

TRENDS AND DEVELOPMENTS

California

MIDWATER TRAWLING FOR SALMON FINGERLINGS CONTINUED:

M/V "Nautilus" Cruise 62-N-1c and 62-N-1d-Salmon: Midwater trawl operations in the Carquinez Strait area to capture marked salmon fingerlings on their seaward migration were continued by the California Department of Fish and Game research vessel Nautilus (February 4-8, 18-22, 1962). A nylon midwater trawl with 25-foot square opening was used.

Trawling in Carquinez Strait was conducted between 8 a.m. and 3 p.m. and each tow was for 20 minutes. All tows were alternated between upstream and downstream, and between the north shore, center, and south shore of the channel.

A total of 95 tows was completed in the Strait during this cruise yielding a catch of 92 wild king salmon (Oncorhynchus tshawytscha).



King salmon
(Oncorhynchus tshawytscha)

Other species appearing in the catch in significant quantities consisted mostly of Sacramento smelt (Spirinchus thaleichthys) 1,984 fish, striped bass (Roccus saxatilis) 1,923 fish, surf smelt (Hypomesus pretiosus) 1,127 fish, northern anchovy (Engraulis mordax) 1,065 fish, American shad (Alosa sapidissima) 362 fish, Pacific herring (Clupea pallasii) 169 fish, three-spined stickleback (Gasterosteus aculeatus) 104 fish, and king salmon (Oncorhynchus tshawytscha) 92 fish.

M/V "Nautilus" Cruise 62-N-1e and 62-N-1f Salmon: Midwater trawling for salmon fingerlings in the Carquinez Strait area was continued (March 6-9, 18-22, 1962) by the Department's research vessel Nautilus.

Trawling was conducted between 8 a.m. and 3 p.m. and each tow was for 20 minutes. All tows were alternated between upstream and downstream, and between the north shore, center, and south shore of the channel.

A total of 98 tows completed in the Strait during this cruise yielded a total catch of 112 king salmon (Oncorhynchus tshawytscha). Three of these fish were mark recoveries: 2 from a release in the American River on January 5, 1962, and 1 from releases in San Pablo Bay made after March 8, 1962.

Other species appearing in the catch in significant quantities consisted mostly of Pacific herring (Clupea pallasii) 5,033 fish, Sacramento smelt (Spirinchus thaleichthys) 2,798 fish, striped bass (Roccus saxatilis) 1,890 fish, American shad (Alosa sapidissima) 520 fish, northern anchovy (Engraulis mordax) 201 fish, surf smelt (Hypomesus pretiosus) 170 fish, splittail (Pogonichthys macrolepedotus) 119 fish, king salmon (Oncorhynchus tshawytscha) 112 fish, and white croaker (Genyonemus lineatus) 103 fish.

Note: See Commercial Fisheries Review, April 1962 p. 12.



Central Pacific Fisheries Investigations

TUNA BLOOD TYPES BEING STUDIED FOR SUBPOPULATION IDENTIFICATION:

In the past ten years blood typing techniques utilized for humans, and later domestic animals, have found increasing application to the problem of subpopulation identification in fish. This is because blood or serological characters are deemed to be under regular genetic control and hence

free from modification due to the environment of the animal.

The staff of the Subpopulations Program at the U. S. Bureau of Commercial Fisheries Biological Laboratory at Honolulu has been developing blood-typing reagents for four species of tuna: the albacore, big-eyed, skipjack, and yellowfin. By application of sophisticated techniques, tests have been developed with these reagents that will detect different and discrete blood systems within the tuna. The ultimate application of these techniques is to use them on large samples of bloods from different areas to ascertain the frequency of occurrence of the various blood systems. If the frequencies in samples from one area differ statistically from those of another area, it may be assumed that two genetically different and reproductively isolated populations have been sampled.

This aim was realized for skipjack tuna during a cruise of the Bureau's research vessel Charles H. Gilbert in waters around the Marquesas, Tuamotu, and Society Islands. During the period from September 29 to December 4, 1961, blood samples from 780 skipjack caught in those waters were tested.

Comparison of the data from those tests and similar tests with the same reagents run against skipjack taken in local Hawaiian waters, shows the occurrence of 2 of the 6 phenotypes in the Marquesan skipjack to be very different from the frequency of occurrence of the same two phenotypes in all the other areas sampled.

From such comparisons we are able to conclude that in the areas sampled reproductive isolation exists and that at least two genetically different subpopulations have been sampled.

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TUNA STUDIES IN
SOUTH PACIFIC CONTINUED
BY M/V "CHARLES H. GILBERT":

Cruise 55 (January 15-April 3, 1962):
The South Pacific Ocean, in area bounded by latitude 5° and 25° S., longitudes 167° E. and 160° W. (waters of New Caledonia, Fiji, Ellice Islands, Tonga, and Samoa) and waters adjacent to Christmas Island, was where the U. S. Bureau of Commercial Fisheries research vessel Charles H. Gilbert operated for almost three months this year. The ves-

sel departed Honolulu, Hawaii, on January 15, 1962. The vessel fished long line, made plankton net tows and midwater hauls in selected areas on initial leg of cruise to Noumea, New Caledonia, from January 16 to February 4. At Noumea, vessel scientific staff consulted with scientists of the Institut Francais d'Océanie on the cooperative cruise of the Orsom III. Resumed cruise southeastward to $172^{\circ}30'$ E., thence northeast to Suva, Fiji, from February 9 to February 16. Loaded additional bait at Suva and resumed cruise northeastward to $10^{\circ}43'$ S., $178^{\circ}46'$ E., from February 20 to February 25. Continued cruise on southeast leg to Nuku'alofa, Tongatapu Island, Tonga, from February 25 to March 3. Resumed cruise to Pago Pago, American Samoa, from March 9 to March 15. Refueled and loaded additional bait at Pago Pago. Made bait survey on island of Tutuila on March 16 and 18. Resumed cruise from Pago Pago to vicinity of Christmas Island from March 19 to March 28, and fished two long-line stations on March 28 and 29. The vessel returned to Honolulu on April 3.

One of the objectives was to assess the sexual maturity of long line-caught albacore in the general area of New Caledonia, Fiji, Tonga, and Samoa in order to define the spawning of the South Pacific albacore. The 22 long-line stations fished within that area produced 49 albacore, 36 yellowfin, 14 big-eyed tuna, 3 skipjack, 17 spearfishes, 46 sharks, and 51 miscellaneous fishes. The albacore, 16 females, 32 males, and 1 unsexed, were generally large adults; the smallest measured 87 cm. Fifty percent of the females had spent ovaries and the other 50 percent had ovaries that were either immature or in the early stages of development. None had ripe or near-ripe ovaries, indicating that the fish had already spawned.

A second objective was to collect blood and serum samples from tunas, marlins, and sharks for serological studies. Blood samples were collected from albacore, yellowfin, big-eyed, and skipjack tuna, blue marlin, sailfish, and short-nosed spearfish. In addition to those species, blood samples were obtained from dolphin, barracuda,



Collecting tuna blood sample.

cessful, probably owing to lack of sufficient milt and insufficient maturity of the eggs.

In order to capture young tuna alive in the plankton net, a plastic cylinder 17 inches long and $3\frac{1}{4}$ inches in diameter, containing twelve $\frac{3}{4}$ -inch holes in the anterior half, was used at the cod end, instead of the usual sock made of nylon netting. The plastic cod end was used on nearly all of the surface tows. Although no young tuna was taken, it was shown that this device could catch small fish and hold them alive until they were transferred to the aquarium.

In the absence of young tuna for shipboard rearing, the young of other species of fish taken at night-light stations were used in order to test the design and capability of the aquarium. Keeping the more pelagic forms, such as dolphin and marlin, alive for any length of time was not possible, because they did not learn to feed upon the food offered them. Young holocentrids and goatfish, however, fared very well.

To tag and release viable albacore was a fifth objective. Owing to the small numbers of albacore taken on the long line and the premium placed on data for serological and ovarian studies, no albacore were tagged. However, approximately 25 percent of the albacore landed during the cruise were considered to be viable.

During the cruise tuna and shark specimens were collected; drift bottles were released at regular intervals between Hawaii and latitude 5° S. en route to and from the survey area. Total bottles released: 1,680; yellowfin sperm samples were collected for the Inter-American Tropical Tuna Commission; stomach contents of 84 fish, and gonad samples of 3 albacore and 2 big-eyed tuna were preserved in 10-percent formalin.

In addition, during the cruise the thermograph and barograph were operated continuously; weather observations, totaling 218, were made four times daily and transmitted to the Weather Bureau; bathythermograph casts (245) were made and a surface salinity sample was obtained with each BT cast; two lures were trolled during daylight hours at cruising speed (the catch comprised 1 skipjack, 3 yellowfin, 4 dolphin, and 1 wahoo); and 124 surface fish schools and bird flocks were sighted, 65 of them within the survey area (of the latter,

13 were identified as skipjack, and 52 were unidentified).

During the stopover at Pago Pago, a bait survey was conducted around the island of Tutuila.

An albacore sampling program was established at the cannery in American Samoa with the cooperation of the Department of Agriculture, Government of American Samoa, and the tuna company. The sampling will consist of measuring the length and weight and determining the sex of 50 randomly-selected albacore from each load brought to the cannery by Japanese long-liners.

Note: See Commercial Fisheries Review, February 1962 p. 16.



Columbia River

SALMON TEST FISHING IN COLUMBIA RIVER:

"How many spring chinook will move up the Columbia this year? When will the peak of the run occur?" These are among the questions Oregon Fish Commission biologists and their counterparts in the Washington Department of Fisheries are seeking to answer as the two agencies started the fourth year of cooperative test fishing in the Columbia River. Data obtained will help answer these and many other questions bearing on the proper management of the Columbia River anadromous fishery resource.

Oregon started the test fishing on March 15 and Washington on March 27. It consists of a run-sampling gill-netting program designed to gather information on which will be based the commercial seasons in the Columbia River. Oregon technicians fished in the vicinity of Woody Island, some 15 miles upriver from Astoria, and the Washington technicians fished in the Corbett area, below Bonneville Dam. Fishing continued every other day until late April.

The Oregon Fish Commission contracted with an Astoria commercial fisherman to provide the vessel and gear and to conduct the actual fishing operations under supervision on the Agency's Lower Columbia River technical staff. Salmon taken in the nets were marked with a plastic dart-type tag and released.

Washington used a circular plastic tag, the so-called Peterson-disc type, to mark fish taken in their Corbett area netting. Fishermen can render a service to conservation if they will inform the appropriate state agency of the date and location of any tagged fish taken.



Peterson-disc type tag.

Spring chinook salmon of the Willamette River stock, for the most part, pass up the Columbia into the Willamette before the commercial season opens. However, a considerable fluctuation in fish runs necessitates a continuing program of sampling so that fishery biologists remain current on any significant changes. "The information gained from test fishing operations represents a big return on a small investment," according to the Director of Research of the Oregon Fish Commission.



Federal Purchases of Fishery Products

DEPARTMENT OF DEFENSE PURCHASES, JANUARY-MARCH 1962:

Fresh and Frozen: For the use of the Armed Forces under the Department of Defense, a greater amount of fresh and frozen fishery products was purchased in March 1962 by the Military Subsistence Supply Agency than in the previous month--the quantity purchased was up by 78.9 percent

and the value of the purchases was up 36.5 percent. This shows that lower-priced fishery products were purchased in March than in February because the value did not increase in the same proportion as the quantity. Compared with the same month a year earlier, purchases in March 1962 were up 24.2 percent in quantity but the value was up 54.6 percent. This shows that in March this year some of the purchases consisted of higher-priced products than in the same month of 1961.

During the first three months of 1962, purchases were down 7.3 percent in quantity, but the value of those purchases was up

12.8 percent as compared with the same period of 1961. Again this shows that purchases in the first quarter of 1962 consisted of some higher-priced products than was the case in the same period of 1961.

Prices paid for fresh and frozen fishery products by the Department of Defense in March 1962 averaged 55.6 cents a pound, 17.3 cents a pound less than the previous month, but 10.9 cents a pound more than in the same month of 1961.



Table 1 - Fresh and Frozen Fishery Products Purchased by Defense Subsistence Supply Centers, March 1962 with Comparisons

QUANTITY				VALUE			
March		Jan.-Mar.		March		Jan.-Mar.	
1962	1961	1962	1961	1962	1961	1962	1961
. . . (1,000 Lbs.) . . .				. . . (\$1,000) . . .			
1,948	1,568	4,788	5,167	1,084	701	2,874	2,547

Canned: A substantial amount of canned salmon was purchased in March this year for the use of the Armed Forces. For the first quarter of this year purchases of canned tuna and canned salmon were substantially greater than in the same period of 1961, but purchases of canned sardines were down. The decline in the purchases of canned sardines was no doubt due to the short packs of both Maine and California sardines during the 1961 season.

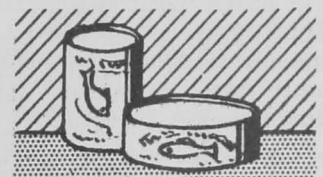


Table 2 - Canned Fishery Products Purchased by Defense Subsistence Supply Centers, March 1962 with Comparisons

Product	QUANTITY				VALUE			
	March		Jan.-Mar.		March		Jan.-Mar.	
	1962	1961	1962	1961	1962	1961	1962	1961
. . . (1,000 Lbs.) . . .				. . . (\$1,000) . . .				
Tuna . .	-	-	3,113	1,365	-	-	1,739	603
Salmon .	1,015	-	1,015	-	638	-	638	-
Sardine .	3	24	10	60	2	12	6	29

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

CORRECTION: Under this section on p. 17 of the May 1962 issue, the second paragraph should have read: "Prices paid for fresh and frozen fishery products by the Department of Defense in February 1962 averaged 72.9 cents a pound, about 16.0 cents more than paid . . ."



Gear

CONSTRUCTION OF A FISH WEIR:

A weir is a type of fixed entrapment gear. It consists of fences of brush or other non-textile materials constructed so as to intercept schools of feeding or migrating fish. These fences form successive enclosures (the heart, pound or bowl, and pocket) into which the fish are voluntarily directed by a fence (the leader). A weir is generally built each year in the same location since it is permanently fixed to the bottom. Fish are removed from weirs by seines or other devices.

Weirs are a popular means of fishing for sardines in Maine. But they are also used to catch other types of fish.

The photographs in this article show the building of an inshore fish weir at Barnstable Harbor, Mass.

The fish weir in this particular location was first erected in 1886 by Benjamin Lovell, the same year his grandson and present owner, Shirley D. Lovell, was born. It is put up in the early spring inside Barnstable Harbor near the Sandy Neck lighthouse, and is taken down in the late fall.

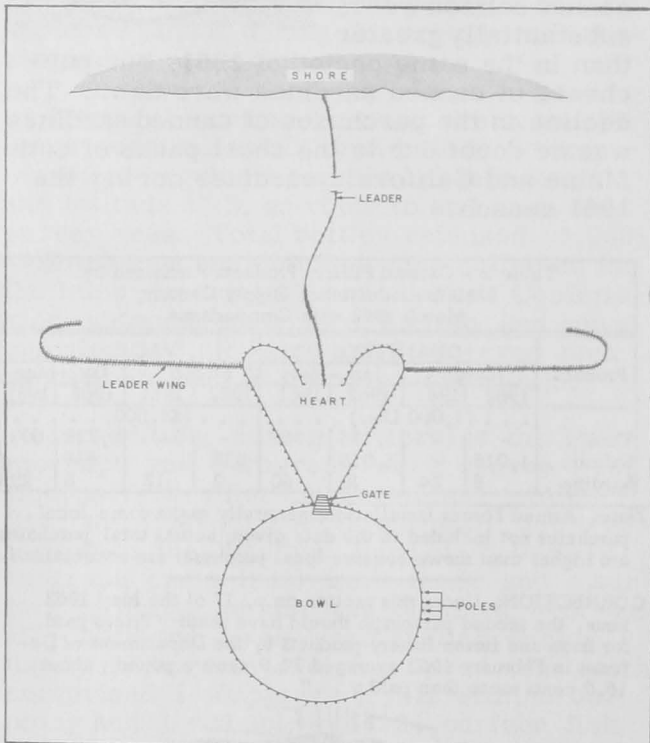


Fig. 1 - A sketch showing the layout and construction of a typical fish weir.

Large and small herring and sand lance are the first fish to be taken from this weir, followed later in the season by flounders, striped bass, menhaden, squid, and mackerel. The unwanted dogfish is usually heavily abundant during the latter part of the season.

Many species of Southern fish find their way to the trap, in large and small schools. These include jacks, dolphins, leather jackets, bonito, needlefish and, for some years now, one or two Atlantic salmon.



Fig. 2 - Putting in small trees for the shore leader. Using a water jet, driven by a small gasoline-powered pump on the skiff at left, a hole is dug 4 feet deep in the sand and the trees inserted 2 feet apart.



Fig. 3 - Setting one of the heart poles. Water temperature during this early spring operation averages 35-39 degrees F. Summer temperatures will go up into the 70's.



Fig. 4 - Tying line to the net that forms the bowl. The net is then raised to a height of about 20-feet. The wider mesh (top, right) is out of water at high tide. The bowl is hung first, followed by the heart. Leaders and the flaking are set as time and low tide permit. Last step is the building of the gate.



Fig. 7 - Tying wire to the shore leader. Collecting debris during the change of tide, the leader becomes a barrier directing the fish towards the bowl.

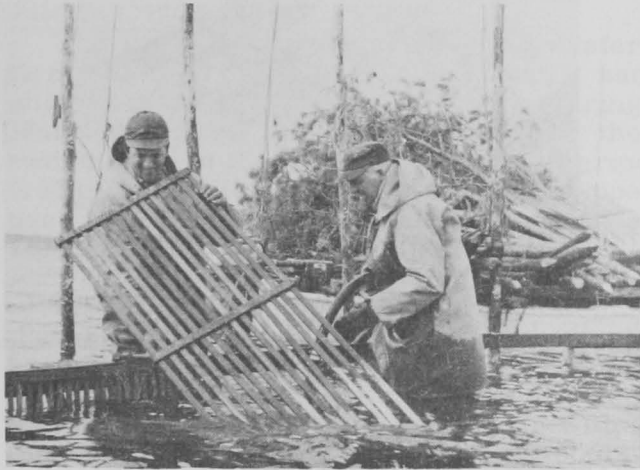


Fig. 5 - Setting the flaking inside the bowl.



Fig. 8 - Building the ramp for the bottom of the gate.



Fig. 6 - Raising the twine that forms the heart from the flaking to the top of the poles. Work on the weir is done at low tide which usually lasts no longer than 2 hours. Barnstable Harbor has a 9- to 12-foot tide.



Fig. 9 - The seine net is set out inside the bowl.



Fig. 10 - A mixed catch in the seine. Pictured is the 1-inch size mesh used for the larger fish such as flounder and striped bass. A $\frac{1}{8}$ -inch mesh is used for the smaller sand lance and herring.



Fig. 11 - Bailing striped bass from the seine to the skiff. One side of the bowl has been lowered and tied to the stern of the skiff.

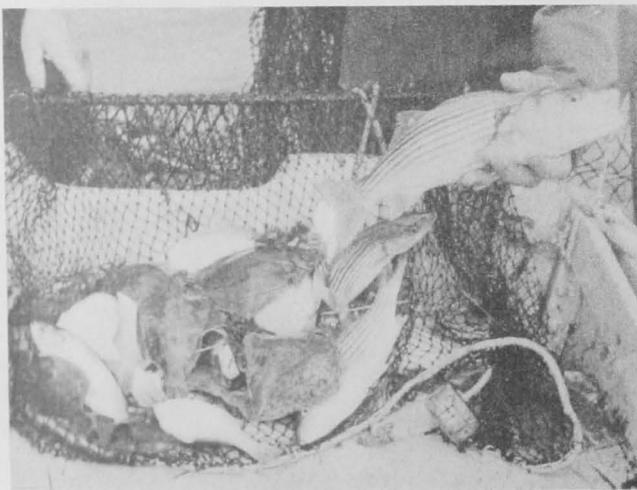


Fig. 12 - A mixed catch made by a weir.

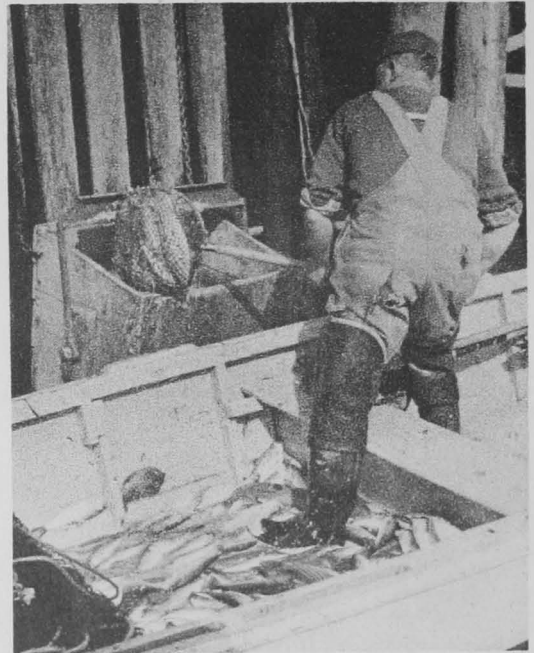


Fig. 13 - Unloading a mixed catch of striped bass, flounder, and menhaden at the wharf.

--Robert K. Brigham, Photographer,
Biological Laboratory,
U. S. Bureau of Commercial Fisheries,
Woods Hole, Mass.

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PATENTS ISSUED FOR NEW TRAWL DOOR AND NET FLOAT:

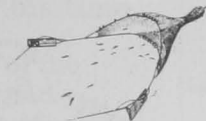
U. S. patents have been issued for a new type trawl door and a new type float for fishing nets, according to the April 1962 issue of Products List Circular, U. S. Small Business Administration, Washington, D. C.

The inventor claims the trawl door (Patent No. 3,007,274) is designed to keep the wings of the trawl net open and to maintain itself in a stabilized position at all fishing depths, also to reduce friction and drag as it is towed through the water, thus reducing power to tow; and is a hollow "turtle-back" shape having openings therein for permitting the water to flow through as the net is towed. That the interior of the hollow door is further provided with stabilizing plates having openings therein which tend to maintain the door on even keel. That the trawl door is hollow and open to the surrounding water and operates

efficiently at any depth because it partakes the same density.

The inventor claims the float (Patent No. 3,007,273) is designed to maintain a high opening of the net at normal trawling speeds and to reduce to a minimum the required towing power for dragging the net along the bottom in deep water. That the float tends to lift the net higher when the speed is increased, thus enabling more fish to be caught.

The inventor of both is G. K. Eggertsson of Winthrop, Mass.



Florida

FIRM INCREASES PRODUCTION OF CLAMS:

The President of a Placida, Fla., oyster firm reported on April 26, 1962, that it had shipped more clams out of Florida during March and April than were produced in the entire State in the previous two-year period (1960-1961). He said that the amount shipped does not even scratch the surface as far as the firm's production is concerned.

Florida's Director of Research stated that the supply of clams in Florida has not been exploited since World War II. He said that the State has almost unlimited stock and that new methods of cultivation along with a more rapid growth rate in Florida could easily make the State the number one clam-producing area of the world. Research of hatchery management and cultivation point to a great future for the clam industry.

The Director of the State's Board of Conservation added that with the knowledge of the clam stock, a stepped-up marketing program for the seafood will be started. He said that every effort is being made to increase the retail sales volume of Florida fishery products.



Georgia

FISHERY LANDINGS, 1961:

Total landings of fish and shellfish at Georgia ports in 1961 amounted to 20.5 million pounds--7.4 million pounds or 27 per-

cent below 1960. The greatest drop occurred in the shrimp fishery with only 6.8 million pounds (heads-on) or 65 percent of the previous year's catch. The poor shrimp season and resulting decrease in fishing pressure brought about a general decline in landings of all finfish caught incidental to shrimp fishing.

The winter of 1961 was cold and wet with temperatures below normal during January and early February. Oyster-shucking plants were not constructed to operate in extremely cold weather and operations were curtailed during the coldest days.

Shrimp landings (4.1 million pounds, heads-off) were the lowest recorded since 1952, and were 2.1 million pounds below 1960. However, the ex-vessel price was only \$204,000 less than in 1960 and averaged 58.5 cents per pound (heads-off) as compared with 41.6 cents received in 1960.



Catch of blue crabs made by a Georgia trawler.

The catch of hard crabs was the third best year on record with landings of 12.3 million pounds--a decrease of 3.5 million pounds compared with the record year 1960. This decrease is believed to be the result of reduced fishing effort due to a drop in demand rather than the non-availability of crabs.

The third best shad season since 1929 was experienced by the fishermen with landings of 404,000 pounds. Compared with 1960, this was a drop of 129,000 pounds. There was a decrease in the number of fishermen operating in the coastal rivers as high waters discouraged fishing activities.

Oyster production declined from 231,000 pounds of meats in 1960 to 158,000 pounds in 1961. Only four previous years (1938, 1956, 1957, and 1958) had a lower production. No oysters were canned by Georgia firms during 1961.



Great Lakes Fisheries

Exploration and Gear Research

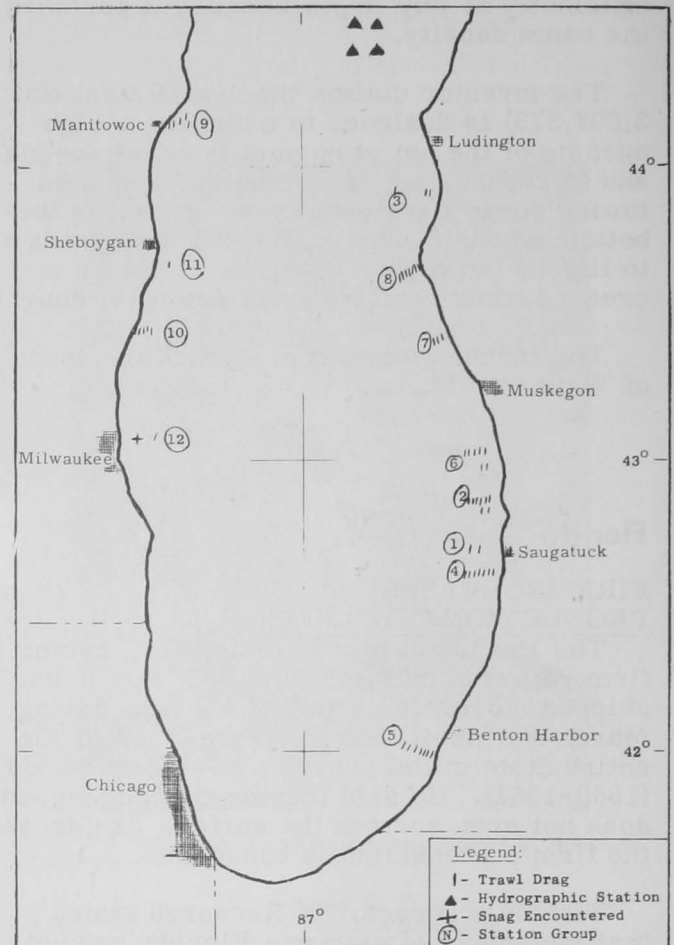
EXPLORATORY FISHING OPERATIONS IN SOUTHERN LAKE MICHIGAN:

M/V "Kaho" Cruise 1: The new 65-foot Great Lakes exploratory fishing and gear research vessel Kaho of the U. S. Bureau of Commercial Fisheries completed its first cruise of the 1962 season on April 18, 1962, after conducting exploratory fishing operations in southern Lake Michigan during the months of February, March, and April. The objectives of the three-phase cruise were to determine the bathymetric and seasonal distribution of various fish stocks and the availability of the fish species to standard Gulf of Mexico-type fish trawls. Unusually severe ice conditions hampered early cruise efforts.

A total of 57 drags were completed in various depths ranging from 9 to 45 fathoms. Best catches of chubs (*Leucichthys* sp.) were made off Port Washington in 19 to 41 fathoms of water where catch rates ranged from 42 to 918 pounds per hour. Significant catches of chubs were obtained as follows: 180-380 pounds per hour in 25-40 fathoms off Benton Harbor; 200-472 pounds per hour in 20-40 fathoms off Ludington; and 610-724 pounds per hour in 35-40 fathoms off Manitowoc. Smelt (*Osmerus mordax*) were caught in amounts of 350 pounds and 459 pounds per half-hour drag at 30 fathoms off Manitowoc and 20 fathoms off Port Washington, respectively. Although other species were caught, none were taken in amounts greater than 100 pounds per trawl tow.

A standard 50-ft. (headrope) Gulf of Mexico-type trawl net was used for all drags. Of the several door types fished, 7' x 30" bracket-rigged doors with 60-ft. dandyline gear were most satisfactory. Gear damage occurred only off Milwaukee at 20 fathoms.

In cooperation with the U. S. Department of Health, Education, and Welfare's Public Health Service, bathythermograph (BT) rec-



Lake Michigan explorations M/V Kaho Cruise 1 (February 20-April 18, 1962).

ordings were obtained from the deepest area of Lake Michigan off Frankfort, Mich., on two occasions. The BT temperature profiles are being used in a study of conditions affecting the extent and distribution of domestic and industrial waste. This information will also be used in Bureau studies to determine the influence of these conditions on reproduction, growth, and distribution of commercial species of fish.

Samples of the bloater chub (*L. hoyi*) were collected for analysis of feeding habits by the Bureau's Biological Laboratory in Ann Arbor.

Note: See Commercial Fisheries Review, Jan. 1962 p. 17.

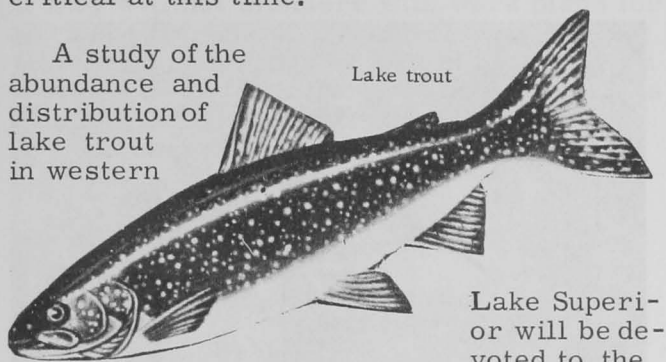


Great Lakes Fishery Investigations

RESEARCH VESSEL "SISCOWET" PROGRAM FOR 1962:

During 1962 the U. S. Bureau of Commercial Fisheries research vessel *Siscowet* will be used almost entirely in studies of young lake trout in Lake Superior. The special emphasis on lake trout was brought about by encouraging signs of reduction in sea lamprey predation and the increased survival of legal-size fish shown by the 1961 commercial catch. The need to follow closely changes in the lake trout population is considered most critical at this time.

A study of the abundance and distribution of lake trout in western



Lake Superior will be devoted to the annual assessment of spawning populations of lake trout in the Apostle Islands region. Information will be gathered on the success of various stocking experiments, the survival of plantings made in recent years, the abundance of native lake trout in the juvenile population, and the seasonal distribution of the young trout. Otter trawls and experimental gill nets will be used to collect the data.

During the environmental studies at pre-selected limnological stations, special emphasis will be placed on the environmental requirements of young trout.

Data will be collected in Keweenaw Bay and at Isle Royale on the contribution of hatchery-reared lake trout to the native population and on the relative abundance of lake trout as compared to previous years.

Other operations will be devoted to the collection of material on the life history of whitefish and various aspects of the life history and distribution of various coregonids (whitefish species).

LAKE MICHIGAN FISHERY SURVEY FOR 1962 SEASON:

The main objective in 1962 of the U. S. Bureau of Commercial fisheries research

vessel *Cisco* will be to study the early life history of chubs. The *Cisco* will operate in Lake Michigan with Saugatuck, Mich., as home port. Few chubs have been collected as fry or fingerlings in the past, mostly because relatively little fishing has been done at midwater levels, where the young chubs live. Emphasis this year will be on midwater fishing with trawls, large-mesh plankton nets, and possibly small-mesh gill nets.

A second objective will be to study fish distribution in the area where the thermocline touches the lake bottom--generally at depths of 10 to 15 fathoms in Lake Michigan. Past experience has shown that catches may differ widely with little change in depth in that zone, probably because the temperature changes are so great. Studies in this area should yield information on temperature preferences of fish of the various segments of the population.

Material for the serological study of chubs, which is being conducted by a graduate student at the University of Michigan, will be collected during each cruise. Preliminary processing of some of the material will be done on the *Cisco*. The Laboratory's primary interest in the study is in the possible development of a more positive method for the identification of the various species of chubs.

The Bureau has entered into an agreement with the U. S. Public Health Service (PHS) for the use of the *Cisco* for collection of limnological data in Lake Michigan for two 15-day cruises during the spring. The *Cisco's* regular vessel crew will be used, but the PHS will furnish the scientific staff. One or two staff members of the Bureau's Ann Arbor Biological Laboratory will also be aboard to act in an advisory capacity. The PHS will make collections and observations for the study of water chemistry, currents, bottom fauna, plankton, and bacteria.

LAKE ERIE FISH POPULATION SURVEY FOR 1962 SEASON BEGINS:

M/V "*Musky II*" (March 1962): The 1962 field operations of the U. S. Bureau of Commercial Fisheries research vessel *Musky II* on Lake Erie were begun on April 1. The 1962 activities will be similar to those in 1961. The fishery unit stationed at Sandusky and the Limnological staff from the Bureau's

Ann Arbor Biological Laboratory will again conduct closely related studies in a coordinated program.

A study of the variability in trawl catches in a given area within a short period of time, begun in 1960, will be continued at the Bono and East Harbor stations during the spring, summer, and fall. On 3 consecutive days in each season, two 10-minute hauls will be made with a standard bottom trawl at each of three depths, during the morning, afternoon, and evening (total of 54 tows at each station during each season). Collections during the series and during regular bimonthly trawling at East Harbor and Sandusky Bay will provide material for life-history studies of various species.

Intensive sampling with fry nets and experimental trawls will be made during the spring to determine localities and dates of spawning of several species, and to estimate spawning success.

Extensive collections of fish, bottom fauna, and plankton will be made, and water temperature, transparency, and chemistry will be determined at seven index stations originally established in the western basin in 1958.

Special studies will be undertaken to obtain more knowledge of the effect on fish of the severe depletion of dissolved oxygen which occurs in the central basin. Emphasis will be placed on the effect of this oxygen deficiency on fish distribution, food habits, behavior, and survival.

The semiannual sampling of the major species in the commercial catch will continue as in previous years. The spring sampling was expected to be under way by late April.

Commercial operations in March were slow to start in Ohio and elsewhere, in spite of the official opening of the fishing season. Extensive ice in all parts of the lake restricted the activities to a small amount of gill-netting. Catches were reported to be mediocre, considering the amount of effort expended.

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CHEMICAL TREATMENT FOR LAKE SUPERIOR STREAMS TO ERADICATE SEA LAMPREY:

The continuing battle against sea lamprey by chemical treatment will be waged this

year in 32 lake trout streams tributary to Lake Superior and the St. Marys River, the U. S. Bureau of Commercial Fisheries reports.

Under a permit issued recently by the Michigan Conservation Department, the Bureau hopes to re-treat 24 Lake Superior streams. It also plans to make its first chemical attack on the lamprey in 6 Lake Superior streams and 2 tributaries to the St. Marys River where studies reveal the presence of young sea lamprey.



Perforated hose used to introduce chemical into stream.

Chemical treatments were scheduled to get under way in late April, starting in streams of the western upper peninsula. By the end of June, this work was scheduled to be completed in Carlton Creek and Big Munuscong River, Chippewa County; Au Train River, Alger County; Boston-Lilly Creek, Pilgrim River, and Gravaeraet River, Houghton County; and Iron River, Marquette County.

Treatment of Carlton Creek and Big Munuscong River will match work already completed by Canada in its streams along the north channel of the St. Marys River.

Of the streams listed for treatment this spring, all but the Au Train and Iron Rivers are new to the lamprey control program. Three Mile Creek and Dead Sucker River, Luce County, and Otter River, Baraga County, are also due for initial treatment during the year.

Since 1958 when the chemical war on sea lamprey began, 75 Lake Superior streams

have been treated, 52 of them in Michigan. Latest survey results show that the program has reduced considerably the rate of fresh lamprey scarring on lake trout in different areas of Lake Superior.

During 1961, treatments were made in 33 lamprey-producing streams along the north shore of Lake Michigan. Surveys nearing completion in April 1962 point up the production of sea lamprey in 53 other Lake Michigan streams.

Lamprey control efforts will be continued in the Lake's northern streams during 1962 if they will not interfere with work plans for the Lake Superior tributaries. Scope of the Lake Michigan program will also depend on whether there are further encouraging signs of lamprey reduction at electrical barriers in Lake Superior streams this spring.



Gulf Exploratory Fishery Program

MIDWATER TRAWLING AND ESCAPEMENT BEHAVIOR OF PELAGIC FISH STUDIED:

M/V "Oregon" Cruise 77: To complete measurements of performance on three different experimental midwater trawls and six types of otter boards, and to continue motion picture studies of the reaction of pelagic sardine-like fish to midwater trawling gear in the Mississippi Delta area were the principal objectives of the U. S. Bureau of Commercial Fisheries exploratory fishing vessel Oregon. The cruise was conducted in nine intermittent phases between January 18 and April 3, 1962.

A total of 61 stations was completed in the Mississippi Delta area, most of which were devoted to gear mechanics studies. A total of 12,700 feet of motion picture film was exposed using remote-controlled underwater cameras placed inside the trawl and along the headrope. Heavy turbidity severely affected most of the footage, but fair to excellent results showing gear performance and reactions of several species of fish within the net were obtained on 3,300 feet. In general, the most abundant species, thread herring (Opisthonema oglinum), butterfish (Poronotus triacanthus), and razorbellies (Harengula pensacolatae) were found to concentrate heavily in the body and throat of the trawl. There they showed remarkable tenacity and endurance in maintaining their relative position within the trawl, swimming vigorously

forward, and not becoming disoriented in even the most turbid water. Endurance determinations will require detailed studies of the films, but in general the movement of fish back through the net toward the cod end seemed slight at towing speeds of 4 knots or less. The few observations at faster speeds indicated some disorientation. Anchovies (Anchoa hepsetus) appeared to be quite passive and displayed no discernible escape-ment reactions.

Several hundred feet of film were exposed in small cameras mounted on the headrope and upper wings. The complete absence of fish in the camera fields indicates that most fish enter near the footrope. However, no cameras were mounted on the footrope owing to frequent encounters with the bottom during haul-back.

Note: See Commercial Fisheries Review, Nov. 1961 p. 23.



Gulf Fishery Investigations

Some of the highlights of studies conducted by the Galveston Biological Laboratory of the U. S. Fish and Wildlife Service, Bureau of Commercial Fisheries during January-March 1962:

ESTUARINE PROGRAM: Ecology of Western Gulf Estuaries: Scheduled field work continued during the first quarter of 1962 in the three study areas of Clear Lake, Offats Bayou, and Trinity Bay. Some difficulty was experienced in obtaining samples on schedule from Trinity Bay because of inclement weather.

The dominant species of fish, such as the croaker, anchovy, spot, and menhaden, occurred in expected numbers, but there was a delay of a couple weeks in the occurrence of young menhaden in quantity, possibly due to the effects of the extended freeze in January. Two groups of organisms, differing in their occurrence from 1961, include postlarval shrimp and very small (8-12 mm.) flatfish.

Postlarval shrimp (probably brown shrimp) first occurred in the Trinity Bay samples on March 2, which is somewhat earlier than last year. The distribution of postlarval shrimp was also interesting: the Cross Bayou station in the northwest corner of Trinity Bay, farthest from the pass at Galveston, produced approximately five times as many post-

larval shrimp as each of the two stations in the southern part of Trinity Bay.

Effects of Engineering Projects: During the quarter 56 appraisals were made of engineering projects potentially affecting estuarine fishery resources, under the present system of coordination with the Branch of River Basin Studies; only three did not involve Texas estuarine waters. The majority resulted from the more than 85 Corps of Engineers public notices and letters received during the quarter, and screened to determine which projects could materially affect estuarine and marine fishery resources. Sampling at 12 stations in Trinity Bay was continued through January on a weekly basis, when conditions permitted, in connection with a study of the effects of the Wallisville and Livingston Dam Project (CE) upon bay fauna.

Research relative to the Colorado River Special Study was initiated in February, and 10 stations were established in Matagorda and East Matagorda Bays, the Intracoastal Waterway, and the lower Colorado River to determine the effects of proposed consumptive water usage upon marine fishery resources. Sampling at each station includes both surface and bottom salinity and temperature measurements and a trawl haul for biological specimens. An additional station at Parker's Cut, between the Colorado River and the eastern arm of Matagorda Bay, was established for sampling only salinity and temperature, since the depths are too irregular for trawling. Additional data are being recorded for meteorological conditions and for salt wedge intrusions into the river and into Parker's Cut.

SHRIMP FISHERY PROGRAM: Migrations of Pink Shrimp: A mortality experiment involving pink shrimp on the Sanibel grounds was begun on March 19, 1962, using the Bureau of Commercial Fisheries exploratory fishing vessel Silver Bay. Shrimp ranging from 20 to 53 mm. carapace length were marked with fast green FCF. A total of 2,496 shrimp was released in 26 releases, using the underwater release box. As of March 27, 1962, two marked shrimp were recovered. As a part of the recovery phase, a series of experiments will be conducted to estimate the number of stained shrimp recaptured but not discovered on the shrimp vessels or in the heading houses.

Shrimp Spawning Populations: Stained sections of ovaries from an additional 400

brown shrimp, Penaeus aztecus, were examined during the quarter. As observed in earlier collections, females taken from deeper waters generally had more advanced ovaries. Of the brown shrimp ovaries taken from September through December 1961 at 7½- and 15-fathom stations, less than 27 percent had advanced beyond the developing stage. More than half the brown shrimp from the 25-fathom stations were in the yellow or further advanced stages, and 16 percent of those taken in 45 fathoms were ripe or spent.

Shrimp Larval Studies: An illustrated key to larval Penaeidae (genus only) was completed. Including only forms known to occur in the northern Gulf, the key treats protozoal, mysis, and postlarval stages, and is now being tested through use in the laboratory.

Continuing attempts to differentiate species of Sicyonia larvae found in the plankton samples reveal slight morphological differences in the protozoal stages but none in the mysis stages.

At the end of the first quarter, ripe specimens of brown shrimp and Trachypeneus were obtained in experimental hauls by the M/V Silver Bay midway between New Orleans and Galveston. Immediately after being brought into the laboratory, representatives of both species released large numbers of viable eggs. Trachypeneus eggs began to hatch soon thereafter, whereas, none of the brown shrimp eggs survived.

During the quarter 43 plankton samples collected during October, November, and December 1961 were examined for penaeid larvae.

In July, August, and September of 1961 penaeid larvae were distributed over the entire sampling pattern. This distribution did not persist through the ensuing 3 months, however. Nauplii and protozoa occurred at the 7½-fathom stations only until October, while mysis and postlarvae persisted until the end of November. At the 15-, 25-, and 45-fathom stations, all stages of penaeid larvae were encountered. The majority of protozoa and mysis larvae occurred at the 15- and 25-fathom stations while most postlarval shrimp were encountered at the 25-fathom stations.

The relative abundance of penaeid larvae decreased markedly at all stations in late

November and December, reaching a low comparable to that of January 1960.



A drift bottle and seabed drifter study was initiated in February in order to supplement the current meter and temperature/salinity measurements made at each monthly station. In February and March, 1,384 drift bottles and 702 seabed drifters were released at stations located from the mouth of the Mississippi River to Brownsville, Texas. At the end of March, 3 percent of the drift bottles and less than 1 percent of the seabed drifters had been recovered. From the initial drift bottle recoveries, it appears that there is a strong, westerly surface current. Due to the meager recoveries of seabed drifters very little can be said at this time concerning bottom currents.

Migrations of Brown and White Shrimp: Experiments to test the suitability of various inks, and fluorescent dyes and pigments as primary or secondary marking agents were initiated during the quarter.

Of the eight inks tested on small white shrimp (70-100 mm.), Bates numbering machine inks--green, blue, and black--showed the most promise. The inks are easily seen in the branchial region of the shrimp up to 43 days after staining. The "control" shrimp, injected with sterile double-distilled water, showed significantly less mortality than the stained shrimp.

A second experiment still in progress and using the same species and size range of shrimp, indicates Sanford numbering machine inks--red, blue, and black and two fluorescent pigments, Day-Glo blaze orange and neon red--also have possibilities as secondary marks.

An experiment using fast green with Rhodamine B, a fluorescent dye, as a secondary

mark, showed the latter dye to have almost completely disappeared 5 days after staining.

Publicity was completed for the offshore marking experiments commencing on March 30. Posters describing the program and recovery kits were distributed from Brownsville, Tex., to Bayou LaBatre, Ala.

Commercial Catch Sampling: Sampling of the size and species composition of commercial shrimp landings continued at the Port of Galveston. Additional sampling stations were established at Aransas Pass, Texas, and Morgan City, La. The biologist at Aransas Pass covers landing activities at the neighboring ports of Fulton Beach and Rockport, while the biologist at Morgan City collects information from the ports of Berwick and Patterson.

Landings during the first quarter were scattered and below average in quantity, primarily because of weather.

Sampling and recording procedures have been standardized, and a small tape recorder was tested and is now used for rapid recording of shrimp measurements during unloading and processing at the docks. Additional data are being obtained from all commercial species on the tail length and total length relationship.

A total of 11,900 shrimp of three species was measured during the quarter--9,500 brown, 2,200 white, and 200 pink shrimp.

Bait Shrimp Fishery: Final tabulation disclosed that bait shrimp production in the Galveston Bay area totaled 731,200 pounds in 1961 compared with the previous year's total of 943,400 pounds.

Most of the bait shrimp retailed in the Galveston area during the first quarter of 1962 originated offshore in the Gulf of Mexico, Matagorda Bay, or Sabine Lake.

Postlarval Shrimp Survey: Semiweekly monitoring of postlarval shrimp moving into Galveston Bay continued during the quarter; the greatest number (1,220) were sampled on February 26. Great variations in number between sampling periods appeared to be related to fluctuations in temperature. Following rapid drops in temperature, very few postlarvae were collected, and on two occasions great numbers of dead postlarval shrimp were noted.

INDUSTRIAL FISHERY PROGRAM: Atlantic croaker, spot, and sea trout continued to dominate landings which fell slightly below 17 million pounds in the first quarter of 1962, a 25-percent drop from production during the corresponding quarter a year earlier.

Monthly indices of collective abundance of fish supporting the upper Gulf's industrial trawl fishery were computed from statistics of 290 vessel trips covering the period October 1960-March 1961. The average catch per tow by smaller vessels operating east of the Delta ranged from 0.32 ton (Feb.) to 0.75 ton (Oct.), and decreased 42 percent during the first quarter this year. Catches per unit of effort of large vessels (over 60 feet long) fishing west of the Mississippi Delta varied between 0.38 ton (Oct.) and 1.00 ton (Dec.), and decreased steadily from December through March. The over-all average for the 6-months period was nearly equal in both areas.

Continuing analysis of data secured during 1961 in sampling operations off western Louisiana and eastern Texas indicates that concentrations of fish having commercial potential are greatest in nearshore waters (to 20 fathoms) during summer months, and in deeper shelf waters (20-50 fathoms) in winter.

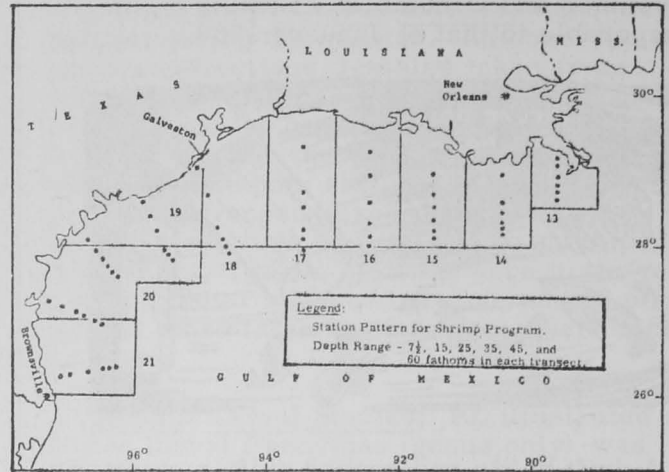
Cursory investigation of food preference in the more abundant species disclosed that shrimp constituted the major if not the primary element in the diets of most. Several kinds of shrimp were represented among the fish-stomach contents, but noncommercial species greatly outweighed those of commercial importance.

Note: See Commercial Fisheries Review, Dec. 1961 p. 32.

SHRIMP DISTRIBUTION STUDIES:

M/V "Belle of Texas" Cruise BT-19 and "Miss Angela" Cruise MA-13: Only moderate catches of shrimp were made by the research vessels M/V Belle of Texas and the M/V Miss Angela between April 18-27, 1962. Both of the vessels are operated by the Galveston Biological Laboratory of the U. S. Bureau of Commercial Fisheries in studying the distribution of shrimp in the Gulf of Mexico.

A total of 9 statistical areas were covered. One 3-hour tow was made in each of 3 depth ranges in each area. A 45-foot shrimp trawl



Shows the station pattern for cruise BT-19 of the M/V Belle of Texas and cruise MA-13 of the M/V Miss Angela, April 18-27, 1962.

was used. Most of the catches consisted of brown shrimp, but there were a few catches in which white and pink shrimp were found. The largest single catch was 31 pounds (all brown) of 12-15 count shrimp in 20-40 fathoms in area 14. This same area yielded 6 pounds of 12-15 count brown shrimp in the 40-60 fathom range and 1 pound of 12-15 and 15-20 count shrimp in the 0-20 fathom range. The catch in area 15 consisted of 21 pounds of 15-20 count brown shrimp in the 20-40 fathom range, 22 pounds of 12-15 count brown shrimp in the 40-60 fathom range, and 4 pounds of 21-25 count white shrimp in the 0-20 fathom range.



Hawaii

YIELD OF SKIPJACK TUNA FISHERY THIS YEAR EXPECTED TO BE BELOW AVERAGE:

Since 1959 annual predictions for the skipjack tuna fishery, in terms of above or below average catch, have been made to the Hawaiian fishing industry by the Honolulu Biological Laboratory of the U. S. Bureau of Commercial Fisheries. Such predictions are of considerable value to the industry, for changes in skipjack availability result in total annual landings ranging from 6 to 14 million pounds. The prediction can usually be made by the end of March and therefore is well ahead of the peak fishing months of June and July.

The forecast is based on an empirical relationship between annual landings and an

oceanographic index derived from weekly sea water surface temperatures at Koko Head on the island of Oahu. Since adequate data first became available in 1951, it has been found that better than average landings followed when the initial heating at Koko Head occurred before the end of February and poorer than average landings followed when initial heating occurred during March. There have been no exceptions to this relationship.

This year, the initial heating occurred in March and it is therefore believed that availability of skipjack to the Hawaiian fishery will be somewhat below average.



A skipjack catch waiting to be unloaded.

The initial heating index can best be obtained from the Koko Head heating curve showing the monthly rate of change of surface temperature. The shape of this curve, as well as the time of initial heating, reflect oceanographic conditions or "the oceanographic climate" in the Hawaiian region. The sequence of observations is now sufficiently extended that years with similar oceanographic climates can be recognized.

Two groups of years are easily identifiable from the shape of their heating curves. The years within each group had similar skipjack catch rates. The years 1954, 1959, and 1961 were marked by early heating, followed by a period of cooling and another major period of heating; skipjack catch rates were the best of the past decade. By contrast,

the years 1955 and 1960 were characterized by late initial heating, followed immediately by the major heating period and lacking the intervening cooling period; skipjack catch rates during those years were all lower than average. Recognizing these patterns, it is believed that the oceanographic conditions for 1962 will be similar to those of 1955 and 1960, and on the basis of similar catch rates, we add to the 1962 forecast of below average landings, that the catch rates will probably be similar to those of 1955 and 1960.

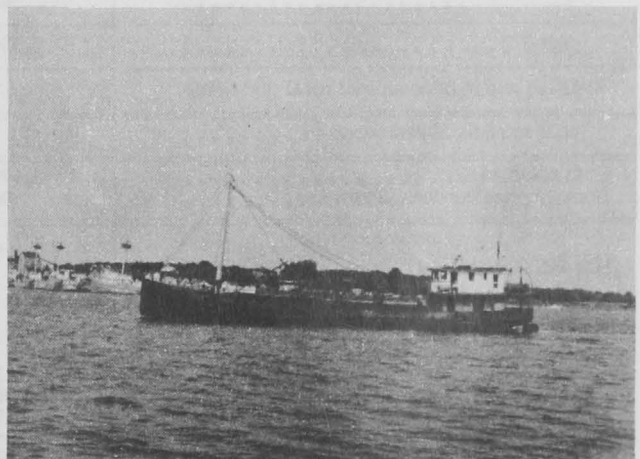
As important as these forecasts based on the empirical associations between oceanographic conditions and the availability of fish are, it is even more important for long-range benefits to gain an understanding of the significance of these associations. To this end, on the basis of the oceanographic climate and certain hypotheses regarding skipjack occurrence, it is believed that the center of skipjack availability will be displaced northward along the Hawaiian Island chain during 1962. Records of catch locations for 1955 and 1960 show a trend in this direction. If it is possible to do so, it is planned to test this hypothesis during the coming summer and thus add to our understanding of this valuable resource.



Industrial Fishery Products

U. S. FISH MEAL AND SOLUBLES:

Production and Imports, January-February 1962: Based on domestic production and imports, the United States available supply of fish meal for the first 2 months of 1962 amounted to 49,000 tons--20,300 tons or 71 percent above the same



A typical menhaden purse-seiner operating out of Reedville, Va.

U. S. Supply of Fish Meal and Solubles, January-February 1961-62 and Total for 1961			
Item	January-February		Total
	1962 ^{1/}	1961	1961
..... (Short Tons)			
Fish Meal and Scrap:			
Domestic production:			
Menhaden	-	-	247,551
Tuna and mackerel...	2,928	2,880	21,243
Herring, Alaska	-	-	3,810
Other	1,870	1,946	38,661
Total production . . .	4,798	4,826	311,265
Imports:			
Canada	5,757	3,898	38,218
Peru	35,231	17,334	151,439
Chile	1,157	1,061	12,074
Angola	-	-	1,543
So. Africa Republic . .	2,000	1,486	13,026
Other Countries	101	96	1,545
Total imports	44,246	23,875	217,845
Available fish meal supply	49,044	28,701	529,110
Fish Solubles:			
Domestic production 2/ .			
	3,114	2,985	111,254
Imports:			
Canada	208	194	1,001
So. Africa Republic . .	-	180	1,351
Other Countries	2,314	-	4,387
Total imports	2,522	374	6,739
Available fish solubles supply	5,636	3,359	117,993
^{1/} Preliminary. ^{2/} 50 percent solids. Includes production of homogenized condensed fish.			

period of 1961. Domestic production was slightly less, but imports were nearly 20,400 tons greater than in the 2-months period of 1961. Peru continued to lead other countries with shipments of 35,200 tons during the first 2 months of 1962--slightly more than twice the quantity imported in the same period of the previous year.

The total United States supply of fish meal in 1961 of 529,100 tons exceeded the peak year 1959 when the quantity amounted to almost 440,000 tons.

The United States supply of fish solubles (including homogenized fish) during January-February 1962 totaled 5,600 tons--2,300 tons more than during the same period in 1961. Solubles and homogenized fish of 3,100 tons manufactured from domestically-caught fish made up 55 percent of the 2 months supply in 1962.

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FISH MEAL, OIL, AND SOLUBLES:

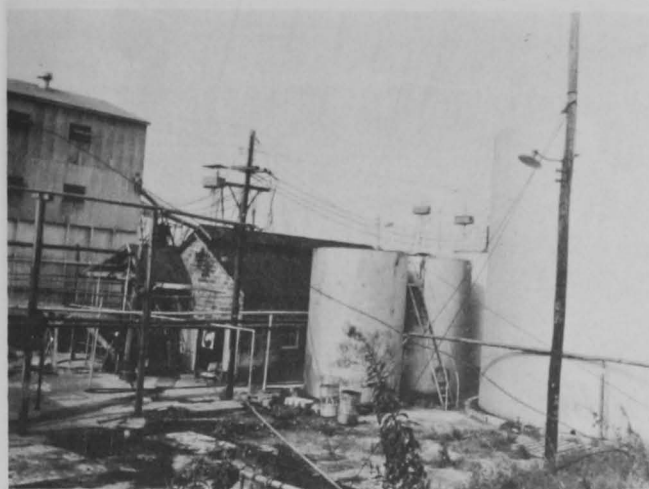
U.S. Production and Foreign Trade, February 1962: In February 1962, 2,100 tons of fish meal and scrap and 49,100 gallons of marine animal oils were produced in the United States. Compared with February 1961, this was a decrease of 1 percent in meal and scrap production, but an increase of 4 percent in oil.

In February 1962, tuna and mackerel accounted for 1,300 tons or 62 percent of the meal total, and 34,700 gallons or 71 percent of the oil production.

There were 1,500 tons of fish solubles produced in February 1962--54 tons above the same month of 1961. The

Table 1 - U.S. Production of Fish Meal, Oil, and Solubles, February 1962 with Comparative Data

Product	February		Jan.-Feb.		Total
	1962 ^{1/}	1961	1962 ^{1/}	1961	1961
..... (Short Tons)					
Fish Meal and Scrap:					
Alewife	-	-	-	-	89
Herring:					
Alaska	-	-	-	-	3,810
Maine	-	-	-	-	1,374
Menhaden ^{2/}	-	-	-	531	247,551
Sardine, Pacific	234	-	689	-	2,518
Tuna and mackerel	1,287	1,313	2,928	2,880	21,243
Unclassified	545	775	1,181	1,415	24,380
Total	2,066	2,088	4,798	4,826	300,965
Shellfish and marine animal meal and scrap	<u>3/</u>	<u>3/</u>	<u>3/</u>	<u>3/</u>	11,090
Grand total meal and scrap	<u>3/</u>	<u>3/</u>	<u>3/</u>	<u>3/</u>	312,055
Fish solubles	1,476	1,422	2,984	2,840	112,086
Homogenized condensed fish	90	80	130	145	11,690
..... (Gallons)					
Oil, body:					
Alewife	-	-	-	-	12,053
Herring:					
Alaska	-	-	-	-	727,517
Menhaden ^{2/}	-	-	-	10,050	31,355,570
Sardine, Pacific	4,911	-	19,111	-	86,167
Tuna and mackerel	34,696	24,055	72,512	51,908	762,509
Other (including whale)	9,517	23,194	51,747	48,332	1,464,989
Total oil	49,124	47,249	143,370	110,290	34,408,805
^{1/} Preliminary data. ^{2/} Includes a small quantity produced from thread herring. ^{3/} Not available on a monthly basis.					



View of menhaden reduction plant at Reedville, Va.

production of homogenized condensed fish amounted to 90 tons--a slight gain compared with February 1961.

Imports and Exports, January 1962: Imports of fish meal and scrap in January 1962 (25,400 tons) were 167 percent greater than in January 1961, and imports of fish solubles (273 tons) were up 25 percent. Exports of fish oils and fish-liver oils in January 1962 amounted to 509,300 pounds compared with 13.4 million pounds in January 1961.

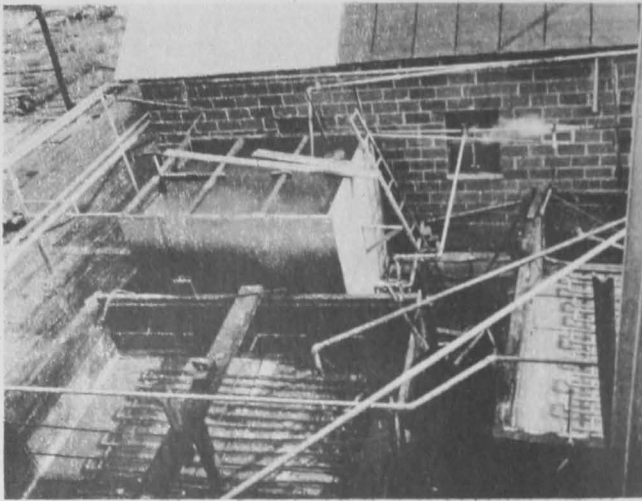
Product	January		Total
	1962 ^{1/}	1961	1961
	.....(Short Tons).....		
Imports:			
Fish meal and scrap	25,427	9,531	217,845
Fish solubles	273	219	6,739
	..... (Gallons)		
Whale oil, sperm (crude and refined)	303,034	361,237	7,807,625
	..... (Pounds)		
Exports:			
Fish and fish liver oils ..	509,259	13,448,795	122,485,721
Whale and sperm oil	13,982	-	1,205,674
^{1/} Preliminary data.			

United States Major Indicators, March 1962: For the first two months of 1962, production and imports of fish meal and solubles were up as compared to the same months in 1961. Production of fish oil and exports were also up.

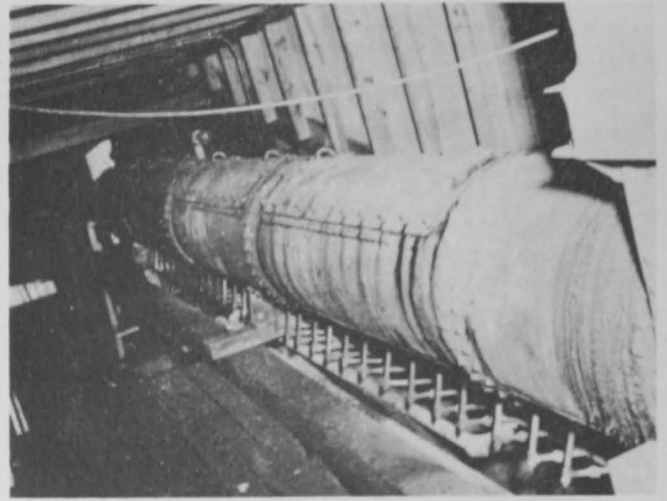
Item and Period	1962	1961	1960	1959	1958
	..... (Short Tons)				
Fish Meal:					
Production ^{1/}:					
May	-	32,922	17,194	25,312	17,433
April	-	6,179	5,076	6,810	5,143
March	2,700	2,751	2,955	2,122	2,601
Jan.-Feb.	4,798	4,263	4,191	5,223	3,917
Jan.-Dec. preliminary tot. ^{2/}	-	289,039	257,969	275,396	226,299
Jan.-Dec. final tot.	-	311,265	290,137	306,551	248,140
Imports:					
May	-	24,753	9,496	16,329	8,949
April	-	19,060	10,397	17,654	11,758
March	-	20,458	18,652	16,719	7,233
February	18,158	14,344	8,081	19,463	11,219
January	25,427	9,531	8,571	19,700	7,696
Jan.-Dec. totals ..	-	217,845	131,561	132,955	100,352
	..... (Short Tons)				
Fish Solubles:					
Production ^{3/}:					
May	-	12,667	7,370	18,639	9,351
April	-	2,539	2,870	6,987	3,619
March	1,362	2,295	2,462	2,382	1,371
Jan.-Feb.	3,114	2,651	3,509	4,124	2,518
Jan.-Dec. totals ..	-	111,254	98,929	165,359	130,177
Imports:					
May	-	283	59	4,874	1,405
April	-	220	134	1,622	45
March	-	135	87	410	84
February	2,249	155	1,875	398	149
January	273	219	214	954	473
Jan.-Dec. totals ..	-	6,739	3,174	26,630	14,567
	..... (1,000 Gallons)				
Fish Oils:					
Production:					
May	-	4,367	1,768	2,604	2,166
April	-	439	248	436	200
March	47	63	66	42	84
Jan.-Feb.	143	98	105	102	95
Jan.-Dec. preliminary tot. ^{2/}	-	33,471	26,690	24,418	21,957
Jan.-Dec. totals ^{2/} ..	-	34,416	27,886	24,978	22,028
Exports:					
May	-	426	324	1,455	293
April	-	980	761	1,116	254
March	-	753	421	600	1,664
February	2,886	2,327	3,177	999	1,038
January	68	1,793	276	898	825
Jan.-Dec. totals ..	-	16,331	19,155	19,264	12,539

^{1/}Does not include crab, shrimp, and misc. meals.
^{2/}Preliminary data computed from monthly data. Fish meal production reported currently comprised 86 percent of the annual total for 1958, 90 percent for 1959, 89 percent for 1960, and 92 percent for 1961. Fish oil production reported currently accounted for over 95 percent of the total production each year.
^{3/}Includes homogenized fish.
 Note: Data for 1962 and 1961 are preliminary.

U. S. Production, March 1962: Preliminary data on U. S. production of fish meal, oil, and solubles for March 1962 as collected by the U. S. Bureau of Commercial Fisheries and submitted to the International Association of Fish Meal Manufacturers are shown in the following table.



Another view of menhaden reduction plant at Reedville, Va.



Cookers used to process fish at a menhaden plant in Reedville, Va.

U. S. Production ^{1/} of Fish Meal, Oil, and Solubles, March 1962 (Preliminary) with Comparisons				
Region	Meal	Oil	Solubles	Homogenized
	Short Tons	1,000 Gallons	Short Tons	
March 1962:				
East & Gulf Coasts	899	10	229	3/100
West Coast ^{2/}	1,886	37	1,533	-
Total	2,785	47	1,762	100
Total:				
Jan.-Mar. 1962	8,248	186	5,017	230
Jan.-Mar. 1961	7,556	162	4,986	295

^{1/}Does not include crab meal, shrimp meal, and liver oils.
^{2/}Includes Hawaii, American Samoa, and Puerto Rico.
^{3/}Includes condensed fish.

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U. S. Production, 1961: The production of industrial fishery products by 170 plants in the United States, American Samoa, and Puerto Rico in 1961 was valued at \$74.5 million to the processors.

Final data for 1961 shows that production of fish scrap and meal amounted to 311,000 tons valued at \$32 million to the processors. This was 21,000 tons more than in 1960 and exceeded the previous record established in 1959 by nearly 5,000 tons. Menhaden meal accounted for 80 percent of the total production of fish meal.

Production of fish and fish-liver oils in the United States and Puerto Rico totaled nearly 35 million gallons. The production was 23 percent above that of 1960 but below the record 40 million gallons produced

in 1936. Menhaden oil established a new record and accounted for 91 percent of the 1961 production.

The yield, during 1961, of homogenized condensed fish (nearly 12,000 tons) was about 2,000 tons above that of the previous year. Production of fish solubles (100,000 tons) was about 10,000 tons larger than in 1960.



Maine Sardines

CANNED STOCKS, APRIL 1, 1962:

Distributors' stocks of Maine sardines totaled 148,000 actual cases on April 1, 1962--119,000 cases or 45 percent less than the 267,000 cases on hand April 1, 1961. Stocks held by distributors on January 1, 1962, amounted to 193,000 cases, and on November 1, 1961, totaled 202,000 cases, according to estimates made by the U. S. Bureau of the Census.

Canners' stocks on April 1, 1962, totaled only 45,000 standard cases (100 3³/₄-oz. cans), a decline of 461,000 cases (91.0 percent) as compared with April 1, 1961. This reflected one of the shortest packs in recent years for 1961. Stocks held by canners on January 1, 1962, amounted to only 144,000 cases and on November 1, 1961, totaled 221,000 standard cases.

The Maine Legislature authorized a 1962 season of 13 months--December 2, 1961-

Canned Maine Sardines--Wholesale Distributors' and Cannery Stocks, April 1, 1962, with Comparisons

Type	Unit	1961/62 Season			1960/61 Season					1959/60 Season		
		4/1/62	1/1/62	11/1/61	7/1/61	6/1/61	4/1/61	1/1/61	11/1/60	7/1/60	6/1/60	4/1/60
Distributors'	1,000 actual cases	148	193	202	208	215	267	233	277	172	197	252
Cannery'	1,000 std. cases ^{2/}	45	144	221	201	294	506	1,029	1,258	359	235	397

^{1/}Table represents marketing season from November 1-October 31.
^{2/}100 $\frac{3}{4}$ -oz. cans equal one standard case.

January 1, 1963. The 1961 season was from April 15 to December 1, the usual legal packing season for canned sardines in Maine. But as of the end of March 1962 the extended season had not yielded very much. The pack December 2, 1961, to April 7, 1962, was only 15,541 standard cases. And as of April 30, 1962, there were no indications of an early spring run of sardines. What sardines were landed were caught by purse seiners in off-shore waters. But the industry was still looking forward to a normal pack for 1962. Heavy landings were not expected until the end of May.

Shipments from April 15, 1961, to April 1, 1962, of 1,087,000 cases were substantially less than the 1,794,000 cases shipped in the same period a year earlier. The drop in shipments was due almost entirely to the small 1961 pack.

Note: See Commercial Fisheries Review, March 1962 p. 21.

* * * * *

**RESEARCH SUGGESTS
CANNED MAINE SARDINES
PROMOTE HEALTHIER ARTERIES:**

A researcher told the Federation of the American Society for Experimental Biology in Atlantic City on April 16, 1962, that frequent substitution of a can of Maine sardines, for other calories in the diet, produces a desirable effect on the blood of humans that

may contribute towards the prevention of arteriosclerosis.

Dr. T. F. Kelley of Bio-Research Consultants, Cambridge, Mass., reported this finding in a paper on recent research conducted by his organization.

He said that in the work, carried on in laboratories and hospitals, 62 patients with high serum cholesterol ate one can of Maine sardines a day ranging from one week to six months.

"It was found that their total serum lipids or fats decreased significantly during these periods," he stated.

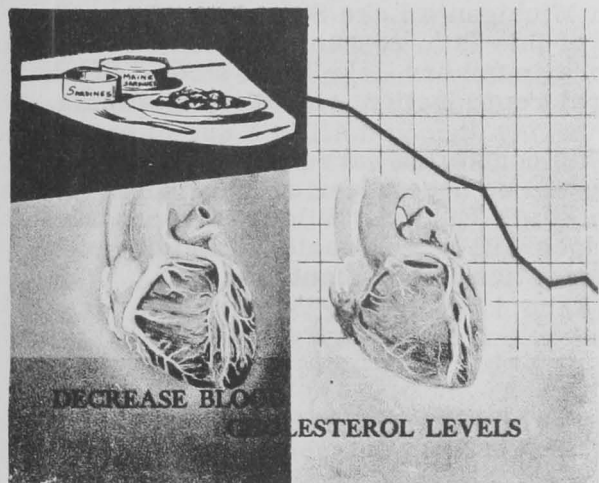
Dr. Kelley further explained that the beneficial effect can be explained to some extent by the ingestion of polyunsaturated fats contained in Maine sardines.

"If a recent statement by the American Heart Association that reasonable substitution of polyunsaturated fats for saturated fats is recommended as a possible means of preventing arteriosclerosis and decreasing the risks of heart attacks and strokes, is valid, the present observations suggest that a similar effect may be achieved to some extent by substituting one can of Maine sardines a day for a portion of the diet," he added.

The Maine Sardine Council Chairman hailed the findings as a significant development for the State's big sardine industry.

"We have always known that Maine sardines were a highly nutritive and healthful food and this further supports our contention as did animal feeding experiments at Massachusetts Institute of Technology last year," he said.

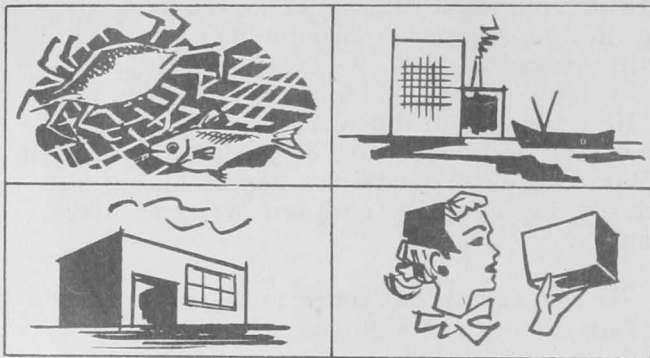
In the latter experiments animals fed a diet of sardines showed a much lower cholesterol level than those on a diet of a well known household type of saturated fats. (Maine Sardine Council, Augusta, Maine, news release of April 16, 1962.)



Marketing

EDIBLE FISHERY PRODUCTS MARKETING PROSPECTS, SUMMER 1962:

Consumption of fishery products during 1961 in the United States reached almost 11 pounds per capita, an increase of about one-half pound over the rate in 1960. During the summer of 1962, it is expected that the per capita consumption rate will be up seasonally and should continue at about the year-earlier rate during the remainder of 1962.



Retail prices went up a little during the first quarter of 1962 and averaged 4 percent above a year earlier. They were expected to continue at that level during the second quarter.

Supplies of edible fishery products become more plentiful with the beginning of fishing operations in most segments of the industry during the late spring months. Commercial landings, which are already on a seasonal upturn, will reach a peak during June or July.

Total stocks of edible fishery products were at the low point of the year early this spring but will experience a gradual build-up with increased fishing activity during the summer. Holdings of frozen edible fishery products at the beginning of April were almost 20 percent lower than in April 1961. Packers' stocks of canned products were also lower than last year at that time and they will continue to decline seasonally until the 1962 canning season is well under way in early summer.

Imports of edible fishery products during the first two months of 1962 were 4 percent higher than those in the same period a year earlier, and are expected to continue high during the first half of 1962.

This analysis was prepared by the Bureau of Commercial Fisheries, U. S. Department of the Interior, and published in the Department of Agriculture's May 1962 issue of The National Food Situation (NFS-100).



Michigan

LAKE SUPERIOR WATERS CLOSED TO COMMERCIAL LAKE TROUT FISHING:

Final approval was given early in April 1962 by the Michigan Conservation Commission to the closing of commercial lake trout fishing in Michigan's Lake Superior waters. The restriction, another step toward bringing back the lake trout fishery of the upper Great Lakes, went to the State's Governor with the request that it be made effective June 1 of this year.

Wisconsin and Minnesota were scheduled to follow suit with similar restrictions. The states' joint effort to protect low lake trout populations from commercial fishing pressure was triggered by signs that chemical treatment of streams had made a significant cut in Lake Superior's sea lamprey.

This improvement in the lamprey picture, coupled with the ban on commercial fishing, will give impetus to natural reproduction in Lake Superior by an age class of lake trout due to reach maturity during 1962. Without the restriction, the commercial lake trout fishery of Superior would soon have been doomed to a total collapse, according to the U. S. Bureau of Commercial Fisheries.

A controlled lake trout harvest of about 40,000 pounds per year will still be made from Michigan's Lake Superior waters. Purpose of this is to continue studies on sea lamprey numbers, lake trout stocks and their natural reproduction, and other vital data.

This controlled harvest for assessment work will be done under arrangements made by the U. S. Fish and Wildlife Service whose services will be contracted by Michigan's Conservation Department.



Nautical Charts

ATLANTIC SUPPLEMENTAL CHARTS SHOW COASTLINE CHANGES CAUSED BY MARCH STORM:

A total of 27 supplemental charts showing changes in the storm-lashed Atlantic coastline during the week of March 6, 1962, have been published by the Coast and Geodetic Survey, U. S. Department of Commerce, it was announced on April 13, 1962. This completes the series of preliminary chart supplements intended to warn the mariner and chart user of shifted shorelines, shoaled channels, and other dangers.

The emergency supplements called "chartlets" by the nautical chart trade, were compiled directly from new aerial photography. The preliminary series are simple outlines showing alterations in the shoreline. Subsequent editions to be issued later in 1962 will include hydrography and aids to navigation. Ultimately the basic nautical charts of the Coast and Geodetic Survey will be revised to reflect the changes.

The chartlets are printed in black ink on thin white paper at the same scale as the basic chart. They may be placed over the basic chart to compare exact shoreline changes.

The 27 preliminary chartlets and their basic chart of reference are available free of charge to the chart-using public from authorized nautical chart agents of the Coast and Geodetic Survey.



New York

FISHERY LANDINGS, 1961:

Total landings of fish and shellfish in the Marine District of New York during 1961 amounted to 123.6 million pounds valued at \$9.1 million. Compared with 1960, this was a drop of 14 percent in quantity, but a gain of 5 percent in value. The decline in quantity was the result of a decrease in landings of whiting, unclassified fish used for animal food, and scup or porgy. The catch of yellowtail flounders registered the major increase.

Striped bass landings in 1961 were the highest annual commercial catch for the last



Unloading a trawler at the Fulton Fish Market dock, New York City. Fish are packed in ice for shipment.

16 years. The heavy run of that species was attributed to a very large year-class that were too small for the market during the previous year. Haul seines took the majority of the catch. The greatest landings of striped bass occurred in November.

New York City is the State's major fishing port. Total landings of 11.7 million pounds at that port's Fulton Fish Market showed a drop of 1.3 million pounds as compared with 1960. Scup, the principal species, was down 1.3 million pounds, butterfish was down 400,000 pounds. Because of the short supply, there was an improvement in the price of both of those species.

Menhaden landings in New York State in 1961 were approximately the same as in 1960, with only a small increase in value.

Hard clams are the most important species in terms of value in the State. The 1961 production was up. The value per bushel averaged lower for the year.

Oyster production continued at a low level and dropped 22,000 pounds below 1960, while the value increased \$163,000.

The bay scallop production during 1961 maintained a high level with a slight drop compared with the previous year's peak catch.



North Atlantic Fisheries Investigations

BIOLOGICAL DATA ON SEA SCALLOPS COLLECTED:

M/V "Charlotte" Cruise 5: In order to obtain live scallops for laboratory tank ex-

periments, to observe gonad development of sea scallops, and to obtain scallops for length-weight data, the vessel Charlotte chartered by the U.S. Bureau of Commercial Fisheries, operated 4 to 5 miles offshore of Barnstable, Mass., on April 7, 1962. The sex and condition of gonads of about 50 scallops were determined; 1 bushel of live scallops was culled from the total catch.

It was found that gonad development was proceeding normally to stage 6. One bushel of live scallops was brought back to the Bureau's Biological Laboratory at Woods Hole, Mass.

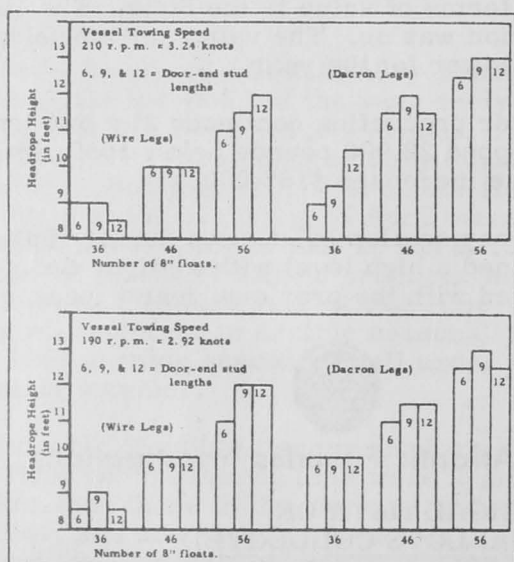
Note: See Commercial Fisheries Review, Jan. 1962 p. 25.



North Atlantic Fisheries Exploration and Gear Research

VERTICAL OPENING OF OTTER TRAWLS STUDIED:

M/V "Delaware" Cruise 62-4: To determine the relationship of the door-end-stud length and the vertical opening of a standard No. 41 otter trawl was the principal objective of the March 29-April 6, 1962, cruise by the U. S. Bureau of Commercial Fisheries exploratory fishing vessel Delaware. Measurements were also taken to show the effect of various numbers of standard aluminum ball floats attached to the headrope and of lightweight dacron top legs as compared with wire legs.



Headrope Height Data Delaware Cruise 62-4.

Vertical openings of the trawl were measured by means of an echo-sounder transducer mounted on the headrope of the trawl and a bottom contact indicator light. Both instruments were connected to indicators in the vessel's pilothouse by a "third wire" electric cable.

When the footrope was on bottom, as indicated by the contact switch and light, the distance to the bottom as sounded from the transducer mounted on the headrope indicated the vertical opening of the trawl.

Door-end-studs of 6-, 9-, and 12-foot lengths were tested on the same No. 41 trawl under identical conditions. The following modifications were made to the trawl while testing each of the three stud lengths: (1) the number of floats was increased from 36 to 56, by groups of 10; (2) dacron (pre-tensioned) rope was substituted for top wire legs; (3) the lower wings were cut free from the sweep sections of the footrope.

A total of 25 tows were conducted in an area 3 miles by 3 miles on Stellwagen Bank. Each tow consisted of four runs made with and against the tide at 210 r.p.m. (average speed 3.24 knots) and at 190 r.p.m. (average speed 2.92 knots).

The tests showed that the No. 41 otter trawl achieved an opening ranging from 8.5 feet to 13.5 feet. Highest headrope openings were attained with the lower wing cut free from the footrope sweeps and with the greatest number of floats (56) attached to the headrope.

Most significant findings of the cruise were: (1) the length of door-end studs did not appear to affect the opening of a No. 41 otter trawl; (2) increasing the number of floats increased the headrope height within the limitations of the netting; (3) dacron top legs helped to increase the headrope opening provided maximum opening had not already been reached through the use of floats; and (4) varying the towing speed between 3.24 and 2.92 knots did not affect headrope height.

Analyses of the data obtained indicated that the dimension of the No. 41 trawl netting sections restrict the headrope height to 13.5 feet. Higher opening of the trawl will require further modification of the trawl or use of a trawl of different design.

Note: See Commercial Fisheries Review, Nov. 1961 p. 25.



North Carolina

FISHERY LANDINGS, 1961:

Fish and shellfish landings in North Carolina during 1961 amounted to 276.6 million pounds, 20.8 million pounds (8 percent) above 1960. The production of food finfish was about 1 percent less than in the previous year. Shellfish landings declined 9 percent as compared with 1960.



Fig. 1 - A small vessel used for catching industrial fish, Beaufort, N. C.

The catch of menhaden and thread herring, used in the manufacture of fish meal, oil, and solubles, was 11 percent greater than in 1960. Lower landings of croaker, mullet, spot, and striped bass accounted for most of the decrease in the finfish production. Failure of the shrimp run was chiefly responsible for the drop in shellfish landings.

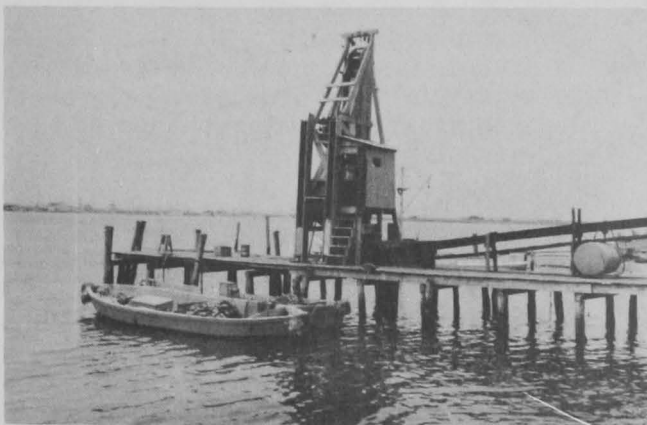


Fig. 2 - Menhaden net boats and dock unloading system at a pet food plant, Beaufort, N. C.

Otter-trawl fishing in outside waters was somewhat better than in 1960. The poor shrimp season may have been partly responsible since many of the large shrimp trawlers converted to fish trawls earlier in the fall than usual. Beach net fishing was not as

good as in the previous year. This fishery appeared to be decreasing in importance.

Landings of sea bass, which amounted to only 41,000 pounds in 1959, totaled 635,000 pounds in 1961, up sharply compared with the 126,000 pounds landed in 1960. This fishery seemed to be spreading to other southern areas and some of the dealers were optimistic regarding its future as a substitute for fisheries which were declining in importance.

Menhaden landings increased 16 percent. More vessels operated and only the bad weather during the latter part of the season prevented much greater landings. The price of menhaden oil was depressed in 1961, due to a loss of some of the export market, but the price of meal was somewhat better than in 1960.

The catch of hard blue crabs was 6 percent greater than in 1960. However, the crab market was poor during most of the year--resulting in low returns. Activity in the soft blue crab fishery was light, although 11 percent more soft shell crabs were produced than in 1960. The 1961 oyster production was practically the same as for the previous year. Landings of bay scallops increased 54 percent above 1960, while the catch of calico scallops dropped 80 percent.



North Pacific Exploratory Fishery Program

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

M/V "John N. Cobb" Cruise 53: The fourth in a series of cruises designed to monitor deep-water marine fauna at stations established along a track line southwest of the mouth of the Columbia River was completed on March 23, 1962, by the U. S. Bureau of Commercial Fisheries exploratory fishing vessel John N. Cobb. This cruise was also designed to extend the track line into deeper water off the Columbia River and to establish stations west of Destruction Island suitable for future resurveying. As in previous cruises, commercial otter-trawl nets were used for the survey.

A total of 17 stations at depths from 50 to 550 fathoms were successfully trawled off

the Columbia River. Regions surveyed off Destruction Island at depths greater than 75 fathoms were characterized by rough bottom which caused considerable damage to nets. One successful haul was completed at 200 fathoms in this region.

Samples of fish and shellfish were collected for the Atomic Energy Commission and delivered to the Laboratory of Radiation Biology at the University of Washington College of Fisheries for radiological analyses. Additional samples of Dover sole and sablefish were collected for study by the Bureau's Technological Laboratory in Seattle.

The Bureau-Oregon Fish Commission cooperative study of Dover sole migrations was continued, with release of 244 tagged fish caught at depths from 100 to 425 fathoms.



Dover sole
(*Microstomus pacificus*)

Commercial species of fish encountered off the Columbia River were the same as those taken in previous cruises, including sablefish (*Anoplopoma fimbria*), Dover sole (*Microstomus pacificus*), English sole (*Parophrys vetulus*), petrale sole (*Eopsetta jordani*), turbot (*Atheresthes stomias*), hake (*Merluccius productus*), and several species of rockfish. Some Dover sole and sablefish were found throughout the depth range fished. Largest sablefish catches ranging from 800 to 1,036 pounds per hour tow were caught at depths between 250 and 425 fathoms. The largest number of Dover sole were taken at the 200-fathom station. Good catches of 1,000 to 1,600 pounds per hour of ocean perch (*Sebastes*) were made at stations from 125-175 fathoms. Very few hake were taken during the survey.

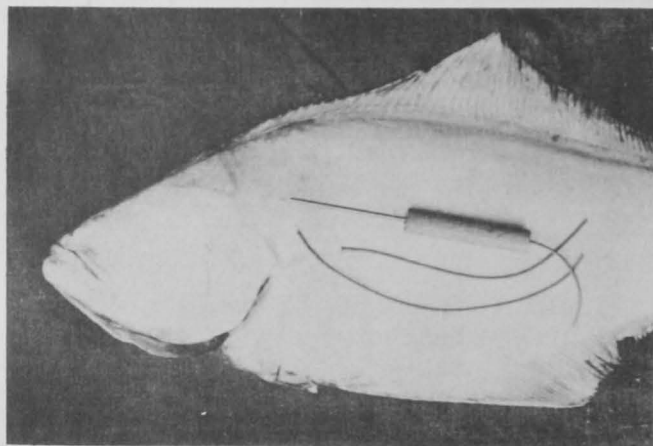


Sablefish
(*Anoplopoma fimbria*)

Catches of invertebrates increased in deeper water. Half of the total catch at the 550-fathom station consisted of invertebrates (starfishes and heart urchins). Male and female tanner crabs (*Chionoecetes tanneri*) were taken at the 350- and 375-fathom stations in contrast to previous cruises where they were found to occupy separate depth ranges. Egg-carrying females slightly outnumbered males.

The 200-fathom hauls off Destruction Island yielded 12,000 pounds of sablefish, mostly of subcommercial size.

The John N. Cobb left Seattle April 16, 1962, for 8 weeks of exploratory trawling for bottomfish in the Gulf of Alaska. The vessel was expected to return to Seattle June 8, 1962, from Cruise 54. The area of operation was to be Cape St. Elias to the general vicinity of Portlock Bank. The purposes of Cruise 54 were to determine the relative abundance and sizes of bottomfish and shellfish encountered in the area. Otoliths (ear bones) and scales were to be removed from commercial species of fish so that their ages can be determined. Halibut caught on the survey was to be tagged and



A fully-exposed dart tag lying beside one that has already been applied, and also a tag inserted into the hollow needle by which the tags are inserted in the halibut.

returned to the water to provide information on migration and growth. Sonic equipment was to be used to survey the bottom. A commercial otter-trawl net was to be towed over grounds indicated by the sonic gear as being trawlable. Catches made by the net were to be examined to assess the commercial fishing potential of the region.

Note: See Commercial Fisheries Review, Feb. 1962 p. 33, Apr. 1962 p. 20.

Oceanography

TROPICAL ATLANTIC COOPERATIVE INVESTIGATIONS SCHEDULED TO BEGIN IN 1963:

Cooperative investigations of the tropical Atlantic Ocean from South America to Africa are set to begin in January 1963, coordinated by the U. S. Fish and Wildlife Service's Bureau of Commercial Fisheries.

Proposed by the Bureau of Commercial Fisheries and accepted and sponsored by the Interagency Committee on Oceanography, this program will explore the equatorial Atlantic, one of the last remaining ocean areas with large stocks of underdeveloped food resources and what appears to be an enormous fishery potential. These fishery resources, so valuable as protein food, are sorely needed by peoples of West Africa and other parts of the world who lack, to a crippling degree, protein in their diet.

Although some research and exploration have been conducted by other nations in the tropical Atlantic, the Bureau's program will be a major fishery and oceanographic research project. It is now under consideration for submission to the Inter-governmental Oceanography Committee as a United States-sponsored international program.

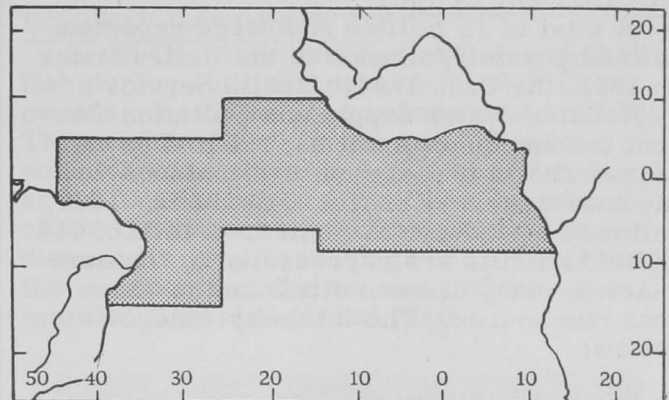
A review of what already is known about the area shows a lack of general knowledge about changes in the aquatic plant and animal life of the area as affected by currents, temperature, and other physical environmental factors. Therefore, the first year's work will be oceanographic research of a general descriptive nature, studying the complex surface currents, variances of water temperature, salinity, weather observations, nutrient content, the role of the Equatorial Undercurrent, and related topics. Pelagic fishery surveys will be carried out during 1964 and 1965, using results from the 1963 studies for experimental design of later work.

Cooperating in these investigations will be several universities, the U. S. Weather Bureau, the U. S. Coast and Geodetic Survey, and the U. S. Department of the Navy. Research vessels from Argentina and Brazil may participate, and expressions of interest have been received from Britain and France.

Anticipating the need for additional staff and facilities to carry on the greatly expanded work of the Bureau of Commercial

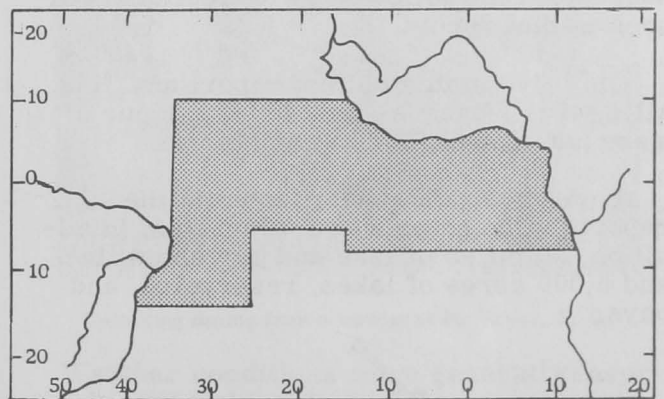
Fisheries' Washington, D. C., Biological Laboratory in this new program, the Laboratory moved May 1 to larger quarters in Building 74, Naval Weapons Plant. The Laboratory was previously located at 734 Jackson Place in Washington.

The program has been designated as the Tropical Atlantic Investigations and the first of two synoptic or general surveys as EQUALANT I and EQUALANT II.



EQUALANT I, Jan.-Mar. 1963.

EQUALANT I will take place January-March 1963. As of March 1962, the ships committed to the survey include the Chain and Crawford of the Woods Hole Oceanographic Institution, Explorer of the U. S. Coast and Geodetic Survey, and Geronimo of the U. S. Bureau of Commercial Fisheries. The Oregon of the Bureau of Commercial Fisheries and the Ombango of the Pointe-Noire Laboratory may be used. An Argentine vessel will participate in the survey also.



EQUALANT II, July-Sept. 1963.

For EQUALANT II, covering July-September 1963, the only vessel definitely committed is the Geronimo of the Bureau of

Commercial Fisheries. However, Argentina and Brazil will cooperate in this phase as will the Pointe-Noire Laboratory, the Agricultural and Mechanical College of Texas, and the University of Rhode Island.



Pollution

FISH KILLED BY WATER POLLUTION IN 1961:

A total of 15 million fish were reported killed by water pollution in the United States in 1961, the U. S. Public Health Service's Division of Water Supply and Pollution Control announced on April 23, 1962. The new report shows that agricultural poisons led all known sources of fish kills during 1961, followed by industrial wastes. A total of 444 individual kills are represented in the summaries, many of them attributed to more than one source. The totals by categories follow:

Agricultural poisons: 75 reports accounting for 5.6 million fish killed; industrial wastes: 150 reports accounting for a total of 2.9 million fish killed; mining operations: 19 reports accounting for 1.1 million fish killed; other sources: 60 reports accounting for a total of 184,000 fish killed; domestic sewage: 52 reports accounting for 162,000 fish killed; and 79 unknown source reports accounting for 5.8 million fish killed.

The previous year's report, released on June 30, 1961, showed a total of 286 reports received from 36 States and a total of 6.3 million fish killed. Industrial wastes led as source of kills followed by agricultural poisons in that report.

Only five states did not report any fish kills, either because they did not occur or were not of significant amounts.

Total river mileage affected in the 1962 reports when given was 1,700 miles; in addition, 50 miles of lake and bay shore lines, and 6,000 acres of lakes, reservoirs, and bays.



Shrimp

UNITED STATES SUPPLY AND DISPOSITION, 1959-61:

With the sharp drop in landings in 1961 in the Gulf and South Atlantic States, the available supply in 1961 was substantially below 1960. If it had not been for the substantial increase in imports of shrimp, the 1961 supply would have been even less.



Bucket unloader used for unloading shrimp from trawlers, Tampa, Fla.

U. S. Supply and Disposition of Shrimp, 1959-61			
Item	1961 ^{1/}	1960 ^{2/}	1959
	..... (1,000 Lbs.)		
Supply--Heads-on Weight:			
Domestic catch	174,200	249,452	240,182
Imports ^{3/}	227,189	197,515	186,202
Total supply	401,389	446,967	426,384
Disposition--Heads-on Weight (Approximate):			
Frozen:			
Headless ^{4/}	^{5/}	287,400	255,646
Meat, raw ^{4/}	^{5/}	76,370	51,245
Meat, cooked ^{4/}	^{5/}	10,390	10,465
Breaded	^{5/}	86,460	83,994
Specialties	^{5/}	580	364
Total frozen ^{6/}	328,989	341,287	322,356
Canned	44,400	56,670	57,730
Dried	4,000	6,330	3,298
Fresh	24,000	42,680	43,000

^{1/}Preliminary.
^{2/}Revised.
^{3/}Reported by the United States Bureau of the Census as "shrimp and prawn," which includes fresh, frozen, cooked, dried, canned, etc., as follows: 1959--106,555,000; 1960--113,418,000; and 1961--126,268,000 pounds. The equivalent heads-on weight was computed.
^{4/}May include small quantities of fresh products.
^{5/}Not available.
^{6/}These totals do not add and are less than actual totals because products frozen more than once have been eliminated.
 Note: Shrimp data were compiled from figures assembled by the U. S. Tariff Commission and the Bureau of Commercial Fisheries Market News Service offices. To convert the weight of heads-on shrimp to heads-off, divide by 1.68.

UNITED STATES SHRIMP SUPPLY INDICATORS, APRIL 1962:

Item and Period	1962	1961	1960	1959	1958
..... (1,000 Lbs., Heads-Off)					
Total Landings, So. Atl. and Gulf States:					
June	-	8,220	12,427	14,547	10,241
May	-	5,279	6,335	6,885	6,523
April	2,700	3,169	4,729	3,595	5,300
Jan.-Mar.....	10,900	14,352	13,284	10,487	14,035
Jan.-Dec.....	-	91,280	141,035	130,659	116,552
Quantity canned, Gulf States 1/:					
June	-	3,744	7,537	7,641	5,107
May	-	1,316	1,591	2,680	1,462
April	3	10	72	81	306
Jan.-Mar.....	855	335	640	536	234
Jan.-Dec.....	-	15,760	28,594	24,679	26,404
Frozen inventories (as of end of each mo.) 2/:					
June 30	-	19,416	15,338	19,283	10,664
May 31	-	24,696	17,540	21,137	11,013
April 30	-	27,492	20,502	23,331	12,211
March 31	16,607	31,345	23,232	24,893	14,501
January 31	-	31,842	34,332	30,858	17,963
Imports 3/:					
June	-	8,065	8,932	8,300	6,018
May	-	8,278	9,902	8,264	5,666
April	4/	9,208	7,733	9,051	5,446
March	9,658	10,347	8,545	8,492	4,986
Jan.-Mar.	33,164	31,617	24,798	24,211	15,148
Jan.-Dec.....	-	126,268	113,418	106,555	85,393

1/Pounds of headless shrimp determined by multiplying the number of standard cases by 33.
 2/Raw headless only; excludes breaded, peeled and deveined, etc.
 3/Includes fresh, frozen, canned, dried, and other shrimp products as reported by the Bureau of the Census.
 4/Not available.
 Note: Data for 1962 and 1961 are preliminary. March 1962 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 Atlantic Exploratory Fishery Program

SHRIMP TAGGED IN GULF OF MEXICO AREA:

M/V "Silver Bay" Cruise 38 (March 14-April 13, 1962): To stain and tag shrimp for mortality and migration studies was the primary objective of the 31-day cruise of the exploratory fishing vessel Silver Bay of the U. S. Bureau of Commercial Fisheries. The tagging was done for the Bureau's Biological Laboratory at Galveston, Tex. The vessel returned to Brunswick, Ga., on April 13, 1962.

Approximately 2,500 pink shrimp were stained and released off Sanibel Island, Fla. A total of 2,431 stained and 1,632 tagged brown shrimp were released between Galveston and Aransas Pass, Texas. Postlarval penaeid shrimp and ripe brown shrimp were collected off the Louisiana coast.



South Carolina

FISHERY LANDINGS, 1961:

South Carolina landings of fish and shellfish during 1961 amounted to 19.2 million pounds--5 million pounds less than in 1960. The production of finfish was 1.6 million pounds greater than in 1960, while landings of shellfish dropped 6.6 million pounds. Most of the 1961 over-all decline was due to a disastrous drop in landings of shrimp, one of the mainstays of the economy of the commercial fisheries of that State.



Unloading shrimp from a trawler at Pt. Royal, S. C.

Weather conditions were generally favorable for all fishing during the year, except in September, when there were several days of high winds and rough seas. In July, the rainfall was in excess of normal recordings for that period.

The catch of food finfish increased 1.5 million pounds (30 percent) above 1960. This increase was due primarily to the poor shrimp season, as the shrimp vessels turned to fishing for finfish to take the place of income usually derived from shrimp fishing. Compared with the previous year, the 1961 landings of flounder increased 74 percent; king whiting, 65 percent; spot, 27 percent; and sea bass, from 29,000 pounds to 324,000 pounds. The tremendous gain in sea bass was attributed to more extensive use of fish pots during the latter part of the year.

Landings of shrimp dropped from 8 million pounds (heads-on) in 1960 to 3.9 million pounds in 1961. There was an increase of approximately 7 cents per pound in the ex-vessel price of shrimp--compensating in only a very small measure for the greatly reduced landings.

The 1961 production of hard clams increased 12 percent compared with 1960. The price held good throughout the year, and there was a ready market for all that could be taken. Landings of hard crabs dropped from 7.1 million pounds in 1960, to 4.7 million pounds, or 34 percent. The oyster fishery had a good year, but production was about 3 percent below that of the previous year. South Carolina oysters were in demand and brought good prices. With the advent of the new wage and hour law, most of the shucking plants laid off large numbers of shuckers.



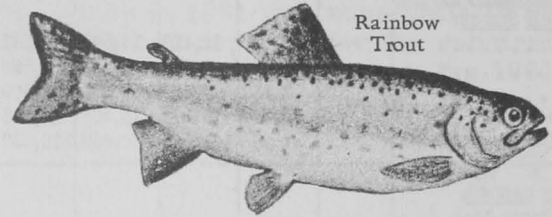
Trout

SHORTAGE OF AMERICAN-PRODUCED RAINBOW TROUT PREDICTED:

The increase in demand for American-produced rainbow trout has created shortages in many portion sizes, states the U. S. Trout Farmers' Association. The Association is the official legal organization representing a large number of American trout producers located throughout the nation.

One leading United States trout producer reported an increase of over 70 percent in sales volume during March 1962. The Association predicts additional increases in demand due to the fact that more and more eating establishments and food outlets are vigorously promoting quality fishery products and other low fat, polyunsaturated main

dishes. Modern processing, high quality feeds, and rapid shipping--coupled with close proximity to the ultimate consumer--are a few of the factors that have made American-produced rainbow trout popular.



Rainbow trout's high popularity stems from the variety of ways it can be prepared and because it lends itself to a variety of enticing menu descriptions. Another reason for rainbow trout's growing popularity is that the dining public has discovered that trout are the original "all American fish." Being native to the United States, these colorful and fighting game fish helped to feed our country's forefathers as they moved West. A rainbow's coloring actually depicts our Nation's favorite and historic colors as it is characteristically blue on top with silvery white underneath and red stripes or side markings. (April 10, 1962, news release from the U. S. Trout Farmers' Association.)

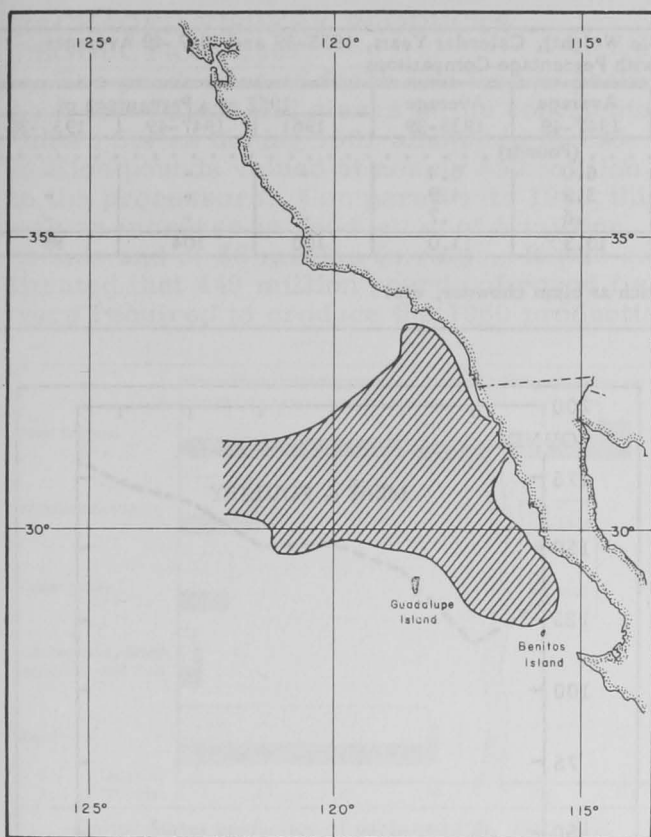


Tuna

ALBACORE CATCH PREDICTION BY U. S. WEST COAST FISHERMEN SOUTH OF INTERNATIONAL BORDER:

This year United States west coast commercial fishermen will catch 18.0 million pounds of albacore tuna from waters south of the International Border between Mexico and the United States, and 5.7 million pounds of bluefin tuna in waters off California. This prediction was made by the San Diego Biological Laboratory of the U. S. Bureau of Commercial Fisheries. It was based on shore temperatures averaged for January through April 1962, and water temperatures and salinities taken in April by the California Cooperative Oceanic Fisheries investigations off the Baja California and southern California coasts.

The albacore fishery is expected to range as far south as Guadalupe Island in June and July. Bureau scientists have not yet found a



Cross-hatched region delineates the area expected to produce about two-thirds of albacore catch in June and July 1962.

means to predict total west coast albacore and bluefin landings.

Since 1945, the albacore catch south of the border has ranged from zero to 26.7 million pounds. The bluefin catch off California for the same period has fluctuated from below a million pounds to 15.6 million pounds.

During the past year the ocean to the west of Baja California and southern California has continued to cool from abnormally high water temperatures in the years 1958 and 1959. This year, temperatures are up to 2° F. cooler than the long-term mean, whereas in 1958 and 1959, temperatures were as much as 6° F. warmer than the long-term average. The years 1958 and 1959 were noted for the complete failure of the southern albacore fishery.

Historical catch records show an inverse relationship between the albacore catch from south of the International Border and the bluefin catch from California waters. We believe this relationship is due to differences in response by the two species to the oceanic en-

vironment. In "cold" years albacore move farther south than usual, resulting in high catches south of the border. In "warm" years bluefin move to the north, giving high catches from California waters. Since this is a "cold" year the center of the bluefin population is expected to remain to the south; we estimate that a below-average bluefin will be taken from California waters.

The estimates of catch may be subject to considerable error because as yet it has not been possible to correct for substantial changes in fishing effort and to anticipate changes that may occur in the ocean environment after the forecast has been made. During the preceding three weeks prior to May 15, the ocean appeared to be warming at a rate faster than normal. This may cause the albacore forecast to be somewhat high and the bluefin forecast somewhat low.

In May 1961 the Bureau Laboratory at San Diego issued its first forecast for the albacore fishery in the eastern Pacific Ocean. The staff predicted that 10.0 million pounds of albacore would be taken from waters south of the International Border between Mexico and the United States and that the fishery would begin farther south than it had in the preceding three years. A preliminary report from the California Department of Fish and Game stated that 8.4 million pounds of albacore were taken from that region in 1961.



United States Fisheries

TRENDS IN 1961:

Per capita consumption of fish in the United States increased to 10.9 pounds in 1961, a half pound more than in the previous year. This increase was divided equally between "fresh and frozen" and canned items.

The supply of domestically-produced fresh and frozen products declined substantially, even though the annual harvest was the Nation's second largest--5.2 billion pounds. Imports were up sharply due to increased receipts of groundfish fillets and blocks, and shrimp. Both edible and non-edible imports established records.

The total amount paid to United States fishermen and vessel owners amounted to \$358 million--nearly \$4 million more than

Apparent Civilian Per Capita Consumption of Fishery Products (Edible Weight), Calendar Years, 1935-39 and 1947-49 Averages, 1959-61 and Preliminary for 1962, with Percentage Comparisons									
Commodity	Preliminary 1/		1960 1/	1959	Average 1947-49	Average 1935-39	1962 as a Percentage of		
	1962	1961					1961	1947-49	1935-39
(Pounds)									
Fresh and Frozen	3/	6.0	5.8	5.9	6.0	5.4	-	-	-
Canned 2/	3/	4.3	4.0	4.2	3.9	4.9	-	-	-
Cured	3/	.6	.6	.6	.6	.7	-	-	-
Total	10.9	10.9	10.4	10.7	10.5	11.0	100	104	99

1/Excludes Alaska and Hawaii.
 2/Excludes canned food products containing small quantities of fish, such as clam chowder, etc.
 3/Not available.

in 1960, but \$15 million less than the record \$373 million paid in 1958. The average price per pound was 6.94 cents, a low figure due to the record catch (2.3 billion pounds) of low-priced menhaden.

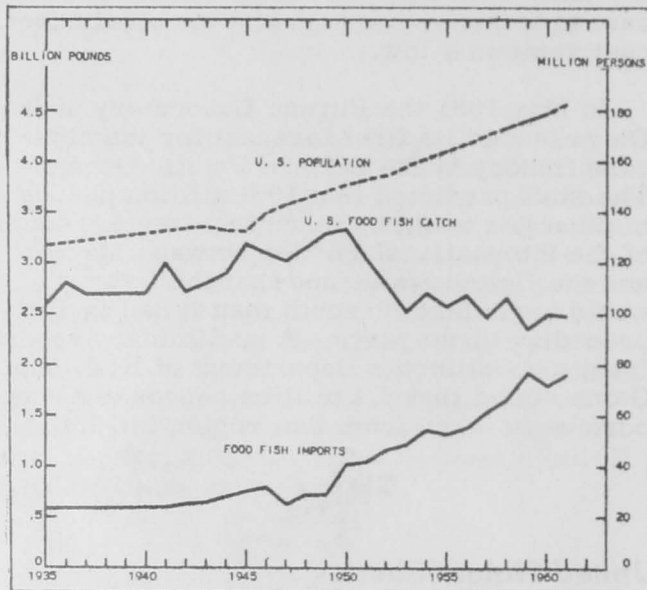
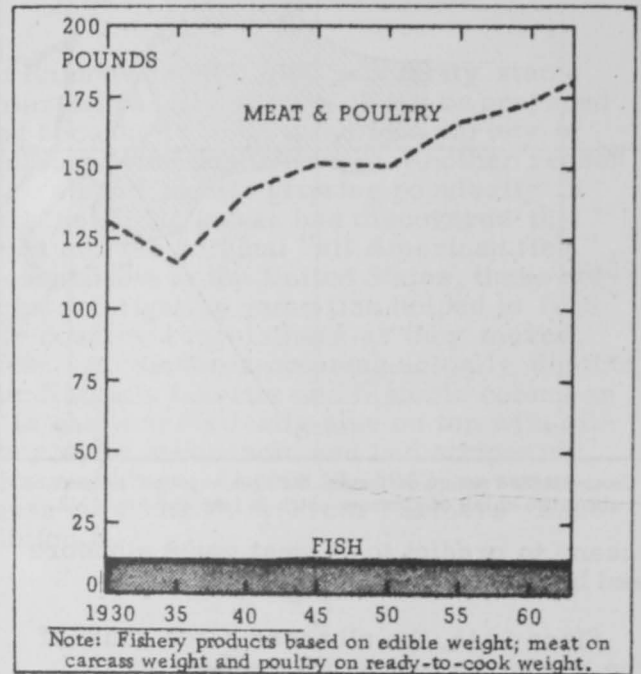


Fig. 1 - Relationship of United States population to food fish catch and imports, 1935-61.

San Pedro, Calif., was the leading United States fishing port in 1961 with respect to both quantity and value of fishery landings. At that port landings amounted to 416 million pounds, with an ex-vessel value of \$36 million. Pascagoula, Miss., was in second place with 354 million pounds; followed by Lewes, Del., 303 million pounds; Reedville, Va., 290 million pounds; Cameron, La., 252 million pounds; and Empire, La., 246 million pounds. All but San Pedro were entirely or principally menhaden ports. New Bedford, Mass., occupied second place in value of landings with \$15 million; followed by Boston, Mass., \$10 million; San Diego, Calif., \$8 million; and Gloucester, Mass., \$6 million.

The 1960 world catch amounted to a record 83.2 billion pounds. Five countries accounted for well over 50 percent of the total



Note: Fishery products based on edible weight; meat on carcass weight and poultry on ready-to-cook weight.
 Fig. 2 - United States per capita consumption of fishery products compared to meat and poultry, 1930-1961.

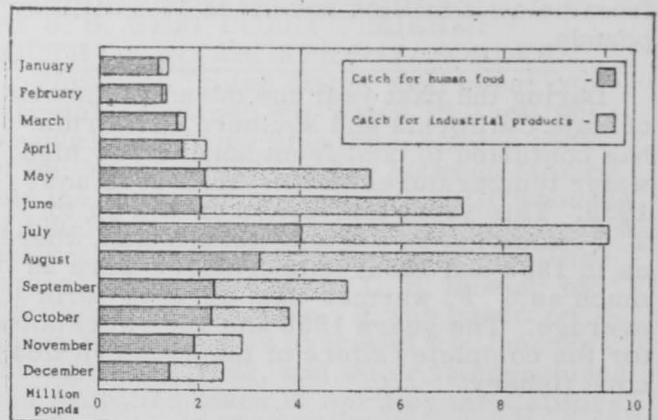
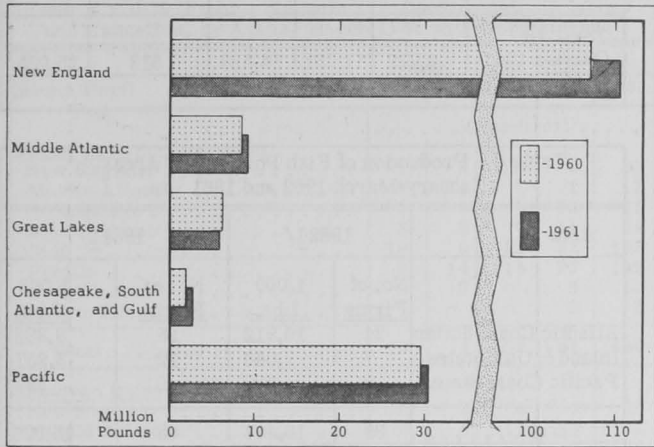


Fig. 3 - United States monthly catch and utilization of fish and shellfish, 1961.

catch--Japan (16.4 percent), China (Mainland) (13.3 percent), Peru (9.4 percent), U.S.S.R. (8.1 percent), and the United States (7.5 percent).

PACKAGED FISHERY PRODUCTS PRODUCTION, 1961:

The production of fresh and frozen packaged fish fillets and steaks in the continental United States during 1961 amounted to 158 million pounds valued at nearly \$52 million to the processors. Compared with 1960, this was an increase in production of 5 million pounds and of \$3 million in value. It was estimated that 449 million pounds of round fish were required to produce the 1960 production.



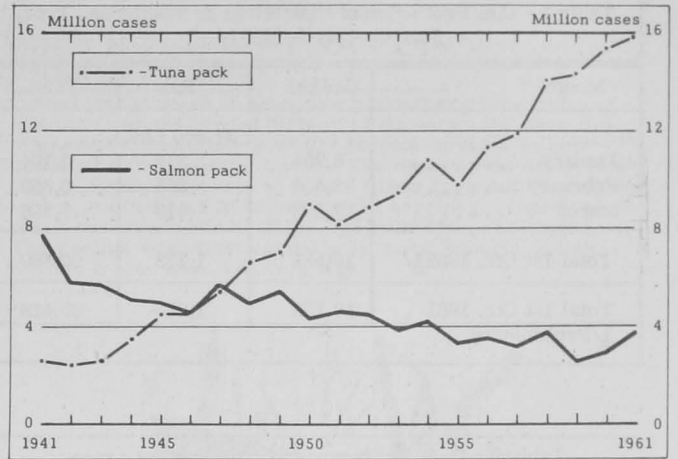
United States production of packaged fish, 1960-61.

Haddock fillets (38 million pounds) and Atlantic ocean perch fillets and steaks (37 million pounds) were the leading items produced in 1961 and accounted for 48 percent of the total volume and 42 percent of the total value. Other important items produced during 1961 were flounder, cod, halibut, and pollock steaks and fillets.

CANNED FISHERY PRODUCTS, 1961:

The pack of canned fishery products in the United States, American Samoa, and Puerto Rico during 1961 amounted to 33 million standard cases (1 billion pounds) valued at \$424 million to the packers. Compared with 1960, this was a 4 percent decrease in production, but an increase of 9 percent in value.

The 1961 pack for human consumption was 48 million pounds and \$41 million higher than in 1960. The gain in both quantity and value was due largely to record packs of tuna and crab meat, and to increased packs of canned salmon, mackerel, and oysters. The value of two items--canned salmon and tuna--accounted for 72 percent of the



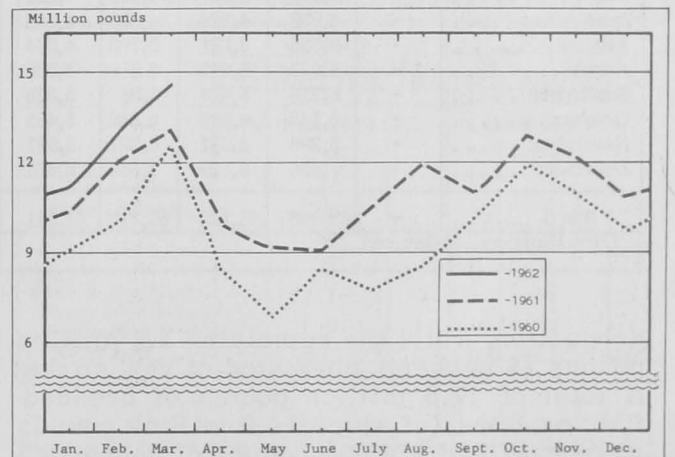
United States pack of tuna and salmon, 1941-61.

total value of canned fishery products to the packers.

The packs of Maine and Pacific sardines, shrimp, and animal food were less than in the previous year.

FISH STICKS AND PORTIONS PRODUCTION, JANUARY-MARCH 1962:

The United States production of fish sticks during the first quarter of 1962 amounted to 20.7 million pounds, while the production of fish portions totaled 18.4 million pounds. This was a gain of 253,000 pounds (1 percent) in fish stick production and 3.4 million pounds (22 percent) in the production of fish portions as compared with the first quarter of 1961.



U. S. production of fish sticks and portions combined, 1960-1962.

Cooked sticks (19.5 million pounds) accounted for 94 percent of the total fish stick

Month	Cooked	Raw	Total
(1,000 Lbs.).....		
January	5,734	370	6,104
February	6,504	355	6,859
March	7,293	413	7,706
Total 1st Qtr. 1962 ^{1/}	19,531	1,138	20,669
Total 1st Qtr. 1961 .	19,133	1,283	20,416
^{1/} Preliminary.			

Area	1962 ^{1/}		1961 ^{2/}	
	No. of Firms	1,000 Lbs.	No. of Firms	1,000 Lbs.
Atlantic Coast States	22	16,398	24	16,589
Inland & Gulf States .	4	2,147	7	1,980
Pacific Coast States .	8	2,124	10	1,847
Total	34	20,669	41	20,416
^{1/} Preliminary, ^{2/} Revised.				

Month	1962 ^{1/}	1961 ^{2/}	1960	1959	1958
	.....(1,000 Lbs.).....				
January	6,104	6,091	5,511	6,277	5,471
February	6,859	7,092	6,542	6,352	5,925
March	7,706	7,233	7,844	5,604	5,526
April	-	5,606	4,871	4,717	4,855
May	-	5,136	3,707	4,407	4,229
June	-	4,938	4,369	4,583	4,702
July	-	3,585	3,691	3,790	4,574
August	-	6,937	5,013	3,879	4,358
September	-	5,216	5,424	5,353	5,328
October	-	6,143	6,560	5,842	5,485
November	-	6,298	6,281	4,831	5,091
December	-	5,628	5,329	4,743	5,467
Total	-	69,903	65,142	60,378	61,011
^{1/} Preliminary, ^{2/} Revised.					

production, while the remaining 1.2 million pounds (6 percent) consisted of raw sticks. A total of 17.8 million pounds of breaded fish portions (of which 14.9 million pounds were raw) and 574,000 pounds of unbreaded portions was processed during the first quarter of 1962.

Month	Breaded			Unbreaded	Grand Total
	Cooked	Raw	Total		
	.....(1,000 Lbs.).....				
January	945	4,028	4,973	129	5,102
February	753	5,359	6,112	262	6,374
March	^{1/} 1,234	5,514	6,748	183	6,931
Total 1st Quarter 1962	2,932	14,901	17,833	574	18,407
Total 1st Quarter 1961	2,772	11,751	14,523	513	15,036
^{1/} Preliminary.					

Area	1962 ^{1/}		1961 ^{2/}	
	No. of Firms	1,000 Lbs.	No. of Firms	1,000 Lbs.
Atlantic Coast States	24	10,912	25	9,382
Inland & Gulf States	7	7,046	12	5,257
Pacific Coast States	8	499	6	397
Total	39	18,407	43	15,036
^{1/} Preliminary, ^{2/} Revised.				

Month	1962 ^{1/}	1961 ^{2/}	1960	1959	1958
	.....(1,000 Lbs.).....				
January	5,102	4,303	3,632	2,692	1,973
February	6,374	4,902	3,502	3,025	1,254
March	6,931	5,831	4,706	3,225	1,471
April	-	4,507	3,492	2,634	2,268
May	-	3,902	3,253	2,684	1,478
June	-	4,063	3,995	3,247	1,504
July	-	3,986	4,088	2,227	2,161
August	-	4,987	3,558	2,796	1,516
September	-	5,769	4,631	3,558	1,566
October	-	6,783	5,275	4,314	2,560
November	-	5,813	4,790	3,483	1,979
December	-	5,215	4,459	3,262	2,060
Total	-	60,061	49,381	37,147	21,790
^{1/} Preliminary, ^{2/} Revised.					

The Atlantic Coast led all areas in the production of both fish sticks and portions with 16.4 and 10.9 million pounds, respectively. The Inland, Gulf, and Pacific Coast States produced the remaining 4.3 million pounds of fish sticks and 7.5 million pounds of fish portions.

Note: See Commercial Fisheries Review, March 1962 p. 24.

U. S. Fishing Vessels

DOCUMENTATIONS ISSUED AND CANCELLED, MARCH 1962:

During March 1962, a total of 19 vessels of 5 net tons and over were issued first documents as fishing craft as compared with 44 in March 1961. There were 44 documents cancelled for fishing vessels in March--the same as in March 1961.

Area (Home Port)	Mar.		Jan.-Mar.		Total
	1962	1961	1962	1961	
..... (Number)					
Issued first documents^{2/}:					
New England	1	2	3	9	33
Middle Atlantic	1	1	1	1	12
Chesapeake	1	8	7	12	75
South Atlantic	3	8	7	11	44
Gulf	10	9	25	27	103
Pacific	3	14	15	23	149
Great Lakes	-	2	-	3	12
Puerto Rico	-	-	-	2	2
Total	19	44	58	88	430
Removed from documentation^{3/}:					
New England	1	2	6	5	20
Middle Atlantic	6	8	15	10	32
Chesapeake	-	6	3	14	28
South Atlantic	7	3	14	8	29
Gulf	10	13	29	30	104
Pacific	15	9	42	26	111
Great Lakes	2	2	8	4	17
Hawaii	2	-	3	-	-
Total	43	43	120	97	341

^{1/}For explanation of footnotes, see table 2.

Gross Tonnage	Issued ^{2/}		Cancelled ^{3/}	
 (Number)			
5-9	2		9	
10-19	7		11	
20-29	2		4	
30-39	2		3	
40-49	2		2	
50-59	-		4	
60-69	1		-	
70-79	3		2	
80-89	-		1	
100-109	-		1	
110-119	-		1	
130-139	-		2	
140-149	-		1	
260-269	-		1	
310-319	-		1	
Total	19		43	

^{1/}Includes both commercial and sport fishing craft. A vessel is defined as a craft of 5 net tons and over.
^{2/}Includes redocumented vessels previously removed from records. Vessels issued first documents as fishing craft were built: 9 in 1962, 2 in 1961, 1 in 1960, and 7 prior to 1951. Assigned to areas on the basis of their home ports.
^{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.



U. S. Foreign Trade

EDIBLE FISHERY PRODUCTS, FEBRUARY 1962:

Imports of fresh, frozen, and processed edible fish and shellfish into the United States in February 1962 were down 5.5 percent in quantity and 10.6 percent in value as compared with the previous month. The decline was due primarily to smaller imports of frozen fillets (groundfish and other types), canned tuna in brine, canned sardines, canned salmon, fresh and frozen sea scallops, spiny lobster, and shrimp. The decline was offset partially by more imports of fish blocks, frozen tuna, and frog legs.



Compared with the same month in 1961, imports in February 1962 were up 1.5 percent in quantity and 7.5 percent in value. The general increase came about because of more imports of fillets of groundfish (mostly ocean perch and fish blocks), frozen tuna other than albacore, tuna loins and discs, canned sardines in oil, live lobsters from Canada, and shrimp. The increases were offset somewhat by declines in the imports of fillets other than groundfish, frozen albacore, frozen salmon from Canada, canned tuna, canned sardines not in oil, canned crab meat, canned lobster meat from Canada, and canned oysters.

In the first two months of 1962 the imports of fresh, frozen, and processed edible fish and shellfish were up 3.0 percent in quantity and 14.7 percent in value as compared with the same period the previous year. The increase in value was due to the higher prices for nearly all imported fishery products. Imports in January-February 1961 were greater for frozen fillets (especially fish blocks and ocean perch), frozen tuna, tuna loins and discs, canned tuna, canned sardines in oil, frozen shrimp, fresh and frozen scallops from Canada, and lobster and spiny lobster.

Item	Quantity				Value			
	Feb.		Jan.-Feb.		Feb.		Jan.-Feb.	
	1962	1961	1962	1961	1962	1961	1962	1961
.. (Millions of Lbs.) .. (Millions of \$) ..								
Imports:								
Fish & Shellfish:								
Fresh, frozen, & processed ^{1/}	84.0	82.8	173.0	167.9	28.8	26.8	61.0	53.2
Exports:								
Fish & Shellfish:								
Processed only ^{1/} (excluding fresh & frozen)	2.9	4.4	6.4	6.9	1.3	1.9	2.7	3.0

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

United States exports of processed fish and shellfish in February 1962 were down 33.6 percent in quantity and 31.6 percent in value as compared with February 1961. The drop was due to smaller exports this February of canned mackerel, salmon, and sardines not in oil, frozen shrimp, canned shrimp, and shucked oysters.

Compared with the previous month, the exports in February 1962 were down 16.8 percent in quantity and 7.1 per-

cent in value principally because of smaller exports of canned mackerel.

Processed fish and shellfish exports for the first two months of 1962 were down 7.2 percent in quantity and 10.0 percent in value as compared with the same period of 1961. The following products were exported in substantially lesser quantities in 1962: canned salmon, canned sardines not in oil, canned shrimp, and shucked oysters.

* * * * *

IMPORTS OF CANNED TUNA IN BRINE UNDER QUOTA:

United States imports of tuna canned in brine during January 1-March 31, 1962, amounted to 14,180,044 pounds (about 675,200 std. cases), according to data compiled by the Bureau of Customs. This was 19.9 percent more than the 11,822,619 pounds (about 563,000 std. cases) imported during January 1-April 1, 1961.

United States imports of tuna canned in brine during January 1-April 28, 1962, amounted to 17,049,225 pounds (about 811,900 std. cases). This was 13.0 percent more than the 15,083,873 pounds (about 718,300 std. cases) imported during January 1-April 29, 1961.

The quantity of tuna canned in brine which may be imported into the United States during the calendar year 1962 at the $12\frac{1}{2}$ -percent rate of duty is limited to 59,059,014 pounds (about 2,812,000 std. cases of 48 7-oz. cans). Any imports in excess of the quota are dutiable at 25 percent ad valorem.



Virginia

CHESAPEAKE BAY FLOUNDER MIGRATION STUDIES:

Biologists from Massachusetts, New York, New Jersey, and Virginia, with the New Jersey Department of Conservation acting as host, met at the New Jersey State laboratory at Island Beach on April 13 to consolidate their findings about the migrations of flounder in the Middle Atlantic area. An Associate Marine Scientist of the Ichthyology Department of the Virginia Institute of Marine Science, Gloucester Point, discussed the movement of flounders from the time they hatch in the ocean until they are caught by fishermen.

"We have collected eggs and larvae of flounders over the continental shelf from

November to March for three years," the scientist reported, "and have followed the migration of young fishes into Chesapeake Bay, up the rivers, and their return to the ocean." Small flounders no more than an inch in length are found in the shallow waters of the York River during late spring.

A graduate student of the Virginia Institute and associated with the Ichthyology Department has been determining the age of flounders in the commercial catch since October 1961. Age is determined by carefully examining the ear stones called otoliths. Each year's growth adds a concentric ring similar to the growth ring on a tree.

The head of the Department of Ichthyology of the Virginia Institute has been processing catch data for the past six years in order to learn trends of the fishery. Another member of the same department has been collecting sport fishing records on the flounder catch.

A crew from the Ichthyology Department has been making monthly surveys for the past several years to gain information about the presence, abundance, and distribution of flounder and other fish in the Chesapeake Bay, and has traced their migration into Chesapeake Bay.

The symposium was called to gather together all regional workers who are interested in the problem and to summarize information which has been gathered. In this way, answers to some questions can be found which an individual state could not obtain because their facilities do not reach beyond state boundaries.

It is hoped that serious gaps in the present knowledge of the flounder will soon be filled in, and that the meeting will be mutually beneficial to representatives of all of the states.

* * * * *

OYSTERS AND RADIOACTIVE WASTE:

At a meeting of the Atlantic Estuarine Research Society held at Morehead City, N. C., the weekend of April 14-15, an Associate Marine Scientist at the Virginia Institute of Marine Science, Gloucester Point, pointed out that one acre of oysters may deposit a ton, dry weight, of silt, clay, and suspended matter in a week's time. This is equivalent to five tons wet weight.

"Should fission particles be present in the waters, they would be attached to clay,

silt, and other suspended material," the scientist stated. "Oysters, barnacles, clams, tunicates, and copepods all ingest this material and eventually deposit it on the bottom." The scientist and his research assistant at the Institute gave a joint paper entitled, "Biodeposition by Filter Feeding Marine Organisms as a Process in Concentrating Radioactive Wastes into Bottom Deposits." The paper states that there are many sources of radiation contamination such as, disposable low-level wastes from experimental uses (hospitals, therapeutic uses, etc.), nuclear power plants, maritime reactors, fallout from nuclear testing, and the possibility of contamination from nuclear accidents.

"What would be the ultimate fate of radioactive materials once introduced into marine waters?" the scientist asked. The laboratory work he is doing is under the direction of the head of the department of basic ecology-pollution at the Institute. They are concerned with the absorption (sticking) of radionuclides to suspended materials in the water, especially clay. Work completed thus far indicates that the higher the salinity the lower the absorption of fission products. Apparently radioactive material is not stripped off of clay particles as it passes through the digestive tract of marine animals. One of the next problems to be attacked is to learn how permanent the sediments of the deposits from these marine animals are.

A graduate student at the Virginia Institute gave a paper on the age and size of *Urosalpinx cinerea*, the screw borer or oyster drill, at the onset of maturity in the lower York River. He reported that these smooth oyster drills are sexually mature when only half an inch long. Few drills grow to be more than one inch long in the York River. On the Eastern Shore of Chesapeake Bay they frequently reach a length of two inches and are highly destructive to oysters in the high salinity waters throughout Virginia.

The membership of the Atlantic Estuarine Research Society consists of 166 scientists who conduct research in marine waters along the Atlantic Coast.

* * * * *

FISHERY LANDINGS, 1961:

Landings of fish and shellfish at Virginia ports during 1961 amounted to 400.8 million

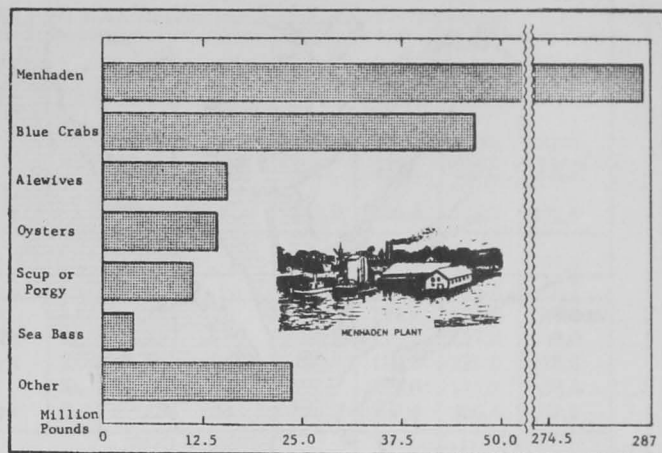


Fig. 1 - Virginia landings of certain species, 1961.

pounds valued at \$20.5 million. Compared with 1960, this was a gain of 9 percent in quantity, but a drop of 2 percent in value. The catch of menhaden accounted for 72 percent of the 1961 total catch, while oysters accounted for 52 percent of the total value.

The virtually constant \$20 million value of the Virginia catch in recent years could be offered as proof that Virginia's fisheries have been static for a good many years. There may be noteworthy changes occurring within individual fisheries, but they seldom qualify as major trends. There has been some automation over recent years as in the cases of menhaden fishing and unloading and, to a lesser extent, in oyster steaming. On the whole, handwork remains essential throughout the industry. Wages have risen slowly over the years, and a laborer might count on a moderate livelihood only if employment was steady.

Fishery employment--both afloat and ashore--was a little below the previous year's total, but the total working time was less than last year.

The drop in the oyster landings which began in 1960, continued at an accelerated pace into 1961. However, as the year progressed, the decline tapered off, and the total landings were only about 7 percent below 1960. Despite the lower landings, a price rise resulted in oyster fishermen and vessel owners realizing nearly \$600,000 more than in the previous year.

Seed oysters are an important part of the Virginia fishing industry. The 1961 catch of seed oysters from public grounds amounted

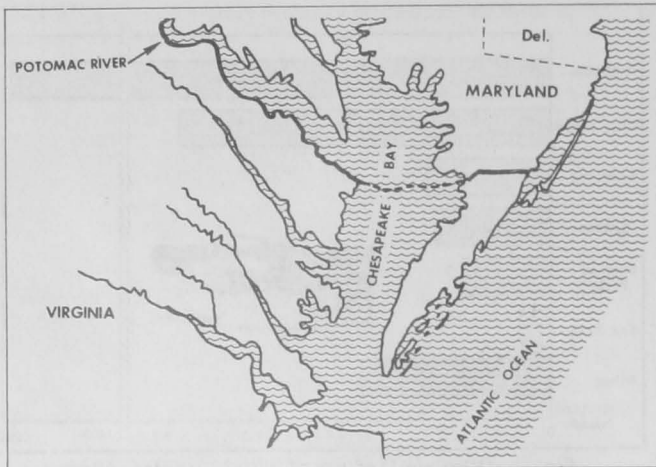


Fig. 2 - Virginia fishing areas.

to 1.5 million bushels and added nearly \$1.3 million to tongers' income.

Hard crab landings were near an all-time high. The winter-dredge and the summer-pot fisheries were both quite productive. More than 45 million pounds valued at nearly \$2 million were landed. Soft crabs and peelers were also in good supply.

After the depressing factors that slowed down the menhaden industry the previous year, the 1961 season returned almost to normal. Even so, one of the five processing plants remained closed. The total menhaden catch for reduction was 277.3 million pounds. The adversities of a highly competitive market compelled at least one processor to investigate new products, with the result that a plant food made from solubles was successfully placed on the market. Other products, such as pet food and fish flour, or fish protein concentrate are under serious consideration by industry members.

Hard clam fishing changed very little from the previous year. The soft clam fishing remained dormant. Clam fishing in Virginia lacks the sharp ups and downs that beset so many other segments of the fisheries. Production and prices of hard clams held fairly steady.



Wholesale Prices

EDIBLE FISH AND SHELLFISH, APRIL 1962:

The usual seasonal increase in landings occurred in April throughout the country and prices declined seasonally 1.2

percent from March. But the April 1962 wholesale price index for edible fishery products (fresh, frozen, and canned) at 118.9 percent of the 1957-59 base was 17 percent higher than in the same month of 1961. There wasn't a single fishery product included in the index that didn't bring higher prices this April than in the same month a year earlier.

Seasonally heavier landings of fish in New England ports, principally haddock, were responsible for the drop of 2.2 percent in the drawn, dressed, or whole finfish subgroup index from March to April. But prices for the subgroup this April still were 23.9 percent higher than in the same month of 1961. A drop of 26.1 percent in the ex-vessel price of large haddock at Boston was almost offset by the substantially higher prices for halibut and fresh-water fish. The Jewish holiday trade and the fact that supplies were light caused the higher prices for the more popular fresh-water varieties like whitefish and yellow pike. The market was strong throughout most of April for all the products in this subgroup.

Prices for processed fresh fish and shellfish dropped 2.3 percent from March to April. Seasonally heavier supplies were responsible for the 25-percent drop in the price of fresh haddock fillets at Boston. In the same period shucked oyster production was light as dealers processed just enough to satisfy the limited end-of-season demand, and prices remained steady at the March level. But compared to a year earlier, prices this April for all the products in the subgroup were up 17.5 percent. Prices for fresh haddock fillets were up 41.5 percent, fresh shrimp at New York City up 26.1 percent, and shucked oysters at Norfolk up 7.0 percent.



Breaded shrimp is packed in cartons prior to freezing in a shrimp-breeding plant located in Brunswick, Ga. Packed boxes on center belt conveyor are carried to weigher.

Frozen fishery products moved well in April. Markets were steady to firm for most of the major products, and some shortages were reported for halibut, ocean perch fillets, and whiting. Small quantities of new-season halibut helped to alleviate the shortage slightly for that product. Markets continued strong for frozen shrimp as supplies remained short. The frozen processed fish and shellfish subgroup index for this April was down 0.9 percent from March because prices dropped for fillets of haddock and ocean perch; but prices for shrimp were slightly higher. The April index for the subgroup was 21.8 percent higher than in the same month of 1961, with prices up 2.6 percent for frozen flounder fillets, up 3.1 percent for haddock fillets, up 13.9 percent for ocean perch fillets, and up 36.8 percent for frozen shrimp at Chicago.

Canned fishery products prices remained at the same level from February through April. But the index for the subgroup this April was 10.5 percent higher than a year earlier. Compared to April 1961, prices this April were up 1.8 percent for canned pink salmon, up 10.4 percent for

Table 1 - Wholesale Average Prices and Indexes for Edible Fish and Shellfish, April 1962 With Comparisons

Group, Subgroup, and Item Specification	Point of Pricing	Unit	Avg. Prices 1/ (\$)		Indexes 2/ (1957-59=100)						
			Apr. 1962	Mar. 1962	Apr. 1962	Mar. 1962	Feb. 1962	Apr. 1961 ^{3/}			
			ALL FISH & SHELLFISH (Fresh, Frozen, & Canned)								118.9	120.3	119.7	101.6
Fresh & Frozen Fishery Products:					117.2	119.4	118.5	97.0			
Drawn, Dressed, or Whole Finfish:					119.1	121.8	118.6	96.1			
Haddock, lge., offshore, drawn, fresh	Boston	lb.	.12	.16	91.6	124.0	107.4	43.0			
Halibut, West., 20/80 lbs., drsd., fresh or froz.	New York	lb.	.45	.40	133.1	116.8	117.3	98.6			
Salmon, king, lge. & med., drsd., fresh or froz.	New York	lb.	.86	.86	120.5	120.5	120.5	118.8			
Whitefish, L. Superior, drawn, fresh	Chicago	lb.	.85	.75	126.9	111.9	115.7	68.6			
Yellow pike, L. Michigan & Huron, rnd., fresh	New York	lb.	.85	.74	139.2	120.4	120.4	83.5			
Processed, Fresh (Fish & Shellfish):					120.4	123.2	125.4	102.5			
Fillets, haddock, sml., skins on, 20-lb. tins.	Boston	lb.	.38	.50	91.1	121.4	109.3	64.4			
Shrimp, lge. (26-30 count), headless, fresh	New York	lb.	.99	1.00	116.0	117.2	123.1	92.0			
Oysters, shucked, standards	Norfolk	gal.	7.75	7.75	130.7	130.7	130.7	122.2			
Processed, Frozen (Fish & Shellfish):					108.0	109.0	107.7	88.7			
Fillets: Flounder, skinless, 1-lb. pkg.	Boston	lb.	.40	.40	100.1	100.1	100.1	97.6			
Haddock, sml., skins on, 1-lb. pkg.	Boston	lb.	.33	.35	96.7	101.1	96.7	93.8			
Ocean perch, lge., skins on 1-lb. pkg.	Boston	lb.	.33	.34	115.7	119.2	119.2	101.6			
Shrimp, lge. (26-30 count), brown, 5-lb. pkg.	Chicago	lb.	.95	.95	112.7	112.1	112.1	82.4			
Canned Fishery Products:					122.1	122.1	122.1	110.5			
Salmon, pink, No. 1 tall (16 oz.), 48 cans/cs.	Seattle	cs.	28.50	28.50	124.2	124.2	124.2	122.0			
Tuna, lt, meat, chunk, No. 1/2 tuna (6-1/2 oz.), 48 cans/cs.	Los Angeles	cs.	12.15	12.15	107.9	107.9	107.9	97.7			
Sardines, Calif., tom. pack, No. 1 oval (15 oz.), 24 cans/cs.	Los Angeles	cs.	5.25	5.25	118.5	118.5	118.5	101.5			
Sardines, Maine, keyless oil, 1/4 drawn (3-3/4 oz.), 100 cans/cs.	New York	cs.	12.81	12.81	164.3	164.3	164.3	112.2			

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/ Beginning with January 1962 indexes, the reference base of 1947-49=100 was superseded by the new reference base of 1957-59=100.
 3/ Recomputed to be comparable to 1957-59=100 base indexes.

canned tuna, up 16.7 percent for California sardines, and up 46.4 percent for Maine sardines. The canned tuna pack this year was only slightly less than last year at the end of April, but less light meat and more white meat was packed the first four months of this year. A substantial drop in do-

mestic landings of yellowfin tuna in California curtailed the pack of light meat tuna. Through April the pack of Maine sardines was very light and the available stocks had practically been sold out by the end of April. The 1961/62 season pack for California sardines was again a small one.

