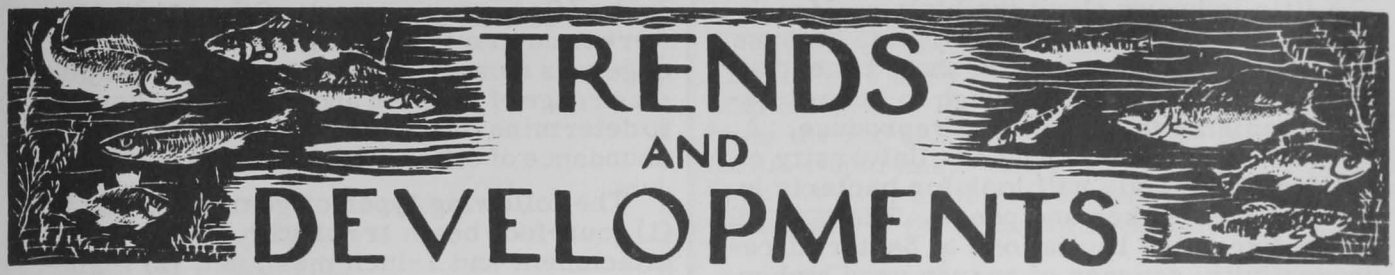

American Dietetic Association

FOOD AND ATHEROSCLEROSIS TO BE DISCUSSED AT ANNUAL MEETING:

Food and atherosclerosis are two of the subjects listed for the 44th Annual Meeting of The American Dietetic Association in St. Louis, Mo., October 24-27, 1961. Daytime sessions for the first three days will take place at the Kiel Auditorium where an extensive exhibition of food service equipment and food products will be on display. On the last day sessions will be held at the Sheraton-Jefferson, the headquarters hotel.

The latest advances in nutrition will be one of the topics. A session will be devoted to atherosclerosis, and one of the speakers on the subject will present his views on whether or not the American diet should be drastically modified.

Food service administration will be the subject of another session. The executive vice president of the National Restaurant Association, Chicago, will present his views on what is needed in food service management today. Another speaker will discuss standards in precooked frozen foods, and still another the latest convenience foods from the institutional viewpoint. One speaker will talk about new products, various processes, and latest methods of packaging.

Antarctic

RESEARCH PROGRAM FOR 1962 INCLUDES FISHERIES AND OCEANOGRAPHY PROJECTS:

The United States is about to launch its largest and most far-reaching season of scientific research in the Antarctic, and fisheries and oceanography projects are included.

With the start of the Southern Hemisphere summer in October, close to 200 scientists from more than 25 universities, research institutions, and government agencies will undertake research projects on and around the world's most remote and least-known continent.

The National Science Foundation on August 14, 1961, announced the awarding of 53 grants and contracts totaling $4,687,783 in support of Antarctic research. Additional grants yet to be made will bring the total program to about $5,500,000.

The Foundation funds and coordinates the U. S. Antarctic Research Program, which is administered by its Office of Antarctic Programs. The U. S. scientific program is coordinated with the Antarctic programs of other participating nations by the Committee on Polar Research of the National Academy of Sciences. Logistic support for the scientific effort is provided by the U. S. Navy and through cooperative arrangements with other nations.

There will be for the first time a floating research laboratory, the USNS Eltanin, operating in Antarctic waters under a lease agreement between the National Science Foundation and the Military Sea Transportation Service (MSTS).

The Eltanin, an ice-strengthened ship suited for operations in polar seas, will not only be outfitted for oceanographic research, but is intended to accommodate scientists of many disciplines, including meteorology, upper atmosphere physics, marine biology, and submarine geology ($1,027,076 to Military Sea Transportation Service for conversion of vessel for Antarctic ocean research and $383,241 to Columbia University to equip the vessel for geological, geophysical, and oceanographic research in Antarctic waters.)

Little is known about the biology of fresh-water ponds and lakes in Antarctica because of their remoteness and the short time they are ice-free and warm enough to permit living organisms to mature and reproduce. A team of researchers from the University of California at Davis will look for bacteria in many of these lakes and ponds. The men will try to determine limitations to bacterial reproductivity, sources of energy used by bacteria to remain alive, and methods of interaction and reproduction among the free-floating organisms. (Amount of grant, $27,208.)

Other biological work will include:

The third year of a Stanford University study of marine animals in the McMurdo Sound area ($43,499).

Study and collection by the University of the Pacific, Stockton, Calif., of the class of arthropods known as Pycnogonida--marine spider-like animals of which the sea-spider is a well-known example ($550).

In two small fresh-water lakes of the Mt. Gran Dry Valley area not far from McMurdo Sound, University of Kansas biologists last season discovered bottom water with temperatures up to 70° and with extremely high salinity. In order to learn why such warm, briny water occurs in permanently ice-covered lakes, a team from Kansas is returning this season to carry out limnological and geochemical investigations of the two lakes ($18,352).

Also, in the field of oceanography, investigators from the Texas A & M Research Foundation will take surface and deep current measurements in the Drake Passage ($50,785).

California

CRAB STUDIES CONDUCTED IN COASTAL WATERS:

M/V "Nautilus" Cruise 61-N-4-7-Crab: Crab fishing was conducted (Feb. 24-Mar. 11; Apr. 1-9; May 27-June 4; June 24-July 3, 1961) by the California Department of Fish and Game research vessel Nautilus in California coastal waters off San Francisco and Bodega Bay to locate nursery areas and follow the development of juvenile Dungeness crabs (Cancer magister). Other objectives were to determine which gear or combination of gear is most effective for taking a complete size range of juvenile and mature crabs; and to determine time of occurrence and relative abundance of different size groups of crabs.

The following types of gear were used: (1) four-foot beam trawl with bottom rake attachment and 1-inch mesh net; (2) eight-foot beam trawl with 1-inch mesh net; (3) ten-foot beam trawl with ½-inch mesh overhang and 1-inch mesh net; (4) seven 30-inch diameter crab traps, woven with 1-inch mesh stainless steel wire, without escape ports; and (5) two standard commercial crab traps of 4-inch mesh without escape ports.

SAN FRANCISCO BAY AREA: The several types of gear were fished at various locations. The ranges of shoulder widths (straight-line distance across the carapace immediately anterior to the outermost spine) of the crabs caught ranged from 8 to 158 mm. Although none of the areas produced significant numbers of juvenile crabs (8 to 100 mm.), the Potato Patch was the most promising. Of the gear used, the 10-foot beam trawl, 30-inch diameter traps, and the commercial traps when used together, produced a complete size range of crabs present in the area. The 4-foot beam trawl with a bottom rake attachment and the 8-foot beam trawl caught some crabs but quantities and size ranges were not as great as when the 10-foot beam trawl was used in the same areas.

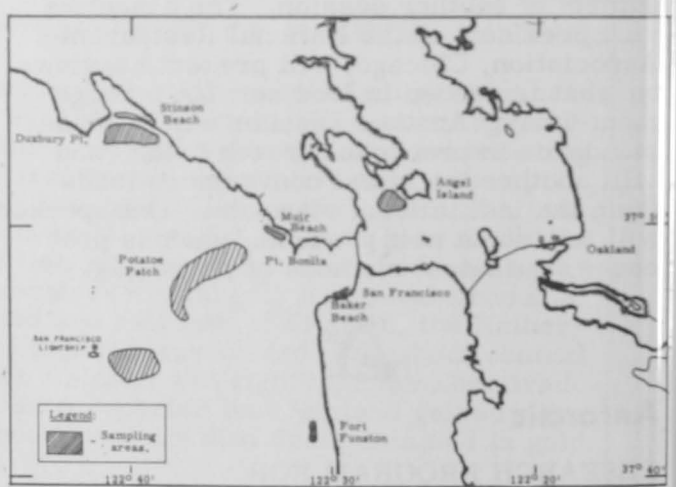

Fig. 1 - San Francisco Bay area sampling locations.

BODEGA BAY AREA: In this area the 10-foot beam trawl, 30-inch diameter traps, and commercial traps were used. Heavy concentrations of juvenile crabs were located in ocean waters between Estero Americano and Estero

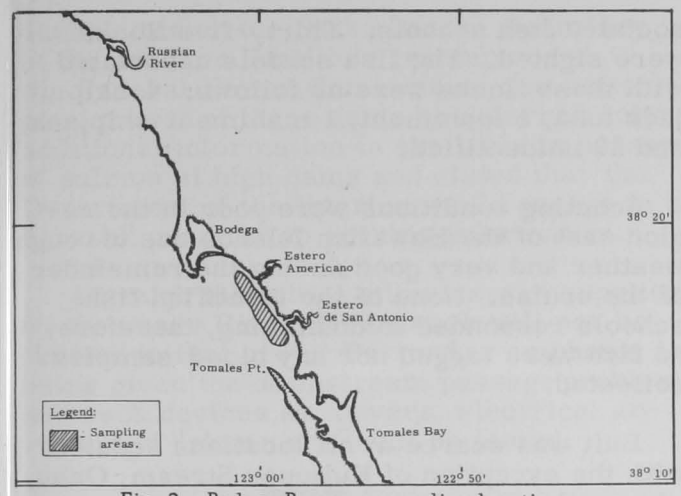

Fig. 2 - Bodega Bay area sampling locations.

de San Antonio. Crabs 7 to 165 mm. wide were taken in the 10-foot beam trawl. In this area 1,000 to 5,000 juveniles were taken per tow. Very few crabs wider than 50 mm. were taken by the 10-foot beam trawl; however, those 50 to 192 mm. wide were readily caught in the 30-inch diameter and commercial traps.

Note: Also see Commercial Fisheries Review, Feb. 1961 p. 13.

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MIDWATER TRAWLING FOR SALMON FINGERLINGS CONTINUED:

M/V "Nautilus" Cruise 61-N-13; and M/V "Al La Rocca" Cruise 61-C-1: The midwater trawl operations of the California Department of Fish and Game research vessels Nautilus (July 4-6, 1961) and Al La Rocca (July 17-21, 1961) were continued in the Carquinez Strait to capture marked salmon fingerlings. All midwater trawling for marked salmon fingerlings was conducted between 8 a.m. and 4 p.m. and each tow was for 20 minutes. Tows were alternate upstream and downstream along the north shore, center, and south shore of the channel.

A total of 70 tows was made during the 2 cruises resulting in a catch of 43 king salmon fingerlings, 3 of which were marked; 2 from Rio Vista releases and 1 from releases made at Coleman Hatchery. The Nautilus was responsible for 36 of the 43 salmon taken during the two cruises.

Incidental catches of northern anchovy (Engraulis mordax) declined to approximately 5 pounds per tow. During June, catches of that species ran as high as 800 pounds per tow.

Note: Also see Commercial Fisheries Review, Sept. 1961 p. 21.

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PELAGIC FISH POPULATION SURVEY CONTINUED:

Airplane Spotting Flight 61-8-Pelagic Fish: The inshore area from the United States-Mexican Border to Pt. Reyes, Calif., was surveyed from the air (July 10-13, 1961) by the California Department of Fish and Game Cessna "182" 9042T, to determine the distribution and abundance of pelagic fish schools.

During the five days, unfavorable weather prevailed along the southern and central California coasts. Low coastal clouds, fog, and thunder storms made it impossible to survey some areas while others were covered under adverse flying conditions.

Despite the poor conditions, 700 anchovy schools were seen, all north of Point Dume. Of this total, 262 schools were observed between Point Dume and Point Arguello; 30 in Avila Bay, 175 in the northern end of Estero Bay, 154 in the north-east corner of Monterey Bay, and 79 at the northern end of Halfmoon Bay.

No sardine or mackerel schools were observed anywhere in the survey area.

Note: Also see Commercial Fisheries Review, Aug. 1961 p. 20.

Central Pacific Fisheries Investigations

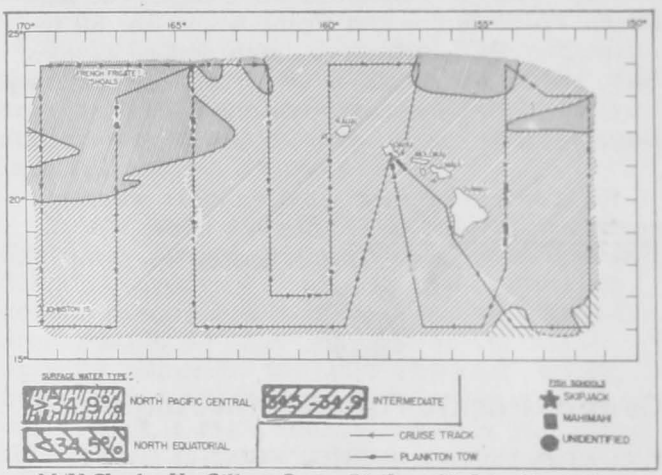
EXPERIMENTAL FISHING WITH MONOFILAMENT GILL NETS FOR SKIPJACK TUNA CONTINUED:

In the feasibility test of the use of monofilament gill nets to catch skipjack tuna in Hawaiian waters, the chartered vessel Broadbill in July 1961 was equipped with a power block, gill-net bin, gill nets, and Loran, and sea trials were held. The vessel and equipment operated satisfactorily and fishing operations were started late in July. However, the few skipjack schools sighted in Hawaiian waters limited the number of trials. From July 23-31, sets were made on only three schools. A total of 25, 2-4 pound skipjack, were taken by pole and line just prior to the setting of the nets. The gill-net catches totaled 31 skipjack. The gill nets did not fish as effectively as anticipated and modifications to both the nets and methods of handling are being made in an attempt to increase their efficiency.

* * * * *

OCEANOGRAPHIC DATA COLLECTED FROM HAWAIIAN ISLAND WATERS:

M/V "Charles H. Gilbert" Cruise 53: A 6 weeks' detailed oceanographic survey of the waters among and surrounding the Hawaiian Islands was completed on July 30 by the U. S. Bureau of Commercial Fisheries research vessel Charles H. Gilbert. The primary purpose of the cruise was to obtain measurements of the temperature and salinity of the surface water for use in the program of research on skipjack tuna (aku) being carried on at the Bureau's Biological Laboratory in Honolulu. Scientists of the Laboratory believe that the seasonal and annual variations in the Hawaiian skipjack catch are related to certain temperature and salinity changes which occur seasonally in the surface waters of the ocean.



M/V Charles H. Gilbert Cruise 53 (June 20-July 30, 1961).

Two thousand drift bottles were released at various points throughout the cruise, as part of a large-scale program, started this year, to gain more knowledge of the pattern of ocean currents in the Hawaiian region.

Tuna schools were less abundant than anticipated in the area covered by the cruise, and biological observations were limited by the scarcity of fish. While at French Frigate Shoals, a field party made a census of the rare Hawaiian monk seal and the sea turtles on the island.

Bathythermograph lowerings were made at three-hour intervals at sea. At each lowering a surface water sample and surface temperature were obtained. The salinity samples were titrated aboard ship.

Standard scouting procedures were followed to collect data on bird flocks and associated fish schools. Thirty-five flocks were sighted. The fish schools associated with these flocks were as follows: 4 skipjack tuna, 1 mahimahi, 1 mahimahi-skipjack, and 29 unidentified.

Scouting conditions were poor in the region east of the Hawaiian Islands due to rough weather and very good during the remainder of the cruise. None of the identified fish schools responded to chumming, therefore, no fish were tagged nor any blood samples collected.

Bait was scarce at all locations scouted with the exception of Kuliouou Stream, Oahu, where tilapia and mosquitofish were present in large quantities.

Forty-nine surface and 22 0-60 plankton tows, using a one-meter net, were made during the cruise. These included tows in low, intermediate, and high salinity water types.

Weather observations were made 4 times daily and transmitted to the Weather Bureau.

Two lures were trolled during daylight hours with the discouraging result of 5 dolphin (Corphaena hippurus) and one wahoo being landed. Two skipjack, 2 dolphin, 2 little tuna (Euthynnus yaito) and 2 unidentified fish were hooked but not landed.

Eleven adult and 4 young adult Hawaiian Monk seals were counted at French Frigate Shoals. Three large female turtles were observed nesting on East Island. Also, there were 25-30 young adult laysan and blackfooted albatross, and numerous sooty terns on East Island.

Columbia River Fish Passage Research Program

ACCELERATED PROGRAM GETS UNDER WAY:

In July 1961, the new Columbia River accelerated fish passage research program was staffed and plans were completed for the research to get under way.

The fish passage problems in the Columbia River were brought to a head by proposals to build high dams at the Nez Perce and Mountain

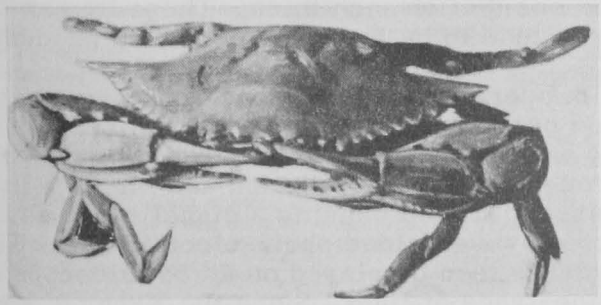
Sheep sites on the Snake River. Secretary of the Interior Udall has recommended to the Federal Power Commission that action on approval of these dams be deferred until additional information is available on passage of salmon at high dams and stated that the Department of the Interior would engage in a "crash" program to get this information.

Although the initial stimulus was supplied by the Snake River dams, work will not be limited to that area. Particular emphasis is being given the downstream passage problem, and such devices as louvers, electrical arrays, and "skimmers" will be tested.

Crabs

STUDY TO IMPROVE EFFICIENCY IN PROCESSING PLANTS:

To discuss a new U. S. Bureau of Commercial Fisheries study for improving the efficiency in blue crab-processing plants, a meeting was held on August 1, 1961, at the National Fisheries Institute Headquarters in Washington, D. C., between representatives of the blue crab industry and the Bureau. Through improved processing, which may be achieved through the development of automatic machinery, the production of the processing plants may be increased to enable them to meet the requirements of the new amendment to the minimum-wage-hour law without increasing the cost of their product to the consumer.



Blue Crab

It was agreed that a Government contract would be awarded by the Bureau to a consulting firm for the purpose of conducting a survey of processing methods now utilized in the industry. Upon completion of the survey, the firm will meet with industry and Bureau representatives to present their recommendations to reduce operating costs.

A second phase of the study will then involve utilizing these recommendations for the development of prototype automatic processing equipment which may eventually be utilized by the industry.

Electronics

THERMOMETER DEVELOPED TO RECORD WATER TEMPERATURE AT FISH HOOK:

Maryland scientists in their effort to probe the secrets of fish life have developed a new electronic fishing unit which can tell the temperature of the water at the fish hook while they are fishing. The new thermal hook is called an ankylothermistor; Greek, meaning hook-thermometer. The basic concept of the unit originated with the Director of the Natural Resources Institute of the University of Maryland. Skilled electronics technicians of the Chesapeake Bay Institute of the Johns Hopkins University constructed it to his specifications.

Far from being a mere gadget, it will be put to immediate use in the Potomac River to study the relationship between fishing success and the heated water entering the river from a power plant on the Potomac River. Ever since the plant went into operation, disposing of hot water in the river, fishermen and biologists have been noticing marked changes in fish habits in the area. Now they expect to be able to tell more precisely what effect the hot water has on fishing, and how fishermen can take maximum advantage of the responses of fish to heat.

The new unit, consisting of a black box mounted on a cut-down salt-water fishing pole, looks like a small walkie-talkie radio. In reality, the box holds delicate instruments to magnify the tiny electric current received, and a needle and dial to show the fisherman-scientist the temperature at the hook. The fishing reel is a standard salt-water reel, but the line is a pair of twisted wires with a small thermocouple installed just above the hook. When a fish bites, or during periods when they fail to bite, the operator can turn a dial on the box and note the temperature reading to the nearest half degree.

The new device also is expected to be used in the Chesapeake Bay where scientists and

fishermen have long suspected that knowledge of the temperature preferences of fish can increase the catch.

Federal Purchases of Fishery Products

DEPARTMENT OF DEFENSE PURCHASES, JANUARY-JUNE 1961:

Fresh and Frozen Fishery Products: For the use of the Armed Forces under the Department of Defense, about 1.6 million pounds (value $702,000) of fresh and frozen fishery products were purchased in June 1961 by the Military Subsistence Supply Agency. This was lower than the quantity purchased in May 1961 by 27.9 percent and 41.4 percent under the amount purchased in June 1960. The value of the purchases in June this year was lower by 34.6 percent as compared with May and 41.3 percent less than for June a year ago.

Table 1 - Fresh and Frozen Fishery Products Purchased by Military Subsistence Supply Agency, June 1961 with Comparisons

QUANTITY				VALUE			
June		Jan.-June		June		Jan.-June	
1961	1960	1961	1960	1961	1960	1961	1960
(1,000 Lbs.)				($1,000)			
1,593	2,718	10,872	11,740	702	1,195	5,311	5,986

During the first 6 months of 1961 purchases totaled 10.9 million pounds (valued at $5.3 million)--a decrease of 7.4 percent in quantity and 11.2 percent in value as compared with the same period in 1960.

Prices paid for fresh and frozen fishery products by the Department of Defense in June 1961 averaged 44.1 cents a pound, about 4.5 cents less than the 48.6 cents paid in May and 0.1 cent more than the 44.0 cents paid during June last year.

Canned Fishery Products: The only canned fishery product purchased for the use of the Armed Forces during June this year was a small quantity of canned sardines. In the first 6 months of 1961, purchases of canned tuna were up 83.7 percent and canned sardines were up 7.1 percent as compared with the same period in 1960. Canned salmon purchases are practically all made at end of the packing season (usually September and October).

Table 2 - Canned Fishery Products Purchased by Military Subsistence Supply Agency, June 1961 with Comparisons

Product	QUANTITY				VALUE			
	June		Jan.-June		June		Jan.-June	
	1961	1960	1961	1960	1961	1960	1961	1960
	(1,000 Lbs.)				($1,000)			
Tuna	-	166	2,662	1,449	-	75	1,175	656
Salmon	-	3	2	3	-	2	2	2
Sardine	1	22	90	84	1	9	44	35

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

Fish Bone Detection

X-RAY UNIT DEVELOPED TO DETECT BONES IN FISH FILLETS AND PORTIONS:

Progress in the development of equipment that will automatically detect fish bones and reject fish fillets and portions containing bones has been made by a Fitchburg, Mass., firm under a contract with the U. S. Bureau of Commercial Fisheries Technological Laboratory at Gloucester.

The X-ray unit developed for this purpose is capable of detecting most bones in fish portions that are moving on a conveyor belt at speeds up to 25 feet per minute. All bones thicker than 0.012 of an inch (about as thick as three sheets of typewriter paper) were detected in half-inch thick portions. Almost all portioned fishery products produced today are a half-inch or less in thickness. Bones 0.012 of an inch thick or less are essentially harmless in that they become friable when the the fish is cooked. All bones greater than 0.018 of an inch in thickness were detected in portions $\frac{3}{4}$ of an inch thick. These larger bones tend to be annoying in cooked products.

In operation of the test unit, fish portions pass over an X-ray emitter at two speeds--$12\frac{1}{2}$ and 25 feet per minute. The X-rays pass through the fillet or portion and strike a fluorescent screen causing a signal which is detected by a shielded photo-electric cell. This signal is then displayed on an oscilloscope as a line-trace of light. Since the X-ray signal for bones at the fluorescent screen is different from that for meat, this difference shows up as a deflection in the shape of the line-trace. Thus, when a deflection shows up in the line-trace, the operator knows that the sample being exposed to the X-rays contains a bone.

It is expected that additional equipment can be fabricated which will be sensitive to

this bone signal deflection that appears on the oscilloscope. Such sensitized equipment could then be coupled with an automatic rejection system. Thus, the end result would be an automatic detection and rejection system that would guarantee practically boneless fish fillets and portions.

Fish Flour

PROTEIN EFFICIENCY RATING HIGH:

Speaking about a finding that fish flour has a higher protein efficiency rating than skim milk or beef, Senator Saltonstall made the following statement in the U.S. Senate, which was printed in the Congressional Record of August 11, 1961:

"Mr. President, since the earliest times, the fishing industry has been vital to the economy of Massachusetts and to the economy of many other States along our sea coasts.

"But today the industry faces difficult times, partly because U.S. consumers eat much less fish than nutritionists believe their bodies need.

"One dramatic answer, both to this nutritional need and to the problems of the ailing industry, is a new product called 'fish flour.' This is processed from whole fish. It can be made from any kind of fish, and from fish of any sizes. It emerges from the process as a fine, white powder.

"All of our studies to date indicate that this powder is the cheapest source of animal protein in the world. It is an immediate answer to the protein hunger which is such a serious problem in so many parts of the world.

"My colleague, Senator Benjamin A. Smith III, and Representative Hasting Keith, of Cape Cod, and many other Members of the Congress have been working for several months to make this new product more widely understood and available. The Bureau of Commercial Fisheries in the Department of the Interior is an enthusiastic supporter of the product, and is engaged in vital research with funds which we have appropriated recently.

"But we have just received the finest scientific endorsement to date in the form of a report from three food scientists at the University of Illinois--Drs. B. Connor Johnson, V. Chalam Metta, and Harold E. Schendel, of the division of animal nutrition at that university.

"They have found that fish flour has a higher protein efficiency rating than skim milk or beef; that it has no harmful effect, even when fed as the sole source of protein; that standard East Indian diets showed growth improvements of from 50 to 100 percent when supplemented with fish flour; and that 3 percent fish flour can be added to standard diets without detection by the consumer.

"Because of the enormous significance of this report to our fishing industry and to the solution of the world food problem, I ask, Mr. President, that the summary and conclusions of these scientists be printed in the Record at the conclusion of my remarks.

There being no objection, the statement was ordered to be printed in the Record, as follows:

"Summary and Conclusions:

"An odorless, defatted fish flour, evaluated for its protein quality by the Mitchell method, was found to have a biological value of 8 percent. At the 10 percent protein level in diet, its protein efficiency ratio (gram gain per gram protein consumed) was 3.24 as compared to 2.85 for skim milk and 3.15 for beef.

"When fed as the sole source of protein, fish flour proved as adequate as casein for the reproduction and general performance of rats through four generations. Examinations of 11 organs and tissues from animals of the first through third generations revealed no differences between the groups.

"The supplementing value of fish flour added to four East Indian diets was studied with growing rats using Mitchell's pair-feeding method. At 1- and 3-percent supplementation, growth improvements were 13 to 76 percent and 43 to 145 percent, respectively, over the controls. The protein efficiency ratios of all but one of the cereal diets were also improved significantly. . .by 1 and 3 percent fish flour supplementation, indicating a better amino acid mixture of the supplemented diets.

"Fish flour supplementation was also shown to improve the protein efficiency ratio of experimental East Indian diets containing both a low-protein corn (from 0.172 to 0.242) and of a high-protein corn (from 0.245 to 0.320), indicating again that an improved amino acid pattern had been achieved.

"An organoleptic test indicated that a panel of 26 Indian students was unable to detect the presence of 3 percent fish flour in 3 Indian diets.

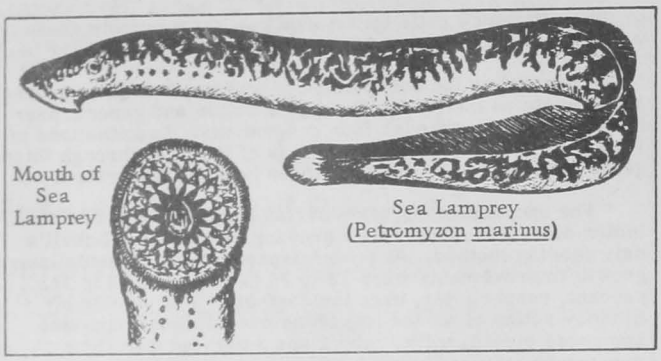
"All these data support the view that a good fish flour could be a real significance in helping to supply the protein needs of the world."

Great Lakes Fishery Investigations

Following are some of the highlights of the studies conducted by the Ann Arbor (Mich.) Biological Laboratory of the U. S. Bureau of Commercial Fisheries during April-June 1961:

SEA LAMPREY RESEARCH: Bioassays on water samples from the 18 representative streams tributary to Lakes Huron and Michigan were continued. The periodic bioassays were also continued on water from Lake Huron. This work is part of the long-term study of the seasonal loss of biological activity of the nitrophenols.

Ripe individuals of the following 4 of the 5 species of lampreys present in the Great Lakes have been artificially spawned in the laboratory: sea lamprey (Petromyzon marinus); silver lamprey (Ichthyomyzon unicuspis); American brook lamprey (Lampetra lamottei); and the northern brook lamprey (Ichthyomyzon fossor). To date we have been unable to obtain ripe individuals of the chestnut lamprey (Ichthyomyzon castaneus). Fertilized eggs of the available species are in various stages of development; 2 species have started to hatch. Periodic samples



will be taken of the ammocetes after hatching in an attempt to develop methods of identification.

A considerable number of sea lamprey larvae will be exposed in the laboratory to a wide variety of environmental conditions to learn the effects on development and survival. This lamprey-culture may also provide specimens for bioassay work.

Twenty-one 24-hour experiments were made with larval lampreys and several chlorinated benzenes as part of a project to develop a chemical-survey technique. Two of the compounds tested, orthodichlorobenzene and paradichlorobenzene, show considerable promise in causing larvae to emerge and in preventing re-burrowing.

Six compartmented troughs have been constructed and installed for use in a study of the extent and factors of movements of larval lamprey. This research is to include also the investigation of possible upstream movement of larval lampreys in relation to swimming speed.

SEA LAMPREY CONTROL: Good weather, a welcome contrast to last year, permitted extensive field activity during the quarter. The majority of electrical barriers were in operation by the beginning of the period and chemical-treatment crews from both the Marquette and Ludington stations were in the field during April. High-water levels limited ammocete surveys during part of April, but conditions were favorable by May.

Staff from the Marquette and Ludington stations treated 18 Lake Michigan tributaries. These streams are located in Charlevoix and Emmet Counties on the northeast coast and in Mackinac and Schoolcraft Counties on the north shore. Streams of the Lower Peninsula required approximately 31 pounds of active ingredient per second foot of water, more than twice the 14.5 pounds needed for Upper Peninsula streams.

The routine bioassays were continued on 13 streams tributary to the east shore of Lake Michigan; 28 tests were conducted by June 8. The working range for treatment has improved considerably over the previous quarter. Minimum lethal concentrations have fluctuated erratically, however during the past month.

The surveys of ammocete distribution have advanced notably. Fifty-two watersheds tributary to the east shore of Lake Michigan were checked during the quarter and surveys were completed on 48. Only 10 contained sea lamprey larvae.

Ammocete surveys were completed on 5 rivers on the north shore and 7 rivers on the west shore of Lake Michigan. Five additional west-shore streams were checked to determine presence or absence of sea lamprey ammocetes; 1 of the 5 was infested.

Identification of larvae caused difficulties for survey crews on the east shore of Lake Michigan. Ammocetes, believed to be American brook lampreys, were encountered which had pigment-distributions characteristic of sea lampreys. This problem was greatest with larvae collected from the Manistee River drainage.

A new 80-place mobile bioassay laboratory has been completed and placed in operation. The acquisition of this unit provides both treatment crews with bioassay facilities.

A total of 29 barriers were placed in operation along the south shore of Lake Superior to measure the runs of adult sea lamprey. (Twenty-three of the barriers were installed prior to the beginning of the quarter.) The last device was in operation by April 24. Although high water and flooding have caused occasional difficulties, conditions have been immeasurably better than last season.

Captures of adult sea lampreys totaled 59,320 by June 23; these same devices had produced 30,721 adults during the same period in 1960. The 1961 catch represents an increase of 93 percent. The year's run also exceeds that of 1959 when 42,248 individuals were caught during the same period. The in-

crease in numbers of sea lampreys has occurred throughout Lake Superior.

The search is being continued for ammocetes in Lake Superior streams which have been chemically treated. Results to date indicate survival of a few sea lamprey ammocetes in 18 of the treated streams. Periodic collections are also being made from re-established populations. A series of collections made last October of young-of-the-year in 13 streams was duplicated during May. The rate of growth in different streams varied considerably.

COMMERCIAL LAKE TROUT FISHERY CENSUS IN LAKE SUPERIOR: The 1961 census of the commercial lake trout fishery in Lake Superior was started in March. The expansion of the census to Whitefish Bay completes coverage of all major fishing areas on the south shore. The incidence of both fresh and old lamprey scars has been generally higher than last year. Average weights of trout in the commercial catch have fallen to all-time lows. The quality of fishing has been poorer than in 1960 although there was some improvement in Wisconsin in the early spring. No records were obtained from Whitefish Bay in 1960, but fishermen there report a very substantial improvement in fishing this spring. Although the incidence of old lamprey scars in this area is the highest of all the south shore ports, fresh scarring was only 1.9 percent--by far the lowest at any locality.

The number of fin-clipped hatchery trout caught this spring was more than triple that of the spring of 1960; the catch has dropped, however, in Wisconsin. The decrease in fin-clipped fish in Wisconsin is probably a reflection of failure to mark the 1957 plant. Large numbers of fin-clipped fish were taken this spring in Whitefish Bay (nearly 25 percent of the catch). Almost all of these fish were from the 38,000 fish planted in the Bay in 1958. Most unmarked fish in the catch in Whitefish Bay are the proper age to be from the 1956 and 1957 plants (inside the Bay) which were not fin-clipped. Planted trout from Wisconsin are as numerous off Munising and Grand Marais, Mich., as are fish planted in the immediate area. Indeed they are common along the entire south shore except in Whitefish Bay. A most unusual capture was that of a 6.4-inch trout planted in the fall of 1960 at Port Arthur, Ont., and caught at Grand Marais, Mich., in April.

The first results in a test of relative efficiency of nylon and cotton gill nets, fished in separate gangs, indicate roughly a 2 to 1 advantage of nylon nets for taking lake trout.

A total of 463,378 lake trout yearlings (average length 5.5 inches) were fin-clipped at Pendills Rearing Station prior to their release in Lake Superior in June.

YELLOW PIKE TAGGING IN GREEN BAY-SAGINAW BAY: The annual spring yellow pike or walleye tagging in conjunction with the Institute for Fisheries Research, Michigan Department of Conservation, Lake Michigan's Green Bay and Lake Huron's Saginaw Bay, was conducted in late April and early May; 1,814 fish were tagged and scale samples were taken from 950 of them. Trap nets were set in northern Little Bay de Noc, and on Stoney and Poplar Points just east of Nahma in Big Bay de Noc. An attempt to capture yellow pike in Wilsey Bay east of Peninsula Point, with trap nets, produced very few fish. Yellow pike were caught with a dip net below the lamprey weir on the Whitefish River. Fish were also tagged at Dry Shoal northeast of Bark River; these fish were caught by a commercial fisherman.

Yellow Pike
(Stizostedion vitreum vitreum)

Additional information on tag recoveries gives further evidence of numerous yellow pike spawning populations in the Bay de Noc area. These groups seemingly return to the same spawning area year after year.

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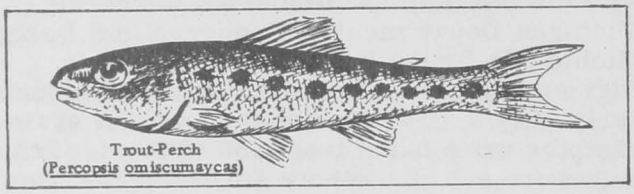
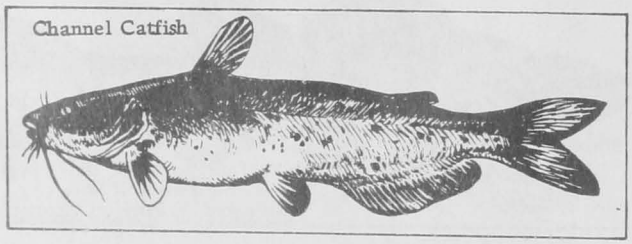
HATCH AND SURVIVAL IN 1961 FAIR FOR MANY SPECIES IN LAKE ERIE:

The 1961 hatch and survival appears fair to good for many Lake Erie species, according to the Biological Laboratory, U. S. Bureau of Commercial Fisheries, Ann Arbor, Mich. Based on exploratory fishing in July, yellow perch were most abundant, and considerable numbers of smelt and white bass were taken. The largest collections of white

bass were from the extreme western end of Lake Erie (Bono to Monroe), whereas smelt were concentrated in the Island region and deeper waters to the east. Young yellow pike or walleyes were fairly common in most areas, although not quite as plentiful as in 1959. Varying numbers of young-of-year alewives, gizzard shad, spottail shiners, and trout-perch were collected. The young fish of all species were somewhat smaller than for corresponding dates in other recent years, presumably because of the cool weather during last May and June.


Trout-Perch
(Percopsis omiscumaycas)

Older fish taken in July included yellow perch, smelt, sheepshead, white bass, channel catfish, bullheads, carp, and goldfish. Only yellow perch (1959 year-class) were collected in quantity. The average length of these 2-year-old perch was only about 7.3 inches. Consequently, few were expected to reach the minimum legal length of 8.5 inches by September, when Ohio's fall commercial fishing season begins.


Channel Catfish

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YELLOW PIKE TAGGING EXPERIMENT:

A mid-season assessment of the Lake Erie yellow pike tagging experiment shows that of the 4,000 yearling pike tagged in the spring of 1960, 439 (11.0 percent) were recaptured as of July 1961--334 in 1960, and 105 during the first 7 months of 1961. The 1961 returns have demonstrated a pronounced movement of yellow pike to the extreme western end of Lake Erie and into the Detroit River and northward. One fish was recovered in Saginaw Bay, some 236 miles from the locality of release. Only 3 tagged yellow pike were recaptured east of Cleveland.

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LAKE MICHIGAN FISH POPULATION SURVEY CONTINUED:

M/V "Cisco" Cruise 4: The chub (Leucichthys sp.) population survey in Lake Michigan was continued (July 18-August 1, 1961) by the U. S. Bureau of Commercial Fisheries research vessel Cisco. The primary purpose was to compare chub populations in the Charlevoix-Manistique region with populations in 1932 and in 1955. The comparisons were made possible by duplicating (as to time of year, depth, gear, and location) sets of linen gill nets made by the Bureau's research vessel Fulmar in 1932 and again by the Cisco in 1955. Nets of $2\frac{1}{2}$-, $2\frac{5}{8}$-, and $2\frac{3}{4}$-inch mesh were set at 50 fathoms off Charlevoix, off Manistique, and in midlake between those ports. In 1955, chubs (Leucichthys hoyi) were appreciably more abundant--except at Charlevoix--than in 1932; considerably fewer chubs of other species (L. kiyi, L. reighardi, L. zenithicus, L. alpenae) were taken; and the chubs caught in 1955 were of much smaller average size. During the present cruise, many more chubs (L. hoyi) were taken at all three locations than in either 1932 or 1955; far fewer other chubs were caught than in 1932 (fewer in midlake than in 1955 but slightly more off Charlevoix and Manistique); and the chubs were of about the same average size as in 1955, except off Manistique, where they were larger (but not as large as in 1932).


Chub
(Leucichthys sp.)

Chub
(Leucichthys spp.)

Regular gangs of nylon gill nets (50 feet each of $1\frac{1}{4}$- and $1\frac{1}{2}$-inch mesh and 300 feet each of 2-, $2\frac{3}{8}$-, $2\frac{1}{2}$-, $2\frac{3}{4}$-, 3-, $3\frac{1}{2}$-, and 4-inch mesh) were set at 25 and 50 fathoms off Charlevoix and Manistique. The catches were light at 25 fathoms, but moderately heavy at 50 fathoms.

Two half-hour tows with a 50-foot balloon trawl at 30 fathoms off Charlevoix (in Little Traverse Bay) yielded 108 and 115 pounds of chubs; and one tow at 50 fathoms off Manistique netted 97 pounds. Practically all of the chubs were bloaters. Except for 10 pounds of deep-water sculpins in the 50-fathom tow, few fish other than chubs were taken.

Hydrographic observations were made at 40-fathom stations off Charlevoix, off Manistique, and in midlake between the two ports. Thermal stratification was present in all areas. Surface water temperature, the highest thus far this year, ranged from 15.3° to 21.1° C. (59.5° to 70.0° F.).

M/V "Cisco" Cruise 5: Much of this cruise (August 8-21,1961) was devoted to fishing linen gill nets off Ludington, Mich., so that existing chub populations in that area might be compared with those present in 1931-32 and 1955. The linen gill nets were fished exactly, as to mesh sizes ($2\frac{3}{8}$-, $2\frac{1}{2}$-, $2\frac{5}{8}$-, $2\frac{3}{4}$-, 3-inch, stretched), depth (25 and 60 fathoms), location, and almost exactly as to time of year, as were the sets of the U.S. Bureau of Fisheries research vessel Fulmar in 1931-1932 and the Cisco in 1955. A similar study was conducted in the Charlevoix and Manistique, Mich., areas during cruise 4. The differences between the 1955 and the 1931-1932 periods were striking off Ludington. In 1955, the average size of the chubs was much smaller than in 1931-32, chubs (Leucichthys hoyi) were much more plentiful, and other chubs (L. kiyi, L. reighardi, L. zenithicus, L. alpenae) were decidedly less abundant at both 25 and 60 fathoms. In 1931-1932 somewhat more than 40 percent of the chub catch was other than L. hoyi, but in 1955 the catch had dropped to about 10 percent. Chubs other than L. hoyi are even fewer now than in 1955, especially at 60 fathoms, but the size distribution has not changed appreciably.

Regular gangs of nylon gill nets (50 feet each of $1\frac{1}{4}$- and $1\frac{1}{2}$-, 300 feet each of 2-, $2\frac{3}{8}$-, $2\frac{1}{2}$-, $2\frac{3}{4}$-, 3-, $3\frac{1}{2}$-, and 4-inch mesh) were set at 25 and 50 fathoms off Frankfort, Mich. The catch was rather light at the former depth and very light at the latter. The 25-fathom set took 330 L. hoyi, 18 L. kiyi, 2 L. alpenae, 1 L. zenithicus, 2 L. reighardi, and 4 lake herring (L. artedii); the 50-fathom nets took 85 hoyi, 21 kiyi, 6 L. reighardi, 1 L. alpenae, 1 lake herring, and 4 deep-water sculpins. Several of the L. reighardi in these nets and the ones off Ludington were ripe or nearly ripe. This situation is considered unusual, since the spawning season for this species in Lake Michigan is ordinarily late April to early June. Many L. reighardi were, in fact, spawning during that time this year.

Half hour tows with a 50-foot balloon trawl were made south of Frankfort (off Arcadia) at 10, 13, 14, 25, 35, and 50 fathoms. Chub catches were 10, 27, 124, 184, 406, and 262 pounds, respectively. The catch at 35 fathoms, over 99 percent L. hoyi, was the largest thus far this year. Smelt and alewives were common at the shallowest 3 depths. The largest catches were 48 pounds of smelt and 113 pounds of alewives. Thirty-six pounds of deep-water sculpins were caught at 50 fathoms. A single tow of 30 fathoms in Little Traverse Bay (near Charlevoix, Mich.) took 138 pounds of chubs.

Hydrographic information was collected at a 40-fathom station off Frankfort. Surface-water temperatures were mostly 18° to 20° C. (64.4° to 68° F.). Near the end of the cruise, however, following strong north winds, a surface-water temperature of only 13.6° C. (56.6° F.) was recorded near Frankfort. An upwelling, the extent of which was not determined, was apparently occurring.

Note: Also see Commercial Fisheries Review, Sept. 1961 p. 30.

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WESTERN LAKE SUPERIOR FISHERY SURVEY CONTINUED:

M/V "Siscowet" Cruise 4: Midsummer environmental conditions were studied by the U. S. Bureau of Commercial Fisheries research vessel Siscowet (July 17-27, 1961) at three limnological stations in western Lake Superior. Hydrographic collections included: records of water temperature; Secchi-disc readings; water samples for chemical analyses; and bottom and plankton samples. Information was gathered also on the vertical distribution of fish and on distribution and survival of planted lake trout; larval stages of various species of fish were collected; and blood samples were taken from several Lake Superior species for electrophoretic studies.

Stations visited were: north of Sand Island; south of Stockton Island; Pike's Bay; Frog Bay; northwest of Oak Island; northwest of Ironwood Island; Punky Bay; east of Gull Island; north of Clinton Point; southeast of Bear Island; and Siskiwit Bay.

Surface-water temperatures had warmed considerably since the last cruise to nearly 70° F. in some areas. Bottom temperatures remained near 40° F.

A standard gang of gill nets set north of Sand Island (48 fathoms) caught mostly chubs

and smelt. Gill nets set south of Stockton Island (18 and 25 fathoms) took small numbers of whitefish, lake herring, and lake trout. Three $1\frac{1}{4}$-inch-mesh gill nets which were suspended 12 feet below the surface (water depth 28 fathoms) north of Sand Island, in an attempt to capture small lake herring, caught 50 smelt, 10 chubs, and 10 herring.

About 25 trawl tows (average duration, 15 minutes) at depths ranging from 7 to 60 fathoms yielded generally small catches of smelt, chubs, sticklebacks, and cottids. The most successful catch was in Punky Bay (18 fathoms) where 19 small lake trout were captured of which 18 were hatchery-reared (fin-clipped).

Trawl tows near Cornucopia captured hatchery-reared lake trout, which had been planted near shore in the spring, at distances as great as 15 miles from the nearest planting site.

As of late July the M/V Siscowet had captured 102 small trout (excluding fish of the 1961 plant) in the Apostle Island area; 85 (83 percent) were fin-clipped and 62 (73 percent) of the marked fish were from the 1960 Bayfield plant.

Blood samples were collected from lake herring, lake trout, whitefish, pygmy whitefish, sculpins, smelt, and several forms of chubs for electrophoretic studies at the University of Wisconsin. In these studies, the haemoglobin of fish blood is subjected to an electrical current; fractions of the haemoglobin then separate into distinct patterns which are characteristic for each form or species. It is hoped that these studies will help answer some of the perplexing problems in chub identification.

A skin diver observed the action of the converted midwater trawl which was being towed about 10 feet below the surface. He reported that the trawl was completely open to a diameter of about 12 feet.

Note: Also see Commercial Fisheries Review, Aug. 1961 p. 27.

Gulf Fishery Investigations

CONTRACTS LET FOR BIOLOGICAL RESEARCH IN GULF OF MEXICO:

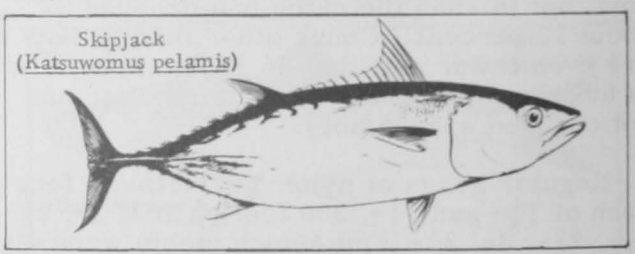
A new contract for vessel charter was awarded during August to the M/V Belle of Texas by the U. S. Bureau of Commercial Fisheries. The 75-foot vessel will be utilized by the Bureau's Galveston (Tex.) Biological Laboratory for deep-sea shrimp trawling.

Two research contracts for biological research in the Gulf of Mexico under the direction of the Bureau's Laboratory at Galveston have been renewed for the fiscal year beginning July 1, 1961. The contracts cover the study of the egg and larval stages of pink shrimp and their distribution by currents (with the University of Miami), and the effects of environmental factors on the development and survival of larvae of blue crab (with Duke University).

Hawaii

SKIPJACK TUNA LANDINGS, JANUARY-JULY 1961:

Landings of skipjack tuna (mostly 18-28 pound size) in Hawaii during July 1961 were about 2,430,000 pounds or 320,000 pounds under the landings for the preceding month. However, the July 1961 landings were close to 0.5 million pounds above the 1948-58 average landings for the month.



Of the total landings, 6 percent were below 8 pounds, 11 percent between 8 and 15 pounds, and 83 percent above 15 pounds. No marked changes in size composition were observed during the month. The changes which did occur took place in the latter half of the month and were (1) a slight increase in percentage of small skipjack; (2) a slight decrease in the size of the large fish; and (3) a decrease in the number of fish in the upper modal group.

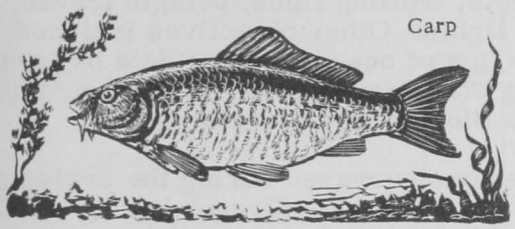
Total estimated landings for January-July 1961 were 8.1 million pounds or about 2.2 million pounds above average, almost twice the 1960 landings for the same period, and one million pounds above the total 1959 catch. The increase over 1959 was largely due to the high catches in June of this year.

Catches for Oahu boats averaged 10,382 pounds per trip. However, the catch was reduced in the latter half of July, the total landings being about one-third of those made during the first half of the month.

Missouri

COMMERCIAL FISHERY LANDINGS, 1960: Commercial fish landings in Missouri during 1960 amounted to 350,200 pounds with a live-weight value at $81,000, according to a biologist for the Missouri Conservation Commission.

Mississippi River fishermen reported landings of 178,180 pounds, Missouri River fishermen 155,320 pounds, and St. Francis River fishermen 16,700 pounds.



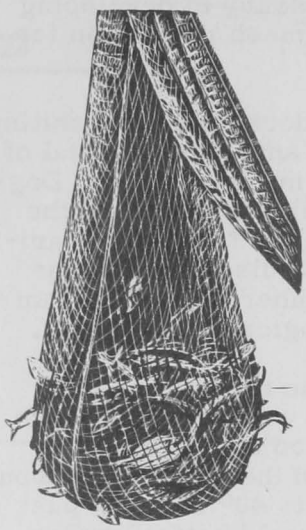
Carp

Carp is Missouri's most important commercial fish, comprising about 45 percent of the total catch, the biologist reported. Buffalofish ranked second with about 23 percent of the landings, followed by flathead catfish, drum, blue catfish, gar, paddlefish, quillback, channel catfish, sturgeon, suckers, bowfin, bullheads, and eels.

North Atlantic Fisheries Investigations

TRAWL NETS OF DIFFERENT DESIGNS TESTED FOR ESCAPEMENT OF GROUNDFISH: M/V "Delaware" Cruise 61-12: A study of the differential escapement of haddock, whiting, and other species of groundfish from trawl nets of special design was made by the U. S. Bureau of Commercial Fisheries research vessel Delaware during a 15-day cruise that ended August 3, 1961. Previous experiments using the underwater television camera to observe the behavior of various species of fish in otter trawls had indicated that haddock and whiting react differently to their containment within the net and that this differential behavior might be utilized in developing special types of nets which would allow the escape of small, undersized haddock while at the same time retaining most of the whiting of marketable size.

A large number of experiments were conducted on this cruise. In some of the experiments conducted during the cruise, a "window" was constructed in the upper part of the cod end of the net. This window was in some cases simply a large hole. In other cases, it was a large area covered with a very large mesh rather than the small mesh of which the rest of the net was constructed. The window, in turn, was covered with a special small mesh cod end to recover any fish that passed through the window. In some experiments a deflector consisting of large mesh netting was hung from the upper part of the net and extended halfway to the bottom of the net.



Cod end.

The results of the experiments substantiated the theory that different species come into the net at different levels and have different reaction patterns in attempting to escape. Haddock, cod, and sea herring tend to come in high in the net and were deflected through the window in substantial percentages. Other species, such as whiting, tend to come into the net low down and were not deflected through the window in such high percentages.

Another experiment in which the cod end was divided horizontally by a sheet of netting showed, in general, the same difference in behavior pattern of the different species of groundfish. Although the experiments corroborated previous ideas as to the differential behavior of different species, it was not possible in this series of experiments to develop any net which might, in a practical way, allow most of the small haddock to escape while retaining most of the marketable whiting.

Further experiments will be conducted on future cruises to gain more information on this aspect of fish behavior which may be of extreme importance to the conservation of the groundfish.

Additional experiments were conducted on the size selectivity of whiting using 3-inch and $3\frac{1}{2}$-inch mesh nets to provide additional information on the selectivity of this species. This information is necessary in developing a recommendation for a mesh regulation for the whiting fishery.

Blood samples of haddock, cod, and whiting were obtained for racial analyses. A total of 160 dogfish were tagged in Ipswich Bay. Dogfish in large numbers were observed at the surface at several localities feeding on various crustacea and on fish discarded by the commercial fleet. A number of dogfish samples were taken for biological examination.

Water temperatures on the bottom in depths of 25 fathoms and over in the Ipswich Bay and offshore Cape Cod areas were unusually low for the time of the year--only about 37° F. instead of 39° F. to 40° F. as in past years. These relatively cold bottom water temperatures may explain, at least in part, the late arrival of whiting on the inshore grounds this year. Temperature transects were made off Gloucester, Mass., and into South Channel off Nauset Light on Cape Cod.

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DATA COLLECTED ON GEORGES BANK SEA SCALLOPS:

M/V "Delaware" Cruise 61-13: Information on the populations of sea scallops found on Georges Bank was collected by the U. S. Bureau of Commercial Fisheries research vessel Delaware during a 10-day cruise that ended on August 19, 1961. The cruise was part of the Canadian-United States cooperative program to obtain the scientific data necessary for preparing a proposal on sea scallop management for submission to the International Commission for the Northwest Atlantic Fisheries in 1962.

Information was collected on the different sizes of sea scallops caught with dredges with 3-, 4-, or 5-inch rings. A total of 112 tows of 10 minutes each were made at selected stations and about 112,000 scallops were collected and measured. The data collected will be analyzed to determine the escapement of scallops through rings of different sizes. Shell samples and live scallops were brought back to the laboratory for further study. In addition to scallop measurements, sex ratios, length-weight ratios, and the condition of the gonads were recorded.

North Pacific Exploratory Fishery Program

WATERS OFF OREGON AND WASHINGTON SURVEYED FOR ALBACORE AND OTHER SPECIES OF PELAGIC FISH:

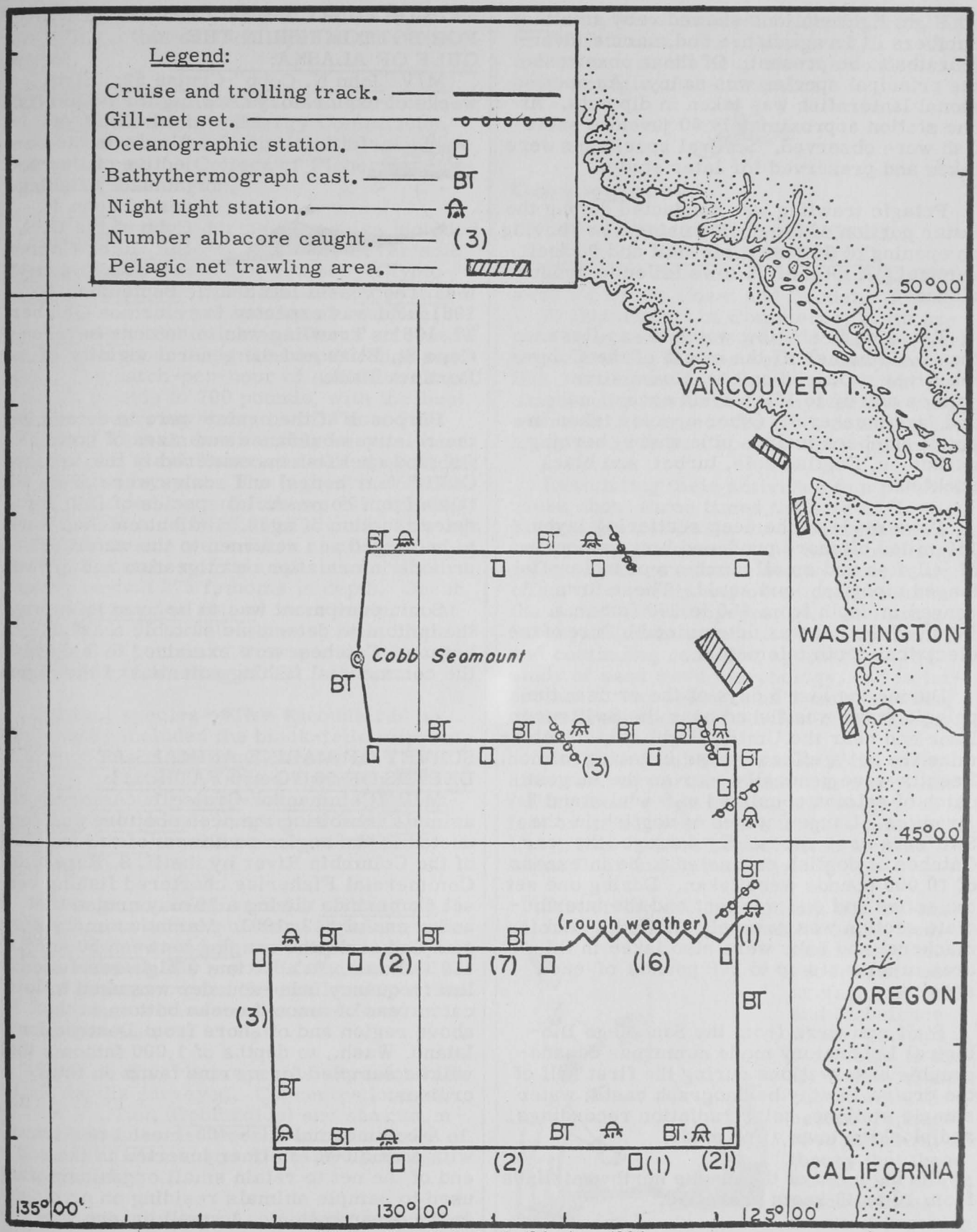
M/V "John N. Cobb" Cruise 51: Primary objectives of a 6-week cruise (ended August 18, 1961) by the U. S. Bureau of Commercial Fisheries exploratory fishing vessel John N. Cobb were to obtain information on the abundance and distribution of albacore tuna and other pelagic species of fish by sampling with gill nets, trolling lines, pelagic trawls, and night lights. Other objectives included the collection of oceanographic data by participating staff members of the Bureau's San Diego Biological Laboratory.

Regions surveyed during the cruise extend from the California-Oregon border to Cape Beale, British Columbia, offshore to a maximum of 310 miles.

The first half of the cruise was devoted to use of gill nets, night lights, and trolling gear. During the last half of the cruise, pelagic trawling gear was used to sample shallow areas (less than 50 fathoms deep) near the mouth of the Columbia River, deep scattering layers off Washington and Oregon, and the coastal waters near Swiftshure Bank and the Umatilla light ship.

A total of 5 gill-net sets was made using 4 shackles of surface nets and 4 shackles of nets submerged to a corkline depth of 100 feet. The total catch of tuna consisted of 2 albacore and 1 bluefin. Blue sharks were taken in every set and caused considerable fouling and damage to the gear. All 8 shackles of gear were lost on the fifth set, presumed to be caused by excessive loading with shark.

Trolling was conducted during daylight hours with generally poor results. Fifty-two albacore ranging in size from 29.4 - 31.9 inches were taken on troll lines. Best catches were made on the more southerly track lines.



M/V John N. Cobb Cruise 51 (July-Aug. 1961).

Night light stations showed very small numbers of forage fishes and marine invertebrates to be present. Of those observed the principal species was saury. An occasional lanternfish was taken in dip nets. At one station approximately 50 juvenile sablefish were observed. Several specimens were taken and preserved for later study.

Pelagic trawling was conducted during the latter portion of the cruise using a net having an opening of 80 feet horizontal and 90 feet vertical. A total of 25 tows failed to produce albacore.

Trawling in shallow water areas (less than 50 fathoms) off the mouth of the Columbia River produced an occasional silver salmon and up to 160 pounds each of hake and jack mackerel. Other species taken in small numbers include blue shark, herring, anchovies, English sole, turbot, and black rockfish.

Tows made in the deep scattering layer 110 miles offshore produced large amounts of jellyfish and small numbers of lanternfish, fanged viperfish, and squid. These tows ranged in depth from 150 to 200 fathoms. Depth of the net was determined by use of the electrical depth telemeter.

During the last 5 days of the cruise, the pelagic trawl was fished near the Swiftsure Bank and near the Umtilla light ship to determine the net's effectiveness in taking salmon. Results were generally poor as the largest catch of salmon consisted of 5 adults and 8 juveniles. Large catches of dogfish in the Swiftsure area repeatedly damaged the gear. Catches of dogfish estimated to be in excess of 10,000 pounds were taken. During one set the entire cod end was lost and the intermediate section was severely chaffed. Jack mackerel and hake were also taken in this area in amounts up to 200 pounds of each species.

Staff members from the San Diego Biological Laboratory made numerous oceanographic observations during the first half of the cruise. Bathythermograph casts, water sample stations, solar radiation recordings, and plankton tows were made.

During most of the cruise northwest winds from 10 to 45 knots prevailed.

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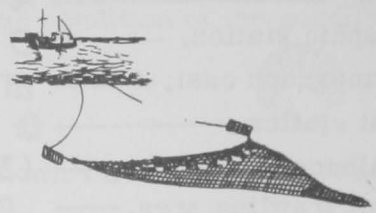
EXPLORATORY TRAWLING FOR BOTTOMFISH IN THE GULF OF ALASKA:

M/V "John N. Cobb" Cruise 52: Eight weeks of exploratory trawling for bottomfish in the Gulf of Alaska is the objective of the exploratory fishing vessel John N. Cobb of the U. S. Bureau of Commercial Fisheries. The vessel left Seattle September 5, 1961, and was expected to return on October 27, 1961. Trawling was to be done between Cape St. Elias and the general vicinity of Portlock Bank.



Purposes of the cruise were to determine the relative abundance and sizes of bottomfish and shellfish encountered in the area. Otolith (ear bones) and scales were to be taken from commercial species of fish for determination of ages. Halibut catches were to be tagged and returned to the water to provide information on migration and growth.

Sonic equipment was to be used to survey the bottom to determine suitable trawlable bottom. Catches were examined to assess the commercial fishing potential of the region.

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SURVEY OF MARINE ANIMALS AT DEPTHS OF 50 TO 450 FATHOMS:

M/V "Commando" Cruise 1: A survey of animals inhabiting the ocean bottom was conducted in the region southwest of the mouth of the Columbia River by the U. S. Bureau of Commercial Fisheries chartered fishing vessel Commando during a 20-day cruise that ended on July 12, 1961. Marine animals were sampled at depths ranging between 50 and 450 fathoms. In addition, a high-resolution, low frequency echo-sounder was used to locate areas of smooth ocean bottom in the above region and offshore from Destruction Island, Wash., to depths of 1,000 fathoms that will be sampled for marine fauna on future cruises.

A commercial-size 400-mesh otter trawl with a small-mesh liner inserted in the cod end of the net to retain small organisms was used to sample animals residing on or close to the ocean bottom. A small dredge was

used to collect burrowing and other animals inhabiting a thin surface layer of the ocean bottom.

Samples of fish and shellfish were collected for the Atomic Energy Commission and delivered to the Radiation Biological Laboratory at the College of Fisheries, University of Washington.

Food fish taken during the cruise included sablefish (Anaplopoma fimbria), Dover sole (Microstomus pacificus), rex sole (Glyptocephalus zachirus), petrale sole (Eopsetta jordani), and several species of rockfish (Sebastodes). Sablefish and Dover sole were taken throughout the entire depth range sampled. The catch-per-hour of sablefish ranged from 25 pounds to 700 pounds, with the best catches occurring at depths of 275 to 375 fathoms. This is considerably deeper than commercial trawl fishermen now operate in the region surveyed. The highest catch of Dover sole per hour of fishing, 800 pounds, was taken at a depth of 250 fathoms. Although some Dover sole were taken at all depths surveyed, catches of this species declined rapidly beyond 275 fathoms in depth. Ocean perch (Sebastodes alutus) were captured at depths from 75 to 250 fathoms, including a catch of 750 pounds of this species taken in a one-hour trawl drag at 225 fathoms.

Unusual species of fish encountered in deep water included the black-tailed liparid (Careproctus melanurus), arrowfish (Tactostoma macropus), fanged viperfish (Chauliodus macouni), deep-water sole (Embassichthys bathybius), long-finned cod (Antimora rostrata), and several unidentified herring-like fish.

Although not commercially utilized at present, substantial numbers of tanner crabs (Chionoecetes tanneri) were captured at depths between 250 and 400 fathoms. Male tanner crabs occupied the shallower portion of this range while females were found in the deeper waters.

Starfish of various species were common at all depths surveyed. Concentrations of brittle starfish (Ophiuroids) and sea cucumbers (Holothuroids) were found at a range of 150 to 200 fathoms and 225 to 300 fathoms, respectively.

Three specimens of an unusual species of octopus, the "flapjack devilfish" (Opisthoteuthis sp.), were captured at depths from 300 to 450 fathoms. They measured 12 to 15 inches across the body which extended to the outer margin of the tentacles.

Oceanography

UNUSUAL SEA BOTTOM FEATURES OBJECT OF NEW OCEAN STUDY:

Under the first research grant ($2,000) awarded by the Coast and Geodetic Survey, U. S. Department of Commerce, in its expanding research program, oceanographers began probing the sea near Bethany Beach, Del., on August 7, to learn more about the origin and behavior of the mysterious sand waves that intersect the U. S. coastline in many areas from Cape Hatteras to New York.

Restricting their activities to a patch of ocean about three times the size of New York's Central Park, the oceanographers equipped with cameras and instruments are going to plunge into the sea to observe the effect of currents and other phenomena on the sandy bottom topography. This project, Survey officials say, is the first systematic and continuing research approach to the study of sand wave morphology, and is important to increasing man's understanding of the processes and mechanics of the sea.

The individual sand waves in the study area are very broad formations rising and falling from ridge to trough in heights of 10 feet or more, over one-half mile intervals. Very little is known about these unusual ocean floor undulations.

Skin diving oceanographers will release colored dyes near the shallow ocean floor and make film records of subsurface currents and turbulence which, perhaps, contribute to the formation of the sand waves. Some oceanographers have advanced the theory that these waves may be old beach stands, drowned in geologic time by a rising sea level. The ten-square-

mile project area along the Delaware coast contains some of the best examples of sand wave formations known to marine researchers today.

Oysters

CHEMICAL METHODS FOR CONTROL OF SHELLFISH PREDATORS TESTED:

Steps are being taken to clear the chemical method for the control of shellfish predators for industrial use. Testing is being done by the Milford (Conn.) Biological Laboratory of the U.S. Bureau of Commercial Fisheries. In previous publications the Laboratory strongly emphasized that although the method is quite effective against boring snails, such as oyster drills, and several other molluscan enemies, its use is not recommended until the effects of the chemicals constituting the formula on water communities in general could be determined, and also ascertain whether some of the substances accumulate in the body tissues of mollusks, such as oysters and clams, rendering them undesirable or dangerous as food.

In accordance with this principle, representatives of the U.S. Bureau of Commercial Fisheries and other Federal institutions, including the U.S. Public Health Service and U.S. Food and Drug Administration, held several meetings to decide the steps that should be taken to determine the safety of the method. Since then, to test the method, a number of experimental oyster plots in Long Island Sound have been treated with different formulae and different quantities of the chemicals. At present, samples of oysters and clams are collected at definite intervals from these plots and adjacent areas to be tested for traces of the chemicals in their body tissues.

Because accurate testing methods have already been developed and approved for Sevin, one of the components of the chemical formula, tests for residues of this chemical in molluscan meats are already in progress. However, since no methods were available for determining small quantities of chlorinated benzenes, such as orthodichlorobenzene, in tissues of clams and oysters, a contract to develop such a method has been signed with a testing company of Hoboken, N. J. Only after a method has been developed and accepted by proper authorities, which may take several months, can analysis of the sample begin. The Laboratory at Milford is now collecting samples, however, that will be ready for analysis as soon as a method is developed.

Oystermen are asked not to employ the chemical method until it is approved since improper use of it may lead to many undesirable misunderstandings and mistakes. Meanwhile, various aspects of the method will be developed in an effort to make it more versatile, effective, cheaper and, most of all, safer for aquatic communities.

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LONG ISLAND SOUND OBSERVATIONS ON SPAWNING AND SETTING AS OF AUGUST 17:

Examination of numerous plankton samples, collected since July 26, showed either a complete absence or a scarcity of oyster larvae and of bivalve larvae in general, the U. S. Bureau of Commercial Fisheries Biological Laboratory, Milford, Conn., reports. Samples collected on July 27, each representing the plankton contents of 500 gallons of sea water, contained only two oyster larvae at Station 10, 4 oyster larvae at Station 5, and 1 oyster larva at Station 2. From then until August 10 no oyster larvae and very few bivalve larvae of any kind were found in the samples. From August 10 to 17, the water of Long Island Sound became less populated with microorganisms of the type that change the color of the water to brownish-red and, parallel with this clearing, the number of bivalve larvae increased although oyster larvae were still virtually absent.

Scarcity of bivalve larvae, in general, and oyster larvae, in particular, is due to toxic substances released into the sea water by microscopic "red water" organisms. These toxins are known to interfere with development of molluscan eggs and growth of their larvae. As of August 17 oyster setting has been virtually a failure in all the areas of Long Island Sound where observations on setting are conducted.

During the last part of July starfish setting continued to be heaviest in the Bridgeport area, especially at Stations 9 and 10. The peak of the wave was reached during the first few days of August. Setting virtually ceased on August 7, but was resumed the following day and finally formed a second peak on August 12 and 13. This peak, however, was peculiar in the respect that, while some stations in each of the three major areas received some set, other stations, exemplified by Stations 4 and 5 in New Haven and Station 10 in Bridgeport, were virtually free of newly set starfish. (Bulletin No. 4, August 17, 1961, issued by the Milford Biological Laboratory.)

* * * * *

MARYLAND OBSERVATIONS, 1961 SEASON:

Setting Observations: The progress of oyster setting in Maryland as shown by exposure of test shells for weekly periods in certain areas is reported seasonally by the State of Maryland "Special Oyster Bulletin" of the Chesapeake Biological Laboratory, Natural Resources Institute, Solomons, Md.

Placement of test shell bags was begun this year on June 12. Some areas included in former years have been discontinued while stations in the Little Choptank have been added. Setting as of late July 1961 has been rather light and scattered except in St. Marys River and on Punch Island Creek bar where, while not exceptionally heavy, the best spatfalls for several years have been observed. The late spring peak of barnacle setting had ended at most stations before test bags were started. In St. Marys River a fairly numerous set of barnacles occurred during the second week of July.

General Conditions: Both water temperature and salinity were lower than normal during most of the spring and early summer of 1961. Rainfall was above normal and the increased flow of soluble nutrients from the land probably has been an important factor in the generally excellent spring growth and spring fattening of oysters. An exception to this has been in limited upstream areas where salinities became too low for the oysters to feed and grow normally this spring.

Oyster Mortalities: Maryland oysters in general have continued to show an impressive freedom from the parasites and predators that cause serious damage in most other areas. However, the severe losses recently experienced in the neighboring States of New Jersey, Delaware, and Virginia are a matter of major concern.

Research in Progress: The extent to which MSX may contribute to future mortalities in Maryland is not yet known. Oysters in the Maryland Chesapeake area do not yet, as a group, show resistance, but have been found to be highly susceptible when experimentally transplanted to infested waters in Delaware Bay. Resistance to the parasite is being shown by lower death rate among surviving oysters in the heavy mortality areas of Delaware Bay and Virginia. When resistant survivors become apparent in Maryland, they should be utilized as brood stock in order to hasten the buildup of a resistant population. This measure has been recommended in both Delaware Bay and Virginia.

There are indications, though still incomplete, that MSX infection is lighter and less destructive in the low salinity portion of affected areas. Experiments to determine the effect of low salinity on development of MSX are under way at the Chesapeake Biological Laboratory where oysters from an area of infection in Virginia are being held in aquaria under

high, intermediate, and low salinity conditions. Infections among all groups thus far have been too low to produce conclusive results so that a new series with more heavily infected oysters must be observed. It remains extremely important that no infected oysters be transplanted to uninfested low salinity areas unless it can be demonstrated that MSX will not continue to develop and spread to other oysters in these waters.

Major emphasis is being given to continued oyster mortality studies by all agencies working on the problem. This laboratory plans to test resistance to MSX of oysters from different sources when exposed on trays to the infective conditions now present in Pocomoke Sound. Also the laboratory will continue to monitor Maryland oyster mortality at selected tray stations, study the effects of salinity upon MSX development, check for the presence of MSX and other known parasites on oyster beds throughout the State, conduct basic studies of the MSX organism, search for new oyster parasites, and follow up reports of any serious oyster losses that may occur. These mortality studies will continue to be coordinated with and supplement the research of the other scientific agencies.

Outlook: Present indications are that, except for a scarcity of oysters on the bottom, the outlook for oysters in most of Maryland continues good with prospects of better than usual growth. Though the future oyster mortality problem is uncertain, losses to date should not seriously affect next season's harvest. An upturn in MSX mortality in out-of-state areas has occurred each year during late summer and fall and mortality from this cause in Maryland must be watched for, especially in those areas where the parasite is now known to be present. It should be emphasized that MSX is perfectly harmless to man and its presence in oysters does not affect the utilization of such oysters as food.

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MARYLAND OBSERVATIONS AS OF AUGUST 24:

Setting Observations: Since issuance of the first bulletin for this season, oyster setting improved in Holland Straits, Hooper Straits, and the Tar Bay-Barren Island area but still was quite light, according to the August 24, 1961, "Special Oyster Bulletin" of the Chesapeake Biological Laboratory, Natural Resources Institute, Solomons, Md. An upturn in Honga River shows a good set for the upper river. Setting tapered off on Punch Island Creek bar and in the upper St. Marys where good sets occurred on test shells. A first but light set occurred at the Laboratory pier in the lower Patuxent and at Hog Island on the western side of the Bay near the mouth of the Patuxent. Few additional spat were found in the Little Choptank where the total set on the test shells remained light.

It must be emphasized that the surviving set at the end of the season on planted shells usually will be much less than the amount of 1- to 7-day old spat counted on clean test shells. Sometimes nearly all of the set is lost due to fouled shells and the presence of oyster enemies. The degree of survival cannot be accurately predicted and varies greatly from place to place. In general, a higher proportion of spat will survive from a light set than from a heavy one, partly because of uncrowded space for growth. Counts of the surviving or commercial set on bottom cultch are made in late fall and in the spring. Test shells are useful for determining the time of set and the potentials for good or poor commercial sets. Last year the State shell planting in Pry Cove, made just at the start of a light set, received a commercial set on the upper layer of shells that was approximately 75 percent of the quantity found on test shells, an exceptionally good record that illustrated the value of timing shell planting to coincide with the beginning of an oyster set.

Other Conditions: Water temperatures for the past month were near normal to a few degrees above. Salinity at Solomons rose to about 12 but was still below normal. Oysters opened for parasite examination generally were in good condition for the season of the year.

Serious losses of oysters in lower Virginia and in portions of the Maryland Seaside area occurred during the past few weeks and were continuing. In the Maryland portion of the Chesapeake area losses still were low. The parasite MSX was not observed in other areas than those reported in the previous bulletin.

* * * * *

USE OF CHEMICALS TO PREVENT FOULING OF SHELLS USED AS CULTCH:

Rapid fouling of oyster shells used as cultch to collect sets of oysters is one of the major difficulties experienced by oyster growers of Long Island Sound and other areas where cultivation of oysters is conducted. Often, soon after planting, shells become so encrusted with fouling organisms that they are no longer of any value as cultch.

Realizing the seriousness of the fouling problem to the oyster industry, the Milford (Conn.) Biological Laboratory of the U. S. Bureau of Commercial Fisheries, parallel with studies on chemical control of oyster predators, has been conducting extensive experiments to find a method by means of which fouling can be either prevented to a large degree or entirely stopped. The fouling organisms, which the Laboratory wishes to prevent from setting, included barnacles, sea grapes or tunicates, tube-forming worms, such as Polydora, Bryozoa, Folliculina, small mussels, and algae. The Laboratory is also interested in preventing setting of larvae of such predators as the flatworm Stylochus, starfish and, in some areas, the free-swimming larvae of drills.

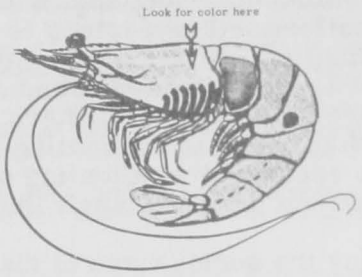
Shrimp

LARGE-SCALE MARKING EXPERIMENT IN DRY TORTUGAS AREA:

As a part of its program of research on Gulf of Mexico shrimp stocks, the Galveston Biological Laboratory of the U. S. Bureau of Commercial Fisheries initiated a large-scale shrimp-marking experiment in the area just north of Dry Tortugas in mid-September 1961. Objectives will be to secure a reliable index of the rate of fishing on the Tortugas pink shrimp stock, together with a better measure of growth during the pink shrimp's transition from noncommercial to commercial size.

STAINED SHRIMP $2.00 REWARD

Shrimp have been marked with blue and green biological stains to obtain information on movements, growth, and rate of harvest. The color appears only on both sides of the head (in the gills) as shown in the illustration.



A reward of $2.00 will be paid for stained shrimp when returned with the following information:

1. Exact place the shrimp was caught.
2. Date the shrimp was caught.

Notify by mail the U.S. Fish and Wildlife Service, No. 1 Rickenbacker Causeway, Miami, Florida, or contact any Fish and Wildlife Service agent at port of landing. Please include name of vessel with the information submitted.

The capture, marking, and release of the experimental shrimp was done by the exploratory fishing vessel George M. Bowers. Plans called for release at random points on the Tortugas grounds not less than 11,000 shrimp, 10,000 to be marked by injection with green stain, 1,000 with blue. Since stains, when injected into shrimp, ultimately concentrate in restricted areas of the head (viewed from the side), commercial shrimp catches must be examined rather closely to detect stained individuals that might have been recaptured. Marked shrimp may be expected to occur in commercial catches with diminishing frequency for at least six months following commencement of the experiment.

The nature of this experiment demands, and its success in the light of applying the same technique to shrimp stocks elsewhere in the Gulf requires, that the highest possible number of marked specimens detected be returned for analysis.

South Atlantic Exploratory Fishery Program

AVAILABILITY OF COMMERCIAL STOCKS OF CALICO SCALLOPS OFF CAPE CANAVERAL (FLA.) SURVEYED:

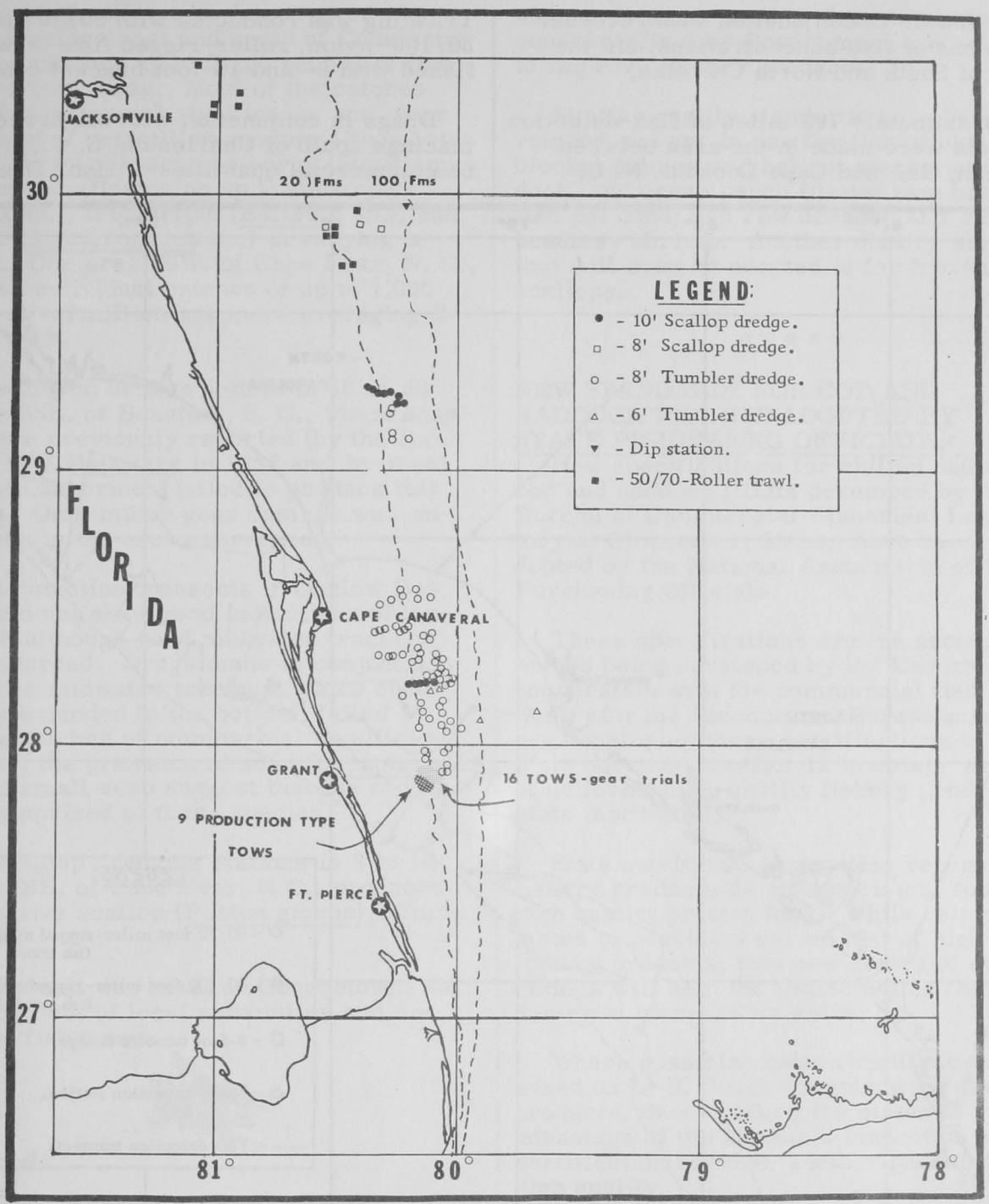
M/V "Silver Bay" Cruise 31: Providing technical assistance to the fishing industry in developing the calico scallop fishery off Cape Canaveral, Fla., was the primary objective of a 17-day cruise (ended July 21, 1961) by the U. S. Bureau of Commercial Fisheries exploratory fishing vessel Silver Bay. Principal efforts were concentrated on determining the availability of commercial quantities of scallops in that area.

Best results were achieved SSE. of Cape Canaveral in 20 fathoms (approximate position 27°54' N., 80°06' W.). In that area, catches of large scallops (shell diameter 2 to $2\frac{5}{8}$ inches) ranged up to 11 bushels per 15-minute drag. Meat yields ranged from $5\frac{1}{2}$-6 pints per 75-pound bushel and from 70-85 scallop meats per pound.

Fishing between Cape Canaveral and Grant, Fla., resulted in catches of small to medium scallops in amounts ranging up to 15 bushels per 15-minute drag. Owing to the small size and yield of the meats, only marginal commercial value can be attached to the catches at present. East of Cape Canaveral in 13-22 fathoms catches consisted of up to 8 bushels of scallops that did not approach commercial size and were mostly between $\frac{5}{8}$ and 1 inch in shell diameter.

The effectiveness of the types of scallop gear used was tested in a series of comparative trials. An 8-foot tumbler dredge with 2-inch rings was found most effective under test conditions. Scallop samples were obtained for use by Bureau biologists and technologists. Four lots of shell stock were landed at Cape Canaveral for industry use in testing newly-developed processing machinery.

A secondary objective was to conduct limited snapper trawling trials between St. Augustine and the St. Johns River, Fla. Efforts were confined to 11 drags in 12 to 32 fathoms. Catches of mixed fish ranged up to 1,570 pounds. Vermillion snapper (Rhombop-



M/V Silver Bay Cruise 31 (July 5-21, 1961).

lites aurorubens), tomtate (Haemulon aurolineatum) and grey triggerfish (Balistes capriscus) dominated most catches. Red snapper (Lutianus blackfordi) and grey snapper (L. griseus) were taken in smaller amounts.

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COASTS OF NORTH AND SOUTH CAROLINA SURVEYED FOR BOTTOM FISH:

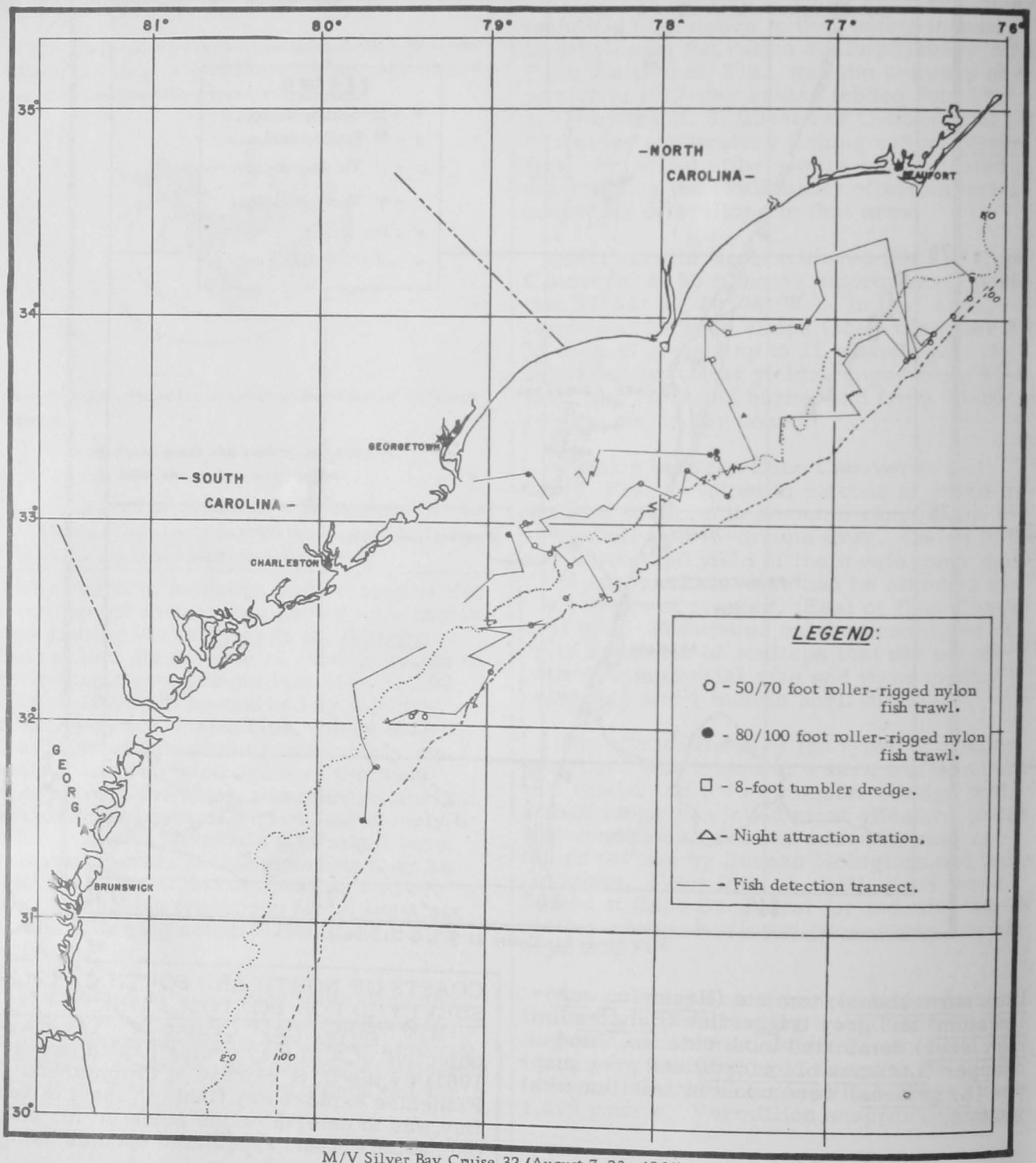
M/V "Silver Bay" Cruise 32: The major objective of a 17-day cruise (ended August 23, 1961) by the U. S. Bureau of Commercial Fisheries exploratory fishing vessel Silver Bay was to determine the potential for snapper, grouper, and associated species using

bottom trawls in conjunction with recorder indications of fish concentrations, off the coasts of South and North Carolina.

Approximately 795 miles of fish-detection transects were made in the area between Savannah, Ga., and Cape Lookout, N. C.

Trawling was conducted with 50/70' and 80/100' nylon, roller-rigged fish trawls fished with 8- and 10-foot bracket doors.

Drags in conjunction with slight recorder tracings south of Charleston, S. C., produced no commercial quantities of fish. Drags



M/V Silver Bay Cruise 32 (August 7-23, 1961).

made in conjunction with fair to good recorder tracings east and north of Charleston produced catches up to 2,100 pounds of fish per 60-minute drag. Most of the catches were of commercial significance and were comprised of vermillion snapper (Rhomboplites aurorubens), scup or porgy (Stenotomus sp.), tomtate (Haemulon sp.), amberjack (Seriola sp.), triggerfish (Balistes sp.), and grouper (Mycteroperca sp.) in varying amounts. One area SSW. of Cape Fear, N. C., produced individual catches of up to 1,000 pounds of vermillion snappers averaging 2 pounds each.

Trawling on broken bottom in 30 to 60 fathoms SSE. of Beaufort, S. C., where snappers were previously reported (by the Bureau's M/V Delaware in 1958 and by local hand-line fishermen) failed to produce this species. Only minor gear damage was encountered in the areas surveyed.

Fish detection transects in Onslow Bay, N. C., did not show good indications of bottom fish although good midwater tracings were recorded. Drags made in conjunction with these midwater tracings, which occasionally extended to the bottom, failed to produce catches of commercial significance. However, the presence of scad (Decapterus sp.) and small scup suggest that the shoals were comprised of these species.

Six scallop dredging stations in 8 to 18 fathoms NE. of Cape Fear, N.C., produced a single live scallop (Pecten gibbus), 20 mm. in width.

A port call was made in Georgetown, S.C., at the request of local authorities and interested fishermen.

Standards

MEETINGS HELD ON PROPOSED QUALITY STANDARDS FOR FROZEN FLOUNDER AND SOLE FILLETS:

The U. S. Bureau of Commercial Fisheries held public meetings at Seattle, Wash. (August 28), at San Francisco (August 30), and at Boston, Mass. (September 1), to consider new quality standards for frozen flounder and sole fillets.

Developed by Bureau laboratories in Seattle, Wash., and Gloucester, Mass., these standards mark another important step in a constant effort by Government and industry to improve fishery products.

Similar quality standards have been developed and are in use for fish sticks; fish blocks; salmon and halibut steaks; cod, haddock, and ocean perch fillets; raw breaded fish portions; and raw breaded and raw headless shrimp. Another quality standard that will soon be adopted is for frozen fried scallops.

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NEW STANDARDS FOR COD AND HADDOCK FILLETS ADOPTED BY STATE PURCHASING OFFICIALS:

New specifications for chilled and frozen cod and haddock fillets developed by the U.S. Bureau of Commercial Fisheries' Laboratory at Gloucester, Mass., have been adopted by the National Association of State Purchasing Officials.

These specifications are the second of a series being developed by the Laboratory in cooperation with the commercial fishing industry for the Association. Bureau scientists are developing these specifications to enable state purchasing officials to obtain wider use of uniform, high-quality fishery products in state institutions.

State nutritional authorities recognize fishery products as an economical source of high quality protein food. While helping the states to provide a varied diet of high-quality fishery products, this new series of specifications will help the United States fishing industry to increase its sales.

Where possible, these specifications are based on U. S. Grade Standards for fishery products, thus enabling the states to take advantage of the Bureau's inspection and certification service, another guarantee of high quality.

State Purchasing Specifications

SPECIFICATIONS FOR SEVERAL FISHERY PRODUCTS FRAMED FOR STATE PURCHASING OFFICIALS:

Specifications for frozen ocean perch fillets, chilled and frozen cod or haddock

fillets, and scallops were framed by the Gloucester Technological Laboratory of the U. S. Bureau of Commercial Fisheries during the fiscal year ending June 30, 1961, for the National Association of State Purchasing Officals (NASPO). Late in July the Director of Purchases for the State of Connecticut and his assistants visited the Gloucester Laboratory to discuss fishery specifications work for the Association.

A schedule for new NASPO specifications to be developed during this fiscal year was agreed upon. These include (1) portions, all forms; (2) shrimp, all forms; and (3) canned tuna.

It was also agreed to publish the specifications in some periodical, such as Commercial Fisheries Review, in order to obtain a permanent record of these specifications and to make them known to all segments of the fishing industry. NASPO also plans to publish the specifications for use by the States.

The Connecticut Director of Purchases volunteered the institutions in Connecticut for field-testing new whiting products to be developed as part of a Bureau project to improve the quality of whiting.

United States Fishery Landings, January-July 1961

Total Landings: Landings of fish and shellfish in the United States during the first 7 months of 1961 amounted to about 351 million pounds or 16 percent more than during the comparable period of 1960.

Salmon: On the basis of the reported pack of canned salmon, it was estimated that the Alaska catch to August 20, 1961, of about 232 million pounds was up almost 40 million pounds over a year ago.

Shrimp: The South Atlantic and Gulf States landings through July 1961 (nearly 70 million pounds) were down 28 million pounds--a drop of 29 percent from the same period in 1960.

United States Commercial Fishery Landings of Certain Species for Periods Shown, 1961 and 1960

Species	Period	1961 1/	1960	Total 1960
		(1,000 lbs.)		
Anchovies, Calif.	7 mos.	2,600	1,962	5,057
Cod:				
Maine	6 mos.	1,500	2,045	2,897
Boston 2/	7 "	13,200	10,073	15,548
Gloucester 2/	7 "	1,600	2,056	3,199
Total cod		16,300	14,174	21,644
Haddock:				
Maine	6 mos.	1,300	1,803	3,834
Boston 2/	7 "	52,300	46,031	76,695
Gloucester 2/	7 "	9,000	9,068	12,107
Total haddock		62,600	56,902	92,636
Halibut: 3/				
Alaska	7 mos.	18,800	18,682	21,351
Wash. & Oreg.	7 "	10,800	14,102	16,802
Total halibut		29,600	32,784	38,153
Herring:				
Maine	6 mos.	3,400	16,462	152,327
Alaska	7 "	33,400	42,380	77,913
Industrial Fish, Maine & Mass, 4/	7 mos.	22,600	21,058	43,733
Mackerel:				
Jack	7 mos.	29,800	38,672	74,945
Pacific	7 "	20,600	9,966	36,808
Menhaden	7 mos.	1,294,400	999,019	1,999,000
Ocean Perch:				
Maine	6 mos.	39,900	36,867	78,258
Boston	7 "	300	556	1,481
Gloucester	7 "	34,400	39,211	61,673
Total ocean perch		74,600	76,634	141,412
Salmon:				
Alaska	to Aug. 20	232,200	192,423	207,101
Washington	5 mos.	2/1,000	2/832	16,178
Oregon	3 "	2/100	2/68	5,582
Scallops, Sea, New Bedford (meats)	7 mos.	11,900	11,047	19,353
Shrimp (heads-on):				
South Atl. & Gulf	7 mos.	69,900	98,304	236,938
Washington	5 "	300	559	1,801
Oregon	3 "	70	14	881
Squid, Calif.	7 mos.	1,100	444	2,562
Tuna, Calif.	to Aug. 19	211,600	198,836	283,060
Whiting:				
Maine	6 mos.	2,300	3,131	11,123
Boston	7 "	60	86	754
Gloucester	7 "	24,200	26,281	63,112
Total whiting		26,560	29,498	74,989
Total all above items		2,144,630	1,842,038	3,532,073
Others not listed		399,370	351,131	1,397,927
Grand Total		2,544,000	2,193,169	4,930,000

1/Preliminary.
2/Landed weight.
3/Dressed weight.
4/Excludes menhaden.
Note: Data represent weight of fish and shellfish as landed except for mollusks which are weight of meats only.

Menhaden: Landings during the first 7 months of 1961 amounted to about 1,294 million pounds--an increase of 295 million pounds over the previous year.

Tuna: Landings in California (including transshipments of United States-caught fish from South America) totaled almost

212 million pounds to August 19, 1961--up nearly 13 million pounds from the same period in 1960.

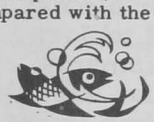
Haddock: The 7-months 1961 landings of nearly 63 million pounds were about 6 million pounds greater than during the same period in 1960.

Halibut: The Alaska, Washington, and Oregon catch January through July of about 29 million pounds was 3 million pounds less than in the same period in 1960.

Scallops: New Bedford landings of meats during the first 7 months of 1961 of almost 12 million pounds exceeded the 1960 catch for the period by 900,000 pounds.

Mackerel: Landings of Pacific mackerel (over 20 million pounds) through July 1961 more than doubled those in the previous year, while jack mackerel landings (nearly 30 million pounds) declined 9 million pounds in comparison with 1960.

Whiting: During the first 7 months of 1961, landings at Gloucester (24 million pounds) were down 2 million pounds or 8 percent as compared with the previous year.



U.S. Fish Meal and Solubles Supply, June 1961

The total United States supply of fish meal for the first 6 months of 1961 amounted to 207,000 tons--57,000 tons greater than during the same period of 1960. The domestic production accounted for 48 percent and imports 52 percent of the total supply for the first half of 1961.

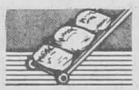
Fish meal produced by United States firms during January-June 1961 totaled close to 100,000 tons. Fish meal processed from menhaden accounted for 82 percent of that total. Fish meal imports from foreign countries during January-June 1961 amounted to 107,000 tons--up 41,000 tons from the same period of 1960. Imports from Peru made up 69 percent and those from Canada, South Africa, and Chile accounted for 29 percent of the imports in the first six months of 1961.

U. S. Supply of Fish Meal and Solubles, January-June 1961 with Comparative Data

Item	January-June 1961	January-June 1960	Total 1960
	(Short Tons)		
Fish Meal and Scrap:			
Domestic production:			
Menhaden	82,277	56,013	218,423
Tuna and mackerel	9,705	15,520	26,325
Herring, Alaska	1,216	1,526	6,071
Other	6,621	11,096	38,897
Total production	1/99,819	1/84,155	289,716
Imports:			
Canada	19,367	21,930	30,982
Peru	73,648	32,889	68,156
Chile	5,892	7,393	21,183
Angola	1,433	-	888
Republic of South Africa	6,396	3,905	7,073
Other countries	727	258	3,279
Total imports	107,463	66,375	131,561
Available fish meal supply	207,282	150,530	421,277
Fish Solubles:			
Domestic production 2/	38,428	36,946	98,929
Imports:			
Canada	660	615	869
Denmark	28	1,858	1,858
Other countries	531	45	447
Total imports	1,219	2,518	3,174
Available fish solubles supply	39,647	39,464	102,103

1/Preliminary. Based on reports from firms which accounted for 96 percent of the 1960 total production.
2/50-percent solids. Includes production of homogenized condensed fish.

The United States supply of fish solubles (including homogenized condensed fish) during January-June 1961 was about the same as in the first six months of 1960. Domestic production in January-June 1961 amounted to 38,000 tons and imports totaled about 1,200 tons.



United States Fishing Vessels

DOCUMENTATIONS ISSUED AND CANCELLED, JUNE 1961:

During June 1961, 63 vessels of 5 net tons and over were issued first documents as fishing craft, 7 vessels less than in the same month last year. But the number issued first documents the first 6 months this year was 16 more than in the same period last year.

Table 1 - U. S. Fishing Vessels 1/ --Documentations Issued and Cancelled, by Areas, June 1961

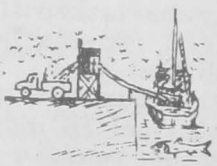
Area (Home Port)	June		Jan.-June		Total
	1961	1960	1961	1960	1960
	(Number)				
Issued first documents 2/:					
New England	2	6	17	13	35
Middle Atlantic	2	1	4	11	16
Chesapeake	10	15	35	38	78
South Atlantic	6	7	21	29	48
Gulf	9	17	61	46	89
Pacific	31	21	101	89	147
Great Lakes	3	3	8	7	18
Puerto Rico	-	-	2	-	-
Total	63	70	249	233	431
Removed from documentation 3/:					
New England	2	7	8	15	22
Middle Atlantic	-	2	15	6	18
Chesapeake	-	-	17	9	21
South Atlantic	3	3	14	21	38
Gulf	12	7	56	53	88
Pacific	9	6	52	38	86
Great Lakes	-	1	8	6	13
Puerto Rico	-	-	-	1	1
Total	26	26	170	149	287

See footnotes in table 2.

Table 2 - U. S. Fishing Vessels 1/ --Documents Issued and Cancelled, by Tonnage Groups, June 1961

Gross Tonnage	Issued 2/	Cancelled 3/
	(Number)	
5-9	18	5
10-19	24	6
20-29	4	3
30-39	2	4
40-49	5	1
50-59	2	2
60-69	2	2
70-79	2	1
90-99	1	-
130-139	-	1
180-189	-	1
260-269	1	-
270-279	1	-
580-589	1	-
Total	63	26

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: 38 in 1961, 2 in 1960, 1 in 1958, 2 in 1957, 1 in 1955, and 19 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

UNITED STATES EXPORTS AND RE-EXPORTS OF FROZEN SHRIMP TO JAPAN, JANUARY-MAY 1961:

Of the almost 2.8 million pounds of domestic and foreign fresh and frozen shrimp exported and re-exported from the United States during the first five months of this year, 53.1 percent or almost 1.5 million pounds were shipped to Japan. A substantial proportion of the shipments to Japan was made from California. Most of the re-exports consist of shrimp imported into the United States from Mexico.

United States Exports and Re-Exports of Fresh and Frozen Shrimp 1/to Japan, Jan.-May 1961

Type of Product	Jan.	Feb.	Mar.	Apr.	May	Total
	(1,000 Lbs.)					
Domestic	31	80	23	64	137	335
Foreign	286	198	185	148	326	1,143
Total	317	278	208	212	463	1,478

1/Although data appear under the "fresh and frozen shrimp" category, it is believed that all of the exports were frozen shrimp.

Exports and re-exports of shrimp to Japan from California were negligible prior to 1961. But due to a short supply of shrimp in Japan during the first part of this year and a strong market, that country has purchased substantial quantities of shrimp from the United States. Most of the Japanese purchases consist of frozen raw headless brown

shrimp, 21-25 shrimp to the pound. But some shipments included 26-30 count, 16-20 count, and under 15 count. The data for the first five months do not fully reveal the extent of the shrimp exports to Japan since sizable quantities were purchased in May and stockpiled for shipment in June-July. Later information as it becomes available will reveal the full extent of frozen shrimp exports to Japan.

* * * * *

EDIBLE FISHERY PRODUCTS, JUNE 1961:

Imports of edible fresh, frozen, and processed fish and shellfish into the United States during June 1961 increased by 4.1 percent in quantity and 6.5 percent in value as compared with May 1961. The increase was due primarily to higher imports of groundfish and other fillets (up 3.6 million pounds) and frozen other tuna (up 2.9 million pounds), and to a lesser degree, an increase in the imports of canned tuna in brine and lobsters and spiny lobsters. The increase was partly offset by a 1.4-million-pound decrease in the imports of frozen albacore tuna.

Compared with June 1960, the imports in June this year were up by 0.6 percent in quantity and 1.8 percent in value due to higher imports of frozen groundfish fillets (up 5.6 million pounds). Compensating, in part, for the increase was a drop of about 1.6 million pounds in the imports of frozen albacore and other tuna, frozen shrimp, lobsters and spiny lobster tails, and canned salmon.

U. S. Imports and Exports of Edible Fishery Products, June 1961 with Comparisons

Item	QUANTITY			VALUE		
	June		Year	June		Year
	1961	1960	1960	1961	1960	1960
	(Millions of Lbs.)			(Millions of $)		
Imports:						
Fish & shellfish:						
Fresh, frozen, & processed 1/. . . .	86.8	86.3	1,011.2	27.7	27.2	304.8
Exports:						
Fish & shellfish:						
Processed only 1/ (excluding fresh & frozen)	1.2	1.5	48.7	0.8	0.8	19.2

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

United States exports of processed fish and shellfish in June 1961 were lower by 14.4 percent in quantity and 33.3 percent in value as compared with May 1961. Compared with the same month in 1960, the exports this June were down by 18.3 percent in quantity but unchanged in value. The lower exports in June this year as compared with the same month in 1960 were due primarily to sharply lower exports of California sardines and squid. In June 1961 the value of the exports was relatively high because of increases in the exports of high-priced fresh, frozen, and canned shrimp.

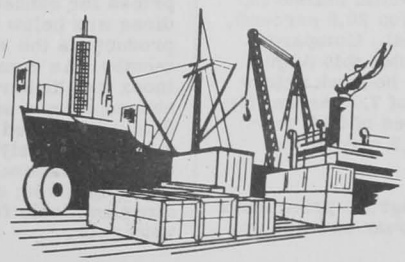
* * * * *

IMPORTS OF CANNED TUNA IN BRINE UNDER QUOTA:

The quantity of tuna canned in brine which may be imported into the United States during the calendar year 1961 at the $12\frac{1}{2}$-percent rate of duty is 57,114,714 pounds. Any imports in excess of the quota are dutiable at 25 percent ad valorem.

Imports from January 1-July 29, 1961, amounted to 27,898,898 pounds, according to data compiled by the Bureau of Customs.

Imports in 1960 for the period January 1-July 30 amounted to 26,754,852 pounds.



U.S. Shrimp Supply Indicators as of Sept. 6, 1961

Item and Period	1961	1960	1959	1958	1957
	(1,000 Lbs.)				
Total Landings, Atlantic and Gulf States (heads-off):					
September	1/	18,832	18,330	15,847	13,673
August	10,100	20,441	18,595	14,173	15,011
July	10,521	21,746	17,490	13,457	15,389
January-August	52,400	78,961	71,599	63,729	72,289
January-December	1/	141,035	130,659	116,552	116,238
Quantity used for Canning, Gulf States (heads-off): 2/					
September	1/	2,236	2,108	2,825	1,506
August	1,155	5,041	2,427	2,809	2,464
July	3,058	6,319	3,085	4,805	3,475
January-August	9,696	21,210	16,450	14,723	13,429
January-December	1/	28,594	24,679	26,404	18,386
Frozen Inventories of raw headless (as of end of each month) 3/:					
August	1/	20,171	23,780	15,274	10,867
July	15,343	17,397	22,352	12,351	8,768
June	19,416	15,338	19,283	10,664	7,007
January-July, monthly average	27,678	22,486	24,200	13,580	10,194
January-December, monthly average	1/	25,954	27,296	18,008	13,627
Imports 4/:					
July	1/	7,319	7,861	6,340	5,384
June	8,065	8,932	8,300	6,018	5,240
May	8,278	9,902	8,264	5,666	3,870
January-June	57,168	51,365	49,826	32,278	28,972
January-December	1/	113,419	106,555	85,393	69,677

1/Not available.
2/Pounds of headless shrimp determined by multiplying the number of standard cases by 33.
3/Source: "Frozen Fish Reports." Includes raw headless only; excludes breaded, peeled and deveined, etc.
4/Includes fresh, frozen, canned, dried, and other shrimp products as reported by U. S. Bureau of the Census.
Note: Data for 1961 are preliminary. August 1961 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.

Wholesale Prices, August 1961

In August this year, the wholesale price index for edible fishery products (fresh, frozen, and canned) at 137.1 percent of the 1947-49 average was up sharply (6.1 percent) from the preceding month and was also higher by 10.2 percent from the same month of 1960. Higher wholesale prices for fresh and frozen shrimp, fresh large haddock, and Maine canned sardines this August were largely responsible for the increase over July. As compared with August a year ago, most of the fishery products index items were higher priced this August.

The fresh and frozen drawn, dressed, and whole finfish subgroup index this August rose 10.9 percent from the preceding month due to higher ex-vessel prices for large haddock at Boston (up 65.4 percent), fresh dressed Pacific halibut (up 8.6 percent), Lake Superior drawn whitefish (up 20.8 percent), and fresh dressed king salmon (up 1.2 percent). Compared with the same month of 1960, the subgroup index this August rose about 2.7 percent. Sharply higher large haddock prices (up 44.2 percent) at Boston plus an increase of 7.0 percent for dressed halibut more than offset price declines of 24.5 percent for fresh Great Lakes yellow pike and 2.8 percent for fresh dressed king salmon at New York City.

The fresh processed fish and shellfish subgroup price index jumped 8.4 percent from July to August this year and was up 20.2 percent from August 1960. From mid-July to mid-August this year fresh shrimp prices at New York City increased 19.4 percent and fresh small haddock fillets at Boston rose 5.2 percent. When compared with August of 1960, prices this August were higher for fresh shrimp by 28.2 percent, fresh small haddock fillets by 15.1 percent, and fresh shucked oysters by 14.3 percent.

Wholesale prices this August for frozen processed fish and shellfish rose 7.5 percent from a month earlier due primarily to a sharp rise (about 11 cents a pound or 14.8 percent) in frozen shrimp prices at Chicago. From August a year ago to this August the subgroup price index increased 10.1 percent because of lower shrimp landings and stocks and shorter supplies of frozen haddock and ocean perch fillets. In August 1961, prices increased for frozen shrimp (up 28.3 percent), frozen haddock fillets (up 20.3 percent), and ocean perch fillets (up 5.6 percent) from the same month of 1960.

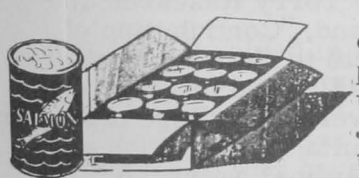
The canned fishery products subgroup index in August 1961 increased 1.5 percent from July due to 14.2-percent higher prices for canned Maine sardines. The pack of Maine sardines was below normal as of August 31. Other canned fish products in the subgroup remained unchanged from past months. As compared with August of 1960, the subgroup price index was higher by 8.9 percent due to higher prices for canned salmon and canned Maine and California sardines. Stocks of canned Pacific salmon as of the end of August 1961 were moderately good and up from the same period of 1960. Canned tuna stocks at the end of August 1961 were good but trending lower; supplies of both Maine and California sardines available for current use and for the near future were very poor.

Table 1 - Wholesale Average Prices and Indexes for Edible Fish and Shellfish, August 1961 With Comparisons

Group, Subgroup, and Item Specification	Point of Pricing	Unit	Avg. Prices 1/ ($)		Indexes (1947-49=100)			
			Aug. 1961	July 1961	Aug. 1961	July 1961	June 1961	Aug. 1960
ALL FISH & SHELLFISH (Fresh, Frozen, & Canned)					137.1	129.2	129.5	124.4
Fresh & Frozen Fishery Products:					153.5	140.8	141.6	138.5
Drawn, Dressed, or Whole Finfish:					162.4	146.5	151.9	158.1
Haddock, lge., offshore, drawn, fresh	Boston	lb.	.13	.08	128.2	77.5	86.9	88.9
Halibut, West., 20/80 lbs., drsd., fresh or froz.	New York	lb.	.38	.35	117.6	108.3	114.5	109.9
Salmon, king, lge. & med., drsd., fresh or froz.	New York	lb.	.88	.87	196.6	194.3	196.6	202.2
Whitefish, L. Superior, drawn, fresh	Chicago	lb.	.64	.53	158.7	131.4	151.2	158.7
Yellow pike, L. Michigan & Huron, rnd., fresh	New York	lb.	.55	.58	129.0	136.0	132.5	170.0
Processed, Fresh (Fish & Shellfish):					158.2	146.0	145.4	131.6
Fillets, haddock, sml., skins on, 20-lb. tins	Boston	lb.	.31	.29	103.8	98.7	98.7	90.2
Shrimp, lge. (26-30 count), headless, fresh.	New York	lb.	.87	.73	136.7	114.5	122.4	106.6
Oysters, shucked, standards	Norfolk	gal.	8.00	8.00	198.0	198.0	185.6	173.2
Processed, Frozen (Fish & Shellfish):					124.0	115.3	113.2	112.6
Fillets: Flounder, skinless, 1-lb. pkg.	Boston	lb.	.39	.39	100.8	100.8	102.1	102.1
Haddock, sml., skins on, 1-lb. pkg.	Boston	lb.	.33	.33	102.0	103.6	102.0	84.8
Ocean perch, skins on, 1-lb. pkg.	Boston	lb.	.29	.28	114.8	112.8	114.8	108.7
Shrimp, lge. (26-30 count), 5-lb. pkg.	Chicago	lb.	.82	.71	125.8	109.6	106.5	111.5
Canned Fishery Products:					114.1	112.4	112.0	104.8
Salmon, pink, No. 1 tall (16 oz.), 48 cans/cs.	Seattle	cs.	28.00	28.00	146.1	146.1	146.1	127.8
Tuna, lt. meat, chunk, No. 1/2 tuna (6-1/2 oz.), 48 cans/cs.	Los Angeles	cs.	11.00	11.00	79.3	79.3	79.3	80.0
Sardines, Calif., tom. pack, No. 1 oval (15 oz.), 48 cans/cs.	Los Angeles	cs.	4.50	4.50	105.0	105.0	105.0	93.9
Sardines, Maine, keyless oil, 1/4 drawn (3-3/4 oz.), 100 cans/cs.	New York	cs.	10.31	9.03	109.7	96.1	93.1	93.1

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

Cans--Shipments for Fishery Products, January-June 1961



Total shipments of metal cans for packing fishery products during January-June 1961 amounted to 63,146 short tons of steel (based on the amount of steel consumed in the manufacture of cans) as compared with 60,560 tons in the same period of 1960. Canning of fishery products in January-June this year was confined largely to tuna, shrimp, jack mackerel, Pacific salmon, and Maine sardines. The greater use of cans this year was largely due to a greater pack of salmon in Alaska.

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