TRENDS AND DEVELOPMENTS

Fishing Vessel and Gear Developments

EQUIPMENT NOTE NO. 2--
PACIFIC COAST DRUM TRAWLING:

Drum trawling, a relatively recent development, was introduced into the Pacific Northwest otter-trawl fishery in 1954 (Alverson 1959) following the development of drum purse-seining. The drum-trawling method can be adapted readily to the trawling system in conventional use on the Pacific coast, wherein the net is towed from davits located one on each quarter of the stern. No major modifications in net rigging are necessary to convert the trawl to the drum method. Patents covering some aspects of drum trawling have been applied for by the designers.

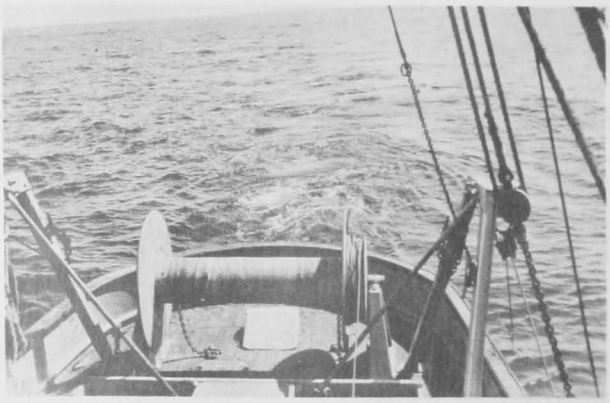

Fig. 1 - Otter trawl drum. The drive reel is on the port end of the drum. The drive wire, extending forward, leads to the winch drum.

The principal unit of the system is the drum upon which the trawl is wound (fig. 1). It is constructed of sheet steel and is designed to accommodate a conventional otter trawl. Drum flanges are 4 to 5 feet in diameter and the drum core is 15 to 20 inches in diameter and 5 to 8 feet long. Stopper chains, for securing the trawl to the drum, are fastened near each end of the core (fig. 2). The drum is powered either directly by an independent hydraulic or mechanical drive similar to that described for drum seiners (Smith 1954), or indirectly by means of a wire rope running from the main winch drum to a drive reel on the side of the trawl drum (fig. 3).

Fig. 2 - Stopper chain. A six- to seven-foot stopper chain is secured near each end of the core of the trawl drum. A snap is secured to the other end of the chain to receive the bridle.

Two methods are employed commonly for connecting the net to the doors in the Pacific Coast trawl fishery: (1) wires leading from the headrope and footrope of each side of the trawl are connected directly and separately to the doors

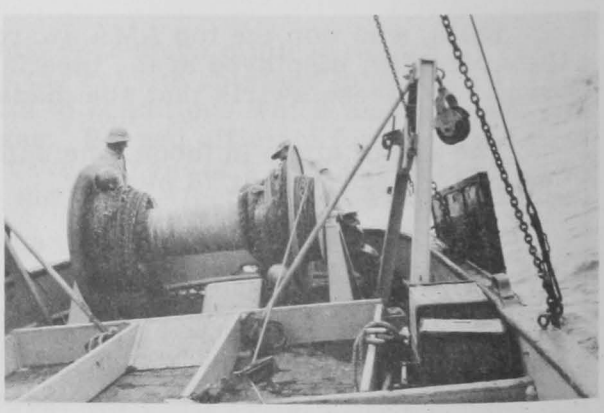

Fig. 3 - Setting the trawl. The drive wire, leading through the block in the foreground, is unwinding from the trawl winch onto the drum drive reel.

creating a net-door connection known locally as a "double dandyline;" or (2) the foreward end of the wire leading from the headrope is joined to the foreward end of the wire leading from the footrope of the same side to form a bridle, usually about 15 fathoms long, and the bridle is connected to the door by a 25-fathom single-wire section (ground wire) forming what is known locally as a "single dandyline." The chief difference between the use of double and single dandylines in drum trawling lies in the way in which the two are started onto the trawl drum: when a double dandyline connection is used, the trawl is started onto the drum at the wingtips; whereas when a single dandyline is used, the trawl is started onto the drum at the foreward end of the bridles. The following is a description of a trawl equipped with a single dandyline.

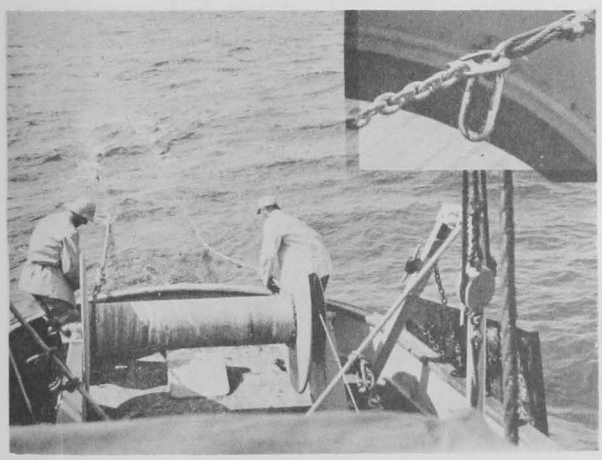

Fig. 4 - Drum stopper chains taking the strain of the gear. The trawl bridle can be seen leading to the net. The inset shows the snap at the end of the stopper chain connected to the end of the trawl bridle.

Setting the Gear: (1) The bag of the trawl is thrown overboard and the net unwinds from the trawl drum as the vessel moves ahead (fig. 3). (2) When the trawl and trawl bridle have been set the drum stopper chains support the strain of the gear (fig. 4). (3) At this time the dandylines are reeved through the towing blocks on the davits and secured to the ends of the trawl bridles (fig. 5); the strain is taken off the stopper chains with the winch, and the chains are disconnected. (4) Setting is then continued until the end of the dandyline is reached, the doors are hooked on in the conventional manner, and the set is completed by slacking out the required amount of warp.

Picking Up the Gear: (1) The doors are hauled back to the davits and, in contrast with conventional trawling methods (Knake 1958), are completely disconnected from the dandylines--this is facilitated by replacing the conventional "Kelly-eye" with a "G-hook." (2) The gear is hauled in until the foreward end of the trawl bridles appear. (3) The stopper chains are then connected. (4) The gear is slacked off slightly until the stopper chains take the strain of the trawl; and the dandylines are disconnected from the doors, removed from the trawling davits, and connected to the drum-drive wire. (5) The trawl is then started onto the drum (fig. 6). (6) When the trawl has

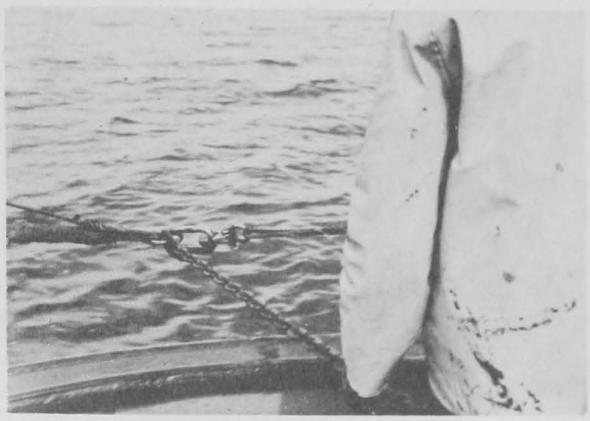

Fig. 5 - The dandyline (on the other side of the fisherman) has been reeved through the davit towing block and connected to the trawl bridle. When the dandyline receives the strain of the gear, the stopper chain will be disconnected. Note the G-hook at the end of the dandyline.

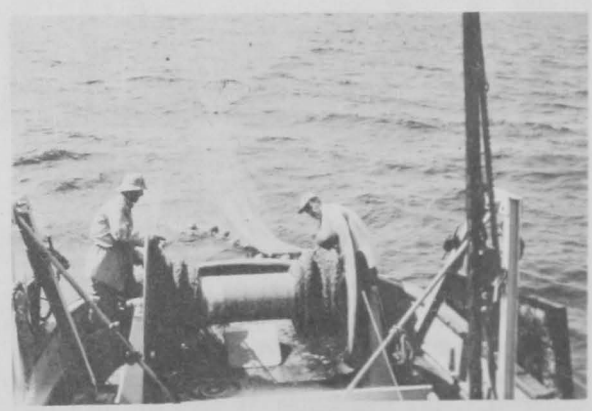

Fig. 6 - Winding the gear onto the drum. A "floater" of Pacific ocean perch can be seen in the background. The drive wire in the foreground is being wound from the drive drum onto the trawl winch.

been wound onto the drum as far as the intermediate trawl section, the portion of the trawl remaining in the water is lifted with a single-block lift, the fish bag is brought alongside by turning the vessel, and the splitting operation carried out in the usual way (figs. 7 and 8).

Fig. 7 - The fish bag alongside ready for splitting. Note how, after splitting, the intermediate trawl section and bag are wound directly onto the trawl drum without further handling or vessel maneuvering.

There are several advantages to drum trawling: the net can be handled much more rapidly and with less labor; the operation is safer because overhead handling of heavy gear is eliminated and

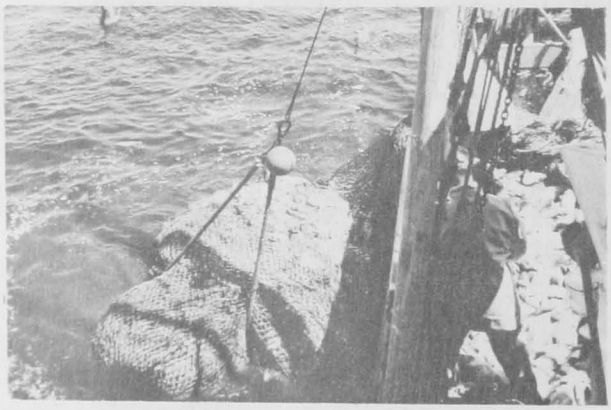

Fig. 8 - Splitting a 6,000-pound catch of Pacific ocean perch.

the amount of total handling required is reduced; the operation can be carried out more easily in rough seas; and the method helps prevent the partial escape of fish from the mouth of the trawl--a source of loss that is often serious with conventional methods of picking up the trawl.

LITERATURE CITED

ALVERSON, DAYTON L.
1959. Trends in Trawling Methods and Gear on the West Coast of the United States. Modern Fishing Gear of the World, Hilmar Kristjonsson, editor, Fishing News (Books) Ltd., London, pp. 317-320.

KNAKE, BORIS O.
1958. Operation of North Atlantic Type Otter Trawl Gear. U. S. Bureau of Commercial Fisheries, Washington, D. C., Fishery Leaflet 445, 15 pp.

SMITH, KEITH A.
1954. Drum Seining--A New Development in the Puget Sound Salmon Fishery. Commercial Fisheries Review, vol. 16, no. 2 (February), pp. 1-6. (Also Separate No. 365.)

--By Fred Wathne, Fishery Methods and Equipment Specialist
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Note: Appreciation is extended to Capt. Louis Salveson of the drum trawler Guide for his cooperation in providing the opportunity to observe and photograph the drum-trawling technique.

Agriculture Yearbook Includes Story of Fish

Included in the recently issued U. S. Department of Agriculture Yearbook for 1959--Food--is the story of the U. S. Department of the Interior's activities relating to fish and the fishing industry.

The article is by A. W. Anderson, Assistant Director of the Bureau of Commercial Fisheries, Fish and Wildlife Service. It deals with the food aspects of fish--the food which is hunted, not farmed--and the activities of the Department of the Interior in behalf of the fishing industry and in the interest of the consuming public.

The value of fish as a food is pointed out--a well-balanced protein with good percentages of several essential vitamins and with "unsaturated" acids of apparently considerable value in lowering the cholesterol level in the blood serum.

The standards of quality for several fishery products and the inspection serv-

ice which assures quality fishery products are described as services available to those fishery processors who want to display the Department of Interior shield of quality on the goods they offer to the householder.

There is a "purchasing guide" which explains the terminology of fishery products in simple language and numerous items of interest to the housewife about fish and shellfish.

After the discussion of fish as a food comes information on the activities of the Bureau of Commercial Fisheries in behalf of the fishing industry and the consumer of fishery products. Concisely told is the story of fishery statistics compiled by the Bureau and the dissemination of market information by the Fishery Market News Service which puts buyer and seller on an even footing on facts about supply and demand.

In 1957, the annual harvest of about 5 million pounds was worth $351 million to the men on the boats; $592 million at the processing level; $836 million at wholesale level; and $1,091 million to the retailers.

A chart shows that United States production is relatively stable but that the imports are definitely increasing; another chart shows the United States in second position, far behind Japan, in fish production and just barely ahead of mainland China and the U. S. S. R.

The interesting story of fishery biological research is told. Included is a reference to the three-Nation effort which is being made to learn enough about salmon to set up salmon management plans for countries in two hemispheres. The job is complex, for salmon is a fish which has a definite "home" for short periods in America or Asia at hatching and spawning times but otherwise is voyaging several thousand miles of ocean.

There is the story of the sea lamprey, the huge king crab, and the minute oyster crab, common and uncommon fish and shellfish, fishing equipment problems, distribution problems, the value of fish meal in animal diets, and the value of fish oil in industry. There is material about exploratory fishing, gear research which helps the industry meet some of its technical and practical problems, and technological research which aims to make it possible for the consumer to get the best possible product.

In one place the article pays tribute to the United States fishing industry with "Our fishing industry is unusually independent. It prefers to pursue its own course with a minimum of governmental assistance or the exercise of Federal or State authority. There is no Federal legislation authorizing subsidies or price support or similar programs for fishery foods. The producers and consumers do benefit, however, from the research and similar services that the government provides for most industries."

American Fishery Advisory Committee

PROGRAMS AND PROBLEMS DISCUSSED AT 10TH MEETING:

The tenth meeting of the American Fisheries Advisory Committee was opened on October 7, 1959, at Old Point Comfort, Va. This advisory group was created under the terms of the Saltonstall-Kennedy Act of 1954 as amended in 1956. This legislation provides that an amount equal to 30 percent of the moneys received from import duties on fishery products shall be made available to the Secretary of the Interior to promote the free flow of domestically-produced fishery products in commerce by conducting a fishery educational service and fishery technological, biological, and related programs and to develop and increase markets for fishery products of domestic origin.

The meeting concentrated on fishery programs and problems of the Middle Atlantic and Chesapeake Bay areas. Discussing topics vital to the fisheries industry were representatives of the U. S. Bureau of Commercial Fisheries and Committee members.

Representatives of the Bureau pointed out that:

(1) In the Middle Atlantic and Chesapeake Bay area fish and shellfish valued at $61 million are landed annually--about 17 percent of the total value of all fish and shellfish landings in the Nation.

(2) There are two species of whiting potentially abundant in the Middle Atlantic area not now exploited.

(3) The three major problems of the oyster industry are the need for an increase in seed production; control of oyster predators; and the need to identify and control diseases of oysters.

(4) A method has been developed based upon the effectiveness of a chemically-treated barrier of sand to protect oyster beds.

(5) There has been progress reported on the team approach by the Government-Industry Cooperative Research Program to the problem of determining satisfactory definitions and standards of identity for raw oysters.

(6) The sudden and large fluctuations in the supply of blue crabs needs research attention and a shift of effort from the shad investigation to the study of blue crab problems is scheduled.

(7) In a report of progress in the processing of crab meat, it was revealed that tests proved that the boiling method of extracting crab meat yielded nearly nine percent more meat than did the steaming method. In terms of current production figures, this would provide an increase in gross value of crab meat of about $1 million annually.

(8) Various factors influence the important menhaden fishery--the effect of man-made changes in the estuarine nursery grounds, the make-up of menhaden populations, and the characteristics of the ocean environment that influence the behavior, distribution, and abundance of the fish; all these factors need to be studied.

(9) The need to insure the future market for fish meal by a complete knowledge of the nutritional value of the product and a study of new market possibilities.

(10) A chemical test has been developed for determining accurately the freshness of crab meat. This so-called picric acid turbidity test has been industry-tested successfully on shrimp. It reveals a departure from ideal freshness of the product even before changes in either the flavor or odor can be detected.

(11) The economics of the fish-oil industry point up the need for better methods of processing, new products, and exploitation of recent studies of fish-oil fatty acids and their derived products. Progress has been made in the analysis of fishy odors leading to practical application of those studies.

American Samoa

American Samoa Tuna Landings, January-September 1959

Species	September		January-September	
	1959	1958	1959	1958
	(1,000 Lbs.)			
Albacore	2,077	1,716	15,284	15,450
Yellowfin	322	313	3,430	4,185
Big-eyed	63	29	744	874
Skipjack	-	-	4	-
Total	2,462	2,058	19,462	20,509

Note: Most of these tuna were landed by Japanese vessels; a small amount by South Korean vessels.

Atlantic Estuarine Research Society Meets

The fall meeting of the Atlantic Estuarine Research Society, whose members are marine scientists from Massachusetts to Florida, met at Virginia Beach October 2-4, 1959, as guests of the Virginia Fisheries Laboratory.

Several fishery biologists of the Virginia Laboratory presented papers before the assembled scientists: (1) comparison on "condition indices" of oysters cultured in trays and those grown on natural bottoms; (2) the catch-rate changes in the salt-water sport fishery; (3) a review of the grey sea trout studies made in Virginia; and (4) Virginia's work on crab pot mesh size and its relation to catch.

A visiting shellfish biologist from the University College of North Wales pre-

sented a paper on the setting of barnacles.

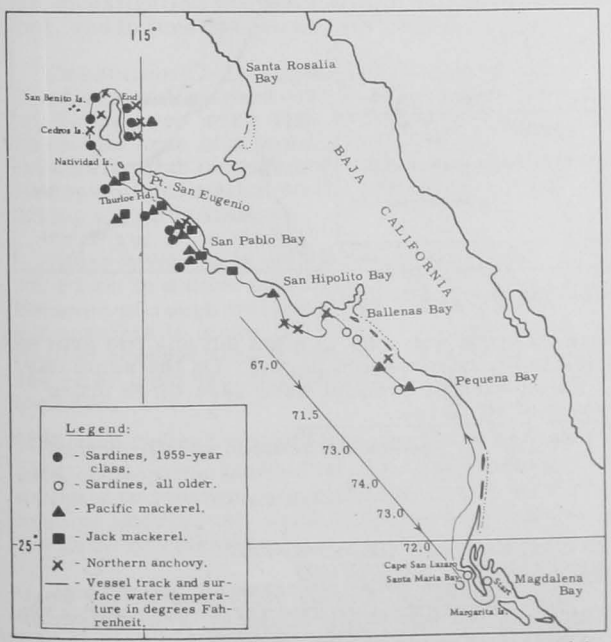
This society, which is the only one in the United States devoted exclusively to the study of the problems of research in inshore marine waters along the Atlantic seaboard, meets in regular spring and fall session. Its membership consists of about 140 marine scientists.

California

PELAGIC FISH POPULATION SURVEY OFF COAST OF SOUTHERN AND CENTRAL CALIFORNIA CONTINUED:

M/V "Alaska" Cruise 59A6-Pelagic Fish: The coastal waters of central Baja California from Magdalena Bay to Cedros Island were surveyed (July 24-August 11, 1959), by the California Department of Fish and Game research vessel Alaska. The objectives were: (1) to sample young sardines for determining the relative abundance and distribution of fish resulting from the 1959 spawning; (2) to sample adult sardines, Pacific mackerel, jack mackerel, and anchovies; (3) to collect live sardines for genetic studies conducted by the U.S. Bureau of Commercial Fisheries Biological Laboratory at La Jolla; (4) to tag barracuda incidental to pelagic fish work; (5) to collect specimens as requested by other investigations; and (6) to troll for albacore while en route to Magdalena Bay.

Of the 68 light stations occupied, sardines were taken on 17, Pacific mackerel on 12, northern anchovies on 11, and jack mackerel on 6.



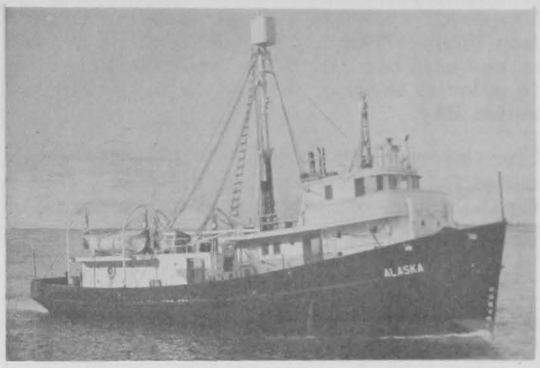


Fig. 2 - California Department of Fish Game's research vessel M/V Alaska.

Eleven of the 17 sardine samples were comprised of the 1959 year-class ranging in length from 80 to 115 mm. These fish were taken between San Pablo Bay and Cedros Island. Adult sardines were taken only in a small area between Ballenas and Pequena Bays. One sample of these fish produced a near running-ripe female which was the only female of a 50-fish sample. No live sardines were delivered to the Bureau's Laboratory at La Jolla due to insufficient quantities collected.

The Alaska scouted 396 miles and 44 pelagic fish schools were sighted. Of this total, 30 were identified as sardine, 6 as anchovy, and 8 were unidentified. Bioluminescence was adverse for good visual scouting during a large part of the cruise.

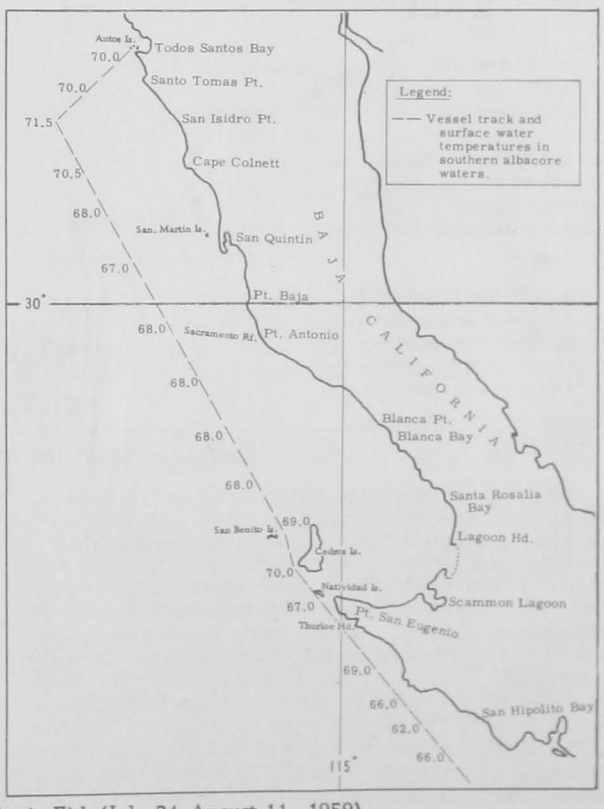


Fig. 1 - M/V Alaska Cruise 59A6--Pelagic Fish (July 24-August 11, 1959).

A total of 499 California barracuda was tagged with type "G" spaghetti tags at Asuncion Bay and Cedros Island. The fish were taken on barbless lures and held one day in the vessel's large live wells prior to tagging. All but 73 were released at Asuncion Bay.

Live red crabs (Pleuroncodes planipes) requested by inland fisheries died before the vessel reached port. Specimens of marine organisms were collected for other investigations.

While en route from Ensenada to Magdalena Bay, a special offshore trolling track was followed to encompass previously productive albacore waters. No albacore were taken. Water temperatures were unfavorable for albacore.

Sea surface temperatures ranged from 60.8° F. (16.0° C.) at San Pablo Bay to 77.2° F. (25.1° C.) off San Juanico Point. In general, offshore differences were small from southern California south to Magdalena Bay. A range of 68° F. (20.0° C.) to 72° F. (22.2° C.) prevailed over the greater part of the cruise.

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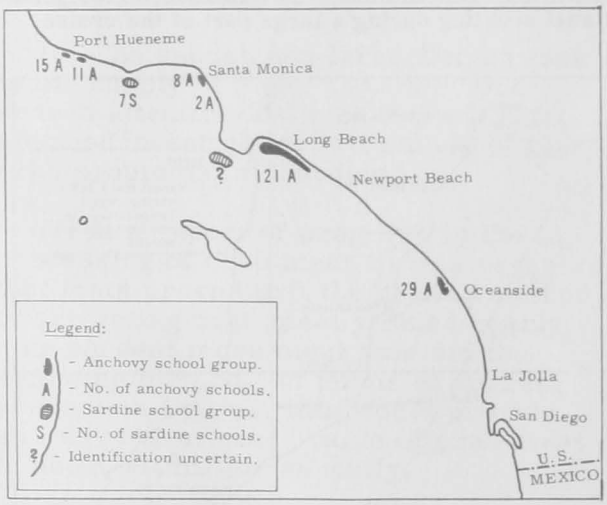
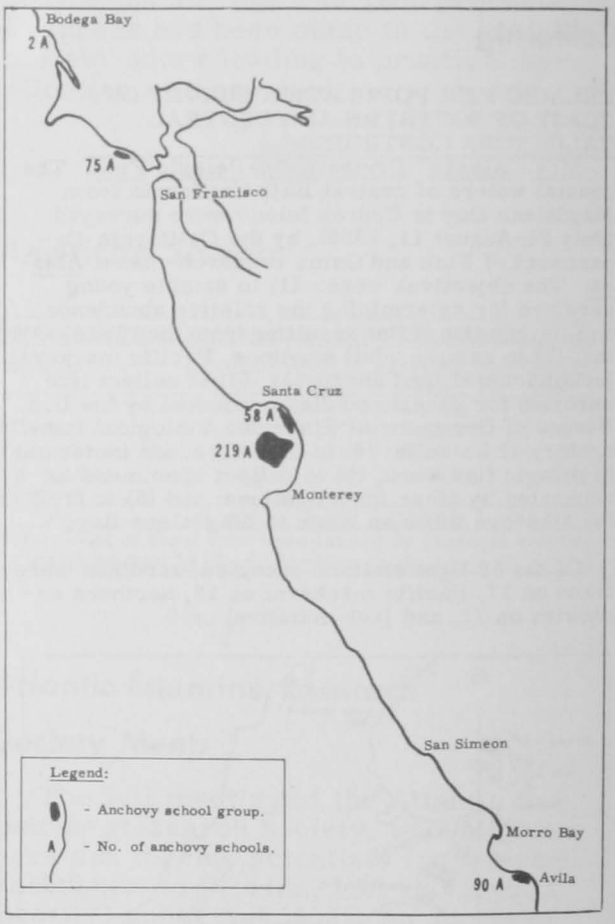
Airplane Spotting Flight 59-14-Pelagic Fish: The inshore area from the Mexican Border to Bodega Bay was surveyed from the air (August 10-13, 1959) by the Department's Cessna 170 (1359D) to determine the distribution and abundance of pelagic fish schools.





Airplane spotting flight 59-14 (August 10-13, 1959).

Low clouds and haze hindered observations in some portions, but sufficient coverage was achieved during the four days to determine that pelagic fish schools were not plentiful in the inshore areas of southern and central California. Only 29 anchovy schools were observed south of Huntington Beach. These were loose and strung out, in very shallow water, five miles north of Oceanside. From Los Angeles Harbor to Huntington Beach, 121 schools were sighted. Of these, 61 were outside the Long Beach breakwater and one mile off Sunset Beach and Tin Can Beach. The remaining schools were small "breezing" spots centered one-half mile off the Belmont pier. Only 10 schools were found in Santa Monica Bay, all in shallow water very close to shore. Two small groups containing 26 schools were present off Port Hueneme and Point Mugu, and San Luis Obispo Bay contained 90 small, poorly defined schools, near the Avila piers. Of the 277 schools seen in Monterey Bay, 58 were in the extreme inshore area between Capitola and Aptos, and the remaining 219 were in the approximate center of the bay, showing up as medium to large sized, well defined spots. North of Monterey, 77 schools were seen, 75 close to the beach in Bolinas Bay and 2 just off the sandy beach at Bodega Bay.

On the afternoon of August 10 many "breezing" schools of fish were seen three miles southeast of Pt. Vicente. They behaved like sardines, but were erratic and difficult to observe. At any given time, 5 to 10 spots would be in sight but any one spot was visible for only a short period. On the same day, 7 small sardine schools were seen three miles south of Pt. Dume.

Note: Also see Commercial Fisheries Review, Sept. 1959, p. 22.

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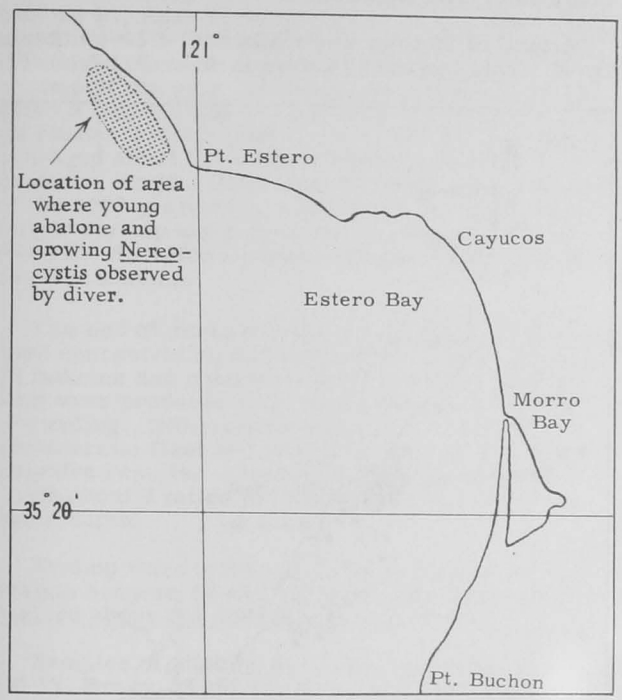
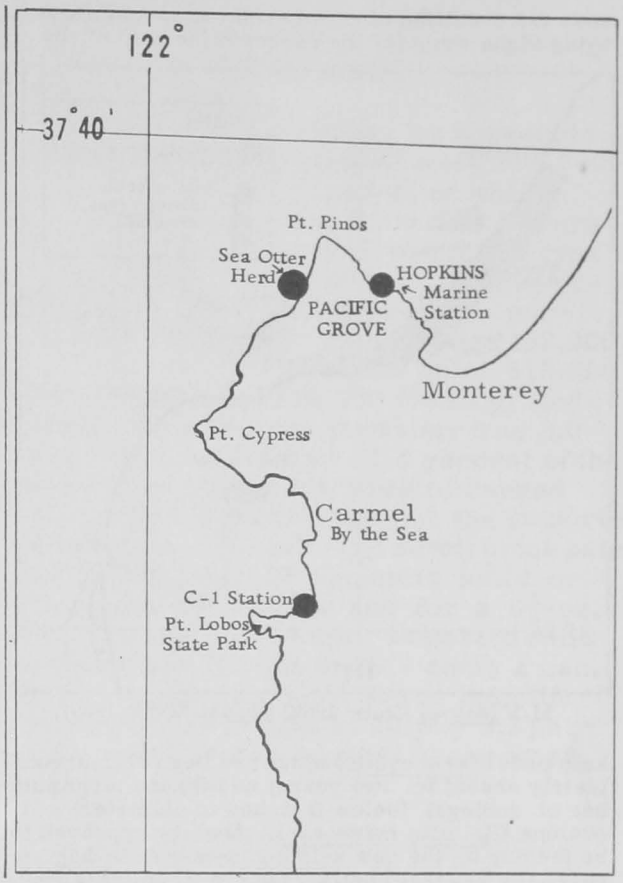
INVESTIGATION OF ABALONE RESOURCES CONTINUED:

M/V "Nautilus" Cruise 59N3, and Diving Boat "Mollusk" Cruise 59M1-Abalone: The abalone investigations were continued from April 15-June 30, 1959, by the California Fish and Game Department's research vessel Nautilus and diving boat

Mollusk in waters off Monterey and Morro Bay. The objectives were (1) to establish stations and habitat improvement areas; (2) to investigate sea otter-abalone relationships; (3) to recover tagged abalone; (4) to investigate skin-diving activity and areas of commercial activity; and (5) to recover abalone spat.





Area covered by M/V Nautilius on Cruise 59N3.

Because of unusually rough weather, activities were seriously curtailed during almost the entire cruise. Diving was limited to one day in April, five in May and one in June. During April and May the investigation worked out of Monterey and Carmel, and in June operations were moved to Morro Bay.

One station (C-1) established in Carmel Bay was found to be well worked over by skin divers. Abalone left in the area were deep in cracks and crevices. Since this area is a popular spot for skin divers, especially club outings and classes, it should provide good information on the effects of skin divers during a year's time.

Dives were made off Pacific Grove south of Pt. Pinos in a cove inhabited by 20-25 sea otters. Because of rough water and poor visibility it was not possible to cover the entire area, but from limited observations it was apparent that this small sea otter herd had eaten almost all the abalone in the area.

Recovery was made of three abalone tagged in 1956 off Hopkins Marine Station. None of these animals had grown during the two years they had been at liberty. All were found within a few feet of the point of release.

Because of the weather it was not possible to set out equipment for the recovery of abalone spat nor was it possible to examine the areas of former commercial abalone fishing between Monterey and San Simeon. During June, weather conditions were such that only three boats of the commercial abalone fleet remained at Morro Bay. By the latter part of the month even those had given up. The abalone investigation was able to make only one dive during June. However, two encouraging observations were made. Many small and sublegal (less than 8 inch) red abalone (H. rufescens) were found in the area north of Pt. Estero and a considerable growth of young kelp (Nereocystis) was observed on the bottom in that area.

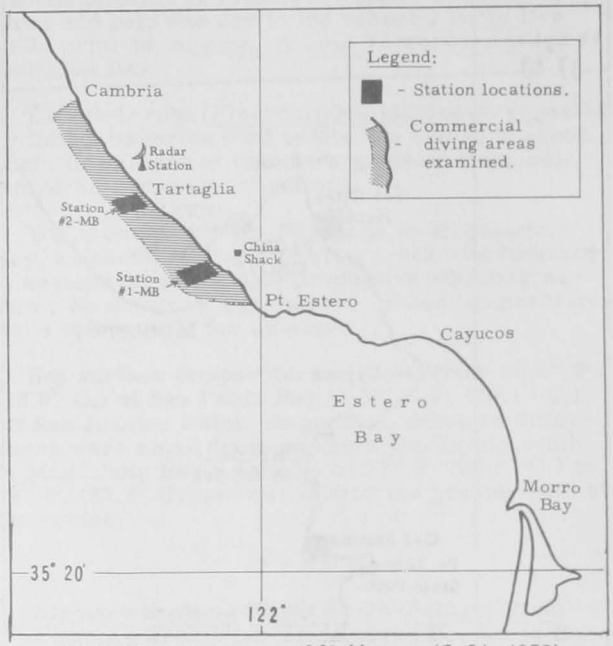
Although attempts were made to reach the diving areas whenever weather conditions permitted, it was not possible to conduct operations with any degree of safety or accuracy and attempts had to be abandoned.

Diving Boat "Mollusk" Cruise 59M2-Abalone: Investigations were continued in Morro Bay from August 12-31, 1959, by the Department's diving boat Mollusk to (1) establish abalone stations to be used for observation and study; (2) observe condition of abalone on commercial diving areas; (3) set out abalone spat collectors; and (4) conduct habitat improvement experiments.

Two experimental stations were established in commercial diving areas. Each station encloses an area roughly one-half by three-quarters of a mile extending from shore out to 100 feet. One station is located off what is known locally as the Second China Shack; the other is located south of the radar station off the Tartaglia ranch.

Three days were spent inspecting the grounds from Pt. Estero to Cambria in an attempt to as-

sess the condition of commercial areas. Encouraging signs were (a) the re-establishment of the



M/V Mollusk Cruise 59M2 (August 12-31, 1959).

kelp beds (Nereocystis) which had been almost completely absent for two years; and (b) the large number of sublegal (below 8 inches in diameter) red abalone (Haliotis rufescens). Abalone appeared to be feeding on the new kelp and new growth was apparent on several shells. This is in marked contrast to observations made last year when almost a complete lack of growth was found.

Two types of abalone spat collectors were fabricated and a set of each was placed in the two station sites. One consisted of abalone shells strung on a wire 15-feet long and suspended from floats; the other was made by enclosing 40-50 abalone and oyster shells in a chicken-wire basket. At each station, three float collectors and two bottom collectors were set out in water 15- to 35-feet deep ranging from 200 to over 600 yards offshore. One bottom collector was lost and could not be recovered.

Although inspection of the shells after approximately two weeks in the water revealed no young abalone, it was felt that this method of collection has value and should be tried again in the spring. Setting apparently did not occur at this time.

Because of the limited diving weather it was not possible to conduct habitat experiments.

Note: Also see Commercial Fisheries Review, April 1959, p. 37.

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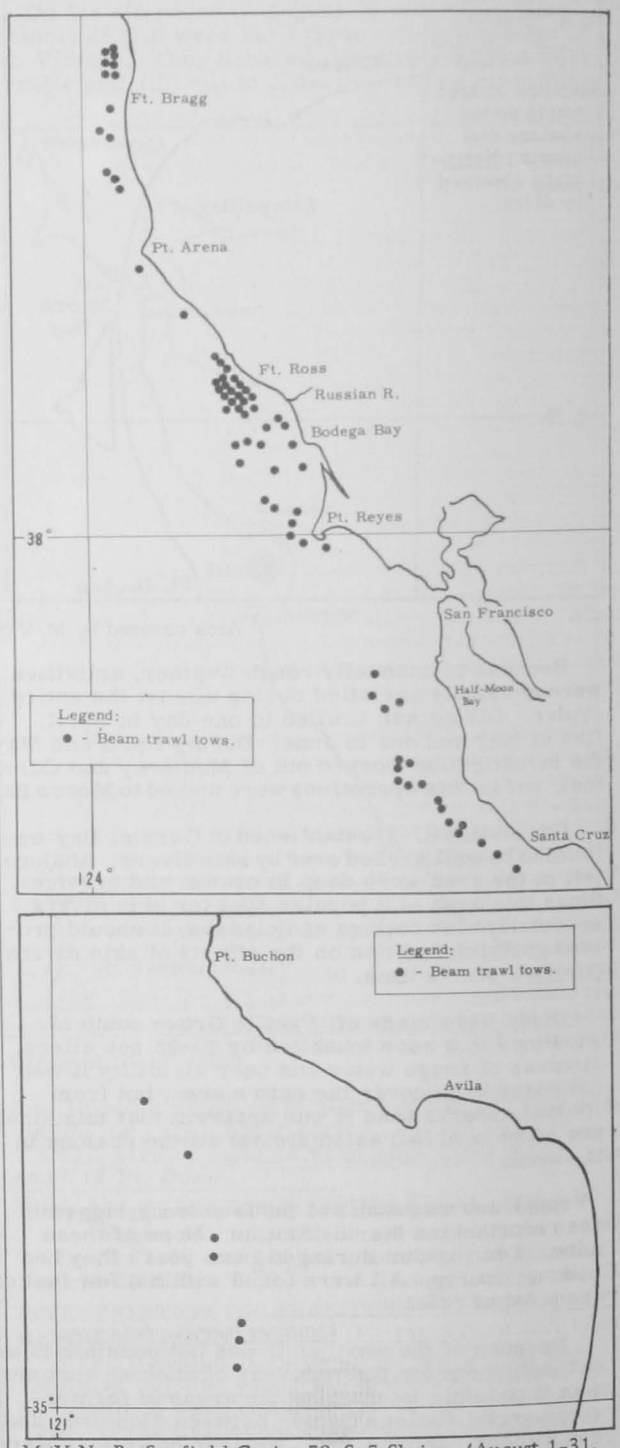
SHRIMP STUDY OFF CENTRAL AND NORTHERN CALIFORNIA COAST CONTINUED:

M/V "N. B. Scofield" Cruise 59S5-Shrimp: The coastal waters off central and northern California from the vicinity of Ft. Bragg to the vicinity of Avila were surveyed by the California Department of Fish and Game research vessel N. B. Scofield from August 1-31, 1959, for stocks of ocean shrimp (Pandalus jordani) both inside and outside the 3-mile limit. Other objectives were: (1) to determine size, sex, weight, and count of shrimp from different beds; (2) to determine size and weight of incidental fish catches; (3) to make bathythermograph casts to obtain temperatures in shrimp fishing areas; and (4) to collect specimens requested by other investigations.

A total of 86 tows was made with a 20-foot beam trawl. This included 14 tows in Area B-1 from Ft.



M/V N. B. Scofield Cruise 59-S-5 Shrimp (August 1-31, 1959).

Bragg to Pt. Arena, 64 tows in Area B-2 from just south of Pt. Arena to Santa Cruz and 8 tows in Area C off Avila. Depths ranged from 32 to 135 fathoms.

Tows made within the 3-mile limit around Bodega Bay and the Russian River failed to produce shrimp. Shrimp were found in limited concentration off Ft. Ross between 52 and 60 fathoms. Best tow in Area B-2 was at Ft. Ross where 71 pounds of shrimp per hour were caught. Quite a few shrimp of the year (approximately 400 individuals about 5 months old) were caught in a half-hour tow off Sander's Reef--just south of Pt. Arena. They averaged about 8.5 millimeters (about $\frac{1}{3}$-inch) in carapace length. This was the best representation of the 1959 year-class taken in all the tows. No larger shrimp were present. A total of 19 tows from the Farallon Islands to Santa Cruz failed to produce shrimp.

The bed of shrimp in the Ft. Bragg area was in good concentration within a depth range of 60 to 72 fathoms and coastwise for 4.5 miles. The two best tows produced 500 pounds each in a half-hour of trawling. Efforts to find the shrimp where the commercial fleet had left them in July produced negative results. Apparently they had shifted south about 4 miles but had maintained about the same depth.

Shrimp were found off Avila in limited concentration between 83 and 114 fathoms. Best tow here yielded about 120 pounds in a half-hour.

Samples of shrimp were obtained from 4 tows off Ft. Bragg, 11 off Ft. Ross, and 7 off Pt. San Luis. One hundred shrimp from each of these tows were sexed and measured. In addition, the entire contents of the gallon sample were counted and weighed.

The catch of incidental fish was comparatively light due to the use of a small unweighted foot rope. Counts and average weight of all species from 78 tows were recorded. In addition, all fish taken in 8 of the tows were measured. The biggest tow of fish weighed about 60 pounds. Two best shrimp tows contained only about 2.3 and 3.4 pounds of fish each. Pacific sand dabs (Citharichthys sordidus), slender sole (Lyopsetta exilis), juvenile rockfish (Sebastodes sp.), tomcod (Microgadus proximus) and juvenile hake (Merluccius productus) were the major constituents in the catches. Sand dabs accounted for most of the poundage while hake accounted for the greatest total number.

Forty-six bathythermograph casts were made in depths ranging from 47 to 75 fathoms. Casts were made in all areas where shrimp were caught and also in areas where shrimp were not taken.

Vessel thermograph and surface temperatures were recorded during all tows for the entire cruise. Temperatures ranged from 53.4° F. off Ft. Bragg on August 14 to 61.9° F. off Half-Moon Bay on August 23.

Note: Also see Commercial Fisheries Review, July 1959, p. 25.

Canned Fish

CONSUMER PURCHASES, AUGUST 1959:

Canned tuna purchases by household consumers in August 1959 were 965,000 cases, of which 54,000 cases were imported. By type of pack, domestic-packed tuna purchases were 199,000 cases solid, 613,000 cases chunk, and 100,000 cases grated or flakes. The average purchase was 2.0 cans at a time. About 31.3 percent of the households bought all types of canned tuna; only 2.0 percent bought the imported product. The average retail price paid for a 7-oz. can of domestic solid or fancy was 35.2 cents and for a $6\frac{1}{2}$-oz. can of chunk 27.5 cents. Imported solid or fancy was bought at 29.7 cents a can. August purchases were lower than the 998,000 cases bought in July by 3.2 percent; retail prices in most cases were slightly higher.

During August household consumer purchases of California sardines were 34,000 cases; and 23,000 cases imported sardines. The average purchase was 1.6 cans at a time for California sardines and 1.9 cans for imported. Only 1.4 percent of the households bought canned California sardines and 1.7 percent imported. The average retail price paid for a 1-lb. can of California sardines was 24.5 cents, and for a 4-oz. can of imported 26.2 cents. Retail prices were higher for California sardines but slightly lower for imported canned sardines. August purchases of California sardines were lower than the 36,000 cases bought in July by 5.6 percent.

Canned salmon purchases in August 1959 were 201,000 standard cases, of which 104,000 cases were pinks and 53,000 cases reds. The average purchase was 1.2 cans at a time. About 14.2 percent of the households bought all types of canned salmon; 6.9 percent bought pinks. The average retail price paid for a 1-lb. can of pink was 56.5 cents and for red 87.0 cents. August purchases were down about 6.9 percent from the 216,000 cases bought in July.

Canned Foods

SURVEY OF MOVEMENT OF CANNED FOODS BY METHOD OF TRANSPORTATION:

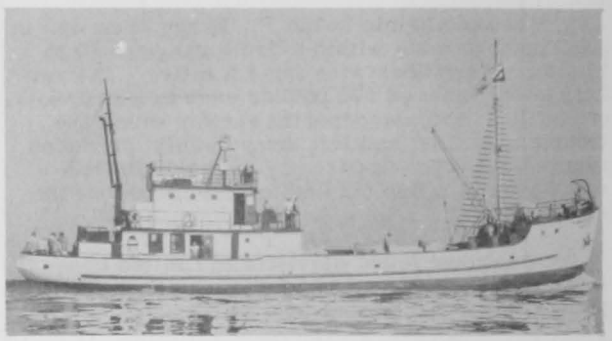
A survey of canned food movement covering a period of one year ending June 30, 1958, has been released by the Bureau of the Census, U. S. Department of Commerce. The survey was underwritten by the Association of American Railroads. Data were compiled by nine commodity class groups: prepared meats; milk; fish and shellfish; fruits; seasonal vegetables; nonseasonal vegetables; juices; soups, baby foods, and jellies; and specialties. The movement was measured in tons and straightline ton-miles by four types of transport: rail, "for hire" motor carrier, private truck, and other. "Other" included predominantly intercoastal water and freight forwarder. The survey covered only commodities of domestic plants.

It is estimated that 349,000 tons of canned fish were transported at an average-haul of 1,318 miles. This average is longer than that for any other commodity. The next closest-average is for fruits with 866 miles. Milk, with 385 miles had the shortest average-haul. The average-haul for all commodities was 548 miles. When considering average-haul by type of transport, fish had the longest average-haul by rail of 1,676 miles. The average-haul by rail of all commodities was 765 miles. By motor carrier, fish had next to the shortest average-haul of 213 miles (milk had the shortest). Of all canned goods, 45 percent of the tons originated go by rail, 27 percent by "for hire" motor carrier, 23 percent by private truck, and 5 percent by other means. Of all canned fish, 62 percent of tonnage originated go by rail, 21 percent by "for hire" motor carrier, 7 percent by private truck, and 10 percent by other means. Packers of prepared meat haul 39 percent of their traffic in their own trucks.

Central Pacific Fishery Investigations

OCEANOGRAPHIC AND FISHERY SURVEY IN HAWAIIAN WATERS COMPLETED:

M/V "Charles H. Gilbert" Cruise 46: During a 30-day cruise that ended on October 17, 1959, the U. S. Bureau of Commercial Fisheries research vessel, the Charles H. Gilbert, completed an oceanographic and fishery survey in Hawaiian waters. This cruise was one of a series being conducted by the Bureau's laboratory in Honolulu to learn more about the skipjack tuna and the waters in which they live.



U. S. Bureau of Commercial Fisheries research vessel Charles H. Gilbert.

The biologists believe that season skipjack are associated with a certain type of water, an extension of the California Current, and that the success of the Hawaiian summer fishing season may depend on the time of entry and amount of this water in the Hawaiian area. Unlike the summer months when the entire Island chain was surrounded by the California Current Extension and when numerous tuna schools were sighted close to land, the cruise just completed showed that the higher salinity water from the North Pacific had moved in and only a few fish schools were sighted.

Although very few skipjack schools were fished, the Field Party Chief reports that the vessel was able to successfully fish one school of medium size (10-18 pounds) skipjack using tilapia as bait. The tilapia is a tropical fish species which was introduced in

Hawaii several years ago as a possible supplement to the nehu, a less hardy native bait species.

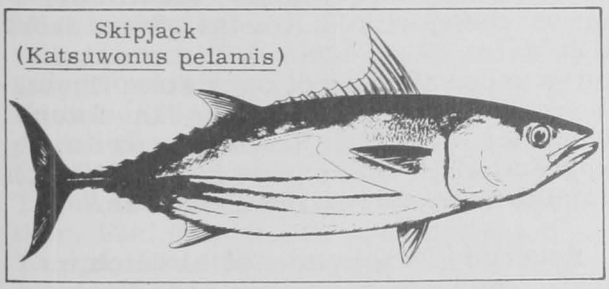
In addition to the oceanographic and biological surveys, underwater movies were taken of skipjack during fishing operations. The Honolulu laboratory is the first to successfully record on film the behavior of the skipjack in their natural environment. These records will be studied in order to understand more fully the behavior of the tunas.

During the cruise flagline fishing was carried out and net tows were made to determine the kinds and abundance of marine animals to be found in the various types of ocean water encountered during the cruise.

* * * * *

SKIPJACK TUNA LANDINGS IN HAWAII INCREASE ACCORDING TO PREDICTION:

In March 1959 a prediction was made by the fisheries biologists of the U. S. Bureau of Commercial Fisheries' Honolulu Laboratory that the 1959 landings of skipjack tuna in Hawaii would be better



Skipjack
(Katsuwonus pelamis)

than those for an average season. Landings (preliminary figures) for the first 9 months of 1959 amounted to 9.8 million pounds as compared with 8.6 million pounds landed in a similar period of 1958. Thus, it seems that the prediction was essentially satisfied. By the method of prediction it would have been anticipated that both the 1957 and 1958 landings would fall substantially below normal, and such was the case; the 1957 landings through September were 5.2 million pounds and those of 1958, 6.4 million pounds. As the prediction was based on environmental changes alone, a look at some of the characteristics of the stock of skipjack available to the Hawaiian fishery was suggested. The first characteristic chosen for such study was the pattern of the distribution of fish sizes in the landings at the Honolulu tuna cannery.

In a normal fishing season, the live-bait fishermen purposely bypass schools of the smaller skipjack in order to fish the more preferred size, the 18-22 pound fish. The larger, 28-32 pound fish are less desirable as they are "two-pole fish," and two-pole fishing has the effect of reducing the number of fishermen by one half.

The skipjack fishery in Hawaiian waters is seasonal with the bulk of the annual landings made between May and September and with a peak as a rule during July. A large percentage of the fish caught during these months are normally 18-22 pounds (70-75 cm.) with lesser weights of small fish, 4-8 pounds (45-55 cm.) and of large fish, 28-32 pounds (80-83 cm.). During the off-season the majority of the skipjack landed at the Honolulu cannery consist of the smaller 4-8 pound size.

Beginning in August 1959 length measurements of skipjack were taken on board fishing vessels during unloading at the Honolulu cannery. Some 25 fish from each of the schools identifiable in the catch were measured. Other data, such as numbers of schools sighted, the number consisting of small fish and not fished, the area of catch, were recorded for each vessel.

The results to the end of September show a distribution of size among the catch that is different from previous observed distributions. A group of fish from 24 to 31 pounds in weight dominated the catch during August and September, as compared with an expected dominant group at 18-22 pounds. Furthermore, the middle-size group, normally 18-22 pounds, was represented during August by a group from 11-16 pounds and during September the mode for this group could not be identified. The small-size group was present in about the expected proportions.

Although data are very inadequate as yet, it is interesting to speculate on the reason for these results; 1958 was a poor season. If this resulted from low availability, i.e., the "season fish" (18-22 pounds) were elsewhere, these fish would not have been removed from the population and, thus, one year later (1959), would dominate. Another possibility is that there was a comparatively low survival of eggs and larvae during the natal year of the 1959 "season fish," in turn resulting in a low abundance of those fish in Hawaiian waters in 1959. Several years' additional length frequency data, along with additional corollary life history, migration, and environmental data are necessary before it will be possible to do more than speculate concerning the causes of these year-to-year variations in size groups.

Crabs

FUTURE BLUE CRAB RESEARCH PROGRAMS DISCUSSED AT VIRGINIA MEETING:

The Blue Crab Committee of the Atlantic States Marine Fisheries Commission, with representatives from Maryland, Virginia, North Carolina, South Carolina, Florida, and the U. S. Bureau of Commercial Fisheries, met during the week of September 14, 1959, at the Virginia Fisheries Laboratory, to discuss future blue crab research to be conducted by Federal, state, and private agencies along the Atlantic coast.

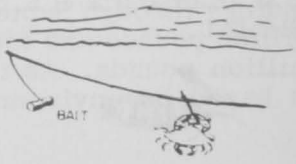
Maryland packers have been greatly concerned by the scarcity of crabs in their section of the Chesapeake Bay all summer. They question whether the present laws are in harmony with the findings of research biologists. Although Virginia packers have not handled as much crab meat this year as in some previous years, they do not believe that this summer's crop has been much below average.

The Committee unanimously recommended that future biological investigation of the blue crab be directed at ascertaining the causes for these serious fluctuations in abundance. For a number of years, biologists at the Virginia Laboratory have been studying the hydrographic, biological, and other factors which affect the survival of larval and juvenile crabs both in Chesapeake Bay and its many tributaries.

One of the outstanding needs of the scientists is to be able to measure accurately the marketable crop produced from each year's spawning. In order to do this, they must determine the size, sex, and age composition, and the spawning history of crabs in the commercial catch. They must also be able to measure the amount of effort required to catch a definite number of crabs.

Virginia's marine laboratory is currently carrying on an extensive tagging program to determine the movement of crabs within each river system and also the movement of crabs from one river to another or to the Bay. The chief crab biologist at the Virginia Fisheries Laboratory stated: "We are extremely interested in discovering the contribution made by the stocks of crabs in the Rappahannock, York, James, and Back rivers to the winter crab fishery which develops out in the Bay each winter. This information, along with knowledge gained from other areas of research, will permit a better understanding of population fluctuations, and permit us to predict the future abundance of crabs. Research now in progress will also provide information on which to base corrective measures."

Records of the commercial catch indicate that there have been wide fluctuations in the number of pounds of crabs landed each year, but since 1929 the total catch landed in Virginia has exceeded 30 million pounds 12 times. The best catch was in 1950 when over 50 million pounds of crabs were marketed. Although the average year's catch falls below the 30 million mark, crab fishermen have a tendency to remember the good years and think of them as being average. Thus, their concept of average is usually too high.



Fisheries Loan Fund

LOANS APPROVED THROUGH SEPTEMBER 30, 1959:

As of September 30, 1959, a total of 624 applications for fisheries loans totaling $20,432,430 had been received. Of these, 338 ($8,161,863) have been approved, 228 ($6,328,063) have been declined or found ineligible, 51 ($2,280,556) have been withdrawn, and 19 ($3,001,089) are pending. Several of the pending cases have been deferred indefinitely at the request of the applicants. Sufficient funds are available to process new applications when received.

The following loans have been approved between July 1 and September 30, 1959:

New England Area: Boat Fairhaven Corp., New Bedford, Mass., $49,000; Charles S. Mitchell, Jr., Vinalhaven, Maine, $2,000; Peter Condelli, Medford, Mass., $25,000; Risdal & Anderson, Inc., New Bedford, Mass., $47,500.

South Atlantic and Gulf Area: Harry E. Robinson, Key West, Fla., $5,000; Clyde J. O'Daniel, Key West, Fla., $7,441; Billy Jay Brown, Long Beach, Miss., $12,000; Frank W. Scott, Brownsville, Texas, $14,000; H. J. & C. J. Eymard, Cut Off, La., $19,805; T. Irvin Knowles, Key West, Fla., $5,290; Everglades Shrimp Co., Everglades, Fla., $19,645; W. D. Henderson, Rockport, Texas, $24,000; Ralph R. Combs, Marathon, Fla., $9,062; Pioneer Shrimp Co., Tampa, Fla., $32,000; M. L. Frakich, Aransas Pass, Texas, $40,000.

California: Ove A. Holm, Morro Bay, $2,500; Carl Hanken, et al, San Diego, $80,000.

Pacific Northwest Area: Mrs. Anna Ancich, Gig Harbor, Wash., $34,137.

Alaska: Vernon Eckman, Juneau, $1,250; Peter G. Olsen, Kodiak, $9,000.

Hawaii: M. Hamabata & S. Tokumine, Honolulu, $10,000.

Federal Purchases of Fishery Products

DEPARTMENT OF DEFENSE PURCHASES, JANUARY-SEPTEMBER 1959:

Fresh and Frozen Fishery Products: For the use of the Armed Forces under the Department of Defense, 1.8 million pounds (value $0.9 million) of fresh and frozen fishery products were purchased in September 1959 by the Military Subsistence Supply Agency. This was lower than the quantity purchased in August by 16.8 percent, but was 4.7 percent higher than the quantity purchased in September 1958. The value of the purchases in September this year was higher by 7.6 percent as compared with the preceding month and up 2.0 percent from September 1958.

Table 1 - Fresh and Frozen Fishery Products Purchased by the Military Subsistence Supply Agency, September 1959 with Comparisons

QUANTITY				VALUE			
September		Jan.-Sept.		September		Jan.-Sept.	
1959	1958	1959	1958	1959	1958	1959	1958
(1,000 Lbs.)				($1,000)			
1,758	1,679	17,488	17,875	924	906	8,973	10,204

During the first nine months of 1959, purchases amounted to 17.5 million pounds (valued at $9.0 million)--a decrease of 2.2 percent in quantity and 12.1 percent in value as compared with the first nine months of 1958.

Prices paid for fresh and frozen fishery products by the Department of Defense in September averaged 52.6 cents a pound, about 11.9 cents higher than the 40.7 cents paid in August, but 1.4 cents less than the 54.0 cents paid during September 1958.

Canned Fishery Products: Tuna was the principal canned fishery product purchased for the use of the Armed Forces in September 1959. In the first nine months of 1959, purchases of canned tuna were down about 36.4 percent, canned

Table 2 - Canned Fishery Products Purchased by the Military Subsistence Supply Agency, September 1959 with Comparisons

Product	QUANTITY				VALUE			
	September		Jan.-Sept.		September		Jan.-Sept.	
	1959	1958	1959	1958	1959	1958	1959	1958
	(1,000 Lbs.)				($1,000)			
Tuna	370	461	2,502	3,931	162	1/	1,159	1/
Salmon	3	1	18	1,402	3	1/	14	1/
Sardine	4	-	974	93	1	1/	144	1/
Totals	377	462	3,494	5,426	166	1/	1,317	1/

1/Unavailable.

salmon down 98.7 percent, but canned sardine purchases were up tenfold from the same period of 1958. The sharp drop in the purchases of canned salmon from January-September this year is not significant as heavy purchases of this item are usually made in the month of October.

Note: Armed Forces installations generally make some local purchases not included in data given; actual total purchases are higher because it is not possible to obtain local purchases.

Fish Meal

QUICKLIME PROCESSING METHOD DEVELOPED:

A process in which fish meal is prepared from fish or fish waste with the addition of quicklime or slaked lime has been developed. The amount added--not more than 10 percent of the weight of the fish material used--is sufficient to convert the hydrophilic protein material to a gel.

A batch of fish is loaded into a hopper and carried to the inlet of a mill by a conveyer belt. The material receives 5 percent by weight of quicklime from a container with a controllable outlet valve while it is on the conveyer. The mixture is ground down to pass through a 2-in. (5.1-cm.) mesh, the resultant paste thus obtained being transferred to a drying yard, where it is spread out in thin layers and stirred once or twice to accelerate the drying. When dried, it is ground to the required particle size. Oil may be recovered from the fish by solvent extraction before the addition of the lime. It is claimed that this method gives a light-colored, pleasant-smelling product which is relatively cheap to produce (Food Manufacture, Feb. 1958).

Frozen Fish

REFRIGERATED TRUCK HAULING COSTS MAY INCREASE:

Some indication of operating problems in connection with the proposed frozen food code of the U. S. Association of Food and Drug Officials of the United States is already at hand. A prominent motor carrier handling fresh and frozen fishery products in the Pacific Coast States has proposed rate increases on frozen fish from the Pacific Northwest to California. The reason given for the requested increases is that excessive costs of maintaining low temperatures (0° F. or lower at all times) on frozen fish make it more expensive to handle.

Fur Seals

ALASKA FUR-SEAL SKIN HARVEST IN 1959 LOWER:

The fur-seal industry, operated by the U. S. Department of the Interior's Bureau of Commercial Fisheries, began its annual sealing season on the Pribilof Islands, Alaska, on June 27 and ended on August 20, 1959. The Pribilofs normally supply about 80 percent of the world's annual production of fur-seal skins.

Fur seals swimming.

Soon after the season opened, it was evident that 3-year-old seals, which usually make up most of the harvest, were arriving at the Islands in numbers far below normal expectations. The shortage of this year-class became more pronounced as the season advanced. At the conclusion of the sealing operations, only 58,251 skins had been obtained as compared with 78,919 skins harvested in 1958.

The low incidence of 3-year-old animals in 1959, which can be at least partly explained by a record loss of new-born pups on the Islands in 1956, points to a corresponding shortage next year in the appearance of 4-year-olds. A relatively

low loss of young seal pups on the Pribilofs during the summer of 1957, however, gives promise of a more nearly normal harvest of 3-year-old fur seals in 1960.

* * * * *

PRICES FIRM FOR ALASKA FUR-SEAL SKINS AT FALL AUCTION:

At the semi-annual auction sale of Alaska fur-seal skins held in St. Louis, Mo., on October 23, 1959, a total of 24,018 fur-seal skins were sold for $2,479,441, for the account of the United States Government. The skins are the product of the sealing operations of the U. S. Bureau of Commercial Fisheries on the Pribilof Islands.

The annual production of the Pribilof Islands is divided, under treaty, 70 percent to the United States and 15 percent each to Canada and Japan. The United States and Japanese skins, plus lesser quantities of South African and South American skins, all processed and ready for use in garment manufacturing, are disposed of at sales each spring and fall.

Of the three shades of skins auctioned, skins dyed black sold at an average of $109.17, whereas matara (brown) dyed skins brought $99.85, and kitovi (midnight blue) brought $97.65 a skin. The average for all United States skins was $103.23 per skin as compared with an average of $101.46 for the Japanese-owned skins, $44.99 for South African skins, and $51.42 for skins from Uruguay.

Although the average price for United States-owned skins was the highest on record (the average of the previous sale on April 10, 1959, was $99.71[1/]), the prices reflected a slight decline grade for grade. The unusually good quality of the offerings sold at this auction caused the average to be somewhat higher.

1/Revised.

Note: Also see Commercial Fisheries Review, January 1959, p. 30 and June 1959, p. 35.

Great Lakes Fisheries Exploration and Gear Research

EXPLORATORY SMELT FISHING IN LAKE ERIE CONTINUED:

M/V "Active" Cruise 5: During the period August 27-September 6, 1959, the U. S. Bureau of Commercial Fisheries chartered vessel Active continued exploratory smelt fishing operations in Eastern Lake Erie.

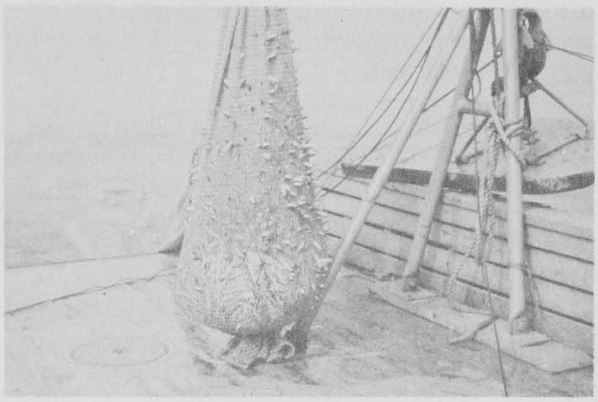


Fig. 1 - Smelt catch from Lake Erie made by M/V Active.

Thirty tows were completed between Fairport Harbor, Ohio, and Sturgeon Point, N. Y., in depths of 5-25 fathoms

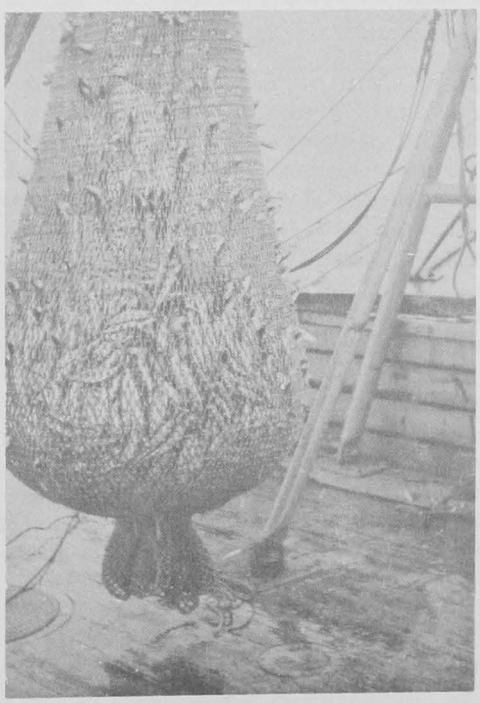


Fig. 2 - Another large catch of smelt from Lake Erie made by M/V Active.

using a 50-foot two-seam balloon trawl with a $1\frac{1}{2}$-inch mesh cod end. Catches ranged from trace amounts to 600 pounds of large smelt per hour. Mixed catches also produced small amounts of burbot, white suckers, and whitefish. Best fishing results were obtained in the 10-13 fathom depths north of Dunkirk, N. Y., and northwest of Erie, Pa.

Large surface schools of emerald shiners were observed daily. Small mid-water echo traces off Dunkirk, N. Y., were unidentified. No seine sets were attempted.

Surface temperatures equaled previously recorded high temperatures for eastern Lake Erie (79.5° F.). Bottom temperatures ranged from 41° F. at 25 fathoms to 76° F. at 5 fathoms. Thermal stratification continued well defined throughout the Eastern and East Central basins.

Note: Also see Commercial Fisheries Review, October 1959, p. 26 and November 1959, p. 35.

Great Lakes Fishery Investigations

WESTERN LAKE ERIE BIOLOGICAL RESEARCH CONTINUED:

M/V "George L." Cruise 7: The U. S. Bureau of Commercial Fisheries research vessel George L. participated in a cooperative survey of oxygen conditions in the Central Basin of Lake Erie in September and continued investigations on young-of-the-year yellow pike (walleyes). Preliminary compilations of trawl catches during a 3-day study of fish populations in one area during August were completed.

Normal dissolved oxygen conditions were present in waters of the Western Basin covered by the George L. during the August cruise. Severe oxygen depletion was, however, observed near the bottom in late August in the Central Basin during surveys by the Ohio Division of Wildlife and Ontario Department of Lands and Forests. A cooperative synoptic survey of dissolved oxygen concentrations in the Central Basin was undertaken in early September to determine the degree and extent of oxygen depletion.

No oxygen was found near the bottom in water 40 feet deep at one station 5 miles north of Sandusky Harbor. Severe oxygen deficiencies of less than 3 parts per million were found in the hypolimnion, which often extended 20 feet above the bottom, in Canadian and United States waters from Sandusky and Wheatley east to Port Stanley and Fairport. Samples of fish and bottom organisms were taken at several locations to compare with samples taken in past years.

Young yellow pike began to appear in trap-net and seine catches of commercial fishermen in the Western Basin. By the end of September these fish averaged about nine inches long and one 10.5-inch fish was observed. The trawling survey of the George L. showed that these young yellow pike are now found in all waters of the Western Basin. They feed on spot-tail minnows, emerald shiners, and young yellow perch.

Intensive around-the-clock trawling at 3 stations, on 4 consecutive days (July 27-30), by the George L. and Madtom near East Harbor was conducted to determine variations in trawl catches over a short period of time. Fifty 10-minute tows captured 174,966 fish of various species. The numbers of young-of-the-year fish taken were: yellow perch 102,450; spot-tail shiner 53,990; trout-perch 3,097; sheepshead 1,713; white bass 1,277; white crappie 659; gizzard shad 339; yellow-pike 79; carp 59; smelt 33; and one each of bullhead, muskellunge, and silver chub. Only 11,267 fish one year old or older were captured and most of them were adult spot-tail shiners and trout-perch. In a period of less than 2 days, the trawl catch of young-of-the-year yellow perch at one station varied from 14 to 19,250 fish per 10-minute tow. During the first 48 hours of trawling, 952 fish in good condition and of various sizes and species were fin-clipped and returned to the water where they were captured. Only 12 of these fish were eventually recaptured in the trawl hauls. Only 9 percent of the perch, 23 percent of the sheepshead, and 21 percent of the bullhead stomachs contained fish.

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WESTERN LAKE SUPERIOR FISHERY SURVEY CONTINUED:

M/V "Siscowet" Cruise 6: Studies were conducted (Sept. 14-21, 1959) by the U. S. Bureau of Commercial Fisheries research vessel Siscowet in Presque Isle Bay of Stockton Island, east of Oak Island, east of Outer Island, west of Outer Island, and southeast of Cat Island. The objectives were to observe the vertical distribution of the various types of chubs (Leucichthys sp.) and to locate young-of-the-year lake trout, whitefish, menominee whitefish, and lake herring (L. artedi).

Oblique gill-net sets were made over known chub grounds to determine the vertical distribution of the various species of chubs. Five $2\frac{1}{4}$-inch (stretched measure) gill nets were fished obliquely from the surface to the bottom at 286 feet. All of the L. kiyi, 60 percent of the L. zenithicus, and 15 percent of the L. hoyi were nearly or entirely ripe.

A gang of five nets ($2\frac{1}{4}$-inch) was set east of Outer Island on a steep bank in water from 20 to 66 fathoms. This set was made to measure the bathymetric distribution of the various species of chubs. All of the L. kiyi, 80 percent of the L. zenithicus, and 3 percent of the L. hoyi were nearly or entirely ripe.

Trawl tows were made at various depths west of Outer Island and southeast of Cat Island. The catches consisted mainly of ninespine sticklebacks, trout-perch, slimy muddlers, and smelt. One young-of-the-year lake trout was captured at 25 fathoms west of Outer Island. A very few young-of-the-year whitefish, menominee whitefish, and lake herring were also captured.

Practically no fish were captured above 18 fathoms in trawl tows made east of Oak Island. A heavy northeast sea the previous day apparently swept the grounds and forced all species into 20-30 fathoms where small numbers of lake trout, pygmy whitefish, L. hoyi, ninespine sticklebacks, smelt, and slimy muddlers were taken.

Surface water temperatures varied from 62.7° F. in Presque Isle Bay to 56.3° F. west of Outer Island.

M/V "Siscowet" Cruise 7: Environmental conditions were studied (Sept. 28-Oct. 7) at three index stations located (1) southeast of Stockton Island, (2) northeast of Bear Island, and (3) east of Pike's Bay. In addition to the fishery and environmental studies at the index stations, trawling operations were conducted west of Outer Island in search of young-of-the-year lake trout, whitefish, menominee whitefish, and lake herring. A six-hour limnological survey was conducted northeast of Bear Island to measure environmental changes which may occur during the day.

Trawl tows were made and standard gangs of gill nets were fished at each index station. Water, plankton, and bottom samples were collected in addition to observations of water temperatures, Secchi-disc readings, and currents.

Very few of the chubs (Leucichthys sp.) appeared ready to spawn as compared to a high percentage of ripe chubs captured at other locations in the Apostle Island area during cruise 6.

Trawl tows southeast of Stockton Island took mainly trout-perch, ninespine stickleback, slimy muddlers, and smelt. Small numbers of lake trout, lake herring, pygmy whitefish, and L. hoyi were also taken.

Trawl tows northeast of Bear Island took many slimy muddlers and ninespine sticklebacks. One hundred L. hoyi and two L. zenithicus were also captured.

Trawl tows east of Pike's Bay took 633 smelt, 203 L. hoyi, with lesser numbers of whitefish, lake trout, trout-perch, slimy muddlers, ninespine stickleback, and burbot.

Trawl tows west of Outer Island were made at depths ranging from 6 to 27 fathoms. The most striking catch was three young-of-the-year (age-group O) lake trout taken in one 15-minute tow in water 17 to 21 fathoms. Other age-group O fish taken included 7 whitefish, 7 menominee whitefish, and about 40 smelt. Eight female pygmy whitefish caught at 27 fathoms appeared to be ripe. There were no males captured. Large numbers of trout-perch, ninespine sticklebacks,

and slimy muddlers were taken at this location.

The environmental survey northeast of Bear Island (29 fathoms) consisted of the collection of plankton and water samples, bathythermograph casts and Secchi-disc readings over a six-hour period. The studies began at 1130 (EST) and were repeated at 1330, 1530, and 1730.

Surface water temperature varied from 55.8° F. east of Pike's Bay to 53.3° F. northeast of Bear Island. Bottom temperature varied from 54.0° F. at Pike's Bay to 41.7° F. northeast of Bear Island.

Note: Also see Commercial Fisheries Review, Nov. 1959, p. 36.

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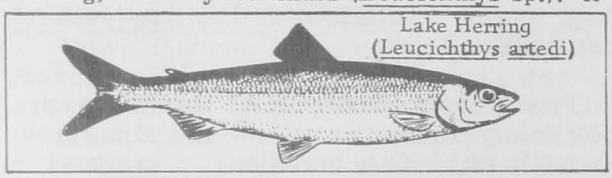
SURVEY OF EASTERN LAKE SUPERIOR CONTINUED:

M/V "Cisco" Cruise 5: Experimental fishing and limnological studies were continued in eastern Lake Superior by the U. S. Bureau of Commercial Fisheries research vessel Cisco. The areas of operation during August 11-25, 1959, were from Marquette, Mich., to Whitefish Bay, and northward to Michipicoten Island.

Standard gangs of gill nets were set at 25, 50, 75, and 100 fathoms off Grand Marais. The catch at 25 fathoms included 26 lake trout, many lake herring, and very few chubs (Leucichthys sp.). A

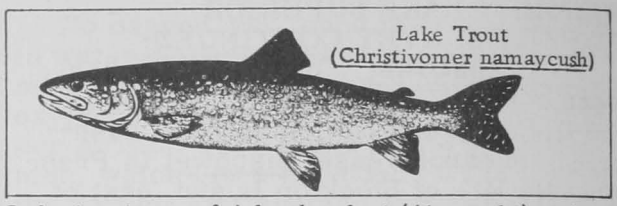


Lake Herring (Leucichthys artedi)

fair catch of L. hoyi and L. reighardi and 3 lake trout were in the 50-fathom set. L. kiyi was abundant at 75 fathoms and a few L. hoyi, L. reighardi, and L. zenithicus were represented. A very light catch at 100 fathoms included 16 L. kiyi, 2 lake herring, and 1 round whitefish. The last-mentioned species had not been previously reported from that depth.

Catches from standard gangs of gill nets set at 25, 35, 50, and 70 fathoms in Whitefish Bay indicate an appreciably larger population of L. hoyi as compared with the Grand Marais area. This species dominated the catch at 25 fathoms, and together with L. reighardi made up most of the catch at 35, 50, and 70 fathoms. The catch at 70 fathoms, however, was very light. Small numbers of L. nigripinnis and L. zenithicus were caught at the shallower depths. Smelt were common at 25 fathoms, a few deep-water sculpins were caught at 70 fathoms and 2 lake trout were caught at 35 fathoms.

A standard gang of gill nets with 3,600 feet of large mesh (3½ to 6-inch) added was set 25 miles southwest of Michipicoten Island in 50 fathoms.



Lake Trout (Christivomer namaycush)

Lake trout were fairly abundant (41 caught) and chubs were scarce. A 7-pound male siscowet, the only one of this subspecies taken, appeared to be ripe.

Yellow perch and round whitefish were very abundant in a very shallow (2-3½ fathom) gill-net set just outside Munising Bay. Round whitefish and white suckers were numerous in a shallow (5 fathoms) set inside the Bay. The deepest set in the Bay (33-35½ fathoms) produced numerous whitefish and L. hoyi, and a few smelt, burbot, L. nigripinnis, alewives, and lake trout.

Trawling at various depths (14-20 fathoms) in Shelter Bay caught the first young-of-the-year (age-group 0) lake trout (2.3 inches) this year.

Ninespine Stickleback (Pungitius pungitius)

Cottus cognatus was generally abundant and occasional catches were made of ninespine stickleback and pygmy whitefish.

Twenty-seven of the 78 lake trout caught at various locations were tagged and released.

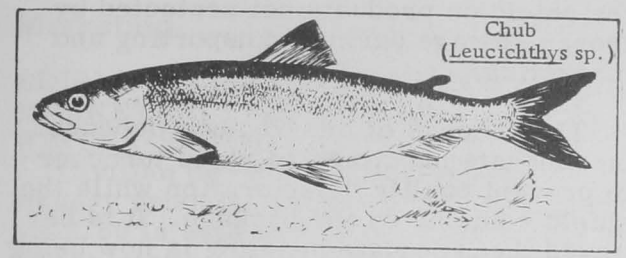
Extreme temperatures of 9.4° C. (48.9° F.) and 20.0° C. (68.0° F.) were recorded at the surface. The surface of the water was warming at all areas. Regular limnological stations off Grand Marais (45 fathoms) and in Whitefish Bay (70 fathoms) were visited.

M/V "Cisco" Cruise 6: The Cisco surveyed (September 2-14, 1959) the Marquette-Keweenaw Bay area, repeating for the most part work of cruises 2 and 4 to observe possible seasonal changes in fish distribution and abundance.

Standard gangs of gill nets were set overnight at 15 fathoms in Shelter Bay; 20, 25, 35, and 50 fathoms off Marquette; 25, 35, 50, and 80 fathoms in Keweenaw Bay; and for two nights at 75 and 100 fathoms off Marquette.

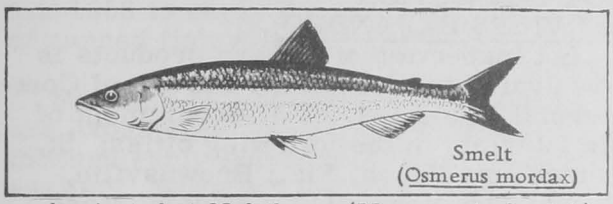
Five lake trout were caught in Shelter Bay, 16 off Marquette (4 at 20 fathoms, 9 at 25 fathoms, and 3 at 35 fathoms), 4 in Keweenaw Bay (3 at 25 fathoms and 1 at 35 fathoms). Nineteen lake trout were marked with "spaghetti" tags and released.

Chub (Leucichthys sp.) catches off Marquette were, as in cruise 4, very light at 25 fathoms (11 taken), and rather light at 50 fathoms (73). The chub catches at 35 fathoms (125), 75 fathoms (484), and 100 fathoms (203) were noticeably heavier than similar ones made during cruise 4, even allowing for the fact that in cruise 6 the sets at 75 and 100 fathoms were for two nights. L. reighardi and L. hoyi constituted the bulk of the catches except at 75 fathoms where L. reighardi and L. kiyi were


Chub
(Leucichthys sp.)

most important, and at 100 fathoms where L. kiyi made up 93 percent of the catch.

In Keweenaw Bay the chub catches were appreciably lighter than during cruise 4, except at 80 fathoms, where the reverse was true. A total of 36 chubs was taken at 25 fathoms, 154 at 35 fathoms, 134 at 50 fathoms, and 62 at 80 fathoms. L. hoyi


Smelt
(Osmerus mordax)

predominated at 25 fathoms (55 percent of catch), 35 fathoms (93 percent), and 50 fathoms (76 percent). L. kiyi was somewhat more numerous than L. hoyi at 80 fathoms. L. reighardi was the second most numerous chub at the 3 shallower depths. Other species caught in the gill nets were L. nigripinnis and L. zenithicus (small numbers in most sets), lake herring (105 weighing 93 pounds in Shelter Bay, few elsewhere), smelt (198 at 20 fathoms off Marquette), burbot (commonest in the shallow sets), longnose suckers, whitefish, and round whitefish (a few of the latter 3 species in Shelter Bay only).

Trawls were towed at various depths from 14 to 42 fathoms in Shelter Bay, 7 to 21 fathoms near Traverse Island in Keweenaw Bay, and 25 to 42 fathoms off Pequaming in Keweenaw Bay. Only four young-of-the-year lake trout were caught in Shelter Bay, as compared with as many as a dozen or more per 10-minute tow taken by the Cisco in the same area during 1953. Only one other age-group 0 lake trout had been caught previously this year. The Shelter Bay drags also took moderate numbers of slimy sculpins, a large number of ninespine sticklebacks at 38-42 fathoms (few at other depths), and an occasional L. hoyi (deeper tows), smelt fry, and pygmy whitefish. Trawl catches off Traverse Island in Keweenaw Bay were similar to the shallower tows in Shelter Bay, except that there were no lake trout. Eight, 7 to 10-inch, lake trout were taken off Pequaming in Keweenaw Bay, all of them hatchery reared. Otherwise the catch composition was about the same as in the deeper tows in Shelter Bay.

Hydrographic stations in Shelter Bay, off Big Bay Point, and in Keweenaw Bay were visited for the third time this year. Surface water temperature generally cooled from about 18° C. (64.4° F.) at the beginning of the cruise to about 15° C. (59.0° F.) at the end. In Keweenaw Bay, however, strong southwest and west winds created an upwelling which temporarily resulted in surface water temperatures of only 5.2° to 10° C. (41.3° to 50.0° F.) over nearly the entire Bay. Extremes during the cruise were 5.2° C. and 19.3° C. (41.3° and 66.7° F.)

Note: Also see Commercial Fisheries Review, Nov. 1959, p. 37.

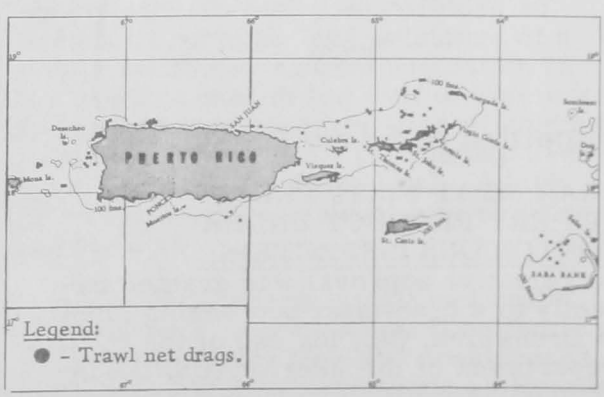
Gulf Exploratory Fishery Program

EXPLORATORY TRAWLING FOR SHRIMP OFF PUERTO RICO AND VIRGIN ISLANDS:

M/V "Oregon" Cruise 62: Extremely poor shrimp trawling conditions were found to exist in the Puerto Rico-Virgin Island area during a 31-day cruise (ended October 17) made by U. S. Bureau of Commercial Fisheries exploratory fishing vessel Oregon. Sixty-six exploratory shrimp trawl drags were made in depths of 17-380 fathoms to evaluate the shrimp stocks of the area.

Approximately 2,000 miles of depth-recorder transects were made over the 300-mile area in an attempt to locate clear bottom, with little success. On the shelf (inside of 50 fathoms), coral, rock, and sponge were encountered on every drag. The "slope" beyond 50 fathoms abruptly drops to 300-500 fathoms in most areas, with rock and coral as principle bottom constituents. Sixteen trawls were torn up during the survey and minor gear damage occurred on most of the remaining drags. Trawling stations were made in all locations that depth-recorder tracings indicated a slight hope of getting the gear back.

Pink spotted shrimp were found in small numbers in 30-45 fathoms along the northern edge of the shelf. Drags of



M/V Oregon Cruise 62 (September 16-October 17, 1959).

5-10 minutes would produce up to two pounds of shrimp (size 26-30 and 41-45 shrimp to the pound). Longer drags in this depth range resulted in gigantic sponge catches or tear-ups.

A very restricted smooth area in 150-300 fathoms off Aguadilla, Puerto Rico, was explored for royal-red shrimp. Not a single specimen was caught, although the smaller deep-water shrimp, Penaeopsis megalops (usually associated with royal-red shrimp in the known areas), was present in small numbers. Elsewhere, deep-water trawling produced only a small number of another species of penaeid shrimp (Aristaeus).

Eight drags were made along the northern edge of Saba Bank in depths of 19-380 fathoms. The only shrimp caught were 5-count scarlet shrimp in 360-380 fathoms at a rate of about 10 pounds per hour.

Small numbers of red snappers were caught in most successfully retrieved drags from inside of 50 fathoms. Other food fish were absent in the catches. Depth-recorder tracings indicated the presence of small school fish in several locations north of the Virgin Islands, hovering over bottom that was impossible to trawl with the gear on hand.

Numerous large schools of tuna were observed along the northeastern edge of the shelf. Several trolling captures yielded blackfin tuna ranging from 3-16 pounds each. All of these fish had been feeding on small Spanish sardines (Sardinella anchovia). In Mona Passage, scattered large tuna were observed on one occasion.

Inspection of Fishery Products

CRAB MEAT FIRST FRESH FISHERY PRODUCT UNDER CONTINUOUS INSPECTION:

Tentative approval was granted recently to a crab-meat processing plant in Brunswick, Ga., for use of the U. S. Department of the Interior (USDI) continuous inspection shield on unfrozen crab meat. This marks the first use of the shield on products not protected by frozen storage during transporting and marketing.

The success of this venture depends on adequate handling and rapid turnover to prevent quality deterioration while the shield remains on the package. It is believed that adequate handling is now being practiced commerciallly on crab meat to an extent which will allow the use of the shield.

* * * * *

LOT INSPECTION SERVICES EXPANDED:

Lot inspection of fishery products is now available through the Bureau of Commercial Fisheries, U. S. Department of the Interior, in the following cities: St. Petersburg Beach, Fla.; Brownsville, Texas; New York, N. Y.; Boston, Mass.; Bellingham and Seattle, Wash.; and San Francisco, Calif. Requests for inspection service or information on both lot and continuous inspection services offered by the U. S. Bureau of Commercial Fisheries may be obtained through the inspectors located in these cities.

Inspection criteria include Federal, State or company specifications as well as the official U. S. Department of the Interior's Standards for grades of processed fishery products. Bids and purchase specifications requiring Government inspection and certification of fishery products should state "USDI Inspection and Certification Required." The inspector may be requested to certify the product lot as to (1) quality or grade, (2) conditions, or (3) quality and condition, following his examination. In addition, the inspector may be requested to check the loading and to provide an official certificate of loading for a specific lot of fishery products being shipped. The grade certificate and stamp "Officially Sampled" in conjunction with the date on the shipping cases constitute an assurance of the quality of the product when it was forwarded. The costs of these inspection services average $6 per hour, including travel time from the office.

Marketing

EDIBLE FISHERY PRODUCTS MARKETING PROSPECTS, WINTER-SPRING 1959/60:

Civilian per capita consumption of fishery products in the winter-spring of 1959/60 is expected to be about the same as the year-earlier rate. Consumption of frozen products may be up a little; the rate for canned fish will be lower. Retail prices of frozen fishery products well into spring 1960 are expected to average somewhat lower than the relatively high ones which prevailed from fall 1958 to early spring 1959, but those of canned fish will be a little higher.

Supplies of edible fishery products are expected to be somewhat lower through early spring 1960 than a year earlier. More of the frozen commodities will likely be available than a year earlier, but supplies of fresh fish will be seasonally light until next spring. Because of reduced output in 1959, supplies of the seasonally-packed major canned fish (principally salmon, Maine sardines, and California sardines) will be lower than a year earlier at least until the 1960 packs start moving to market after mid-1960. Output of canned tuna in 1959 was slightly below the record 1958 pack, but tuna is packed on a year-round basis.

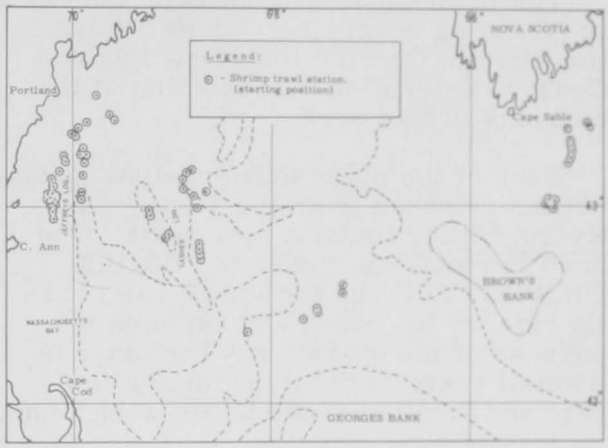
Imports of fresh and frozen fish and shellfish in the next several months will likely be close to the year-earlier high level, but those of canned fish may be lower. Exports of edible fishery products from the United States through mid-1960 will likely be smaller than in the same part of 1958/59 because of reduced supplies of canned salmon and California sardines (pilchards).

This analysis appeared in a report prepared by the Agricultural Marketing Service, U. S. Department of Agriculture, in cooperation with the Bureau of Commercial Fisheries, U. S. Department of the Interior, and published in the former agency's November 5, 1959, release of The National Food Situation (NFS-90).

North Atlantic Fisheries Exploration and Gear Research

GULF OF MAINE SHRIMP STOCKS SURVEYED:

M/V "Delaware" Cruise 59-11: Commercial concentrations of ocean pink shrimp (Pandalus borealis) were found in the deep water areas surveyed by the U. S. Bureau of Commercial Fisheries exploratory fishing vessel Delaware in the Gulf of Maine.



M/V Delaware Cruise 59-11 (September 8-17, 1959).

During the September 8-17, 1959, cruise 71 drags were made in the Gulf and off Nova Scotia. The areas surveyed ranged in depth from 75 to 160 fathoms and included a number of mud-bottom basins. A standard 40-foot Gulf shrimp trawl was used as sampling gear on 66 of the exploratory tows. Five drags were made with a standard 100-foot Gulf shrimp trawl in the Jeffreys Ledge area. The most productive area was found to be west of Jeffreys Ledge in 90 to 105 fathoms where the best catch yielded 35 pounds of shrimp. The existence of a widely scattered shrimp population in the western part of the Gulf of Maine was indicated by small quantitites of shrimp in most of the drags. The shrimp averaged 34 per pound (heads on). A high percentage of the shrimp were egg-bearing females.

On several drags, small red crabs (Gervon sp.?) were abundant; collections of these and other fish and crustaceans (including shrimp) were made by Bureau personnel and cooperating scientists from Boston University.

Bottom temperatures were taken at selected stations. Drift bottles were released in cooperation with the Woods Hole Oceanographic Institution.

Ocean Currents

COAST AND GEODETIC SURVEY INITIATES STUDIES OFF NEW ENGLAND COAST:

The U. S. Coast and Geodetic Survey is releasing nearly 2,000 drift bottles in the Atlantic Ocean off the New England Coast to determine the direction of the currents in that area.

Each of the plain soda pop-type glass bottles released from the survey ship Hydrographer contains two cards. One card requests the finder to "BREAK THIS BOTTLE" so the finder can readily remove the cards and explains the purpose of the operation. The other is a small postpaid form asking for the date and location of the bottle when found.

All 2,000 bottles will be released from 10 to 35 miles offshore between the eastern tip of Long Island, N. Y., and Boston, Mass. They are part of a large-scale study of ocean currents and the date and place of release of each bottle will be on file at the Coast and Geodetic Survey's Washington office.

Survey officials hope to have a large percentage of the cards returned although some bottles may find their way via the Gulf Stream to the European side of the Atlantic. As an added incentive for the return of the cards, the finder will be told where the bottle he found originated. The card informs the finder, "You can add to the knowledge of ocean currents by returning the addressed card with the requested information. . . You will receive by return mail, information as to where this bottle was released. Your cooperation in giving accurate information will be of great assistance."

Oysters

LONG ISLAND SOUND SPAWNING AND SETTING OF OYSTERS AND STARFISH:

Observations on the occurrence and distribution of bivalve larvae, in general, and oyster larvae, in particular, have been continued. Contrary to the healthy condition of the oyster larvae reported previously, those collected on August 27 at one station were of dull color and looked unhealthy. Empty larval shells were also found in the plankton. The only mature larvae found on that date were at one station where there were four in a 200-gallon sample. At the station where the heaviest oyster setting was recorded at that time, no mature and only three immature straight-hinge larvae were observed. (Bulletin No. 5, dated September 11, of the Fishery Biological Laboratory of the U. S. Bureau of Commercial Fisheries, Milford, Conn.)

Since June 27, the number of larvae in the plankton samples has remained small. On September 3 only a few were found at two stations, while at one station there were only 24 bivalve larvae, of which none were oysters. In view of the heavy setting at the latter station at that time, the absence of oyster larvae in the samples seems peculiar. A possible explanation of this phenomenon is that the larvae are brought to this point by currents only for brief periods. A continuous collection of samples at the station during 24-hour periods may offer an explanation although, in the past, such attempts did not help much in clarifying the enigma.

The plankton samples collected on September 8 showed a comparatively large number of bivalve larvae at one station, although only one mature oyster larva was found there. In other areas bivalve larvae were not numerous and oyster larvae virtually absent.

It is clear that this year two stations in the Milford area seem to be receiving the heaviest sets. Unfortunately, because of a prevalence of starfish and drills, this section has been virtually abandoned and, as far as we know, no cultch to receive the new set has been planted there. However, because of the promising new chemical method for the control of starfish and drills, which is now under development at our laboratory, we hope to help the industry re-convert this area into productive seed oyster beds. Experiments along these lines have been carried on by the Bureau, some of them in close cooperation with the Connecticut Shell Fish Commission, for quite some time and the results will soon be reported. Several of the largest oyster companies of Connecticut and New York have also offered their cooperation in these studies.

Setting of starfish continues, but is extremely light. The young starfish that set earlier in the summer have grown in inshore areas to considerable size and are capable of attacking the oysters of last year's set, but in Long Island Sound proper, probably because of a lack of food, many of the starfish appear emaciated.

South Atlantic Exploratory Fishery Program

EXPLORATORY SURVEYS FOR NEW FISHERY RESOURCES INITIATED:

A search for new fishing grounds and for species of commercially-valuable fish and shellfish along the South Atlantic coast between North Carolina and Florida was started on August 31, 1959. This is a part of the U. S. Bureau of Commercial Fisheries program of charting potential marine resources as a means of insuring continuous supplies of fishery products.

The project now under way was endorsed for several years by the Atlantic States Marine Fisheries Commission. It has finally materialized through an allocation of about $150,000 for this fiscal year (1960) from funds provided by the Saltonstall-Kennedy Act of 1954, as amended by the Fish and Wildlife Act of 1956.

The exploratory fishing vessel Silver Bay, a 96-foot steel-hulled New England-type trawler equipped with modern electronic navigational and fish-detecting devices, is being used in the survey. The vessel, transferred from the Gulf of Mexico after a two-year red snapper trawling survey, will be based at Brunswick, Ga., for the duration of the program. Brunswick was chosen as a base of operations due to its central geographical position, deep-water port facilities, convenience of cooperation with the Bureau's Fishery Biological Laboratory there, and the resultant savings that can be expected through joint administrative services.

In formulating the operational program, the immediate needs of the commercial fishing industry in those areas have been taken into consideration. Exploratory operations for the present will place primary emphasis on a 5-50 fathom depth range. The cruises will be arranged, insofar as possible, to permit seasonal coverage for all areas. Special effort will be made to determine the availability of shrimp and fish steaks beyond the range of present fishing.

A staff of 3 fishery exploration specialists and 9 skilled fishermen man the vessel. General program and operational supervision is by the Chief, Gulf Fisheries Exploration and Gear Research Section, Bureau of Commercial Fisheries, Pascagoula, Miss.

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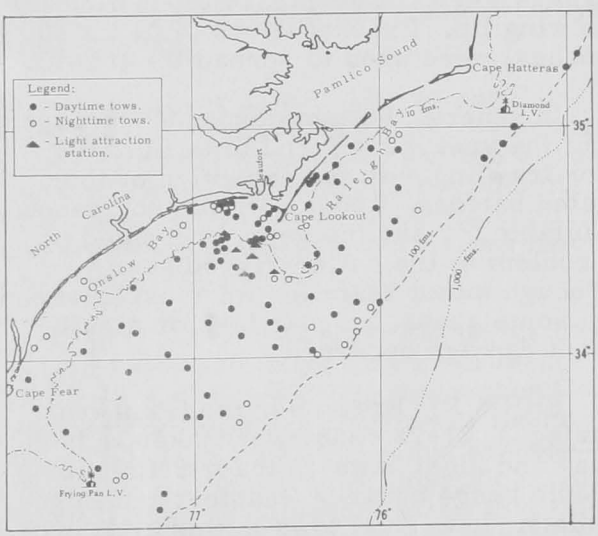
CONTINENTAL SHELF OFF NORTH CAROLINA COAST SURVEYED:

M/V "Silver Bay" Cruise 18: A 29-day exploratory trawl survey of the continental shelf off the coast of North Carolina was completed on October 2, 1959, by the U. S. Bureau of Commercial Fisheries chartered trawler Silver Bay. This work, which was proposed by the Atlantic States Marine Fisheries Commission, is a continuation of the East Coast exploratory program that was initiated in 1957 and is designed to gather additional information concerning the offshore fishery potential of the continental shelf be-



M/V Silver Bay Cruise 18 (August 31-September 25, 1959).

tween Cape Hatteras, N. C., and Cape Canaveral, Fla. The exploratory operation is temporarily based at Brunswick, Ga., to coordinate the exploratory work with the oceanographic research that has been in progress for the past five years at the Bureau's Brunswick Biological Laboratory.

During the trawl survey, 76 day and 33 night exploratory tows were completed

in the 5- to 100-fathom depth range between Cape Hatteras and Cape Fear, N. C. Major effort was expended in the 5-50 fathom depth range between Cape Lookout and Cape Fear at the request of the North Carolina Fisheries Association. Six night-light attraction stations were completed between Cape Lookout and Cape Fear.

Trawling operations were conducted with both shrimp and fish trawls rigged with chain and/or rollers on the foot rope, and fished with standard V-D bridles and ground cables. Tickler chains were used whenever bottom conditions permitted. The shrimp trawls were constructed from 2-inch stretched mesh webbing throughout the body and cod end, and with few exceptions were fished with loop-chain foot rope. The fish trawls were constructed from $4\frac{1}{2}$-inch stretched mesh webbing in the frame and body and 2-inch webbing in the 150-mesh extension and cod end. The fish trawls were roller-rigged from wing tip to wing tip. Bracket doors (8 feet x 46 inches) were used to spread the trawls.

In general, bottom conditions throughout the area were found to be suitable for trawling with the exception of isolated patches of coral, which though not suitable for shrimp gear, presented no problem to the roller-rigged gear. Though minor tear-ups were experienced in some areas, no gear loss or significant damage occurred.

SHRIMP: Brown shrimp (Penaeus aztecus, 21-25 count) were taken in both day and night tows in the 5-8 fathom depth range between Beaufort and Bogue Inlets. Individual tows in this area produced between 5 and 35 pounds of heads-off shrimp per hour. Only scattered individuals were taken west of Bogue Inlet in this depth range. Approximately 45 tows completed in the 10-50 fathom depth range between Cape Fear and Cape Lookout failed to produce catches of brown shrimp.

Large pink shrimp (Penaeus duroarum, 15-20 count) were caught between Beaufort Inlet and Cape Lookout in the 6-10 fathom depth range, but none were taken beyond the 10-fathom curve. Brown and pink shrimp were notably absent from all tows east of Cape Lookout. Night-light attraction stations failed to attract concentrations of shrimp or fish.

Though rock shrimp (Sicyonia sp.) were present in nearly all tows no catches of commercial importance were made.

The results of this phase of the survey strongly suggests that no fishable concentrations of shrimp are to be found beyond the range of the existing fishery during this season.

FISH: Moderate to heavy concentrations of fish consisting mainly of small spot (Leiostomus xanthurus), croakers (Micropogon undulatus), porgy (Stenotomus sp.), and butterfish (Poronotus tricanthus) were located in widely separated areas. Exploratory tows in the 5-12 fathom depth range between Cape Lookout and Cape Fear produced mixed catches of fish at the rate of 2,000-3,000 pounds per one-hour tow. Beyond the 12-fathom curve, production of fish ranged from less than 100 pounds to a maximum of 600 pounds per hour tow.

Between Cape Lookout and Cape Hatteras moderate catches of small-market fish or noncommercial varieties of fish (up to 1,000 pounds per hour) were taken in depths ranging from 10 to 30 fathoms.

Moderate to heavy concentrations of small butterfish were located at 35°20' N. and 74°56' W. in 85 to 105 fathoms. One tow of less than one hour with the $4\frac{1}{2}$-inch mesh fish trawl resulted in a catch of 1,800 pounds of butterfish. Fair catches of squid (Loligo pealii, up to 500 pounds per hour) also were taken in this area in 75 to 95 fathoms. Some difficulty was experienced in working this area due to the extremely steep slope of the shelf.

SCALLOPS: Of special interest was the discovery of large calico scallops (Pecten gibbus) in 17 to 20 fathoms southeast of Core Banks. From 1-3 bushels of these scallops were taken in shrimp trawls. The scallops, which measured approximately 3 inches across the shell, yielded approximately $2\frac{1}{2}$ quarts of meats per bushel. Taste and texture were excellent and compare favorably with the bay scallop (Pecten irradians). No attempt was made to define the extent of

the bed due to the lack of suitable gear. Modified "George's Bank" type scallop dredges will be used on the next cruise in this area to determine the commercial potential.

OTHER FINDINGS: In many areas the vessel's fish finder indicated heavy concentrations of bottom fish. However, trawl sets made on these indications suggested that the traces were made by dense schools of small anchovies (Anchoa sp.) too small to be caught in significant quantities with the existing gear.

Numerous schools of surface fish were observed almost daily and were tentatively identified as thread herring (Opisthonema oglinum) and menhaden (Brevoortia sp.).

Surface trolling was conducted at intervals between stations and resulted in the capture of six "false albacore" (Euthynnus alletteratus) and one white skipjack (Katsuwonus pelamis).

Heavy ground swells preceding Hurricane "Gracie" interrupted the cruise plan and precluded any attempt at surveying the broken bottom area where red snapper were discovered by the research vessel Delaware in February 1958.

South Carolina

FISHERIES BIOLOGICAL RESEARCH PROGRESS, JULY-SEPTEMBER 1959:

Leased Seed Oyster Areas Surveyed: Because of the increased importance of seed oysters, field surveys of three areas in polluted grounds leased from the State for the production of seed oysters was made during this quarter. An area of 45 acres in Jasper and Beaufort Counties on the New and Wright Rivers was examined in mid-August. As yet the lessee has made no attempt to plant cultch for seed oyster production. The area seems well suited for this purpose. At present there are less than 10,000 bushels of oysters within the area.

Another seed lease in the Stono River area (Charleston County) was surveyed. This area is about in the same general condition as the above. It is capable of producing seed oysters, but there are relatively few in the area now. Intensive cultivation is needed for seed production.

The third area, on the edge of Charleston Harbor, was examined during the latter part of August. Here some 400 bushels of seed had been grown on cultch in wire baskets in June and July. In this 50-acre lease the extent of seed oyster production is limited only by the amount of cultch which can be placed overboard. About 200 bushels of large oysters were removed from this area in September for replanting under special permission of the State Health Department.

There are other seed oyster leases yet to be surveyed. More and more polluted grounds and bottoms which have not been in commercial production of oysters are being leased for seed production. Five oystermen, new to the oyster business in South Carolina, have now either leased or have applied to lease seed oyster grounds.

Shrimp Research: The 50 regular trawl hauls made during July-September 1959 indicated that brown shrimp were only slightly less abundant than during the same period of 1958. White shrimp, on the other hand, were just about twice as numerous.

Under the new Coastal Fisheries Laws which went into effect in May 1959, the Chairman of the Wildlife Resources Commission, on recommendation of Bears Bluff Laboratories, was given greater authority in opening and closing certain sounds and inland waters to shrimp fishing. As a result, from early July through mid-August, the Laboratories' 40-foot survey boat and its crew were constantly busy checking the size of shrimp in those areas. Consequently, three large sounds in South Carolina which ordinarily would not have been opened to shrimp fishing until August 15, were opened 19 days earlier.

Continuous reinspection of the sounds and inland waters indicated that St. Helena Sound needed to be closed again 14 days later because the large shrimp had disappeared and the shrimp in the sound

were generally too small to be marketed profitably.

This opening and closing of restricted areas after studies made by Bears Bluff Laboratories is a step in the direction of good fisheries management, but because of the large areas involved, the considerable distances to be traveled by the research vessel, and the small staff, it imposes considerable strain on the Laboratory in order to keep abreast of this and its other work.

Crab Research: In August, two biologists from the U. S. Bureau of Commercial Fisheries at Beaufort, N. C., together with personnel and crew of Bears Bluff Laboratories, tagged 973 blue crabs in the vicinities of Charleston Harbor and the North Edisto River. As of mid-September only 12 tags had been returned; all from nearby the area of release. Perhaps the lapse of more time will indicate whether the movement of blue crabs in summer is different from that observed in the winter by this Federal-State cooperative tagging program.

Pond Culture: Two experiments being carried out in the salt-water ponds were terminated suddenly on the morning of September 29 when Hurricane Gracie produced tides sufficiently high to completely sweep over the pond dikes. Although there was no structural damage, it will be impossible to tell whether the shrimp and fish in the pond came in or washed out with these hurricane tides.

Sponges

NATURAL SPONGE INDUSTRY TO BE FEATURED IN FILM:

The signing of a contract with the Sponge and Chamois Institute for the production of an industry-sponsored sound-color film which will feature the United States natural sponge industry was announced October 8, 1959, by the U. S. Department of the Interior.

The contract provides that the Bureau of Commercial Fisheries, Fish and Wildlife Service, will produce and distribute the film. Tarpon Springs, Fla., home of the natural sponge industry in the United States, will be the locale of the picture.

Tarpon Springs is a community of Greek-American sponge fishermen. It is rich in the tradition of an old and colorful industry. Filming will start on Epiphany, the day upon which the sponge season traditionally opens with religious and festive ceremonies. Scenes will include sponge divers in action, underwater shots of the sponge colonies, and the picturesque wholesale sponge market. The picture will be 14 minutes in length and will be available on a free loan basis. The production is being financed by the natural sponge industry.

The natural sponge has several specialized uses. About one fourth of the output is used by the pottery industry. Professional painters, decorators, and cleaners use about half of the annual production. Householders and various amateur users take the rest.

The industry was established in Tarpon Springs in 1849. Its peak production was 486,000 pounds in 1936. A blight which started in 1938 and which persisted for a number of years all but ruined the resource. In recent years sponge production has been increasing.

Standards

PROPOSED STANDARDS FOR FROZEN RAW HEADLESS SHRIMP REVIEWED AT MEETINGS:

Four open meetings were scheduled in October and November for full discussion of possible grade standards for frozen raw headless shrimp. The National Fisheries Institute Technology Division arranged these meetings in order to assure expeditious development of practical standards through effective industry-government cooperation. On the basis of its recent canvass of the industry, the Technology Division recommended to the U. S. Bureau of Commercial Fisheries that an attempt be made to develop these standards. Bureau technologists compiled a first draft for consideration by the industry. The use of the standards

for grading samples of frozen shrimp were to be demonstrated at the meetings.

U. S. Foreign Trade

EDIBLE FISHERY PRODUCTS, AUGUST 1959:

Imports of edible fresh, frozen, and processed fish and shellfish into the United States during August 1959 decreased by 8.0 percent in quantity and 16.3 percent in value as compared with July 1959. The decrease was due primarily to lower imports of groundfish fillets (down 6.5 million pounds), frozen other tuna (down 3.3 million pounds), frozen shrimp (down 2.8 million pounds), and lobsters (down 2.9 million pounds), and to a lesser degree, a decrease in the imports of canned tuna in brine and fresh and frozen salmon. The decrease was partly offset by a 2.4-million-pound increase in the imports of frozen albacore tuna and other fillets (up 0.4 million pounds).

United States Foreign Trade in Edible Fishery Products, August 1959 with Comparisons

Item	Quantity			Value		
	August		Year	August		Year
	1959	1958	1958	1959	1958	1958
	(Millions of Lbs.)			(Millions of $)		
Imports:						
Fish & shellfish:						
Fresh, frozen, & processed 1/ . . .	85.9	91.0	956.8	22.6	25.2	278.4
Exports:						
Fish & shellfish:						
Processed only 1/ (excluding fresh & frozen)	4.6	2.5	41.2	1.6	0.9	15.6

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

Compared with August 1958, the imports in August this year were down by 5.6 percent in quantity and 10.3 percent in value due to lower imports of frozen albacore and other tuna (down 7.4 million pounds), fresh and frozen salmon (down 3.0 million pounds), and frozen shrimp (down 1.5 million pounds). Compensating, in part, for the decreases was an increase of about 1.4 million pounds in the imports of fillets other than groundfish and canned salmon (up 0.6 million pounds).

United States exports of processed fish and shellfish in August 1959 were lower by 26.9 percent in quantity, but higher by 14.3 percent in value as compared with July 1959. Compared with the same month in 1958, the exports this August were higher by 85.1 percent in quantity and 77.8 percent in value. The higher exports in August this year as compared with the same month in 1958 were due to better stocks of California sardines available for export to foreign markets.

* * * * *

GROUNDFISH FILLET IMPORTS, SEPTEMBER 1959:

During September 1959, imports of groundfish (including ocean perch), classified as fillets, into the United States amounted to 6.3 million pounds, according to data obtained from the U. S. Bureau of Customs and published by the Bureau of Commercial Fisheries. However, since September 15, 1959, fish fillet blocks are being classified under a different category and are not included with the fillets as previously. Thus imports including fish blocks would be much higher in September 1959, but exact data won't be available until later.

During the first nine months of 1959, total imports of groundfish and ocean perch classified as fillets (but not including fish fillet blocks since September 15) into the United States totaled 126.1 million pounds.

Note: See Chart 7 of this issue.

* * * * *

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 1959 at the 12½-percent rate of duty is 52,372,574 pounds. Any imports in excess of the quota will be dutiable at 25 percent ad-valorem.

Imports from January 1-October 31, 1959, amounted to 43,114,352 pounds, according to data compiled by the Bureau of Customs. January 1-October 31, 1958, a total of 42,349,036 pounds had been im-

ported. The quota for 1958 of 44,693,874 pounds was reached on November 20, 1958.

U. S. Production of Fish Sticks and Portions, July-September 1959

The United States production of fish sticks in the third quarter of 1959 was 13.0 million pounds and fish portions totaled 8.6 million pounds. This was a drop of 1.3 million pounds, or 9 percent, in fish sticks, but a gain of 3.4 million pounds, or 65 percent, in portions as compared with the same quarter of the previous year.

Cooked fish sticks (11.8 million pounds) made up 91 percent of the total fish-stick production. The remaining 1.2 million pounds, or 9 percent, consisted of raw fish sticks. A total of 8.2 million pounds of breaded fish portions (of which 7.1 million pounds were raw) and nearly 0.5 million pounds of unbreaded portions was processed during the third quarter of 1959.

The Atlantic Coast was the principal area in the production of both fish sticks and portions with 10.8 and 4.4 million pounds, respectively.

During the first nine months of 1959, a total of 45.0 million pounds of fish sticks was produced--an increase of less than 1 percent as compared with the corresponding period of 1958. Fish portions (26.1 million pounds) were up 72 percent over the nine-months period of 1958.

Table 1 - U. S. Production of Fish Sticks by Months, July-September 1959[1/]

Month	Cooked	Raw	Total
	(1,000 Lbs.)		
July	3,477	292	3,769
August	3,560	295	3,855
September	4,752	592	5,344
Total 3rd. quarter 1959	11,789	1,179	12,968
Total 3rd. quarter 1958	12,855	1,405	14,260
Total first 9 months 1959	41,223	3,758	44,981
Total first 9 months 1958	40,766	4,202	44,968

1/Preliminary.

Table 2 - U. S. Production of Fish Sticks by Areas, July-September 1958 and 1959

Area	1959[1/]		1958[2/]	
	No. of Firms	1,000 Lbs.	No. of Firms	1,000 Lbs.
Atlantic Coast States	24	10,812	21	11,329
Interior and Gulf States	6	1,216	4	1,704
Pacific Coast States	9	940	11	1,227
Total	39	12,968	36	14,260

1/Preliminary.
2/Revised.

Table 3 - U. S. Production of Fish Sticks by Months, 1955-1959

Month	1959[1/]	1958[2/]	1957	1956	1955
			(1,000 Lbs.)		
January	6,316	5,471	4,261	4,862	5,345
February	6,394	5,925	5,246	5,323	5,794
March	5,622	5,526	5,147	6,082	7,205
April	4,708	4,855	4,492	3,771	5,953
May	4,398	4,229	3,380	3,873	4,879
June	4,575	4,702	3,522	3,580	5,392
July	3,769	4,574	3,821	3,153	4,340
August	3,855	4,358	4,643	4,166	4,520
September	5,344	5,328	4,861	4,085	4,535
October	-	5,485	5,162	5,063	5,261
November	-	5,091	4,579	4,585	4,946
December	-	5,359	4,014	4,019	4,876
Total	-	60,903	53,128	52,562	63,046

1/Preliminary. 2/Revised.

Table 4 - U. S. Production of Fish Portions by Months and Type, July-September 1959[1/]

Month	Breaded			Unbreaded	Total
	Cooked	Raw	Total		
			(1,000 Lbs.)		
July	216	1,903	2,119	127	2,246
August	291	2,353	2,644	171	2,815
September	593	2,808	3,401	182	3,583
Total 3rd. quarter 1959	1,100	7,064	8,164	480	8,644
Total 3rd. quarter 1958	754	4,085	4,839	403	5,242
Total first 9 months 1959	3,731	20,530	24,261	1,851	26,112
Total first 9 months 1958	2,472	11,330	13,802	1,389	15,191

1/Preliminary.

Table 5 - U. S. Production of Fish Portions by Areas, July-September, 1958 and 1959

Area	1959[1/]		1958	
	No. of Firms	1,000 Lbs.	No. of Firms	1,000 Lbs.
Atlantic Coast States	23	4,398	15	2,902
Interior, Gulf, and Pacific Coast States	12	4,246	7	2,340
Total	35	8,644	22	5,242

1/Preliminary.

Table 6 - U. S. Production of Fish Portions by Months, 1958-1959

Month	1959 1/	1958
	(1,000 Lbs.)	
January	2,665	1,973
February	2,996	1,254
March	3,203	1,471
April	2,627	2,268
May	2,706	1,478
June	3,271	1,504
July	2,246	2,161
August	2,815	1,516
September	3,583	1,566
October	-	2,560
November	-	1,979
December	-	2,060
Total	-	21,790

1/Preliminary.

United States Fishery Landings, January-August 1959

Landings of fish and shellfish in the United States during the first eight months of 1959 were 11 percent higher than for the same period of 1958.

Menhaden landings, following the upward pattern of the preceding month, accounted for the greater production with an increase of 510 million pounds. Landings of Alaska herring also showed an increase which, with the season over, totaled 110 million pounds--a gain of more than 21 million pounds. Among the food fishes, shrimp landings for the first eight months of 1959 were up over 11 million pounds in the South Atlantic and Gulf States. In New England, the catch of whiting increased by 7 million pounds.

Alaska salmon landings declined considerably (down 99 million pounds) with the fishing season past its peak. Tuna landings dropped 37 million pounds below the same period of 1958--due largely to the tie-up of the tuna fleet. Landings of Pacific sardines since the opening of the season on August 1 totaled only 10 million pounds, due mainly to a price dispute in Southern California. Over 76 million pounds of Pacific sardines were taken by September 30, 1958. Ocean perch landings in New England and Maine herring were down 13 million pounds and 11 million pounds, respectively. The production of industrial fish

Table 1 - United States Fishery Landings of Certain Species for Periods Shown, 1959 and 1958 1/

Species	Period	1959	1958	Total 1958
		(1,000 lbs.)		
Anchovies, Calif.	8 mos.	2,000	6,072	8,148
Cod:				
Maine	7 mos.	2,100	2,191	2,735
Boston	8 "	12,700	11,829	16,183
Gloucester	8 "	2,200	2,198	3,189
Total cod		17,000	16,218	22,107
Haddock:				
Maine	7 mos.	2,100	2,666	3,997
Boston	8 "	52,400	64,616	81,509
Gloucester	8 "	10,200	7,986	9,798
Total haddock		64,700	75,268	95,304
Halibut 2/:				
Wash. and Oreg.	8 mos.	16,200	13,758	16,200
Alaska	8 "	20,400	18,159	19,814
Total halibut		36,600	31,917	36,014
Herring:				
Maine	7 mos.	60,400	71,607	170,977
Alaska (season over)	8 "	110,000	88,801	88,801
Industrial Fish, Maine & Mass. 3/	8 mos.	72,900	89,300	108,869
Mackerel, Calif.:				
Jack	8 mos.	15,800	8,364	21,698
Pacific	8 "	12,800	12,984	24,624
Menhaden	8 mos.	1,528,240	1,018,421	1,544,700
Ocean perch:				
Maine	7 mos.	43,400	44,549	71,068
Boston	8 "	1,900	1,632	2,625
Gloucester	8 "	41,300	53,786	74,951
Total ocean perch		86,600	99,967	148,644
Salmon:				
Wash. 4/	8 mos.	24,500	20,213	54,363
Oreg. 4/	6 "	2,100	3,418	8,179
Alaska	8 "	134,500	233,176	241,255
Sardines, Pacific	9 mos.	10,500	76,100	207,429
Scallops, sea, New Bedford (meats)	8 mos.	12,300	10,679	15,253
Shrimp (heads-on):				
South Atl. & Gulf	8 mos.	118,400	107,100	195,808
Washington	8 "	2,000	5,911	6,730
Oregon	6 "	1,900	1,268	1,523
Alaska	8 "	9,500	4,856	7,862
Squid, Calif.	7 mos.	15,500	3,974	4,864
Tuna, Calif.	to Sept. 19	217,500	254,156	307,378
Whiting:				
Maine	7 mos.	18,300	20,551	23,577
Boston	8 "	500	243	596
Gloucester	8 "	45,100	35,851	58,927
Total whiting		63,900	56,645	83,100
Total of all above items		2,619,640	2,296,415	3,403,630
Others (not listed)		427,360	439,262	1,312,370
Grand total		3,047,000	2,735,677	4,716,000

1/Preliminary.
2/Dressed weight.
3/Excluding menhaden
4/Landed weight.

in that area decreased by 16 million pounds, compared with the first eight months of 1958.

Table 2 - United States Fishery Landings by States for Periods Shown, 1959 and 1958 1/

Area	Period	1959	1958	Total 1958
		(1,000 lbs.)		
Maine	7 mos.	146,100	162,122	316,955
Massachusetts 2/:				
Boston	8 mos.	78,500	91,839	123,764
Gloucester	8 "	162,500	153,564	230,218
New Bedford	8 "	78,100	80,541	111,669
Provincetown	8 "	17,100	14,100	25,754
Total Mass.		336,200	340,044	491,405
Rhode Island 3/	7 mos.	73,200	61,089	103,452
New York 3/	7 "	23,000	24,800	42,063
New Jersey 3/	8 "	37,800	32,777	50,933
North Carolina 3/	8 "	41,700	40,849	54,866
South Carolina 3/	8 "	8,800	9,409	15,359
Georgia	8 "	11,900	11,612	20,066
Florida 3/	8 "	85,300	95,073	158,724
Alabama	7 "	7,700	5,395	10,343
Mississippi 3/	7 "	10,600	8,002	82,476
Louisiana 3/	5 "	24,600	28,800	75,237
Texas 3/	7 "	26,400	27,324	80,478
Ohio (Mar.-June)	6 "	12,200	12,029	19,145
Oregon 2/	6 "	19,700	26,645	59,467
Washington 2/	8 "	98,000	92,506	164,987
California:				
Certain species 4/	8 mos.	274,100	361,650	581,199
Other	5 "	35,600	35,931	82,709
Total Calif.		309,700	397,581	663,908
Rhode Island, Middle Atlantic, Chesapeake, South Atlantic, and Gulf States (menhaden only)	8 mos.	1,499,700	1,014,628	1,540,867
Alaska:				
Halibut 5/	8 mos.	20,400	18,159	19,814
Herring (season over)	8 "	110,000	88,801	88,801
Salmon	8 "	134,500	233,176	241,255
Shrimp	8 "	9,500	4,856	7,862
Total of all above items		3,047,000	2,735,677	4,308,463
Others (not listed)		6/	6/	407,537
Grand total		6/	6/	4,716,000

1/Preliminary.
2/Landed weight.
3/Excluding menhaden.
4/Includes catch of anchovies, jack and Pacific mackerel, Pacific sardines, squid, and tuna. Data on tuna are for the season to September 19; data on squid are for first seven months.
5/Dressed weight.
6/Data not available.
Note: Data principally represent weight of fish and shellfish as landed except for mollusks which represent the weight of meats only.

Wholesale Prices, October 1959

The October 1959 wholesale price index (121.1 percent of the 1947-49 average) for edible fishery products (fresh, frozen, and canned) was down slightly (0.4 percent) from September 1959 because of lower prices for drawn large haddock and fresh and frozen shrimp. But compared to October a year ago, a more substantial decline of 6.6 percent occurred due to lower prices for 10 out of the 17 items making up the edible fishery products index. This year supplies have been more plentiful and normal while last year they were light and below normal.

Due to a temporary improvement in the landings of large drawn haddock at Boston during mid-October 1959, good supplies of frozen halibut, and a slight improvement in Great Lakes yellow pike supplies, the October 1959 drawn, dressed, and whole finfish subgroup price index dropped 3.8 percent from September. But fresh-water whitefish prices were higher. Compared to October a year ago, this October there were price declines of 14.2 percent for large haddock, 7.3 percent for frozen dressed halibut, and 3.0 percent for fresh and frozen king salmon which resulted in a drop of 4.0 percent in the subgroup index. These declines were only partially offset by higher wholesale prices for the fresh-water items.

Fresh processed fish and shellfish prices in mid-October 1959 were up by 3.7 percent from the preceding month. Higher prices for fresh small haddock fillets (up 23.2 percent) and fresh shucked oysters (up 10.2 percent) offset a drop of 6.1 percent in prices for fresh headless shrimp. From October last year to October 1959 the fresh processed fish and shellfish subgroup index dropped 8.5 percent. Lower prices for fresh small haddock fillets (down 15.0 percent) and fresh headless shrimp (down by 24.7 percent) more than offset an increase of 12.5 percent in fresh oyster prices. East Coast oyster supplies were short during the 1958/59 season and this shortage is even more pronounced as the 1959/60 season entered into full swing this October.

Changes in the wholesale price index for processed frozen fish and shellfish from September to October this year were slight (down only 0.7 percent). An increase of about 1 cent a pound in frozen flounder fillet prices failed to overcome a further drop of 2.8 percent in frozen headless shrimp prices at Chicago. Prices for frozen haddock fillets and ocean perch fillets remained unchanged. The drop in the price index for this subgroup from October 1958 to October 1959 was sharper (20.1 percent). Declines in frozen fillet prices ranged from 19.7 percent for haddock fillets, 9.9 percent for ocean perch fillets, and 8.4 percent for flounder fillets. The sharpest drop occurred in the frozen headless shrimp price, which was down 25.8 percent. More imports, generally larger domestic landings, and substantial inventories were responsible for the sharp drop in prices from October 1958 to this October.

Canned fish prices in October 1959 were unchanged from the preceding month. The packing season for Maine sardines and West Coast salmon was about over by the end of the month with a sharply lower pack of canned salmon and about a 10-percent smaller pack for Maine sardines. As of October 29 the estimated pack of California sardines was only 533,920 cases (48 1-lb. cans) a drop of 71.4 percent from the 1,883,720 cases packed to that date in 1958. Tuna canning began to pick up in October following several months of tie-ups because of disputes over ex-vessel prices at California producing and canning centers. The 1959 pack of canned tuna will be high, but not up to the record set in 1958. The October 1959 canned fish price index was up about 1.6 percent from October a year ago because available supplies were lighter. Canned salmon (up 12.6 percent) and canned Maine sardines (up 6.4 percent) more than compensated for price drops of 9.6 percent for California tuna and 12.3 percent for California sardines.

Table 1 - Wholesale Average Prices and Indexes for Edible Fish and Shellfish, October 1959 With Comparisons

Group, Subgroup, and Item Specification	Point of Pricing	Unit	Avg. Prices 1/ ($)		Indexes (1947-49=100)			
			Oct. 1959	Sept. 1959	Oct. 1959	Sept. 1959	Aug. 1959	Oct. 1958
ALL FISH & SHELLFISH (Fresh, Frozen, & Canned)					121.1	2/121.6	119.8	129.6
Fresh & Frozen Fishery Products:					134.0	2/134.8	132.8	149.2
Drawn, Dressed, or Whole Finfish:					153.8	159.9	152.2	160.2
Haddock, lge., offshore, drawn, fresh	Boston	lb.	.13	.15	127.9	153.1	109.1	149.0
Halibut, West., 20/80 lbs., drsd., fresh or froz.	New York	lb.	.32	.33	98.5	101.1	107.8	106.2
Salmon, king, lge. & med., drsd., fresh or froz.	New York	lb.	.79	.80	177.2	179.7	179.7	182.6
Whitefish, L. Superior, drawn, fresh	Chicago	lb.	.75	.73	185.9	179.7	158.6	161.1
Whitefish, L. Erie pound or gill net, rnd., fresh	New York	lb.	1.00	.73	202.3	146.7	161.8	182.0
Yellow pike, L. Michigan & Huron, rnd., fresh	New York	lb.	.69	.73	161.8	170.0	193.5	138.4
Processed, Fresh (Fish & Shellfish):					128.9	2/124.3	121.5	140.8
Fillets, haddock, sml., skins on, 20-lb. tins	Boston	lb.	.43	.35	144.6	117.4	125.9	170.1
Shrimp, lge. (26-30 count), headless, fresh	New York	lb.	.63	.67	98.7	105.1	101.1	131.1
Oysters, shucked, standards	Norfolk	gal.	6.75	6.25	167.1	2/151.6	148.5	148.5
Processed, Frozen (Fish & Shellfish):					106.4	107.2	112.3	133.1
Fillets: Flounder, skinless, 1-lb. pkg.	Boston	lb.	.38	.37	99.5	96.8	98.2	108.6
Haddock, sml., skins on, 1-lb. pkg.	Boston	lb.	.33	.33	102.0	102.0	102.0	127.1
Ocean perch, skins on, 1-lb. pkg.	Boston	lb.	.27	.27	108.8	108.8	108.8	120.8
Shrimp, lge. (26-30 count), 5-lb. pkg.	Chicago	lb.	.62	.64	95.3	98.0	106.5	128.5
Canned Fishery Products:					103.4	103.4	102.0	101.8
Salmon, pink, No. 1 tall (16 oz.), 48 cans/cs.	Seattle	cs.	24.50	24.50	127.8	127.8	123.9	113.5
Tuna, lt. meat, chunk, No. 1/2 tuna (6-1/2 oz.), 48 cans/cs.	Los Angeles	cs.	10.80	10.80	77.9	77.9	77.9	86.2
Sardines, Calif., tom. pack, No. 1 oval (15 oz.), 48 cans/cs.	Los Angeles	cs.	7.50	7.50	88.1	88.1	88.1	100.4
Sardines, Maine, keyless oil, No. 1/4 drawn (3-3/4 oz.), 100 cans/cs.	New York	cs.	8.75	8.75	93.1	93.1	93.1	87.5

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

METHOD FOR DETERMINING FRESHNESS OF FISH

A method for determining the freshness of sea fish based on the determination of volatile, permanganate-reducing substances in fish, is stated to be independent of the variety of fish and easily done on whole fish, and fresh or frozen fillets. Air is passed through 5 ml. of test fish pulp, through a safety trap, and into an absorption flask containing either 10 or 20 ml. of 0.02N $KMnO_4$ in 1N NaOH. A 2 ml. aliquot, to which has been added 1 ml. 6N H_2SO_4 and 0.6 ml. 20 percent KI in 0.1N Na_2CO_3 is titrated with 0.00025N $Na_2S_2O_3$ to a starch indicator end point. The following microequivalents were found: 0 in freshly killed fish, 0 to 10 in fresh fish, 10 to 20 for those with first observable changes in quality, greater than 20 for those starting decomposition, and greater than 30 for those showing putrefaction (Die Fischwaren und Feinkostindustrie, April 1958).