, as Soviet vessels were making substantial catches of Pacific ocean perch.

Two Soviet whale-processing fleets continued to operate in waters adjacent to Alaska during August, and killer vessels were still being sighted close inshore. One fleet operated along the eastern part of the Aleutian Island Chain while the second fleet operated south of the Alaska Peninsula throughout most of August.

Japan: The three Japanese whaling fleets that operated off Alaska during the current season had filled their quotas and departed for Japan by early August.

Two Japanese factoryships, accompanied by 4 trawler-type vessels and 16 "Kawasaki" type picker boats, were engaged in fishing for king crab in Bristol Bay northwest of Port Moller. The Japanese shrimp fleet fishing north of the Pribilof Islands consisted of a single factoryship and 15 trawlers.

The long-line fleet then fishing southeast of the Pribilof Islands was believed to consist of 5 factoryships and about 70 trawlers. One factoryship was scheduled to depart for Japan during late August.

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ALLEGED VIOLATION OF TERRITORIAL WATERS BY FOREIGN VESSELS PROTESTED:

Alaska senators protested alleged violations of territorial waters by Soviet whale killer vessels, and Alaskan military authorities were asked to furnish additional protection against incursions by foreign vessels into the waters of the State. Several reported violations of territorial waters by both Soviet and Japanese vessels created a storm of protest from the Alaska Congressional Delegation, Alaska's Governor, and members of the fishing industry.

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EMERGENCY REGULATIONS ISSUED TO PROHIBIT ALIENS FROM FISHING IN TERRITORIAL WATERS:

The Alaska Department of Fish and Game issued emergency regulations in response to reported violations of territorial waters by foreign vessels. The new regulations prohibit aliens not lawfully admitted to the United States from engaging in fishing or whaling activities within territorial waters. Violation of the regulations would carry a penalty of up to $5,000 and/or 6 months imprisonment as well as seizure of gear and vessel.

* * * * *

TRAINING COURSE FOR FISHERMEN PROPOSED:

The Ketchikan committee on the Manpower Development and Training Act decided to submit a proposal under the Act for a "Fishermen's Course" to upgrade skills of Alaskan fishermen. The proposed course would be

offered by the Ketchikan Community College and would include a total of 52 weeks of instruction divided into two 26-week periods with the seasonal salmon fishery intervening. The course would cover the same subject areas previously offered in two "Fishermen's Short Courses" conducted by the University of Alaska in cooperation with the U. S. Bureau of Commercial Fisheries Technological Laboratory at Ketchikan. In addition, practical experience aboard fishing vessels chartered by the school would be included.

* * * * *

SHRIMP-PACKING OPERATIONS CURTAILED:

As the 1963 summer season neared an end, certain shrimp processors in the central Alaska region were reportedly preparing for a cut-back in operations. At the end of August, 4 vessels were landing shrimp at Seward and 2 at Seldovia. No shrimp were being landed at Kodiak where two plants had been geared-up earlier this year. At Seward, production consists of frozen shrimp logs; at Seldovia it is canned shrimp; and at Kodiak facilities are available for both the canned and frozen shrimp products. According to sources in the areas, the Seldovia operation was scheduled to close as usual about October; the Seward operation was due to cease in November; and at Kodiak there appeared to be no plans for activating the shrimp plants. It has been reported that one shrimp vessel serving the Seward packing industry will be converted to crab fishing. Curtailment of production of shrimp was attributed to the depressed market for the Alaskan products brought about, it was conjectured, by the increased production of other established sources of supply in the "lower 48" States.

* * * *

COMPOSITION OF 1963 ALASKA SALMON PACK:

As of August 25, the composition of the 1963 Alaska salmon pack was predominantly pink salmon. The percentage composition by species at that time was pinks 62 percent, reds 19 percent, chums 15 percent, cohos 3 percent, and kings 1 percent. Comparative figures through August 26, 1962, were pinks 54 percent, reds 23 percent, chums 19 percent, cohos 2 percent, and kings 2 percent.

The pack of salmon in Western Alaska as of August 25, was 291,000 cases compared with 512,000 cases packed at that time a year earlier. The 1963 season in western Alaska was the worst recorded since 1935 when the pack totaled 277,000 cases.

Considering that Central Alaska had a record salmon catch in 1962 with a pack of 1,975,000 cases packed as of August 26 of that year, the 1963 season's pack of 1,145,000 cases as of the end of August was considered to be about normal.

Pink salmon were abundant in Southeastern Alaska and canneries were going full time. As of of August 25, 1963, the pack climbed to 1,102,000 cases as compared with 579,000 cases for the same period a year earlier.

* * * * *

AIRBORNE CRAB SHIPMENTS FROM YAKUTAT:

Yakutat, a small community of 250 persons, located on Yakutat Bay in the Gulf of Alaska, has shipped more than 100,000 pounds of processed fresh crab (equal to about 300,000 pounds of whole crab) to seafood distributors in Seattle, Wash., and San Francisco, and Los Angeles, Calif. The crab meat is vacuum packed in specially designed containers which hold 5 pounds each. Cartons containing 6 such containers are air-shipped approximately 3 times weekly in 3,000 pound lots to Seattle. Dungeness crab accounts for about 75 percent of the shipments, and king crab the remainder.

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SALMON CAVIAR FROM ALASKA SHIPPED TO JAPAN:

The Japanese vessel Banshee Maru No. 32 was reported to have picked up 10 tons of salmon caviar which was manufactured in Kodiak, Alaska. The experimental shipment was taken directly to Yokohama, Japan. The potential Japanese market for Kodiak salmon roe may exceed several hundred tons per season. In the past, the bulk of the Japanese supply of salmon caviar has been obtained from the Soviet Union; however, the Japanese have indicated a desire to purchase the product from Alaska.

Alaska Fisheries Exploration and Gear Research

SHRIMP DISTRIBUTION STUDIES IN GULF OF ALASKA CONTINUED:

M/V "Yaquina" Cruise 63-2 (July 8-September 11, 1963): Exploratory fishing for shrimp was conducted along the northern perimeter of the Gulf of Alaska between Prince William Sound and Chirikof Island during this 9-week cruise by the U.S. Bureau of Commercial Fisheries chartered fishing vessel Yaquina. Work was done to supplement previous explorations in the area, as well as to provide coverage at locations not previously sampled.

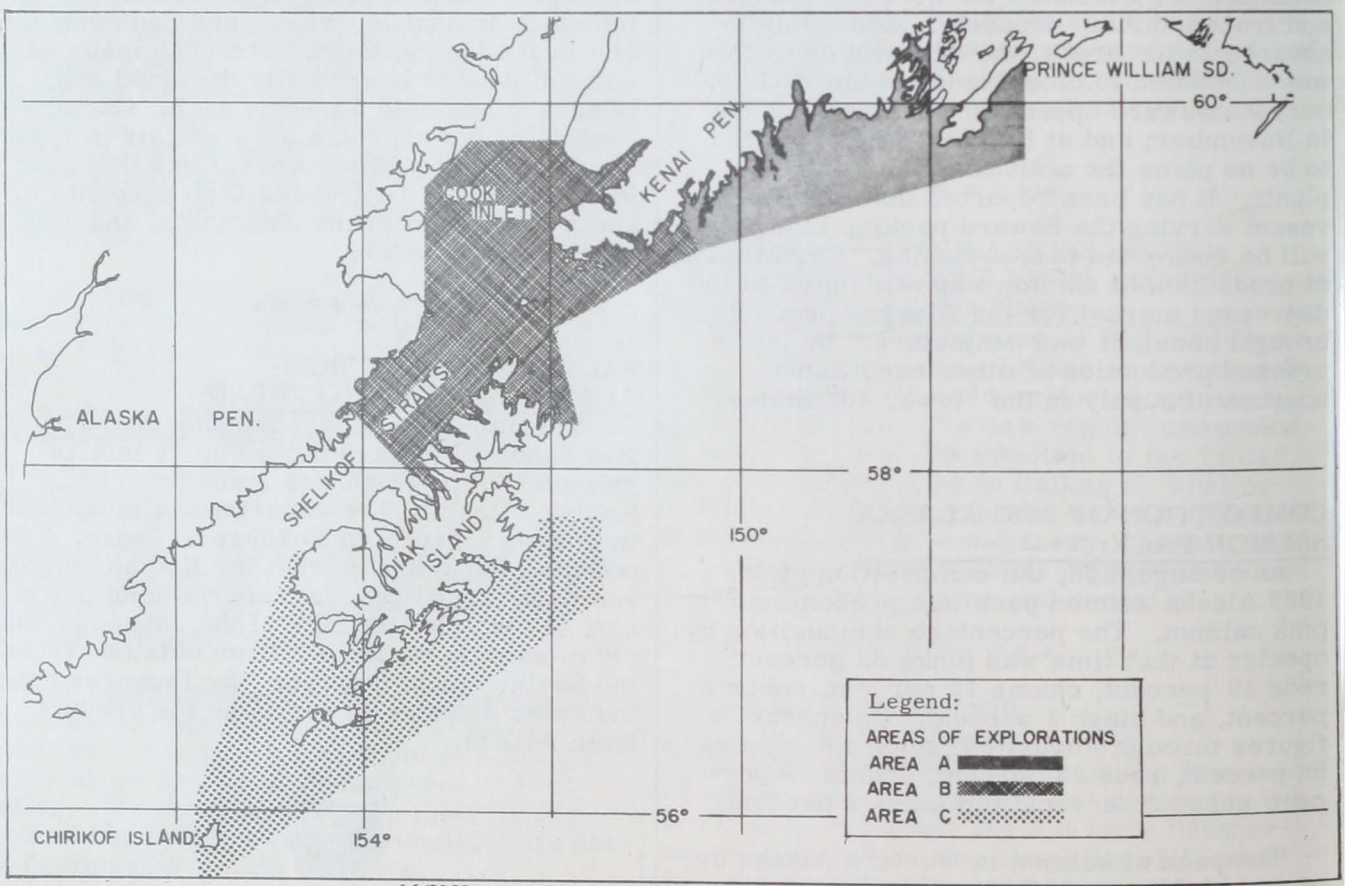
Evaluation of the potential resources was made by fishing selected areas with experimental trawl gear. The basic sampling gear used during the cruise consisted of 40-foot regular flat shrimp trawls, with $1\frac{1}{2}$-inch mesh in the intermediate and body section, and $1\frac{5}{8}$-inch mesh in the bag section. The footrope was hung with a loop chain, and 6 deep sea aluminum alloy floats were attached to the headrope. The nets were fished with 5-foot otter boards suspended from 25-fathom bridles and towed from a single trawl warp. The average length of each trawl drag was 3(minutes.

Summary of Shrimp Catch Data during Yaquina Cruise 63-2

Species of Shrimp		Average Catch of Shrimp Per Trawl Drag		
Common Name	Scientific Name	Area "A"	Area "B"	Area "C"
		(Pounds)		
Pink Shrimp	Pandalus borealis	19.6	163.7	251.4
Side-stripe	Pandalopsis dispar	2.3	37.3	26.9
Humpy	Pandalus goniurus	-	7.3	58.0
Coon stripe	Pandalus hypsinotus	0.5	14.2	14.5
Other Species		0.1	0.7	4.4
Total		22.5	223.2	355.2

The cruise was divided into three sampling areas. Area "A" consisted of waters between Prince William Sound and Nuka Passage (West of Seward); Area "B" included those waters adjacent to the Kenai Peninsula, the Barren Islands, and portions of Kachemak Bay, Lower Cook Inlet and the Shelikof Straits; and Area "C" covered the waters east and south of Kodiak Island.

In Area "C", catches of up to 3,000 pounds of pink shrimp were taken during a single



M/V Yaquina Cruise 63-2 (July 8-September 11, 1963).

drag off Twoheaded Island. A total of 64 trawl drags in the area produced an average of over 350 pounds of shrimp per drag. The largest catch of side-stripe shrimp from an individual drag (630 pounds) was taken in Alitak Bay.

In Area "B," 91 trawl drags were completed, yielding an over-all average shrimp catch of approximately 220 pounds per drag. Individual tows produced as high as 2,000 pounds of pink shrimp and 420 pounds of side-stripe shrimp. There were consistently high catch rates for side-stripe shrimp in northern Shelikof Straits.

The catch rates in Area "A" were significantly lower than those to the westward. The largest individual catch in this area was only 130 pounds of pink shrimp caught near Seal Rocks off Seward. Attempts to repeat high catch rates previously encountered during exploratory fishing off Montague Island were not successful.

Side-stripe shrimp averaged 21-30 whole shrimp per pound. Pink shrimp, which in the aggregate accounted for over 70 percent of the total catch, ranged in size from less than 50 to over 150 shrimp per pound, most of those, however, were 60 to 80 count (heads-on).

Note: See Commercial Fisheries Review, October 1963 p. 15.

Alaska Fishery Investigations

LOW WATERS IN SOUTHEASTERN ALASKAN STREAMS HAVE DIFFERENT EFFECTS ON DISSOLVED OXYGEN:

This year, levels of dissolved oxygen in Sashin Creek at Little Port Walter were significantly higher, and levels of free carbon dioxide and ammonia nitrogen lower than during the 1962 summer. The improved conditions occurred in spite of extremely low stream flows and warm water temperatures. One major difference between the summer of 1962 and 1963 was the presence of decaying eggs in the gravel during the former period and their absence during the most recent summer. Controlled experiments have been started by the U. S. Bureau of Commercial Fisheries Auke Bay Biological Laboratory, to determine the effect of dead eggs on water quality.

In contrast to Sashin Creek, and concurrent with the extreme low flows in Southeast Alaska, the dissolved oxygen was critically low in Traitors Cove Creek. This resulted in severe mortalities in the early run chum salmon eggs. Traitors Cove Creek gravel did not have any significant burden of decaying eggs from the previous brood year. Dissolved oxygen levels are important to the survival of salmon eggs and apparently may become critical during summer low stream flows in some Southeast Alaska streams, but not in others.

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RED SALMON MOVE SLOWLY UP KARLUK RIVER:

Adult red salmon tagged at Portage weir in the Karluk River took, on the average, 150 hours to move 9 miles up stream to the Karluk Lake weir. The fastest migration took $16\frac{1}{2}$ hours and the slowest 312 hours. The rate of migration seemed to vary inversely with the numbers of fish present in the river; that is, the fish seemed to slow down as their numbers increased.

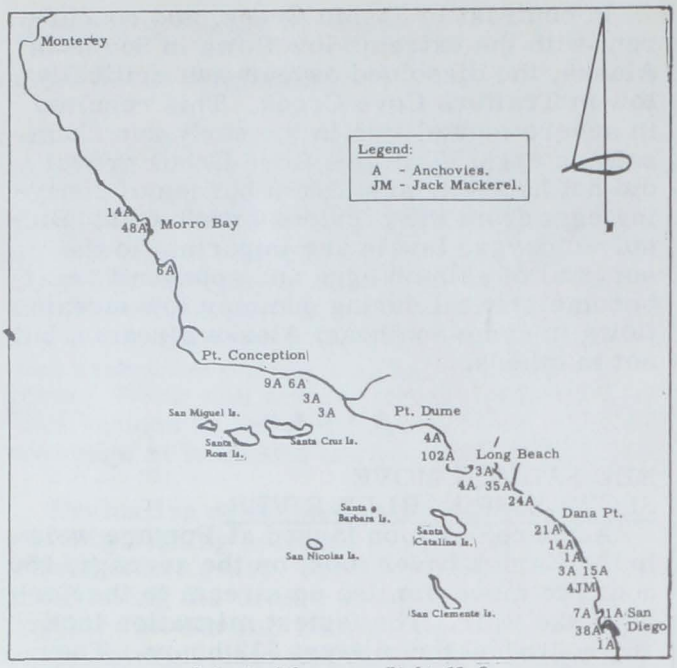
California

PELAGIC FISH POPULATION SURVEY CONTINUED:

Airplane Spotting Flight 63-8 (August 19-21, 1963): The survey to determine the inshore distribution and abundance of pelagic fish schools was continued by the California Department of Fish and Game Cessna "182" 9042T during flights over the inshore area from the United States-Mexican Border to Point Piedras Blancas, Calif.

Weather and visibility were generally poor and only afternoon flights were possible during the days scheduled. Water clarity was excellent south of Point Conception, but turbid in the Morro Bay area. The clear water sometimes made it difficult to distinguish fish schools from shoals and kelp beds. Very little red tide was seen, but where it did exist, it was concentrated in small areas and generally quite dense.

A total of 359 anchovy schools and 4 jack mackerel schools were sighted during the 3 afternoons. The first day's flight was the



Pelagic fish survey flight 63-8.

most productive with 102 schools sighted in Santa Monica Bay, 61 in the Point Vicente to Dana Point area, and 86 between Dana Point and the United States-Mexican Border.

Los Angeles Harbor bait fishermen have mentioned that anchovies quite often can be seen during the day in the channels of the "inner" harbor. The area was checked closely and three schools were seen among the moored boats. It has been said that those fish move into the outer harbor at night. No schools were seen in the outer harbor. A San Diego bait boat was seen making a set off Coronado Strand. Thirty-eight anchovy schools were counted in the immediate area. The bait fleet had difficulty locating anchovies in that area during previous months.

Four jack mackerel schools were seen off Encinitas near several purse seiners. None of the vessels was actively making a set.

On August 20, the area north of Los Angeles was flown, but visibility was very poor to Point Conception. North of the Point, the haze lifted and scouting was continued to Point Piedras Blancas. Anchovy schools seen around Morro Bay numbered 68.

On August 21, the entire area from Point Conception to the Mexican Border was scouted again. The Santa Barbara area still was enshrouded in haze, and fog. The condition prevailed down the coast to Los Angeles Harbor. South of Los Angeles, the air was clear and 42 anchovy schools were seen.

Note: See Commercial Fisheries Review, September 1963 p. 14.

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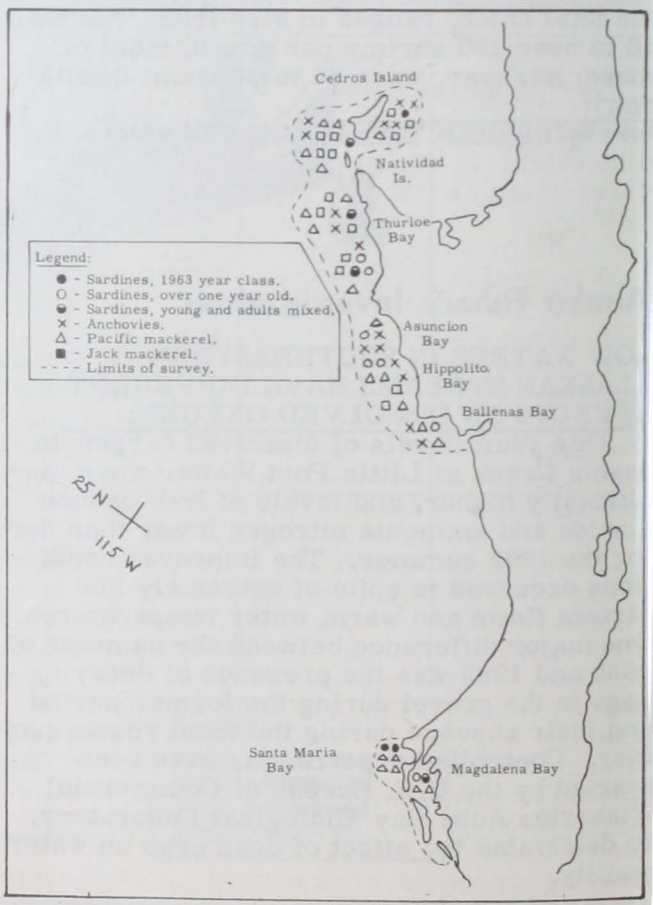
M/V "Alaska" Cruise 63-A-5 (August 6-27, 1963): The objectives of this cruise by the California Department of Fish and Game research vessel Alaska off the Mexican coastal waters of Baja California from Magdalena Bay to Cedros Island were to:

(1) Survey the fish and invertebrates in the inshore pelagic environment.

(2) Determine the amount of recruitment from this year's spawning of Pacific sardines (Sardinops caeruleus) and to measure the population density of older fish.

(3) Determine the distribution and abundance of northern anchovies (Engraulis mordax), Pacific mackerel (Scomber diego), and jack mackerel (Trachurus symmetricus).



M/V Alaska Cruise 63-A-5, August 6-27, 1963.

(4) Continue evaluating the midwater trawl under a variety of conditions.

(5) Collect live sardines and broomtail groupers (Mycteroperca xenarcha) for age, growth, and serology studies by the U. S. Bureau of Commercial Fisheries Biological Laboratory at La Jolla, Calif.

The midwater trawl, a blanket net, and visual scouting were used during the survey. A total of 35 night-light stations were occupied with a blanket net and the midwater trawl was used at 33 stations. Visual scouting was carried out for 271 miles. The principal fish species taken were northern anchovies, Pacific mackerel, jack mackerel, Pacific round herring (Etrumeus teres), and sardines. Over 32 other species were taken in lesser quantities, the most common of which were Pacific pompano (Palometa simillima), slim midshipmen (Porichthys myriaster) and northern midshipmen (P. notatus). The invertebrate catch consisted almost entirely of various squids, pelagic red crabs (Pleuroncodes planipes), salps, and pyrosomes.

PACIFIC SARDINES: Sardines were taken at various scattered locations within the cruise area. Fish of the 1963 year-class were frequently mixed with adults and made up slightly less than one-third of the total sardine catch. It appears that the 1963 year-class is similar to the poor one spawned in 1962.

The midwater trawl took sardines in 10 of 21 night tows and the blanket net at 4 of the 35 night-light stations. The best catches were made in Magdalena Bay where sardines were taken on all three night tows attempted. Many small schools were also observed in that area during daylight hours. Only 11 sardine schools were sighted during night scouting, all in the vicinity of Thurloe Bay.

NORTHERN ANCHOVIES: Anchovies were by far the most abundant pelagic fish taken or observed. They were found in an unbroken stretch from Ballenas Bay to Cedros Island. Extremely heavy concentrations were present near Natividad Island and Asuncion Bay. In those areas, schools were grouped so closely it was difficult to count them separately. The midwater trawl took anchovies in 14 of 18 tows. Most of the fish sampled were small (under 100 millimeters), but the 2 areas of heaviest concentrations contained large adults (115-140 millimeters). During visual scouting at night, 174 schools were detected. Many more indications of their presence were observed during daylight hours and on echo-sounder traces.

PACIFIC MACKEREL: Pacific mackerel were distributed over the entire area. They were present at 9 of 35 night-light stations and in 12 of 21 night trawls. But individual catches were limited except at night-light stations in Santa Maria Bay. The bulk of the catch appeared to be fish-of-the-year.

JACK MACKEREL: Jack mackerel were distributed from Ballenas Bay to Cedros Island. They were taken by trawl and night-light fishing at almost the same rate as Pacific mackerel. The catch consisted chiefly of fish less than 1 year old. The young jack mackerel frequently were schooled with sardines and Pacific mackerel.

MIDWATER TRAWL EVALUATION: The midwater trawl functioned very effectively in sampling pelagic fish species. It never failed to take fish that had been detected beforehand, and many times made catches where there had been no evidence of fish. The size of the fish caught by the trawl ranged from 2-inch anchovies to 35-pound white sea bass (Cynoscion nobilis). The number of species and the frequency at which they were taken by the trawl far exceeded the blanket-net catches. The trawl was much more effective than the blanket net in sampling anchovies. It made 15 catches as compared to 1 for the blanket net. Sardines and jack mackerel were more thoroughly sampled by the trawl, but no appreciable difference was evident with Pacific mackerel.

Night tows consistently caught more than day tows, especially of the important pelagic species. The difference was large enough to suggest that only night tows be made on future surveys. The best catches were made within 60 feet of the surface in turbid water. The latest modification of the net (shortened wings) resulted in a substantial improvement in door spread and ease of setting.

MISCELLANEOUS OBSERVATIONS: Live broomtail groupers were collected at Magdalena Bay for blood serology studies by the U. S. Bureau of Commercial Fisheries.

Trolling for albacore off northern Baja California failed to produce catches.

Weather and sea conditions were good at all times in the survey area. Sea surface temperatures ranged from 64.85° F. (18.25° C.) at Thurloe Bay to 75.90° F. (24.40° C.) at Hipolito Bay.

Note: See Commercial Fisheries Review, September 1963 p. 17.

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ABALONE OBSERVATIONS AND GROWTH STUDIES:

M/V "N.B. Scofield" and M/V "Mollusk" Cruise 63-S-5 and 63-M-1 Abalone (August 1-22, 1963): The objectives of these cruises by the California Department of Fish and Game research vessels N. B. Scofield and Mollusk along the mainland coastal areas of San Simeon and Morro Bay, and the Channel Islands of San Miguel, Santa Rosa, San Clemente, and Santa Catalina were to:

(1) Examine abalone beds in the San Simeon area in order to determine the effects of sea otters;

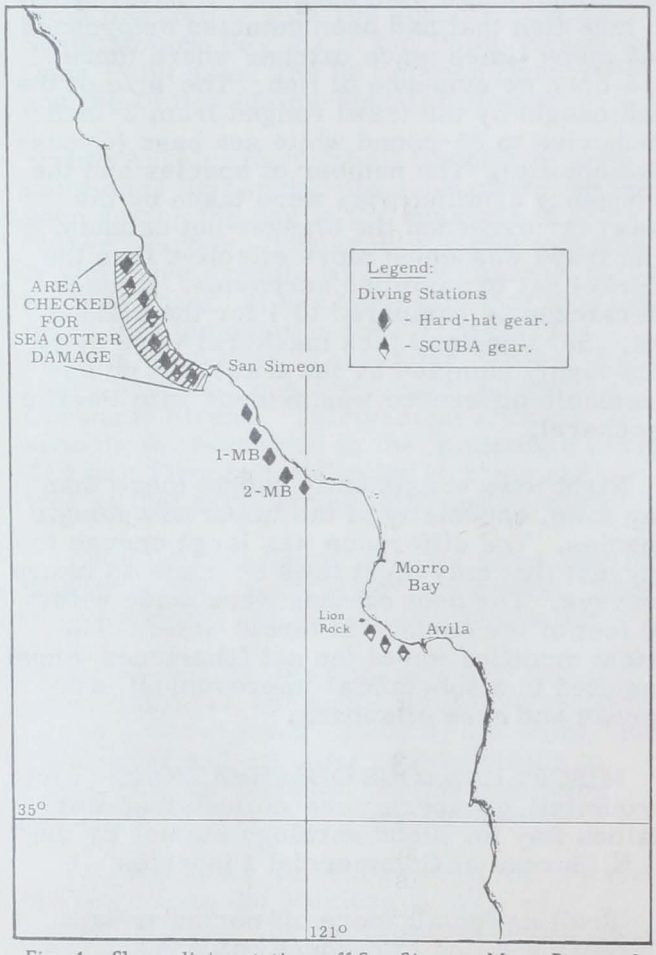


Fig. 1 - Shows diving stations off San Simeon, Morro Bay, and Avila during Cruises 63-S-5 and 63-M-1 by research vessels N. B. Scofield and Mollusk.

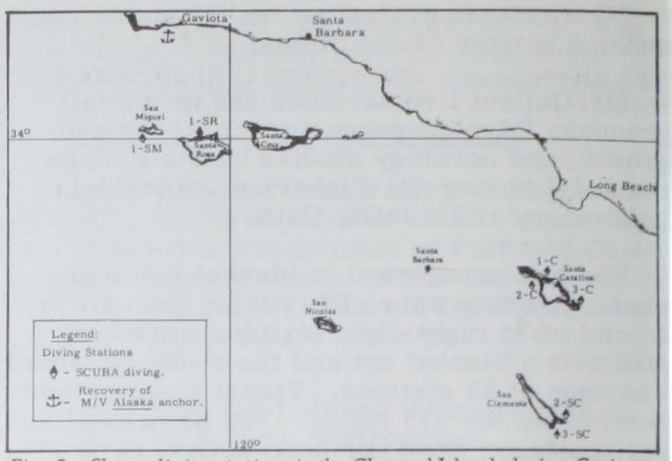


Fig. 2 - Shows diving stations in the Channel Islands during Cruises 63-S-5 and 63-M-1 by research vessels N. B. Scofield and Mollusk.

(2) Examine areas in the vicinity of Morro Bay and Avila to determine the extent of abalone;

(3) Check established abalone-observation stations at the Channel Islands, and tag abalone for continued growth study; and

(4) Conduct shipboard experiments designed to induce abalone spawning in tanks in order to obtain larvae for study.

SEA OTTER DEPREDATION: A special field trip was conducted in the San Simeon area (figure 1) with representatives of the abalone commercial fishery to determine the effects of sea otters on the abalone beds. Dives were made in areas where sea otters had been reported and in areas where sea otters were present. Broken shells, characteristic of sea otter depredation, were present in all areas where abalone were found. The amount of broken shell appeared to be in direct proportion to the numbers of abalone. An estimated 20 to 30 sea otters were in the area. While it was impossible to place a numerical figure on the amount of depredation, it was obvious that otters had been taking abalone and represented serious competition to divers on the same beds.

DISTRIBUTION AND GROWTH OBSERVATIONS: Morro Bay-Avila: Abalones here (figure 1) showed well developed gonads and appeared to be within 2 to 3 weeks of spawning. The gonads of the larger specimens (190-228 millimeters) were better developed than those of the smaller ones (178-188 millimeters). Many showed little or no shell growth in contrast with last year when most abalone had added 1 to 2 centimeters of new growth.

Spot dives were made along the coast north of Avila to obtain data for comparison with

observations made on last year's cruise. Specimens were found only in the Lion Rock area although the bottom and kelp appeared suitable for abalone in most places.

SAN MIGUEL: Bottom conditions at station 1-SM (figure 2) were much the same as those observed in 1962. Considerable sand still remained, but kelp growth had not been inhibited to any extent. Several large areas were thickly covered with sea urchins. At the eastern and western ends of the station, abalone was scarce, although they were plentiful in the central section. Samples were taken for transplanting to Santa Catalina Island. The water was thick with plankton (mostly salps) and dense schools of minute shrimp.

Ninety-two specimens (165 to 234 millimeters in length) had gonad tissue in stages of development from very early to nearly maximum maturation. Observations indicated that most of the abalone in the area might have recently spawned. A few showed recent shell growth.

SANTA ROSA (STATION 1-SR): A total of 20 tagged black abalone were recovered from a group of 130 marked in 1961. They showed no evidence of migration and no appreciable growth between September 1961 and August 1963. Other tagged shells were seen that could not be recovered due to heavy swells. With favorable weather, 50 to 75 percent of the original 130 could probably have been recovered.

In a shallow bay adjacent to the station, a school of over 1,000 leopard sharks was observed. The sharks are reported to congregate in the area during summer.

SAN CLEMENTE: Abalone were less numerous at stations 2-SC and 3-SC (figure 2) than a year ago, and growth during the year had been very slight. Gonad samples indicated that some were spent. Others had not developed and would not spawn this year.

Dives were made to 100-105 feet, but only a few pink abalone were found at those depths. Kelp growth was moderate and about the same as in 1962.

SANTA CATALINA: Abalone at station 2-C (figure 2) in Catalina Harbor were not as numerous as last year. The bottom appeared to have undergone considerable change. Large rocks and boulders were piled over the bottom, probably the result of storms. Eight marked abalone were recovered; 5 had been released in 1958 and 3 in 1962. Growth ranged from 0-18 millimeters. All were recovered at approximately the same depth and in the area of release, except 1 which had moved from 25 into 50 feet of water.

Numerous abalone of all sizes were found on the undersides of rocks and boulders, buried in 6 to 10 inches of sand and gravel. The abalone appeared to be dormant. How long they remain under the rocks is unknown.

At station 1C (Isthmus Reef), 39 red abalone from San Miguel were tagged and placed in water 100-105 feet deep off the side of the reef in the same general area to which survivors of the first red abalone transplant in 1957 had moved. The water at that depth is 4 to 5 degrees cooler (58° C.), and elk kelp (Pelagophycus porra) rather than giant kelp (Macrocystis pyrifera) is the dominant species.

At station 3-C (Avalon Harbor), approximately 30 tagged abalone released in 1957 and 6 shells of abalone tagged in 1958 were recovered. One live pink abalone tagged in 1958 and released in 25 feet of water was recovered at a depth of 80 feet. When tagged, it measured 140 millimeters, and when recovered, 150 millimeters. The station looked much better than in 1962. More kelp was growing and more fish and invertebrates were present, although the abalone population had not increased appreciably.

HOLDING EXPERIMENTS: Attempts to keep abalone alive in tanks aboard ship were not successful. Several methods of circulating and aerating sea water were tried without success. None of the abalone survived more than 24 hours, and all attempts to induce spawning were unsuccessful.

Note: See Commercial Fisheries Review, December 1962 p. 25.

Cans--Shipments for Fishery Products, January-July 1963

A total of 1,763,139 base boxes of steel and aluminum was consumed to make cans shipped to fish- and shellfish-canning plants in January-July 1963, a decline of 3.5 percent from the 1,826,186 base boxes used dur-

during the same period in 1962. Most of the decline was due to a smaller pack of tuna in the first part of 1963.

Note: Statistics cover all commercial and captive plants known to be producing metal cans. A "base box" is an area 31,360 square inches, equivalent to 112 sheets 14" x 20" size. Tonnage figures for steel (tinplate) cans are derived by use of the factor 21.8 base boxes per short ton of steel. The use of aluminum cans for packing fishery products is small.

Central Pacific Fisheries Investigations

OCEANIC EDDY SOUTHEAST OF OAHU SURVEYED:

M/V "Charles H. Gilbert" Cruise 68 (August 21-29, 1963): To locate and study one of the major eddies downstream of the Hawaiian Islands, in order to determine currents within the eddy as a unit, and to study the changes

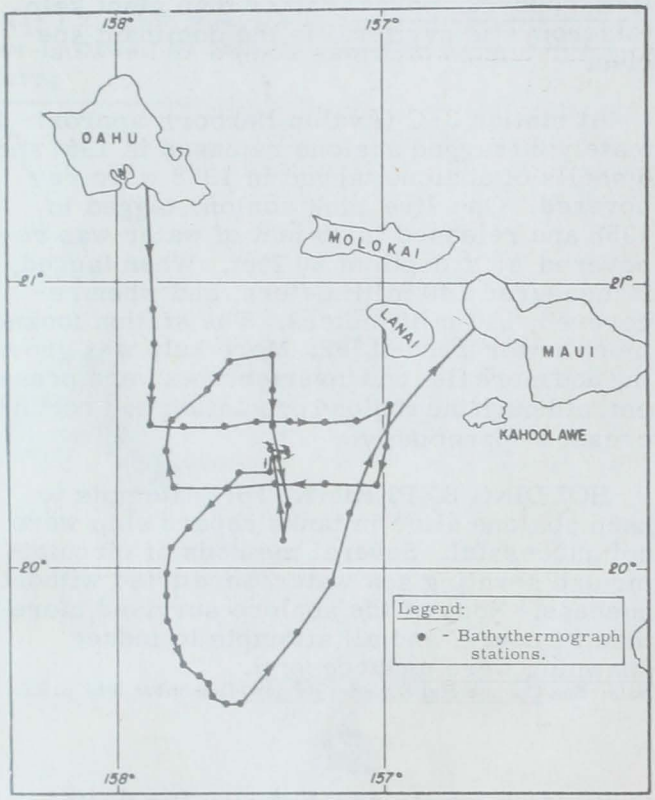


Fig. 1 - Cruise 68 track, Phase I, M/V Charles H. Gilbert (August 21-25, 1963).

in salinity and temperature distributions within the eddy were the primary objectives of this cruise by the U. S. Bureau of Commercial Fisheries research vessel Charles H. Gilbert. The vessel operated in the area bounded by 19°30'-20°30' N. latitude and 156°30'-158° W. longitude. Cruise tracks during phase I (August 21-25, 1963) and phase II (August 26-29, 1963) are shown in figures 1 2.

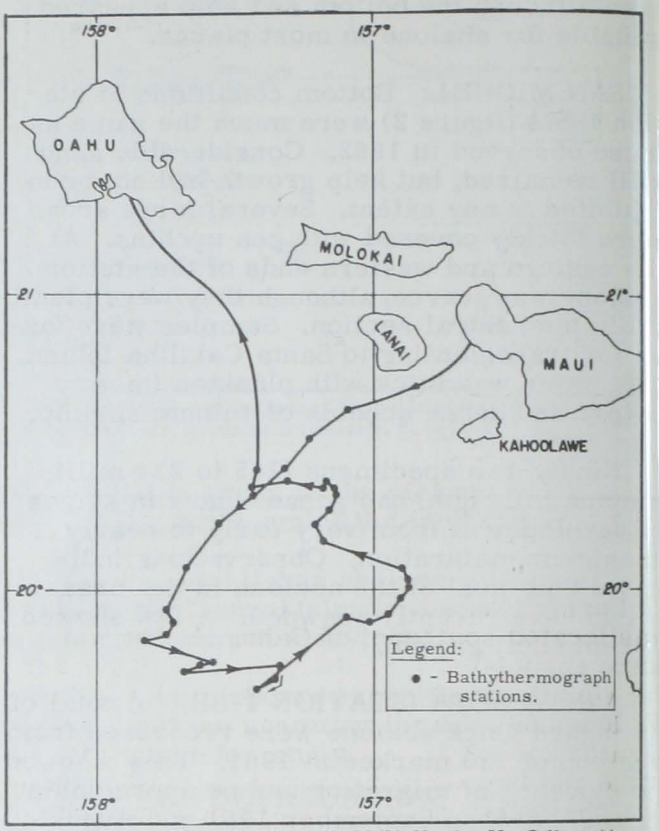


Fig. 2 - Cruise 68 track, Phase II, M/V Charles H. Gilbert (August 26-29, 1963).

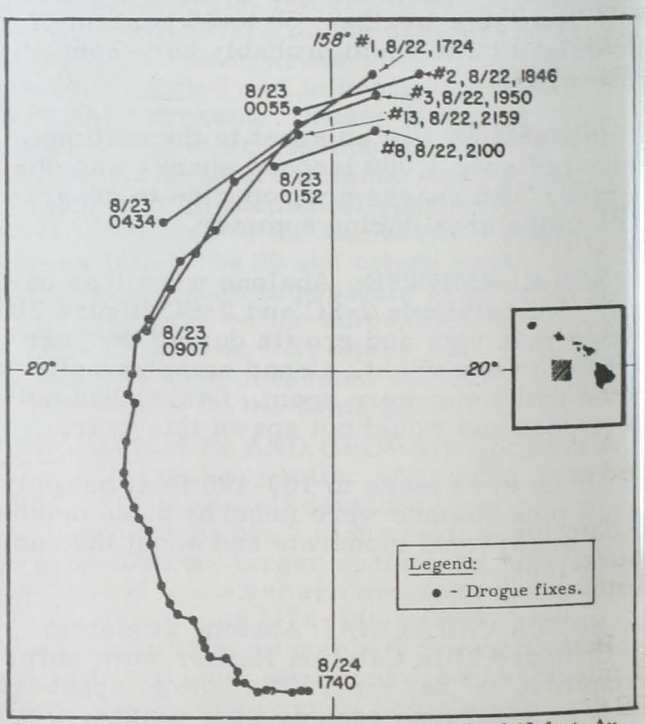


Fig. 3 - Drift of parachute drogues set at depth of 40 feet, August 22-24, 1963. M/V Charles H. Gilbert Cruise 68, Phase I.

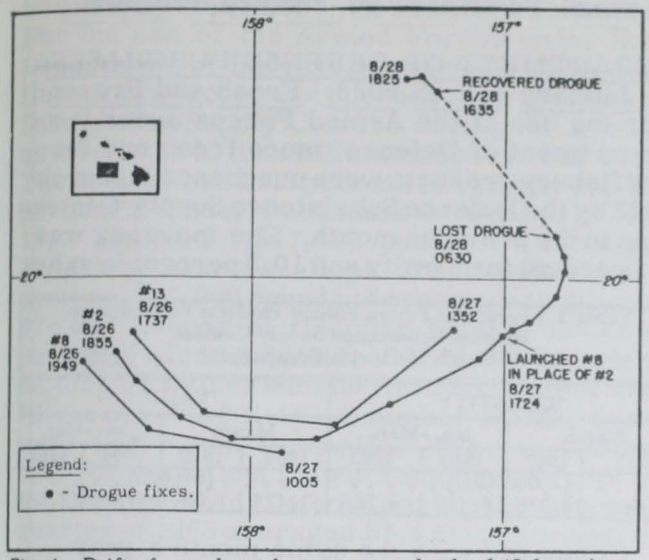


Fig. 4 - Drift of parachute drogues set at depth of 40 feet, August 26-28, 1963. M/V Charles H. Gilbert Cruise 68, Phase II.

During phase I of the cruise a major eddy was located southeast of Oahu. A thermal dome associated with the eddy was located in the vicinity of 20°25' N. latitude and 157°26' W. longitude. Parachute drogues were launched about 25 miles from the thermal dome and tracked for 3 days. During phase II of the cruise, tracking of the eddy was resumed. The drogues were tracked in a cyclonic movement to within 10 miles of the starting point. The average speed of the drogues was 1.5 knots. Phase I and phase II drogue drifts are shown in figures 3 and 4.

Other activities during the cruise were:

Approximately 60 drift cards and 80 drift bottles were released during both phases of the cruise.

Watches were kept for fish schools and bird flocks, although no pronounced association was found between such sightings and the eddy system.

A thermograph and barograph were operated continuously during the cruise.

Two lures were trolled during daylight hours. The total catch during the cruise consisted of nine Mahimahi (Coryphaena hippurus).

Bathythermograph observations were made at intervals of one hour except while following drogues, when observations were made at each drogue fix.

During phase I of the cruise, shipboard and scientific activities were photographed for a television program.

Note: See Commercial Fisheries Review, August 1963 p. 21.

* * * * *

VISUAL PERCEPTION OF SKIPJACK TUNA AND LITTLE TUNNY:

Experiments to test the visual acuity of tuna have produced comparative data for two of the species that are being maintained in the experimental facilities of the U.S. Bureau of Commercial Fisheries Biological Laboratory at Honolulu, Hawaii. It appears that skipjack tuna (Katsuwonus pelamis) have more acute vision at high light intensities than the closely related little tunny (Euthynnus yaito). In dimmer light, the two species are about equal in visual perception.

The tuna used in the experiments were kept in rapidly circulating sea water in a long rectangular tank, which was roofed and enclosed to control the available light. The biologist conducting the experiments was concealed in an observation booth, so that his presence and his actions would not influence the behavior of the tuna. In one end of the tank was an underwater window with a frosted glass screen on which various patterns could be focused from a slide projector. In preparation for the vision tests, tuna were trained by rewarding them with food when they approached a projected pattern of vertical stripes, and punishing them with an electric shock if they approached when a pattern of horizontal stripes was shown.

In the testing procedure, the projector was turned on when a tuna was at the end of the tank opposite the window. The fish immediately reacted by swimming rapidly toward the light. When the fish reached a marked distance from the window, the projector was turned off. If the fish had seen vertical stripes on the screen, it would continue down the tank to receive its reward. If the fish turned around and returned to the far end of the tank, it indicated that the tuna had detected a pattern of horizontal stripes. The tuna were scored for correct and incorrect reactions to the projected patterns.

The visual acuity of the tuna under different light conditions was measured by varying the distance between the fish and the window when the projector was turned off, the width of the projected stripes, and the intensity of

the projection light. From such data it was possible to estimate how large an object a tuna can distinguish at a given level of illumination.

It was found, for example, that skipjack have keen enough vision to distinguish a dark object about 1 inch square to a distance of around 50 feet under optinum light conditions in their normal habitat, that is, within the upper 150 feet of clear oceanic water around noon on a sunny day. Under the same conditions, the little tunny apparently could not make out the same object at a distance of more than 33 feet.

Additional experiments should make possible more detailed comparisons of the visual acuity of tuna species. The studies should have definite practical implications for the design of fishing gear and the planning of fishing strategy.

Clams

SURF CLAM RESOURCES OFF NEW JERSEY COAST SURVEYED:

A survey of the Atlantic east coast surf or sea clam potential was initiated this past summer with the signing of a cooperative agreement between the U. S. Bureau of Commercial Fisheries and the Sea Clam Packers Committee of the Oyster Institute of North America. The agreement provides for the Bureau to direct the technical activities related to the offshore clam survey, prepare progress reports for public release, and contribute some clam sampling equipment. The Sea Clam Packers Committee, representing the surf-clam industry, is providing a vessel with captain and crew, and will operate the vessel.

Scheduled to last at least 10 weeks, the survey will concentrate on determining the availability of surf clam just beyond the operating area of the current commercial fishery. It will extend generally from Cape May, N. J., to Long Island, N. Y., and to 40 miles offshore.

Federal Purchases of Fishery Products

DEPARTMENT OF DEFENSE PURCHASES:

January-March 1963: Fresh and Frozen: For the use of the Armed Forces under the Department of Defense, more fresh and frozen fishery products were purchased in March 1963 by the Defense Subsistence Supply Centers than in the previous month. The increase was 5.1 percent in quantity and 10.3 percent in value

Table 1 - Fresh and Frozen Fishery Products Purchased by Defense Subsistence Supply Centers, March 1963 with Comparisons

QUANTITY				VALUE			
March		Jan.-Mar.		March		Jan.-Mar.	
1963	1962	1963	1962	1963	1962	1963	1962
(1,000 Lbs.)				($1,000)			
2,064	1,948	6,117	4,788	1,178	1,084	3,792	2,87

Compared with the same month a year earlier, purchases in March 1963 were up 6.0 percent in quantity and 8.7 percent in value. Purchases this March included 494,000 pounds of shrimp as well as substantial quantities of ocean perch fillets, flounder fillets, haddock fillets, halibut, scallops, and oysters. Prices paid for fresh and frozen fishery products by the Department of Defense in March 1963 averaged 57.1 cents a pound, 2.7 cents a pound more than in the previous month, and 1.5 cents a pound more than in the same month of 1962.

During the first 3 months of 1963, purchases were up 27.8 percent in quantity and 31.9 percent in value from those in the same period of the previous year.

Canned: Canned tuna was the principal canned fishery product purchased for use of the Armed Forces in March 1963. Purchases of the three principal canned fishery products (tuna, salmon, and sardines) in the first quarter of 1963 were down 79.6 percent in quantity and 82.2 percent in value from those in the same period of 1962. The decline was due to lower purchases of canned tuna and salmon.

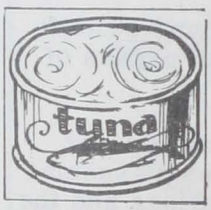


Table 2 - Canned Fishery Products Purchased by Defense Subsistence Supply Centers, March 1963 with Comparisons

Product	QUANTITY				VALUE			
	March		Jan.-Mar.		March		Jan.-Mar.	
	1963	1962	1963	1962	1963	1962	1963	1962
	(1,000 Lbs.)				($1,000)			
Tuna	686	-	696	3,113	352	-	358	1,739
Salmon	-	1,015	6	1,015	-	638	4	638
Sardine	49	3	143	10	22	2	61	6

* * * * *

January-June 1963: Fresh and Frozen: For the use of the Armed Forces under the Department of Defense, less fresh and frozen fishery products were purchased by the Defense Subsistence Supply Centers during the second quarter of 1963 than in the same period of 1962. The decline was 21.9 percent in quantity and 23.3 percent in value. Purchases during April-June 1963 included 1,517,000 pounds of shrimp, 786,000 pounds of scallops, 407,000 pounds of oysters, 941,000 pounds of ocean perch fillets, 674,000 pounds of flounder fillets, 534,000 pounds of haddock fillets, and 323,000 pounds of halibut, as well as substantial quantities of cod fillets and sole fillets. A number of other items were purchased in smaller volume. Prices paid for fresh and frozen fishery products by the Department of Defense during the second quarter of 1963 averaged 53.1 cents per pound.

Table 1 - Fresh and Frozen Fishery Products Purchased by Defense Subsistence Supply Centers, April-June 1963 with Comparisons

QUANTITY				VALUE			
April-June		Jan.-June		April-June		Jan.-June	
1963	1962	1963	1962	1963	1962	1963	1962
(1,000 Lbs.)				($1,000)			
5,611	7,185	11,878	11,973	2,981	3,888	6,773	6,762

Total purchases in the first 6 months of 1963 were almost identical in both quantity and value to those in the same period of the previous year.

Canned: Canned tuna and canned sardines were purchased in quantity for the use of the Armed Forces during April-June 1963, but purchases of canned salmon continued very light. Purchases of the three principal canned fishery products (tuna, salmon, and sardines) in the first 6 months of 1963 were down 53.8 percent in quantity and 61.2 percent in value from those in the same period of 1962.

Table 2 - Canned Fishery Products Purchased by Defense Subsistence Supply Centers, April-June 1963 with Comparisons

Product	QUANTITY				VALUE			
	April-June		Jan.-June		April-June		Jan.-June	
	1963	1962	1963	1962	1963	1962	1963	1962
	(1,000 Lbs.)				($1,000)			
Tuna	1,194	594	1,890	3,707	568	323	926	2,062
Salmon	8	-	16	1,015	6	-	10	638
Sardine	154	40	297	50	61	19	122	25

Notes: (1) 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.
(2) See Commercial Fisheries Review, Sept. 1963 p. 24.

Fish Meal

RECENT DEVELOPMENTS IN USE OF FISH MEAL IN POULTRY AND HOG RATIONS: During the latter part of July and much of August 1963, an animal nutritionist in the Technical Advisory Unit of the U. S. Bureau of Commercial Fisheries, traveled on the west coast, stopping en route to attend a poultry convention at Chicago, and attending one scientific meeting at Corvallis, Oreg., and another at Stillwater, Okla. During the trip, scientists at a number of experiment stations were visited and calls were made on representatives of mixed feed corporations and producers of industrial fish products. Some observations made on the trip are reported.

Fish meal is used more liberally on the west coast than it is in most other parts of the country. A factor contributing to this situation is the relative price structure of grain and oil seed products compared with the price of fish meal on the west coast. Shipping charges add to the cost of such products as soybean meal and corn shipped from the Great Plains area, whereas much of the fish meal used in the west is produced on the coast or imported from Peru and, of course, is less expensive there than it is inland. Western rations for growing chicks ordinarily contain up to 5 percent (and often much more) fish meal and laying rations up to 3 percent of the meal. (With the exception of the west coast and the Delaware, Maryland, and Virginia areas, levels of 3 percent fish meal for growing chicks and 0.5 percent for layers ordinarily are considered high.) "Least cost" calculations made in mid-1963 by two different firms indicated that 11 and 15 percent fish meal could be incorporated economically in chick rations.

Mixed feed production on the west coast differs from practice at most other places in that feeds are largely custom-mixed in the former region; such rations tend to be more liberally supplied with fish meal than those based upon proprietary formulas. Only a few western firms attempt to market the bulk of their output as "brand name" feeds, mixed on a proprietary-formula basis, according to various western authorities.

Workers at several western experiment stations are engaged in research on the utilization of industrial fish products. For example, at the University of California, studies both on fish oils and on certain digestive en-

zymes of fish that act on lipids are in progress; findings on tuna are presently in press and those on menhaden in process of preparation. At this same station, work is also being carried out on antioxidants for use with marine oils. At Oregon State University, a long-term project is being carried out on the uses of fish oil in animal feeding and on the uses of antioxidants to preserve fish oil. Workers there have observed that swine attain excellent growth rates when their rations contain 2.5 and 5 percent menhaden oil.

Poultry producers, constituting the bulk outlet for industrial fish products, can be expected to remain a good market for fish products as long as they can do business at a profit. However, economists have long maintained that United States poultry production operates dangerously close to the margin and any trend toward relief of this situation should be welcome. Such a trend was generally acknowledged at the Annual Poultry Congress and Exposition held at Chicago, July 24-26, where an aura of excitement concerning recent improvements in efficiency and the expectations of further advances pervaded the meetings. Efficiency, expressed in terms of the number of hens a worker can care for, has undergone something like a tenfold increase during the past half century, and further increases are already in sight. Much of the past improvement has come through mechanization, but in addition, such things as environmental control (control of temperature, light, and dust, and exclusion of wild animals and birds, etc.) and improved management are expected to contribute to increased efficiency in the near future.

Some of the papers given at the meetings of the American Society of Animal Science at Corvallis, Oreg., August 12-15, dealt directly with the values of fish meal in rations for swine. Brief summaries of those papers follow:

Researchers from State College, Fresno, Calif., reported that 1.5 percent fish meal added to a barley-grain, sorghum-degossypolized cottonseed ration containing no animal protein tended to improve rate of gain and enhance the efficiency of feed conversion by pigs. The addition of 0.1 percent lysine to the ration also tended to improve rate of gain but failed to enhance feed efficiency. Neither the addition of 0.5 percent lysine nor of 0.15 percent methionine hydroxy analog influenced rate of gain or feed efficiency.

Scientists from the University of Idaho evaluated the addition of herring fish meal, methionine, and B vitamins to barley-pea rations for growing-finishing swine. The addition of fish meal to the rations resulted in increased rate of gain in each of 4 trials and in improved efficiency of feed utilization in 3 of 4 trials. In each of two trials, methionine likewise increased feed efficiency and, to a lesser degree than did fish meal, it increased rate of gain. B vitamins resulted in slightly improved rates of gain but failed to influence feed efficiency to any great extent.

A scientist from the University of Illinois reported that fish meal added to a grain sorghum-peanut meal mixture resulted in significant improvement in the performance of pigs from 18 to 47 days of age. The fish meal was added to the mixture in amounts equivalent to 4, 6, 8, and 10 percent of the ration; all except the lowest of these additions were similarly effective. In a second experiment, gains were significantly and equally improved by the addition to a grain sorghum-peanut meal mixture of the following: 0.13 percent lysine; 0.13 percent lysine plus 0.13 percent DL-methionine, 3 percent menhaden meal; and 3 percent menhaden meal plus 0.1 percent DL-methionine. However, in each case the gains were less than those made on a corn-soybean meal ration with a nitrogen content equal to that of the ration with which it was compared.

Some of the experiments, reported upon, dealt directly with the amino acid requirements rather than with the relative merits of the various protein concentrates. The reason for this specialization is that it has become increasingly evident that a mutual balance among the essential amino acids must be attained before optimum nutritional performance can be achieved. After the relative requirements of the amino acids have been established, it doubtless will become possible, by means of optimal amino acid balances in rations, to increase the economy of feed utilization by swine to levels above those now commonly attained. Thus, the papers on amino acid requirements of swine are of primary value in establishing the true values of fish meal as a protein concentrate. Some brief summaries of amino acid requirements follow:

Representatives of a commercial feed company, reported a somewhat greater rate of gain and improved feed efficiency as com-

pared with performance on the basal ration when 0.1 percent lysine was added to an 11-percent protein, corn-soybean meal ration for pigs. In similar trials with rations containing 13 percent portein, lysine failed to influence rate of gain but did improve feed efficiency.

North Carolina State College scientists reported that the addition of 0.3 percent L-lysine, 0.05 percent DL-tryptophan, and 0.2 percent isoleucine to an 8-percent protein, corn-soybean meal ration significantly increased feed intake, rate of gain, and feed efficiency of pigs. Lysine and tryptophan, added together, also improved the ration but lysine and isoleucine without tryptophan depressed performance.

At the Annual Meeting of the Poultry Science Association, Stillwater, Okla., August 19-23, 1963, a few of the papers dealt directly with the values of fish meal in poultry rations, but far more of them dealt with the amino acid requirements of poultry. Such papers are, of course, of primary importance in establishing the true value of fish meal as a protein source in poultry rations. A review of selected papers follows:

The Ohio Agricultural Experiment Station reported that the addition of 2.5 percent fish meal plus 0.2 percent fish solubles to a corn-soybean meal breeder ration slightly improved egg production of turkey hens and tended to increase growth rate of poults. Poult growth was slightly accelerated, but egg production of hens was not increased by the addition of 5 percent alfalfa meal.

Interactions between nutrition, environment, and peformance were also demonstrated at the Ohio station. Maximum growth and egg production rates were obtained with range-reared birds that received UGF (unidentified growth factors) and were kept on litter floors during the reproductive season; poorest results were obtained with birds reared in confinement on raised wooden-slat floors, fed rations unsupplemented with UGF and kept in slat floor pens or wire cages during the laying season.

Annual nutritionists from Utah State University reported that a ration containing 18 percent protein supplied by peanut meal was found deficient in the sulfur-containing amino acids, and in lysine and threonine; the amino acids became limiting in the order given. A ration containing 22.5 percent protein supplied by peanut meal plus corn was found deficient in lysine and methionine and slightly deficient in valine and threonine as well. The University workers pointed out that fish meal, which is well supplied with the amino acids not present in sufficient amounts in peanut meal, can supply the needed amino acids.

Other scientists from Michigan State University reported that when two rations each containing 16 percent protein but having different energy values, were fed to 5-week-old chicks, growth was significantly more rapid on the ration having the greater caloric value. Although the amino acid contents of the two rations were similar, chicks on the lower energy ration responded to methionine supplementation while those on the higher energy ration failed to do so.

Chicks on a control ration containing 21 percent protein utilized feed more efficiently than did those given less protein. The authors pointed out that ". . . the response obtained from amino acid supplementation depends not only on the protein but also on the adequacy of energy."

Florida

FEEDING BEHAVIOR STUDY OF CORAL REEF FISH:

The National Science Foundation has issued a grant of $47,200 to the Institute of Marine Science, University of Miami, for a study of the feeding behavior of coral reef fish. The research program will be directed by the Curator of Fish for the Institute. Graduate students will assist in the field work, which will involve day and night diving to observe and collect fish in the Florida Keys.

Studies of coral reef fish have been in progress at the Universtiy of Miami for the past seven years and a great deal of scientific information has been accumulated on many of the 600 species found on Florida reefs. In 1962, a night-diving program was begun at Alligator Reef, near Islamorada. Night diving is important to an ecological study because certain nocturnal fish can be observed better at night, or in some cases only at night. Scientists are also interested in nighttime variations in feeding habits. The

new research program will involve at least three years of work.

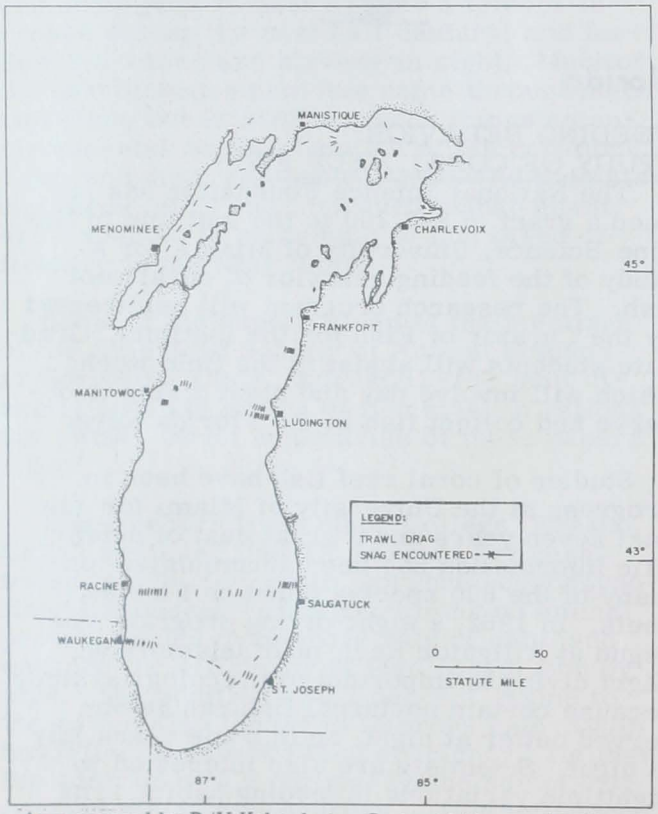
The food habits of the grunts are particularly important to the study, as they make up a large portion of the fish population on Florida reefs. Certain morays, wrasses, surgeonfish, butterflyfish, gobies, blennies, and others will also be included in the study. It is hoped that the study will reveal when peaks of feeding activity occur on the reefs, how feeding habits change with the season, and how the anatomy of the feeding mechanisms has been modified to permit feeding on specific organisms and in special habitats.

Great Lakes Fisheries

Exploration and Gear Research

TRAWLING INVESTIGATIONS IN LAKE MICHIGAN CONTINUED:

M/V "Kaho" Cruise 13 (Phase I--August 14-28, 1963; Phase II--September 6-18, 1963): Trawl fishing explorations were continued throughout Lake Michigan and Green Bay during this 27-day cruise (divided into 2 phases) by the U. S. Bureau of Commercial Fisheries research vessel Kaho. The primary objectives of the cruise were to: (1) investigate the seasonal distribution and abundance of various fish stocks, (2) determine the seasonal effectiveness of commercial-type otter trawls for catching abundant species such as alewife and chubs, and (3) further define areas suitable for otter-trawl fishing.



Area covered by R/V Kaho during Cruise 13 (August 14-28 and September 6-18, 1963).

Fair to good fishing was experienced in all areas visited except the Beaver Island-Charlevoix area where rough bottom conditions hampered fishing operations. Alewife dominated catches in Green Bay and, with few exceptions, those in Lake Michigan at depths from 5 to 20 fathoms. Potentially good commercial catches of "bloater" chubs were taken throughout most of the lake in the 15- to 45-fathom depth range, with the central and southern areas generally more productive. One shallow drag off Saugatuck produced a good catch of yellow perch of marketable size.

FISHING OPERATIONS: A total of 109 trawl drags were completed with a 52-foot (headrope) Gulf-of-Mexico-type fish trawl. Efforts were made to keep each drag at a uniform depth. All drags were of 30-minute duration except for 12 tows which were terminated when the net became fouled on bottom obstructions or when irregular bottom conditions or set nets were encountered. Minor gear damage occurred during 10 drags and a major loss of net webbing resulted from 2 drags. Bottom topography and bathymetric distribution of fish were continuously recorded with a high-resolution white-line-type depth-sounder recorder.

Suitable conditions for trawling were found to be scarce in the rugged bottom areas of northern Lake Michigan between Green Bay and Manistique; throughout most of the island area; and along the eastern shore as far south as Frankfort.

In addition to the 13 drags made in Green Bay and the 21 drags in northern Lake Michigan, 75 drags were made along 3 lakewide transects between various lake ports within southern Lake Michigan to study the extent of deepwater fish stocks as well as differentials in east-west and north-south fish distribution.

FISHING RESULTS: Green Bay: Commercially significant catches of alewife and/or

smelt were taken at several localities in Green Bay. The best catches of alewife were obtained at 10½ fathoms off Menominee and at 3 stations south of Big Bay de Noc at depths of 6½ and 11 fathoms. Eleven stations yielded catches of smelt; however, only 1 drag completed west of Chambers Island resulted in a catch of commercial proportion (300 pounds--30 percent 6-10 count per pound; 70 percent 20-30 count per pound). Whitefish appeared in 5 catches in amounts of 4 pounds or less. Yellow perch were present in only 2 drags and in both cases the catch was less than 1 pound.

Northern Lake Michigan: Clear bottom areas at depths between 15 and 40 fathoms off Manistique and between 20 and 40 fathoms off Arcadia yielded 7 relatively good catches of chubs ranging from 235 to 472 pounds. Two catches made off Manistique at 20 and 25 fathoms and 1 catch off Arcadia at 20 fathoms contained exceptional proportions of large chubs (18.4, 40.7, and 16.5 percent, respectively). Trawlable grounds located north and east of Beaver Island and near Charlevoix in Little Traverse Bay yielded negligible catches of small chubs and alewife. Other commercial species which appeared in trawl catches in less than significant amounts included whitefish (10 pounds total from 2 drags) and smelt (220 pounds total from 11 drags).

Southern Lake Michigan: The investigations completed along the three lakewide transect lines, between Ludington and Manitowoc, Saugatuck and Racine, and St. Joseph and Waukegan, revealed significant differences in depth distribution, abundance, and species interrelationship from one side of the lake to the other, as well as from one transect area to the others. With 2 exceptions, alewife (taken in amounts up to 820, 300, and 768 pounds per drag on each transect, respectively) dominated all catches within the 5- to 20-fathom depth range. The exceptions occurred off Racine, where "bloater" chubs made up 59.8 percent of the catch at 20 fathoms and 63.3 percent at 15 fathoms, and off Saugatuck at 5 fathoms, where 420 pounds of yellow perch were taken.

The most consistent chub catches were obtained along the Ludington-Manitowoc transect (19 drags averaged 190 pounds) and were best along the Michigan shore at 20 to 50 fathoms. Along other transects, the average catch rate was lower (23 drags averaged 182 pounds--Saugatuck to Racine, and 20 drags averaged 140 pounds--St. Joseph to Waukegan) and catches tended to be better on the western side of the lake.

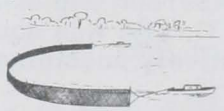
Yellow perch were taken in 10 drags in amounts of 85 pounds or less. Whitefish catches, ranging from 1 to 6 pounds, were taken in 5 drags. Smelt were produced in 18 drags in amounts of 10 pounds or less.

Miscellaneous Species: Other species appeared in trawl catches during the cruise as follows (frequency of catch and rate of catch shown in parenthesis):

Burbot (2 drags--½ to 4 pounds), carp (4 drags--½ to 90 pounds), herring (9 drags--1 to 9 pounds), minnows (5 drags--up to 15 pounds), round whitefish (1 drag--½ pound), sculpins (54 drags--up to 70 pounds), sea lamprey (4 drags--1 individual per drag), suckers (3 drags--2 to 40 pounds), stickleback (6 drags--up to 1 pound), and trout-perch (5 drags--up to 10 pounds).

HYDROGRAPHIC DATA: A total of 64 bathythermograph casts were made and air and surface temperatures were continuously recorded as a supplement to trawl fishing data. Surface water temperatures ranged from 40.0° F. near Ludington, Mich. (recorded during a wind induced upwelling), to 65.0° F. in Green Bay and other localities in Lake Michigan proper. A narrow thermocline with a temperature variation of about 11° F. was noted in southern reaches of the lake. This temperature gradient apparently influenced the distribution of alewife.

Note: See Commercial Fisheries Review, August 1963 p. 23; Sept. 1963 p. 26.



Great Lakes Fishery Investigations

LAKE TROUT DISTRIBUTION STUDIES CONTINUED:

M/V "Siscowet" Cruise 6 (August 19-27, 1963): To establish a catch-per-unit-effort index for lake trout in Keweenaw Bay, Grand Traverse Bay, and Shelter Bay, Mich., which can be used to measure the relative abundance of native and hatchery-reared fish in future years, was the main objective of this cruise by the U. S. Bureau of Commercial Fisheries research vessel Siscowet. Ten to twelve trawl tows were made at each location. The average number of juvenile lake trout caught per

15-minute trawl tow was 13.5 in Keweenaw Bay (north of Pequaming), 1.1 in Grand Traverse Bay, and 1.3 in Shelter Bay (east of Laughing Fish Point).

All of the 194 lake trout captured (range in length: 4.6 to 13.4 inches) were fin clipped. The fish were most abundant in 27-33 fathoms. The lake trout planted at Pequaming in the spring of 1963 were most common in the catches from Keweenaw Bay and were noticeably more abundant nearest the planting site. Trout planted at Bete Grise in the spring of 1962 predominated in the catches at Grand Traverse Bay, and most of those taken in Shelter Bay were planted in that area in 1962. Other species taken during trawling were smelt, chubs, sticklebacks, sculpins, and pygmy whitefish.

Small-mesh gill nets (600 feet of $2\frac{1}{4}$-inch and 300 feet of $2\frac{1}{2}$-inch mesh), set at 66 fathoms in Keweenaw Bay to obtain blood samples from chubs for electropheretic studies, yielded 129 chubs (Coregonus hoyi, C. kiyi, and C. zenithicus), 3 lake herring, and 1 fin-clipped lake trout. The same gang of nets set at 16 fathoms in Grand Traverse Bay caught only 5 lake herring, 6 lake trout (all fin clipped), and 1 longnose sucker.

Field data were collected for a detailed contour map of Au Train and Shelter Bays to facilitate future trawling. Young-of-the-year lake trout were abundant in that area in 1952-1953.

Experimental gill nets (15 nets ranging in mesh size from 1 to $5\frac{1}{2}$ inches) were fished at 12-26 fathoms at Stannard Rock, about 45 miles north of Marquette, Mich. The catch included 42 native lake trout (7-31 inches long), 85 lake herring, 79 burbot, and 93 chubs (C. kiyi. The catch of C. kiyi was unusual, since the species is relatively uncommon at depths less than 60 fathoms.

Surface water temperatures ranged from 53.2° F. at Stannard Rock to 62.4° F. in Keweenaw Bay.

Note: See Commercial Fisheries Review, October 1963 p. 22.

Gulf Exploratory Fishery Program

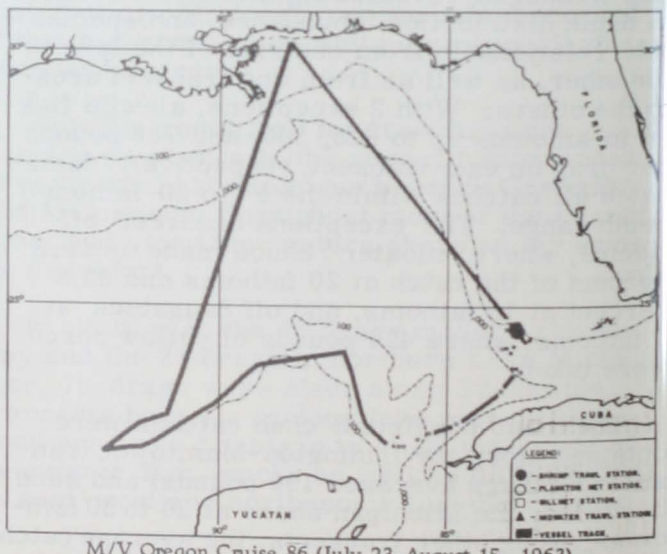
SURVEY OF SEASONAL DISTRIBUTION OF ROYAL-RED SHRIMP:

M/V "Oregon" Cruise 86 (July 23-August 15, 1963): To continue seasonal coverage of royal-red shrimp (Hymenopenaeus robustus) resources on the Dry Tortugas grounds, to conduct deep-water faunal transects in the north and southeast Gulf of Mexico, and to begin preliminary gear trials with experimental monofilament gill nets were the main objectives of this 23-day exploratory cruise in the Florida Straits-Campeche Bank area by the U. S. Bureau of Commercial Fisheries exploratory fishing vessel Oregon.

Thirty-two 3-hour drags on the Tortugas grounds in the 190- to 225-fathom depth range with conventionally-rigged 40- and 65-foot flat trawls towed from a single warp and 25 fathom bridle produced 2,525 pounds of royal-red shrimp tails (predominately 31-35 count). The area fished was centered between 83° 38' and 83° 05' west longitude. The best catches occurred in 210 fathoms between 83° 36' and 83° 25' west longitude. Bottom temperatures varied from 47° to 49° F.

Fishing operations were hampered somewhat by strong currents and rough seas. Vessel speed and warp length were adjusted according to towing direction, but several drags were considered to be marginal. Some 300 feet of film were exposed with the trawl-mounted movie camera in the red shrimp depth range, but mechanical breakdowns curtailed further work with the system.

A series of 40-minute shrimp-trawl drags was made at 100-fathom intervals off the Dry Tortugas grounds, beginning at the 100-fathom contour. Catches were generally small out to 500 fathoms and fell off rapidly there-



M/V Oregon Cruise 86 (July 23-August 15, 1963).

after. Drags were discontinued beyond 800 fathoms because of bad bottom conditions. The general character of the bottom and the comparatively light catches indicate an active scour condition in the transect area, especially at the deeper stations. The condition is probably caused by the proximity of the Gulf Stream Axis.

A "blind" 4-hour night set with a 7-inch mesh nylon gill net (900 x 60 feet) off the Tortugas area produced some 3,000 pounds of sharks, predominately white tip (Carcharhinus longimanus).

Three days of scouting around the periphery of Campeche Bank failed to yield sufficient quantities of surface-schooling fish to warrant testing the monofilament gill net.

Plankton tows were made incidental to operations at trawling stations and separately in cooperation with the Florida State Board of Conservation.

Additional work off the Mississippi Delta was cancelled because of the vessel's early return to port.

Hawaii

SKIPJACK TUNA LANDINGS, JANUARY-AUGUST 1963:

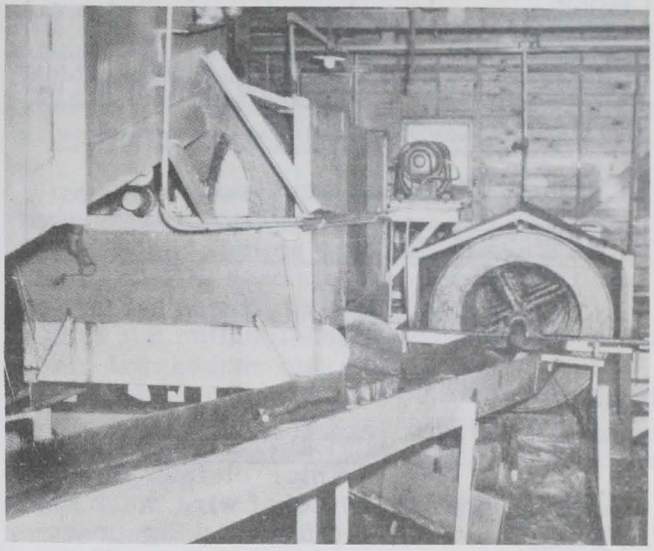
Skipjack tuna landings in Hawaii in August 1963 were about 2.4 million pounds, 800,000 pounds above the 1948-62 average for the month. The cumulative total catch for January-August 1963 was 6.7 million pounds, almost 1.0 million pounds below the 1948-62 average for the same period.

During August there were 153 productive trips, giving an average of 14,268 pounds per productive trip. Individual catches ranged from 217 pounds to 43,390 pounds.

Industrial Fishery Products

U.S. FISH MEAL, OIL, AND SOLUBLES:

Major Indicators for U.S. Supply, August 1963: United States production of fish meal and fish solubles in August 1963 was higher by 11.2 and 17.6 percent, respectively, as compared with August 1962. Fish oil production was down 3.1 percent.



Menhaden from the fish pumps are separted from the pump water in the rotary sieve of an industrial fishery products plant in Moss Point, Miss.

Major Indicators for U.S. Supply of Fish Meal, Solubles, and Oil, August 1963

Item and Period	1963	1962	1961	1960	1959
	(Short Tons)				
Fish Meal:					
Production 1/:					
October	-	36,614	16,852	24,455	22,026
September	-	31,165	28,642	36,239	36,874
August	43,336	38,955	57,031	49,709	47,364
January-July	128,293	166,949	171,726	146,635	143,605
Jan.-Dec. prelim. totals 2/	-	288,336	289,039	257,969	275,396
Jan.-Dec. final tot.	-	310,000	311,265	290,137	306,551
Imports:					
October	-	12,732	9,425	12,515	3,821
September	-	13,698	13,941	9,487	9,224
August	-	28,253	19,026	8,340	5,695
January-July	225,157	166,743	126,173	79,506	105,724
Jan.-Dec. totals	-	252,307	217,845	131,561	133,955
Fish Solubles:					
Production 3/:					
October	-	15,010	8,415	11,139	13,946
September	-	12,009	11,415	12,367	25,651
August	18,626	15,833	19,603	16,891	30,378
January-July	56,505	71,401	59,823	59,499	96,448
Jan.-Dec. prelim. totals	-	120,886	109,018	106,361	176,913
Jan.-Dec. final tot.	-	124,334	112,241	98,929	165,359
Imports:					
October	-	290	110	-	1,908
September	-	178	263	38	1,732
August	-	422	318	180	4,718
January-July	2,769	4,596	1,927	2,614	14,763
Jan.-Dec. totals	-	6,308	6,739	3,174	26,630
	(1,000 Pounds) 5/				
Fish Oils:					
Production:					
October	-	39,563	14,734	23,439	16,866
September	-	30,723	24,988	30,530	22,383
August	32,500	33,526	50,749	38,052	30,043
January-July	99,688	139,472	145,831	94,463	94,185
Jan.-Dec. prelim. totals 4/	-	257,131	259,400	206,848	189,240
Jan.-Dec. final tot.	-	255,808	266,670	215,861	193,324

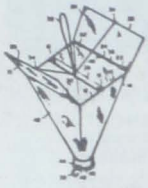
(Table continued on next page)

Item and Period	1963	1962	1961	1960	1959
	(1,000 Pounds)5/				
Exports:					
October	-	26,003	15,202	4,434	14,331
September	-	219	9,521	13,959	8,469
August	-	33,272	13,304	1,395	18,367
January-July	127,147	63,133	72,549	93,441	77,634
Jan.-Dec. totals	-	123,050	122,486	143,659	144,481

1/Does not include crab meat, shrimp, and misc. meals.
2/Preliminary data computed from monthly data. Fish meal production reported currently comprised 90 percent for 1959, 89 percent for 1960, 93 percent for 1961 and 1962.
3/Includes homogenized fish.
4/Preliminary data computed from monthly data. Represents over 95 percent of the total production.
5/Beginning with March 1963 fish oil is shown in pounds instead of gallons. Conversion factor, 7.75 pounds equal 1 gallon.
Note: Data for 1963 are preliminary.

Inventions

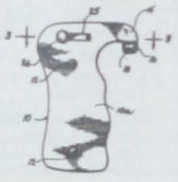
CATCH-ALL FISH NET PATENTED:



The inventor claims an improved fish net of wire mesh which can be used for catching or retaining live fish or bait. Two hinged doors are provided with cord control to trap bait or fish upon withdrawal from water. A slide bolt locks a smaller door at the lower end of the net. (Patent No. 3,045,383, SIC No. 2298, granted Philip Pugliese, 330, South Regent St., Port Chester, N. Y.)

* * * * *

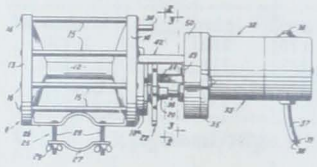
FISH HOOK SNELLING DEVICE PATENTED:



The inventor claims a simple and inexpensive device made from sheet metal which can be used for quickly and easily snelling hooks of any size to any weight of leader. (Patent No. 2,700,840 SIC No. 3949, granted John N. Butts, 7029 190th St., S.W., Lynwood, Wash.)

* * * * *

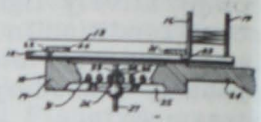
FISHING REEL WITH ELECTRIC MOTOR DRIVE ATTACHMENT PATENTED:



Designed for salt water reels used by sport and commercial fishermen. A 12-, 18-, or 24-volt battery on a fishing craft provides power for the gear head motor. (Patent No. 3,077,318, SIC No. 3949, granted Morris S. DuVal, 4102 Maple Avenue, Dallas 19, Tex.)

* * * * *

FISHING ROD HOLDER PATENTED:

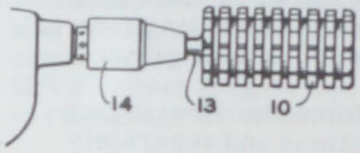


Designed for ice fishing. The inventor claims the holder works like a windmill on a fulcrum, tipping up when fish bite and automatically going back into position if the fish is not caught. (Patent No. 3,074,197, SIC No. 3949, granted John A. Schnars, 4707 Beniteau St., Detroit 14, Mich.)

* * * * *

FISH SCALER PATENTED:

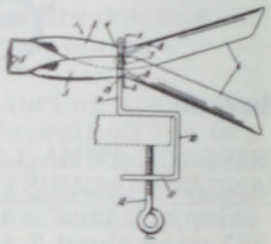
The inventor claims an economical device which quickly and efficiently removes scales.



It is made of molded plastic with a shaft extending therefrom which is readily secured to a portable electric drill. (Patent No. 3,072,956, SIC No. 3079, granted Walter Olrich, 4219 W. 59th St., Cleveland 9, Ohio.)

* * * * *

HOLDER FOR SCALING FISH PATENTED:



The inventor claims a device which can be easily clamped to any table or flat working surface. It can be rotated to flip the fish from one side to the other. (Patent No. 2,980,948, SIC No. 3429, granted Homer Ivy McCain, 423 Fifth St., Traverse City, Mich.)

* * * * *

METHOD FOR SHUCKING SCALLOPS PATENTED:

The inventor claims the method offers a sanitary and economical means of shucking small bay scallops. It involves subjecting the closed scallop shell to a high frequency electrical field which causes the muscles and viscera to separate from the shell, and the shell to partially open, thereby making available the edible portion of the scallop in its natural raw state. (Patent No. 3,070,834, SIC No. 3662, granted J. Hall Carpenter, P. O. Box 3272, Jacksonville 6, Fla.)

Maine Sardines

EXPORT MARKET DEVELOPMENT PROGRAM LAUNCHED:

The Maine Sardine Council has launched an export market development program on a world-wide basis. Legislature, during the recent session, authorized that activity which will be financed by regular sardine tax funds paid to the State by the canners.

The plan is to create expanded long-term outlets for the industry.

Maine sardines will be procured for the Council by the State Purchasing Agent on a competitive bid basis and then sold by the former in foreign countries. Arrangements had been made with an international export firm in New York to assist the Council with the selling and distribution.

"Although we expect to find the situation highly competitive in most areas we plan to make every effort to get a sizable slice of the world sardine traffic," the Council's Executive Secretary stated.

Recent data released by the Food and Agriculture Organization of the United Nations revealed that approximately 16 million cases of sardines, valued at $100 million, were handled in international trade in 1962. Maine, which is one of the world's largest sardine producers, contributed but an infinitesimal share of this volume.

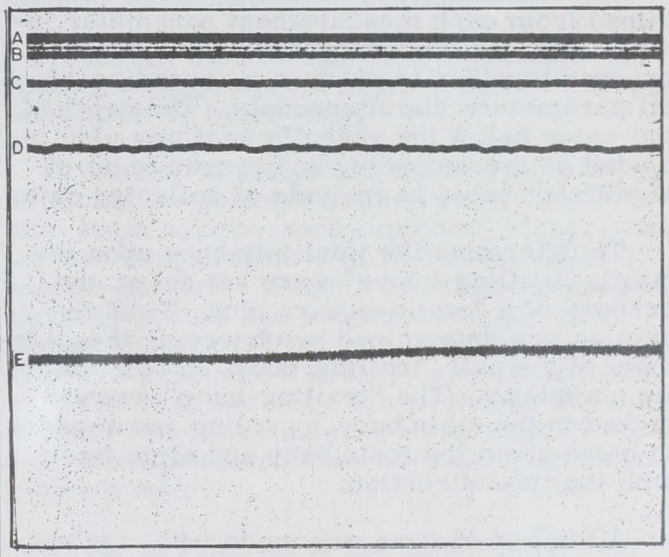
With more and more emphasis being placed on foreign trade the Maine sardine industry has decided that the time has arrived to try to do something to participate.

North Atlantic Fisheries Exploration and Gear Research

ELECTRONIC TRAWL-NET MEASURING AND INSTRUMENTATION STUDIES CONTINUED:

M/V "Delaware" Cruise 63-7 (August 19-30, 1963): The main objectives of this cruise by the U. S. Bureau of Commercial Fisheries exploratory fishing vessel Delaware were: (1) to continue "sonic" trawl-door and net measurements begun during Delaware Cruises 63-2 and 63-3; (2) to evaluate the performance of a modified transducer suspension system for trawl doors; (3) to develop an improved recording technique different from that used during the previous two instrumentation cruises of the Delaware; and (4) to determine the tidal influence upon the trawl performance by correlating known tide direction relative to the vessel towing course.

Simultaneous, graphic measurements of trawl door spread, wing opening, vertical opening, and fishing depth were made and automatically recorded on an echo-sounder roll-chart aboard the Delaware. Improvements and refinements have been made on the sonic-transducer measuring system which allowed accurate measurements of all parameters to be recorded on the echo sounder's moving strip chart in the vessel's pilothouse (see figure).



A part of an echograph recording of the linear dimensions measured during Cruise 63-7. The length of the trawl warp used during the recording was 100 fathoms; the depth of the water was 27 fathoms; and the vessel towing speed was approximately 2.92 knots (190 engine r. p. m.). The "letters" on the recording and the identity of the lines indicated are: A--zero line or starting pulse; B--height of headrope above the bottom; C--distance between the wing ends of the net; D--distance between the otter-trawl doors; and E--depth of the water below the vessel's keel. All spread dimensions are measured from the zero line (A) to each individual echo; the measurements are read A-B, A-C, A-D, and A-E. The spread dimensions as shown are: B = 8 feet, C = 45 feet, D = 108 feet, and E = 27 fathoms. (Reproduction reduced in size.)

The work area selected for the cruise was located 15 miles south of "No Mans Land Buoy" (buoy located approximately 24 miles south of New Bedford, Mass.) The depth of water in the work area was 26 fathoms. All measurement tows were conducted within a plot of good trawlable bottom, 2 miles square,

identified by marker buoys placed at each corner of the plot.

Considerable difficulty was experienced while trying to determine the correct placement of the trawl-door transducers for optimum recording results. Several angular placements on the trawl doors were tried before satisfactory results were obtained. This led to the following tentative conclusions: (1) when a 5:1 trawl warp-depth ratio was used, the doors appeared to lean inward, i.e., toward the brackets; (2) with a 4:1 ratio, the doors appeared to lean outward, i.e., on their backs; and (3) with a 3:1 ratio, the doors appeared to be towing on their forward end or nose. Placement of the transducers on the doors at angles determined from the results of those conclusions provided the clearest recordings.

After satisfactory recordings were obtained from each measurement parameter individually, the transducers were electrically grouped together to produce a recording of all parameters simultaneously. The depth of the water below the vessel's keel was also included on the recording and proved to be of significant value in analysis of collected data.

To determine the tidal influence upon the trawl, "trailing-buoys" were set out at the corners of a 2-mile-square plot. Tidal direction was determined by observing the alignment of a small "trailing-buoy" in relation to its main buoy. The "trailing-buoy" was attached to the main buoy by a line and was free to move about the main buoy and align itself with the tidal direction.

A total of 45 tows was made with, against, and across the tide. One variable was changed during each of the first 27 tows. Eighteen repeat tows were made in order to compare like tows.

A standard No. 41, roller-rigged, manila trawl net was used throughout the cruise equipped with (a) 37 8-inch aluminum ball floats secured to the headrope, (b) 10-fathom ground cables and 5 fathom legs, and (c) trawl doors measuring $10\frac{1}{2}$ feet by $4\frac{1}{2}$ feet and weighing approximately 1,200 pounds. The doors were approximately 240 pounds lighter than those used during the previous instrumentation cruises.

The method used for determining the net dimensions was essentially the same as that used during the previous cruises. An exception, however, was the elimination of the headrope switching unit. By grouping together all of the transducers electrically, the need for the switching unit was eliminated.

Measurement data were obtained as follows:

1. The maximum distance recorded between the trawl doors was 139 feet. (Measurement obtained while towing at 2.92 knots or 190 engine r. p. m., and using a 5:1 trawl warp-depth ratio.)

2. Minimum trawl-door spread while towing in a "straight line" was 86 feet. (Measurement obtained while towing at 200 r. p. m. and using a 3:1 warp-depth ratio.)

3. The maximum distance recorded between the wing-ends was 53 feet. (Measurement obtained while towing at 190 r. p. m., and using a 5:1 warp-depth ratio.)

4. Minimum wing-end measurement was 36 feet. (Measurement obtained while towing at 200 r. p. m. and using a 3:1 warp-depth ratio.)

5. The headrope height, measured at the center, varied from 7 to 9 feet. The smaller measurement occurred during maximum wing-end spread; the larger measurement occurred during minimum wing-end spread.

6. Average trawl-door spread during all tows made was: (1) with the tide - 114.3 feet, (2) against the tide - 114.5 feet, and (3) across the tide - 115.1 feet.

7. Average trawl-door measurement of the tows made during the times when the tidal flow was estimated to be less than one knot was: 113.6 feet with the tide; 113.1 feet against the tide; and 114.9 feet across the tide.

8. Average trawl-door measurement of the tows made during the times when the current was estimated to be more than one knot but less than two knots was: 115.3 feet with the tide; 116.7 feet against the tide; and 115.4 feet across the tide.

9. The velocity of the tidal current in the cruise area was considered to be very slight during the period of the cruise. An area where tides are stronger would, in all probability, produce different results.

Note: See Commercial Fisheries Review, June 1963 p. 37.

North Pacific Exploratory Fishery Program

PELAGIC TRAWL TESTED AS A HIGH-SEAS PACIFIC SALMON SAMPLING DEVICE:

M/V "John N. Cobb" Cruise 61 (August 5-September 14, 1963): The principal objective of this cruise by the U. S. Bureau of Commercial Fisheries exploratory fishing vessel John N. Cobb was to determine the salmon catching efficiency of the Cobb pelagic trawl compared to that of gill nets. The Bureau's biological research vessel George B. Kelez cooperated in the tests.

The pelagic trawl was tested under the following variable conditions:

(1) Direction of towing the pelagic trawl relative to the direction of migratory movement of salmon (parallel in opposite directions and perpendicular in opposite directions).

(2) Depth of towing (surface and subsurface).

(3) Time of day (night and day towing).

The Mark II Cobb pelagic trawls rigged to spread in a conventional manner with two aluminum Cobb pelagic hydrofoils and 60-fathom bridles were used during the entire cruise.

Gear modifications used during the first 26 drags included: (1) 51 "Phillips" trawl floats on headrope; and (2) full length cod end liner of $\frac{1}{2}$-inch mesh.

Gear modifications used during the last 17 drags included: (1) 81 "Phillips" trawl floats on headrope; and (2) cod end liner not used.

Distance of towing behind the vessel during surface drags was 105 fathoms (45 fathoms of towing warp plus 60 fathom bridles).

Deepest depth tow was approximately 175 fathoms. Depth of net during subsurface tows was determined by triangulation using cable angle and length of towing cables.

Pelagic trawling operations by the John N. Cobb were conducted south of Adak, Alaska, in the same general area in which gill nets were being fished by the George B. Kelez. Distances offshore ranged from one mile to 30 miles. Proximity of trawling stations to gill net stations ranged from 3 to 9 miles. Echo-sounding recordings were made at all stations.

A series of four surface tows were usually made each day (or night). The first tow was made in an easterly direction (opposite to the direction of movement of fish); the second, southerly; the third, westerly; and the fourth, northerly. Whenever weather and time permitted, an additional two tows were made. The additional tows were usually made in the transition periods of dusk and dawn.

Six subsurface tows were made during the cruise. These consisted of one combination surface and subsurface tow made at night, one 5-fathom depth tow at dusk, three tows at depths of 40 fathoms, 50 fathoms and 57 fathoms during daylight hours, and one daytime oblique tow from the surface to a depth of 175 fathoms. Directions of subsurface tows were also made parallel in opposite directions and perpendicular in opposite directions to migratory movements of the salmon.

Although most drags were of one hour duration, 6 drags were 2 hours long and 2 drags were each $4\frac{1}{2}$ hours long.

A total of 43 drags was made during which 96 immature sockeye salmon and 19 immature chum salmon were captured. Catch rates per tow ranged from 0 to 22 and averaged 2.7 salmon per tow. Weights of salmon averaged about $1\frac{1}{2}$ pounds and lengths averaged about 35 centimeters (14 inches). The best one-hour tow produced 9 sockeye and 4 chum salmon. The best two-hour tow produced 21 sockeye and 1 chum salmon. Two successive $4\frac{1}{2}$ hour tows produced 8 sockeye and 1 sockeye, respectively.

Prior to removal of the small mesh cod end liner, several species of fish, other than salmon, were taken in small numbers. Following removal of the liner, incidental catches were limited to jellyfish, squid, and pomfret. One nighttime surface tow produced a young fur seal. Incidental catches included: Prowfish, myctophids, sand lance, saury, pomfret, smelt, lamprey, liparids, wolf eel, fanged viper fish, turbot, and several unidentified "smelt-like" and "cod-like" fishes.

In relation to gill-net catch rates of the George B. Kelez (usually in excess of 200 salmon per night), catch rates of the John N. Cobb were poor. Although the gill nets captured both immature and mature salmon and steelhead trout, the Cobb pelagic trawl catches were limited to immature sockeye and immature chum salmon.

Salmon taken with the Cobb pelagic trawl were usually gilled in the top intermediate section of the net suggesting they were swimming within a few feet of the surface. Those few salmon captured in the cod end of the net were usually larger than average and in excellent condition, probably suitable for tagging.

Surface water temperatures ranged from 44° F. near shore to 51.5° F. 30 miles offshore with lowest catch rates of salmon being made at the two extremes. Small fish such as sand lance, smelt and "cod-like" species were commonly caught near shore but were absent in offshore catches. Saury and pomfret were caught only in the offshore, higher temperature water.

No relationship between catch rate and direction of towing was noted.

* * * * *

SURVEY OF DEEP-WATER MARINE FAUNA OFF MOUTH OF COLUMBIA RIVER CONTINUED:

M/V "Commando" Cruise 11: The eleventh in a series of cruises to survey the fauna in 50-850 fathoms southwest of the mouth of the Columbia River was completed on September 5, 1963, by the U.S. Bureau of Commercial Fisheries chartered research vessel Commando. The 18-day cruise was conducted in cooperation with the Atomic Energy Commission.

A standard 400-mesh otter trawl with a 1½-inch mesh liner in the cod end was used to monitor stations from 50 to 450 fathoms, and a 72-foot semiballoon shrimp trawl was used at stations greater than 450 fathoms. A hydraulically-driven drum for the handling of the trawl was used for the first time. The drum, which was fixed to the after deck of the vessel, facilitated the setting and retrieving of the trawl. After making successful tows at 650, 750, and 850 fathoms, trawling in deep water was suspended 1 day early because of damage to the shrimp nets.

Commercial species of fish during the survey included sablefish (Anoplopoma fimbria), ocean perch (Sebastodes alutus), and other species of rockfish (Sebastodes), Dover sole (Microstomus pacificus), rex sole (Glyptocephalus zachirus), Petrale sole (Eopsetta jordani), English sole (Parophrys vetulus), lingcod (Ophiodon elongatus), and one halibut (Hippoglossus stenolepis). Sablefish were collected at all stations from 50 to 650 fathoms. The largest catches of sablefish occurred at 50 fathoms (900 pounds) and from 350 to 400 fathoms where catches ranging from 700 to 1,000 pounds were taken. Ocean perch were taken from 75 to 250 fathoms; the catch per 1-hour tow between 125 and 200 fathoms ranged from 1,400 to 1,700 pounds. A catch of 900 pounds of greenstripe rockfish (Sebastodes elongatus) was taken from 75 fathoms, and catches of 300 and 200 pounds of bocaccio (S. paucispinis) and silver-gray rockfish (S. brevispinis), respectively, were taken from 100 fathoms. A half-hour tow at 50 fathoms collected 1,500 pounds of Dover sole and 800 pounds of rex sole. Dover sole were taken at all stations to a depth of 450 fathoms; catches of 800 to 1,125 pounds per 1-hour tow occurred at 175 and 200 fathoms. The catch of English sole, Petrale sole, and lingcod was small.

A 2,000-pound catch of hake (Merluccius productus) was taken in 50 fathoms. Rattails (Coryphaenoides) were dominant in the fish catches from 650, 750, and 850 fathoms.

Unusual fish encountered during the cruise were an angler fish (Ceratioidei) and a Beryciform taken during trawling at 275 and 350 fathoms. Although both forms were found in the trawl after bottom tows, it is believed that they were collected from mid-depths.

Commercial invertebrates found along the Columbia River trackline were Dungeness crabs (Cancer magister), scallops (Patinopecten caurinus), pink shrimp (Pandalus jordani), and tanner crabs (Chionoecetes tanneri). Six scallops and 36 Dungeness crabs were taken from 50 fathoms. Small quantities of pink shrimp were found from 75 to 125 fathoms. Adult tanner crabs were taken in large numbers at only 2 depths--350 and 375 fathoms. Crabs from those depths were predominantly ovigerous. Sixty-five pounds of juvenile crabs were collected in a 1-hour drag at 650 fathoms.

Samples of fish were collected and delivered to the Laboratory of Radiation Biology University of Washington, for radiological analysis.

The cooperative program with the Oregon Fish Commission to study the migrations of sablefish and Dover sole in the area of investigation was continued. Tagging was conducted at stations from 50 to 450 fathoms.

The study of heterotrophic marine bacteria by personnel from the College of Fisheries,

University of Washington, was continued during the cruise.

Note: See Commercial Fisheries Review, July 1963 p. 47.

Oceanography

DEEP EQUATORIAL COUNTERCURRENT IN ATLANTIC OCEAN DISCOVERED:

A Soviet scientist of the U.S.S.R. Marine Hydrophysical Institute has described the discovery of an undercurrent in the Atlantic Ocean corresponding to the Cromwell countercurrent in the Pacific Ocean. The Atlantic current was measured during the tenth voyage of the Mikhail Lomonosov. Automatic current measuring devices were attached to anchored buoys. They operated to a depth of 1,200 meters for periods from 26 to 62 hours, and recorded at 5-minute intervals. At 6 stations the currents were measured simultaneously with 2 buoys spaced 24 miles apart. From 4,500 current measurements taken at 17 stations, it was established that there is a deep countercurrent in the Atlantic Ocean. It has been named the "Lomonosov Deep Equatorial Countercurrent."

The Soviet scientist reported that the Lomonosov and Cromwell countercurrents differ in the following respects: (1) the Lomonosov countercurrent is considerably less strong than the Cromwell countercurrent; (2) the maximum velocity of the Lomonosov countercurrent--116 centimeters per second--is at a depth of about 50 meters, whereas the Cromwell countercurrent's maximum velocity of 150 centimeters per second is at a depth of about 100 meters; (3) the lower boundary of the Lomonosov countercurrent is above 200 meters, whereas in the Cromwell countercurrent it is at about 300 meters; (4) at a distance of about 2 miles to the south of the equator and near 30° W. longitude, the Lomonosov countercurrent's lower boundary is less than 100 meters.

In the Atlantic Ocean near the western boundary of the Gulf of Guinea, at a depth of 800 meters, there is a second deep countercurrent with a maximum velocity of 15 centimeters per second and a direction of 42°.

The Soviet scientist recommended that an effort be made to find an equivalent countercurrent in the Indian Ocean. (Newsletter, National Oceanographic Data Center, Aug. 31, 1963)

* * * * *

NEW TROPICAL RESEARCH LABORATORY PLANNED:

The United States oceanographic program received new support with the announcement on September 13, 1963, by Assistant Secretary of the U. S. Department of the Interior Frank P. Briggs of the selection of Miami, Fla., for a new tropical oceanographic-fisheries research center. The new center, which will be operated by the U. S. Bureau of Commercial Fisheries, will be specially geared to research in tuna and other tropical fisheries. An appropriation for planning and designing the laboratory has been approved by Congress. Construction is scheduled to start late in 1964 if funds are available.

Oregon

REMOVAL OF ABANDONED DAM ON YAMHILL RIVER OPENS NEW SALMON SPAWNING GROUNDS:

An obsolete navigation lock and dam on the lower Yamhill River was breached in the fall of 1963. The structure, located near Lafayette, Oreg., had long blocked ready access by salmon to 600 miles of potential spawning and rearing grounds in the Yamhill system, according to the Oregon Fish Commission.

With the assistance of Fish Commission specialists, dynamite was used to substantially lower a section of the old dam to allow the passage of salmon and steelhead. That was a major step in the long range salmon rehabilitation plans for the Willamette River system, of which the Yamhill is a tributary.

A fish ladder was present in the old navigation facility at the time of its completion by the U. S. Army Corps of Engineers in 1900, but high water removed the ladder, and it was never replaced. Information is incomplete on salmon runs that may have existed in the Yamhill River prior to the construction of the dam. The Corps of Engineers abandoned the lock and turned the property over to Yamhill County in 1953.

Oregon Fish Commission scientists feel the outlook now is bright for the river system to become an important spawning and nursery ground for both salmon and steelhead. The low cost of the project makes it a conservation bargain. Experimental introductions of

small silver salmon were made as early as 1954 after extensive biological surveys of the river system indicated an excellent potential for salmon production. Over 700,000 young silver salmon have been released into the Yamhill system in the last 9 years. Many of those fish grew to downstream migrant size and later returned in substantial numbers as adults. Yamhill Dam, however, prevented full development of natural runs. Only during extremely high water, were adult fish able to pass the barrier. With the removal of the obstruction, extensive plantings of yearling silvers will be made in the river with an excellent chance for success.

Plans called for additional work in the near future to improve habitat in the upper tributaries of the Yamhill. Other obstructions in the form of rock ledges and mill dams will be laddered or removed. Evaluation of the program will undoubtedly have worth in developing similar streams elsewhere. (Fish Commission of Oregon, September 26, 1963.)

* * * * *

WILLAMETTE RIVER HATCHERY COLLECTS RECORD NUMBER OF CHINOOK SALMON EGGS:

The highest spring chinook salmon egg take in twenty years is in prospect at the Oregon Fish Commission's Dexter Dam egg-taking facility on the Middle Willamette River, the agency's fish culture director announced on October 1, 1963.

Hatcherymen from the Willamette River station near Oakridge are expected to take over 10 million eggs this season from adults currently on hand, more than doubling last year's excellent take of $4\frac{1}{2}$ million. Over 5,000 adult chinook will be handled this season, the agency director said. This is the largest number of mature fish taken at Dexter since the fish-holding facility was established in 1955. Survival of adults over the summer months was excellent this year due at least in part to cooler water temperatures. During some seasons the mortality of ripening adults has been high as a result of disease outbreaks abetted by relatively warm water in the holding pond.

If all goes well, future hatchery-produced runs on the Middle Willamette may be even higher. This year's excellent spring run--essentially 4 and 5 year old fish--originated from annual releases of $1\frac{1}{2}$ million yearlings for each of the 1958 and 1959 broods. Liberations of yearlings of the 1960 Middle Willamette brood totaled 1 million. Of the 1961 brood some 1.5 million were released downstream. Now on hand at the Willamette Salmon Hatchery at Oakridge are 3.4 million yearlings of the 1962 brood awaiting liberation during late winter.

Temperature conditions in the Middle Willamette mainstem are such that during most years relatively little survival can be expected from eggs deposited naturally in the stream. Because of this fact, the mainstem Middle Willamette spring chinook run is considered to be maintained, for all practical purposes, by Fish Commission hatchery operations.

The 1963 total Willamette River spring chinook run was calculated at 48,100 fish of which approximately 13,500 or about 28 percent were taken by sport fishermen. The total run size during other recent years was 24,200 during 1960, 27,500 during 1961, and 38,200 in 1962.

Oysters

DISEASE MSX DECLINES IN VIRGINIA:

Relatively few oysters in Virginia are dying from the oyster disease MSX this year, according to the Head of oyster research at the Virginia Institute of Marine Science. He cautioned against a misinterpretation of this fact, however, since few oysters remain to become affected in the heavily infested areas. Nevertheless, heavy losses such as those experienced in 1960 and 1961 have ceased, and the surviving young oysters in the infected area do not show high mortality.

Planters, acting on advice given them by the Institute as to when oyster seed should be put down in order to avoid MSX infections as long as possible, have cautiously made trial plantings in Mobjack Bay, Egg Island off Poquoson River, and the lower York River. Samples from each planting have been examined at the Institute for occurrence of MSX.

All of those plantings have been, or will be, harvested early and the results are fairly encouraging. No oysters have been left on growing grounds for more than one summer. This was made possible by selecting large seed oysters from the James River and planting them thin. Good growth and fat oysters resulted.

Despite signs of a slowly recovering oyster industry in lower Chesapeake Bay, danger signals still exist. Small-scale experimental transplantings of oysters by the Institute indicate that MSX remains active in some areas.

Technicians from the Institute have placed oysters in trays in all the MSX infected waters of the State and have regularly tested the oysters for signs of infection. The tray-grown stocks have been reliable indicators of conditions on commercial beds in respect to the occurrence of MSX and the mortalities caused by it.

For 3 years prior to 1963, MSX killed about 70 percent of the test oysters placed in Mobjack Bay and in lower York River within 1 year of transplanting. This year MSX infections occurred in early summer and oysters began dying in August and September as usual. The difference between this and prior summers is that the losses have been lower and the number of oysters infected with MSX has been less. Mobjack Bay and lower York River still seem to be the most seriously afflicted areas. For example, a recently examined group of oysters from a commercial planting in Mobjack Bay was found to be almost fifty percent infected. Hampton Roads appears to be making a recovery because oysters planted on Hampton Bar and on Egg Island beds exhibited only moderate levels of infection in late August 1963.

"One especially encouraging development is the relative absence of MSX from James River seed beds at present," reported the Director of oyster research at the Institute. "Planting disease-free seed is of utmost importance for survival of oysters to market size in epidemic areas." Planters who used MSX-infested seed from the mouth of Elizabeth River did not reap a harvest because MSX destroyed the crop. He also cautioned that planters who wish to be successful with short-term oyster plantings in MSX-infested areas must be aware of the habits of MSX in order to avoid unneccessary infections. Both planting and harvesting must be carefully timed and oysters must be in a position to grow to market size within a relatively short period. Two- and three-year culture of oysters, as in pre-MSX days, is far too much of a gamble with MSX around. (Virginia Institute of Marine Science, October 2, 1963.)

* * * * *

JAMES RIVER SPATFALL FAILS AGAIN IN 1963:

Oyster spatfall in the James River seed area has been inadequate to maintain seed stocks for the third year in succession, according to the Head of oyster research at the Virginia Institute of Marine Science.

The scientist said that three successive years of setting failure cannot be ascribed easily to chance circumstances or weather. "Something has changed in the James River. The efforts of the industry, the Virginia Commission of Fisheries, and the Virginia Institute of Marine Science must be devoted to locating and correcting the causes before the seed area is depleted," he stated. The short term outlook for the James River is dim, although setting in other areas of the Chesapeake Bay system appears successful. The situation can be helped by bringing in other rivers as seed oyster areas."

Twenty years of records compiled by scientists at the Virginia Institute of Marine Science show that in the past setting on the best James River beds averaged 5 to 15 spat per test shell. In 1962, the average for the important area between Brown Shoal and Wreck Shoal was less than one-half spat per shell. Upriver and inshore areas that usually show some spatfall during good years received virtually none in 1962. Some 90,000 bushels of shell planted at Blunt Point early in the summer of 1962 received almost no set.

During the summer of 1963, setting was monitored by the Institute on a weekly basis at 17 test stations. The stations were located near the channel, inshore, upriver, and down river to determine the distribution of spatfall. Technicians exposed clean shells for one week and then examined them under a microscope for spat. They found that no appreciable setting had occurred as late as September 17, 1963, except at Brown Shoal near the channel. Occasional spat were found at all stations. Test shells left in wire bags for the whole setting season had not been collected by the end of September. Natural cultch will be closely examined by the Virginia scientists to assess the level of spatfall on public beds.

It was pointed out that there was no evidence weather conditions were unfavorable for setting in 1963 (record levels of setting occurred in other areas of Chesapeake Bay in spite of this year's drought). The two previous years of spat failure were wet ones, whereas 1963 was exceptionally dry with very high salinities in the James River. Oysters were very poor and weak in the spring and early summer of 1962, but in 1963 their condition was excellent in the James River. Large quantities of spawn could be seen in the oysters until after September 1, 1963.

"There appears to be no scarcity of brood oysters and spawn in the seed area; therefore, it can be deduced that the main source of brood stock for the James River seed area may be in Hampton Roads," the Director of oyster research at the Institute stated. It is known that many organisms ride bottom currents upriver once they get in deep water and this applies to young oysters. The scarcity of oysters in Hampton Roads as a consequence of the MSX epidemic continues because planting has not been resumed. Preliminary steps have been taken by the Virginia Commission of Fisheries to restock public grounds in the Newport News-Nansemond area by planting shells. The Virginia scientist said that planting of private beds on Hampton Bar with large seed oysters may be even more important.

Studies by the Institute show that successive failures of spatfall in the seed area have affected the quality of seed oysters. Since essentially the same year classes (1959 and 1960 mostly) of oysters are being harvested each year, current seed stock are large and have a low count per bushel, whereas formerly the count was high and the average size much smaller. Large seed oysters permit early harvesting, but total yield is eventually reduced. The large seed oysters are particularly important to planters operating in areas where long culture is hazardous because of MSX. However, last year a large proportion of James River seed oysters were culled and sold directly to shuckers or canners for marketing. This practice is expected to become more extensive during the coming year. It seriously reduces the supply of seed oysters available for planting and is a misuse of the James River seed area in the judgment of Institute scientists.

Whereas MSX has declined in James River for lack of oysters to sustain an epidemic, oyster drills are exceptionally active on Brown Shoal and the lower seed beds. Spat are being killed as fast as they set on Brown Shoal and considerable numbers of oysters up to 2 inches are dead. Drills have been seen as far upriver as Miles' watch house. High salinities have favored drill activity and movement upriver.

It is unfortunate that setting should fail in the James River just when the Virginia Commission of Fisheries has initiated large plantings of shells which should have boosted seed production enormously. However, the shells will last and be useful when setting of oysters returns to the James. The Institute recommended the use of every feasible means to aid nature in the recovery of setting patterns. Any closures of brood stock and seed areas until the proper time for harvesting should be accepted by all segments of the industry. Already the Virginia Commission of Fisheries has planted shells in deep waters near Wreck Shoal to produce a deep-water stock of brood oysters. If private planters fail to replant beds in Hampton Roads for fear of MSX, it may become necessary to move some public oysters to areas such as Hampton Bar and Newport News shoals. Shell plantings will not suffice in those areas because young oysters are readily killed by drills.

By careful use of multiple seed areas, State agencies and private interests acting on scientific advice can probably produce all the seed and oysters Virginia can utilize. (Virginia Institute of Marine Science, September 30, 1963.)

Plankton

STUDY OF TROPICAL PHYTOPLANKTON:

The National Science Foundation has issued a research grant of $74,200 to the Institute of Marine Science, University of Miami, for a 3-year study of tropical phytoplankton--tiny plants that drift free in the sea. The study will be directed by the scientist in charge of the Institute's microbiology section. The new research program, titled "Ecology of Phytoplankton in Semi-Tropical Environments," is for the purpose of determining the distribution, significance, and productivity of the various planktonic plants and bacteria in selected areas. Samples will be collected and experiments conducted across the Gulf Stream between Biscayne Bay, Fla., and Cat Cay in the Bahamas. The groups of organisms involved in the study are diatoms, flagellates, blue-green algae, and bacteria. Knowledge of the extent and behavior of those minute plants may help scientists learn more about primary production in the sea.

Salmon

MATURE CHINOOK SALMON SPAWN IN SACRAMENTO RIVER DURING MAY-JUNE 1963:

Mature chinook salmon spawning at Keswick Dam on California's Sacramento River during May and June 1963 stirred considerable interest among fishery biologists. Little is known about chinook salmon spawning so early in the northern hemisphere.

Approximately 150,000 eggs were taken from 50 mature salmon, and an additional 500 fish were trapped, hauled downstream, and released into the river to spawn naturally. After incubation and hatching, half of the young salmon were released as unfed fry in the Sacramento River at Princeton, Calif., which is below the major water-use diversions. The remainder of the fry were transferred to the Coleman National Fish Hatchery for rearing and release as fingerlings.

In addition to contributing to the ocean and San Francisco Bay sport and commercial salmon catch, the run of fish provides excellent sport fishing from January to April in the upper Sacramento River. Federal and State conservation agencies are observing the buildup of this winter run strain of chinook salmon in the Sacramento River with considerable interest. If the number of fish at Keswick Dam continue to increase, the present salmon rearing program may be altered in order to take advantage of those gains to provide more sport and commercial fishing.

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SAN JOAQUIN RIVER FLOW REVERSAL THREATENS SALMON RESOURCE:

The U. S. Bureau of Reclamation began pumping additional water into the San Joaquin River in California on September 15, 1963, in an effort to save the river's salmon resources. In past years, as many as 50,000 salmon returned to spawn in the San Joaquin River during late September, October, and November. But during the past two spawning seasons, salmon runs in the river have dwindled to less than 3,000 fish.

A key reason for the decline is the decreased flow of water in the San Joaquin, according to an official of the California Department of Fish and Game. Toward the end of summer when the river is normally low, the water diversions in the Delta and incoming tides produce a flow reversal. In effect, the water flows upstream.

The California Department of Fish and Game believes that a positive downstream flow of a salmon's home stream is essential for salmon to properly orient themselves. It is believed that salmon "home" on the characteristic odors of the streams in which they are spawned. Under conditions of flow reversal in the San Joaquin, little or no water from the home stream reaches the coastal area, and salmon search in vain for home stream waters.

To solve the problem, the Federal Bureau of Reclamation in mid-September increased its pumping of water from the Delta in order to divert 400 cubic feet of water per second from the Delta Mendota Canal into the San Joaquin River six miles north of Patterson, Calif. It was believed that the increased flow into the San Joaquin would push back the tidal waters and end the flow reversal of the river. (California Department of Fish and Game, September 14, 1963.)

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STREAM IMPROVEMENT AIDS SPAWNING FISH:

The application of trout stream improvement techniques to aid spawning salmon is

being tested on a small tributary of the lower Columbia River with promising results, according to the Director of the Oregon Fish Commission. The experiment is being conducted on Plympton Creek near Westport, Oreg; and involves creating resting pools, deeper channels to facilitate upstream movement, and shelter areas to provide salmon respite from harassment by natural enemies, including humans. The work on Plympton Creek may have application on other Northwest salmon-spawning streams.

Plympton Creek is a stream where spawning salmon have long experienced difficulty in negotiating the lower and shallower stretches of water in order to reach spawning gravel. To aid the fish, dams, deflectors, and ripraps of poles and rock have been constructed in order to create a series of pools with connecting deep-water channels. This provides resting holes, spawning areas, and transportation water for the salmon. The program, which was launched in September 1963, is expected to be completed in the spring of 1964, after a shutdown of construction activities this winter to prevent interference with spawning fish.

Counts of mature chinook in Plympton Creek in recent years have numbered between 50 and 100 fish. This season, an estimated 900 salmon are in the stream. However, unusually favorable water conditions probably account for much of the upsurge in fish numbers. It is during years of normal low water when the stream improvement structures are expected to be of greatest value.

Financing for the Plympton Creek program was provided by the Federal Government under terms of the Columbia River Fisheries Development Program administered by the U. S. Bureau of Commercial Fisheries. (Fish Commission of Oregon, October 2, 1963.)

Shrimp

FUTURES TRADING FOR FROZEN SHRIMP MAY OPEN IN CHICAGO:

The Chicago Mercantile Exchange contemplates opening a futures market for frozen shrimp, according to a statement to the press by the President of the Exchange in late September 1963. He emphasized that the Exchange is not going into the shrimp business as the Exchange does no buying or selling, but provides a point where contracts for future delivery may be traded, in the same manner as grain futures at the Chicago Board of Trade. This provides price insurance by allowing processors and handlers to sell futures contracts against their inventory and buy such contracts to meet contemplated needs.

The Exchange plan would open contracts for delivery in January, March, and September 1964. The plan calls for trading in 5,000-pound units of U. S. Grade-A raw, frozen, grooved, brown, headless Gulf shrimp with a count of 16/20 to the pound (restricted to the domestic catch in the Gulf of Mexico). All shrimp traded would be required to meet the standards promulgated by the U. S. Bureau of Commercial Fisheries.

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UNITED STATES SHRIMP SUPPLY INDICATORS, SEPTEMBER 1963:

Item and Period	1963	1962	1961	1960	1959
	..... (1,000 Lbs., Heads-Off)				
Total landings, So. Atl. and Gulf States:					
November.....	-	11,604	9,996	14,454	12,412
October	-	14,699	12,696	21,688	19,601
September	18,800	13,182	9,691	18,832	18,330
August	19,554	12,332	10,944	20,441	18,595
January-July....	54,979	44,430	41,530	58,521	53,004
January-December	-	105,779	91,396	141,035	130,660
Quantity canned, Gulf States 1/:					
November.....	-	2,727	2,175	1,535	2,122
October	-	4,454	2,065	2,480	2,324
September	3,400	1,727	598	2,222	1,936
August	3,040	1,333	1,090	4,427	2,223
January-July....	13,876	11,089	7,756	14,836	12,876
January-December	-	23,210	14,500	26,394	22,659
Frozen inventories (as of end of each mo.) 2/:					
November 30....	-	27,500	20,668	37,264	37,334
October 31	-	21,315	17,811	31,209	33,057
September 30 ...	3/	12,843	13,361	24,492	26,119
August 31	4/ 24,803	12,754	12,728	20,171	23,780
July 31.....	4/ 25,460	13,677	14,849	17,397	22,352
June 30.....	4/ 24,047	13,796	19,416	15,338	19,283
May 31	4/ 25,114	13,904	24,696	17,540	21,137
Imports 5/:					
November.....	-	17,964	14,852	13,516	10,269
October	-	18,279	16,813	14,211	15,340
September	-	9,696	8,629	8,190	7,541
August	8,598	7,381	6,743	6,406	5,107
January-July....	81,487	72,265	63,803	58,684	57,687
January-December	-	141,183	126,268	113,418	106,555
	...(¢/lb., 26-30 Count, Heads-Off)....				
Ex-vessel price, all species, So. Atl. & Gulf Ports:					
December.....	-	82.9	75.2	54.2	48.4
November.....	-	84.5	73.5	54.0	46.2
October	-	90.0	68.7	53.0	44.4
September	6/ 55-61	90.9	70.1	52.2	46.4
August	6/ 57-71	83.6	66.1	52.0	46.9
July.....	6/ 57-78	82.1	55.8	54.6	49.2
June	6/ 72-83	84.4	53.7	64.1	60.7
May.....	80.9	83.7	52.8	62.9	63.3

(Table continued on next page)

Item and Period	1963	1962	1961	1960	1959
	(¢/lb., 26-30 Count, Heads-Off)				
Wholesale price froz. brown (5-lb. pkg.) Chicago, Ill.:					
December	-	101-107	91-92	68-70	64-66
November	-	105-110	89-92	69-73	60-65
October	-	108-115	83-90	69-73	59-62
September	73-77	113-118	87-90	65-70	62-64
August	75-81	110-112	76-91	64-67	62-64
July	80-97	3/	70-75	72-77	62-74
June	95-102	102-104	67-72	76-77	73-74
May	98-103	96-103	67-69	74-77	70-76

1/Pounds of headless shrimp determined by multiplying the number of standard cases by 30.3. The figures in the section (Quantity canned, Gulf States) have been completely revised beginning with February 1963 on the basis of a new conversion factor (formerly 33.0 pounds per case).
2/Raw headless only; excludes breaded, peeled and deveined, etc.
3/Not available.
4/Inventory of May 31, 1963, includes 553,000 pounds; June 30, 1963, includes 667,000 pounds; July 31, 1963, includes 925,000 pounds; and August 31, 1963, includes 1,011,000 pounds for firms not reporting previously.
5/Includes fresh, frozen, canned, dried, and other shrimp products as reported by the Bureau of the Census.
6/Range in prices at Tampa, Fla.; Morgan City, La., area; Port Isabel and Brownsville, Texas, only.
Note: Data for 1963 are preliminary. September 1963 landings and quantity used for canning estimated from information published daily by the New Orleans Fishery Market News Service. To convert shrimp to heads-on weight multiply by 1.68.

Tuna

PACIFIC COAST PURSE SEINERS COOPERATE WITH SCIENTISTS IN THERMOCLINE STUDY:

The masters and crews of the California tuna purse seiners Caribbean, Carol Virginia, Elsie A, Elsinore, Nautilus, Royal Pacific, and West Point are assisting scientists at the U. S. Bureau of Commercial Fisheries, San Diego Biological Laboratory, in a study to determine whether the depth and strength of the thermocline affects rate of success of purse seining for tuna. The thermocline is the region of sharp temperature change which separates the warm surface water (mixed layer) from the cold water of the depths. The warm surface mixed layer above the thermocline varies greatly in thickness depending on location and time of year. For example, in the eastern portion of tropical oceans it varies from 50 feet or less to 200 feet, whereas in the western margins it is much thicker, frequently more than 300 feet. The regions where purse seining for tuna is carried on successfully, notably the eastern tropical Pacific, ordinarily have thermoclines that can be reached by the nets. It might be that the thermocline acts as a barrier to tuna at times and limits their escapement from the net.

The thermocline data so far available from the cooperating seiners suggests that as the depth of the thermocline increases past about 60 feet, the percent of sets which are successful may decrease, and as the temperature gradient in the thermocline increases, the percent of successful sets may increase.

First mate on Royal Pacific, prepares to lower bathythermograph.

However, proof of the thermocline's effect on purse seining has not been established with the limited data available. What is needed is a great many more observations on the thermocline taken at the time purse seine sets are made.

Equipment required to measure water temperatures at depths consists of a bathythermograph (BT) and a small winch to lower and retrieve it. The BT is a torpedo-shaped device which records, on a coated glass slide, temperature against depth as it is lowered below the surface.

The San Diego Laboratory has installed the necessary equipment on the seven vessels noted. The U. S. Navy is also interested in obtaining more information on thermocline depths and has assisted by furnishing some of the BT's and winches. Laboratory technicians accompanied the vessels on the first trip after the equipment was installed to take the observations and to instruct crew members in the procedure. BT casts and the necessary record keeping are not particularly time consuming and can fit into a vessel's normal fishing schedule. It is planned to obtain the cooperation of additional vessels in order to answer as quickly as possible the question of whether seining success is related to the depth and strength of the thermocline.

United States Fisheries

COMMERCIAL FISHERY LANDINGS JANUARY-AUGUST 1963:

Total Landings: Fish and shellfish landings in the United States during the first 8 months of 1963 were down

13 percent compared with the same period of 1962. Landings were about 419 million pounds less than a year ago--due principally to greatly reduced landings of menhaden, salmon in Alaska, tuna in California, and ocean perch in New England.

Menhaden: Total landings for the first 8 months of 1963 amounted to about 1.3 billion pounds--336 million pounds less than during the same period in 1962. During August, there was a marked drop in quantity in every State along the Atlantic and Gulf Coasts, except Louisiana.

Salmon: On the basis of the reported pack of canned salmon, it was estimated that the 1963 catch in Alaska amounted to approximately 214 million pounds--about 59 million pounds less than in 1962.

Tuna: Landings (including bonito) in California totaled nearly 209 million pounds to September 21, 1963,--a decrease of almost 17 million pounds as compared with the same period in 1962. Purse-seine landings dropped 4 million pounds, and clipper-fleet landings were 10 million pounds lower than during that period in 1962. Transshipments of U.S.-caught fish from South America declined from nearly 5 million pounds in 1962 to 2 million pounds in 1963.

Scallops: New Bedford landings totaled nearly 12 million pounds during the first 8 months of 1963--slightly below the 14 million pounds for the same period in 1962.

Maine Herring: During the first 7 months of 1963, landings (62 million pounds) were 2 million pounds more than for the same period in 1962.

Mackerel: Pacific mackerel landings, amounting to 21 million pounds during the first 8 months of 1963, were down slightly from the 23.8 million pounds during that period of 1962. Landings of jack mackerel (56.5 million pounds) were up 14.5 million pounds.

Shrimp: South Atlantic and Gulf landings during the first 8 months of 1963 totaled nearly 119 million pounds--28 million pounds or 31 percent more than the same period in 1962.

Ocean Perch: During the first 7 months of 1963, landings in Maine amounted to 38.4 million pounds. In Gloucester, Mass., during the first 8 months of 1963, landings totaled 34 million pounds. Compared with the same periods of 1962, this was a decline of over 5 million and 10 million pounds, respectively.

United States Commercial Fishery Landings of Certain Species for Periods Shown, 1963 and 1962

Species	Period	1/1963	1962	Total 1962
		(1,000 Lbs.)		
Anchovies, Calif. 2/	7 mos.	2,100	1,312	2,252
Cod:				
Maine	7 mos.	1,300	1,583	2,260
Boston 3/	8 "	13,500	10,685	21,213
Gloucester 3/	8 "	2,300	2,265	3,823
Total cod		17,100	14,533	27,296
Haddock:				
Maine	7 mos.	1,200	1,158	2,545
Boston 3/	8 "	56,900	61,720	83,057
Gloucester 3/	8 "	13,200	10,902	16,089
Total haddock		71,300	73,780	101,691
Halibut: 4/				
Alaska	8 mos.	20,600	24,817	27,496
Wash. & Oreg.	8 "	10,500	11,322	12,404
Total halibut		31,100	36,139	39,900
Herring, Maine	7 mos.	62,200	60,008	156,699
Industrial Fish, Me. & Mass. 5/	8 mos.	39,900	22,669	42,741
Mackerel:				
Jack 2/	8 mos.	56,500	41,996	93,414
Pacific 2/	8 "	20,900	23,758	44,980
Menhaden	8 mos.	1,271,900	1,607,812	2,249,100
Ocean perch:				
Maine	7 mos.	38,400	43,714	69,453
Boston	8 "	400	462	909
Gloucester	8 "	34,000	44,716	53,619
Total ocean perch		72,800	88,892	123,981
Salmon, Alaska	to Sept. 22	213,600	272,834	280,000
Sardine, Pacific	9 mos.	3,700	13,154	15,363
Scallops, sea, New Bedford (meats)	8 mos.	11,700	14,153	19,309
Shrimp (heads-on):				
So. Atl. & Gulf	8 mos.	118,700	90,762	168,200
Washington	8 "	900	1,200	1,400
Squid, Calif. 2/	7 mos.	7,300	6,854	7,056
Tuna, Calif.	to Sept. 21	206,000	224,854	284,559
Whiting:				
Maine	7 mos.	13,000	13,935	17,831
Boston	8 "	100	166	212
Gloucester	8 "	34,100	35,135	53,183
Total whiting		47,200	49,236	71,226
Total all above items		2,254,900	2,643,946	3,729,167
Other 6/		455,700	480,883	1,510,533
Grand total		2,710,600	3,124,829	5,239,700

1/Preliminary.
2/Cannery receipts.
3/Landed weight.
4/Dressed weight.
5/Excludes menhaden.
6/Includes landings for species not listed.
Note: Finfish generally converted to round weight, crustaceans to weight in the shell, and mollusks reported in meats only.

U. S. Fishing Vessels

DOCUMENTATIONS ISSUED AND CANCELLED, AUGUST 1963:

Table 1 - U. S. Fishing Vessels 1/--Documentations Issued and Cancelled, by Areas, August 1963 with Comparisons

Area (Home Port)	Aug. 1963	Aug. 1962	Jan.-Aug. 1963	Jan.-Aug. 1962	Total 1962
			(Number)		
Issued first documents 2/:					
New England	3	2	17	22	28
Middle Atlantic	3	-	15	2	3
Chesapeake	6	3	37	26	43
South Atlantic	7	10	51	31	47
Gulf	35	16	170	78	110
Pacific	7	10	143	110	130
Great Lakes	1	1	4	2	5
Puerto Rico	-	-	2	-	2
Total	62	42	439	271	368
Removed from documentation 3/:					
New England	5	2	38	14	24
Middle Atlantic	2	2	41	28	39
Chesapeake	1	4	13	17	23
South Atlantic	6	3	43	25	38
Gulf	2	2	78	71	104
Pacific	5	6	65	78	111
Great Lakes	2	3	11	15	22
Hawaii	-	-	1	3	3
Puerto Rico	-	-	-	1	1
Total	23	22	290	252	365

1/For explanation of footnotes, see table 2.

During August 1963, a total of 62 vessels of 5 net tons and over was issued first documents as fishing craft, as compared with 42 in August 1962. There were 23 documents cancelled for fishing vessels in August 1963 as compared with 22 in August 1962.

Table 2 - U. S. Fishing Vessels--Documents Issued and Cancelled, by Tonnage Groups, August 1963

Gross Tonnage	Issued 2/	Cancelled 3/
	(Number)	
5-9	13	6
10-19	15	10
20-29	8	1
30-39	2	3
40-49	3	1
50-59	2	-
60-69	3	-
70-79	8	-
80-89	5	-
110-119	1	-
120-129	-	2
260-269	1	-
770-779	1	-
Total	62	23

1/Includes both commercial and sport fishing craft. A vessel is defined as a craft of 5 net tons and over.
2/Includes 3 redocumented vessels in August 1963 previously removed from records. Vessels issued first documents as fishing craft were built: 43 in 1963; 1 in 1962; 1 in 1960; 1 in 1957; 1 in 1954; 1 in 1953; 13 prior to 1951; and 1 unknown.
3/Includes vessels reported lost, abandoned, forfeited, sold alien, etc.
Source: Monthly Supplement to Merchant Vessels of the United States, Bureau of Customs, U. S. Treasury Department.

* * * * *

FISHERIES LOAN FUND AND OTHER FINANCIAL AID FOR VESSELS, JULY 1-SEPTEMBER 30, 1963:

From the beginning of the program in 1956 through September 30, 1963, a total of 1,296 loan applications for $34,981,977 were received by the U. S. Bureau of Commercial Fisheries, the agency administering the Federal Fisheries Loan Fund. Of the total, 677 applications ($15,563,707) have been approved, 474 ($12,156,761) have been declined or found ineligible, 150 ($6,009,843) have been withdrawn by applicants before being processed, and 25 ($453,283) were pending. Of the applications approved, 269 ($1,668,027) were approved for amounts less than applied for.

The following loans were approved from July 1, 1963, through September 30, 1963:

New England and Middle Atlantic Areas: Salvatore Passanisi, Somerville, Mass., $40,000; William B. McConnell, Pleasantville, N. J., $30,000; Samuel S. Cottle, Jr., Wakefield, R. I., $10,000; and John C. Sisson, Wakefield, R. I., $9,918.

Under the Fishing Vessel Mortgage Insurance Program (also administered by the Bureau) during the third quarter of 1963, 2 applications for $72,327 were received and 2 applications for $74,188 were approved. Since the program began (July 5, 1960), 30 applications were received for $3,558,967. Of the total, 24 applications were approved for $2,203,163 and 6 applications for $1,318,304 were pending as of September 30 this year. Since the mortgage program began, applications received and approved by area are:

New England Area: Received 10 ($1,025,365 approved 8 ($775,365);

California: Received and approved 1 ($557,000);

South Atlantic and Gulf Area: Received 14 ($509,056), approved 11 ($400,752);

Pacific Northwest: Received 5 ($1,467,546) approved 4 ($507,546).

No applications for the Fishing Vessel Construction Differential Subsidy were received during the July-September quarter of 1963 as the authority to accept applications expired June 12, 1963. Since the beginning of the program on June 12, 1960, 13 applications were received for $1,101,770, of which 6 applications were approved for $546,103, and 7 applications for $555,667 were pending.

U. S. Foreign Trade

AIRBORNE IMPORTS OF FISHERY PRODUCTS, MAY 1963:

Airborne fishery imports into the United States in May 1963 were up 20.5 percent in quantity and 26.6 percent in value from those in the previous month. Total airborne imports in January-May 1963 were up 37.7 percent in quantity and 55.6 percent in value from those in the same period of 1962. The increase was due mainly to larger shipments of shrimp.

The data as issued do not show the state of all products--fresh, frozen, or canned--but it is believed that the bulk of the airborne imports consists of fresh and frozen products.

U. S. 1/ Airborne Imports of Fishery Products, January-May 1963 with Comparative Data

Product and Origin 2	1963 May		1963 Jan.-May		1962 Jan.-May	
	Qty. 3/	Value 4/	Qty. 3/	Value 4/	Qty. 3/	Value 4/
	1,000 Lbs.	US$ 1,000	1,000 Lbs.	US$ 1,000	1,000 Lbs.	US$ 1,000
Fish:						
Mexico	25.1	7.5	124.3	38.6	275.0	53.4
British Honduras	3.3	1.0	33.9	8.6	-	-
Honduras	-	-	15.5	4.0	-	-
Japan	-	-	2.0	8.2	-	-
United Kingdom	0.2	0.6	1.3	3.3	-	-
Iran	-	-	1.2	7.4	-	-

(Table continued on next page)

U. S. 1/ Airborne Imports of Fishery Products, January-May 1963 with Comparative Data (Contd.)

Product and Origin 2/	1963 May Qty. 3/	1963 May Value 4/	1963 Jan.-May Qty. 3/	1963 Jan.-May Value 4/	1962 Jan.-May Qty. 3/	1962 Jan.-May Value 4/
	1,000 Lbs.	US$ 1,000	1,000 Lbs.	US$ 1,000	1,000 Lbs.	US$ 1,000
France	0.3	0.3	0.7	0.6	0.2	0.5
Rumania	-	-	-	-	1.3	11.3
Panama	-	-	-	-	7.8	1.3
Ireland	-	-	0.8	0.3	-	-
Canada	-	-	-	-	8.1	5.0
Total Fish	28.9	9.4	179.7	71.0	292.4	71.5
Shrimp:						
Guatemala	15.6	8.2	117.1	62.1	98.1	52.3
El Salvador	18.3	13.3	163.5	115.0	208.1	146.4
Honduras	16.9	8.6	22.7	11.9	-	-
Nicaragua	63.4	23.4	256.8	85.0	715.4	241.5
Costa Rica	-	-	284.0	137.3	93.7	39.4
Panama	115.8	63.2	723.5	389.6	457.9	230.4
Venezuela	455.4	226.0	1,920.2	941.4	986.0	470.4
Ecuador	21.9	9.6	94.3	32.7	12.2	3.5
France	-	-	2.6	0.9	-	-
Mexico	5.0	1.8	5.0	1.8	18.8	7.9
Netherlands Antilles	-	-	-	-	3.1	2.7
Total Shrimp	712.3	354.1	3,589.7	1,777.7	2,593.3	1,194.5
Shellfish other than Shrimp:						
Mexico	2.1	1.1	73.0	42.6	27.8	16.1
British Honduras	10.7	2.1	108.9	78.5	65.8	39.7
El Salvador	-	-	5.0	3.6	-	-
Honduras	0.3	0.2	1.9	1.0	60.2	47.7
Nicaragua	23.5	11.4	71.3	49.3	0.4	0.3
Costa Rica	-	-	73.8	60.1	1.4	1.3
Jamaica	3.4	3.4	47.7	36.8	30.0	21.3
Netherlands Antilles	3.7	2.6	32.8	20.9	14.2	9.3
Colombia	3.5	11.3	6.4	15.8	1.3	3.2
Ecuador	-	-	2.2	1.8	0.9	0.7
Tunisia	0.3	0.3	0.8	0.9	-	-
Leeward and Windward Islands	-	-	1.6	0.5	17.3	6.2
British Guiana	-	-	1.7	0.3	-	-
Canada	126.7	65.6	128.5	66.3	20.7	7.8
Venezuela	-	-	13.7	6.0	22.3	13.6
Panama	-	-	-	-	1.0	1.0
Guatemala	-	-	-	-	7.4	3.9
Japan	-	-	-	-	5/	0.3
France	0.7	0.8	0.7	0.8	0.3	0.9
Dominican Republic	-	-	6.2	5.0	-	-
Peru	0.2	0.8	0.2	0.8	-	-
Total Shellfish (except shrimp)	175.1	99.6	576.4	391.0	271.0	173.3
Grand Total	916.3	463.1	4,345.8	2,239.7	3,156.7	1,439.3

1/Imports into Puerto Rico from foreign countries are considered to be United States imports and are included. But United States trade with Puerto Rico and with United States possessions and trade between United States possessions are not included.
2/When the country of origin is not known, the country of shipment is shown.
3/Gross weight of shipments, including the weight of containers, wrappings, crates, and moisture content.
4/F.o.b. point of shipment. Does not include U. S. import duties, air freight, or insurance.
5/Less than 50 pounds.
Note: These data are included in the over-all import figures for total imports, i.e., these imports are not to be added to other import data published.
Source: United States Airborne General Imports of Merchandise, FT-380, May 1963, U. S. Bureau of the Census.

* * * * *

EDIBLE FISHERY PRODUCTS, AUGUST 1963:

Imports of fresh, frozen, and processed edible fish and shellfish into the United States in August 1963 were down 2.4 percent in quantity and 7.4 percent in value from those in the previous month. Imports were noticeably lower for canned tuna in brine, northern lobsters from Canada, and frozen shrimp. But there was a substantial increase in arrivals of groundfish fillets, blocks and slabs, and frozen tuna.

Compared with the same month in 1962, imports in August were down 8.8 percent in quantity, although the value of the imports was the same in both months. This August there was a heavy cutback in imports of frozen tuna. The decline was offset partly by a large increase in imports of groundfish fillets and blocks and slabs, as well as higher imports of fresh swordfish, canned albacore tuna in brine, and frozen shrimp.

In the first 8 months of 1963, imports were down 5.9 percent in quantity and 2.2 percent in value. Fluctuations in individual import items were much greater than the overall totals indicate. Imports were down sharply in 1963 for canned tuna in brine, frozen tuna, canned sardines in oil, and canned salmon. On the other hand, there was a large increase in imports of canned sardines not-in-oil (mostly from South Africa Republic) and frozen shrimp, as well as heavier shipments of ocean perch fillets, blocks and slabs, fresh swordfish from Canada, canned crab meat from Japan, and frozen frog legs from India.

U. S. Imports and Exports of Edible Fishery Products, August 1963 with Comparisons

Item	Quantity Aug. 1963	Quantity Aug. 1962	Quantity Jan.-Aug. 1963	Quantity Jan.-Aug. 1962	Value Aug. 1963	Value Aug. 1962	Value Jan.-Aug. 1963	Value Jan.-Aug. 1962
	(Millions of Lbs.)				(Millions of $)			
Imports:								
Fish & Shellfish:								
Fresh, froz. & processed 1/	93.7	102.7	721.2	766.4	32.5	32.5	253.0	258.6
Exports:								
Fish & Shellfish:								
Processed only 1/ (excluding fresh & frozen)	1.6	1.7	20.0	21.2	0.9	0.9	8.5	8.8

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

Exports of processed fish and shellfish from the United States in August 1963 were down 11.0 percent in quantity and 10.0 percent in value from those in the previous month. Lower shipments of canned salmon, canned shrimp, and canned squid offset a gain in exports of canned mackerel and canned sardines not in oil.

Compared with the same month in 1962, the exports in August 1963 were down 5.9 percent in quantity, although the value of the exports was the same in both months. Exports of canned salmon to the United Kingdom and canned sardines not in oil were down considerably this August.

Processed fish and shellfish exports in the first 8 months of 1963 were down 5.7 percent in quantity and the value dropped 3.4 percent from the same period in 1962. The drop in value was due to a general decline in the price of canned fishery products in 1963. The decline in quantity was due mainly to lower shipments of canned sardines and a drop in exports of canned mackerel to the Congo Republic. There were increases in exports of canned salmon, canned squid, and canned shrimp. Although not covered in the table, exports of frozen shrimp were up sharply in the first 8 months of 1963 (increase mostly in exports to Japan), and there was a substantial increase in exports of frozen salmon.

* * * * *

IMPORTS OF FISH MEAL AND SCRAP BY CUSTOMS DISTRICTS, AUGUST 1963:

United States imports of fish meal and scrap in August 1963 totaled 43,987 short tons, an increase of 55.7 percent from the 28,253 tons imported in August 1962.

About 90.6 percent of the fish meal and scrap imports in August 1963 entered through the Customs Districts of Maryland, Georgia,

Mobile (Ala.), Galveston (Tex.), Los Angeles (Calif.), San Francisco (Calif.), and Washington.

U. S. Imports of Fish Meal and Scrap by Customs Districts, August 1963

Customs Districts	August 1963
	Short Tons
Maine and New Hampshire	551
New York (N. Y.)	220
Massachusetts	160
Maryland	2,362
North Carolina	1,268
Georgia	6,510
Mobile (Ala.)	5,422
Galveston (Tex.)	1/4,084
Los Angeles (Calif.)	6,406
San Francisco (Calif.)	12,648
Washington	2,405
Dakota	385
Duluth (Minn.) and Superior (Wis.)	980
Michigan	503
Other Customs Districts	2/ 83
Total	43,987

1/Includes 1,161 tons of fish meal classified as fertilizer.
2/Includes 60 tons of fish meal classified as fertilizer.

Note: A list of the entry ports included within each Customs District is given in Schedule D, Code Classification of United States Customs Districts and Ports, which may be obtained free of charge by writing to the Foreign Trade Division, Bureau of the Census, U. S. Department of Commerce, Washington, D. C., 20233.

* * * * *

IMPORTS OF CANNED TUNA UNDER QUOTA:

United States imports of tuna canned in brine during January 1-August 31, 1963, amounted to 33,425,128 pounds (about 1,591,673 std. cases) according to data compiled by the Bureau of Customs. This was 10.3 percent less than the 37,272,804 pounds (about 1,774,895 std. cases) imported during January 1-September 1, 1962.

The quantity of tuna canned in brine which may be imported into the United States during the calendar year 1963 at the 12½-percent rate of duty is limited to 63,130,642 pounds (or about 3,006,221 std. cases of 48 7-oz. cans). Any imports in excess of the quota are dutiable at 25 percent ad valorem.

Wholesale Prices

EDIBLE FISH AND SHELLFISH, SEPTEMBER 1963:

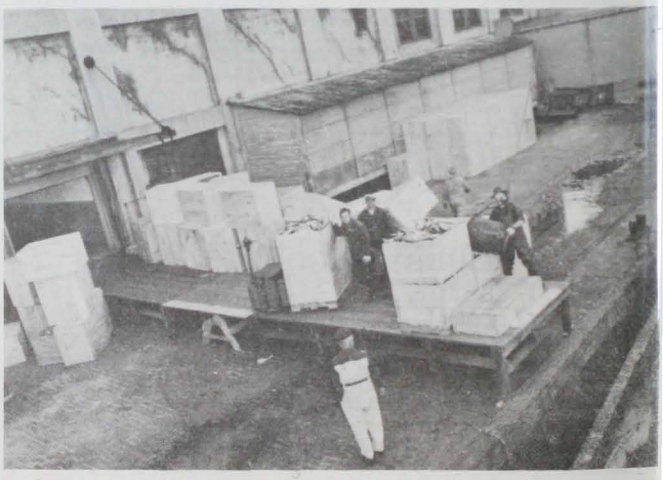
Higher prices in September for most of the major fresh finfish items reversed the downward price trend of the previous three months in the wholesale price index for edible fishery products (fresh, frozen, and canned). The September 1963 index at 107.1 percent of the 1957-59 average was up 1.5 percent from the previous month. Compared with the same month a year earlier, prices this September were down 10.6 percent due to sharply lower prices for fresh and frozen shrimp and generally lower prices for all canned fish products.

The more significant price increases during September were in the subgroup for drawn, dressed, or whole finfish. From August to September the subgroup index rose 8.3 percent due to higher prices for ex-vessel large haddock at Boston (up 16.4 percent), and fresh dressed western halibut (up 13.0 percent) and king salmon (up 6.8 percent) at New York City. Supplies of fresh halibut from the seasonal North Pacific fishery were not as plentiful as in August, and the good demand for limited supplies of king salmon boosted prices upward. Prices this September also were higher for Lake Superior fresh whitefish at Chicago but dropped for Great Lakes yellow pike at New York City. Compared with the same month a year earlier, prices this September were higher for all items except salmon (down 5.7 percent). Lower salmon prices than in September 1962 cancelled out the sharp increase in fresh haddock prices which this September were up 26.1 percent from a year earlier and caused the subgroup index to rise only a nominal 0.5 percent.

The subgroup index for processed fresh fish and shellfish was down 0.2 percent from August to September despite substantially higher prices for fresh haddock fillets at Boston (up 14.6 percent) and some increase in fresh shrimp prices at New York City (up 1.5 percent). Lower prices for shucked standard oysters at Norfolk (down 3.1 percent) were responsible for the slight drop in the September subgroup index. As compared with the same month in 1962, the subgroup index this September was down 15.3 percent because of sharply reduced prices for fresh shrimp (down 33.7 percent).

Although most prices for processed frozen fish and shellfish were the same or slightly higher than in August, they were offset by a drop in prices for frozen shrimp at Chicago (down 3.2 percent). The subgroup index was down 1.5 percent from August to September and was below a year earlier by 20.7 percent because of lower frozen shrimp prices which were down about one-third from those in September 1962.

A slight drop of 0.2 percent from August to September in the price index for canned fishery products was caused by lower prices for canned Maine sardines which this September were lower by 1.8 percent. Prices for other canned products in the subgroup were unchanged from August. Compared with the same month a year earlier, the subgroup price index this September was down 8.0 percent due to lower prices for all canned fishery products. The disappearance of canned fish stocks this September was by no means marked but there was some indication of improvement and the beginning of a better market outlook for some items.



Frozen fish are unloaded into large boxes for holding in commercial frozen storage.

Table 1 - Wholesale Average Prices and Indexes for Edible Fish and Shellfish, September 1963 with Comparisons

Group, Subgroup, and Item Specification	Point of Pricing	Unit	Avg. Prices 1/ ($)		Indexes (1957-59=100)			
			Sept. 1963	Aug. 1963	Sept. 1963	Aug. 1963	July 1963	Sept. 1962
ALL FISH & SHELLFISH (Fresh, Frozen, & Canned)					107.1	105.5	110.0	119.8
Fresh & Frozen Fishery Products:					110.6	108.0	114.3	125.6
Drawn, Dressed, or Whole Finfish:					125.6	116.0	110.0	125.0
Haddock, lge., offshore, drawn, fresh	Boston	lb.	.13	.11	98.5	84.6	83.4	78.1
Halibut, West., 20/80 lbs., drsd., fresh or froz.	New York	lb.	.44	.39	128.6	113.8	106.4	126.6
Salmon, king, lge. & med., drsd., fresh or froz.	New York	lb.	.99	.93	138.0	129.2	122.3	146.3
Whitefish, L. Superior, drawn, fresh	Chicago	lb.	.68	.66	100.7	98.5	88.0	98.5
Yellow pike, L. Michigan & Huron, rnd., fresh	New York	lb.	.61	.64	99.9	104.8	100.7	91.7
Processed, Fresh (Fish & Shellfish):					104.3	104.5	120.8	123.1
Fillets, haddock, sml., skins on, 20-lb. tins	Boston	lb.	.43	.38	104.4	91.1	93.5	86.2
Shrimp, lge. (26-30 count), headless, fresh	New York	lb.	.71	.70	83.2	82.0	106.7	125.4
Oysters, shucked, standards	Norfolk	gal.	7.75	8.00	130.7	134.9	143.3	126.5
Processed, Frozen (Fish & Shellfish):					97.4	98.9	107.9	122.8
Fillets: Flounder, skinless, 1-lb. pkg.	Boston	lb.	.40	.39	100.1	98.9	100.1	100.1
Haddock, sml., skins on, 1-lb. pkg.	Boston	lb.	.36	.36	105.5	105.5	102.6	101.1
Ocean perch, lge., skins on 1-lb. pkg.	Boston	lb.	.34	.33	117.5	115.7	116.6	110.4
Shrimp, lge. (26-30 count), brown, 5-lb. pkg.	Chicago	lb.	.76	.79	90.1	93.1	109.7	136.4
Canned Fishery Products:					101.4	101.6	102.8	110.2
Salmon, pink, No. 1 tall (16 oz.), 48 cans/cs.	Seattle	cs.	24.00	24.00	104.6	104.6	104.6	111.1
Tuna, lt. meat, chunk, No. 1/2 tuna (6-1/2 oz.), 48 cans/cs.	Los Angeles	cs.	10.88	10.88	96.6	96.6	99.0	104.4
Mackerel, jack, Calif., No. 1 tall (15 oz.), 48 cans/cs.	Los Angeles	cs.	5.75	5.75	97.5	97.5	2/100.0	3/118.5
Sardines, Maine, keyless oil, 1/4 drawn (3-3/4 oz.), 100 cans/cs.	New York	cs.	7.96	8.11	102.1	104.0	104.0	116.9

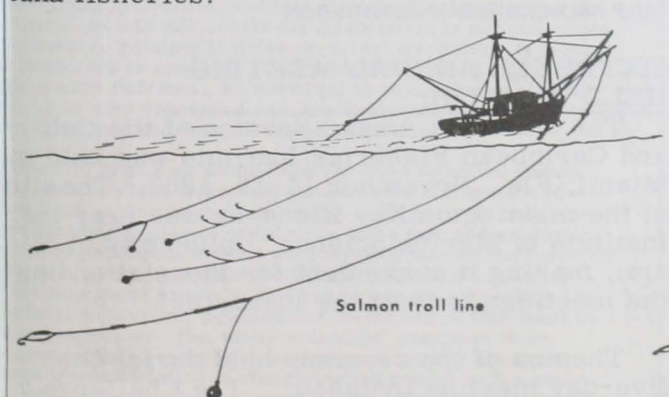
1/ Represent average prices for one day (Monday or Tuesday) during the week in which the 15th of the month occurs. These prices are published as indicators of movement and not necessarily absolute level. Daily Market News Service "Fishery Products Reports" should be referred to for actual prices.

2/ One commodity has been dropped in the fishery products index as of December 1962--"Sardines, Calif., tom. pack, No. 1 oval (15-oz.), 24 cans/cs."--and replaced by--"Mackerel, jack, Calif., No. 1 tall (15-oz.), 48 cans/cs." Under revised procedures by the Bureau of Labor Statistics all new products enter wholesale price indexes at 100.

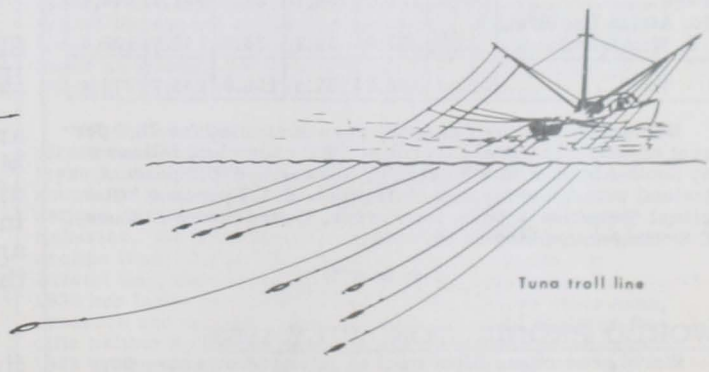
3/ Based on Calif. sardines and not directly comparable with replacement (jack mackerel) for January-September 1963.

TROLL LINES

Troll lines are long single lines, with one or more barbed hooks at the free end of the line, baited with either a natural or an artificial lure, and drawn or towed behind a moving boat. They require constant attention. Troll lines are used principally in the salmon and tuna fisheries.



Salmon troll line



Tuna troll line

Note: Excerpt from Circular 109, Commercial Fishing Gear of the United States, for sale from the Superintendent of Documents, Government Printing Office, Washington, D. C. 20402, single copy, 40 cents.