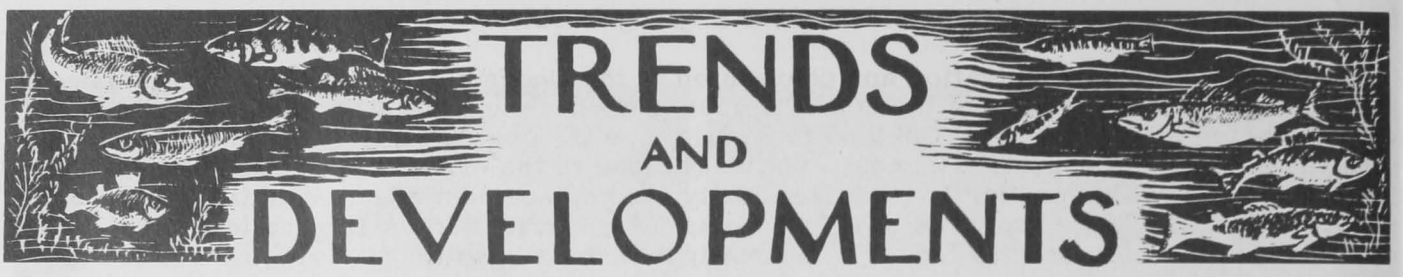

Alaska

SOVIET AND JAPANESE FISHERIES IN GULF OF ALASKA:

About 180 fishing and related support vessels of the Soviets in May 1963 had shifted their major efforts from the winter grounds in the Bering Sea into the Gulf of Alaska. Japanese fishing efforts increased markedly during May 1963, with about 180 vessels in the eastern Bering Sea and North Pacific Ocean.

The maximum Soviet fishing effort in the Gulf of Alaska occurred in early May when a fleet of about 150 vessels began operations in the waters southwest of Kodiak Island. That fleet composed of well over 100 conventional SRT-type trawlers, up to 12 stern-ramp factory trawlers, and accompanying processing and support vessels progressed northeasterly generally along the 100-fathom curve and was centered on the Portlock Bank area east of Kodiak. Observations indicated the Soviets were again trawling primarily for Pacific ocean perch as they did in 1962.

Claims of the Japanese that the king crab stocks near the Port Moller area may have been depleted appear to be somewhat refuted by the more recent Soviet king crab fishery in that area. In 1962, the ultramodern 15,000-gross-ton processing vessels Andrei Zakharov and Pavel Chebotnyagin operated for king crab in that area. This year the Zakharov (built in 1960) and the Chebotnyagin (completed in 1962) were joined by their sister-ship Eugeny Nikishin (also completed in 1962). Those factoryships were each served by two SRT trawlers which set the tangle nets. The nets were later picked up by 1 of the 12 picker boats that are carried in davits on each factoryship.

Soviet whaling efforts have also been increased in 1963 by the addition of a second whale factoryship and presumably accompanying catcher vessels. The Alewt, a former United States ship converted to whale processing, has operated in that area for several years. This year she was again present and was joined by the new 17,600-gross-ton Vladivostok. Both fleets began operating in the western Aleutians area but about May, the Vladivostok fleet moved into the area southwest of Kodiak Island. The Aleut fleet remained in the central to western Aleutian Islands region.

The 1963 Japanese fisheries in the eastern Bering Sea generally followed the pattern of the past several years with a reduction in fleet strength from the 1962 levels.

Of perhaps primary interest are the Japanese long-line fleets operating in the "triangle" area of the Bering Sea. The total strength of that fishery was reported to be 5 processing "motherships" accompanied by 66 catcher vessels.

Shrimp fisheries were being conducted by the Japanese in the general area north and west of the Pribilof Islands with 2 processing ships and 26 accompanying catcher boats. A Japanese tangle-net fishery for king crab was centered in the Port Moller region and included 2 processing motherships and about 20 catcher vessels. The fish-meal and oil operations were reduced to one mothership with 30 trawlers from the 4 mothership operations in 1962. Fish meal activities have been localized in the region northwest of Unimak Pass. As of May, there was no knowledge of Japanese whaling efforts.

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1963 BERING SEA HALIBUT CATCH:

The catch of halibut in the eastern Bering Sea quota area had reached 9.2 million pounds, according to an announcement by the International Pacific Halibut Commission on May 29, 1963. This included a United States catch of 3.2 million pounds, a Canadian catch of 4.6 million pounds, and a Japanese catch of 1.4 million pounds. In 1963, the recommended

quota for the area is 11.0 million pounds. United States and Canadian fishing activity in the area was virtually over by the end of May due to the opening of the season south of the Aleutian Chain. Japan was expected to take the greater part of the remaining 1.8 million pounds of the Bering Sea quota.

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YAKUTAT AREA GOOD PRODUCER OF DUNGENESS CRAB:

Three vessels delivering Dungeness crabs to a canning company at Yakutat were doing quite well as of the end of May. The Tana, largest of the vessels, unloaded nearly 13,000 pounds of crabs after a two-day trip. The vessel was fishing with the legal limit of 300 pots. The fishermen were guaranteed not less than 9 cents a pound for the live crabs at the cannery.

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KODIAK AREA KING CRAB LANDINGS LIGHT:

There was very little commercial fishing for king crab during May, although tags from marked king crabs continued to arrive at the Auke Bay Biological Laboratory. They were mostly from the Kodiak area and included crabs that were caught during March.

* * * * *

CONTINUED INTEREST IN TANNER CRAB PROCESSING:

There is continued interest in the development of a tanner crab fishery in Alaska. Several firms have requested information on the fishery and have processed limited quantities of the species during the past winter. One firm plans to pack at least 2,000 pounds of tanner crabs for market acceptance tests this coming season.

* * * * *

YAKUTAT CANNERY HAS DIVERSIFIED OPERATIONS:

A fish-canning plant at Yakutat has been seeking ways to diversify its production. Although the firm traditionally subsisted on salmon production, the decline in availability of fish prompted their interest in other resources. Production of cooked Dungeness crabs was successful during the 1962 season and was being continued in May 1963. Experimental pot fishing for spot shrimp and king crab was also being conducted. Active interest was also being shown in shrimp trawling and scallop potentials of the area.

* * * * *

RESTAURANTS AND MARKETS REQUIRED TO REPORT FRESH FISH PURCHASES:

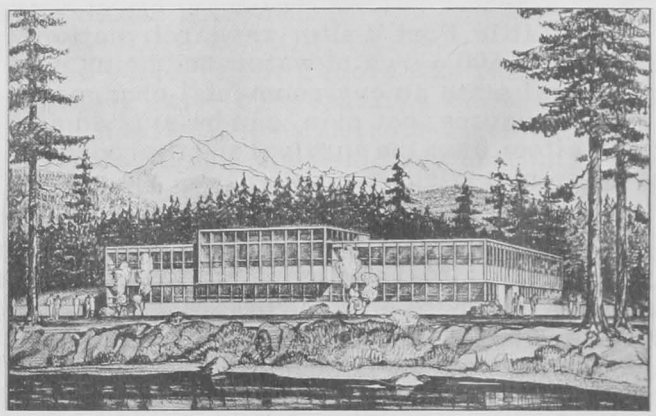
Restaurants, meat markets, grocery stores, and similar establishments in Alaska which buy fish or shellfish directly from commercial fishermen for resale to the general public are subject to a new regulation which requires in part that primary buyers of fish or shellfish issue a fish ticket to the commercial fishermen for each purchase made. Protection Officers of the Alaska Department of Fish and Game have been contacting markets and restaurants to explain the procedure, and supply fish ticket books.

* * * * *

AUKE BAY FEDERAL FISHERIES BIOLOGICAL LABORATORY COOPERATES WITH STATE ON RESEARCH:

A U. S. Bureau of Commercial Fisheries biological laboratory at Auke Bay, Alaska, built in 1960 at a cost of $600,000 by the U. S. Department of the Interior and with an annual budget of about $1.2 million, is the center of a far-flung fisheries research program in Alaska. Much of the research is done in cooperation with the State of Alaska.

Alaska's fish and shellfish catch in 1962 was worth $48 million at dockside and $126 million at the processor level.



Architect's sketch of the U. S. Bureau of Commercial Fisheries Auke Bay Biological Laboratory.

Studies by the Laboratory range from research on the possible effects of the proposed Rampart Dam on the world's longest salmon

run on the Yukon River to life history studies of Alaska's popular cocktail shrimp. The Yukon River salmon run (2,000 miles long) is important as a source of food and income for natives who live on or near the river.

The Laboratory has a staff of 35 scientists and 15 clerks and technical aides. Seasonal workers, most of them student biologists, help with field examinations. Recently, as many as 100 such workers were employed on one project in one season.

The Laboratory site was chosen because of its ideal location. It is between fresh-water Auke Lake and salt-water Auke Bay, making possible a great variety of studies on the effect of salinity changes on salmon during various stages of the life cycle. It is adjacent to Juneau and accessible by sea and air. The Laboratory is being equipped to test field situations under controlled conditions. Basic research is conducted on herring, king crab, shrimp, the five species of salmon (red, chum, coho, pink, and king), and on the food and predatory species associated with them. Physical environmental studies on lakes, streams, and the ocean itself are part of the program.

Scientific studies include the long-established fisheries biological programs at Little Port Walter and at Karluk and Brooks Lakes, and at the newer projects at Kasitsna Bay, Olsen Bay, Traitors Cove, Naknek River, Hollis, Old Tom's Creek, Yukon River, Wood River, and Kvichak. The studies at Hollis, Wood River, and Kvichak are under contract to the Fisheries Research Institute of the University of Washington.

The Little Port Walter research station includes 2,500 acres of watershed being held in natural state so environmental changes made by nature, not man, can be studied and their effect upon the survival and reproduction of salmon studied.

The largest single program is the Bristol Bay red salmon research, with headquarters at the town of King Salmon. Some 100 seasonal workers have been engaged in studies designed to understand red salmon problems and predict the runs. At Karluk Lake, on Kodiak Island, other red salmon studies are being pursued. Red salmon generally spend two years in inland lakes before making their pilgrimage to sea and Karluk Lake offers an excellent opportunity to study the environmental effect on the growth and survival of young fish.

The biology of shrimp and king crab is studied at Kasitsna Bay, across from Homer on Cook Inlet. Olsen Bay, 40 miles from Cordova, is the site of research on salmon which have shown a preference to spawn in the intertidal sections of streams rather than run up towards headwaters as is customary; at Traitors Cove is the principal chum salmon research station where the effects of temperature, predation, competition for food, flooding, and other environmental factors on survival and growth of salmon in fresh water are investigated.

At Old Tom's Creek, near Ketchikan, the U. S. Bureau of Commercial Fisheries and the Forest Service are jointly studying the effects of pesticides upon fish life. At Hollis, near Ketchikan, the Fisheries Research Institute is investigating the effects of logging upon a salmon fishery.

The Auke Bay Laboratory is a two-story structure with facilities for red salmon studies, ocean studies, biometrics, and river salmon research. It is equipped with an aquarium laboratory, a library, a museum, and conference rooms. There are also dock and warehouse facilities.

In addition to the Auke Bay Laboratory and its field stations, the U. S. Bureau of Commercial Fisheries has regional offices at Juneau and a technological laboratory at Ketchikan.

Alaska Exploratory Fishery Program

DISTRIBUTION AND ABUNDANCE OF SEA SCALLOPS IN GULF OF ALASKA STUDIED:

M/V "John R. Manning" Cruise 63-1 (May 20-June 14, 1963): Large scallops (Patinopecten caurinus) were caught in the waters of the Gulf of Alaska during an exploratory fishing cruise conducted by the U. S. Bureau of Commercial Fisheries vessel John R. Manning.

Eastern-style scallop dredges were employed at 82 locations between Cape Saint Elias and Lituya Bay in the waters of the Gulf of Alaska and Yakutat Bay. Catches of up to 7 bushels of scallops per 30-minute drag were made using an 8-foot dredge, identical with the type used in the scallop fishery

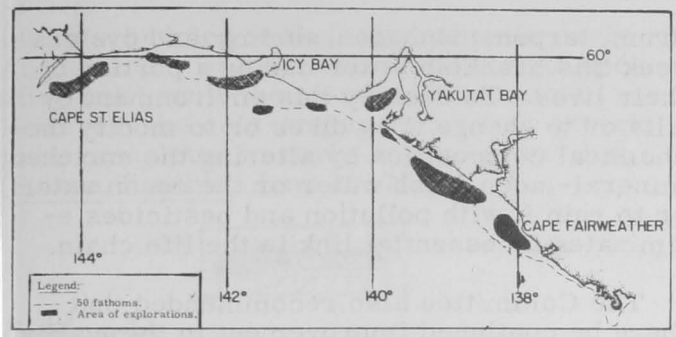


Fig. 1 - M/V John R. Manning Cruise 63-1 (May 20-June 14, 1963).

of the Northwest Atlantic. Depths between 20 and 90 fathoms were sampled to gather preliminary information on the distribution and abundance of the scallop in the Gulf of Alaska.

Scallops were taken at the following locations: off Cape Fairweather at depths from 34-42 fathoms, off Icy Bay in 39-44 fathoms, and east of Cape Saint Elias where catches were taken between 54 and 56 fathoms.

Fig. 2 - Eight-foot scallop dredge used aboard John R. Manning during Cruise 63-1. The inside diameter of the rings is three inches.

East of Yakutat Bay, the size of scallops measured ranged from $2\frac{3}{4}$ to $6\frac{1}{2}$ inches. Of those, 73 percent were between 3 and 4 inches (measured from the hinge to the outer margin of the shell). West of Yakutat Bay, the size range was from 3 to 7 inches with 82 percent of the scallops falling between 5 and $6\frac{1}{2}$ inches. The edible (muscle) portion of the scallops varied from 15 to 60 count per pint measure. The yield of meats varied from 2 to 5 pints for each bushel of whole live scallops. The meats of the large size scallops were slightly yellow in color.

About 650 pounds of shrimp were caught in a single 60-minute drag with a small shrimp trawl off Knight Island in Yakutat Bay. About 90 percent of the shrimp catch was the side-stripe variety (Pandalopsis dispar); the remainder consisted of coon stripe (Pandalus hypsinothus), spot (Pandalus platyceros), and pink shrimp (Pandalus borealis).

Alaska Fisheries Investigations

EVIDENCE OF SEPARATE PINK SALMON INTERTIDAL RACES:

Length measurements from 1,075 pink salmon measured in 1962 revealed that spawners in the intertidal tributaries of Olsen Creek again were significantly smaller than mainstream spawners. The consistent segregation of small fish to certain portions of Olsen Creek intertidal spawning grounds indicates the possibility of separate genetic stocks, and plans are under way to verify whether separate races do occur in such close proximity.

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PINK EGGS WARMED BY INTERTIDAL ACTION:

The photographic record was read of intragravel water temperatures in the Olsen Creek intertidal area October 20, 1962, to March 12, 1963. Mechanical operation of the "Braincon" instrument clockwork and film advance mechanism was flawless for the five-month period. Temperature fluctuations associated with tides and weather changes corresponded closely with actual time of those occurrences as calibrated from tide prediction tables. Horizontal reference lines, representing degrees of temperature did not appear on the film as advertised, but the film was read by use of a scale established by calibration. According to the film record, salmon eggs last winter at the 10.5-foot tide level were subject to 234 day-degrees centigrade, of which 27 day-degrees centigrade were a

result of warming action by tides. As far as is known, this is the first time significant data of that type have been obtained, and it is a start on determining what environmental conditions are conducive to maximum survival of intertidal pink salmon.

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BRISTOL BAY FRY AND SMOLT MIGRATIONS FAVORABLE:

By late May 1963, the smolt index on the Ugashik River reached 200,000, indicating a sizable smolt migration. The Hidden Creek fry outmigration was near the 300,000 mark, indicating a survival from potential egg deposition of over 10 percent. A generally moderate winter with good water flow likely contributed a great deal to this relatively high survival.

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AUKE BAY PLANKTON INCREASES:

Day and night samples taken in Auke Bay during late May, showed considerable seasonal increase in zooplankton. Again, this coincides with the outmigration of pink fry from Auke Creek. Day samples average around 5,000 organisms, with some samples going as high as 14,000 per haul. The principal organism is barnacle larvae (Balanus sp.). Larval crabs, shrimp, and fish have increased in numbers. Some fish eggs have been tentatively identified as those of the walleye pollock. Some night samples have contained 40 to 60 thousand organisms, principally euphausids.

American Fisheries Advisory Committee

PROTECTION OF ESTUARIES RECOMMENDED:

Protection of estuaries essential as spawning grounds and nursery areas for valuable fisheries and recognition of the joint interest of sport and commercial fishermen in pesticides and pesticide research were stressed by the American Fisheries Advisory Committee at its June 1963 meeting in Washington, D. C.

In discussing estuaries, committee members pointed out that many important fisheries depend upon inshore brackish water environment. Gray sea trout (weakfish), drum, tarpon, menhaden, shrimp, and oysters seek this brackish water during a portion of their lives. To destroy this environment by fills or to change it by dikes or to modify the chemical composition by altering the enriched, mineral-laden fresh water or the ocean water or to ruin it with pollution and pesticides eliminates an essential link in the life chain.

The Committee also recommended that there be continued improvement in the quality of fishery products offered to the consumer, that there be an increase in the research and exploratory efforts on bluefin tuna and swordfish in the Atlantic Ocean, and that the commercial fishing values of large reservoirs be studied.

The American Fisheries Advisory Committee, a group of 20 fisheries experts selected by the Secretary of the Interior, was established under the Saltonstall-Kennedy Act of 1954. This law provides for research and educational programs which will improve the economic status of the domestic fishing industry and make valuable protein from the sea more readily available to the consumer. The law is administered by the U. S. Bureau of Commercial Fisheries.

In speaking to the group, Senator Leverett Saltonstall (Mass.), co-author of the Saltonstall-Kennedy Act, urged studies of the effect of water pollution upon marine life, development of underutilized resources as a possible solution to hunger throughout the world, and modernization of fishing fleets and shore facilities.

Chairman Benjamin Smith, of the United States delegation to the International Convention for the High Seas Fisheries of the North Pacific Ocean, stressed the international aspects of commercial fisheries.

The next meeting of the Committee will be held in Honolulu, Hawaii, January 22-24, 1964.

American Samoa

COMPLETION DATE FOR SECOND TUNA CANNERY DELAYED:

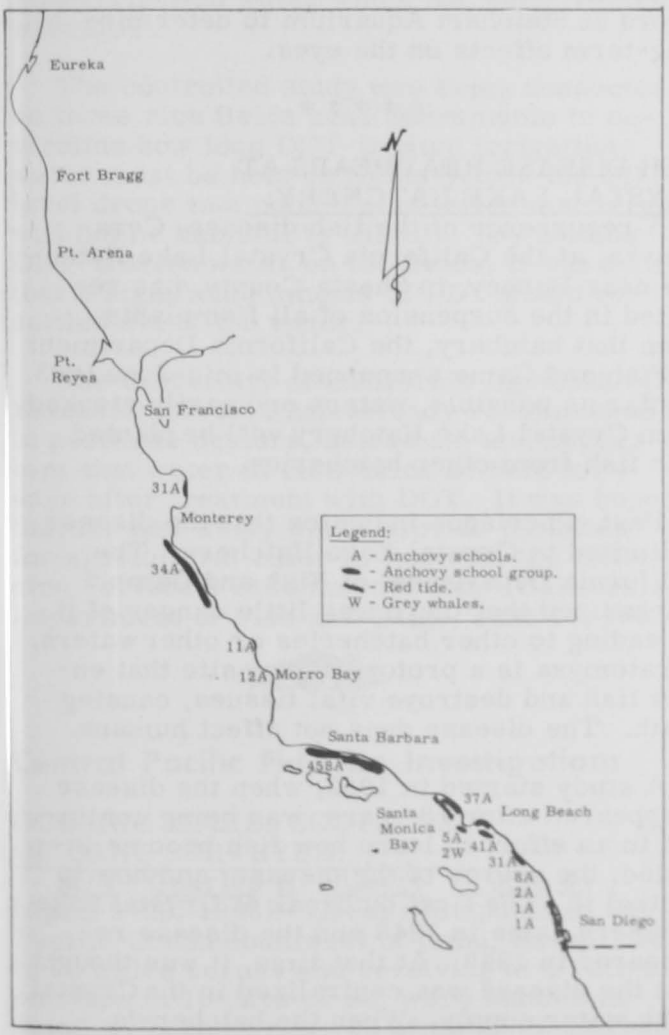
Construction of the second United States tuna cannery at American Samoa is reported to be behind schedule slightly, according to Japanese press reports. The cannery, orig-

inally scheduled to be in operation in early August 1963, was not expected to begin operating until after the middle of the month. However, the cold-storage plant was expected to be completed in early July as scheduled. (Suisan Tsushin, June 10, 1963.)

California

PELAGIC FISH POPULATION SURVEY CONTINUED:

Airplane Spotting Flight 63-5-Pelagic Fish (May 13-15, 1963): To determine the inshore distribution and abundance of pelagic fish schools, the inshore area from the United States-Mexican Border to Fort Bragg, Calif., was surveyed by the California Department of Fish and Game's Cessna "182" 9042T.



Pelagic fish survey flight 63-5.

Weather and visibility conditions were generally good and the entire survey area was covered.

The flight was successful in that schools of anchovies were observed along the Monterey County coast from Pt. Sur to Piedras Blancas. Fish schools seldom are sighted in this area.

The school groups along the southern California coast were extensive. The group at Santa Barbara extended almost continuously from Gaviota to Rincon Point. One school in Santa Monica Bay extended from Santa Monica pier to Playa del Rey, a distance of 4 miles.

Some red water was seen in Santa Monica Bay but it was not nearly as heavy as in past months. The anchovies were schooled between the red tide and the surf. Red tide also was observed in Los Angeles-Long Beach Harbor, off Laguna Beach, and was quite extensive around Oceanside and Mission Beach.

Two grey whales were seen near Point Fermin. This was quite late in the year for those mammals to be passing along the California coast.

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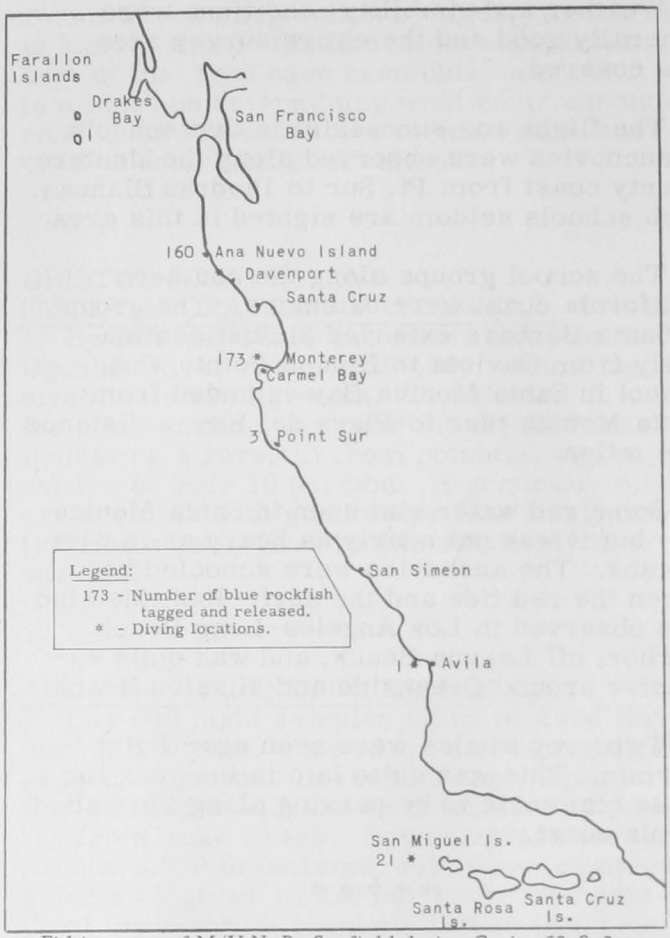
BLUE ROCKFISH TAGGED AND BIOLOGICAL DATA COLLECTED OFF MID-COASTAL AREA:

M/V "N. B. Scofield" Cruise 63-S-3 (April 10-May 9, 1963): The objectives of this cruise by the California Department of Fish and Game research vessel N. B. Scofield were: (1) tagging blue rockfish (Sebastodes mystinus) for studies of migration; (2) taking blue rockfish stomachs for food analyses; (3) collecting live fish for holding in aquaria for serological studies; (4) taking blood samples for studies of subpopulations; (5) making underwater observations and censuses of fish on reefs; and (6) collecting specimens for Steinhart Aquarium and for taxonomic studies.

Nineteen days were spent fishing in the California coastal area between the Farallon and San Miquel Islands, but 11 other days were lost due to bad weather or in traveling between fishing areas.

Blue rockfish fishing was poor, particularly from Avila to the Farallon Islands. Only 616 fish were caught; 359 of those were tagged and released at sea. A total of 91 blue



Fishing area of M/V N. B. Scofield during Cruise 63-S-3.

rockfish were tagged and delivered alive to three different aquaria for seriological studies. Deflation of the swim bladder was required on 107 of the tagged fish, and 9 of those also required stomach replacement. All blue rockfish tagged were first anesthetized in a solution of one part MS-222 to 15,000 parts of sea water. Blood samples were obtained from 48 fish, and stomach samples were collected from 96.

SCUBA dives were made on reefs at Adams Cove, San Miguel Island; Lion Rock off Avila; Monterey Breakwater; and off Davenport. Estimates of the total numbers of fish by species were made on all reefs except at the Monterey Breakwater. Observations were made of blue rockfish habitat and behavior. When salps (Salpa sp.), jellyfish, and other plankton were abundant it was very difficult to catch blue rockfish by hook and line.

Shrimp traps were fished at Cuyler Cove, San Miguel Island, one night and at the Monterey Breakwater for three days and nights in an attempt to capture juveniles. Two 4-8 inch juvenile rockfish were caught at the Monterey Breakwater.

Several species of juvenile fishes were collected under a nightlight at Año Nuevo Island, Farallon Islands, Drakes Bay, Monterey Bay, and Pfeiffer Point. These fish were retained for taxonomic studies. Ninety-nine live fish were saved for the Steinhart Aquarium.

Most of the live fish had their swim bladders so distended that deflation was necessary. Those not requiring deflation were the swell shark, starry flounder, Pacific sanddab, rock sole, kelp greenling, brown Irish lord, cabezon, lingcod, and sharpnose seaperch. Deflation and replacement of protruding eyes of several quillbacks, rosy, China, canary, and vermilion rockfish was successful in most instances.

Observations were to be made on the survivors at Steinhart Aquarium to determine long-term effects on the eyes.

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FISH DISEASE REAPPEARS AT CRYSTAL LAKE HATCHERY:

A recurrence of the fish disease, Ceratomyxa, at the California Crystal Lake Hatchery near Burney, in Shasta County, has resulted in the suspension of all fish plants from that hatchery, the California Department of Fish and Game announced in mid-June 1963. Insofar as possible, waters ordinarily stocked from Crystal Lake Hatchery will be planted with fish from other hatcheries.

Past experience indicates that the disease is limited to Crystal Lake Hatchery. The California Department of Fish and Game emphasized that there was little danger of it spreading to other hatcheries or other waters. Ceratomyxa is a protozoan parasite that enters fish and destroys vital tissues, causing death. The disease does not affect humans.

A study started in 1962, when the disease reappeared after 13 years, was being continued in an effort to learn how fish become infected, the source of the disease, and how to control it. The first outbreak at Crystal Lake Hatchery came in 1948 and the disease reappeared in 1949. At that time, it was thought that the disease was centralized in the Crystal Lake water supply. When the hatchery's water supply was changed to Rock Creek in

1950, the disease disappeared until 1962.

About 400,000 fish were being raised at the hatchery. A small population of 17,000 trout on a separate water supply did not have the disease and were to be planted in local waters. (California Department of Fish and Game, June 15, 1963.)

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INVESTIGATION OF POSSIBLE FISH LOSSES FROM DDT-TREATED IRRIGATION WATER:

A study aimed at controlling conditions which led to fish kills during the spring of 1963 in sloughs north of Sacramento, Calif., was being made by the California Department of Fish and Game in cooperation with State agricultural agencies. It is thought that the fish losses were caused by the discharge of rice irrigation water which had been treated with DDT.

The controlled study was being conducted on three rice fields near Sacramento to determine how long DDT-treated irrigation water must be held on fields before the DDT level drops to a point where water discharges will not be harmful to wildlife. By holding DDT-treated water on the fields, it was hoped that a significant amount of DDT would be settled out of the water.

The University of California Agricultural Extension Service has already recommended to pesticide dealers, salesmen, and applicators that water in rice fields be held for 5 days after treatment with DDT. It was hoped that the new study would provide the basis for agricultural rules in line with the Extension Service's recommendation. (California Department of Fish and Game, June 15, 1963.)

Central Pacific Fisheries Investigations

OCEANIC EDDIES SOUTHWEST OF OAHU SURVEYED:

M/V "Charles H. Gilbert" Cruise 64 (April 9-28, 1963): Great whirlpools in the Pacific Ocean southwest of Oahu, Hawaii, 20 to 50 miles across and revolving at a rate of one turn in 10 days or so, were studied in detail by oceanographers of the U. S. Bureau of Commercial Fisheries on a cruise of the research vessel Charles H. Gilbert. These ocean eddies are like the swirls seen below rocks in a stream, the rocks in this case being the Hawaiian Islands and the stream the North Pacific Equatorial Current.

The scientific field party began to search down-current from Oahu for signs of the eddies which should theoretically be there. On April 10, in an area about 80 miles southwest of Honolulu, measurements of deep-water temperatures indicated that cold-water layers were bulging up toward the surface as they might be expected to do in the middle of an eddy. Nine drogues were strategically placed across the area, each consisting of an aviator's parachute suspended by a fine nylon line from a float bearing a flagpole, light, and radar reflector. The line on one drogue was made 2,000 feet long, to "anchor" it in the more slowly moving deep water, while the other parachutes were only 60 feet below the surface.

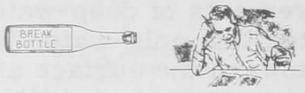
For three days the vessel observed the drogues, plotting their positions as they traced the counterclockwise revolution of the great gyral and its slow total drift to the westward. Fortunately the weather was fine and the area is one where Loran navigation is accurate within one-quarter of a mile. The result is an unprecedentedly fine set of measurements of an eddy in the open sea. The drogues near the outer edge of the gyral whizzed along at about 40 miles a day, while the speed of those nearer the center was only about 10 miles a day. The whole system was moving west at 5 to 8 miles a day.

Revisiting the same area 10 days later, the scientists found that the eddy had been replaced by, or possibly had broken up into, 4 or 5 smaller eddies, forming a pattern of movement too complex to study effectively with drogues.

The observations made on this two-part cruise prove that downstream eddies do exist near oceanic islands and give an accurate idea of the speed at which they may revolve and move. Future experiments of the same type will be aimed at discovering more about the life span of such eddies and the changes of form and speed that they undergo as they develop and then die out.

The attainment of a better knowledge of the behavior of eddies around the Hawaiian Islands will be of immediate value in inter-

preting returns of drift bottles and cards, which the expeditions of the Bureau's Laboratory at Honolulu have been releasing on a large scale over the past two years. In the longer run, the marine scientists hope to be able to study eddies long and intensively enough to discover how they may affect the fisheries, as for example by enriching and concentrating the animal life of the ocean surface.



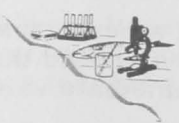
Fish Behavior

NEW LABORATORY AT UNIVERSITY OF MIAMI TO CONDUCT STUDIES:

The new "fish behavior" building (officially designated Marine Life Controlled Environment Building) now under construction at the Institute of Marine Science, University of Miami, Fla., is a "first" in marine science and is designed specifically for the study of the behavior of marine animals under a variety of conditions. From its laboratories may come answers to many questions that have perplexed anglers and scientists: How and why do fish migrate? How do they navigate? What controls their feeding habits? Why do they prefer different kinds of baits at different times? What attracts and repels sharks? How do whales and porpoises communicate?

The Controlled Environment Building will contain 14,000 square feet of research area and will be equipped with the latest scientific apparatus for studying the behavior of all kinds of living marine organisms from tiny planktonic animals to whales.

Special pressurized tubular tanks 40 feet long will enable researchers to study fishes under simulated conditions of great depth. Water in these tanks will be regulated for temperature, salinity, oxygen, carbon dioxide, and acid-base relationship. Rooftop settling tanks will provide up to 600 gallons of water a minute. The building's design permits live specimens to be transferred from the sea to tanks with maximum safety and a minimum of disturbance. A special elevator will carry them to upper floors. (News of the Institute of Marine Science, June 20, 1963.)



Fisheries Laboratory

CONTRACT AWARDED FOR NEW LABORATORY AT SEATTLE, WASH.:

A $1,851,000 contract for a new Bureau of Commercial Fisheries Laboratory, library, and conference center in Seattle, Wash., has been awarded by the U. S. Department of the Interior.

The new buildings will be of reinforced concrete and masonry and will be adjacent to the existing fisheries laboratory at 2725 Montlake Boulevard, on the shore of Lake Union. The new structures will relieve overcrowding of the present laboratory which was built in 1931 and which has been the center for biological and technological research, and the base for an extensive exploratory fishing program conducted in the waters off the northwestern States.

The new laboratory building will be 4 stories high and will contain 65,000 square feet of floor space. The library-conference structure will have 3 stories and will provide 17,000 square feet of space. The buildings are to be completed within a year and a half after the work starts.

Research on developing new uses for fish oil and fish-oil derivatives will be one of the projects to be conducted in the technological section of the new laboratory. A water temperature control system will permit biologists to make long-needed studies of the effect of temperature upon the survival of fish eggs, fry, and fingerlings. Better opportunity also will be provided for determining the value of trace elements in the environment, for antibiotic research, and for ecological studies.

Fish Oils

GAS-LIQUID CHROMATOGRAPHY AIDS IN IDENTIFYING FATTY ACIDS:

Research on fish oil fatty acids is aided by gas-liquid chromatography at the Seattle Technological Laboratory of the U. S. Bureau of Commercial Fisheries. This research tool provides information on the constituent fatty acids. Gas-liquid chromatography analyses of oils from 17 species of edible fish have been completed. The analyses of six additional oils will complete the present study.

Results of those analyses of extracted oils showed marked similarity of the fatty acid distributions between salt- and fresh-water fish and shellfish. A few major differences in amounts of specific fatty acids were noted, for example in Pacific herring, chinook, salmon, and sea scallops.

Fish Protein Concentrate

CONTRACTS AWARDED FOR EXPANDED RESEARCH PROGRAM:

Contract awards from funds made available to the U. S. Bureau of Commercial Fisheries for research on fish protein concentrate (FPC) are as follows:

Texas A & M College, two contracts totaling $39,832, one on research studies dealing with an enzymatic process to remove the viscera of the fish, and the other dealing with production processing procedures. Massachusetts Institute of Technology, a contract of $23,830, to study flavor reversion factors in FPC. Battelle Memorial Institute, a contract of $147,000, to set up a solvent extraction process. Artisan Industries, Inc., a contract of $101,000 to set up a bio-digestion process for fish protein concentrate.

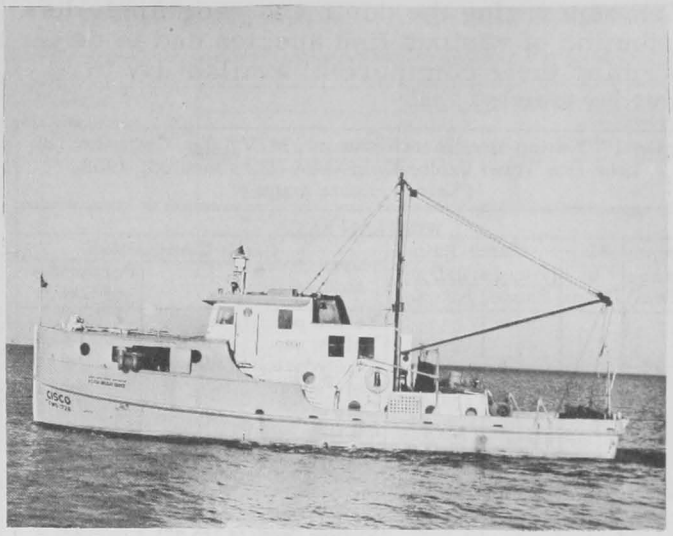
Great Lakes Fisheries

Exploration and Gear Research

TRAWLING INVESTIGATIONS IN NORTHERN LAKE MICHIGAN:

M/V "Cisco" Cruise 12 (July 2-16, 1963): To determine the availability of various species of fish to standard otter trawl fishing gear and define trawlable areas in Green Bay and other areas in northern Lake Michigan were to be primary objectives of this cruise by the U. S. Bureau of Commercial Fisheries research vessel Cisco. The lake-wide transect from Ludington, Mich., to Manitowoc, Wis., were to extend knowledge regarding the seasonal bathymetric distribution, relative abundance, and availability to trawls of various species.

High resolution echo-sounding equipment was to be used to survey bottom conditions and record both bottom and off-bottom fish



U. S. Bureau of Commercial Fisheries research vessel Cisco.

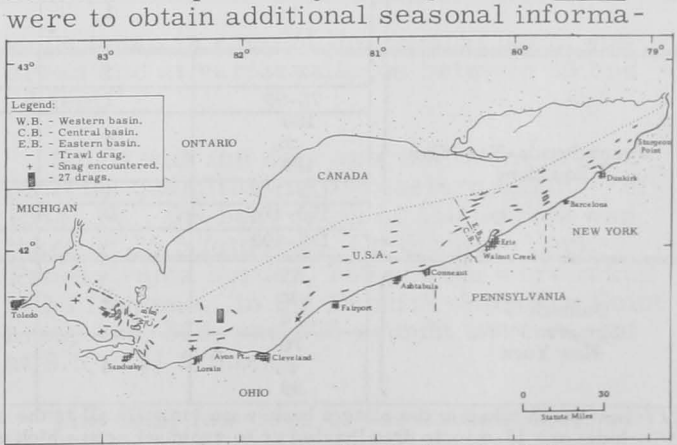
concentrations. Bathythermograph recordings and bottom samples were to be taken at each fishing station. A 52-foot (headrope) Gulf of Mexico-type otter trawl was to be used at standard stations to assess the commercial trawling potential.

It was decided to use the biological research vessel Cisco for these exploratory fishing operations and cooperative biological studies in the designated areas. The Bureau's exploratory fishing vessel Kaho (cruise 11 - May 22-June 20) was used for environmental studies in Lake Erie.

* * * * *

TRAWL FISHING INVESTIGATION OF LAKE ERIE CONTINUED:

M/V "Kaho" Cruise 11 (May 22-June 20, 1963): Primary objectives of this Lake Erie cruise by the U. S. Bureau of Commercial Fisheries exploratory fishing vessel Kaho were to obtain additional seasonal informa-



M/V Kaho Cruise 11, May 22-June 20, 1963.

tion concerning the depth and geographic distribution of various fish species and to determine their commercial availability to bottom trawls.

Table 1 - Fishing Assessment Summary, M/V Kaho, Cruise No. 11, Lake Erie Trawl Explorations, May 22 to June 20, 1963. (Thirty-minute drags.)

WESTERN BASIN					
Depth Range (Feet)	No. of Drags	Catch Rate (Pounds Per Drag) Range	Average	Catch Composition Species	Percentage of Catch
18 to 24	1/ 7	96 to 805	260	Yellow perch (over 8")	12
				Yellow perch (4" to 8")	13
				Yellow perch (under 4")	4
				Sheepshead	44
				Carp	1
				Catfish	12
				Smelt	2
				Other species	12
25 to 48	2/20	76 to 1629	340	Yellow perch (over 8")	4
				Yellow perch (4" to 8")	28
				Yellow perch (under 4")	2
				Sheepshead	28
				Carp	17
				Catfish	6
				Smelt	2
				Other species	3/ 14

1/Includes one 10-minute drag that tore up while catching 224 pounds of fish.
2/Includes one 25-minute drag (hauled up to avoid bad bottom) and two 30-minute drags that tore up while catching 260, 200, and 226 pounds of fish, respectively.
3/Includes one catch containing 500 pounds of fresh-water clams.

A total of 87 routine assessment-type drags was made--27, 37, and 23 in the western, central, and eastern basins, respectively--with standard 52-foot (headrope) Gulf of Mexico-type semiballoon fish trawls. An additional series of 26 drags was made off Avon Point for studies on cod end mesh-size-selectivity for yellow perch and time-of-day effectiveness of otter-trawl fishing. All drags were for 30 minutes except for six which were lifted early due to unexpected appearances of bottom obstacles or gill nets, and when the net was obviously fouled. Four trawl nets were severely damaged and one net entirely lost during the explorations.

This cruise furnished additional evidence that otter trawls are capable of producing commercial quantities of species other than smelt in Lake Erie. Trawl catches of sheepshead, carp, channel catfish, and yellow perch were as good or better than any that have been made since trawling was introduced to Lake Erie.

Sheepshead were taken in quantity in the western basin along with carp, channel catfish, and yellow perch (table 1). Best catches

Table 2 - Fishing Assessment Summary, M/V Kaho, Cruise No. 11, Lake Erie Trawl Explorations, May 22 to June 20, 1963. (Thirty-minute drags.)

EASTERN BASIN						
Area	Depth Range (Feet)	No. of Drags	Catch Rate (Pounds Per Drag) Range	Average	Catch Composition Species	Percentage of Catch
Erie, Pennsylvania	54 to 74	3	1 to 83	28	Yellow perch	1/ 36
					Smelt	60
					Other species	4
	75 to 99	2/4	90 to 553	237	Yellow perch	9
					Smelt	91
					Other species	3/ 0
	100 to 124	1	50	50	Yellow perch	40
					Smelt	60
					Other species	0
	125 to 132	1	100	100	Yellow perch	50
					Smelt	50
					Other species	0
Pennsylvania-New York Boundary	57-74	1	90	90	Smelt	100
	75-99	1	150	150	Smelt	100
	100 to 124	2	180 to 250	215	Smelt	100
	125-149	1	25	25	Smelt	100
	150-174	0	-	-	-	-
	175-192	1	20	20	Smelt	100
Dunkirk to Sturgeon Point, New York	51 to 74	5	34 to 385	244	Yellow perch	2
					Smelt	97
					Other species	1
	75 to 99	3	35 to 92	69	Yellow perch	0
					Smelt	99
					Other species	1

1/Yellow perch taken in the eastern basin were virtually all in the under 4-inch size category.
2/Includes one 15-minute drag (hauled up to avoid set nets) which still caught 203 pounds of fish.
3/0 = less than 0.5 percent.

Table 3 - Fishing Assessment Summary, M/V Kaho, Cruise No. 11, Lake Erie Trawl Explorations, May 22 to June 20, 1963. (Thirty-minute drags.)

Area	Depth Range (Feet)	No. of Drags	Catch Rate (Pounds Per Hour) Range	Catch Rate (Pounds Per Hour) Average	Catch Composition: Species	Catch Composition: Percentage of Catch
CENTRAL BASIN						
Sandusky to Cleveland, Ohio	18 to 24	1	72	72	Yellow perch (4" to 8")	10
					Smelt	6
					Sheepshead	68
					Other species	14
	25 to 49	1/7	52 to 600	290	Yellow perch (over 8")	7
					Yellow perch (4" to 8")	9
					Yellow perch (under 4")	41
					Smelt	38
					Other species	5
	50 to 69	8	88 to 552	189	Yellow perch (over 8")	41
					Yellow perch (4" to 8")	16
					Yellow perch (under 4")	23
					Smelt	18
					Other species	2
Cleveland to Fairport, Ohio	42 to 49	2/1	35	35	Yellow perch (over 8")	3/ 0
					Yellow perch (4" to 8")	0
					Yellow perch (under 4")	71
					Smelt	29
					Other species	0
	50 to 74	9	35 to 680	208	Yellow perch (over 8")	25
					Yellow perch (4" to 8")	4
					Yellow perch (under 4")	29
					Smelt	42
					Other species	0
	75	1	35	35	Yellow perch (over 8")	14
					Yellow perch (4" to 8")	0
					Yellow perch (under 4")	0
					Smelt	86
					Other species	0
Ashtabula, Ohio to Walnut Creek, Pennsylvania	36 to 49	1	242	242	Yellow perch (over 8")	12
					Yellow perch (4" to 8")	29
					Yellow perch (under 4")	17
					Smelt	41
					Other species	1
	50 to 74	6	21 to 580	264	Yellow perch (over 8")	20
					Yellow perch (4" to 8")	4
					Yellow perch (under 4")	20
					Smelt	54
					Other species	2
	75 to 78	1	180	180	Yellow perch (over 8")	3
					Yellow perch (4" to 8")	0
					Yellow perch (under 4")	3
					Smelt	94
					Other species	0

1/One other drag encountered snag; net was lost.
2/One other drag encountered snag; gear was severely damaged.
3/0 = less than 0.5 percent.

of those species were: sheepshead--200, 550, and 950 pounds; carp--440 and 510 pounds; channel catfish--100 and 200 pounds; and yellow perch--180, 190, 190, 315, and 500 pounds.

Several good catches of yellow perch were taken in the central basin (up to 540 pounds per drag). Two drags off Avon Point and one off Fairport, Ohio, at 9 and 11 fathoms, yielded 430, 280, and 160 pounds of yellow perch measuring over 8 inches long. Thirteen drags in the central basin yielded from 100 to 470 pounds of smelt and averaged 198 pounds per drag. Several good smelt catches were taken in each of the central basin subareas and at various depths between 36 and 78 feet.

Smelt was the only species taken in commercial quantities in the eastern basin. Off Erie, Pa., the best catch of 550 pounds was taken at 15.5 fathoms. On the New York-Pennsylvania border, 250 pounds were taken at 18 fathoms. In the Dunkirk-Sturgeon Point area, 250, 350, and 375 pounds were caught at 8.5 to 11 fathoms.

The final few days of the cruise were devoted to yellow perch cod end mesh-size-

selectivity tests and time-of-day otter trawl effectiveness experiments off Avon Point, Ohio. Mesh-size-selectivity tests were conducted with a "trouser leg" cod end--a means of fishing two cod ends of different mesh size simultaneously on one net. The mesh-size-selectivity information is being tabulated, analyzed, and incorporated with data from similar work carried out in 1962 and will be available for distribution at a later date.

The time-of-day otter trawling effectiveness for yellow perch was not significantly different between daytime and nighttime drags. However, smelt catches varied from virtually none during hours of darkness to good catches in the daytime.

Surface temperatures ranged from 52° to 69° F. and thermal stratification occurred from the deeper waters of the eastern basin as far west as Avon Point in the central basin.

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

Great Lakes Fishery Investigations

LIMNOLOGICAL STUDIES EXPANDED:

The Ann Arbor Biological Laboratory of the U. S. Bureau of Commercial Fisheries has been conducting fishery and limnological studies of the Great Lakes since 1927. Limnological investigations were expanded somewhat in 1951 from the extremely limited operations of earlier years, and a separate limnological unit was established in 1957. Recent work has included: general surveys, long-term studies, and unit studies.

Until recently, the large size of the Great Lakes and a lack of suitable vessels and equipment handicapped the exploration of many aspects of their limnology. Various ideas and equipment have been borrowed from marine scientists. Bathythermographs, reversing thermometers, Nansen bottles, Clarke-Bumpus plankton samplers, sonic fathometers, and coring devices are now as commonplace on Great Lakes research vessels as on oceanographic vessels. The methods used by oceanographers are not entirely applicable, however, and must be modified for conditions peculiar to large lakes. The Lakes thus offer a meeting ground between limnology and oceanography.

Following is a summary of the Great Lakes limnological studies conducted in 1962 by the Bureau:

The sampling efficiencies of the Petersen, orange-peel, and the Smith-McIntyre dredges in relation to water depth and bottom type were compared.

A study initiated in 1961 to determine the changes in the species composition, distribution, and abundance of benthic organisms in western Lake Erie was brought near completion. The last survey of this nature was made in 1930. Formerly abundant and widely distributed mayfly nymphs are now found in only very small numbers, while populations of tubificid worms and midge larvae have increased in all areas.

A total of 500 drift bottles was released in Lake Superior in midsummer as part of a study of the relation between movements of marked hatchery-reared lake trout and the counterclockwise littoral currents along the south shore. About 50 percent of the bottles were recovered by December.

During the past 6 years, very low dissolved oxygen concentrations have been observed in the hypolimnetic waters of Lake Erie, over an area of about 3,000 square miles. Laboratory and field measurements were made of the oxygen demand of the sediments and the water, and of the organic content of the sediments. The sediments have a high immediate oxygen demand which is probably chemical and a continued gradual uptake of oxygen which is probably biological. Sediments with the highest oxygen demand had the greatest organic content. The oxygen demand of the hypolimnetic water alone was not great enough to account for the low dissolved oxygen concentrations observed.

Study of the micro-organic constitutents of the Great Lakes waters has been directed toward improving sampling procedures and methods for identifying the organic compounds. In the interim, activated charcoal filters are being used to adsorb and concentrate the organic materials in water. In addition, filter units were operated at a Lake Huron field station and aboard the Bureau's research vessel Cisco, in Lake Michigan.

Note: See Commercial Fisheries Review, December 1962 p. 36, August 1962 p. 21, and June 1962 p. 17.

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DISTRIBUTION AND ABUNDANCE OF SMALL LAKE TROUT IN LAKE SUPERIOR SURVEYED:

M/V "Siscowet" Cruise 1 (May 17-29, 1963): The distribution and abundance of juvenile lake trout were studied in the Apostle Islands region of Lake Superior during this cruise by the U. S. Bureau of Commercial Fisheries research vessel Siscowet. Semiballoon trawls and experimental gill nets (2 nets of each of 6 mesh sizes, from 2 to $3\frac{1}{2}$ inches) were fished at depths of 18-29 fathoms.

Research vessel Siscowet of the U. S. Bureau of Commercial Fisheries.

Catches from trawls included 222 lake trout (4.6 to 21.7 inches long) of which 219 (98.6 percent) were hatchery-reared. Lake trout taken were from 11 plants made in the Apostle Islands region; fish from the 1962 spring plant were most common. All of the juvenile lake trout were returned to the water alive after removal of the anal fin. Other species were relatively scarce in the catches, although small numbers of smelt, chubs, and yearling coregonines were taken in most of the tows.

Experimental gill nets yielded 82 lake trout ranging from 8.3 to 21.9 inches long. Seventy (85.4 percent) were fin-clipped; 10 plants were represented in the catches. Lake trout from the 1960 Bayfield spring plant were most common. Other fish taken in the gill nets included burbot, lake herring, and chubs.

Small lake trout were most abundant at 20-25 fathoms where the water temperature was about 39° F. Surface water temperatures ranged from 37.6° F. east of Madeline Island to 48.2° F. in Punky Bay.

Note: See Commercial Fisheries Review, January 1963 p. 31, December 1962 p. 37.

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LAKE MICHIGAN FISH POPULATION SURVEY CONTINUED:

M/V "Cisco" Cruise 4 (June 11-25, 1963): The depth distribution of fish fry, especially coregonids (whitefishes), and of larger chubs and associated fish species was studied; special emphasis was placed on that area of the bottom where a rapid change in temperature occurs with a change in depth. These were the primary objectives of this cruise by the U. S. Bureau of Commercial Fisheries research vessel Cisco. Operations were conducted in southeastern Lake Michigan, mostly in the Saugatuck-Holland area, but with some trawling near Grand Haven.

Fry were sampled over bottoms of 3 to 60 fathoms with half-meter and meter plankton nets of No. 656 Nitex (0.0258-inch mesh). Chub fry were caught in the 30- to 60-fathom depth range (mostly at 35 to 50 fathoms). They were distributed vertically from near-surface to near-bottom, but were considerably more common in the deeper levels. Many more were caught than on cruise 2 by the same vessel, but the mesh of the net used during the earlier sampling period (No. 1179 Nitex, 0.0464-inch mesh) apparently was too large to take chub fry effectively. Identical tows with meter nets of 656 and 1179 Nitex during this cruise indicated that probably at least 80 percent of the chub fry were lost by the larger-mesh net.

The only fry caught besides coregonids were deepwater sculpins and yellow perch. The sculpins were scarce, and found only over a 50-fathom bottom. The perch fry were numerous on June 14 just north of the Saugatuck breakwater in shallow water (3-7 fathoms) from surface to bottom, but were scare 3 miles north of that area at the same depths. Those near the breakwater had disappeared by the following day, and none were caught elsewhere.

Ten-minute tows with a $\frac{3}{4}$-size North Atlantic semiballoon trawl ($\frac{1}{2}$-inch-mesh cod end) were made off Saugatuck at 3, 5, 7, 10, 12, 15, and 17 fathoms (1 to 3 tows) and at 5-fathom intervals from 20 to 50 fathoms (single tows), and off Grand Haven at 5, 7, 10, 12, and 15 fathoms (single tows). Although thermal stratification had begun (surface water temperatures mostly 50°-57° F.), no sharp thermocline had developed, and there was no bottom area where the temperature changed rapidly. Consequently, depth distribution of the various fish species (which was similar off Grand Haven and Saugatuck) was

not as sharply defined as it probably will be later this year. Alewives were abundant at 3-7 fathoms, common at 10-12 fathoms, and somewhat scarce at 15 fathoms and deeper. Yellow perch were commonest at 3-10 fathoms but were in fair numbers at 12 fathoms. They were scarce in deeper water, although at least one was caught at all depths out to 35 fathoms. Chubs (bloaters) were common from 10-50 fathoms with no notable areas of concentration but were scarce at 5 to 7 fathoms, and absent at 3 fathoms. Other species which were caught commonly included slimy sculpins (common at 15-40 fathoms), deepwater sculpins (40-50 fathoms), smelt (5-20 fathoms, commonest at 12-15), spottail shiners (3-7 fathoms), and trout-perch (5-12 fathoms, commonest at 7). Species caught in very small numbers included emerald shiners, carp, log perch, lake herring, and whitefish (5 of which were 9 to 10 inches long).

Blood, eye lenses, and muscle tissue were collected for serological and electrophoretic studies of chubs, designed to aid in the separation of the various species.

Attempts to catch small chubs in a 5-foot-square net towed in midwater failed. The net was towed obliquely from surface to bottom at 30, 35, and 40 fathoms.

The Cisco was under contract to the U. S. Public Health Service during cruise 3 (May 21-June 4) when limnological and bacteriological samples were collected in northern Lake Michigan.

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

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WESTERN LAKE SUPERIOR FISHERY SURVEY:

M/V "Siscowet" Cruise 2 (June 3-20, 1963): Spring environmental conditions were studied at three limnological stations in the Apostle Islands region of Lake Superior during this cruise by the U. S. Bureau of Commercial Fisheries research vessel Siscowet. Routine limnological collections included records of water temperature, Secchi-disc readings, water samples for chemical analyses, and bottom and plankton samples. Surface water temperature ranged from 40.6° F. to 54.7° F. in the immediate vicinity of the Apostle Islands but only 37.0° F. in the open lake.

Studies were continued on the abundance and distribution of juvenile lake trout in western Lake Superior. Three index stations were established where the abundance of small lake trout was measured by systematic fishing with bottom trawls, with 10 to 15 tows made at each station. The average number of young lake trout caught per 15-minute tow was 3.5 east of Madeline Island, 5.7 southeast of Bear Island, and 24.8 east of Basswood Island. The total catch was 607 (average length, 8.0 inches), of which 600 (98.8 percent) were fin-clipped. Other species in the catches included smelt, chubs, and sculpins.

Experimental gill nets (2 nets each of 6 mesh sizes, from 2 to $3\frac{1}{2}$ inches) yielded 186 lake trout (average length, 13.3 inches), of which 175 (84.1 percent) were hatchery-reared.

Gulf Exploratory Fishery Program

GEAR RESEARCH IN GULF OF MEXICO COORDINATED WITH SHRIMP MARKING STUDIES:

M/V "Silver Bay" Cruise 49 (June 17-28, 1963): This cruise was divided into three phases: (1) shrimp sampling with 40-foot trawls along the Mississippi and Alabama coasts in depths of 4 to 60 fathoms; (2) mesh-selectivity studies, with trawls and cod ends of varying mesh sizes and fitted with cod-end covers; and (3) mortality and migration studies on brown shrimp (Penaeus aztecus). As a part of the phase 3 studies, 4,801 shrimp were captured, stained, and released, and 1,208 were tagged.

The U. S. Bureau of Commercial Fisheries exploratory fishing vessel Silver Bay operated in the northern Gulf of Mexico during this 12-day cruise under a charter agreement with the Bureau's Biological Laboratory at Galveston, Tex.

The vessel returned to her base at Pascagoula, Miss., on June 28, after which she was placed in a local shipyard for annual hauling and maintenance.

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MOTION PICTURES USED TO STUDY DEEP-WATER SHRIMP BEHAVIOR:

M/V "Oregon" Cruise 85 (May 15-June 19, 1963): Successful deep-water motion picture

photography of shrimp trawl operation and the reaction behavior of shrimp to trawls was achieved during this cruise by the U. S. Bureau of Commercial Fisheries exploratory fishing vessel Oregon. The objective of the cruise, which was conducted in 5 phases, was to calibrate and field test a self-contained deep-water motion picture camera designed by the Bureau's staff. The work was carried out in the north central Gulf of Mexico, and motion picture camera operations were conducted at depths of 200 and 210 fathoms. This equipment was developed to obtain direct photographic records to be used in determining the efficiency of trawling gear on royal-red shrimp (Hymenopenaeus robustus) stocks.

Two cameras were used during the trials--the experimental 16 millimeter motion picture camera (400' film capacity) and lighting system, and an Edgerton CA-8 still camera. The motion picture camera was mounted on the headrope of a 40-foot shrimp trawl while in operation. The still camera was placed on the sea floor for detailed study of bottom conditions.

The first three cruise phases were devoted exclusively to housing and equipment testing and the development of handling procedures. Experimental application of the equipment during phases 4 and 5 produced some 1,400 feet of motion picture film and 2,000 still negatives.

Individual trawl drags were limited to 30 minutes each so as to minimize chances of equipment loss by bottom fouling. The motion picture camera was positioned to shoot parallel to the trawl mouth immediately in front of the footrope. A preliminary review of the footage obtained showed numerous fish and shrimp to be present, but detailed study and additional footage will be required to reach conclusive opinions on behavior. In general, shrimp reactions ranged from passive inactivity to violent flipping and swimming. The smaller deep-water shrimp (Peneaopsis megalops) were identified in the films and royal-red shrimp were tentatively identified. Both species were present in catches made during successful film runs. Most of the fish photographed appear to belong to the grenadier family Macrouridae, although many other as yet unidentified species were photographed. Most of the fish appeared capable of vigorous swimming and displayed deliberate escapement reactions, including diving into the mud bottom.

Still photographs of the bottom showed many areas "carpeted" with a thin layer of unidentifiable material, sufficiently fragile to indicate that there has been no previous discernable evidence from trawling activity. Dense patches of mud-dwelling white anemones were photographed. A single identifiable shrimp (P. megalops) was photographed hovering or swimming a few inches over the bottom.

A short cruise to continue equipment testing was scheduled for mid-July, pending receipt of special lighting equipment. Photographic evaluation with this equipment is to be conducted later in conjunction with exploratory fishing cruises by the Bureau's vessels Oregon and Silver Bay.

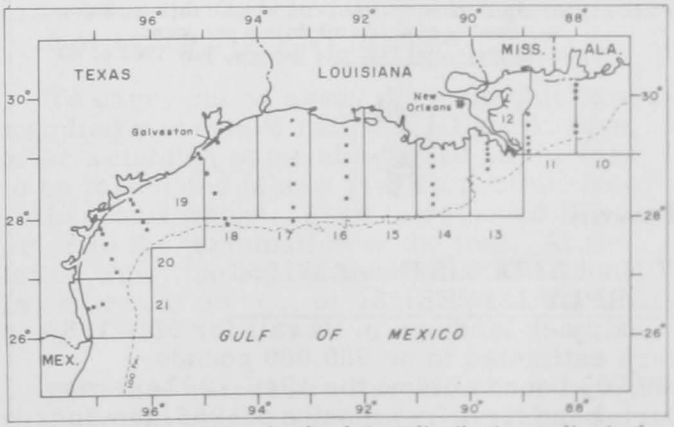
In addition to the operations conducted on this cruise, a series of bottom color photographs was taken in cooperation with the National Geographic Society, using the CA-8 camera furnished by them.

Note: See Commercial Fisheries Review, July 1963 p. 38.

Gulf Fishery Investigations

SHRIMP DISTRIBUTION STUDIES:

M/V "Gus III" Cruise GUS-6 (June 6-July 1, 1963): Excellent catches of brown shrimp were made off the coast of Louisiana and Galveston, Tex., during this cruise by Gus III. The chartered vessel (operated by the Galveston Biological Laboratory of the U. S. Bureau of Commercial Fisheries) is engaged in a continuing study of shrimp in the Gulf of Mexico.



Shows the station pattern for the shrimp distribution studies in the Gulf of Mexico during Cruise 6 of Gus III and Cruise SB-49 of the Silver Bay.

Eight statistical areas (13, 14, 16, 17, 18, 19, 20, and 21) were covered. One 3-hour tow with a 45-foot shrimp trawl was made in each of 3 depth ranges (0-10, 10-20, and over 20 fathoms) in all areas.

The best catches of brown shrimp were made in 10-20 fathoms. Individual tows in that depth took 219 pounds of 31-40 count brown shrimp from area 14, and 120 pounds of 31-40 count brown shrimp from area 13. The same depth range produced a catch of 146 pounds of 51-67 count brown shrimp in area 18.

Area 20 yielded a catch of 50 pounds of 15-20 count brown shrimp from the over 20-fathom depth, and 23 pounds of over 68 count brown shrimp from the 10-20 fathom range. The brown shrimp catch in the other areas was light.

White shrimp were only found in the under 10-fathom depth. Moderate catches of 15-20 count white shrimp were taken in area 16 (45 pounds), area 19 (26 pounds), and area 18 (11 pounds). The white shrimp catch in other areas was light.

The pink shrimp catch was light at all stations sampled.

M/V "Silver Bay" Cruise SB-49 (June 17-19, 1963): Catches of brown and white shrimp were light during this shrimp distribution study off the coast of Alabama and Mississippi by the U. S. Bureau of Commercial Fisheries exploratory fishing vessel Silver Bay. The cruise, which covered statistical areas 10 and 11, resulted in modest catches of pink shrimp from the less than 10-fathom depth.

Notes: (1) Shrimp catches are heads-on weight; shrimp sizes are the number of heads-off shrimp per pound.
(2) See Commercial Fisheries Review, July 1963 p. 40.

Hawaii

TUNA LANDINGS IN MAY 1963 SHARPLY LOWER:

Skipjack landings in Hawaii for May 1963, were estimated to be 660,000 pounds--400,000 pounds below the 1948-1962 average. During the first five months of 1963, landings were estimated at about 1,750,000 pounds. This estimate is 640,000 pounds below the 1948-1962 average for the same period.

In May this year, there were 115 productive trips, giving an average of 3,648 pounds per productive trip. Individual vessel landings ranged from 132 to 11,792 pounds.

Cannery records for May 1963 indicate that 40.7 percent of the fish by weight were small (4-8 lbs.); 6.5 percent were small-medium (4-15 lbs.); 21.8 percent were medium (8-15 lbs.); and 31.0 percent were large (15 lbs. and up). Landings of small fish were heaviest the first part of the month. The medium and large fish first entered the fishery about May 15.

Industrial Fishery Products

COST FACTOR IMPORTANT IN USE OF FISH MEAL IN POULTRY FEED:

In mid-May 1963, a U. S. Bureau of Commercial Fisheries animal nutritionist visited scientists at several universities to discuss uses of fish meal in animal and poultry feeding.

According to one of the speakers at the American Feed Manufacturers Association Convention and National Feed Show at Chicago, Ill., May 12-15, the feed production industry is already the largest in the United States devoted exclusively to supplying goods and services to agriculture and is the 13th largest manufacturing industry in the country. Some idea of the speed with which the feed industry has grown may be gained from the fact that commerical feed tonnage increased by 200 percent from 1939 to 1958.

The animal nutritionist stopped first at the University of Michigan. At that institution, it was pointed out that percentage utilization of fish meal in commercial mixed poultry rations is lower than it was a few years ago. In compliance with general practice, the recommended Michigan rations for growing chickens contain relatively low levels of fish meal; broiler-starter and finisher rations contain 1.5 and 1 percent fish meal, respectively, and allowances for young chickens of the layer type are similar to those for broilers. On the other hand, the Michigan recommendation for laying hens is 1 percent (doubtless considerably in excess of the amount ordinarily present in commercial laying rations), and for turkey starters and growers, allowances are 5 and 2.5 percent fish meal in the rations.

At Rutgers University, New Brunswick, N.J., a professor stated that fish meal is used at the 3-percent level in the chick starter rations recommended by the New Jersey Experiment Station. Such rations, containing 22 percent protein, are extremely efficient, according to the professor.

One locality in which relatively liberal amounts of fish meal are still fed is the Delaware, Maryland, Virginia (Delmarva) area. Percentage utilization of fish meal in broiler feeds is greater in that area than anywhere else, according to a professor of the University of Delaware, meal allowances being from 5 to 7 percent of the ration. Practically all of the fish meal produced in the large plants in the Delmarva area plus a great deal brought in from the outside is utilized in poultry feeds in the area.

Although the percentage of fish meal now incorporated in commercial poultry rations is relatively low, this situation could change radically with a shift in prices of fish meal and other feed ingredients. This point is borne out by experience with rations formulated by computers to yield maximum profits. Recently, the University of Delaware professor

formulated a broiler ration in this way, allowing the computer to select from a number of possible ingredients the amounts of each that would satisfy nutritional requirements at least cost. Fish meal in the Delmarva area, selling at $118 a ton when the ration was formulated, was entered at that price and limited to 6 percent of the ration or less. The computer, "programmed" to formulate a ration to given specifications at least cost, incorporated the full 6 percent of fish meal, or the maximum amount it was permitted to include, in the ration. Fish meal prices are, of course, lower in the Delmarva area, due to the proximity of most points in that region to large fish meal plants, than they are in areas farther from a source of supply. If, in the formulation, prices of feedstuffs at a point relatively distant from a source of supply were used and if the computer were permitted to incorporate as much as 6 percent fish meal, the full allowance might or might not be utilized depending upon relative prices of the various feedstuffs.

The University of Delaware's experience with its formulation suggests that a slight price shift could result in a great increase in demand for fish meal throughout the country.

* * * * *

GROWTH FACTOR IN FISH MEAL AND SOLUBLES STILL UNIDENTIFIED:

It has long been known that fish solubles and fish meal contain a factor that stimulates the growth of chicks, but the identity of this factor has never been determined. Now, some recently published results of a painstaking investigation by a group of well-known scientists confirm both the elusive nature of this unidentified growth factor (UGF) and the factor's growth-stimulating property. Chicks receiving a semipurified ration containing 4 percent menhaden fish solubles for 4 weeks gained 16 percent more weight than was gained by chicks on the same ration without solubles; this is an average of the results of 26 trials, carried on over a period of 3 years. In only one trial did the chicks that received solubles fail to outgain those on the basic ration.

The research, undertaken at the University of Wisconsin and reported in the May 1963 issue of the Journal of Nutrition, has demonstrated that the unidentified growth factor (UGF) is entirely organic in nature; some earlier workers reported that the factor is partly made up of an inorganic fraction. Because the recent work resulted in but little purification of the active factor, little was contributed toward the identification of the chemical nature of the factor; in other words, UGF appears to be still eluding identification as it always has in the past. In order to analyze and identify the factor chemically, scientists will have to concentrate and purify it so that it is uncontaminated by foreign substances.

Poultry nutritionists should keep in mind the fact that the most dependable known sources of the chick growth factor of fish are fish solubles and fish meal.

* * * * *

NET PROTEIN VALUES OF FISH MEAL DETERMINED WITHOUT CHEMICAL ANALYSIS:

Because the ratio of water to nitrogen in birds and mammals is quite constant, the net protein values of fish meal and other feedstuffs can be determined merely by weighing the carcasses of chicks, fed a test diet for 2 weeks or somewhat less, before and after drying. The method, adapted from earlier work published abroad and developed at Rutgers (New Jersey) University yields important information with a minimum of laboratory work. Prior to using the method as a practical assay procedure, the ratio between the water and nitrogen of the chick body is determined after a ration of the type to be assayed has been consumed for 2 weeks. Once this ratio is known, it is necessary only to make body moisture determinations and use them in estimating body nitrogen. Thus, the analytical procedure ordinarily required to determine net protein values is eliminated except for the weighing of carcasses, before and after drying, to determine body moisture.

Far from being just a rough approximation, the test is actually quite sensitive. For example, when fish meal replaced 4 percent of the soybean protein of a corn-soy test ration, net protein value of the ration increased by 15 percent (from 56.1 ± 0.2 to 64.7 ± 0.2). The test ration contained a small amount of alfalfa meal and was similar to a conventional commercial chick starter ration except for the fact that the protein level was held at 13 instead of 21 percent.

To carry out an assay, day-old chicks are supplied a standard ration for 1 week, then, after weighing, some are placed on the feed to be tested and others given a protein-free ration for 2 weeks. Feed is removed 12 hours prior to the termination of the test. At the latter time, the chicks are killed and dried in an oven at 85° C., or 185° F., to constant weight.

Moisture values are the difference between final weight prior to drying and the dried weight. The weight of body water or moisture divided by a factor representing the ratio of

body water to nitrogen represents the nitrogen of the body. The factor must be predetermined in tests in which both body-nitrogen and -water are measured. But once this ratio is known for a given type of ration, routine assays can be carried out indefinitely without the necessity for the determination of body nitrogen.

The reason why some chicks are given a protein-free ration is that otherwise it would be necessary to assume that protein incorporated in the body is proportional to gain in body weight. By feeding a protein-free ration to some chicks, the difference between weight gains of the two different groups, instead of total weight gained by the animals on the test ration, can be used as the criterion of the protein gained.

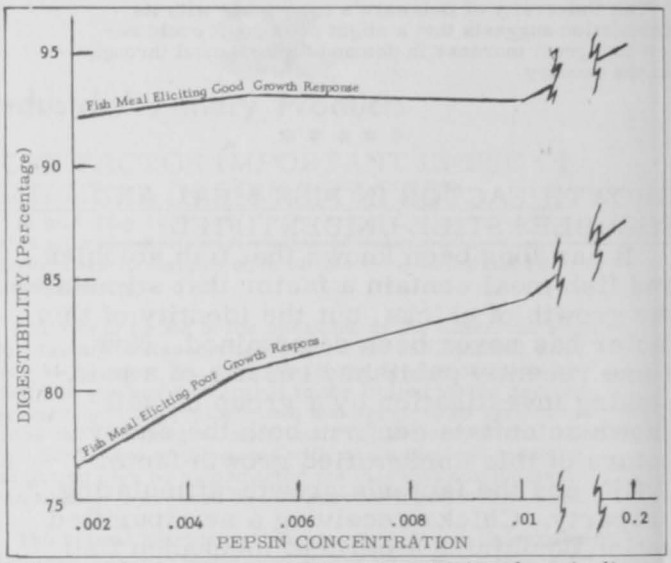
The University's procedure not only shows how much protein is used for maintenance, but also makes possible the evaluation of proteins of such poor quality as to fail to promote growth. (Technical Advisory Unit, U. S. Bureau of Commercial Fisheries, Boston, Mass.)

* * * * *

TESTS FOR DIGESTIBILITY OF FISH MEAL PROTEINS IMPROVED BY LOWERING CONCENTRATION OF PEPSIN:

The pepsin digestibility tests presently in use are not sufficiently sensitive to permit differentiation between fish meals having proteins that are highly digestible and those with proteins having lower coefficients of digestibility, according to some users. Endeavoring to increase the sensitivity of the tests, workers at various laboratories are carrying out experiments in which the test procedure is modified in various ways. Some experiments have involved changes in concentration of the enzyme (pepsin) employed whereas others have involved changes in concentration of the acid used with the enzyme. Still other experiments have dealt with the effects of various temperatures on pepsin digestion. In addition, studies have been made of the effects of shortening the time allotted to the digestive process. Some variations in enzyme concentration used during the investigations have increased the sensitivity of the test, but most of the other experimental modifications of the test have been unproductive.

The present standard pepsin digestibility method consists of the digestion of one gram of a defatted sample ground to pass a 2-millimeter screen, with 0.2-percent pepsin (1:10,000) in 0.075 normal hydrochloric acid for 16 hours at 45° C., with continuous end-over-end agitation. This technique has been recommended by the Association of Official Agricultural Chemists since 1960. By using an enzyme solution with a concentration equal to only one-hundredth of that employed by the standard test in determining digestibilities of fish meals, scientists of the U. S. Bureau of Commercial Fisheries have increased the sensitivity of the tests appreciably, as the following figure shows.



Influence of enzyme concentration on sensitivity of pepsin digestion tests. 1/

Two British scientists have carried the dilution studies a step further by using a dilution one thousand times greater than that of the standard test. This has resulted in still greater sensitivity in determining the digestibility of fish meals.

As the work on the improvement of the tests progresses, doubtless the pepsin digestibility test will become still more sensitive and therefore may be a more reliable criterion of the digestibility of proteins.

1/From Ambrose, Mary E., 1962. "The Pepsin Digestibility of Fish Meal." Mimeo. report, U. S. Bureau of Commercial Fisheries Technological Laboratory, College Park, Md.

* * * * *

U. S. FISH MEAL AND SOLUBLES:

Production and Imports, January-May 1963: Based on domestic production and imports, the United States available supply of fish meal for January-May 1963 amounted to 219,138 short tons--44,040 tons (or 25.2 percent) more than during the same period in 1962. Domestic production was 5,009 tons (or 8.3 percent) less, but imports were 49,049

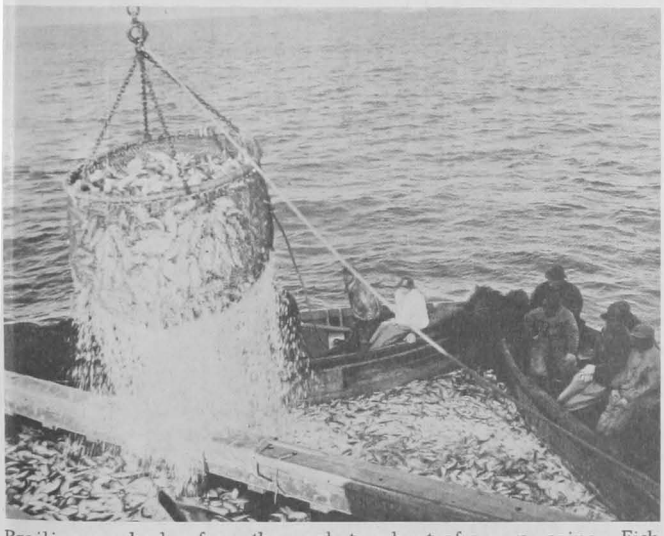
tons (or 42.9 percent) higher than in the same period in 1962. Peru continued to lead other countries with shipments of 125,998 tons.

The United States supply of fish solubles (including homogenized fish) during January-May 1963 amounted to 27,672 tons--a decrease of 2,508 tons as compared with the same period in 1962. Domestic production and imports dropped 4.5 percent and 38.1 percent, respectively.

U. S. Supply of Fish Meal and Solubles, January-May 1963 with Comparisons

Item	Jan.-May 1/1963	Jan.-May 1962	Total 1962
	(Short Tons)		
Fish Meal and Scrap:			
Domestic production:			
Menhaden	39,381	36,204	238,680
Tuna and mackerel	9,430	12,131	26,559
Herring	-	346	5,095
Other	6,845	11,984	40,898
Total production	55,656	60,665	311,232
Imports:			
Canada	17,576	19,875	42,806
Peru	125,998	85,414	186,249
Chile	14,751	2,259	9,247
So. Africa Republic	3,950	6,484	10,084
Other countries	1,207	401	3,921
Total imports	163,482	114,433	252,307
Available fish meal supply	219,138	175,098	563,539
Fish Solubles:			
Domestic production 2/	25,556	26,762	124,334
Imports:			
Canada	1,028	795	1,335
Iceland	-	2,205	2,332
Other countries	1,088	418	2,641
Total imports	2,116	3,418	6,308
Available fish solubles supply	27,672	30,180	130,642

1/Preliminary.
2/50-percent solids. Includes production of homogenized condensed fish.
Note: Differences in totals between the various tables showing data on industrial fishery products are due to partial preliminary estimates and later revisions.



Brailing menhaden from the pocket or bunt of a purse seine. Fish meal, oil, and solubles are produced from menhaden. More modern purse seiners are now equipped with large suction hoses to transfer the fish from the net to the vessel.

* * * * *

Production and Imports, January-April 1963: Based on domestic production and imports, the United States available supply of fish meal for January-April 1963 amounted to 148,985 short tons--39,660 tons (or 36.3 percent) more than during the same period in 1962. Domestic production was 4,259 tons (or 21.1 percent) less, but imports were 43,919 tons (or 49.3 percent) higher than in the same period in 1962. Peru continued to lead other countries with shipments of 104,219 tons.

The United States supply of fish solubles (including homogenized fish) during January-April 1963 amounted to 9,946 tons--a decrease of 3,183 tons as compared with the same period in 1962. Domestic production and imports dropped 17.1 percent and 46.8 percent, respectively.

U. S. Supply of Fish Meal and Solubles, January-April 1963 with Comparisons

Item	Jan.-Apr. 1/1963	Jan.-Apr. 1962	Total 1962
	(Short Tons)		
Fish Meal and Scrap:			
Domestic production:			
Menhaden	4,991	4,265	238,680
Tuna and mackerel	7,167	9,295	26,559
Herring	1/	295	5,095
Other	3,744	6,306	40,898
Total production	15,902	20,161	311,232
Imports:			
Canada	13,603	14,748	42,806
Peru	104,219	67,725	186,249
Chile	12,220	2,039	9,247
So. Africa Republic	1,950	4,501	10,084
Other countries	1,091	151	3,921
Total imports	133,083	89,164	252,307
Available fish meal supply	148,985	109,325	563,539
Fish Solubles:			
Domestic production 3/	8,268	9,976	124,334
Imports:			
Canada	781	600	1,335
Iceland	-	2,205	2,332
Other countries	897	348	2,641
Total imports	1,678	3,153	6,308
Available fish solubles supply	9,946	13,129	130,642

1/Preliminary.
2/Included with "other."
3/50-percent solids. Includes production of homogenized condensed fish.

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U. S. FISH MEAL, OIL, AND SOLUBLES: Major Indicators for U. S. Supply, May 1963: United States production of fish meal in May 1963 was lower by 6.2 percent, as compared with May 1962. Fish oil and fish solubles production increased by 1.5 percent and 6.0 percent, respectively.

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

Item and Period	1963	1962	1961	1960	1959
	(Short Tons)				
Fish Meal:					
Production 1/:					
July	-	52,574	62,586	55,696	52,132
June	-	58,397	53,162	44,293	52,006
May	39,754	42,374	32,922	17,194	25,312
January-April	15,994	13,604	13,724	12,387	14,155

(Table continued on next page)

Item and Period	1963	1962	1961	1960	1959
			(Short Tons)		
Jan.-Dec. prelim. totals 2/	-	288,336	289,039	257,969	275,396
Jan.-Dec. final tot.	-	311,232	311,265	290,137	306,551
Imports:					
July	-	25,857	18,710	13,131	4,303
June	-	26,453	19,317	11,178	10,386
May	-	25,269	24,753	9,496	16,329
January-April	133,083	89,164	63,393	45,701	78,256
January-December	-	252,307	217,845	131,561	133,955
Fish Solubles:					
Production 3/:					
July	-	22,165	21,870	20,208	33,133
June	-	24,350	17,821	19,549	29,594
May	16,979	16,014	12,667	7,191	20,626
January-April	9,394	8,872	7,465	12,551	13,095
Jan.-Dec. prelim. total	-	120,063	109,018	106,361	176,913
Jan.-Dec. totals	-	124,334	112,241	98,929	165,359
Imports:					
July	-	306	708	96	4,938
June	-	872	207	149	954
May	-	265	283	59	4,874
January-April	1,678	3,153	729	2,310	3,997
Jan.-Dec. totals	-	6,308	6,739	3,174	26,630
			(1,000 Pounds) 5/		
Fish Oils:					
Production:					
July	-	46,608	58,533	41,362	32,108
June	-	53,565	48,794	36,207	37,401
May	33,310	32,816	33,844	13,705	20,180
January-April	7,856	6,483	4,660	3,189	4,496
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
Exports:					
July	-	128	4,421	40,603	28,276
June	-	4,922	21,036	14,360	11,358
May	-	6,491	3,192	2,427	10,910
January-April	75,401	51,593	43,900	34,764	27,089
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.

* * * * *

Production by Areas, May 1963: Preliminary data on U. S. production of fish meal, oil, and solubles by areas for May 1963 as collected by the U. S. Bureau of Commercial Fisheries and submitted to the International Association of Fish Meal Manufacturers are shown in the table.

U. S. Production 1/ of Fish Meal, Oil, and Solubles
May 1963 (Preliminary) with Comparisons

Area	Meal	Oil	Solubles	Homogenized 3/
	Short Tons	1,000 Pounds	Short Tons	Short Tons
May 1963:				
East & Gulf Coasts	37,400	33,024	14,402	-
West Coast 2/	2,354	286	1,327	1,250
Total	39,754	33,310	15,729	1,250
Jan.-May 1963: Total	55,656	41,166	23,180	2,500
Jan.-May 1962: Total	55,978	38,680	21,232	3,695

1/Does not include crab meal, shrimp meal, and liver oils.
2/Includes Hawaii, American Samoa, and Puerto Rico.
3/Includes condensed fish.
Note: Beginning with March 1963 fish oil is shown in pounds instead of gallons. Conversion factor, 7.75 pounds equal 1 gallon.

* * * * *

Production, May 1963: During May 1963, a total of 34.4 million pounds of marine-animal oils and 39,754 tons of fish meal and scrap was produced in the United States. Compared with May 1962, this was an increase of 973,000 pounds or 2.9 percent in oil, and a decrease of 750 tons or 1.9 percent in meal and scrap production.

Menhaden oil, amounting to 32.3 million pounds, accounted for 94 percent of the May 1963 oil production. Compared with May 1962, this was an increase of 937,000 pounds or 3 percent. Menhaden meal, amounting to 34,390 tons, accounted for 86.5 percent of the May meal production--an increase of 2,451 tons, compared with the same month last year.

A total of 16,022 tons of fish solubles was produced in May 1963--an increase of 1,651 tons or 11.5 percent as compared with May 1962. The production of homogenized condensed fish amounted to 1,250 tons--a decrease of 1,165 tons as compared with May 1962.

Table 1 - U. S. Production of Fish Meal, Oil, and Solubles, May 1963 1/ with Comparisons

Product	May		Jan.-May		Total
	1/1963	1962	1/1963	1962	1962
			(Short Tons)		
Fish Meal and Scrap:					
Herring	-	51	2/	346	5,095
Menhaden 3/	34,390	31,939	39,381	36,204	238,680
Sardine, Pacific	-	-	9	648	702
Tuna and mackerel	2,263	2,836	9,430	12,131	26,559
Unclassified	3,101	5,678	6,836	11,336	27,297
Total	39,754	40,504	55,656	60,665	298,333
Shellfish, marine-animal meal and scrap	4/	4/	4/	4/	12,899
Grand total meal and scrap	4/	4/	4/	4/	311,232
Fish solubles:					
Menhaden	14,719	10,521	16,555	11,541	84,885
Other	1,303	3,850	6,501	11,571	28,353
Total	16,022	14,371	23,056	23,112	113,238
Homogenized condensed fish	1,250	2,415	2,500	3,650	11,096
			(1,000 Pounds)		
Oil, body:					
Herring	-	-	2/	54	5,255
Menhaden 3/	32,298	31,361	38,130	35,877	237,815
Sardine, Pacific	-	-	-	148	167
Tuna and mackerel	214	375	1,395	1,735	5,175
Other (including whale)	1,889	1,692	2,633	2,866	7,396
Total oil	34,401	33,428	42,158	40,680	255,808

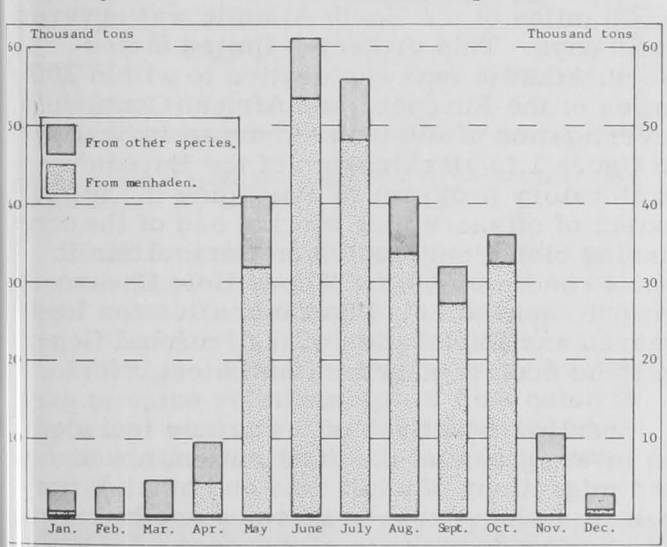
1/Preliminary data.
2/Included in "other" or "unclassified."
3/Includes a small quantity of thread herring.
4/Not available on a monthly basis.
Note: Beginning with February 1963, fish oil is shown in pounds instead of gallons. Conversion factor, 7.75 pounds equal 1 gallon.

A purse seiner in the Gulf of Mexico with a full load of menhaden.

The quantity of fish meal processed during the first 5 months of 1963 amounted to 55,656 tons--5,009 tons less than the same period of the previous year. Marine-animal oil amounted to 42.2 million pounds--1.5 million pounds greater than the same period of 1962.

* * * * *

Production in 1962: During 1962, a total of 311,232 tons of fish meal, and over 255 million pounds of marine animal oils was produced in the United States. Compared with the previous year, the total meal and scrap production remained on nearly the same level as in 1961. Menhaden meal accounted for 77 percent of the total meal production. The production of scrap and meal would have exceeded the 1961 record production by several thousand tons had not bad weather caused an abrupt termination of the North Carolina fall fishery. Producers of fish meal and scrap had a satisfactory year in 1962. Prices were good despite the near record domestic production and the sharply increased volume of imports.



United States production (by months) of fish meal, 1962.

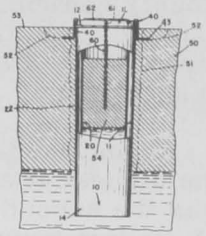
Marine animal oil production showed a decrease of nearly 11 million pounds compared with 1961. Menhaden oil amounted to 238 million pounds or 93 percent of the total oil production. Unlike the meal market, there was some difficulty in marketing fish oil.

Solubles and homogenized condensed fish production increased from 112,000 tons in 1961 to over 124,000 tons in 1962. As in 1961, some solubles were processed into fish meal rather than being sold separately. Prices were good, tending to follow those of fish meal.

Inventions

NEW ICE-FISHING AID PATENTED:

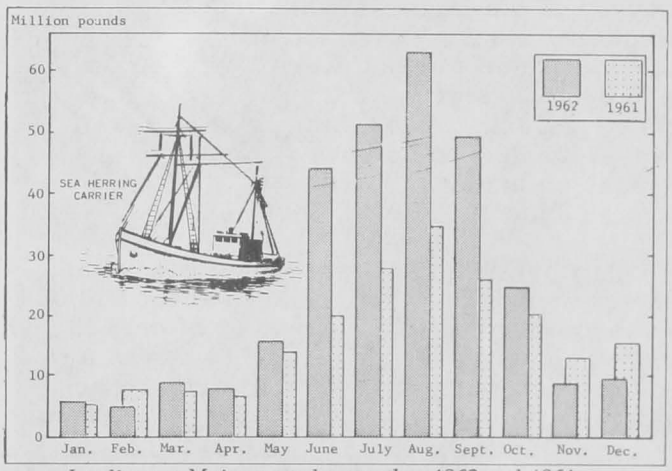
The inventor of a new ice-fishing aid claims that it is only necessary to chop one hole in the ice all season when his device is used. The invention includes a can which is allowed to freeze in an ice hole, and a wick arrangement which can be burned to loosen the ice core within the can. The device is said to have been tested successfully in the field. (Patent Number 3,056,272, U. S. Patent Office Classification Number 62-355, granted Ervin F. Eilers, 1284 Hartford Ave., St. Paul 16, Minn.)



Maine

FISHERY LANDINGS, 1962:

Landings of fish and shellfish at Maine ports in 1962 amounted to 294.3 million pounds valued at $20.4 million. Compared with 1961, this was a gain of 96.4 million pounds or 49 percent in volume, and $1.3 million or 7 percent in value.



Landings at Maine ports by months, 1962 and 1961.

Sea herring landings of 156.7 million pounds in 1962 were up 102 million pounds from 1961. Ocean perch (69.5 million pounds) landings declined 7.9 million pounds from the preceding year. Seventy-seven percent of of the year's total landings consisted of those two species. The Maine lobster catch (22.1 million pounds) in 1962 was up 1.2 million pounds and the whiting catch (17.8 million pounds) gained 3.7 million pounds as compared with 1961.

Knox County led all counties in the 1962 production with 96.3 million pounds. Cumberland County was second in volume with 82.7 million pounds, and Washington County third with 54.5 million pounds. Hancock County contributed 38.2 million pounds, and Lincoln, Sagadahoc, and York Counties furnished 10.6, 10.4, and 1.6 million pounds, respectively.

August landings (63.8 million pounds) were the highest of any month of the year. July was the second highest month in production, 51 million pounds; September followed with 49.5 million pounds, and June 44.1 million pounds.

Imports of Canadian sea herring through Maine ports during 1962 amounted to 62.1 million pounds--17 percent above 1961. Imports during August, September, October, and July totaled 46 million pounds or 74 percent of the year's total imports.

Maine Sardines

CANNED STOCKS, JUNE 1, 1963:

Current canned stocks reflect the recovery of the Maine sardine industry in 1962. Canners' stocks of Maine sardines on June 1, 1963, were 486,000 cases greater than those of June 1, 1962, but only 242,000 cases above stocks on hand two years ago on June 1, 1961.

On April 15, 1963, carryover stocks at the canners' level amounted to about 660,000 cases compared to a carryover of only 33,000 cases on April 15, 1962. But 1962 was a short-pack year. The Maine sardine pack during April 15-June 30, 1963, amounted to 232,000 cases, compared with 452,000 cases during the same period in 1962.

The usual $7\frac{1}{2}$-month Maine sardine packing season opened on April 15 in 1963. The 1962 season was extended to 13 months--Dec. 2, 1961-Jan. 1, 1963--but the 1962 pack canned before April 15 was insignificant.

Note: See Commercial Fisheries Review, June 1963 p. 35.

North Atlantic Fisheries Exploration and Gear Research

TUNA STOCKS IN NORTH ATLANTIC SURVEYED:

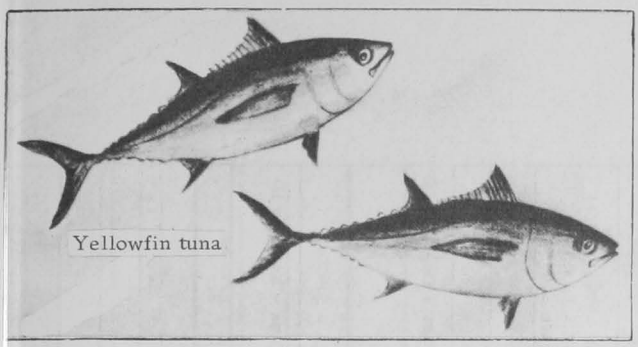
M/V "Delaware" Cruise 63-4 (April 22-June 10, 1963): This tuna exploratory cruise was the eleventh and most extensive of the tuna exploration trips conducted by the U. S. Bureau of Commercial Fisheries exploratory fishing vessel Delaware since 1955. Nearly 5,500 miles of the North Atlantic was covered in 50 days. This projected United States North Atlantic tuna exploration to within 300 miles of the European and African Continents. Investigation of the tunas in areas indicated in figure 1 is an extension of the Bureau's exploratory program to determine the full extent of offshore tuna stocks, and of the continuing biological studies on North Atlantic tunas conducted by the Woods Hole Oceanographic Institution. The Committee for Research and Exploration of the National Geographic Society joined in this latest effort.

Specific objectives of the cruise included an investigation of the distribution, abundance, and migrations of adult tuna and other large pelagic fish by long-line fishing and by tagging fish not needed for other purposes. Biological examination and collection of specimens taken aboard supported the following studies:

Canned Maine Sardines--Wholesale Distributors' and Canners' Stocks, June 1, 1963, with Comparisons 1/

Type	Unit	1962/63 Season				1961/62 Season					1960/61 Season	
		6/1/63	4/1/63	1/1/63	11/1/62	7/1/62	6/1/62	4/1/62	1/1/62	11/1/61	7/1/61	6/1/61
Distributors	1,000 actual cases	215	264	271	230	134	99	148	193	202	208	215
Canners	1,000 std. cases 2/	536	699	1,092	1,348	374	50	45	144	221	201	294

1/ Table represents marketing season from November 1-October 31.
2/ 100 $3\frac{3}{4}$-oz. cans equal one standard case.
Note: Beginning with the "Canned Food Report" of April 1, 1963, U.S. Bureau of the Census estimates of distributors' stocks were based on a revised sample of merchant wholesalers and warehouses of retail multiunit organizations. The revised sample resulted in better coverage. The January 1, 1963, survey was conducted with both samples to provide an approximate measure of the difference in the two samples. That survey showed that the estimate of distributors' stocks of canned Maine sardines from the revised sample was 13 percent above that given by the old sample.
Source: U. S. Bureau of the Census, "Canned Food Report," June 1, 1963.



reproductive maturation, morphometry and meristics, growth determination by analysis of hard parts, anatomical differentiation of species, parasitic host specificity, and sub-population differentiation by dissection and serological analysis.

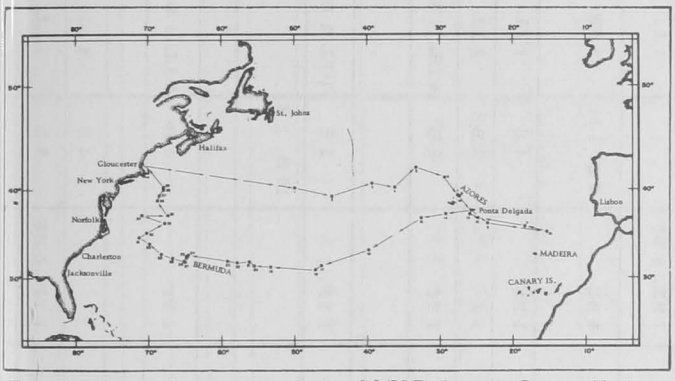


Fig. 1 - Area of operations during M/V Delaware Cruise 63-4, April 22-June 10, 1963.

Of 30 long-line sets completed during the cruise, 24 were daylight sets and 6 were night sets. Gear consisted of Japanese-type long-line with 160-fathom "baskets" of 7-hook design. Floatline depths were varied to determine relationships of tuna catch to depth and temperature; four bathythermograph casts were taken at each long-line station.

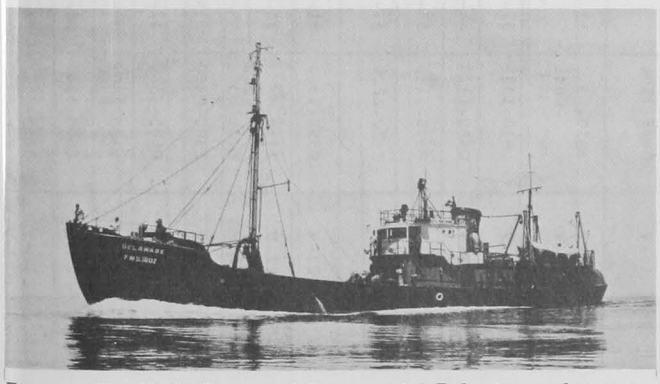


Fig. 2 - The U. S. Bureau of Commercial Fisheries exploratory fishing vessel Delaware operates out of the Bureau's Exploratory Fishing Base at Gloucester, Mass. Since 1957, this vessel conducted 9 tuna long-line exploratory cruises in oceanic areas of the North Atlantic.

The most significant tuna catches were made in areas adjacent to the Azores Islands and the American Continental Shelf. Big-eyed tuna (Thunnus obesus) dominated the catch in the eastern North Atlantic area, yellowfin tuna (T. albacares) in the waters of the mid-North Atlantic and Gulf Stream, and bluefin tuna (T. thynnus) were caught in greatest numbers at the edge of the Continental Shelf south of Cape Cod. Few albacore (T. alalunga) and no blackfin tuna (T. atlanticus) or skipjack (Katsuwonus pelamis) were caught during the cruise.

A concentration of medium bluefin tuna (average weight 113 pounds) was located at Station 38. Of the 47 bluefin at that station, 29 were released with multiple tags to facilitate an early possible return from the East Coast tuna purse-seine fishery during the 1963 season. A later report confirmed the recapture of one of those fish in a purse-seine catch off Ocean City, Md., on June 27, 20 days and 325 miles to the west of its release location. A single 400-pound bluefin caught west of the Azores at Station 4 was of particular interest because of its location

Fig. 3 - Measurements of this giant bluefin tuna (about 400 pounds) were a small part of the scientific data taken from each tuna landed on the Delaware's deck. Note the plastic tag on the fish's side applied at the rail before bringing the tuna to gaff.

Station Data and Catches for M/V Delaware Cruise 63-4.

Sta. No.	Date 1963	Time	Position Lat.	Position Long.	Gear & Set No.	No. of Hooks	Tuna	Sharks	Misc. Fish	Surf. Temp. °F	Remarks 1/
1.	27-IV	0645-1510	40-09N	49-54W	LL#1	420	3 BE, 1 A	2B	8 LL	63.1	
2.	29-IV	0650-1430	39-20N	44-50W	LL#2	420	4 BE		2 LL, 1 R	59.9-60.8	
3.	30-IV	1730-1815	40-40N	39-20W	MWT#1					64.5	
4.	1-V	0630-1435	40-17N	36-07W	LL#3	546	4 BE, 1 BF	3B	1 LL, 1 SL	60.2-62.1	
5.	2-V	0625-1440	42-18N	33-15W	LL#4	546	1 BE	5B		57.0-60.0	1 BE - Tagged 1 BE - Lost
6.	3-V 4-V	1805- -1050	41-20N	29-20W	LL#5, DNNL	560	2 BE	18B	2 SW, 1 LL 1 Opah	59.0-59.7	SW Wt. =230
7.	4-V	2125-2155	39-27N	27-35W	MWT#2					61.3	
8.	5-V	0615-1535	39-15N	27-25W	LL#6	560	5 BE	3 B, 2 M		60.4-62.0	2 BE - Tagged
9.	8-V	0635-1530	36-20N	23-30W	LL#7	567	8 BE, 1 A	2B	2 LL	62.4-65.3	6 BE - Tagged
10.	10-V	0910-1515	35-23N	15-26W	LL#8	420		1B		61.9	
11.	11-V	0630-1500	36-00N	18-20W	LL#9	560	7 BE	1B	1 LL	62.8-63.9	5 BE - Tagged 1 BE - Lost
12.	12-V 13-V	2040-2115 0425-1100	36-57N	24-50W	MWT#3 LL#10 DNNL	420	7 BE, 6 BF		1 LL	65.3 65.3	5 BE - Tagged 2 BF - Tagged
13.	13-V 14-V	1830- -0845	37-25N	25-55W	LL#11 DNNL	280	4 BE	8 B, 1 M	3 SW	64.6-66.0	2 BE - Tagged 1 BE - Lost SW Wt. =707
14.	16-V	0610-1335	37-25N	29-10W	LL#12	420	2 BE	4 B	1 LL	64.4-65.3	1 BE - Tagged
15.	17-V	0400-1110	36-55N	32-32W	LL#13	413	1 A	3 B	2 LL	65.1-65.9	
16.	19-V	0410-1110	33-20N	39-50W	LL#14	420	1 YF	6 B	4 LL, 1 SL	68.9-69.1	1 Tuna - Lost, No ID
17.	20-V	2120-2220	31-36N	46-15W	MWT#4 DNNL					71.6	
18.	21-V	0555-1320	31-00N	47-05W	LL#15	420	1 YF, 1 A	3 B	1 LL, 1 D	70.9-72.7	
19.	22-V 23-V	2110- -1100	30-25N	53-20W	LL#16 DNNL	420		10 B, 1 W		71.4-72.0	1 Tuna - Lost, No ID
20.	23-V	2300-2400	31-38N	55-38W	DNNL					73.4	
21.	24-V	0605-1320	32-00N	56-10W	LL#17	420	2 YF	1 B	6 LL, 1 WM	71.2-72.1	
22.	24-V	2300-2400	31-55N	57-52W	DNNL					71.8	
23.	25-V	0605-1340	32-05N	59-10W	LL#18	420		4 B	4 LL	71.2-71.8	
24.	26-V 27-V	1855- -0825	32-45N	64-36W	LL#19 DNNL	280	1 YF, 2 BE	5 B	1 LL	72.0-72.2	

25.	30-V	1600-1630	32-30N	64-46W	Vert.Pktn.					72.7	
26.	30-V 31-V	2300- -0200	32-01N	65-10W	Vert. LL DNNL				1 G		
27.	31-V	0610-1150	32-00N	65-07W	LL#20	280		1 B, 1 T		73.4-74.9	
28.	31-V	2045-2200	32-22N	66-45W	DNNL					73.0	
29.	1-VI	0610-1340	32-50N	68-15W	LL#21	420	4 YF, 3 A		1 LL, 1 WM	73.0-73.2	3 YF - Tagged
30.	1-VI	2100-2230	34-03N	69-53W	DNNL					72.3	
31.	2-VI	0610-1515	34-45N	71-15W	LL#22	560	9 YF	1 B	5 LL, 2 WM	72.3-72.5	3 YF - Tagged 2 Tuna - Lost, No ID
32.	2-VI	2100-2230	35-18N	70-17W	DNNL					69.8	
33.	3-VI	0610-1505	36-27N	67-50W	LL#23	560	6 YF, 2 BF	1 B, 1 S	1 LL, 1 S	69.6-69.8	4 YF - Tagged
34.	4-VI	0615-1515	37-15N	70-57W	LL#24	420	9 YF, 5 BF	6 B, 7 W 2 D		68.9-77.9	3 YF - Tagged 1 WM - Tagged
35.	5-VI	0610-1345	37-17N	67-25W	LL#25	420	2 YF, 1 BF	1 B, 3 W 3 S		76.6-78.1	2 YF - Tagged
36.	6-VI	0615-1454	38-48N	68-53W	LL#26	560	3 BF, 3 BE	9 B		66.4-67.7	1 BF - Tagged 2 BE - Tagged 1 BF - Lost
37.	6-VI 7-VI 7-VI	2140- 1135 0620-1445	39-23N	68-33W	LL#27 DNNL LL#28	280 280	5 BF, 1 BE 4 BF	5 B 6 B, 1 M	4 SW, 1 SL	61.7-64.0 62.9-63.9	1 BF - Tagged SW Wt. =183 4 BF - Tagged
38.	8-VI	0605-1425	40-00N	68-00W	LL#29	420	47 BF, 2 BE	1B		59.7-61.9	29 BF - Tagged 2 BE - Tagged 6 Tuna - Lost, No ID
39.	8-VI 9-VI	1915- 0950	40-19N	68-00W	LL#30 DNNL	420	6 BF	11 B	18 SW	60.1-64.6	4 BF - Tagged 1 SW - Tagged 2 SW - Lost SW Wt. =2,636
Totals						13,132	80 BF, 55 BE 35 YF, 7 A	121 B, 4M 11W, 1T 4S, 2D	42LL, 1R 3SL, 27SW 1D, 1S, 5WM, 1G 1 Opah		41BF - Tagged 26BE - Tagged 15YF - Tagged 1WM - Tagged 2SW - Tagged 3BE - Lost 1BF - Lost 2SW - Lost 10Tuna - Lost, No ID

1/Fish tagged and released are included in the catch; fish lost at the rail are not included in the catch.

Abbreviations: Gear: LL = Long-line; MWT = Mid-water trawl; DDNL = Dip net-night light; Vert. Pktn = Vertical plankton tow.
Tuna: BF = Bluefin; BE = Bigeye; YF = Yellowfin; A = Albacore.
Sharks: B = Blue; M = Mako; W = White-tip; T = Tiger; S = Sickle; D = Dusky.
Misc. Fishes: LL = Longnose lancetfish; SL = Shortnose lancetfish; R = Pelagic ray; SW = Swordfish; D = Dolphin; WM = White marlin; G = Gempylid; S = Sharp-tailed sunfish.

Note: Roman numerals in date column designate the month.

midway between western and eastern North Atlantic bluefin populations.

Six giant bluefin at Station 12 were the only eastern North Atlantic tunas of that species taken on the cruise; two were tagged and released. The remainder received detailed biological examination aboard the vessel. Giant bluefin occurred in waters of mean surface temperatures (61.0°-77.3° F.) ranging above those where medium and small bluefin were caught (60.8°-62.8° F.).

Yellowfin tuna were not found in any concentrations but were noted to be taken only in warmer waters (68.9°-78.1° F. surface temperature). The larger yellowfin (over 100 pounds) generally appeared in waters of mean surface temperatures 69.0°-73.0° F., while the smaller fish (under 100 pounds) generally occurred in waters of mean surface temperatures 73.0°-77.3° F.

Big-eyed tuna were not taken in large quantity but appeared scattered in small numbers throughout the cruise in waters of mean surface temperatures ranging from 58.5° to 67.0° F. The vessel's big-eyed tuna catch in the vicinity of the Azores reflected the catches by the Azorean live-bait tuna fishery which was in season at the time.

Significant differences in catch composition were noted between day and night sets of long-line gear. Twenty-seven swordfish (Xiphias gladius) were taken exclusively on night sets. A catch of 18 swordfish from 420 hooks on June 8 at the mouth of Oceanographer Canyon (130 miles southeast of Cape Cod) indicated an abundance of those fish in an area farther east than that in which the vessels of the new commercial long-line fishery were operating at that time. This information was promptly transmitted to United States long-line vessels within radio range. One swordfish was multiple-tagged with seven dart-type plastic tags. While the night tuna catch showed little or no change from day sets, the blue shark catch (Prionace glauca) was considerably higher. No shark damage to the tuna or swordfish was encountered on those sets.

Other species of particular scientific interest taken by long-line included the long-nose lancetfish (Alepisaurus ferox), the short-nose lancetfish (A. brevirostris), the pelagic ray (Dasyatis sp.), the dolphin (Coryphaena hippurus), the sharp-tailed sunfish (Mola lanceolata), the white marlin (Makaira albida), a snake mackerel (Gempylidae), the opah (Lampris regius), the mako shark (Isurus oxyrinchus), the whitetip shark (Carcharhinus longimanus), the sickle shark (C. falciformis), the dusky shark (C. obscurus), and the tiger shark (Galeocerdo cuvieri).

As a supplement to long-line fishing data and specimen examination, 208 bathythermograph casts were taken, 4 midwater-trawl tows and 14 dipnet-night light stations were made, vertical plankton hauls and Van Doren water hauls to sample chlorophyl levels were taken at each long-line station. Blood samples from 57 specimens of tuna and swordfish were collected and shipped to the Bureau's subpopulation study program at the Honolulu Biological Laboratory in Hawaii.

Three hydrographic transects across the Gulf Stream by the Bureau's research vessel Geronimo from the Biological Laboratory at Washington, D. C., preceded the arrival of the Delaware in the area east of Cape Hatteras and Cape May. Data from those transects assisted in locating several long-line stations in desirable thermal conditions.

In cooperation with other institutions, materials for further study were collected as follows during this cruise: tuna skeletons for studies on the comparative anatomy and systematics of the tunas of genus Thunnus at the Bureau's Ichthyological Laboratory in Washington, D. C.; marlins, squids, and octopi for the University of Miami Marine Laboratory; bathpelagic fishes for the Museum of Comparative Zoology at Harvard University; hearts of sharks and tunas for arteriosclerosis studies at Centre d'Etude des Maladies des Arteres Coronaires, Brussels, Belgium; flying fish and shark remoras for the U. S. National Museum; sauries for the Scripps Institution of Oceanography; parasitic copepods of tuna and shark for the Department of Biology, Boston University; and tuna parasites for the Federal Institute for Fisheries Research at Hamburg-Altona, Germany.

Two port calls at Ponta Delgada, Azores, and one call at the U. S. Naval Station, Bermuda, were made for bunkering fuel, food and water, and exchanging scientific personnel.

Scientific personnel aboard the Delaware during this cruise included guest cooperators from Canada, Norway, Madeira, Portugal, West Germany, and the United States.

Note: See Commercial Fisheries Review, June 1963 p. 38.

North Atlantic Fisheries Investigations

SURVEY OF SEA SCALLOP POPULATION ON GEORGES BANK:

M/V "Albatross IV" Cruise 63-3 (June 10-13, 1963): To collect samples to determine the average size and age of the sea scallop population on the western part of Georges Bank was the main purpose of this cruise by the U. S. Bureau of Commercial Fisheries research vessel Albatross IV.

The cruise was divided into two parts. During the first half of the survey, 65 stations were occupied, and during the second half, 96 stations were sampled. A 10-foot scallop dredge with a 2-inch ring bag was used at all stations. The gear handled easily and efficiently over the stern ramp of the Albatross IV. Hydrographic data were collected at each station and at hourly intervals while steaming.

The Bureau's newest research vessel during Cruise 63-1 (May 13-17, 1963) collected quantitative samples of sea scallops from the western side of Georges Bank. Only 65 stations were occupied with the 10-foot scallop dredge because of a mechanical breakdown in the gantry used for setting and retrieving the dredge. During Cruise 63-2 (May 25-June 6, 1963), the Albatross IV proceeded to Washington, D. C., to show the vessel to interested groups and the general public. On its return trip from Washington, D. C., to Woods Hole, Mass., the vessel demonstrated the collection of fisheries and hydrographic data to the press.

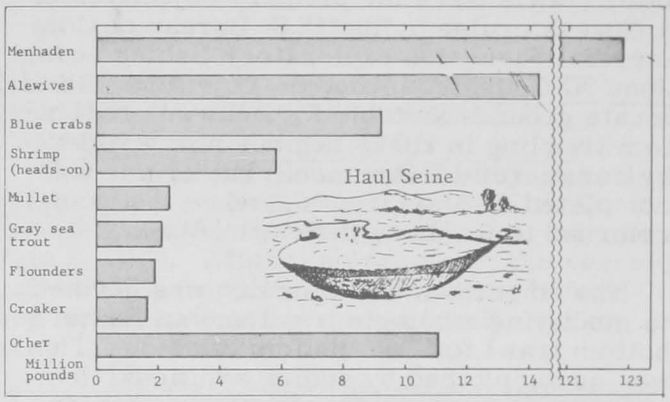
North Carolina

FISHERY LANDINGS, 1962:

Landings of fish and shellfish in North Carolina during 1962 amounted to 174.3 million pounds, 102.3 million pounds (37 percent) below 1961. The production of food fish was 6 percent above the previous year, but excluding alewives, landings of the more valuable species were less than in any year since the program for collecting monthly landings data began in 1955. Shellfish production declined 6 percent below 1961.

The 1962 catch of hard blue crabs (12.2 million pounds) was 23 percent less than in 1961--the highest production year on record for that species. The crab meat market was fairly good throughout the year, but a low meat yield for the greater part of 1962 reduced profits somewhat. Soft blue crab landings were slightly lower than in 1961.

Shrimp landings in 1962 amounted to 5.8 million pounds (heads-on), an increase of 2.8 million pounds over 1961. However, the 1962 shrimp catch was lower than the average for recent years.



North Carolina landings of certain fish and shellfish, 1962.

The landings of menhaden and thread herring used for reduction into fish meal, oil, and solubles were down 46 percent below the previous year. The menhaden catch dropped 99 million pounds (45 percent) and no thread herring was landed in 1962. Although more vessels operated in the fall menhaden fishery, the weather for a period of 3 successive weeks during November and December was too windy for vessels to leave the docks. The 1962 price of fish meal was somewhat better than in 1961, and the oil price was stronger by the end of the season.

Sea bass landings (1.3 million pounds) in 1962 increased 103 percent as compared with 1961. The greater portion of those landings was taken by otter trawls.

The 1962 oyster production of 961,000 pounds was down 20 percent. Approximately three-fourths of the decline was in the Pamlico Sound area, where oysters are normally more abundant. Prices were high for both shell and shucked oysters throughout the year.

North Pacific

Exploratory Fishery Program

"OFF-BOTTOM" TRAWLING INVESTIGATED:

M/V "John N. Cobb" Cruise 59: To develop techniques of fishing trawls just off the bottom, and also evaluate the fish catching efficiency of "off-bottom" trawls compared to that of conventional "on-bottom" otter trawls were the primary objectives of a 4-week cruise by the U. S. Bureau of Commercial Fisheries exploratory fishing vessel John N. Cobb. A secondary objective was to locate grounds suitable for conventional bottom trawling in rocky regions now avoided by commercial fishermen. The cruise was completed on May 31, 1963, when the vessel returned to its base in Seattle, Wash.

The first week of the cruise was devoted to modifying a pelagic trawl and an Eastern bottom trawl for "off-bottom" fishing. This was accomplished by adding additional floats to the head ropes and rib lines, and hanging sash weights at the ends of 1-fathom droppers from the wings of each net.

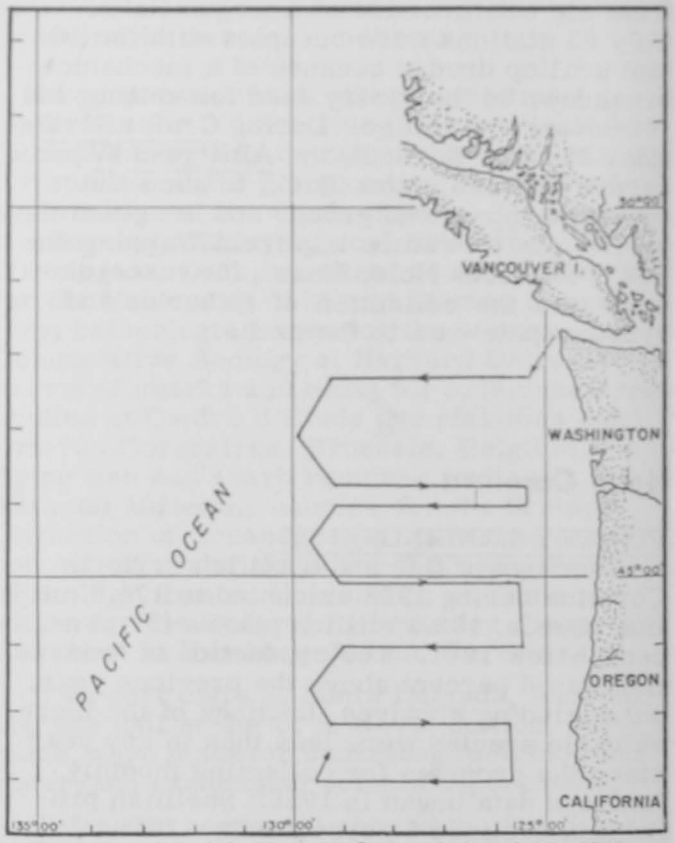
The efficiency of the 2 off-bottom trawls was compared to that of the standard Eastern on-bottom trawl during the middle 2 weeks of the cruise by making hauls with the different trawls over the same grounds. A total of 32 sets was made--12 with the off-bottom pelagic trawl, 10 with the off-bottom Eastern trawl, and 10 with the on-bottom Eastern trawl. Catches of fish with the off-bottom trawls were smaller than with on-bottom trawls. The average catch per hour of trawling with the on-bottom gear was 1,816 pounds; with the off-bottom pelagic trawl, 190 pounds; and with the off-bottom Eastern trawl, 142 pounds. The off-bottom catches were characterized by a dominance of rockfish and other roundfish, and an absence of flatfish, sharks, and skates. About 99 percent of the off-bottom pelagic trawl catch and 78 percent of the off-bottom Eastern trawl catch consisted of rockfish and other roundfish, compared to 48 percent in the on-bottom Eastern trawl. Species most often caught in the off-bottom trawls were Pacific ocean perch (Sebastodes alutus), yellow-tailed rockfish (Sebastodes flavidus), whiting (Theragra chalcogrammus), and Pacific hake (Merluccius productus).

During the last week of the cruise, precision echo-sounding surveys were made to determine if trawlable grounds existed in certain rocky regions off the Washington coast. Only a few new fishing areas were found and they were too small to be of use to the commercial fleet. But in 1 locality, a known area was expanded into a longer tow about 8 miles long.

* * * * *

ABUNDANCE AND DISTRIBUTION OF ALBACORE TUNA AND OTHER PELAGIC SPECIES TO BE STUDIED:

M/V "John N. Cobb" Cruise 60 (July 8-28, 1963): To obtain information on the relative abundance and distribution of albacore tuna and other pelagic species of fish is the primary objective of this cruise by the U. S. Bureau of Commercial Fisheries exploratory fishing vessel John N. Cobb. The area to be investigated covers the waters between 48° and 42° N. latitude and seaward to 130° W. longitude. Oceanographic data, including salinity, oxygen, and chlorophyl determinations also are to be obtained during the survey.



Track line of the John N. Cobb Cruise 60, July 8-28, 1963.

Trolling is the primary method to be used for catching albacore. Any albacore taken in suitable condition is to be tagged, measured,

and released. Information on albacore catches is to be broadcast by radio to the commercial fishing fleet. Night-lighting stations will be conducted to make observations of marine life and forage organisms.

In cooperation with personnel from Scripps Institution of Oceanography (La Jolla) and the Bureau of Commercial Fisheries (San Diego), standard oceanographic stations are to be occupied daily along the track line.

Oceanography

KEEL LAID FOR RESEARCH VESSEL "OCEANOGRAPHER:"

On July 22, 1963, keel-laying ceremonies were held for the first of two Class I Oceanographic Survey Ships to be built at a shipyard in Jacksonville, Fla., for the U. S. Coast and Geodetic Survey.

The vessel, to be known as the Oceanographer, will be the largest ever built in the United States for the express purpose of deep-sea oceanographic survey and research work. It will be 303 feet long, with 52-foot beam, and a loaded displacement tonnage of approximately 3,800 tons. Of welded steel construction, with Diesel-electric twin-screw propulsion, it will have a service speed of 16 knots and a cruising range of 16,000 nautical miles.

The main propulsion and principal auxiliary machinery and associated equipment will be automated by a centralized engine-room control system. A unique feature of the system is the use of a computer in the control section. This means additional automated functions can be incorporated in the future. The computer will also be available to process scientific information.

The Oceanographer will be strengthened for navigation in ice and will have extensive specialized electronic and mechanical equipment for oceanographic, meteorological, and geophysical observations. All scientific working areas will be air conditioned and served by interconnecting wireway trunks and communication facilities.

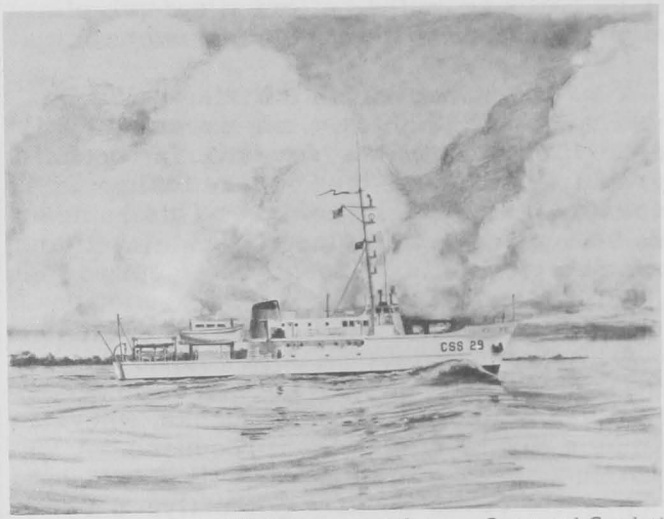
Running vertically through the vessel will be a center well through which experimental equipment can be lowered, and which can serve as a comfortable entrance and exit for SCUBA-diving explorers. Viewing ports below the waterline in the bow will permit underwater observations. Laboratory space of over 4,100 square feet will be provided.

The vessel will be built to carry a normal complement of 13 officers and 72 crewmen. It will have additional accommodations for as many as 20 scientists. (U. S. Coast and Geodetic Survey, July 22, 1963.)

* * * * *

NEW COAST AND GEODETIC SURVEY RESEARCH VESSELS "PEIRCE" AND "WHITING" ENTER SERVICE:

The new Class III Coastal Survey Vessel Whiting was commissioned by the U. S. Coast and Geodetic Survey at New Orleans, La., on July 8, 1963. After the ceremony, the vessel sailed to Norfolk, Va., for outfitting before beginning its first assignment in Nantucket Sound.



Artist's drawing of the Whiting, one of the new Coast and Geodetic Survey vessels.

The Whiting is a sistership of the Peirce which was commissioned early in 1963. The Peirce was scheduled to begin its first hydrographic investigation off Charleston, S. C., in late July 1963. Part of that area has not been surveyed since the turn of the century.

Note: See Commercial Fisheries Review, February 1963 p. 45 and November 1962 p. 36.

* * * * *

NEW RESEARCH VESSEL COMMISSIONED FOR MIAMI UNIVERSITY:

A new oceanographic research vessel for the University of Miami's Institute of Marine

Holland Straits and Tar Bay. As previously reported, test shells indicated a good initial set at the southern entrance to Holland Straits, in Hooper Straits, in Tar Bay, at Barren Island, Punch Island Creek and Seminary Bar in St. Marys.

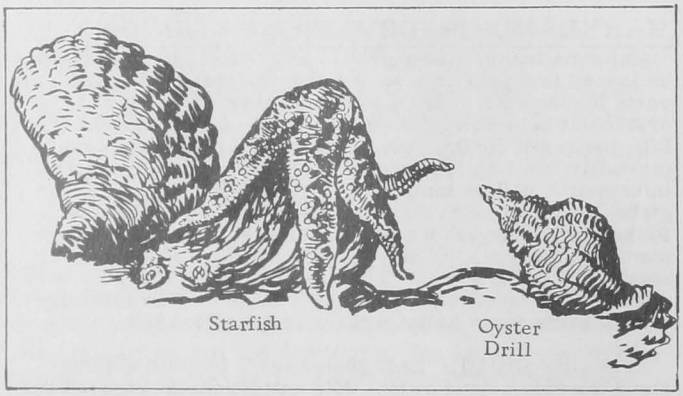
Since test shells only remain overboard for one week, the counts on them represent a potential set of seed oysters but not the surviving set. The newly attached spat are extremely small. Most of them are visible only under a microscope and they are easily killed by a light film of silt, being overgrown by other animals, grazing by mud snails, invasion by oyster leeches, attack by drills, and physical crowding out by other spat when numbers per shell are high. Test shells indicate the time and relative intensity of oyster spatfall and of fouling organisms that interfere with oyster setting in addition to showing the progress of setting during the season.

In order to evaluate the surviving set at the end of the growing season, a survey of planted shells, seed, and natural bar material is conducted jointly by laboratory and tidewater fishery personnel during the fall and early winter. To do this, random half bushel samples of bar material are taken and all spat, oysters, and other material counted or measured.

Some shells designed for seed production did not catch enough spat to justify using it as seed this year. However, the seed areas all have a history of good setting and should receive additional good future sets unless fouling on the year-old shells becomes excessive.

Except where oyster drills are present or bottom is marginal, seed with a count as low as 350 per bushel can produce approximately one bushel of marketable oysters for each bushel of seed in 2 to 3 years on good bottom in most of Maryland's Chesapeake oyster growing area. Counts of 1,000 or more are considered high-quality seed.

The counts taken are representative of the top shells or the seed that would be caught at the beginning of transplanting. As shells are caught the underneath ones form a larger part of the catch. These have fewer spat and a greater proportion will be completely buried and blank so that the average count will fall steadily as the seed is harvested. The proportion of the planted shells that can be utilized for seed is difficult to predict. On a hard shell bottom where none of the planted shells become buried, the harvest can approach 100 percent where the layer of shells is not more than a few inches thick. On a soft bottom more than half of the planted shells may be buried and produce no spat but will serve to form a support for future plantings so that the percent of harvestable shells will increase each year that the area is replanted until 100 percent may eventually be approached provided the bottom is not broken and the old shells that form the foundation are not disturbed.



Research shows that chemical controls and metal fences offer ways to check crabs, drills, and starfish--the principal enemies of oysters.

Some bottoms with high-setting potential are so located that they hold shells up well in normal weather but in exceptional storms may shift so that the shells become packed in the bottom and cannot easily be removed. The attached spat may be partially killed but those on the upper shell margins sometimes are able to make good growth so that they later become more easily caught as they reach above the bottom. Bottoms of this nature are more useful for seed purposes when the new set can be transplanted during the fall before the period of heavy winter winds.

Included in the observations are counts on cultch of natural bars in the upper Bay, Chester River, West side of Bay, Potomac and the upper portion of other major tributaries that were not shelled because their past record of spatfall has been too low to justify shelling. Such areas require plantings of seed and are included to show their low potential as spat producers.

Spat are never uniformly distributed and occasional failures occur even in areas that normally have high sets. In general, 1962 was a better than average setting year and most State shell plantings received satisfactory sets. The careful selection of areas for shelling and the timing of planting so that little fouling occurred before the time of spatfall both contributed greatly to the excellent average success of State shell plantings in 1962. In the bulletin of July 26, 1961, all of the recognized causes of oyster mortality in Maryland were reviewed and copies of that bulletin still are available upon request.

The winter of 1962/63 was accompanied by the heaviest so-called "Winter Kill" that we have observed. Many natural bars suffered little loss but in some instances, especially on thickly planted beds on poor-quality bottom, samples taken by biologists of the Department of Tidewater Fisheries and of the laboratory at Solomons were found to contain from 5 to as high as 30 percent dead oysters with meats during mid-March before water temperatures had risen enough to cause rapid decomposition. In addition to the dead oysters or "gapers," there were many recent "boxes" (pairs of empty shells) that contained few fouling organisms and probably also represented oysters that had died during the winter season.

Samples of these gapers, together with live oysters from the same beds, were examined at the laboratory for the parasite "MSX" but this was not found in any of them. The oysters were not cultured at this time for the fungus Dermocystidium since this parasite virtually disappears during the winter months. The living and dead oysters from the badly affected beds were extremely thin and in poor condition. None of the deaths appeared to be directly due to any of the known predators and parasites that sometimes cause serious oyster losses in this area.

Like other animals, oysters may die from a combination of unfavorable circumstances or "stress" that weakens them to the point where they can be overcome by factors that acting alone normally would not kill them. While much remains to be learned, the following factors are known that contributed greatly to the unusually poor condition of many oysters last season.

During 1962 water temperatures were unusually high from the end of April through June and salinities rose to above normal from late May on. This resulted in the earliest appearance of the fungus Dermocystidium that we have recorded and by July a very high percentage of oysters in the area from Solomons down were found to be infected with some samples containing as high as 85 percent infected oysters. However, from June on the summer was quite cool so that below normal water temperatures slowed down development of the fungus. This generally prevented buildup of the parasite in an infected oyster to the point where the oyster would die. Thus losses from the fungus that normally occur in late summer and early fall were less than usual in 1962 although a few substantial losses did occur where oysters were crowded. However, the many oysters that sur-

vived the fungus infection had not been able to fatten as well as uninfected oysters and were in a weakened condition at the end of the summer. This was an important factor in the exceptionally poor condition in which many oysters were found at the beginning of the 1962 fall oyster season.

A near record drought occurred last year from July through October. This resulted in fewer nutrient salts from the land reaching the Bay and thus there was a reduced bloom last fall of the tiny plants in the water upon which oysters feed. This was a second factor that, by reducing normal fall fattening, caused many oysters, except in areas far upstream, to enter the winter in very poor condition.

That the winter of 1962/63 was one of the longest and most severe for many years is well-known. In early December, water temperatures dropped well below the point at which oysters cease to feed and remained there continuously until mid-March. Oysters need to draw upon food stored in their body tissues when they are unable to feed. While this withdrawal is slow at low temperatures it still produces a steady decline in oyster condition or "fatness" during the winter as long as temperatures continue low. The unusual 1962/63 winter drain on the oysters' condition was a third factor to cause many oysters to become dangerously weakened towards the end of the winter.

Oysters that are in good condition and healthy are seldom directly killed by cold temperatures. Even when exposed to air and frozen they do not die unless jarred before they thaw. Certain microorganisms are present in oysters that cause them no apparent harm while the oysters are vigorous but these microorganisms increase in numbers when oysters become weakened or undergo unusual stress and may then become one of the factors leading to the oyster's death. Thus the losses last winter probably resulted from the combined stress of many factors, both physical and biological rather than the result of attack by a single specific organism.

During the spring of 1963 oysters have fattened rapidly. We have no reports of recent mortalities and oysters appear to have entered the spawning season this year in excellent condition in most Maryland areas.

Setting in 1963: The water this spring was cooler than normal so that temperatures at which oyster spawning occurs were not reached until about the end of May in most Maryland areas. A cool June then has delayed the sustained high-water temperatures that are needed for vigorous spawning and, since the larvae swim for about two weeks before setting, the start of setting can be expected to be later than usual this year.

Bags of test shells in most areas were first put over about the middle of June. These consist of small chicken wire bags each containing 25 clean oyster shells. They are removed and replaced by fresh ones weekly. The locations covered have been expanded through the use of additional help supplied by the Department of Tidewater Fisheries. In general, seed areas or potential seed areas are the primary ones being studied.

The first groups of exposed shells were taken up in mid-June 1963 at a few stations and full-scale sampling was under way by the last week in June. Among 12 stations from which shells were examined, only a single spat has been found. This was from the upper part of the Little Choptank and appeared to have set about the middle of the week of June 16-22. Counts for most areas, however, had not yet been made. As additional data accumulate they will be reported periodically together with other information of interest.

For more detailed data and a copy of the July 26, 1961 bulletin on causes of oyster mortality in Maryland, write to: Chesapeake Biological Laboratory, Natural Resources Institute, University of Maryland, Solomons, Md.

Pesticides

INTERIOR DEPARTMENT FAVORS RESEARCH TO DEVELOP NEW COMPOUNDS:

Proposed Federal legislation designed to promote the discovery and development of effective new pesticides which would be free of the hazards accompanying the use of many formulations now available has the support of the U. S. Department of the Interior. In reports submitted at the request of the United States Congress, the Department emphasized the need for expanded research in pesticides and evaluation of such materials.

The Department cited the report of the President's Science Advisory Committee on the "Use of Pesticides," which points out the necessity to discover the effect pesticides have "on the food chain of which every animal is part, and to determine possible pathways through which accumulated, and in some cases, magnified pesticide residues can find their way directly or indirectly to wildlife and to man." The Department stressed the desirability of acquainting the public with information acquired through pesticide research.

The pending legislation would be extremely helpful in extending urgently needed authorities and in providing more definitive guidelines in carrying out the Government's pesticide research program.

The legislation, according to the Department, "is not intended to be an enforcement measure or a means of regulating industry; rather it is designed to disseminate information to the general public and to promote more adequate and efficient research programs for the benefit of every one.

"Up to the present time," the Department added, "it has been the practice of the chemical industry to test new compounds upon relatively few forms of plant and animal life. These studies have not included tests upon indicator species of wild fishes, birds, mammals and food organisms to ascertain whether the compound poses hazards to such creatures in treated areas.

"The rapid expansion in the use of chemicals in all aspects for present-day living demand the closest cooperation and understanding among the various interested governmental agencies and the chemical industry. Chemicals essential to the health and comfort of the people, the maintenance of a safe

and adequate food supply, and the preservation of our natural resources, must be used intelligently and with full consideration of the possible adverse effects upon humans, domestic animals, and the Nation's fish and widlife resources."

To achieve this, the Department said, "there must be continuous communication of plans and ideas between the scientists who point the way and the administrators who interpret new knowledge and place such knowledge in everyday use.

"This Department has long recognized that many situations involving losses to fish and wildlife following the application of insecticides, fungicides, rodenticides, and other pesticides are due to a lack of knowledge concerning ecological relationships and lack of information on the toxic effects of such formulation upon birds, fishes and mammals, and food organisms in areas where the pesticides are used. Because of their high toxicity, lack of specificity, stable residual properties, and biological magnification resulting from their tendency to accumulate in food organisms, a number of pesticidal chemicals now used pose unavoidable hazards. These can best be avoided by the discovery, development, and substitution of new materials which are highly specific in their effects and readily broken down in nature."

The proposed Federal legislation authorizes the construction and operation of necessary facilities, pesticide evaluation programs, and the wide distribution of information discovered as the result of the research programs.

Salmon

COLUMBIA RIVER CHINOOK MARKING PROJECT:

In the Columbia River area on the Pacific Coast, an effort is being made to measure the contribution to sport and commercial fisheries of hatchery-reared fall chinook salmon from 13 installations operated by the States of Oregon and Washington and the U. S. Fish and Wildlife Service. Under the Federally-financed program, nearly 2 million chinook fingerlings were marked and released from Oregon hatcheries in 1963.

The young fish were fin-clipped in a particular manner to assure their identification either when they return to spawn or are recovered in the offshore and Columbia River fisheries. Most of the survivors will return to spawn in the fall of 1965 as three-year-olds or in 1966 as four-year fish.

The 1963 fin-clipping project marks the second year of a proposed four-year evaluation program. (Fish Commission of Oregon, July 2, 1963.)

Shad

EFFORT TO REESTABLISH IN SUSQUEHANNA RIVER:

Eggs from West Coast shad in the Columbia River are being airlifted to Pennsylvania's Susquehanna River. It is expected that some 10 million eggs can be transferred to the upper Susquehanna from the apparently large Columbia River shad run in 1963. Shad presently occur in the Susquehanna, but four power dams, the first built in 1910, prevent their migration to upstream spawning grounds. This year's replanting efforts are an experiment to determine if water quality is such that shad can now survive in the upper Susquehanna. Results of the study may lead to the construction of fish passage facilities over the dams and eventual reestablishment of major shad runs.

Unseasonably cold water in eastern rivers prevented development of mature roe in Atlantic populations that might otherwise have provided eggs for the project. It is believed that shad of the Columbia River, having adapted to long up-river migrations, will move far up the Susquehanna to use spawning areas not now supporting the species.

Transplanting the shad has been aided by advanced techniques of fertilization, the use of oxygen-filled plastic shipping containers, styrofoam insulated packaging, and fast air transportation. The eggs arrive in their new Susquehanna home within 24 hours after leaving the Columbia River. The present airlift completes a historical round trip for a fish whose origin is the rivers of the Atlantic Coast. The shad was introduced into the Sacramento River from the East in 1871. It soon became well established and is now an important commercial and sport species on

the Columbia and elsewhere along the Pacific Coast.

Technicians from the Oregon Fish Commission, the Washington Department of Fisheries, and the U. S. Fish and Wildlife Service are aiding the Assistant Director of the Pennsylvania Fish Commission in taking the eggs from the Washougal reef area in the Columbia River above Portland, Oreg., for the conservation effort. The program, administered by the Federal Agency in conjunction with the States of Maryland, Pennsylvania, and New York, is being financed by eastern power companies.

Shrimp

ARTIFICIAL CULTIVATION OF PINK SHRIMP FROM EGG TO ADULT:

A graduate student at the Institute of Marine Science, University of Miami, has succeeded in rearing pink shrimp in a laboratory from the egg through all intermediate stages to adult shrimp--something science has never before accomplished with that species. A related Asian species of shrimp has been successfully reared in Japan, but previous attempts to rear the valuable commercial pink shrimp (Penaeus duorarum) of Atlantic and Gulf of Mexico waters have failed. Refinement of the new pink shrimp-rearing techniques eventually may result in commercial shrimp culture on a large scale.

Experimenters had previously learned that shrimp in the larval stage could be raised to maturity in protected tidal locations. (That method involved opening gates and allowing tidal waters to bring young shrimp into screened enclosures, where they were kept until they reached market size.) But culture in tidal waters was drastically limited by the presence of larval forms of predatory species which eat shrimp larvae. Eliminating unwanted forms while keeping the shrimp has been a great problem--particularly since investigators have not always been sure which of the microscopic larvae represented various stages of shrimp and which represented predators. By laboratory rearing of shrimp through the early stages, the problem might be eliminated in future shrimp "farming."

The successful experiment in shrimp rearing was aided greatly by earlier work done by another Institute of Marine Science investigator who, in 1959 and 1960, succeeded in hatching shrimp eggs and keeping them alive through their first six stages of larval development. The tiny shrimp died at that point, apparently due to lack of suitable food. The later stages of shrimp development had also been previously studied by observing specimens obtained from plankton nets.

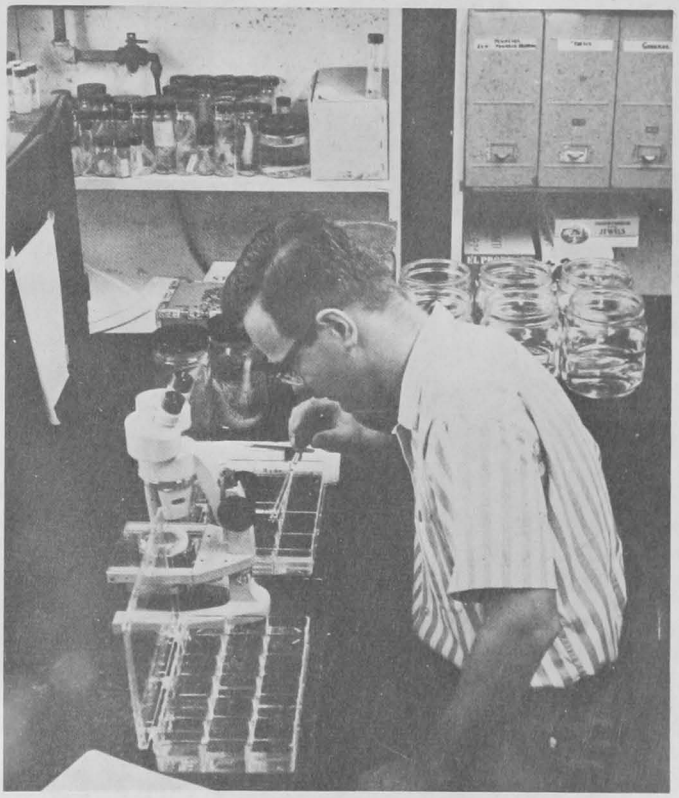


Fig. 1 - Larval pink shrimp were reared in compartmented trays. Shrimp were transferred daily to containers holding clean water.

Now as a result of the new breakthrough in shrimp culture confirming and furthering previous work, scientists know all the stages that pink shrimp go through and can identify them. Lack of such knowledge has hampered investigators in their research on the life histories, migrations, and distribution of shrimp. In taking plankton samples, scientists were confronted by thousands of different minute larval forms of marine animals. More than a hundred different larval stages of shrimp alone are found in the Dry Tortugas area of the Gulf of Mexico, where extensive shrimp beds are located. Identification was difficult since researchers had previously been unable to observe a pink shrimp go through its many stages before maturity.

In earlier attempts to rear shrimp, researchers had three major problems: (1) ob-

taining fertile eggs in good condition, (2) feeding the larval forms, and (3) keeping the tiny animals from becoming entangled in food or wastes while in laboratory containers.

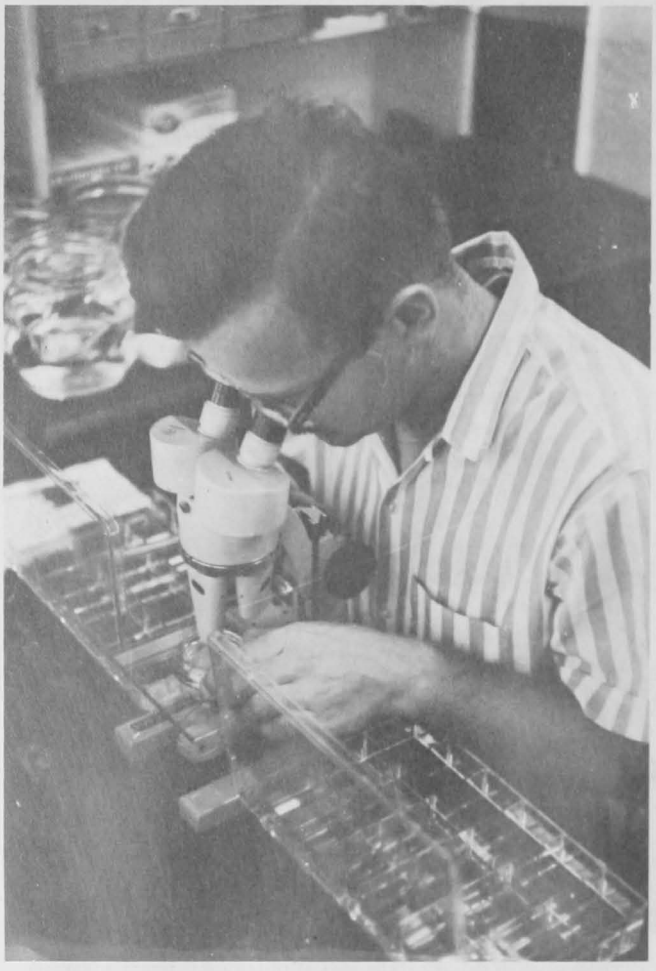


Fig. 2 - Shrimp biologist examines larval stage of pink shrimp through a binocular microscope.

The present successful experiment was started by taking spawning females in try-net hauls off Key West, Fla. The shrimp were then transported overland to Miami in 50-gallon plastic cans. At the Institute of Marine Science, the ripe female shrimp were put individually in 15-gallon aquarium tanks. Several of the shrimp spawned within a few days, and the eggs settled on the bottom of the tanks like a fine white powder.

Eggs were siphoned from the large tanks and placed in finger bowls containing filtered sea water. Many of the eggs hatched in a few hours, and specimens which survived the first critical stages of development were transferred to separate compartments of plastic trays where they could be studied individually through microscopes.

Fig. 3 - An adult shrimp from which hatching eggs were obtained and reared to maturity.

In the initial experiment, about 1,200 larval shrimp were divided into two groups; the first group was placed in Biscayne Bay water while the second group was kept in Gulf Stream water. Although the salinity and other measurable factors were the same for both environments, all shrimp in the Bay water died within a week, while 50 of those kept in Gulf Stream water survived to post-larval stages, and 10 survived to maturity. (Many of the deaths resulted from experiments with temperature, food, and other laboratory-imposed variables, and some specimens in each stage were killed and preserved for detailed study.) The larval shrimp were observed constantly and all were transferred daily to trays containing clean, unused water. They were fed a mixed culture of diatoms, a marine yeast, and three kinds of 1-celled algae. (News of Institute of Marine Science, June 11, 1963.)

Note: See Commercial Fisheries Review, January 1963 p. 49; May 1960 p. 53.

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UNITED STATES SHRIMP SUPPLY INDICATORS, JUNE 1963:

Item and Period	1963	1962	1961	1960	1959
		..... (1,000 Lbs., Heads-Off)			
Total landings, So. Atl. and Gulf States:					
August	-	12,332	10,944	20,441	18,595
July	-	12,283	10,500	21,746	17,493

(Table continued on next page)

Item and Period	1963	1962	1961	1960	1959
			(1,000 Lbs., Heads-Off)		
June	13,800	11,316	8,233	12,427	14,547
May	10,254	6,151	5,276	6,335	6,885
January-April	15,816	14,619	17,521	18,013	14,082
January-December	-	105,779	91,396	141,035	130,660
Quantity canned, Gulf States 1/:					
August	-	1,333	1,090	4,427	2,228
July	-	3,551	2,793	5,802	2,833
June	4,770	4,913	3,438	6,920	7,061
May	3,630	1,794	1,208	1,461	2,461
January-April	900	831	317	653	566
January-December	-	23,210	14,500	26,394	22,659
Frozen inventories (as of end of each mo.) 2/:					
August 31	-	12,754	12,728	20,171	23,780
July 31	-	13,677	14,849	17,397	22,352
June 30	3/	13,796	19,416	15,338	19,283
May 31 4/	25,114	13,904	24,696	17,540	21,137
April 30 4/	24,954	15,637	27,492	20,502	23,331
March 31 4/	27,970	16,607	31,345	23,232	24,893
Febuary 28 4/	28,039	19,012	37,612	29,063	27,555
Imports 5/:					
August	-	7,381	6,743	6,406	5,107
July	-	8,265	6,635	7,319	7,861
June	3/	9,397	8,065	8,932	8,800
May	11,110	11,221	8,278	9,902	8,264
January-April	49,937	43,383	40,825	32,531	33,262
January-December	-	141,384	126,268	113,418	106,555
Ex-vessel price, all species, So. Atl. & Gulf Ports:			(¢/lb., 26-30 Count, Heads-Off)		
September	-	90.9	70.1	52.2	46.4
August	-	83.6	66.1	52.0	46.9
July	-	82.1	55.8	54.6	49.2
June	6/ 72-83	84.4	53.7	64.1	60.7
May	6/ 80-86	83.7	52.8	62.9	63.3
April	6/ 82-90	82.2	55.4	60.6	65.2
March	6/ 85-92	80.9	56.0	56.3	67.6
Febuary	6/ 84-93	78.9	53.5	51.8	69.6
Wholesale price froz. brown (5-lb. pkg.), Chicago, Ill.:					
September	-	113-118	87-90	65-70	62-64
August	-	110-112	76-91	64-67	62-64
July	-	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
April	100-105	94-97	69-70	74-75	75-82
March	102-106	94-95	69-71	65-68	81-83
February	102-106	93-95	69-71	65-67	82-87

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 Feb. 28, 1963, includes 957,000 pounds; Mar. 31, 1963, includes 1,536,000 pounds; Apr. 30, 1963, includes 545,000 pounds; and May 31, 1963, includes 544,000 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 and 1962 are preliminary. June 1963 data estimated from information published daily by the New Orleans Fishery Market News Service. To convert shrimp to heads-on weight multiply by 1.68.

South Carolina

FISHERIES BIOLOGICAL RESEARCH PROGRESS, APRIL-JUNE 1963:

The following is a report on the progress of biological research by the Bears Bluff Laboratories, Wadmalaw Island, S. C., for April-June 1963:

Oyster Studies: During April-June 1963, oyster work has largely been confined to mapping of intertidal beds in the vicinity of Hilton Head. This was done in conjunction with the State's Division of Commercial Fisheries. At the request of that Division, State seed oyster beds were studied. The beds are located along the southern face of St. Helena Island. Detailed studies on the size of oysters and the density of population were made in that area in order to determine the number of bushels of seed oysters which could be removed without depleting the beds.

In the upper reaches of the Toogoodoo River to the northwest of the Laboratory, a subtidal oyster bed was examined. Spat baskets placed on that bed indicated a light spat fall and the area was marked off for shell-cultch planting. This experimental planting will be carried out for the Laboratory by a Yonges Island canning company.

Shrimp Studies: Brown shrimp postlarvae, which first showed up in quantity in experimental plankton tows during the middle of March, continued to enter inside waters through early May. The number of postlarvae was somewhat less than during 1962. This decrease in postlarval shrimp is now being reflected in the catch per-unit-of-effort of juvenile and adult brown shrimp in Bears Bluff Laboratories' shrimp survey trawling at regular stations in coastal waters.

The unusually heavy rainfall which occurred during the last two weeks in June (over 9 inches at Bears Bluff) apparently brought about a seaward migration of much of the brown shrimp population from the creeks and rivers of the marshland areas. Commercial catches offshore increased greatly during that period but was expected to be only short-lived.

A few large white "roe" shrimp began to appear in offshore catches in late April and early May of this year. Unusual numbers of brown spotted shrimp were observed during May, and those shrimp were even more numerous than white shrimp at many locations.

Postlarval white shrimp began to appear in plankton tows in late May and continued to enter inshore waters through June. These postlarvae were very scarce, but were expected to increase in quantity by early July. Some brown spotted shrimp postlarvae also were taken in experimental plankton tows,

and it seems that this species will be more plentiful this year than usual

Finfish Experimental Otter Trawling: Experimental otter trawling at regular stations situated throughout the coastal area was continued on schedule during the quarter. The catch per-unit-of-effort for croaker and blue crabs was slightly lower during April through June of this year as compared with that period of 1962, but the decrease was so small that it is probably of little significance. Spot, however, were approximately 2.5 times less abundant in experimental trawling during the quarter as compared with that of last year. Also, both brown and white shrimp were considerably less numerous during the quarter.

Pond Cultivation: The experimental shrimp ponds at Bears Bluff presumably are not heavily populated this season because of the scarcity of postlarval and juvenile brown shrimp. Thus, rather than drain the ponds for harvest as is usual during the latter part of June, the ponds will be unharvested until October. White shrimp, larval and juvenile, will be added in July and August.

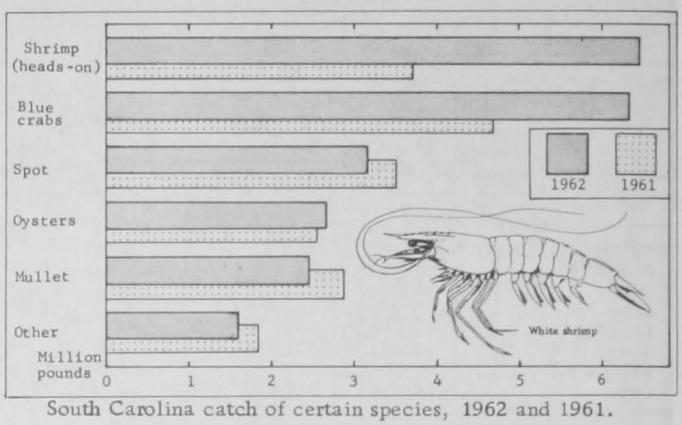
In April, the shrimp ponds were treated with rotenone to remove predaceous fishes. Further treatment will be given the ponds in August. To date supplemental food has not been added to any of the experimental ponds, but feeding with chopped fresh fish will begin in July.

A small-scale feeding experiment was carried out on two groups of juvenile brown shrimp. One group was fed with chopped fish, the other was unfed. Results indicated that supplemental feeding reduces the mortality of the captive shrimp by over 50 percent. This experiment also indicated that the growth rate of shrimp under crowded conditions is slow despite feeding.

* * * * *

FISHERY LANDINGS, 1962:

During 1962, landings of fish and shellfish at South Carolina ports totaled 22.7 million pounds--an increase of 18 percent as compared with 1962. Finfish landings decreased from 8 million pounds in 1961 to 7.1 million pounds in 1962, while shellfish landings increased from 11.2 to 15.5 million pounds. The greater part of the increase was due to the recovery in the catch of shrimp--one of the mainstays in the economy of the State's fisheries. Increased catches of blue crabs also contributed to the greater volume of shellfish landed.



South Carolina catch of certain species, 1962 and 1961.

Food finfish landings in 1962 were about 11 percent less than in 1961, due primarily to poor beach-seine fishing in Horry County during the fall months. Mullet and spot were 3 to 4 weeks late in migrating along the shore and by the time the fish appeared, bad weather prevented fishing. Flounder landings in 1962 were up 40 percent compared with the preceding year; however, king whiting landings decreased 18 percent, spot 10 percent, and sea bass, 17 percent.

Shrimp landings in 1962 amounted to 6.5 million pounds (heads-on), a gain of 2.6 million pounds over 1961. Landings of brown shrimp in June, July, and August accounted for most of the gain. The average ex-vessel price for shrimp in 1962 was about 6 cents above that in 1961.

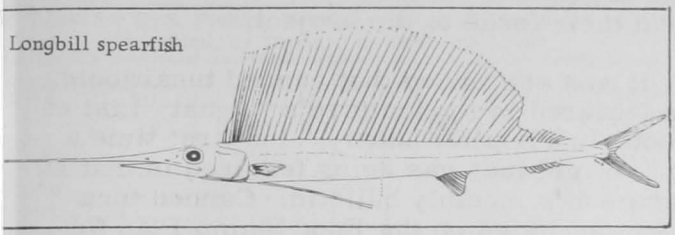
Blue crab landings in 1962 amounting to 6.3 million pounds were up 1.7 million pounds or 36 percent from 1961. The catch was the second highest recorded in the last 30 years. Most of the crabs taken by otter trawlers were shipped to Georgia, while the pot and trot line crabs were processed in South Carolina.

The oyster harvest of 2.7 million pounds in 1962 was up 5 percent from a year earlier. However, during the spring 1962 season, shucking plants experienced unsettled market conditions and low prices for the shucked product at a time the provisions of the new minimum wage law had to be met. These conditions caused many firms to close early in the spring season.

Spearfish

NEW SPECIES IDENTIFIED:

The presence in Atlantic and Gulf coastal waters of a new species of billfish or spearfish previously unknown to science has been established by biologists at the Institute of



Marine Science, University of Miami. The fish was described by two scientists who have been conducting a worldwide study of marlins and other large marine fishes for several years. They have named the new species Tetrapturus pfluegeri in honor of the late Al Pflueger, Miami taxidermist and naturalist, who first recognized the presence of this fourth type of billfish in Florida waters.

The new fish, whose common name is the longbill spearfish, has been occasionally caught over the years by anglers and was often inaccurately identified as either a sailfish or a white marlin. The most obvious difference between the spearfish and other billfish is the size and shape of the dorsal fin, which in the spearfish is somewhat higher throughout most of its length than the dorsal fin of the white marlin, but not as high as the dorsal fin (or "sail") of the sailfish. Also, the dorsal fin of the spearfish is not spotted. Another difference is that the spearfish bill is shorter than the bill of either the sailfish or the white marlin.

Very little is known about the habits, distribution, or prevalence of the new species, although its identity is now known from Texas to Puerto Rico, and from Delaware to Venezuela. Definite catch records are available on only 36 spearfish most of which were taken from the Gulf Stream off southeast Florida. It is a small species, as billfishes go. The largest one on record (taken off Miami Beach in 1958) was about $6\frac{1}{2}$ feet long and weighed about 68 pounds.

The two investigators from the Institute of Marine Science were the first scientists to associate the new billfish with the spearfish group. After a trip to the Mediterranean, they determined that the spearfish in western Atlantic waters is not the same as the Mediterranean spearfish.

The success of the University of Miami billfish program--which has taken Institute of Marine Science specialists to Hawaii, New Zealand, Chile, Panama, Venezuela, the Mediterranean, and other areas--depends to a great extent on the support and cooperation of anglers. A scientist said that, "due to the help of sport fishermen, charter boat captains, taxidermists and others, we are learning much about pelagic fishes that might not otherwise have been learned for many years." (News of Institute of Marine Science, May 23, 1963.)

Tuna

BLUEFIN TUNA TAGGED OFF CAPE COD RECAPTURED NEAR MARYLAND COAST:

An early tag return from a bluefin tuna released by the U. S. Bureau of Commercial Fisheries exploratory fishing vessel Delaware was reported in a purse-seine catch 20 miles off Ocean City, Md. The tuna was released 150 miles southeast of Cape Cod on June 8, along with 28 others of the same species, and traveled 325 miles to the west before its recapture by a commercial fishing vessel on June 27. Two plastic dart-type tags were recovered out of three tags placed in the fish. The fish weighed 92 pounds and measured 54 inches (fork length).

It has generally been believed that bluefin tuna off the edge of the Continental Shelf south of Cape Cod during the late spring of the year rapidly move into inshore areas to the north and east. These recently-tagged fish appear to have moved contrary to previous findings and suppositions.

* * * * *

BLUEFIN TUNA TAGGED OFF MEXICO RECAPTURED SOUTH OF JAPAN:

A bluefin tuna tagged near Guadalupe Island, Mexico, was recovered 5 years and 80 days later in the western Pacific Ocean off the south coast of Japan on April 23, 1963. After it was tagged the fish traveled more than 6,000 miles. This recovery holds the record for the longest period that a tagged tuna of any species has been free. The tuna weighed about 35 pounds when tagged and released in 1958 by a biologist of the Inter-

American Tropical Tuna Commission. It weighed in at 242 pounds (gutted and gilled) when recaptured.

Fishery scientists consider this recapture of great importance because it provides knowledge that bluefin tuna of the eastern and western Pacific apparently intermingle. The extent of intermingling, however, still remains to be determined.

Earlier recoveries of tagged fish have confirmed the Pacific migration of other species of the tuna family. A 2,370-mile migration of an albacore from Hawaii to Japan was recorded in March 1956. This followed the 1953 recapture near Tokyo of an albacore tagged off the California coast. Recoveries of bluefin tagged off the United States east coast and recovered in north European waters have demonstrated a trans-Atlantic migration for bluefin tuna.

The newly recovered bluefin was very large if compared to the average weight of 20 to 40 pounds for a Pacific bluefin. Atlantic bluefin, however, are usually considerably larger, weighing sometimes up to 1,500 pounds. The bluefin is the largest species of tuna and is also known as an important game fish, as well as a commercially valuable species. Generally, it seems to prefer more temperate waters than its related species, the yellowfin and skipjack tuna.

The extensive migrations of tunas have long been suspected by fishery biologists. The tagged fish provides the proof needed to trace their actual migrations. Many aspects of the biology of tunas are still unknown and much more remains to be learned about their habits and the sizes of the various tuna populations.

The Inter-American Tropical Tuna Commission is an international organization devoted to research on the eastern Pacific tuna and their conservation. It was established in 1949 by the United States, Costa Rica, Panama, and Ecuador.

* * * * *

INDUSTRY-GOVERNMENT MARKET PROMOTION:

The United States tuna-canning industry, with the aid of two Federal Government agencies, launched "Operation Tuna" during the summer months of 1963, a multi-million dollar promotional campaign to improve the marketing of canned tuna. In a telegram to national food and allied trade associations, the U. S. Department of the Interior announced that it and the Department of Agriculture would actively cooperate with the tuna industry in this nationwide merchandising effort and urged that the trade associations also lend their force to the project.

It was announced that canned tuna would be featured in Agriculture's August "List of Foods in Plentiful Supply," the first time a fishery product was being featured in that Department's monthly bulletin. Canned tuna also was listed on the Food Stamp Plan for August. In addition, the Agriculture Department cooperated with the Interior Department in the distribution of promotional material through Agricultural marketing offices.

The U. S. Bureau of Commercial Fisheries developed the following promotional materials which are being used nationally: television slides and drop cards, and television and radio scripts adapted for public service announcements; two flyers; and food photographs for newspaper food editors.

U. S. Fishing Vessels

DOCUMENTATIONS ISSUED AND CANCELLED, MAY 1963:

During May 1963, a total of 85 vessels of 5 net tons and over were issued first documents as fishing craft, as compared with 47 in May 1962. There were 42 documents cancelled for fishing vessels in May 1963 as compared with 31 in May 1962.

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

Area (Home Port)	May		Jan.-May		Total
	1963	1962	1963	1962	1962
	(Number)				
Issued first documents 2/:					
New England	3	4	10	13	28
Middle Atlantic	3	1	7	2	3
Chesapeake	8	4	17	16	43
South Atlantic	9	3	27	13	47
Gulf	31	10	97	38	110
Pacific	30	25	77	62	130
Great Lakes	-	-	2	-	5
Puerto Rico	1	-	1	-	2
Total	85	47	238	144	368
Removed from documentation 3/:					
New England	5	3	24	11	24
Middle Atlantic	1	5	22	24	39
Chesapeake	4	1	10	6	23
South Atlantic	8	1	27	16	38
Gulf	13	12	55	46	104
Pacific	9	9	43	59	111

(Table continued on next page)

Area (Home Port)	May 1963	May 1962	Jan.-May 1963	Jan.-May 1962	Total 1962
	(Number)				
Great Lakes	2	-	7	8	22
Hawaii	-	-	1	3	3
Puerto Rico	-	-	-	-	1
Total	42	31	189	173	365

1/For explanation of footnotes, see table 2.

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

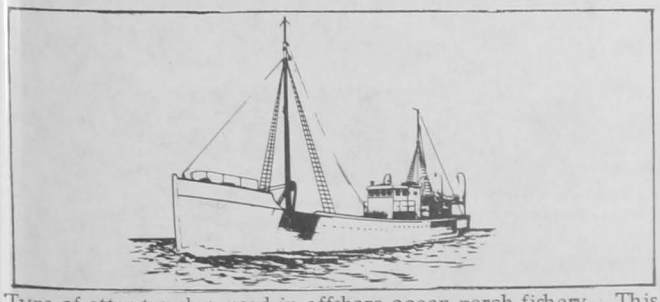
Gross Tonnage	Issued 2/	Cancelled 3/
	(Number)	
5-9	14	18
10-19	36	12
20-29	10	4
30-39	2	3
40-49	5	-
50-59	-	2
60-69	5	2
70-79	10	-
290-299	1	-
310-319	1	-
430-439	-	1
790-799	1	-
Total	85	42

1/Includes both commercial and sport fishing craft. A vessel is defined as a craft of 5 net tons and over.
2/Includes 2 redocumented vessels in May 1963, previously removed from records. Vessels issued first documents as fishing craft were built: 55 in 1963; 6 in 1962; 4 in 1961; 2 in 1960; 1 in 1959; 1 in 1958; 1 in 1955; 1 in 1951; 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 LOANS AND OTHER FINANCIAL AID FOR VESSELS, APRIL 1-JUNE 30, 1963:

From the beginning of the program in 1956 through June 30, 1963, a total of 1,268 applications for $34,599,601 have been received by the U. S. Bureau of Commercial Fisheries, the agency administering the Federal Fisheries Loan Fund. Of those received, 673 ($15,472,951) have been approved, 470 ($12,087,624) have been declined or found ineligible, 147 ($5,957,099) have been withdrawn by applicants before being processed, and 8 ($303,544) are pending. Of the applications approved, 267 were approved for amounts less than applied for, aggregating $1,648,027.



Type of otter trawler used in offshore ocean perch fishery. This is one type of fishing vessel on which Fisheries Loan Fund loans are granted.

The following loans were approved from April 1, 1963, through June 30, 1963:

New England Area: All in Maine--Maynard A. Townsend, Boothbay, $6,100; Cleveland R. Barter, Jr., East Boothbay, $5,500; John Field, Monhegan Island, $2,000; Ronald F. Snow, Topsham, $5,500; Sigward W. Beckman, Vinalhaven, $3,500.

California: Donald and Walter Ghera, Eureka, $7,500; Russell A. Wilson, Eureka, $24,000.

Pacific Northwest Area: Edwin N. Goodrich, Astoria, Oreg., $22,000; Jerome S. Werschkul, Warrenton, Oreg., $16,907; Ludvig Furseth and Darold M. Mathisen, Seattle, Wash., $22,000; Gunnar M. Ildhuso, Seattle, Wash., $20,000.

Alaska: Aaron W. Bauder, Anchorage, $6,500; Roy W. Allen, Haines, $790; John B. Child, Homer, $14,000; Edmond Allain, Ketchikan, $3,000.

Hawaii: William Y. Hoy, Waianae, Oahu, $8,000.

Under the Fishing Vessel Mortgage Insurance Program (also administered by the Bureau) during the second quarter of 1963, 6 applications to insure mortgages for $1,181,665 were received and commitments to insure mortgages in the amount of $248,004 on 6 fishing vessels were approved. Since the start of this program (June 5, 1960), 28 applications were received for $3,486,640. Of the total, 21 applications have been approved for $2,128,975. Seven applications for $1,357,665 are pending. Since the Mortgage Insurance 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 12 ($436,729), approved 8 ($289,064).

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

In the Construction Differential Subsidy Program, 5 applications for $505,000 were received during the second quarter of 1963.

The first approval in this program was made in March 1961. The amount approved for subsidy represents about one-third the cost of a new vessel. Since the beginning of the program on June 12, 1960, 13 applications (excludes several ineligible applications) were received for $1,101,770, of which 6 applications were approved for $546,103. Seven applications for $555,667 under this program are pending.

* * * * *

"DAVID STARR JORDAN" WILL BE NEW RESEARCH VESSEL FOR PACIFIC INVESTIGATIONS:

A $1,747,876 contract to build the David Starr Jordan as a research vessel for the U. S. Bureau of Commercial Fisheries has been awarded to a firm in Sturgeon Bay, Wis. The vessel is to be delivered by October 1964. It will be based at San Diego, Calif., and used for tuna research and other fishery and oceanographic investigations in the Pacific Ocean.

Named after the prominent ichthyologist and first president of Stanford University, the David Starr Jordan will replace the Black Douglas which is over 30 years old.

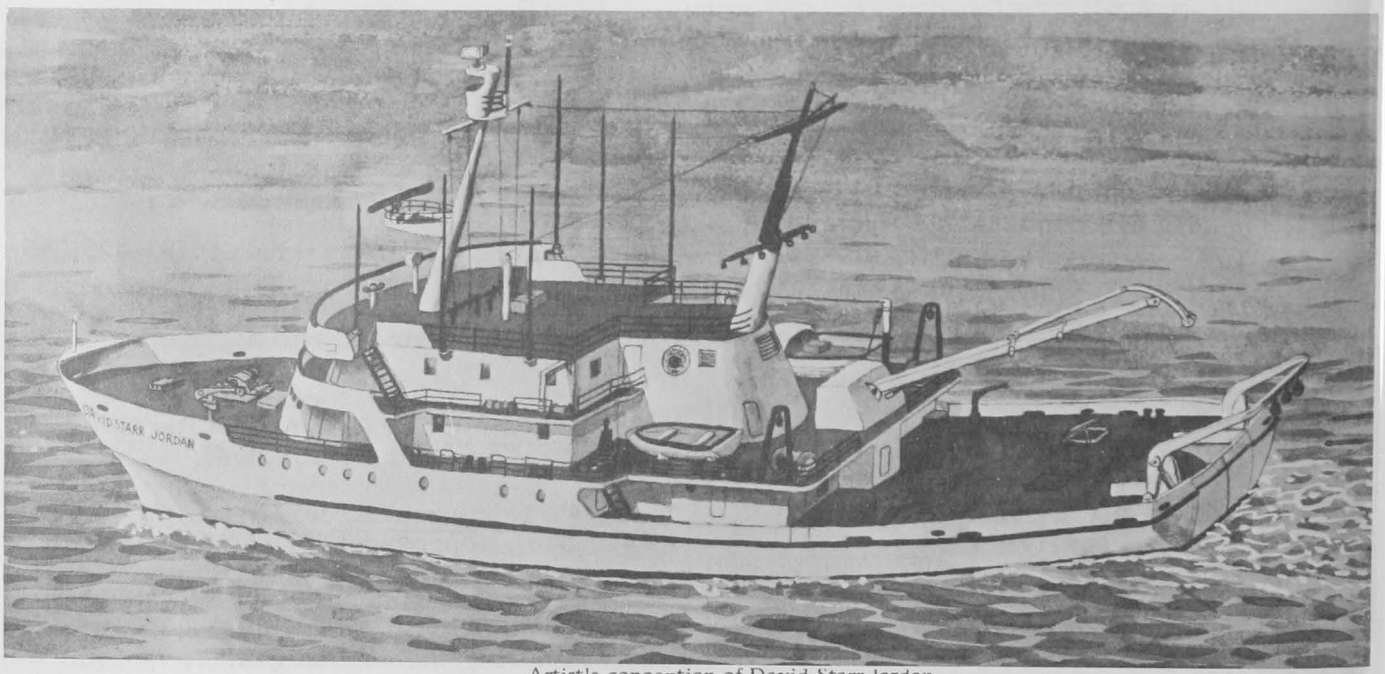
The new vessel will be of welded steel construction with ranked stem and transom stern. It will have 2 partial decks below and 3 superstructure decks above the main deck. Specifications are: over-all length 171 feet, beam 32 feet, and draft 11 feet. Twin Diesel engines of 450 horsepower, each with controllable pitch propellers, will drive the vessel at 12 knots. It will be able to remain at sea more than 40 days and have a cruising range of more than 9,000 miles.

The new vessel will be outfitted with radar and modern navigational and oceanographic equipment. It will be equipped with biological hydrographic, and chemical laboratories, as well as a lead-lined storage area for radioactive material. More than a third of the vessel's enclosed area will be devoted to laboratories and scientific supporting equipment which will include a data-processing center. Another feature is a large enclosed room which will house a combination seine-trawl winch and a deep-dredge winch. There will be living and working space for 22 crew members and 13 scientists. The David Starr Jordan will also have underwater observation stations similar to those on the recently completed Albatross IV.

* * * * *

SHRIMP FISHING VESSELS AVERAGED CLOSE TO 52 FEET IN LENGTH IN 1961:

United States vessels in the 1961 South Atlantic and Gulf shrimp fishing fleet of about 3,512 vessels ranged from 24 to 125 feet in length. The over-all average shrimp vessel was 49.5 feet. The average length for shrimp



Artist's conception of David Starr Jordan.

Fig. 1 - Shrimp vessels docked at Thunderbolt, Ga.

vessels in the South Atlantic area was 43.8 feet, while in the Gulf the average was 51.9 feet. In 1961, there were 244 shrimp fishing vessels that fished both the South Atlantic and Gulf waters. These craft range from 32 to 71 feet in length, with the high point of the frequency occurring in the 51-foot class.

During 1961, there were in the South Atlantic and Gulf fleet, 50 vessels of less than 30 feet, 640 ranging in length from 30 to 39

Fig. 2 - Typical shrimp trawlers docked at Tampa, Fla.

feet, 1,000 vessels of 40-49 feet, 1,169 vessels 50-59 feet long (the high point of the frequency), 611 vessels of 60-69 feet, and 35 vessels of 70-99 feet. Only 7 vessels were 100 feet and over in length, with the longest measuring 125 feet.

* * * * *

CONVERTED YACHT NOW OLDEST FISHING VESSEL IN UNITED STATES:

The oldest fishing vessel still active in the United States fisheries is the Virginia which was built as a luxury two-masted schooner yacht in 1865 at an Alabama shipyard. Now, 98 years later, the Virginia is still active in the Gulf of Mexico. Her present owner predicts that a century hence the Virginia will still be seaworthy and active.

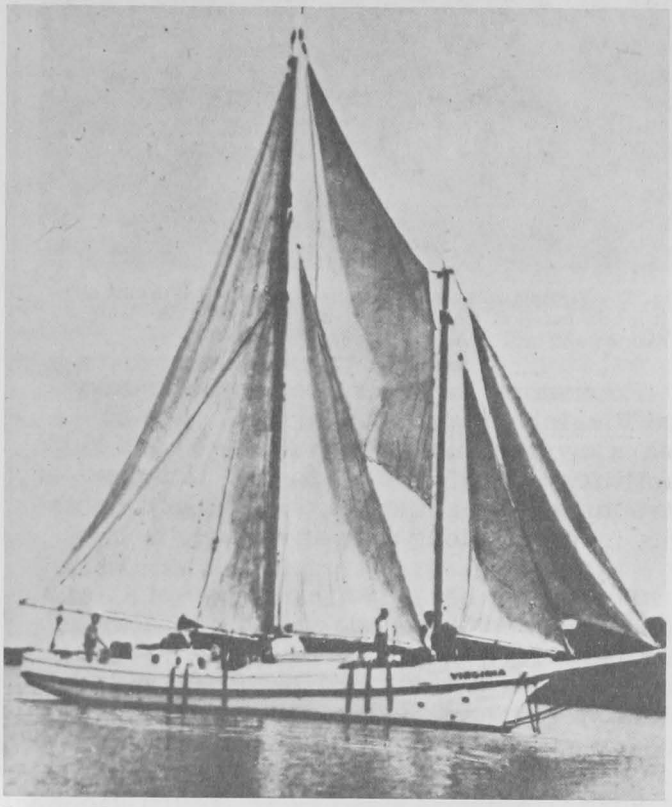


Fig. 1 - Virginia, a two-masted schooner (launched in 1865 on Fish River, Ala.) as it looked 25 years ago. The craft, with masts gone and otherwise changed, is now the oldest commercial fishing vessel in the United States commercial fishing fleet.

Attention has been focused on the Virginia as the result of a study by the U. S. Bureau of Commercial Fisheries to determine the age of the Nation's fishing fleet. The recently released compilation listed the Alabama-built schooner as the most venerable.

The Virginia began her commercial fishing career comparatively recently--in 1946--after a 5-year turn as a charter boat for sport fishermen. Her long history before that was not part of the fleet-age study.

The vessel now is based at Tampa, Fla., and her present owner purchased the craft in 1956. Those who have seen the boat in action in and out of Florida ports assert she is "strong as the Rock of Gibraltar." Her keel and ribs are black walnut and the planking is black cypress, two inches thick.

Fig. 2 - Virginia was converted to a power craft 25 years ago. It is now based at Tampa, Fla., and operates in the Gulf of Mexico and nearby Atlantic Ocean.

For nearly three-quarters of a century the Virginia traveled under sail. But 25 years ago the masts were removed and bunk facilities for 11 were taken out. A superstructure of combined pilothouse and cabin was installed along with an engine.

The vessel has a gross tonnage of 14 and can carry 20,000 pounds of iced fish, although the usual cargo is about 5,000 pounds. She can stay at sea 30 days, but generally makes 20 fishing trips a year. Her occupants no longer are people on a pleasure trip, but a crew of 2 to 4 fishing for red snapper and grouper.

The Virginia is known as a hand-liner because the catches are made by lines on hand-operated reels. One electric reel has been installed and the owner intends to replace the other hand-operated reels in the near future. An automatic pilot, depth-recorder, and fish-finder are also part of her modern equipment.

U. S. Foreign Trade

IMPORTS OF CANNED TUNA UNDER QUOTA:

United States imports of tuna canned in brine during January 1-June 29, 1963, amounted to 22,414,914 pounds (about 1,067,400 std. cases), according to data compiled by the Bureau of Customs. This was 19.0 percent less than the 27,679,895 pounds (about 1,318,100 std. cases) imported during January 1-June 30, 1962.

United States imports of tuna canned in brine during January 1-June 1, 1963, amounted to 19,864,501 pounds (about 945,900 std. cases), according to data compiled by the Bureau of Customs. This was 11.0 percent less than the 22,325,162 pounds (about 1,063,100 std. cases) imported during January 1-June 2, 1962.

The quantity of tuna canned in brine which may be imported into the United States during the calendar year 1963 at the $12\frac{1}{2}$-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.

* * * * *

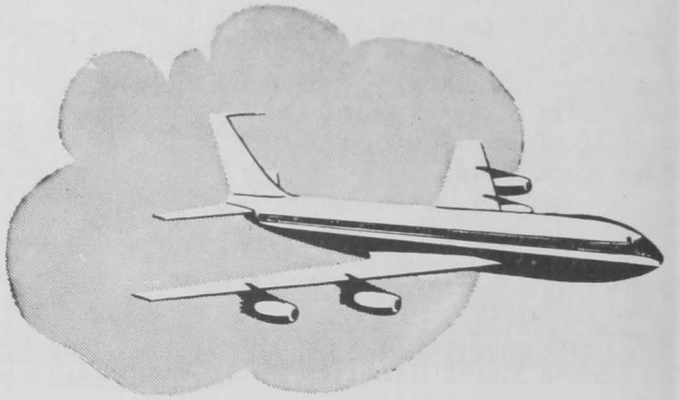
AIRBORNE IMPORTS OF FISHERY PRODUCTS, JANUARY-FEBRUARY 1963:

Airborne fishery imports into the United States in January 1963 amounted to 1,133,400 pounds valued at $613,400, up 29.6 percent in quantity and 23.6 percent in value from those in the previous month. But in February 1963, shrimp shipments were cut back and airborne imports amounted to only 792,000 pounds valued at $420,600.

Total airborne imports in January-February 1963 were up 53.6 percent in quantity and 90.9 percent in value from those in the same period of 1962. The increase was due mainly to larger shipments of shrimp and spiny lobsters.

Raw headless shrimp continued to make up the bulk of the airborne shrimp imports--in January 1963, shipments consisted of 833,462 pounds of fresh or frozen raw headless, 114,343 pounds of frozen peeled and deveined, and 10,927 pounds of unclassified shrimp; in February 1963, shipments consisted of 613,349 pounds of fresh or frozen raw headless, 11,842 pounds of frozen peeled and deveined, and 17,366 pounds of unclassified shrimp. Approximately 90 percent of the total airborne shrimp imports in January and February 1963 entered through the U. S. Customs District of Florida. The remainder entered through the Customs Districts of New Orleans (La.), Galveston (Tex.), and San Francisco (Calif.).

Airborne imports of shellfish other than shrimp in January 1963 included 109,709 pounds of spiny lobster tails and 24,205 pounds of unclassified spiny lobster products. In February 1963, airborne spiny lobster arrivals consisted of 81,027 pounds of lobster tails and 4,218 pounds of unclassified spiny lobster products. The spiny lobster airborne imports originated in Central and South American countries and entered through the Customs Districts of Florida, Galveston (Tex.), and Puerto Rico.



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

Product and Origin 2/	Jan.-Feb. 1963 Qty. 3/	Jan.-Feb. 1963 Value 4/	Jan.-Feb. 1962 Qty. 3/	Jan.-Feb. 1962 Value 4/
	1,000 Lbs.	US$ 1,000	1,000 Lbs.	US$ 1,000
Fish:				
Mexico	39.9	13.0	76.7	10.0
Honduras	8.5	2.0	-	-
British Honduras	19.9	4.7	-	-
United Kingdom	0.7	1.5	-	-
Ireland	0.8	0.3	-	-
France	0.4	0.3	0.1	0.1
Canada	-	-	1.0	0.4
Total fish	70.2	21.8	77.8	10.5
Shrimp:				
Guatemala	62.3	32.3	49.5	24.0
El Salvador	107.5	74.1	67.1	42.2
Nicaragua	9.5	3.5	329.9	107.1
Costa Rica	210.4	101.2	22.6	9.0
Panama	405.4	217.5	135.6	70.5
Venezuela	806.2	392.8	462.8	194.7
Ecuador	-	-	12.2	3.4
Mexico	-	-	6.1	3.8
Total shrimp	1,601.3	821.4	1,085.8	454.7
Shellfish other than shrimp:				
Mexico	48.1	28.2	5.0	2.9
British Honduras	67.3	54.4	39.9	26.1
Honduras	0.4	0.3	28.4	24.9
Nicaragua	26.9	23.2	-	-
Costa Rica	62.1	53.6	1.0	0.9
Jamaica	11.5	8.7	14.9	10.9
Dominican Republic	6.2	5.0	-	-
Netherlands Antilles	16.6	9.9	1.8	0.7
Venezuela	13.7	6.0	11.6	6.0
Ecuador	1.1	1.5	-	-
Panama	-	-	0.5	0.6
Guatemala	-	-	2.4	1.9
Leeward and Windward Islands	-	-	1.7	0.6
Japan	-	-	0.1	0.3
France	-	-	0.1	0.2
Total shellfish (excluding shrimp)	253.9	190.8	107.4	76.0
Grand total	1,925.4	1,034.0	1,271.0	541.6

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.
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, January-February 1963, U. S. Bureau of the Census.

The leading finfish product imported by air in the first two months of 1963 was fish fillets (mostly from Mexico, Honduras, and British Honduras).

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.

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EDIBLE FISHERY PRODUCTS:

May 1963: Imports of fresh, frozen, and processed edible fish and shellfish into the United States in May 1963 were up 2.1 percent in quantity and 9.9 percent in value from the previous month. In May, shipments of the higher-priced northern lobsters from Canada were much heavier, and imports were also up considerably for canned lobsters, fish blocks and slabs, frozen tuna other than albacore, canned sardines not in oil, and sea scallops. The gain was partly offset by a decline in imports of frozen albacore tuna, canned tuna, canned sardines in oil, ocean perch fillets, swordfish fillets, and canned oysters.

Compared with the same month in 1962, imports in May 1963 were down 19.1 percent in quantity, and 2.9 percent in value. There was a heavy cutback in imports of frozen tuna this May, as well as a sizable decline in imports of canned sardines in oil, canned salmon, cod fillets, flounder fillets, and swordfish fillets. But imports were up for some of the higher-priced fishery products such as frozen spiny lobsters, canned oysters, and canned crab meat. In addition, a number of fishery products increased in price this year. Therefore, the value of the imports in May 1963 did not decline as much as the quantity.

In the first 5 months of 1963, imports were down 6.0 percent in quantity and 2.4 percent in value. Fluctuations in individual import items were much greater than the over-all totals indicate. Imports were down sharply in 1963 for frozen tuna, canned sardines in oil, and canned salmon. There was also a noticeable drop in arrivals of canned tuna, haddock fillets, and flounder fillets. On the other hand, there was a large increase in imports of canned sardines not in oil and frozen shrimp, as well as heavier shipments of ocean perch fillets, canned crab meat, and frozen frog legs.

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

Item	Quantity				Value			
	May		Jan.-May		May		Jan.-May	
	1963	1962	1963	1962	1963	1962	1963	1962
	(Millions of Lbs.)				(Millions of $)			
Imports:								
Fish & Shellfish:								
Fresh, froz. & processed 1/	88.1	108.9	447.3	475.6	33.2	34.2	155.4	159.3
Exports:								
Fish & Shellfish:								
Processed only 1/ (excluding fresh & frozen)	2.0	2.1	14.6	14.2	0.7	0.7	5.6	5.9

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

Exports of processed fish and shellfish from the United States in May 1963 were up 25.0 percent in quantity, but down 12.5 per-

cent in value from those in the previous month. Larger shipments of the lower-priced canned squid accounted for most of the increase in quantity, while smaller shipments of the higher-priced canned salmon reduced the value of the exports in May.

Compared with the same month in 1962, the exports in May 1963 were down 5.6 percent in quantity, although the value of the exports was the same in both months. A sharp drop in exports of canned sardines not in oil this May was almost offset by larger shipments of most other canned fish export items.

Processed fish and shellfish exports in the first 5 months of 1963 were up 2.8 percent in quantity, but down 5.9 percent in value from those in 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 small gain in quantity was due mainly to heavier shipments of the lower-priced canned squid (mostly to Greece and the Philippines). There was also a moderate increase in exports of canned salmon and canned shrimp. But exports of canned sardines not in oil and canned mackerel were down. Although not covered in the table, exports of frozen shrimp were up sharply in the first 5 months of 1963 (increase mostly in exports to Japan).

April 1963: Imports of fresh, frozen, and processed edible fish and shellfish into the United States in April 1963 were down 9.8 percent in quantity and 9.3 percent in value from the previous month. The drop was due mainly to sharply lower imports of canned sardines not in oil and frozen albacore tuna, as well as a moderate decline in frozen shrimp arrivals.

Compared with the same month in 1962, imports in April 1963 were down 5.0 percent in quantity and 2.0 percent in value. There was a heavy cutback in imports of frozen tuna this April and also a large drop in imports of canned salmon and canned sardines in oil. But there was a sizable gain in imports of ocean perch fillets, sea catfish fillets, canned tuna in brine, and frozen shrimp.

In the first 4 months of 1963, imports were down 2.0 percent in quantity and 2.3 percent in value as compared with the same period in 1962. Although the over-all totals were about the same in both years, there was considerable fluctuation in individual import items. There was a large increase in the 1963 imports of canned sardines not in oil, and imports of frozen shrimp were also considerably higher. On the other hand, imports were down for frozen tuna, canned tuna in brine, canned salmon, canned sardines in oil, frozen spiny lobsters and frozen haddock fillets.

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

Item	Quantity				Value			
	Apr.		Jan.-Apr.		Apr.		Jan.-Apr.	
	1963	1962	1963	1962	1963	1962	1963	1962
	(Millions of Lbs.)				(Millions of $)			
Imports:								
Fish & Shellfish:								
Fresh, froz. & processed 1/	86.3	90.8	359.2	366.7	30.2	30.8	122.2	125.1
Exports:								
Fish & Shellfish:								
Processed only 1/ (excluding fresh & frozen)	1.6	2.0	12.6	12.1	0.8	1.2	4.9	5.2

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

Exports of processed fish and shellfish from the United States in April 1963 were down 48.4 percent in quantity and 33.3 percent in value from those in the previous month. The cutback in shipments in April affected most canned fish export items with canned salmon and canned squid showing the largest decline.

Compared with the same month in 1962, exports in April 1963 were down 20.0 percent in quantity and 33.3 percent in value. Exports were down this April for the higher-priced canned salmon, while shipments of the lower-priced canned mackerel and canned squid showed a modest increase.

Processed fish and shellfish exports in the first 4 months of 1963 were up 4.1 percent in quantity, but down 5.8 percent in value from those in 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 small gain in quantity was due mainly to heavier shipments of the lower-priced canned squid (mostly to Greece and the Philippines). There was also a moderate increase in exports of canned salmon, canned sardines not in oil, and canned shrimp. But exports of canned mackerel were down. Although not covered in the table, exports of frozen shrimp were up sharply in the first 4 months of 1963 (increase mostly in exports to Japan).

Vessel Unloading

FISH UNLOADING, DE-ICING, AND WEIGHING EQUIPMENT RETESTED AT BOSTON:

The mobile fish unloading, de-icing, and weighing equipment, developed by the Gloucester Technological Laboratory of the U. S. Bureau of Commercial Fisheries as part of a program to promote efficient and sanitary handling of fishery products, was retested at the Boston Fish Pier during the week of June 10, 1963.

Receiving hopper of one of the fish-handling units tested.

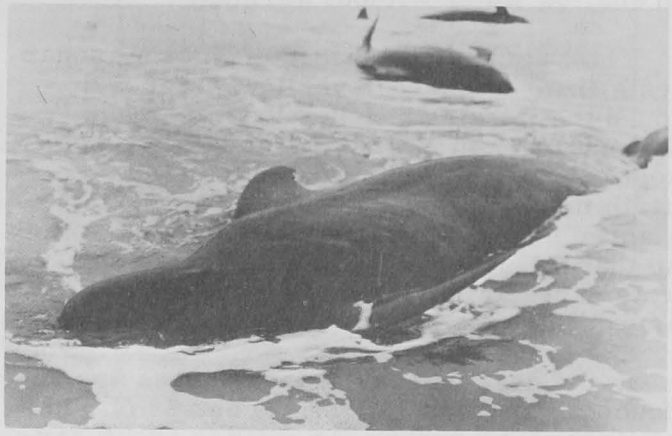
The unit operated successfully at the rate of 20,000 pounds of fish an hour, and was able to keep ahead of the lumpers working in the fish holds at all times.

Note: See Commercial Fisheries Review, August 1957 p. 9, for a diagram and description of the mobile fish-unloading equipment. Also, "Mechanically De-icing and Weighing Groundfish at the Dock in New England," reprint from Fishery Industrial Research, vol. 2 no. 1.

Whales

SCIENTISTS EXPLAIN WHY WHALES STRAND ON BEACHES:

Does a failure of whale "sonar" cause the mass strandings of whales that occur many times yearly in various parts of the world? A new theory of whale-strandings was developed by a Dutch zoologist, who accumulated records of 133 mass strandings throughout the world. Thousands of whales of 20 different species were involved. All strandings occurred on gently sloping beaches, broad shallow flats, or in shallow bays or estuaries. None took place on rocky coasts. Significantly, most strandings involved pilot whales, sperm whales, or false-killer whales--all of which are species that generally stay offshore in deep water.



These pilot whales became stranded on the beach near Marineland, Fla. Science now believes that such mass strandings are caused by a failure of the whales' "sonar" systems in shallow water on gently sloping beaches.

Research has recently established that whales have highly sensitive echo-ranging organs. All species tested have been found to emit a wide range of sounds, including ultrasonic clicks that are apparently used in the same way that ships use the sonic "pings" of fish-finders and depth-sounders. Whales are believed to use their sonars to avoid collisions, to maintain orderly formations, to navigate, and to find prey. By gauging the time it takes a pulse to bounce back from an object, they judge distance and make extremely minute differentiations. Tests indicate that some species, when blindfolded or in total darkness, can swim through a maze of obstacles, and can even distinguish between two fishes of different species but of about the same size. There is evidence, too, that whales may use sound signals to communicate with one another over great distances. Whales have no vocal chords and all sounds are apparently created within the blowholes, or nostrils, which are located on top of their heads.

If whale sonar is far more efficient than science has been able to devise, why should whales lose their sense of direction and dash themselves ashore in what seems a senseless, suicidal gesture? Answers to this question have been sought for centuries.

Scientific tests have established that sounds made by whales travel upward and outward but never downward. In murky water then, where vision would be ineffective, whales would presumably have to roll over and "scan"

with their sonars to determine the depth. If engrossed in feeding or chasing prey along a sloping beach, they might find themselves in shallow water without warning.

The Dutch scientist made numerous sonar tests from a vessel in shallow water and found that sloping beaches tend to "mask," distort, or even entirely eliminate returns sent out in a horizontal direction from beneath the surface. The sound waves often glanced off the sloping bottom and kept going, so that the sonar apparatus indicated deep water ahead when the vessel was actually approaching the beach and about to go aground.

In the case of whales, the hazards are undoubtedly increased when the bodies of other whales, close-packed and milling about, further hamper the effective use of sonic signals. It is easy to imagine the difficulty of screening true echo "pings" from the urgent pulses being transmitted by the other animals in the herd. And if the water becomes so shallow that the whales' blowholes cannot be kept submerged, their sonic apparatus would be totally ineffective, and complete panic might follow.

Confirmation of this new theory may constitute a major "breakthrough" in the new field of marine bioacoustics--the study of sounds made by marine animals. The sounds of whales, fish, and other ocean life are currently under investigation at a unique audio-visual Observation Station which the Institute of Marine Science, University of Miami, has set up at Bimini, in the Bahamas. The United States Navy-sponsored installation, under the supervision of the head of the Institute's submarine acoustic group, consists of an underwater television set and three hydrophones (underwater "microphones") mounted on the bottom at a depth of 65 feet. The equipment is located near a dropoff on the eastern edge of the Gulf Stream. Mile-long cables connect the underwater apparatus to a video monitor, a kinescope recorder and sound-recording and analyzing equipment housed ashore. Another hydrophone is located two miles from shore at a depth of 1,200 feet. Scientists can sit in the control room at Bimini, listen to and record sounds made by marine animals, and even see the animals which make the sounds.

More than 30 different sounds have been heard from the Institute's monitor station, indicating that the ocean is far from being a "silent world." (News release, International Oceanographic Foundation, Miami, Fla., May 15, 1963.)

Wholesale Prices

EDIBLE FISH AND SHELLFISH, JUNE 1963:

Wholesale price trends for fishery products were mostly downward this June, but tended upward for fish landed in New England. The June 1963 wholesale price index for edible fishery products (fresh, frozen, and canned) at 114.4 percent of the 1957-59 average was lower (down 1.3 percent) than for May. From May to June, prices dropped for salmon, shrimp, several canned fish items, and for fresh-water fish varieties. Compared with the same month in 1962, the wholesale price index this June was down 3.3 percent.

A drop in fresh and frozen salmon prices and sharply lower prices for Great Lakes fresh-water fish were directly responsible for a 4.9-percent decrease from May to June in the drawn, dressed, or whole finfish subgroup. Because of improved supplies at Chicago, Lake Superior whitefish prices this June were down 13.7 percent from the previous month, and prices for Great Lakes yellow pike at New York City were lower by 29.5 percent. At New York City prices for fresh and frozen dressed king salmon also were lower (dropped 6.8 percent) than in May, but fresh halibut prices remained steady from May to June. Frozen halibut stocks from the 1962 North Pacific catch were still plentiful in June and the gradually declining market for that product had some influence in bringing about much lower 1963 halibut ex-vessel and wholesale prices than a year earlier. Generally lower prices in the subgroup were offset by a substantial increase (up 13.6 percent) in ex-vessel prices for haddock at Boston because of lighter-than-normal haddock landings. Compared with June 1962, the subgroup index this June was down 4.0 percent because of lower prices for all items except fresh drawn haddock (up 64.5 percent from a year earlier).

Tallying barrels of fresh bagged scallops after unloading from vessel at the dock in the New York City Fulton Fish Market.

Higher prices than in May for fresh haddock fillets (up 5.1 percent) at Boston this June were related to the higher prices for ex-vessel haddock. Combined with higher prices for shucked oysters (up 3.0 percent) at Norfolk, the subgroup index for processed fresh fish and shellfish this June

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

Group, Subgroup, and Item Specification	Point of Pricing	Unit	Avg. Prices 1/ ($)		Indexes (1957-59=100)			
			June 1963	May 1963	June 1963	May 1963	Apr. 1963	June 1962
ALL FISH & SHELLFISH (Fresh, Frozen, & Canned)					114.4	115.9	113.6	118.3
Fresh & Frozen Fishery Products:					120.5	122.4	117.7	117.5
Drawn, Dressed, or Whole Finfish:					109.7	115.4	106.6	114.3
Haddock, lge., offshore, drawn, fresh	Boston	lb.	.13	.11	97.9	86.2	62.5	59.5
Halibut, West., 20/80 lbs., drsd., fresh or froz.	New York	lb.	.36	.36	106.4	105.9	118.3	130.1
Salmon, king, lge. & med., drsd., fresh or froz.	New York	lb.	.85	.92	118.8	127.5	122.3	134.5
Whitefish, L. Superior, drawn, fresh	Chicago	lb.	.57	.74	84.3	110.4	104.5	103.0
Yellow pike, L. Michigan & Huron, rnd., fresh	New York	lb.	.47	.66	76.2	108.1	68.8	73.7
Processed, Fresh (Fish & Shellfish):					135.1	133.9	127.7	120.6
Fillets, haddock, sml., skins on, 20-lb. tins	Boston	lb.	.42	.40	100.8	95.9	76.5	76.5
Shrimp, lge. (26-30 count), headless, fresh	New York	lb.	1.14	1.15	133.0	134.8	128.9	121.9
Oysters, shucked, standards	Norfolk	gal.	8.50	8.25	143.3	139.1	134.9	126.5
Processed, Frozen (Fish & Shellfish):					113.1	114.0	114.4	112.7
Fillets: Flounder, skinless, 1-lb. pkg.	Boston	lb.	.40	.39	100.1	98.9	97.6	96.3
Haddock, sml., skins on, 1-lb. pkg.	Boston	lb.	.35	.35	102.6	102.6	99.7	96.7
Ocean perch, lge., skins on 1-lb. pkg.	Boston	lb.	.34	.34	117.5	117.5	117.5	106.1
Shrimp, lge. (26-30 count), brown, 5-lb. pkg.	Chicago	lb.	1.00	1.02	118.6	120.4	122.8	122.2
Canned Fishery Products:					104.1	104.9	106.8	120.1
Salmon, pink, No. 1 tall (16 oz.), 48 cans/cs.	Seattle	cs.	24.00	24.25	104.6	105.7	105.7	124.2
Tuna, lt. meat, chunk, No. 1/2 tuna (6-1/2 oz.), 48 cans/cs.	Los Angeles	cs.	11.25	11.25	99.9	99.9	104.4	107.9
Mackerel, jack, Calif., No. 1 tall (15 oz.), 48 cans/cs.	Los Angeles	cs.	5.90	5.90	2/100.0	2/100.0	2/100.0	3/118.5
Sardines, Maine, keyless oil, 1/4 drawn (3-3/4 oz.), 100 cans/cs.	New York	cs.	8.81	9.06	113.0	116.2	116.2	145.1

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

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-June 1963.

rose 0.9 percent from the previous month. Fresh shrimp prices at New York City in June dropped slightly (down 1 cent a pound) from May but were still 9.1 percent higher than in June 1962. The subgroup price index this June was up 12.0 percent as compared with June a year earlier due to considerably higher prices for all items.

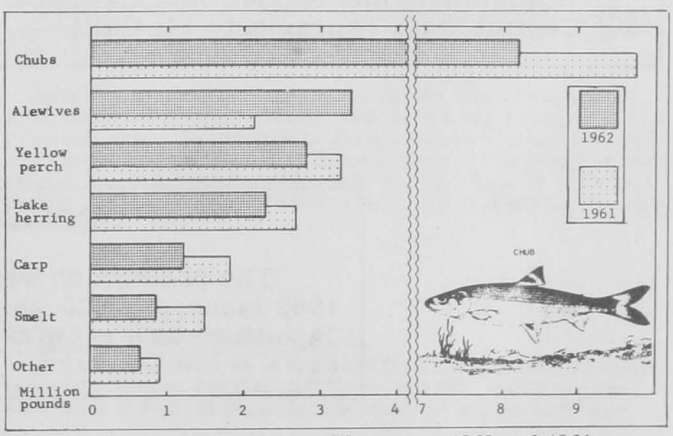
The processed frozen fish and shellfish price index this June was down 0.8 percent from the previous month, but rose 0.4 percent from June 1962. A decline (down 2 cents a pound) in frozen shrimp prices at Chicago from May to June was offset by higher prices (up 1.2 percent) for frozen flounder fillets. Prices for frozen haddock and ocean perch fillets were unchanged from the previous month. As compared with the same month a year earlier, prices this June were higher for all items in the subgroup except frozen shrimp.

The canned fishery products subgroup price index from May to June dropped 0.8 percent because of lower prices for canned pink salmon (down 1.1 percent) and canned Maine sardines (down 2.8 percent). Prices for canned tuna this June were unchanged from those in May but were lower than June 1962 by 7.4 percent. There were indications of a pick-up in sales of canned tuna during June following the significant drop in demand of the previous two months. As compared with the same month a year earlier, prices this June were lower (down 13.3 percent) for all canned fish products.

Wisconsin

FISHERY LANDINGS, 1962:

Total landings of fish at Wisconsin ports of Lake Superior and Lake Michigan (including Green Bay) during 1962 amounted to 19.1 million pounds--2.9 million pounds or 13 percent below the previous year.



Landings of certain fish in Wisconsin, 1962 and 1961.

Landings in Wisconsin during 1962 from Lake Michigan accounted for 11.2 million pounds, Green Bay 4.4, and Lake Superior 3.5 million pounds.

Four species of fish comprised 86 percent of the 1962 catch. They were: chubs 42 percent; alewives 17; yellow perch 15; and lake herring 12 percent. Over one-half of the remainder consisted of carp and smelt.

Landings of chubs ranged from a monthly low of 420,000 pounds in February to a high of 708,000 pounds in August. Over one-half of the alewife catch was made during May, June, and July. Yellow perch was taken principally during June through November when the monthly catch varied from 285,000 to 392,000 pounds. Production of lake herring was confined almost exclusively to the months of November and December.

EMPLOYMENT OPPORTUNITIES FOR BIOLOGISTS WITH CALIFORNIA DEPARTMENT OF FISH AND GAME

The California State Personnel Board announced in July 1963 open nationwide examinations for qualified biologists interested in career employment with the California State Department of Fish and Game as follows:

Classifications	Monthly Salary
Fishery Biologist II	$536-650
Marine Biologist II	536-650
Fishery Biologist III	619-753
Pollution Bioanalyst II	536-650
Pollution Bioanalyst III	619-753

The closing date for filing applications for those positions is September 6, 1963. Written examinations for applicants will be given on October 5, 1963.

Written examinations and subsequent personal interviews for applicants will be held in California and such other States as the number of candidates warrant and conditions permit. Personal interviews are planned for certain major cities throughout the United States. Admission to the examinations requires a college degree in biological sciences and varying amounts of either graduate work or experience in fishery research or management.

Applications and further information can be obtained by writing: State Personnel Board, 801 Capitol Mall, Sacramento 14, Calif.

CORRECTION

The photograph which appeared in the June 1963 issue, page 20, should have had the caption: Japanese stern ramp trawler Akebono Maru No. 51.