TRENDS AND DEVELOPMENTS

Fishing Vessel and Gear Developments

EQUIPMENT NOTE NO. 6--CHAIN BRIDLES AND ACCUMULATORS INCREASE EFFECTIVENESS OF "FALL RIVER" CLAM DREDGES IN DEEP WATER:

Exploratory fishing by State and Federal research agencies and members of the commercial fishing industry revealed the presence of hard clams (Venus sp.) in offshore waters of North Carolina. Several types of mechanical and hydraulic dredges have been used in the past ten years in attempts to produce commercial quantities of the clams, but these attempts have been unsuccessful owing to adverse sea conditions, deep water, and extremely soft mud bottom.

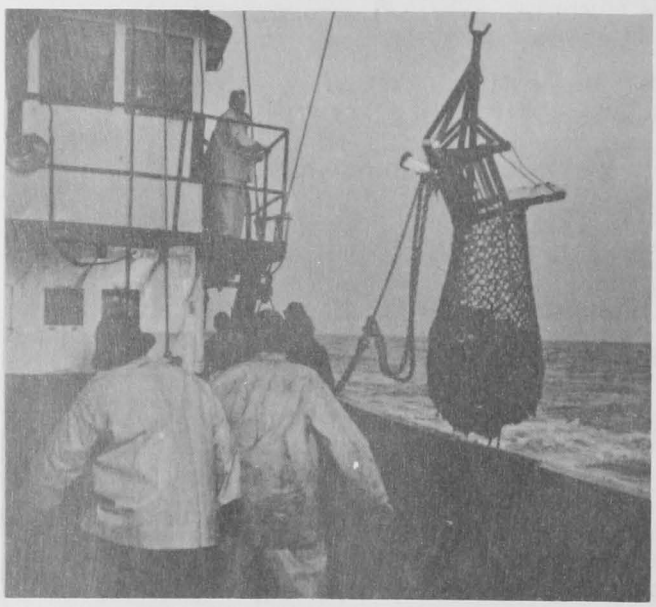

Fig. 1 - Commercial catch ($6\frac{1}{2}$ bushels) of hard clams (Venus sp.) taken by the Silver Bay off Beaufort, N. C., in 6 fathoms. The chain bridle and the accumulator can be seen.

In the fall of 1959, the U. S. Bureau of Commercial Fisheries' chartered exploratory fishing vessel Silver Bay was assigned to part-time clam-dredging operations off the North Carolina coast with a 14-tooth "Fall River" dredge. Initial results were comparable to those obtained by previous investigators in the area. Through experimentation it was determined that the main cause of the poor catches lay in the inherent design and action of the dredge:

1. Efficient dredge operation could only be accomplished with an extremely small ratio of towing-warp length to water depth (warp-scope ratio), because increasing the ratio served only to tip the dredge forward, thereby reducing its catching efficiency (fig. 2, A and B). Efficient operation in deep water, where a large warp-scope ratio is necessary, was therefore precluded.

2. Even with a small warp-scope ratio, the dredge tended to skip or bounce over the surface of the sea bottom in rough seas, on uneven bottom, or when the vessel speed was excessive.

A series of gear studies, undertaken to correct the observed shortcomings of the dredge in deep-water operations, resulted in the adoption of the following modifications (fig. 2C) which increased the catch efficiency of the dredge:

1. The tow point was lowered from the original fixed position on the bail to change the angle of attack and to allow greater control over the angle of attack. This was accomplished by connecting two 9-foot chain slings to the bottom of the vertical steel stiffeners. The chains were shackled together at their forward ends to form a bridle. A third chain was run from the bail to the apex of the chain bridle for controlling the angle of attack. By lengthening or shortening this control chain, the dredge can be made to assume the angle of attack desired for any warp-scope ratio, including the large ratio needed for deep-water work. Determination

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SEP. NO. 607

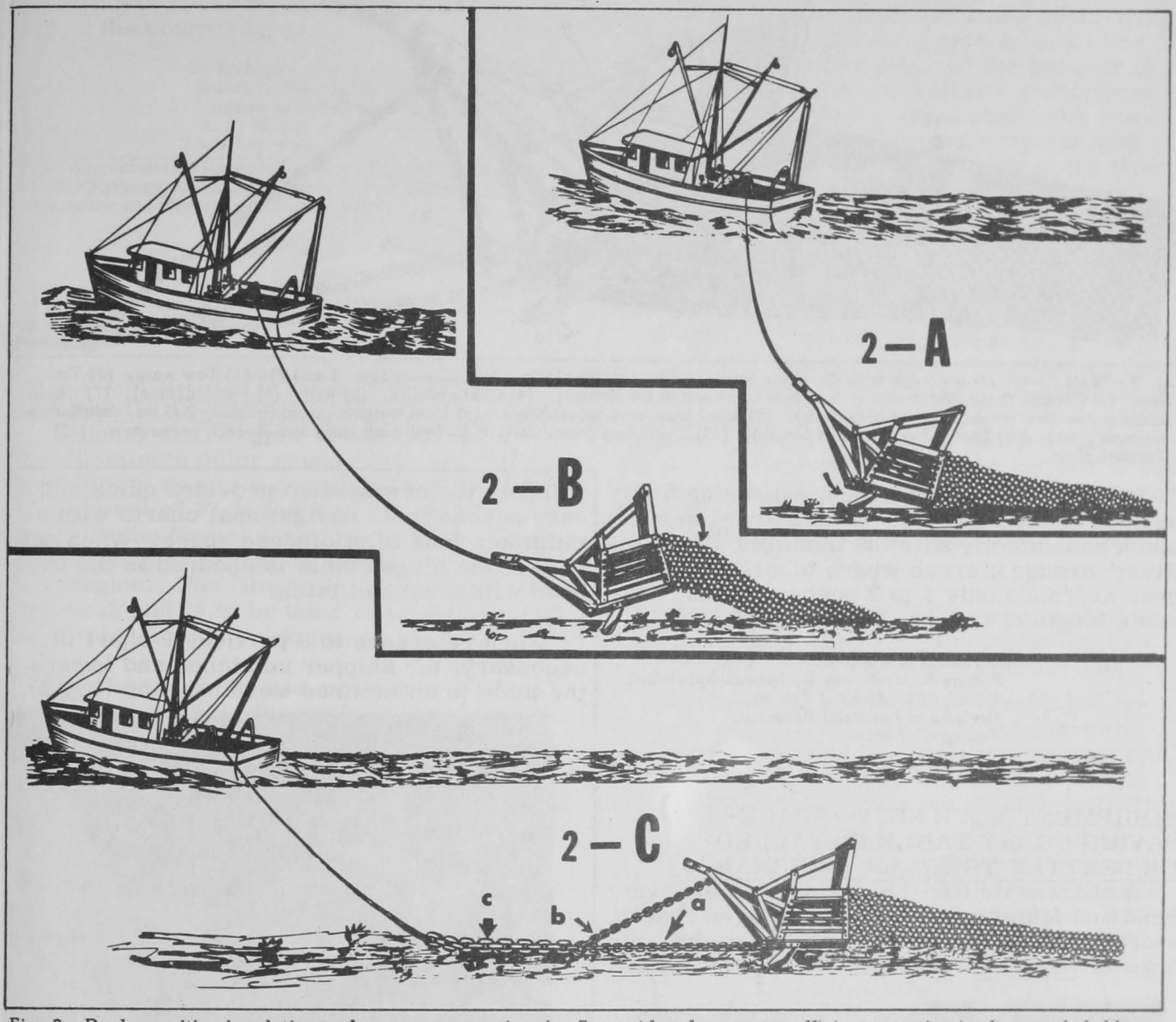

Fig. 2 - Dredge position in relation to the warp-scope ratio: A. Even with a short scope, efficient operation is often precluded because excessive ground speed or sudden surges from wave action cause the gear to skip out of the bottom. B. When the warp-scope ratio is increased, the dredge tips forward. Catching efficiency is thus impaired because of the reduced penetration of the teeth into the bottom. C. Gear modified by the addition of chain bridles (a), control chain (b), and accumulator chain (c) rides at the apparent optimum angle of attack.

of the desired angle of attack was accomplished by correlating the catch with observations of the condition of the runners and teeth of the dredge after each drag. Optimum efficiency is apparently attained when the dredge is on the bottom the full length of the runners.

2. To reduce the tendency of the dredge to skip out of the bottom, nylon towing warp was used in the place of wire, and catches greater than those obtained using wire warp resulted--especially in rough seas or when working uneven bottom. The advantage obtained, however, was offset by the greater risk to the deck crew, excessive manpower requirements, and a more time-consuming operation.

3. A 5-fathom length of $\frac{3}{4}$-inch-diameter chain was then attached between the end of the tow warp and the chain bridle of the dredge to act as an accumulator. This markedly reduced the skipping action of the dredge, thereby permitting a return to wire warp and resulting in a safer, more efficient operation.

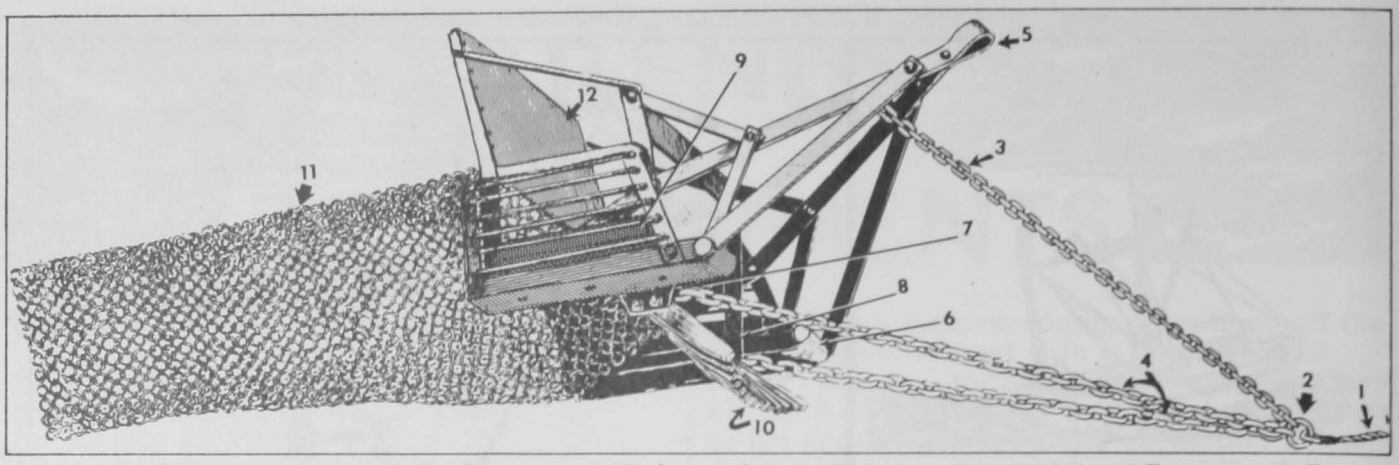

Fig. 3 - "Fall River" clam dredge with the chain towing bridle (accumulator not shown--see figs. 1 and 2): (1) Tow warp. (2) Tow ring. (3) Control chain (for changing the angle of attack of the dredge). (4) Chain bridles. (5) Bail. (6) Runner (shoe). (7) Chain bridle connection point (same on both sides). (8) Steel bar--vertical stiffener. (9) Lead weights (approximately 200 lbs. distributed on both sides). (10) Teeth (7-9 inches in length). (11) Chain bag constructed of $\frac{1}{4}$- by 2-inch rings and $\frac{5}{16}$-inch connectors. (12) Pressure plate.

Commercial-size catches, averaging 6 bushels of clams per 30-minute drag, were taken consistently with the modified "Fall River" dredge in areas where other types of gear averaged only 1 to 2 bushels in the same length of time.

--By Francis J. Captiva,
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EQUIPMENT NOTE NO. 7--SPACE-SAVING CHART TABLE INSTALLED ON SEATTLE TRAWLER "SUNBEAM":

A chart table (fig. 1), mounted on the overhead and featuring electrically-driven chart-storage spools, has been installed on the trawler Sunbeam. Designed by the vessel's skipper, the new system provides quick and easy access to 25 navigational charts with a minimum loss of pilothouse space. When not in use, the hinged table is secured to the overhead with a cabinet latch.

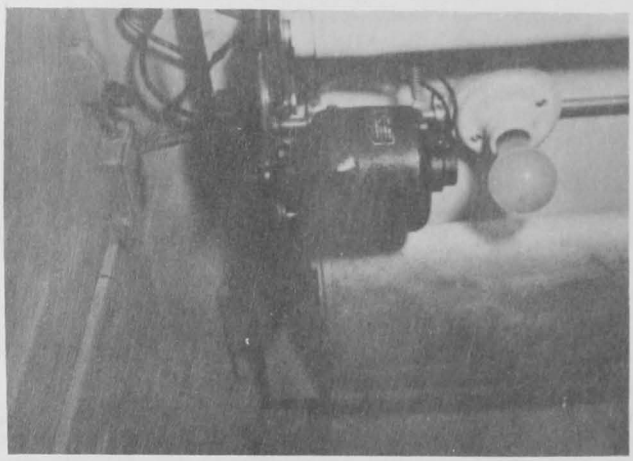

Fig. 1 - Drive motor and storage spools on lower side of the chart table. The chart table is here shown as fixed to the ceiling of the cabin.

When reference to a particular chart is necessary, the skipper unlatches and lowers the table to an inclined work position (fig. 2).

Fig. 2 - Use of chart table in an inclined work position.

As the table moves down from the overhead, a chart lamp is automatically turned on. To move the needed chart into position, a control lever, located under the lower edge of the table, is operated. This turns on the motor and engages a 2-way friction drive, causing charts to unroll from one spool and wind up on the other. Individual charts, fastened to one another with cellulose tape, move across the top of the chart table at a steady

pace of about 6 inches a second. Direction of rolling is reversed by changing the position of the control lever.

--By Richard L. McNeely, Electronic Scientist,
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Note: Appreciation is expressed to Capt. Ward Nickols of the trawler Sunbeam for his cooperation in providing the opportunity to describe and photograph the chart table.

Alaska

NEW FILM ILLUSTRATES KING CRAB FISHING INDUSTRY OF KODIAK REGION:

National distribution is assured for the new 30-minute color sound film, The King Crab Story, recently completed by the Alaska Department of Fish and Game in collaboration with the Kodiak Chamber of Commerce and the king crab fishing industry of the Kodiak region. The film tells the story of the king crab and is to be used to stimulate sales for the industry's products.

The theme of the film emphasizes the contribution the giant king crab has made to the Kodiak Island area. A very few years back the Island's fishing potential was limited to a few months of summer fishing for salmon and halibut. Now the king crab industry goes into full swing around September each year and prospers through the winter providing work for many fishermen and the workers in processing plants. A half dozen processing plants operate on the Island for 8 months of the year.

The film begins with historical references to Kodiak as Alaska's oldest community. The town was established when George Washington was President. A biological sequence shows the work being done by a Departmental research biologist in a program designed to keep the industry functioning on a sustained yield basis. For the first time a king crab shedding its shell is recorded on film.

Other scenes depict the fishing fleet during winter gales and processing plant operations showing how the king crab is prepared for market.

The grand finale of the film is devoted to the annual King Crab Festival staged by the citizens of Kodiak during the month of May.

King crab burgers, skin diving for crabs, a crab-shaking contest, crowning of the King Crab Queen, and the king crab banquet are highlights of the festival. At the banquet in which all residents and visitors participate, prizes are awarded to local chefs who produce the most delectable and original king crab dishes. The final scenes show the fleet departing for the king crab fishing grounds.

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SURVEY OF SUBSISTENCE FISHING MADE ON KUSKOKWIM RIVER:

A 485-mile boat voyage down the Kuskokwim River, which flows into the Bering Sea north of Bristol Bay, to obtain an estimate of the total number of salmon used for dog food and personal use by Alaskan natives was completed this summer, the Commissioner of the Alaska Department of Fish and Game reported. The voyage was made by skiff by members of the Arctic Commercial Fisheries Division staff.

The voyage began at McGrath and ended at Napakiak, about 50 miles from the Bering Sea, visiting all villages and fish camps en route.

Figures obtained provided a valuable index to the Kuskokwim catch and the degree of native dependence on these fishery resources. The survey, which is the first of its kind on the Kuskokwim, will be made annually hereafter.

The biologists found that an estimated 2,132 persons were subsistence fishing on the river. They caught an estimated total of 19,457 king salmon, 70,580 red salmon, and 266,487 chum salmon. Pink salmon, silver salmon, sheefish, whitefish, and smelt figured in the catch to a lesser degree.

The largest number of persons fishing and the largest catches of all species of salmon, except chums, came from the Bethel area between Napakiak and Kwethluk. The greatest chum salmon catch was from the Aniak-Little Russian Mission area.

Much useful information was collected during the trip on the timing of runs and the spawning areas of the various species.

The District Management Biologist, Anchorage, who heads the Arctic area projects said surveys of this kind will provide much needed data on fluctuations in the salmon runs on the Kuskokwim River.

Antarctica

WORM PARASITES OF POLAR FISHES TO BE STUDIED:

A new 30-foot, double-planked research cruiser, specifically designed and built for use in exploring the chilly waters of Antarctica, was loaded on the United States cargo ship Pioneer Isle at Newport News, Va., in mid-October 1960.

W. Stanley Wilson, special staff member of the Virginia Fisheries Laboratory, Gloucester Point, will use the vessel during the next 12 months at Wilkes Station on the fringe of that ice-covered continent around the South Pole. To withstand the grueling conditions of this bleak continent, the Octans (named for a constellation directly above the South Pole) was especially designed and constructed at a cost of over $21,000, including enough spare parts for a year's operation.

The hull is double-planked and reinforced against ice with a quarter-inch steel prow and 1/8" stainless steel sheathing at the waterline. Although it is only 30 feet long, the craft weighs about six tons. A special heating unit will preheat the gasoline marine engine so that the boat may be operated at subzero temperatures, which are common in that part of the world.

Although Wilkes Station is cold when compared to winters in Virginia, it is ice free about seven months of the year. For the other five months the water freezes up to two feet thick, but breaks up periodically under the impact of winds which sometimes gust up to 100 miles per hour.

This open water is the reason for going to Wilkes rather than returning to McMurdo, where previous fishery explorations were conducted. In McMurdo it was necessary to cut through six feet of ice in order to set the traps and it was impossible to do any seining. At Wilkes base it will be possible to operate a trawl net, haul seines, and a variety of other fishing gear. Even during the five winter months it will be possible to collect some material during the period when the ice is broken up by the winds.

The Octans is equipped with a ship-to-shore telephone and will at all times tow a 14-foot aluminum boat with an outboard 18 hp. motor. Both boats can be used together for hauling seines, and the small boat will serve as a lifeboat if necessary. There is a four-man rubber raft aboard, hand flares, and a flare pistol with several hundred rounds of ammunition.

The boat contains berths for two, an auxiliary generator, an alcohol stove, three bilge pumps (one automatic electric, another mechanical, and a third hand-operated), a depth-recorder (fathometer) which records depths up to 1,200 feet.

A special keel cooling system circulates antifreeze through the marine motor. A special guard around the propeller protects it from ice damage, and a power winch on deck will operate trawls, dredges, bottom grabs, and bottom corers. Deck lights are arranged for working at night, which will last 24 hours during the winter months.

One of the problems which will be faced is the freezing up of the nets as they are landed on deck. At such low temperatures the nets become stiff and unpliable almost as fast as they are taken out of the water.

Wilson will leave Gloucester Point to go South in early November, and expects to arrive at Wilkes base in mid-January 1961, which will be early summer in that part of the world. Only one ship a year brings supplies to the 23 people who operate that station. Besides Wilson, who is the only biologist in the group, there will be meterologists and glaciologists. Wilson will remain there for the calendar year.

This expedition to Antarctica is financed by the National Science Foundation to enable Dr. William J. Hargis, Jr., Director of the Virginia Fisheries Laboratory, Gloucester Point, to study the worm parasites of these polar fishes. Hargis is sending Wilson to the Antarctic, Australia, New Zealand, and possibly Madagascar to collect fish parasites and parasites from birds and mammals in these far-flung regions to determine the world-wide distribution of various species.

In addition to collections of fishes, Wilson will collect many invertebrate animals, including crinoids, starfish, crabs, and mollusks. These will be distributed to the Smithsonian Institution and other leading museums in the United States.

California

RECOVERIES OF KING SALMON MARKED IN 1959 TO DETERMINE MIGRATION HAZARDS:

The first marked king salmon released in a California Department of Fish and Game experiment early in 1959 were recovered this year, that Department announced on October 21, 1960.

Young king salmon were released in four lots of 250,000 fish each at Chico, Rio Vista, and San Francisco Bay to determine the effect of downstream migration hazards.

Two lots were released in the Bay; one was trucked to Tiburon from the U. S. Fish and Wildlife Service's Coleman Hatchery, and another lot was trucked to Rio Vista, where the fish were transferred to a live-bait boat and delivered to the release site.

As of the fall of 1960, the marked fish were two years old, weighed 6 to 8 pounds, and were 20 to 26 inches long. Few of the fish were large enough (26 inches) for the commercial catch, but one commercially-caught salmon released at Rio Vista was recovered. In the ocean sport fishery, more were large enough (22 inches) to be landed. Six boated fish and one Rio Vista fish were recovered. In the Sacramento River, two Rio Vista and two Chico kings were caught.

Fish arriving at Coleman Hatchery during the first two weeks of the spawning season included 14 boated fish, 11 from the Rio Vista release, 9 from the Chico release, and 4 fish trucked to Tiburon.

These results are preliminary, but show that fish survived all types of releases and should be available as 3- and 4-year olds in sufficient numbers to make a valid comparison as to what part of the migration to the sea is most hazardous.

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TRAWLING GEAR TESTED ON DUNGENESS CRABS:

M/V "Nautilus" Cruise 60N5-Crab: An experiment with crab trawling gear was conducted (June 25-July 10, 1960), by the California Department of Fish and Game research vessel Nautilus in Bodega Bay, Calif., to develop techniques for catching crabs. Other objectives of the survey were to initiate a standard procedure for random sampling of the fishing grounds; to obtain crab measurements for age and growth studies; and to determine crab shell condition (hard/soft) for life history studies.

A semi-balloon-type otter trawl of three-inch webbing was used in an attempt to catch quantities of Dungeness crabs, Cancer magister. Three daylight drags caught 13 crabs and three night drags yielded 7. Each drag covered approximately one linear mile of the bottom in a ½-hour period.

To determine the effectiveness of traps as compared to trawling, two strings of 18 40-inch traps, without escape ports, were placed in two locations at the sites of four drags. Each set covered about ¼ linear mile and was fished for a maximum of 24 hours. Since 169 crabs were taken by traps and less than 15 by net, it was decided to use traps for sampling.

Age and growth data were obtained from trapped crabs. In all, five strings of 18 traps were set.

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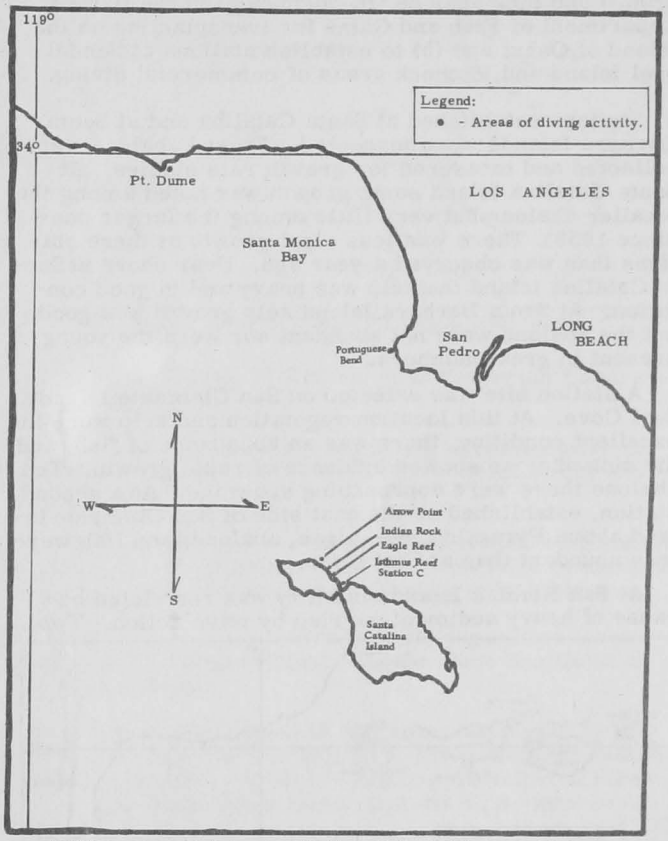
INVESTIGATION OF ABALONE RESOURCES CONTINUED:

M/V "Nautilus" and Diving Boat "Mollusk" Cruise 60N7, 60M2-Abalone: Abalone investigations were continued from July 22-31, 1960, by the California Department of Fish and Game research vessel Nautilus and diving boat Mollusk in waters off Portuguese Bend, Pt. Dume, and Catalina Island. The objectives were (1) to make observations at abalone stations established in 1959; (2) to check other areas for commercial diving activities; (3) to check areas of skin diving; and (4) to collect and photograph in color various species of abalone.

Water conditions along the mainland were the worst encountered in years. A red tide made underwater visibility practically zero. Several dives were made at Portuguese Bend and Pt. Dume but because of opaque water, coastal diving was discontinued.



M/V Nautilus and diving boat Mollusk Cruise 60N7, 60M2-Abalone.

Operations were shifted to the Isthmus at Santa Catalina Island where exploratory and inspection dives were made. On the Isthmus Reef the kelp (Macrocystis) had practically disappeared and the resident pink abalone (Haliotis corrugata) were small with shrunken meats. Several red abalone (Haliotis rufescens) from San Miguel Island, tagged and released on the Isthmus Reef in February 1957, were found at depths of 100 feet. They had moved from shallow water to the deeper, colder waters off the reef. Eagle Reef and Indian Rock areas were also examined and here, also, the thick kelp found on previous dives in 1957 had disappeared.

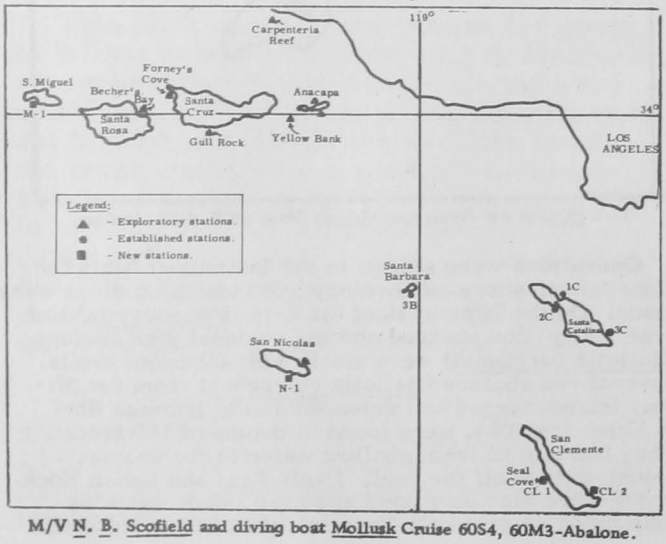
At Arrow Point, kelp and abalone were in approximately the same abundance as in 1957. Apparently the kelp growing along the shoreline of Santa Catalina Island is thick and healthy, while that on offshore reefs (Isthmus Reef, Eagle Reef, and Indian Rock) has practically disappeared. No evidence of commercial diving on the reefs off Santa Catalina Island was found. Several colored photographs were made of live green abalone (Haliotis fulgens) and white abalone (Haliotis sorenseni).

M/V "N. B. Scofield" and Diving Boat "Mollusk" Cruise 60S4, 60M3-Abalone. The investigations were continued (Aug. 3-14 and Aug. 20-30, 1960) by the Department's research vessel N. B. Scofield and diving boat Mollusk in waters off the islands of Santa Catalina, San Clemente, San Nicolas, Santa Barbara, Anacape, Santa Cruz, Santa Rosa and San Miguel, and Carpenteria Reef on the mainland coast. The objectives were (1) to examine established abalone study stations at Santa Catalina and Santa Barbara Islands; (2) to establish stations at San Clemente and San Nicolas Islands; (3) to collect and photograph various species of abalone in color; (4) to collect and ship black (Haliotis cracherodii) and pink abalone (H. corrugata) to the Hawaii Department of Fish and Game for transplanting on the island of Oahu; and (5) to establish stations at San Miguel Island and to check areas of commercial diving.

Stations established at Santa Catalina and at Santa Barbara Islands were inspected. Tagged abalone were collected and measured for growth rate studies. At Santa Catalina Island some growth was noted among the smaller abalone but very little among the larger ones since 1959. There was less algal growth at these stations than was observed a year ago. Near shore at Santa Catalina Island the kelp was heavy and in good condition. At Santa Barbara Island kelp growth was good but the abalone were not abundant nor were the young present in great numbers.

A station site was selected on San Clemente Island at Seal Cove. At this location vegetation and kelp were in excellent condition, there was an abundance of fish, and the pink abalone showed evidence of rapid growth. The abalone there were approaching spawning. At a second station, established on the east side of San Clemente Island above Pyramid Cove, algae, abalone, and fish were less abundant than at Seal Cove.

At San Nicolas Island visibility was restricted because of heavy sediment carried by wave action. Two temporary stations were established. At the station on the south side of the island, the kelp was in poor condition. Great numbers of kelp bass (Paralabrax clathratus) were seen and the few abalone present were in excellent condition and approaching the spawning season. At this station red abalone (H. rufescens) predominated.



M/V N. B. Scofield and diving boat Mollusk Cruise 60S4, 60M3-Abalone.

At the station established on the northeast side of San Nicolas Island, kelp was very dense. There was considerable algal growth on the rocky substrate but only six pink abalone were found.

Many color underwater photographs were taken of various species of abalone. These pictures illustrate the differences in color and structure among the eight Californian abalones.

Young pink and black abalone could not be located in sufficient numbers to make an adequate shipment to Hawaii. They were not present in areas where found previously and high tides and rough waters prevented their being gathered from other known locations.

A station was established at San Miguel Island in a location fished by commercial divers. The red abalone at this station were numerous and in excellent condition. There was a heavy kelp bed, many invertebrates, and great numbers of fish at this station. San Miguel Island is not fished heavily by the commercial fleet because of rather constant adverse, weather conditions during all but a few months of the year.

Exploratory dives were made at Anacapa Island, and at Gull Rock and Forney's Cove on Santa Cruz Island. Red, pink, and green abalones observed were few in number and small in size. At Yellow Bank, between Anacapa and Santa Cruz Islands, pink, red and white abalone were in close association with each other. They were large and of excellent quality. The bottom is rocky, ledge-like and covered with a thick growth of elk kelp (Pelagophycus porra). Because of the depth (75 to over 125 ft.) time on the bottom was limited and only a small part of the area could be examined. Due to strong winds, diving at Santa Rosa Island was confined to Becher's Bay. Only a few pink abalone were observed although a large area was inspected. At Carpenteria Reef, there was a muddy bottom with poor kelp growth and a few small pink abalone. This entire area had a "dead" look.

Note: Also see Commercial Fisheries Review, April 1960 p. 19.

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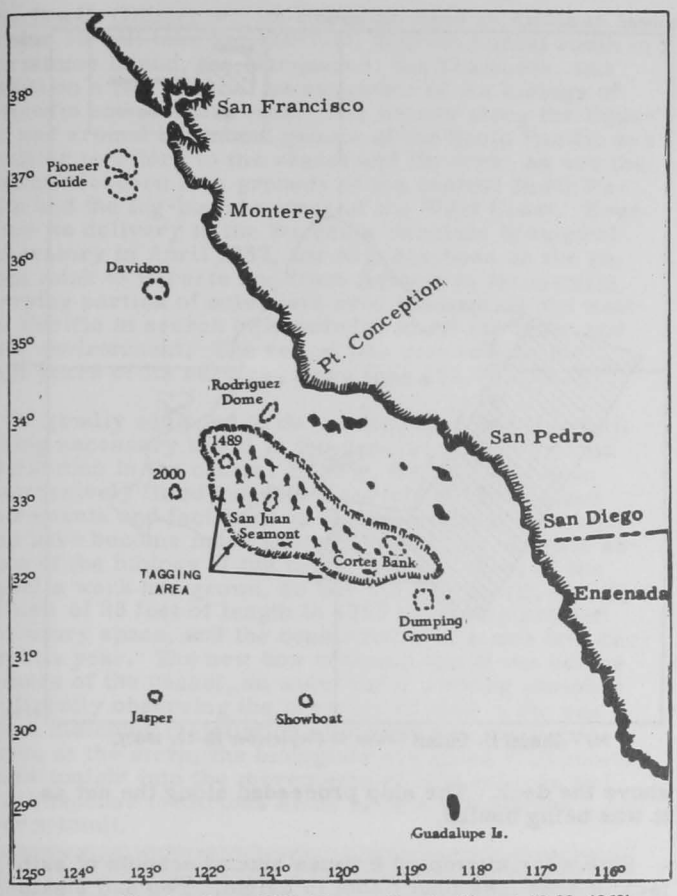
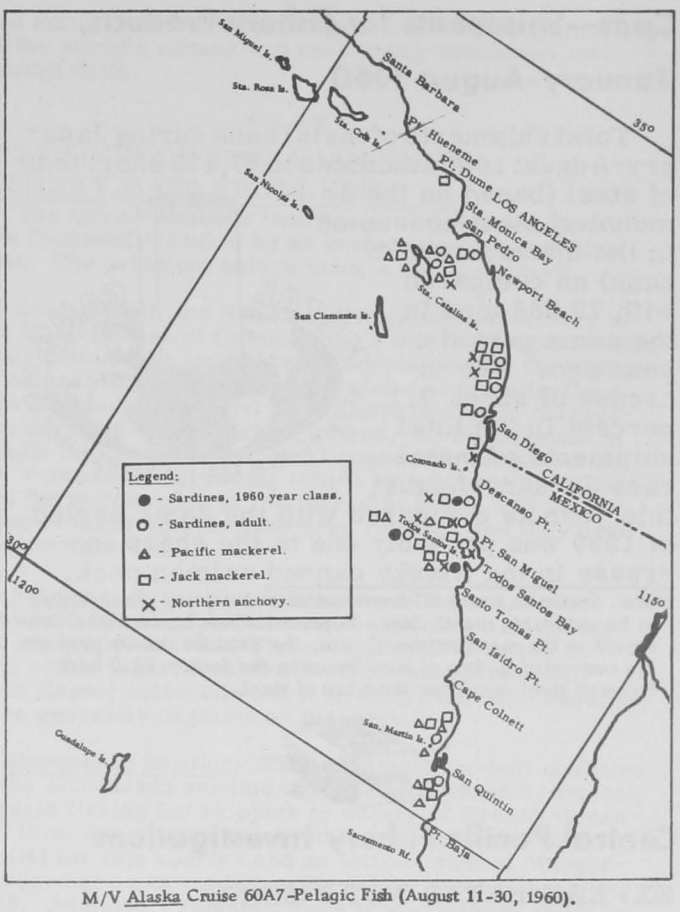
ALBACORE TUNA OFF SOUTHERN CALIFORNIA STUDIED:

M/V "Nautilus" Cruise 60N8-Albacore: The area off southern California within the latitudes 32° N. to 35° N. and longitudes 118° W. to 123° W. was surveyed by the California Department of Fish and Game research vessel Nautilus from August 16-29, 1960. The objectives were (1) to fish for albacore with trolling gear and to tag, measure, and release all viable ones, using dart and type-G spaghetti tags alternately; (2) to hang a light from the stern each night while drifting and to collect the marine organisms attracted to it; (3) to record sea-surface temperatures and weather conditions on the fishing grounds; (4) to obtain blood samples from albacore unsuitable for tagging; and (5) to preserve albacore stomachs.

Of the 160 albacore caught 149 were measured, tagged and released in good condition. All were taken on trolling gear.



M/V Nautilus Cruise 60N8-Albacore Tagging (August 16-29, 1960).



M/V Alaska Cruise 60A7-Pelagic Fish (August 11-30, 1960).

Due to adverse weather conditions only 4 nightlight stations were occupied: 2 on the albacore fishing grounds, 1 off Santa Rosa Island, and 1 at Santa Cruz Island.

Sea-surface temperatures were taken at least every 3 hours while scouting, and more frequently when in concentrations of fish. Weather and sea conditions were recorded intermittently throughout the day. Sea-surface temperatures ranged between 60.8° and 66.4° F. A majority of albacore (154) was caught in waters of 60.8° to 62.4° F. The remaining 6 were taken in 63.7° to 66.4° F. water. The largest albacore were caught in the warmer water.

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PELAGIC FISH POPULATION SURVEY CONTINUED:

M/V "Alaska" Cruise 60A7-Pelagic Fish: The coastal waters from Punta Baja, Baja California, Mexico, to Point Dume and Santa Catalina Island, Calif., were surveyed (Aug. 11-30, 1960) by the California Department of Fish and Game research vessel Alaska. The objectives were: (1) to survey the sardine population to determine the amount of recruitment from the 1960 spawning and to measure the density of older fish; (2) to sample adult sardines, Pacific mackerel, jack mackerel and anchovies for age and distribution studies; and (3) to collect live sardines for genetic studies conducted by the U. S. Bureau of Commercial Fisheries Laboratory at La Jolla.

Of the 78 light stations occupied, sardines were collected at 13, anchovies at 9, jack mackerel at 22, and Pacific mackerel at 14.

A total of 362 miles was scouted between stations and 67 schools were sighted, most of which were small spots making positive species identification unfeasible.

Weather conditions were generally good but a heavy swell hampered operations between Cabo San Quintin and Punta Banda.

Adult sardines (153-225 mm.) were sampled at 12 stations from Cabo San Quintin to Santa Catalina Island and young sardines (105-120 mm.) were taken at three stations between Punta Banda and the U. S.-Mexico border.

Approximately 200 live sardines were delivered to the U. S. Bureau of Commercial Fisheries in San Diego, for use in blood genetic studies.

Sea-surface temperatures ranged from 53.4° F. at Santo Tomas anchorage to 70.3° F. off La Jolla Point.

Note: Also see Commercial Fisheries Review, November 1960 p. 22.

Cans--Shipments for Fishery Products, January-August 1960

Total shipments of metal cans during January-August 1960 amounted to 87,172 short tons of steel (based on the amount of steel consumed in the manufacture of cans) as compared with 79,888 tons in the same period a year ago. The increase of about 9.1 percent in the total shipments of metal cans January-August this year as compared with the same period of 1959 was probably due to the sharp increase in the Alaska canned salmon pack.

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

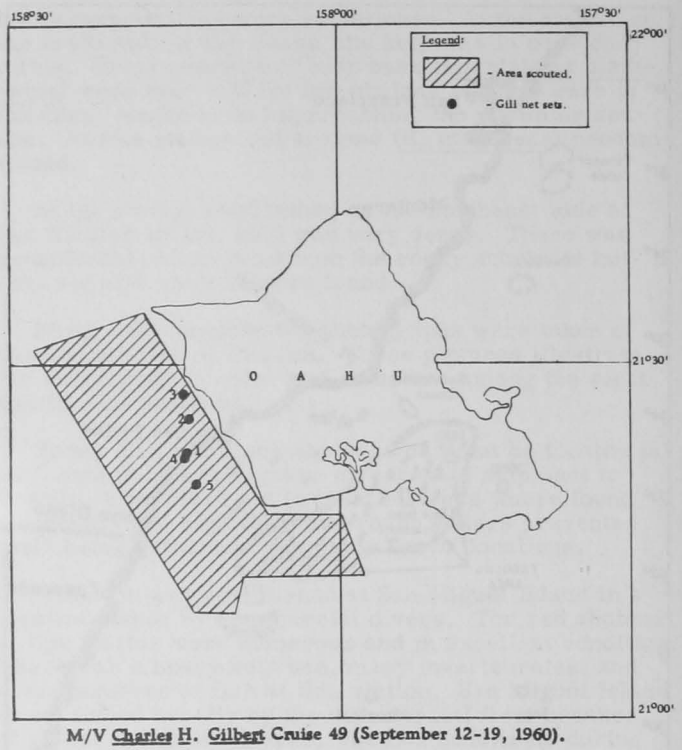
Central Pacific Fishery Investigations

EXPERIMENTAL NET FISHING FOR SKIPJACK TUNA:

M/V "Charles H. Gilbert" Cruise 49: Trial sets were continued (September 12-19, 1960) by the U. S. Bureau of Commercial Fisheries' research vessel Charles H. Gilbert in experimental gill-net fishing for skipjack tuna in the waters of Oahu's Waianae coast. Objectives of this cruise were to (1) determine the practicability of setting the gill net and retrieving it with a power block from the vessel; (2) establish procedures for setting and retrieving the gill net; (3) test gill net and power block as a device for capturing skipjack tuna under a variety of oceanographic conditions; (4) evaluate data collected by experiments with gill nets to determine the possibility of using tuna purse seines in this area; and (5) test sonic equipment and record various vessel and biological sounds.

The experimental gill net is composed of panels of webbing of $4\frac{1}{2}$-$11\frac{1}{2}$ inch stretched mesh, measured 304 fathoms long by 50 fathoms deep. The practicability of handling such a net was demonstrated in the trial set. The net was set in 3 minutes and 20 seconds on the first set. Several minor difficulties were encountered during retrieving but these were easily overcome and avoided on subsequent sets.

The net was payed out over the stern with the ship proceeding at 22 degrees starboard rudder and an engine speed of 1,000 r.p.m. The net was set in a circle as a result of this maneuver. Lines on both ends of the net were brought together to close the net as much as possible. During retrieving the net was passed through the power block and stacked on the main foredeck athwart ship, the leadline to starboard and the corkline to port. The power block was situated at the end of the boom just inboard of the starboard rail about 15 feet above the deck. The ship proceeded along the net as it was being hauled.



M/V Charles H. Gilbert Cruise 49 (September 12-19, 1960).

Sets were attempted 4 times around schools of skipjack in seas less than a foot in height. Two and 8 skipjack, 9-12 pounds in weight, were caught in the first two sets. No fish were caught in the last two sets. It was impossible to tell whether the skipjack had escaped before the net was completely set, through the larger meshes after the net was set, or through the thermocline and under the leadline.

The failure of the gill net to encircle the skipjack schools indicates that the contemporary purse-seining method needs to be modified and the direction towards which it should be modified in order to catch skipjack. Modifications should be towards (1) increasing the time between the beginning of the set and detection (and likely escape) of the net by the skipjack, and (2) reducing the setting time. Lengthening the net so that the set can be started farther away from the school and distracting the school with live bait have been suggested to delay the detection of the net by the skipjack. One obvious way to reduce the setting time is to increase the ship's speed during setting.

A hydrophone from a Sonobuoy and a tape recorder were found to be a suitable combination for recording underwater sounds. Ship sounds at 4 knots and at $1\frac{1}{2}$ knots, with only auxiliary engines, were recorded. Recordings were also made during the soaking and hauling phases of the gill-net operations.

Note: Also see Commercial Fisheries Review, Nov. 1960 p. 24.

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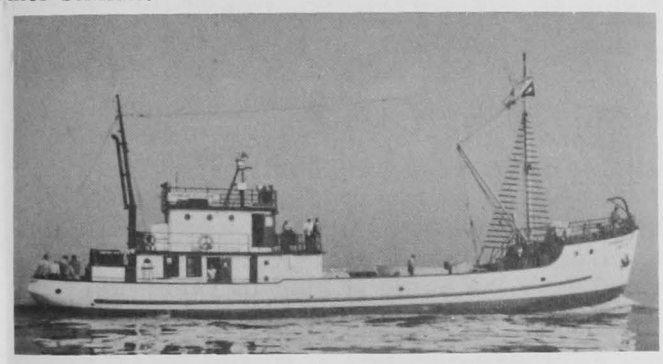
FISHERY RESEARCH VESSEL "CHARLES H. GILBERT" ON 50th VOYAGE:

Half a hundred sailings was the record logged as the U. S. Bureau of Commercial Fisheries' research ship

Charles H. Gilbert left its Hawaiian base on October 12. Cruise 50 will take the 120-foot, 200-ton vessel south to Christmas Island, the Marquesas, the Tuamotus, and Tahiti on a two months' investigation of the biology of yellowfin and skipjack tuna. The waters along the Equator and around the island groups of the South Pacific are familiar territory to the vessel and its crew, as are the stormy albacore tuna grounds of the central North Pacific and the fog-bound waters of the West Coast. Ever since its delivery to the Bureau's Honolulu Biological Laboratory in April 1952, the ship has been on the go, from Adak to Papeete and from Astoria to Manzanillo, carrying parties of scientists over the central and eastern Pacific in search of knowledge about the tunas and their environment. The vessel has steamed, in the eight years of its service, more than 173,000 miles.

Originally equipped to do the long-line and live-bait fishing necessary to fill in the general picture of tuna distribution in the central Pacific, the ship has been progressively fitted out with a variety of specialized instruments and facilities as the interests of the scientists have become more sharply focused on specific aspects of the biology of the tunas. As the scope of the vessel's work has grown, so has the ship itself, with the addition of 28 feet of length in 1953 providing greater laboratory space, and the construction of a new bow section this year. The new bow contains one of the unique features of the vessel, an underwater viewing chamber for directly observing the behavior of tuna in the sea. With a matching installation of windows in the ship's bottom at the stern, the biologists are given a completely new insight into the movements of tuna schools and their response to various kinds of bait, fishing gear, and other stimuli.



The Service's research vessel Charles H. Gilbert.

The vessel's live-bait tank, in addition to its primary function of holding baitfish for use in pole-and-line fishing of tuna, has played a part in the introduction to Hawaiian waters of sardines from the Marquesas, and of snappers and other useful bottomfish from Tahiti and Mexico. The ship has been used for operating gill nets, as well as tuna long lines, and the recent addition of a power block makes it possible to handle nets of great size. A new trawl winch was installed this year for the operation of large midwater trawl nets to collect the young of the tuna and the variety of small animals on which tunas feed. This evolution of the Charles H. Gilbert to meet the needs of scientific research on elusive, fast-swimming, far-ranging species of fish has given the Honolulu Biological Laboratory a mobile marine research station that is probably as able and versatile as any vessel of comparable size. Whether the task is the collection of plankton in the North Pacific, or, as on the present cruise, taking samples of South Pacific tuna blood for serological studies, the Charles H. Gilbert has met the demands made upon it in obtaining knowledge of the world's oceans and the fishery resources that inhabit them.

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RESEARCH ON HAWAIIAN TUNA FISHERY BAIT PROBLEMS:

The annual skipjack landings in the State of Hawaii are frequently limited by an inadequate supply of live bait. The principal bait is nehu, a small anchovy.

During 1952, the Hawaiian Biological Laboratory of the U. S. Bureau of Commercial Fisheries began studies to determine the feasibility of supplementing the supply of natural bait. These studies included investigations into the use of artificial baits, introduction of Marquesan sardines into Hawaiian waters, the introduction of tilapia into various ponds and reservoirs in the State, the economics of rearing tilapia by hatchery methods, and the introduction of the threadfin shad. The objectives of these studies have been realized and they have been terminated.

Artificial Bait: The University of Hawaii, under contract, investigated the use of artificial bait during the period 1952-1953. The reactions of skipjack to both edible (agar, fish) and inedible (aluminum foil, mica flakes) materials were investigated. The results were generally negative or inconclusive.

Marquesan Sardine: The excellent live-bait qualities of the Marquesan sardine were demonstrated by Bureau vessels fishing for skipjack in waters of French Oceania. Hawaiian waters appeared to provide a suitable habitat for this species and an introduction of Marquesan sardines was made into Hawaiian waters in late 1955. Additional releases were made in 1956, 1957, and 1958. By 1957, adults in spawning condition were captured near the Island of Oahu and by September 1960, additional recoveries were reported from Kauai, Maui, Hawaii, Molokai, and Kahoolawe. Recoveries of young fish, indicating successful spawning in Hawaiian waters, were made during late 1958 and 1959. The State Division of Fish and Game placed restrictions on the capture of the Marquesan sardines in Hawaiian waters, pending their establishment. As these fish are now successfully established, the restrictions have been lifted, thus permitting Hawaiian fishermen to capture and use them as live bait.

Tilapia: Tilapia were first brought to Hawaii in 1951. From 1954 through 1956, sea tests were conducted to determine the effectiveness of these fish as a skipjack tuna bait. They proved to be an adequate bait fish, especially for the larger (18-24 pound) skipjack.

Tilapia (Tilapia mossambica).

Investigation into the economics of rearing tilapia were made at a small hatchary near the laboratory (1956) and at a larger hatchery on the Island of Maui (1957-1959). Simultaneously with the 1959 operation

of the Maui hatchery, experiments were conducted at the Kewalo Basin Laboratory to test methods for inducing early spawning and to determine optional salinity, sex ratios, brood stock concentrations, and type and rate of feeding.

The application of the results of the Kewalo Basin experiments to the Maui hatchery, coupled with a warmer spring, resulted in the 1959 production of 1,293,000 tilapia, exceeding that for 1958 of 1,074,000. Bait-size tilapia from the Maui plant yielded an average catch of 46-50 pounds of skipjack per pound of tilapia used as live bait. Comparable figures for nehu were 50-57 pounds of skipjack per pound of nehu.

The favorable results of the investigations, both as to the success and economics of rearing tilapia by hatchery methods and their use as live bait, encouraged the Hawaii State Board of Agriculture and Forestry to request funds from the State Legislature for the construction and operation of a tilapia hatchery. About $180,000 were appropriated. A site has been selected and construction of the plant is presently under way.

Threadfin Shad: A large shipment of threadfin shad was received in Hawaii during August 1959. These fish, after acclimatization to fresh water, were planted in various rivers and reservoirs on the islands of Maui, Kauai, and Oahu. The first successful indication of shad spawning was reported from a reservoir on the Island of Oahu on May 1, 1960, where 20 small schools of 1.5-3 inch shad were observed. On June 11, 1960, more than 200 shad were caught from a reservoir on the Island of Maui. The average length at time of planting was 9.5 centimeters (about 3.7 inches). Successful spawning in the Maui reservoir was evidenced by the capture of shad as small as 1.9 centimeters (0.7 inch). With the successful completion of the project to introduce the threadfin shad into Hawaiian waters, this potential bait species (which is prolific, can tolerate fresh or sea water, and has been proven by sea tests to be an excellent bait fish) is now available to the Hawaiian skipjack tuna fishermen.

Federal Purchases of Fishery Products

DEPARTMENT OF DEFENSE PURCHASES, JANUARY-SEPTEMBER 1960:

Fresh and Frozen Fishery Products: For the use of the Armed Forces under the Department of Defense, 1.7 million pounds (value $0.9 million) of fresh and frozen fishery products were purchased in September 1960 by the Military Subsistence Supply Agency. This was lower than the quantity purchased in August by 29.1 percent and was 4.1 percent under the amount purchased in September 1959. The value of the purchases in September 1960 was lower by 22.0 percent as compared with August, but was 0.4 percent higher than for September 1959.

Table 1 - Fresh and Frozen Fishery Products Purchased by Military Subsistence Supply Agency, September 1960 with Comparisons

QUANTITY				VALUE			
Sept.		Jan.-Sept.		Sept.		Jan.-Sept.	
1960	1959	1960	1959	1960	1959	1960	1959
(1,000 Lbs.)				($1,000)			
1,686	1,758	17,722	17,488	928	924	9,188	8,973

During the first nine months of 1960 purchases totaled 17.7 million pounds (valued at $9.2 million)--an increase of 1.3 percent in quantity and 2.4 percent in value as compared with the similar period in 1959.

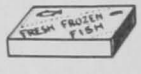
Prices paid for fresh and frozen fishery products by the Department of Defense in September 1960 averaged 55.0 cents a pound, about 3.5 cents more than the 51.5 cents paid in August and 2.4 cents higher than the 52.6 cents paid during September 1959.

Canned Fishery Products: Salmon was the principal canned fishery product purchased for the use of the Armed Forces during September this year. The annual requirements of canned salmon by the Armed Forces are usually contracted for shortly after the end of the canned salmon packing season. In the first nine months of 1960, purchases of canned fish were up 36.7 percent as compared with the same period in 1959, due primarily to the heavy purchases of canned salmon in September of this year.

Table 2 - Canned Fishery Products Purchased by Military Subsistence Supply Agency, September 1960 with Comparisons

Product	QUANTITY				VALUE			
	Sept.		Jan.-Sept.		Sept.		Jan.-Sept.	
	1960	1959	1960	1959	1960	1959	1960	1959
	(1,000 Lbs.)				($1,000)			
Tuna	116	370	2,370	2,502	51	162	1,044	1,159
Salmon	2,304	3	2,308	18	1,565	3	1,568	14
Sardine	-	4	99	974	-	4	41	144

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



Fish Meal

RESEARCH ON NUTRITIVE VALUE:

The research program on fish-meal quality by the U. S. Bureau of Commercial Fisheries College Park Technological Laboratory has revealed some interesting variations in chick-feeding tests. Over 39 fish-meal samples have arrived at the Laboratory. Of these, 19 have been analyzed for proximate composition and in a series of three different ten-day chick tests.

The Laboratory reports that the first series has just been completed, and the results have demonstrated some interesting differences in the nutritive quality of the fish meals tested. The nutritive quality of most of the fish-meal samples appears to be rather uniformly good, but a few appear to be considerably lower in quality than would be expected from a study of their processing history.

Fisheries Loan Fund

FISHERIES LOANS APPROVED JULY 1 TO SEPTEMBER 30, 1960:

From the beginning of the Fisheries Loan Fund program in 1956 through September 30, 1960, a total of 802 applications for $24,818,068 have been received. Of these, 435 ($10,556,897) have been approved, 286 ($8,094,575) have been declined or found ineligible, 68 ($4,234,422) have been withdrawn by applicants before being processed, and 13 ($796,505) are pending. Of the applications approved, 162 were approved for amounts less than applied for. The total reduction was $1,135,669.

The following loans were approved during July, August, and September of 1960:

New England Area: Clinton-Serafina, Inc., New Bedford, Mass., $70,000 and John S. Cottle, Narragansett, R. I., $24,300.

South Atlantic and Gulf Area: Captain Frankie, Inc., Tampa, Fla., $25,000 and Clarence E. Potter, Marathon, Fla., $6,822.

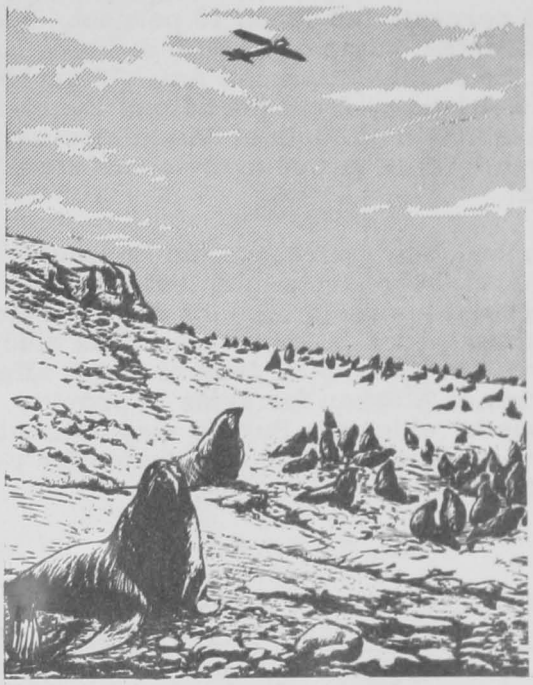
California: Joe M. Medina, et al, San Diego, $120,000; M. Machado Medina, San Diego, $100,000; Joseph M. Nunez, San Diego, $90,000; and Frank J. Souza, et al, San Diego, $110,000.

Pacific Northwest Area: Axel Buholm, Seattle, Wash., $9,922; Erling E. and Harry J. Jacobsen, Seattle, Wash., $41,872; and Robert K. Thompson, Port Angeles, Wash., $4,200.

Fur Seals

ALASKA FUR-SEAL SKIN HARVEST FOR 1960 LOWER:

The 1960 harvesting of fur seals on the Pribilof Islands, Alaska, was terminated August 15, with a crop of 40,616 skins. Included were 36,304 pelts from male seals and 4,312 pelts from female seals. This compared with a take of 30,176 male seals and 27,634 female seals in 1959.



The 1960 take of male seals included about 30,000 3-year-olds and 4,000 4-year-olds, as well as 2,000 2-year olds. The small size of the take of 4-year olds lowered the kill considerably below normal; usually 4-year-old seals contribute 30 to 40 percent of the year's kill. The small size of the 1956 year-class was recognized in 1959 when a shortage of 3-year-old animals caused a below-normal take, and the limited harvest this year had been expected because of this deficiency.

Since 1956 the U. S. Bureau of Commercial Fisheries has been engaged in a herd management program. Through maintenance of the herd at a level of maximum sustainable productivity, such fluctuations in the herd as were encountered in the 1956 year-class can be avoided in the future. It is expected that the value of the reduction in surplus-breeding stock accomplished since 1956 should soon be reflected in improvement in the annual crops of fur-seal skins.

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ECONOMIC STUDY OF SEAL SKIN PRICES INITIATED:

An economic study of prices of Alaska's fur-seal skins has been started by the Bureau of Business Research, Boston College. This is being conducted under a contract awarded by the U. S. Bureau of Commercial Fisheries.

The annual harvest of fur-seal skins from the Pribilof Islands is divided three ways under an international treaty: the United States receives 70 percent of the skins, Canada 15 percent, and Japan 15 percent. The United States' share is now further divided under the Alaska Statehood Act--70 percent of the net income from the sale of the skins, after deduction of costs of administration of the Pribilofs, is turned over to the State of Alaska.

For budgetary purposes the Bureau of Commercial Fisheries must estimate the proceeds of the sales of skins for a period up to three years in the future. This study involves the analysis of factors which affect the price of Alaskan fur skins to provide methods by which the Bureau may estimate the prices which may be anticipated for periods up to three years.

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PRICES FOR ALASKA FUR-SEAL SKINS AT FALL 1960 AUCTION HIGHER:

At the semi-annual auction sale of Alaska fur-seal skins held at St. Louis on October 20-21, 1960, a total of 28,210 United States-owned fur-seal skins was sold for $2,510,890 for the account of the United States Government. Of these, 6,338 skins were the newly-developed "sheared" skins which were offered for sale for the first time. These are known as "Lakoda," a name derived from an Aleutian word meaning young female fur seal. The "Lakoda" skins, unlike the familiar "Matara," "Kitovi" and black Alaska fur seal skins are not dyed and the guard hairs are not removed prior to shearing. The new product was received enthusiastically by the fur trade. All skins are the product of the sealing operations of the U. S. Bureau of Commercial Fisheries on the Pribilof Islands. The 21,872 United States-owned dyed fur-seal skins (exclusive of the "Lakoda" skins) brought $2,282,436 or about 0.5 percent less than the $2,293,580 received for 22,561 such skins at the spring 1960 auction. However, the over-all average price of $104.35 per skin paid at the fall 1960 auction was up about 2.6 percent from the average of $101.66 paid at the spring auction and 1.1 percent higher than the $103.23 average price received at the fall 1959 auction. The "Lakoda" skins, sold for the first time this fall, brought $228,464 or an average of $36.05 per skin.

At the fall 1960 auction, the average prices for the skins by types were: dust-brown or "Matara" $103.22 per skin, black $106.83, and the dark shade "Kitovi" $101.50. Japanese Government fur-seal skins sold: black $101.66, "Matara" $96.01, average for all skins $97.81. All South African fur-seal skins averaged $46.31 and all Uruguayan skins averaged $51.75.

Note: Also see Commercial Fisheries Review, June 1960 p. 28, and December 1959 p. 35.

Great Lakes Fisheries

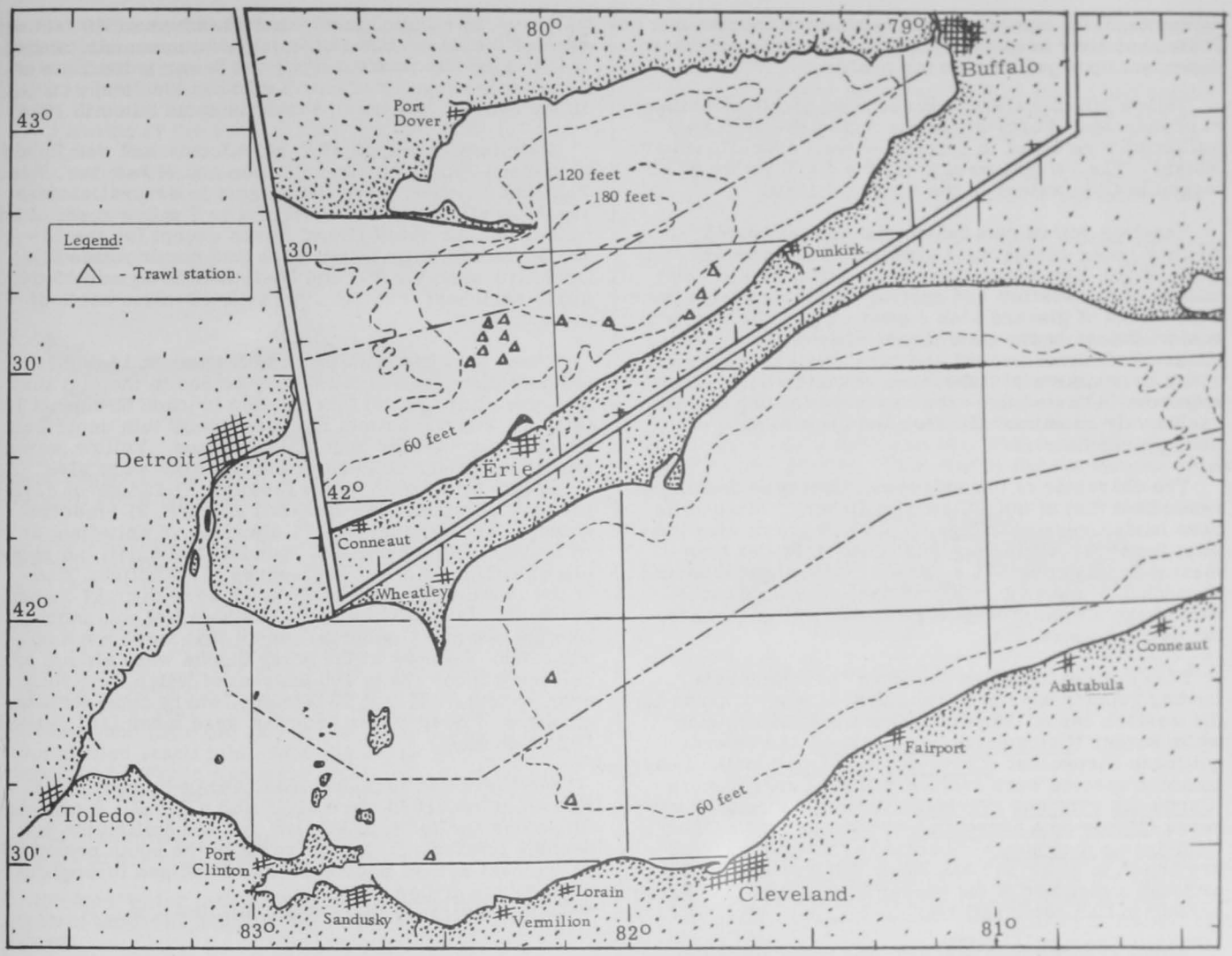
Exploration and Gear Research

SEASONAL DISTRIBUTION STUDIES OF COMMERCIAL FISH STOCKS IN LAKE ERIE CONTINUED:

M/V "Active" Cruise 12: Trawl fishing and sounding operations were carried out (Aug. 30-Sept. 23, 1960) from Buffalo, N. Y., to Sandusky, Ohio, by the U. S. Bureau of Commercial Fisheries' exploratory fishing vessel Active. This survey was designed to determine seasonal abundance, distribution, and availability-to-otter trawls of smelt and other under-utilized species of fish in United States waters of Lake Erie.

Test trawling was conducted only where depth-sounder recordings indicated the presence of fish near the bottom. With exception of a relatively small area off Erie, Pa., extensive soundings and 15 subsequent fishing efforts were not very encouraging. Two 30-minute drags at a depth of 78 feet, 10½ miles northwest of Erie, produced a total of 2,450 pounds of 17-19 count smelt.

Some 5 additional drags made in 72 to 78 feet of water between Erie and Dunkirk, N.Y., caught smelt at rates of 50, 60, 78, 100, and 180 pounds per hour. Six other drags in this area at depths of 50 to 78 feet yielded only trace amounts of fish. Three of these 6 drags indicated the presence of large numbers of young-of-the-year smelt. Two 30-minute drags made in about 60 feet of water off Vermilion and Sandusky, Ohio, caught no smelt but the one off Vermilion took 90 pounds of yellow perch.



M/V Active, Cruise 12, Lake Erie (August 30 to September 23).

One 30-minute drag, made in Canadian waters about 20 miles southeast of Wheatly, Ont., caught 90 pounds of smelt from 66 feet of water.

The area between Erie and Vermilion and west of Sandusky revealed no fish near the bottom.

During the first two days of the cruise, the Active participated in a lake-wide synoptic survey involving 11 vessels and 6 research agencies including the Bureau of Commercial Fisheries. Objectives of the synoptic survey included making simultaneous oxygen determinations and related fish population analysis over all of Lake Erie.

Note: Also see Commercial Fisheries Review, Nov. 1960 p. 32.

Great Lakes Fishery Investigations

LAKE ERIE POPULATION SURVEY:

M/V "Musky II" September 1960: The U. S. Bureau of Commercial Fisheries research vessel M/V Musky II has replaced the charted vessel George L. in its operations on Lake Erie. The Musky II is 45 feet long with a 14½-foot beam and is powered by a 671 GMC Diesel.

Late September water temperatures (70° F.) and turbidity (Secchi disc 3½ feet) in 1960 in the western basin were almost identical to findings in 1959 at the same stations. Summer water temperatures in 1960 were much cooler than in 1959.

The September trap- and gill-net catches of yellow pike from major ports in Ohio consisted almost entirely of yearling fish (hatched in 1959). Commercially-landed yearling yellow pike averaged about 14.2 inches long (maximum 16.2 inches) and slightly more than one pound in weight. Up to 50 pounds of yellow pike per trap-net lift were observed in some areas in the western basin. Prices of landed yearling yellow pike (Number 2's) dropped from about 50 cents per pound in early September to about 35-40 cents per pound in late

September. Commercial catches of other species in September have been very low and fishermen often are dependent upon yellow pike for profits.

Yellow pike apparently do not recognize International boundaries. Forty-seven percent of the 53 tagged yellow pike returned in September were from Canadian waters The returns were from the 4,000 yellow pike tagged in Ohio waters in the spring of 1960.

Yearling yellow pike fed almost entirely on $3\frac{1}{2}$- to $4\frac{1}{2}$-inch young-of-the-year alewives and gizzard shad in September. The young alewives are abundant in most waters of the western and central basins, but large concentrations of gizzard shad appear only in the western basin. Unless heavy natural mortality occurs, gizzard shad and alewives in 1961 and 1962 may become a nuisance to commercial fishermen. Examination of fish stomachs indicated that alewives were feeding almost exclusively on animal plankton and gizzard shad on plant plankton.

The character of the white bass fishery in September resembled that of the yellow pike fishery. Most white bass landed were yearlings. They had grown very rapidly; the average yearling was about 10 inches long--maximum length was 11.3 inches. The relatively great abundance of both the 1959 and 1960 year classes of white bass should provide a reasonably strong fishery for several years.

Fish species listed as "suckers" in commercial landing reports have been examined at several ports in the western basin. Most abundant were the common white sucker (Catostomus commersoni) and central quillback carpsucker (Carpiodes cyprinus hinei). Less common species were eastern quillback carpsuckers (Carpiodes cyprinus cyprinus), northern shorthead redhorse (Moxostoma aureolum), and the spotted sucker (Minytrema melenops). Six other species of suckers are known to occur in Lake Erie. Bigmouth buffalo, although a member of the sucker family, are listed separately in fish catch reports.

Although experimental trawl, and trap- and gill-net catches of yellow perch in September generally have been poor, anglers had phenomenal success in catching yellow perch along the south shore in the western basin. Many anglers caught 15-20 yellow perch per hour. An unusual number of young-of-the-year white crappie were taken in trawls this summer. Black crappie are much less abundant than white crappie in Lake Erie.

Note: Also see Commercial Fisheries Review, Nov. 1960 p. 32.

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LAKE MICHIGAN FISH POPULATION SURVEY CONTINUED:

M/V "Cisco" Cruise 8: The fish population survey in southern Lake Michigan was continued (September 20-October 4, 1960) by the U. S. Bureau of Commercial Fisheries research vessel Cisco. Gangs of nylon gill nets (50 feet each of $1\frac{1}{4}$- and $1\frac{1}{2}$-, 200 feet of 2-, and 300 feet each of $2\frac{3}{8}$-, $2\frac{1}{2}$-, $2\frac{3}{4}$-, 3-, $3\frac{1}{2}$-, and 4-inch mesh) were set overnight at 25 and 50 fathoms off Grand Haven, Mich., and off Racine, Wis. The chub catch was moderately large at 25 fathoms off Grand Haven, but light in the other sets. Both 25-fathom sets contained small numbers of smelt and alewives, and both 50-fathom sets had a few deep-water sculpins.

Gangs of linen gill nets were set for 4 nights off Grand Haven at 25 fathoms (255 feet each of $2\frac{5}{8}$-, $2\frac{1}{2}$-, $2\frac{3}{4}$-, and 3-inch mesh) and 50 fathoms (510 feet of each of the above mesh sizes). Both these nets took many more bloaters (L. hoyi) and fewer individuals of non-bloater species of chubs than did identical nets set in the same locations on about the same dates in 1954.

A commercial-type 52-foot balloon trawl was fished at various depths off Grand Haven and Milwaukee, Wis. The chub catches were the largest in several cruises. The tows off Grand Haven were 4 to 7 miles south of an east-west line out of Grand Haven except for the 45- and 50-fathom tows which were just north of this line. Off Miliwaukee the 30- and 35-fathom tows were 8-10 miles northeast, and the others 10-12 miles north of port.

The great difference in chub catches at 14 and 15 fathoms (consecutive tows) may be due to the fact that the upper limit of the thermocline touched bottom at 14 fathoms, and the bottom temperature at this depth was appreciably warmer than at 15 fathoms. Yellow perch, smelt and shiner catches in the two tows were also strikingly different: at 14 fathoms--1,134 perch (172 pounds), no smelt, 482 spot-tail shiners, 21 emerald shiners, 21 trout-perch, 171 alewives, 7 whitefish; at 15 fathoms--266 perch (44 pounds), 192 smelt, no shiners of either species, 74 alewives, 4 whitefish. Five of the 11 whitefish in the two tows were over 17 inches in length. The catch in the 10-fathom tow was much like the one at 14 fathoms, except that there were no whitefish. Catches at the other depths were almost exclusively chubs (95 to 100 percent of which were bloaters), except at 45 and 50 fathoms, where considerable numbers of deep-water sculpins were taken (181 pounds at 50 fathoms).

Surface water temperatures averaged about 64° F. Extremes recorded were 51.4° and 67.5° F. A well defined thermocline still existed, but the epilimnion has become thicker. Strong currents to the south prevailed on the east side of southern Lake Michigan throughout much of the cruise.

Note: Also see Commercial Fisheries Review, Nov. 1960 p. 32.

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WESTERN LAKE SUPERIOR FISHERY SURVEY CONTINUED:

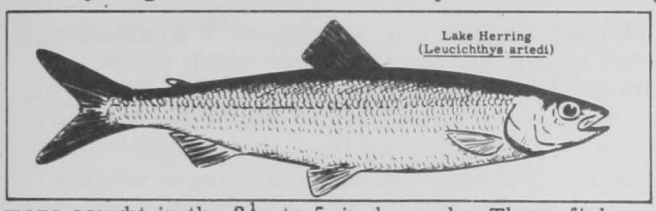
M/V "Siscowet" Cruise 6: The third and last cruise of the season to study the bathymetric and areal distribution of fish stocks in western Lake Superior was conducted (September 12-20, 1960) by the U. S. Bureau of Commercial Fisheries research vessel Siscowet. Standard gangs of experimental gill nets and 30-foot semi-balloon trawls were fished at various locations and depths.

The experimental gill nets were fished just southeast of Gull Island and south of Stockton Island. Trawling operations took place southeast of Gull Island, Pike's Bay, between Outer and Cat Island, east and south of Cat Island, between Manitou and Otter Island, and between Ironwood and South Twin Island.

Four gangs of experimental gill nets were fished southeast of Gull Island at 15 fathoms to determine the differences in catches from successive 1-night sets and the differences between catches in 1-, 2-, 3-, and 4-night sets. Three gangs were set one day and a fourth on the following day. On the following 3 days, one each 1- and 2-night, 1- and 3-night, and 1- and 4-night sets were lifted with one net reset the first two days.

The catch increased with the number of nights only for the lake trout, lake herring, and smelt. There seemed to be little relationship between the duration of set and number of fish caught for the other species. However, the total number of fish caught increased with the duration of the set. The 2-night set took 59 percent more fish than the average of the 1-night sets; the 3-night set took 82 percent more fish than the average 1-night set; and the 4-night set took 153 percent more than the average 1-night set.

The lake herring taken in this experiment were extremely large. Two hundred and forty-four lake herring



were caught in the $2\frac{1}{2}$- to 5-inch mesh. These fish weighed 288.5 pounds, an average of 1.2 pounds each.

Experimental gangs of gill nets were set south of Stockton Island at 5, 15, 25, and 45 fathoms. Trawl tows took predominately ninespine stickleback, trout-perch, and slimy muddlers at all stations. Good samples of pygmy whitefish were taken between Manitou and Otter Island in 25 fathoms. These fish were nearly ready to spawn. A few small lake trout and whitefish were taken around Cat and Outer Island but none were young-of-the-year. Trawl tows in Pike's Bay at 20 fathoms, and near Cat Island and Outer Island at 25 fathoms yielded small lake trout which had the left pectoral fin clipped. These fish were planted by the Wisconsin Conservation Department in early May 1960. The distance from Outer Island to the nearest site of planting is about 18 miles. These catches give further evidence that the shore plant was successful.

Surface-water temperatures ranged from 58.7° F. south of Stockton Island to 56.3° F. southeast of Gull Island.

M/V "Siscowet" Cruise 7: In continuation of a long-term observation of environmental conditions and fish populations in western Lake Superior fall environmental conditions were studied (Sept. 26-Oct. 5, 1960) at index stations located southeast of Stockton Island, Northeast of Bear Island, and east of Pike's Bay. Standard gangs of gill nets were fished at each station, and trawling operations were conducted at the Stockton Island and Pike's Bay stations. Limnological data and materials were collected including: records on water temperatures, water samples for chemical analyses, plankton and bottom samples, and Secchi-disc readings.

There was a marked thermocline at the Stockton Island and Bear Island stations. At Bear Island the water temperature was about the same (56° F.) from the surface to 145 feet, at which point there was a rapid drop in temperature for the next 55 feet (thermocline), and at 200 feet the temperature was about 42° F. The temperature at the bottom (260 feet) was 40° F. Dissolved oxygen was found to be lowest at the surface (11.0 p. p. m.) and highest on the bottom (13.1 p. p. m.).

In addition to the environmental studies, trawling operations took place between South Twin and Ironwood Island, and oblique sets were made with bull nets (gill nets 300 feet long and 20 feet deep) southeast of Gull Island and northeast of Madeline Island. A standard gang of gill nets was also set northeast of Madeline Island adjacent to the oblique bull net.

Bull nets fished southeast of Gull Island and northeast of Madeline Island were set from the surface to the bottom at 120 feet. The float line of the nets was marked at 20-foot intervals, and, since the depth of the net from float line to lead line was 20 feet, each section of the net fished overlapping 40-foot depth intervals.

The catch of lake herring per 1,000 feet of bull net that fished from the surface to 20 feet at the Gull Island station was 210 fish weighing 220 pounds. The catch decreased as the depth increased.

Trawl tows took predominately slimy muddlers and ninespine sticklebacks at all locations. Several small trout (5 to 14 inches) and whitefish were captured. No young-of-the-year trout have been seen this year. One 15-minute tow at 25 fathoms between Ironwood and South Twin Island captured 564 "bloaters" (L. hoyi) weighing 108 pounds. This was by far the largest catch made in a trawl by the Siscowet.

Surface-water temperatures ranged from 54.5° F. southeast of Gull Island to 58.2° F. in Pike's Bay.

Note: Also see Commercial Fisheries Review, November 1960 p. 33.

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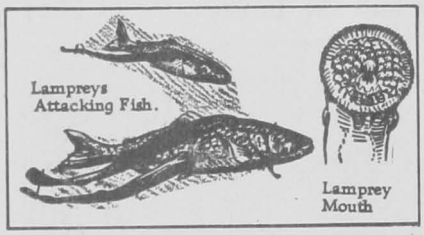
SEA LAMPREY CONTROL FOR 1960 SEASON ENDED:

A number of streams tributary to Lakes Superior and Michigan were treated with chemicals for the destruction of lamprey larvae during the 1960 season by the U. S. Bureau of Commercial Fisheries Great Lakes Fishery Investigations biologists. It is anticipated that by the end of the year all of the lamprey-producing streams on Lake Superior will have been treated by United States and Canadian biologists. The seasonal change of water quality that impairs the selective action of the toxicant was more troublesome than usual this year and persisted longer. Sea lamprey research included bioassays at Hammond Bay and in the mobile unit to study further the seasonal trends of water quality. Surveys to define the distribution of the lamprey larvae in Lake Michigan tributaries have now been extended to the east shore.



Electrical control on Lake Superior terminated on September 2, 1960. The 35 barriers captured 39,694 adult sea lampreys; the same barriers took 46,838 adults during 1959 and 60,367 in 1958. The 1960 total represents a reduction of 15.3 percent from 1959 and 34.2 percent from 1958. However, after 2 consecutive years of declining numbers, the catch at the installations on the east half of Lake Superior increased. These barriers took 24,160 adults in 1960, 17,128 in 1959, and 21,487 in 1958. A drastic drop at the de-

vices on the west half of the Lake was great enough to overcome the increase in the east. The western barriers took 15,534 individuals in 1960 and 29,709 in 1959--a reduction of 14,175 adults or 47.7 percent. Over half of this drop occurred in the Brule River which took only 9,755 adult sea lampreys this season as compared to 19,386 in 1959.

The last of 17 electrical barriers on Lake Michigan was turned off on August 5, 1960. Two additional devices were operated by the Wisconsin Conservation Department as part of the network. The 19 devices killed or captured 16,704 adult sea lampreys. The 1959 network of 37 barriers took 27,552 adults. The 19 barriers operated in both years took 23,076 adults during 1959. The 1960 catch represents a reduction of 6,372 individuals, or 27.6 percent. This is the third consecutive year of a decline in the sea lamprey catches in streams tributary to Green Bay, Lake Michigan.

Gulf Exploratory Fishery Program

BOTTOM FORMATIONS SURVEYED AND VARIABLE PITCH PROPELLER TESTED:

M/V "George M. Bowers" Cruise 29: A preliminary survey of Middle Ground bottom formations was conducted between July 29-August 8, 1960, by the U. S. Bureau of Commercial Fisheries exploratory fishing vessel George M. Bowers operating in the Florida Middle Grounds approximately 80 to 90 miles south-southeast of Cape San Blas, Fla. This cruise was conducted through a cooperative agreement between the U. S. Bureau of Commercial Fisheries and the University of Florida Geology Department.

Service's exploratory vessel George M. Bowers.

Four diving stations were made at depths from 14 to 20 fathoms. Samples were taken of coral rock, sand, and sedentary organisms. Still photographs and color motion pictures of the coral reefs were taken to supplement the observations and collections.

Cruise 30 (October 3-15, 1960): Underwater motion-picture sutdies of shrimp trawls in action were scheduled off Panama City, Fla. Due to heavy algae concentrations along the entire coastal area, photographic work was not attempted.

During the period, speed tests were conducted using the controllable pitch propeller recently installed on the George M. Bowers. Repeated runs were made over a $1\frac{3}{4}$-mile course in St. Andrews Bay, towing a 40-foot flat shrimp trawl. Holding the main engine constant at 800 r.p.m. and setting the propeller pitch at varying angles, accurate ground speed determinations were made. The information gained will be of considerable value in future shrimp-trawl work.

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MISSISSIPPI DELTA AREA SURVEYED FOR SARDINE-LIKE SPECIES:

M/V "Oregon" Cruise 70: Experimental fishing for sardine-like species using submarine lights, trap-lift nets, and a lampara net, was conducted in the Mississippi Delta area (September 6-25, 1960) by the U. S. Bureau of Commercial Fisheries exploratory fishing vessel Oregon. Most of the planned work for this cruise was not accomplished due to interruptions by hurricanes Donna and Ethel.

Seven night-light attraction stations were made using 100- and 250-watt submarine lights and 500-watt surface lights. Echograms showed the reaction of scad and round herring when a 100-watt light was lowered to a depth of 14 fathoms over bottom schools which were initially at a depth of 48 fathoms. On other occasions the schools moved up to midwater depths of 20 to 25 fathoms, but would not surface. Lift-net catches contained either mixed scad and round herring or round herring only. The highest catch was about 100 pounds of the mixed species.

Two large tuna schools were observed off the Mississippi Delta. One school was sampled with trolling jigs and yielded blackfin tuna weighing 4 to 10 pounds and skipjack weighing 3 to 12 pounds. Sea conditions were too rough to attempt setting the lampara net.

A total of 52 bushels of calico scallops was caught off eastern Alabama in 16 fathoms using a 25-foot shrimp trawl. One 30-minute drag yielded 40 bushels. These scallops were shipped to several concerns that are engaged in developing and testing mechanical shucking devices.

Irradiation Preservation

MARKET FEASIBILITY STUDY FOR IRRADIATED FISHERY PRODUCTS UNDER WAY:

To determine the conditions under which radiation-processed fishery products should be marketed in order to provide the greatest over-all benefits to the fishing industry--producer, processor and distributor--and to the consumer, a study is being conducted by the U. S. Bureau of Commercial Fisheries for the Atomic Energy Commission.

A radiation-processing briefing session was held for Bureau marketing specialists at the Gloucester, Mass., Technological Laboratory to provide them with necessary background information for the study.

Bureau marketing specialists will be discussing the feasibility of marketing fishery products with fish producers, processors, and distributors, along with retail food groups and consumer specialists, such as newspaper food editors and extension people. A comprehensive analytical report on this study will be ready for submission to the Atomic Energy Commission on November 1, 1960.

The Atomic Energy Commission is reserving action on a number of research grants pending the outcome of this Bureau study on fish and a similar study on fresh fruits and vegetables being conducted by Stanford University.

Maine Herring Investigations

RECOVERIES FROM TAGGING AID STUDIES:

The Penobscot River-Blue Hill Bay herring tagging program by the U. S. Bureau of Commercial Fisheries Biological Laboratory at Boothbay Harbor, Maine, has been completed. Recoveries of herring tags from the August 23, 1960, tagging at Moores Harbor, Isle Au Haut, have been unusually encouraging. Of 531 tagged herring released, 18 recoveries have been received.

Records from earlier tagging at Cutler, Maine, show that herring can move along the coast at 10 miles a day, the longest known movement having been 50 miles in 5 days. This knowledge has been used in revising sampling methods for age and growth studies.

North Atlantic Fisheries Exploration and Gear Research

EXPLORATORY FISHING VESSEL "DELAWARE" BACK ON SCHEDULE:

The U. S. Bureau of Commercial Fisheries research vessel Delaware is back on its routine task of carrying out research projects designed to aid commercial fishing. The 500-ton vessel had an odd mishap last July when she became stuck halfway up a marine railway in a shipyard--she was being dry-docked for routine maintenance service and for the installation of a new underwater searching device whose purpose is to locate and track schools of fish as well as reveal the presence of underwater obstacles such as sandbars, shoals, sunken vessels, etc.

The Service's research vessel Delaware.

What proved to be a puzzling and complex problem of refloating the Delaware was overcome and she sailed from New London late in October on a cruise to familiarize Bureau personnel with the use of her new "seeing as well as hearing" aid which should permit the search of two miles of adjacent waters for the presence of fish.

The Delaware is being assigned to undertake cruises involving experiments with new and improved fishing gear, the distribution of fish populations, and collection of data for the project on future haddock resources underway at the Bureau's Woods Hole Biological Laboratory.

The Delaware, largest of the Bureau's research vessels, is manned by a crew representing experience in both commercial fishing and fisheries research and is used to carry on activities designed to: explore potential fisheries and fishing grounds; estimate the seasonal availability and the migrations of possible commercial species; introduce more efficient methods of harvesting the resources either by improvement of existing gear or by the introduction of fishing gear not customarily used in this area, and to develop, test, and evaluate electronic and other aids new to the commercial fishing industry.

North Atlantic Fishery Investigations

SURVEY OF DISTRIBUTION AND ABUNDANCE OF GROUNDFISH IN INSHORE NURSERY AREAS CONTINUED:

The vessel Capt. Bill III, chartered by the U. S. Bureau of Commercial Fisheries' Biological Laboratory at Woods Hole, Mass., completed the third of a series of cruises, to determine the distribution and abundance of bottom food fishes found in inshore waters. Special emphasis was placed on the small haddock which might be taken by trawlers using small-mesh gear, and upon the young-of-the-year haddock which were beginning to settle to the bottom in September. The survey was made in the vicinity of Cape Cod and the area between Cape Ann and the Isles of Shoals.

Haddock, whiting, and herring were found to be the most abundant of the food fishes.

Dogfish were so numerous and so destructive to fishing gear that many stations could not be sampled.

Two types of drift bottles have been released on each cruise. The surface drift bottle floats on the top water layer at the whim of the tide, current, and wind. The bottom drag bottles, ballasted so as to float just off the bottom, are moved by the currents on the ocean bottom.

These bottles are released in order that a more thorough understanding of the movement of the water in the Gulf of Maine may be applied to the movement of fish sought by the commercial fishermen.

Omaha, Nebraska

CONSUMPTION OF FROZEN FISH AND SHELLFISH IN RESTAURANTS AND INSTITUTIONS:

Although Nebraska is landlocked, frozen fishery products are purchased and served by the many restaurants and institutions in the city of Omaha, according to a 10-city survey made by Crossley S-D Surveys, Inc., for the U. S. Bureau of Commercial Fisheries.

About nine-tenths of the 174 establishments surveyed reported buying fishery products during the 12 months ending November 1958. About 48 percent of these said they purchased frozen processed fish in November 1958; 32 percent frozen processed shellfish; and 27 percent bought portions. Institutions (such as schools and hospitals) made more use of frozen processed fishery products than did public eating places.

Haddock fillets were the most popular and also the leading fish in total quantity purchased. More than two-fifths of the Omaha users of frozen processed fish bought haddock fillets during November 1958. Ocean perch fillets were the second most popular item, while cod and halibut fillets scored high on the list.

Almost half of the shellfish users in Omaha bought breaded shrimp during the survey month. Many bought frozen raw shrimp, which was the leader in terms of total quantity purchased.

More than a fourth of all the establishments in Omaha bought portions during No-

vember 1958. In this category, Omaha ranked first among the 10 cities, in percentage of

establishments buying portions. The portions most widely purchased were uncooked and breaded and the quantity purchased was much greater than that of any other type. In comparing portion-purchases, more than half of the establishments bought about the same amount during November 1958 as the year before. About one-fourth said they bought more, while 9 percent said they bought less. More than 90 percent of the users were satisfied with the present preparation, quality, and condition of both fish and shellfish. Satisfaction with the same features of frozen fish portions was unanimous by purchasers in Omaha.

The major advantages of portions were convenience and ease of preparation, cited by 67 percent of users... fast and timesaving, by 51 percent... size and uniformity, by 36 percent. Frying was the leading method of cooking frozen processed shellfish, fish, and portions. The average establishment served almost two-thirds of its shellfish fried, about 53 percent of its processed fish fried, and 78 percent of its portions fried. Baking was also a common cooking method for processed fish. The average establishment served 33 percent of this type fish baked.

Three-fourths of the profit-making establishments, which expressed an opinion, considered frozen processed fishery products more profitable than other high protein foods.

Oregon

NEW SHRIMP TRAWLING GROUNDS FOUND OFF COAST:

The first signs of good shrimp trawling grounds have been reported in waters offshore of Bandon (Coquille Point), Oregon, by biologists aboard the U. S. Bureau of Commercial Fisheries research vessel, John N. Cobb, as a result of a cooperative survey with the Oregon Fish Commission. Oregon Fish Commission biologists reported on October 10, 1960, that more than a week of exploration for new shrimp grounds off Coos Bay was not rewarding as the area was too rocky for trawling. Experimental drags off Coos Bay made in areas fished by commercial fishermen revealed only small numbers of shrimp.

South of Coos Bay soundings by electronic equipment proved the area offshore of Bandon soft and free of rocks, and subsequent trawling produced some fair-sized shrimp at a depth of from 90 to 105 fathoms. The field party chief on the vessel explained that, while experiments thus far are inconclusive as to concentrations of shrimp in sufficient quantities to establish a commercial fishery, the Bandon area presented the best grounds for trawling so far.

The John N. Cobb will continue exploring for shrimp grounds north to the Umpqua area (weather and time permitting) and as far north as Newport. (Fish Commission of Oregon, October 11, 1960.)

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SALMON REARING LAKE CONSTRUCTION BEGINS:

A contract for construction of facilities for the 20-acre Lake Wahkeena fish-rearing experiment was awarded on October 19, 1960, by Oregon's Fish Commission.

Fish-rearing ponds and lakes are relatively new in Pacific Northwest fish culture. The use of both artificial and natural ponds

and lakes for salmon rearing is proving to have merit. The impoundments vary in size from a few acres to many square miles. The small fish planted in these basins are expected to subsist on natural foods, but feeding of hatchery food may be necessary. Preliminary results have been encouraging.

The plan is to construct a 20-acre pond in the former stream bed between the old and new U. S. Highway 30 in the Columbia River Gorge area at Wahkeena Creek, about 15 miles west of Bonneville Dam. Facilities will be provided to prevent Columbia River water and scrap fish from entering the lake. Specified numbers of salmon fry will be obtained from the Bonneville Hatchery and released in the lake where they will feed naturally. Physical and chemical tests of the water will be made and biological information collected to determine the natural productivity of the lake. Release of the fish will be early in the year, prior to plantings initiating a new cycle.

On a smaller scale, a similar rearing lake of 8 acres on the Millicoma River near Coos Bay is in operation where the fish are fed artificially instead of naturally. The Millicoma Lake is owned by a timber company and the fish rearing is supervised by the Fish Commission. Early in February 1960, 80,000 silver salmon fingerlings were liberated from this pond into the East Fork of the Millicoma River which runs into the Coos River.

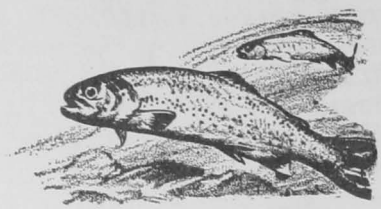
The Wahkeena operation will be for the purpose of determining the most economical method of rearing large numbers of juvenile silver salmon in a pond. Current practice is to stock about 2,000 fish per surface acre without feeding, but this varies from pond to pond and year to year. Future tests may be made to determine whether the pond production can be increased by fertilizing the water and by artificial feeding.

In order to maintain the natural productivity of the water once the pond is filled, only sufficient stream water for desirable oxygen levels and temperatures will be allowed to flow into the lake. The reminder will flow down the present channel into the Columbia River.

Fish will be collected at intervals throughout the year to study the growth of the young silver salmon used in rearing studies.

The fish to be used will be planted as yolk-sac fry in the early part of the year. Length of rearing time will depend on water conditions in the Columbia River, consistent with natural migration time.

Fish will be allowed to migrate at will and be counted as they move over the spillway. However, if a large number of fish remain in the pond, it will be drained to enumerate and liberate these fish into the Columbia and then refilled in time to receive a new crop of young fish.



Wahkeena Creek offers little spawning area to returning adults. Mature migrants will be trapped in Wahkeena Creek, spawned by hatchery personnel, and hatched at Bonneville Hatchery to provide a supply of eggs to maintain the pond.

It will take four months to complete the lake which should be ready to accommodate the small salmon by March 1961.

Oysters

MARYLAND OBSERVATIONS ON SPAWNING AND SETTING AS OF OCTOBER 1, 1960:

An interesting light oyster set occurred in St. Marys River, Maryland, during mid-September 1960. No heavy late set was found at any of the stations conducted by the Maryland Chesapeake Biological Laboratory. While water temperatures generally were still high enough up to October 1 to permit some spawning, it seems quite unlikely that further setting will occur this year. The oysters were spawned out and water temperatures were about due to fall below the level at which spawning occurs.

Very few observations of the commercial set on planted shells had been made. A report of counts made by the Department of Tidewater Fisheries indicated a valuable set on the dredged-up shells planted in Pig Cove. The latest count of a composite sample taken across those shells by a light scrape showed 810 spat per bushel.

The picture of oyster mortalities is one of major concern. The organism "MSX" associated with the Delaware Bay losses has become more widespread in the lower Chesapeake. The Virginia Fisheries Laboratory reported substantial oyster losses in June and again in September in the lower James, the Mobjack

Bay area, and at points along the Bay side of the Eastern Shore of Virginia. The organism has been found in most tributaries of the lower Eastern Shore as far up as Pocomoke Sound and in the lower part of the Rappahannock.

At the Maryland sampling stations in Holland Straits, Pocomoke Sound, and Fishing Bay "MSX" had not yet been found but an increased mortality from the fungus Dermocystidium occurred in late summer and early fall, especially in Holland Straits. This fungus has been observed for many years in the lower Bay and is found generally up to the Solomons area, and to a light extent in deep water in the Choptank River off Castle Haven Point. It often causes some mortality at this season but has not appeared in other portions of the State and apparently does not thrive in low salinity areas.

Oxygen deficiencies occurred in the Chesapeake during August that probably caused losses among oysters in deep water at locations where mixing of the water is poor. This condition disappeared after mid-September. A few reports of deep-water oyster losses, probably a result of the above condition, were reported this season.

The spread of "MSX" is almost certain to affect oysters in the lower portions of Maryland in the near future. An intensive survey of the oyster beds in all Maryland areas was started early in October 1960 in cooperation with the U. S. Bureau of Commercial Fisheries and the Department of Tidewater Fisheries.

It is not yet known whether or not stable low salinity waters, such as occur in the upper Chesapeake, will serve as a barrier to destructive mortalities of the Delaware Bay type. Laboratory experiments at Solomons are being started where the development of "MSX" infections at low salinities can be determined.

It is extremely important that no transplantings be made of "MSX"-infected oysters to uninfected areas, either in waters of high or low salinity. In the higher salinities it is known that such infected oysters will succumb rapidly and can infect other oysters. In low salinities a similar but undetermined risk exists.

Continued research by all agencies upon oyster mortalities is planned to include: (1) accurate determination of rates of mortality by all agents under different environmental conditions; (2) complete knowledge of the life cycle of the "MSX" organism; (3) the method of infection of oysters by "MSX"; (4) the role in oyster mortality played by bacteria, virus infection, and other organisms; (5) the effects of changed environmental conditions upon oyster mortality; and (6) the selection and development of resistant strains of oysters in affected areas. Much time and painstaking effort is needed to gain adequate knowledge of this nature. ("Third Report of Spat-fall and Other Oyster Observations - 1960 Season," Maryland's Chesapeake Biological Laboratory, Solomons, Md.)

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STANDARDS RESEARCH PROGRAM SHIFTED FROM VIRGINIA LABORATORY:

The Government-Industry Cooperative Oyster Research Program (GICORP) sponsored and financed by the U. S. Bureau of Commercial Fisheries, the U. S. Food and Drug Administration, and the Oyster Institute of North America, has shifted its research operations from Gloucester Point, Va., to the U. S. Bureau of Commercial Fisheries Technological Laboratory, College Park, Md. The College Park location will not alter the research progress, but will allow closer contact with the research team by the Research Director of GICORP who is also located nearby on the campus of the University of Maryland.

Preliminary evaluation of the data collected over the past two years by the research team indicates that possibly the work in the Middle Atlantic area can be completed within a short time. The research team will then move on to the Gulf and West Coasts to determine the physical and chemical characteristics of the oysters when processed under the procedures used in those areas. Those objective tests developed in the initial survey in the Chesapeake Bay area will be used to classify the characteristics of the oysters in the additional areas. The extension of the work to these other areas is necessary to provide a basis for the development of a single standard of indentity applicable to all domestically-produced fresh-shucked oysters.

Scallops

CALICO SCALLOP FISHERY IN FLORIDA:

Supply: Exploration by U. S. Bureau of Commercial Fisheries research vessels in 1960 located extensive scallop (Pecten gibbus) grounds off the Florida east coast from Daytona Beach southward to Ft. Pierce in a depth range from 10 to 32 fathoms. Commercial concentrations are now known to exist over a 1,200 square mile area, perhaps the largest known scallop bed in the world. Simulated commercial production, based on 16 experimental tows by the exploratory fishing vessel Silver Bay along the 20-fathom curve, produced 135 bushels ranging from 1 to 13 per 30-minute drag for an average of 8.5 bushels. Highest catch rate with a 10-foot New England-type dredge was 24 bushels per tow. Predominant size range in experimental catches was 2 inches to $2\frac{1}{2}$ inches diameter shell. Commercial production by industry has not yet been undertaken.

Other scallop beds had been located off Cape San Blas, Fla., as early as 1957 in the vicinity of Panama City. The greatest exploratory catch rates, as high as 40 bushels per tow, were in 10- to 20-fathom depths. Local producers have periodically utilized scallops in this area as the price and demand situation warranted.

Other exploration has shown that sizable scallop concentrations exist in the Core Banks area off North Carolina. Some commercial fishing of these stocks started in 1959. Little is known about the biology of the calico scallop or about the growth rate. Some studies have recently been started by the Bureau's Gulf Breeze (Fla.) Biological Laboratory.

Cost of Gear: A modified Georges Bank-type scallop dredge, 10-foot mouth with 2-inch rings and $1\frac{1}{2}$-inch mesh liners, costs approximately $350 (perhaps less for local construction).

Estimated cost of rigging shrimp vessel for scalloping, including dredges, is $1,000 to $2,000 depending on vessel design. As far as is known at this time, no vessels have been converted.

Yield: Florida east coast catches in the spring of 1960 yielded 4 to 5 pints of meats per bushel of shell stock. Average meats run 900 to 1,100 per gallon. There is a definite variation in yield and quality, but the exact causes are yet undeterminded. Further exploratory fishing planned on a seasonal basis should shed some light on these factors. It is assumed that these are associated with seasonal conditions of water temperature, maximum spawning activity, or some mortality factor.

Fig. 1 - The yield of one drag by the exploratory fishing vessel Silver Bay on the Florida east coast calico scallop grounds.

Shucking: Hand shucking is comparatively slow because of small size, shape of shell, and necessity for separating scallop meats from viscera. Mechanical shuckers are being investigated. One type of mechanical oyster shucker is reported to open 250 bushels of scallops per hour, but will not separate meats from viscera. The blanching of the scallops with steam causes muscle release on both shells. Scallops are then tumbled in a cylindrical drum where the shells exit from the end and meats and viscera fall through.

Fig. 2 - Shucked calico scallop meats aboard the exploratory fishing vessel Silver Bay.

Shell particles are separated from the meats by flotation. Industry members are experimenting with this method. The Bureau's Technological Laboratory at Pascagoula is exploring the use of a centrifuge as a separator. There is a possibility that an egg-spinning machine can be adapted for this purpose. The Laboratory has also developed a prototype combination hot water and vacuum apparatus to accomplish production-line mechanical shucking. All developments are still in the early experimental stages; however, some machine makers have shown interest in development of equipment.

Quality: Tender, tasty, appetizing. From limited observations, keeping quality under refrigeration appears good. Pascagoula Technological Laboratory is running some experiments on freezing and storage with final results unavailable until storage time elapses.

Market Situation: Supply of New England scallops is now very plentiful. The Florida Development Commission is active in promoting the use of calico scallops and development of beds as well as possible market outlets. Any large-scale production of calico scallops will require active market promotion to acquaint consumers with the product. New product development with scallop ingredients offers another possibility for improved market.

Byproduct Possibility: Scallop waste or viscera has been shown by Japanese researchers to have unusual growth rate stimulation when mixed with poultry feed. Research needs to be done on this for a more definite determination of scallop waste value as applied specifically to calico scallops.

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CHEMICAL COMPOSITION TO BE STUDIED:

The chemical composition of sea scallops is the objective of a joint research project by the U. S. Bureau of Commercial Fisheries Technological Laboratory at Gloucester, Mass., and the Biological Laboratory at Woods Hole, Mass.

The biologists will collect sea scallops together with information on maturity and state of sexual development and on the area from which they were caught. The Technological Laboratory will analyze the adductor muscle (edible portion) and viscera of the samples for proximate composition, sodium, potassium, and amino acids. It is hoped through this cooperative program, to be able to obtain information on some of the basic factors that contribute to changes in the chemical composition of scallops and to provide additional data that may be useful in biological research on this shellfish. The study will continue for at least a year, during which time it is planned to expand this joint effort to include other species of fish and shellfish.

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LANDINGS FROM GEORGES BANK TO BE LOWER IN 1961:

The unusual abundance of sea scallops on certain parts of Georges Bank in 1959-60 was the result of an unusually heavy set in 1955, according to U. S. Bureau of Commercial Fisheries biologists.

The Bureau's Woods Hole Laboratory biologists first found the 1955-year class in May 1959, when they were still too small to be of commercial value. At that time it was possible to catch up to 3,000 scallops in a 30-minute drag of a 10-foot scallop dredge.

The New Bedford scallop fishing fleet began to fish on that ground in July 1959. At first, they kept only the larger individuals of the 1955 age group, but by November 1959 all had grown large enough to be harvested, and by that time this single age group accounted for over 90 percent of the landings from that ground.

By May of 1960, the population in the area had been reduced to the point where it was only possible to catch about 800 sea scallops in a 30-minute drag. They were, of course, larger and the fleet continued to work the ground until September of this year when it was finally abandoned.

The same situation, although not quite so spectacular, had prevailed on two other grounds during the same period. Those grounds also appeared to be about fished out by September 1960.

Bureau records show that a drop in landings has always occurred in the fall. About 60 percent of an average year's landings of sea scallop meats are made between April and September. The colder, windier months of October through March account for only about 40 percent of a year's total. On this basis alone, landings are expected to decline some.

In addition, the 1956 age group, which is now large enough to be worth shucking, is not present in as great numbers as the unusually abundant 1955 age group. Bureau biologists, therefore, expect that landings of sea scallop meats will drop somewhat during the last 3 months of 1960 to the level of about 3.5 million pounds which prevailed during the last quarter of the years 1955-1958.

Landings in 1961 will no doubt be lower than in 1960, but whether they will be lower than 2 or 3 years ago depends upon the abundance of the 1957 age group which will enter the fishery in the summer and fall of 1961. As part of its investigation of the many factors that affect the abundance of commercially-important species of our marine resources, the biologists will sample the 1959 age group in the spring of 1961.

Shrimp

LOUISIANA INITIATES MARKING PROGRAM:

The Louisiana Wild Life and Fisheries Commission, Oysters, Water Bottoms, and Seafood Division, initiated a shrimp-marking program in the summer of 1960. The program is part of a cooperative effort of the Gulf States Marine Fisheries Commission and the U. S. Bureau of Commercial Fisheries to determine patterns of movement of certain species of shrimp from the nursery ground, located in the estuarine areas along the Gulf Coast, to the offshore fishery where these shrimp are captured by the commercial shrimp fisheries, according to the Commission Director.

During the second week of June 1960, workers of the Louisiana Wild Life and Fisheries Commission caught and marked with a biological stain, 12,000 juvenile brown shrimp, Penaeus aztecus. These shrimp were taken, marked, and released in the western portion of Mississippi Sound.

Under this program, juvenile shrimp will be stained and released in two additional areas. The areas are the Barataria Bay Estuarine Composite and the Vermilion Bay Estuarine complex. Over 10,000 brown shrimp will be marked and released, at each site, with hope of a good recovery.

A reward is offered for each marked shrimp returned. By establishing this reward it is hoped that more cooperation and interest will be stimulated among the shrimp fishermen, dealers, and processors. "A surveillance and coverage of the shrimp fishery along with organized advertising of the staining program will insure a higher recovery of marked shrimp. The returns should be of sufficient quantity to yield valid data which will be utilized in formulating management plans to protect, promote, and prolong one of our most valuable marine resources," the Chief of the Oysters, Water Bottoms and Seafood Division said.

Fifty cents reward will be paid for each returned shrimp, stained with a fast green biological dye. The chemical is harmless to humans. (Louisiana Conservationist, July-August-September 1960.)

Sport Fishing

ALMOST TWENTY MILLION FISHERMEN IN 50 STATES:

During 1959 a total of 19,914,021 fishermen in 50 states purchased one or more licenses to fish, the U. S. Department of the Interior reported on October 30, 1960. This is a slight decline of 1.3 percent from the number of fishermen reported during 1958.

Fishermen in 50 states spent a total of $50,374,832 for fishing licenses, tags, permits, and stamps required by state fish and game departments to legally fish for sport or recreation. During 1958 sport fishermen spent $45,410,462 for the same purposes. Expenditures for 1959 exceeded those for 1958 by $4,964,370.

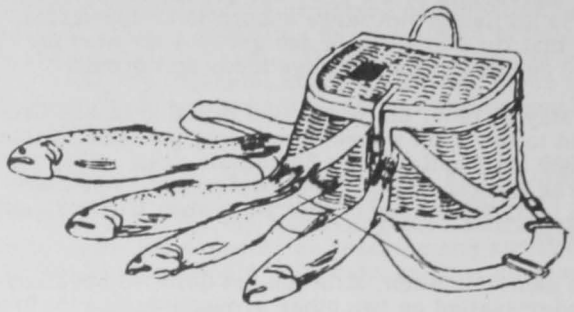
Examination of certified data for 1959 indicates that the number of persons buying one or more licenses to fish for sport or recreation varies from year to year. The number of licenses sold is influenced by types of licenses available to fishermen, weather conditions, the relative abundance of fish and other factors.

Table 1 - Summary of Number of Paid Fishing License Holders, License Sales, and the Cost to Fishermen in United States, July 1, 1958 to June 30, 1959

States	Paid Fishing License Holders1/	Total Fishing Licenses, Tags, Permits, and Stamps Issued2/	Gross Cost to Fishermen
Alabama	511,882	519,717	$ 784,548.30
Alaska	31,886	51,990	127,388.94
Arizona	205,895	210,180	567,514.00
Arkansas	489,729	489,729	1,205,713.55
California	1,475,977	3,407,196	6,230,229.31
Colorado	406,130	406,130	1,458,737.50
Connecticut	109,018	109,072	418,032.89
Delaware	11,524	11,960	22,395.60
Florida	495,333	521,180	1,052,795.50
Georgia	500,565	515,758	669,217.25
Hawaii	2,383	2,383	5,116.00
Idaho	244,570	244,828	948,750.00
Illinois	699,300	699,300	1,512,636.25
Indiana	742,131	746,012	1,047,068.25
Iowa	400,447	383,301	753,024.87
Kansas	254,715	254,720	522,456.75
Kentucky	402,393	402,393	969,836.85
Louisiana	192,290	192,290	259,106.00
Maine	218,226	220,008	781,088.62
Maryland	95,765	97,323	330,155.75
Massachusetts	226,305	227,642	648,888.88
Michigan	1,056,462	1,259,034	3,072,276.00
Minnesota	1,238,250	1,409,751	2,110,002.15
Mississippi	264,144	273,419	559,782.12
Missouri	665,819	794,700	1,815,826.75
Montana	232,731	232,731	493,728.50
Nebraska	191,979	228,442	454,815.00
Nevada	58,164	59,026	253,175.50
New Hampshire	134,118	134,297	439,959.04
New Jersey	153,608	239,349	602,429.90
New Mexico	143,075	143,075	541,987.40
New York	783,362	980,511	2,205,416.75
North Carolina	400,495	475,812	862,562.75
North Dakota	87,304	87,304	93,752.00
Ohio	838,708	875,766	1,208,197.50
Oklahoma	469,638	469,638	1,047,524.50
Oregon	325,278	403,438	1,240,599.75
Pennsylvania	629,635	647,314	2,132,285.00
Rhode Island	15,717	21,942	52,977.87
South Carolina	278,079	280,244	540,752.70
South Dakota	138,893	138,988	264,056.00
Tennessee	791,393	885,132	1,137,190.50
Texas	825,793	825,793	1,776,195.19
Utah	190,960	195,036	558,881.47
Vermont	111,795	111,795	266,246.25
Virginia	403,245	558,554	735,635.00
Washington	366,366	366,366	1,561,239.87
West Virginia	207,899	249,289	455,187.65
Wisconsin	1,032,463	1,032,480	3,051,755.00
Wyoming	162,184	189,383	525,693.00
Totals	19,914,021	22,861,880	$50,374,832.17

1/A paid license holder is one individual regardless of the number of licenses purchased. Data certified by state fish and game departments.
2/Period covered not identical to period covered by certification for all states.
Source: Compiled from information furnished by state fish and game departments.

Some state fish and game departments require sportsmen to purchase separate licenses



tags, permits, or stamps for fishing different species of fish as well as for fishing in different areas. Other states issue only one fishing license which is good for all species of legal fish. Thus, the total number of tags, licenses, permits, or stamps sold is not an accurate reflection of the number of persons holding paid licenses to fish.

Tuna

PROGRESS MADE IN STUDIES ON COMPOSITION:

A project to determine the composition of tuna and tuna-like fish has been under way for more than a year in the U. S. Bureau of Commercial Fisheries Technological Laboratory in Seattle, Wash. Compared to other salt-water species, it has been determined as of August 1960, that tuna and tuna-like fish are low in moisture and sodium and high in protein. The oil content varies within the range of 1 percent to 15 percent.

The study involves the collection of two series of ten fish each, taken each season over a three-year period. The investigation of skipjack is in its first year and albacore in its second year. Some exploratory composition work has also been done on both bluefin and yellowfin tuna.

U. S. Fishery Landings, January-August 1960

Landings of fish and shellfish in the United States during the first eight months of 1960 totaled 3.0 billion pounds--about 3 percent less than for the same period of 1959.

Table 1 - United States Fishery Landings of Certain Species for Periods Shown, 1960 and 1959 1/

Species	Period	1960	1959	Total 1959
		(1,000 lbs.)		
Anchovies, Calif.	8 mos.	2,200	2,022	7,174
Cod:				
Maine	8 mos.	2,400	2,290	2,694
Boston 2/	8 "	11,100	13,046	17,709
Gloucester 2/	8 "	2,200	2,216	3,233
Total cod		15,700	17,552	23,636
Haddock:				
Maine	8 mos.	2,300	2,405	3,405
Boston 2/	8 "	54,700	52,990	72,378
Gloucester 2/	8 "	9,500	10,219	12,103
Total haddock		66,500	65,614	87,886
Halibut 3/:				
Alaska	8 mos.	19,300	20,414	22,537
Wash. and Oreg.	8 "	15,300	16,201	17,908
Total halibut		34,600	36,615	40,445
Herring:				
Maine	8 mos.	105,800	83,174	117,150
Alaska (season over)	9 "	56,000	107,444	107,444
Industrial fish, Me. & Mass. 4/	8 "	30,900	72,482	103,312
Mackerel:				
Jack	8 mos.	43,600	15,810	37,507
Pacific	8 "	14,100	12,792	37,602
Menhaden	8 "	1,482,200	1,528,240	2,193,866
Ocean perch:				
Maine	8 mos.	55,100	51,089	75,225
Boston	8 "	700	1,968	3,280
Gloucester	8 "	47,100	40,663	58,197
Total ocean perch		102,900	93,720	136,702
Salmon:				
Alaska	9 mos.	203,000	147,278	147,278
Washington	7 "	2/ 4,000	2/ 5,668	42,308
Oregon	7 "	2/ 2,400	2/ 2,866	5,329
Sardines, Pacific	to Oct. 6	29,100	19,775	74,367
Scallops, sea (meats), New Bedford	8 mos.	13,000	12,294	18,814
Shrimp (heads-on):				
South Atlantic & Gulf States	8 mos.	130,200	120,289	219,509
Wash.	7 "	1,200	2,045	3,046
Oregon	7 "	400	2,114	2,734
Squid, Calif.	8 "	600	15,482	19,653
Tuna, Calif.	to Sept. 30	226,000	227,800	254,786
Whiting:				
Maine	8 mos.	10,700	21,923	23,339
Boston	8 "	200	492	687
Gloucester	8 "	40,700	44,040	61,797
Total whiting		51,600	66,455	85,823
Total all above items		2,616,000	2,657,531	3,766,371
Others (not listed)		430,000	489,101	1,333,629
Grand total		3,046,000	3,146,632	5,100,000

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

Table 2 - United States Fishery Landings by States for Periods Shown, 1960 and 1959 1/

Area	Period	1960	1959	Total 1959
		(1,000 lbs.)		
Maine	8 mos.	203,300	186,289	265,958
Massachusetts 2/:				
Boston	8 mos.	76,200	79,741	113,257
Gloucester	8 "	136,500	161,489	228,723
New Bedford	8 "	58,200	77,943	107,961
Provincetown	8 "	17,700	17,183	27,700
Total Mass.		288,600	336,356	477,641
Rhode Island 3/	7 mos.	38,400	80,968	101,548
New York 3/	7 "	25,900	23,217	39,387
New Jersey 3/	7 "	39,700	33,093	63,404
Maryland 3/	8 "	40,100	42,106	60,847
North Carolina 3/	8 "	38,200	41,737	62,724
South Carolina 3/	8 "	10,700	9,288	18,654
Georgia	7 "	11,500	9,610	21,513
Florida 3/	7 "	82,200	79,288	148,724
Alabama	8 "	14,400	12,100	14,022
Mississippi 3/	6 "	7,100	8,055	78,866
Louisiana 3/	4 "	20,600	21,670	94,191
Texas 3/	8 "	32,300	40,731	92,913
Ohio (season: Mar.-Dec.)	(Mar.-July)	13,900	14,361	18,586
Alaska:				
Halibut 4/	8 mos.	19,300	20,414	22,537
Herring (season over)	9 "	56,000	107,444	107,444
Salmon	9 "	203,000	147,278	147,278
Washington	7 "	57,600	70,563	155,200
Oregon	7 "	25,700	25,974	51,700
California:				
Certain species 5/	8 mos.	315,600	293,681	431,089
Other	5 "	31,200	35,632	82,339
Total Calif.		346,800	329,313	513,428
Hawaii	6 mos.	4,700	7,031	16,570
Rhode Island, Middle Atlantic, Chesapeake, South Atlantic, and Gulf States (menhaden only)	8 mos.	1,466,000	1,499,746	2,158,423
Total all above		3,046,000	3,146,632	4,731,558
Others not listed		6/	6/	368,442
Grand total		6/	6/	5,100,000

1/Preliminary.
2/Landed weight.
3/Excludes menhaden.
4/Dressed weight.
5/Includes catch of anchovies, jack and Pacific mackerel, Pacific sardines, squid, and tuna. Data on tuna are through September 30 and on Pacific sardines through October 6.
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.

The greatest declines occurred in production of fish used in the manufacture of fish meal and oil. Landings of these fish in Maine and Massachusetts during the first eight months of 1960 were down 42 million pounds while the menhaden catch decreased 46 million pounds compared with the same period of 1959. Total landings of herring in Alaska dropped from 107 million pounds in 1959 to 56 million pounds. Among the species used primarily for food, production of whiting during the first eight months of the year dropped 15 million pounds below that of the comparable period of 1959.

A considerable increase was reported in the Alaska salmon fishery which totaled 203 million pounds in 1960--a gain of 56 million pounds over 1959. Compared with the same period of 1959, landings of Pacific sardines through October 6, 1960 (29 million pounds) were up 9 million pounds; the catch of California tuna through September 30 (226 million pounds) remained almost the same; and the production of jack mackerel during the first eight months increased 28 million pounds.

On the Atlantic Coast the first eight-months' catch of Maine herring increased 23 million pounds and ocean perch landings rose 9 million pounds over the same period of 1959. During the first eight months of 1960, shrimp landings of 130 million pounds--up 10 million pounds over the comparable period of 1959--were reported in the South Atlantic and Gulf States.

United States Fishing Fleet[1/] Additions

JULY 1960:

A total of 48 vessels of 5 net tons and over were issued first documents as fishing craft during July 1960--a decrease of 12 vessels as compared with the same month in 1959. The Pacific area led with 16 vessels, while the New England, South Atlantic, and Gulf areas were next with 7 each. Alaska followed with 4 vessels, the Chesapeake with 3, and the Middle Atlantic and Great Lakes with 2 each.

Table 1 - U. S. Vessels Issued First Documents as Fishing Craft by Areas, July 1960

Area	July 1960	July 1959	Jan.-July 1960	Jan.-July 1959	Total 1959
	(Number)				
New England	7	2	19	10	15
Middle Atlantic	2	1	11	6	12
Chesapeake	3	11	41	56	106
South Atlantic	7	15	34	59	76
Gulf	7	12	50	88	135
Pacific	16	11	87	70	97
Great Lakes	2	-	9	5	6
Alaska	4	8	18	28	32
Total	48	60	269	322	479

Note: Vessels have been assigned to the various areas on the basis of their home ports.

Table 2 - U. S. Vessels Issued First Documents as Fishing Craft by Tonnage, July 1960

Net Tons	Number
5 to 9	24
10 to 19	14
20 to 29	3
30 to 39	2
40 to 49	1
50 to 59	2
60 to 69	1
230 to 239	1
Total	48

During the first seven months of 1960, a total of 269 vessels were issued first documents as fishing craft--53 less than were reported during the same period of 1959. Most of the decline occurred in the Gulf area--38 vessels less as compared with the 1960 seven-months period.

* * * * *

AUGUST 1960:

During August 1960, 45 vessels of 5 net tons and over were issued first documents as fishing craft--an increase of 9 vessels as compared with the same month of last year. The Pacific area led with 12 vessels. The Gulf was second with 10 vessels followed by the Chesapeake with 7, and the New England and South Atlantic areas with 6 each. The Great Lakes and the Middle Atlantic areas accounted for the remaining 4 vessels.

Table 1 - U. S. Vessels Issued First Documents as Fishing Craft by Areas, August 1960

Area	August 1960	August 1959	Jan.-Aug. 1960	Jan.-Aug. 1959	Total 1959
	(Number)				
New England	6	1	25	11	15
Middle Atlantic	1	-	12	6	12
Chesapeake	7	4	48	60	106
South Atlantic	6	8	40	67	76
Gulf	10	14	60	102	135
Pacific	12	7	99	77	97
Great Lakes	3	-	12	5	6
Alaska	-	2	18	30	32
Total	45	36	314	358	479

Note: Vessels assigned to the various areas on the basis of their home ports.

During the first eight months of 1960, a total of 314 vessels were issued first documents as fishing craft--44 less than the same period of 1959. Most of the decline occurred in the Gulf area--a drop of 42 vessels, as compared with the eight-months period of last year.

Table 2 - U. S. Vessels Issued First Documents as Fishing Craft by Tonnage, August 1960

Net Tons	Number
5 to 9	28
10 to 19	8
20 to 29	4
40 to 49	2
50 to 59	2
250 to 259	1
Total	45

U. S. Foreign Trade

EDIBLE FISHERY PRODUCTS, AUGUST 1960:

Imports of edible fresh, frozen, and processed fish and shellfish into the United States

1/Includes both commercial and sport fishing craft.

during August 1960 increased by 6.2 percent in quantity and 8.7 percent in value as compared with July 1960. The increase was due primarily to higher imports of frozen albacore and other tuna (up 2.5 million pounds), fresh and frozen salmon (up 1.2 million pounds), and to a lesser degree, an increase in the imports of canned tuna in brine, frozen shrimp, and lobster and spiny lobster. The increase was partly offset by a 3.8 million-pound decrease in the imports of groundfish fillets and blocks.

Compared with August 1959, the imports in August this year were up by 14.1 percent in quantity and 21.7 percent in value due to higher imports of frozen albacore and other tuna (up 8.4 million pounds), and frozen shrimp (up 1.3 million pounds). Compensating, in part, for the increases was a drop of about 1.0 million pounds in the imports of fresh swordfish and canned salmon (down 1.0 million pounds).

U. S. Imports and Exports of Edible Fishery Products, August 1960 with Comparisons

Item	QUANTITY			VALUE		
	August		Year	August		Year
	1960	1959	1959	1960	1959	1959
	(Millions of Lbs.)			(Millions of $)		
Imports:						
Fish & shellfish: Fresh, frozen, & processed 1/	98.0	85.9	1,070.5	27.5	22.6	309.6
Exports:						
Fish & shellfish: Processed only 1/ (excluding fresh & frozen)	2.3	4.6	68.0	1.5	1.6	22.8

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

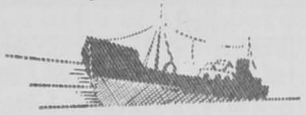
United States exports of processed fish and shellfish in August 1960 were higher by 9.2 percent in quantity and 50.0 percent in value as compared with July 1960. Compared with the same month in 1959, the exports this August were lower by 50.0 percent in quantity and 6.2 percent in value. The lower exports in August this year as compared with the same month in 1959 were due mainly to the much lower exports of California sardines. Exports of high value fishery products, such as canned shrimp and both canned and frozen salmon, were higher this August than the same month of 1959.

* * * * *

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 1960 at the 12½-percent rate of duty is 53,448,330 pounds. Any imports in excess of the quota will be dutiable at 25 percent ad valorem.

Imports from January 1-October 1, 1960, amounted to 37,708,987 pounds, according to data compiled by the Bureau of Customs.



U. S. Production of Fish Sticks and Portions, July-September 1960

The United States production of fish sticks during the third quarter of 1960 amounted to 13.9 million pounds, while the production of fish portions totaled 12.0 million pounds. This was a gain in production of 7 percent for fish sticks and 40 percent for portions as compared with the same quarter of 1959. Most of the increase in fish-stick production occurred in cooked sticks (up almost 1.0 million pounds). The increase in portions was attributed to a greater production of raw breaded portions (up 2.5 million pounds).

Table 1 - U. S. Production of Fish Sticks by Months and Type, July-September 1960 1/

Month	Cooked	Uncooked	Total
	(1,000 Lbs.)		
July	3,454	317	3,771
August	4,553	393	4,946
September	4,733	479	5,212
Total 3rd quarter 1960	12,740	1,189	13,929
Total 3rd quarter 1959	11,789	1,209	12,998
Total first 9 months 1960	43,344	3,392	46,736
Total first 9 months 1959	41,132	3,746	44,878

1/Preliminary.

Table 2 - U. S. Production of Fish Portions by Months and Type, July-September 1960 1/

Month	Breaded			Unbreaded	Total
	Cooked	Uncooked	Total		
	(1,000 Lbs.)				
July	518	3,399	3,917	185	4,102
August	556	2,770	3,326	127	3,453
September	859	3,318	4,177	270	4,447
Total 3rd quarter 1960	1,933	9,487	11,420	582	12,002
Total 3rd quarter 1959	1,095	7,000	8,095	486	8,581
Total first 9 months 1960	5,318	27,509	32,827	1,410	34,237
Total first 9 months 1959	3,722	20,514	24,236	1,852	26,088

1/Preliminary.

Cooked fish sticks (12.7 million pounds) made up 91 percent of the fish stick total. The remaining 9 percent consisted of raw fish stioks. A total of 11.4 million pounds of breaded fish portions (of which 9.5 million pounds were raw) and 582,000 pounds of unbreaded (raw) portions was processed during the third quarter of 1960.

The Atlantic Coast was the principal area in the production of fish sticks and portions with a total of 18.8 million pounds. The remaining 7.1 million pounds of sticks and portions were packed in inland, Gulf, and Pacific Coast States.

Table 3 - U. S. Production of Fish Sticks by Areas, July-September 1960 and 1959

Area	1960[1]		1959[2]	
	No. of Firms	1,000 Lbs.	No. of Firms	1,000 Lbs.
Atlantic Coast States	22	11,447	24	10,812
Inland and Gulf States	4	1,277	6	1,213
Pacific Coast States	8	1,205	10	973
Total	34	13,929	40	12,998

1/Preliminary.
2/Revised.

Table 4 - U. S. Production of Fish Portions by Areas, July-September 1959 and 1960

Area	1960[1]		1959[2]	
	No. of Firms	1,000 Lbs.	No. of Firms	1,000 Lbs.
Atlantic Coast States	20	7,363	23	4,351
Inland and Gulf States	6	4,433	8	4,093
Pacific Coast States	5	206	4	137
Total	31	12,002	35	8,581

1/Preliminary.
2/Revised.

Table 5 - U. S. Production of Fish Sticks by Months, 1956-1960

Month	1960[1]	1959[2]	1958[2]	1957	1956
			(1,000 Lbs.)		
January	5,503	6,265	5,471	4,261	4,862
February	6,534	6,340	5,925	5,246	5,323
March	7,836	5,594	5,526	5,147	6,082
April	4,867	4,708	4,855	4,492	3,771
May	3,706	4,398	4,229	3,380	3,873
June	4,361	4,575	4,702	3,522	3,580
July	3,771	3,783	4,574	3,821	3,153
August	4,946	3,872	4,358	4,643	4,166
September	5,212	5,343	5,328	4,861	4,085
October	-	5,831	5,485	5,162	5,063
November	-	4,822	5,091	4,579	4,585
December	-	4,734	5,467	4,014	4,019
Total	-	60,265	61,011	53,128	52,562

1/Preliminary (includes revisions for first six months).
2/Revised.

Table 6 - U. S. Production of Fish Portions by Months, 1958-1960

Month	1960[1]	1959[2]	1958
		(1,000 Lbs.)	
January	3,620	2,692	1,973
February	3,451	3,025	1,254
March	4,615	3,225	1,471
April	3,415	2,634	2,268
May	3,196	2,684	1,478
June	3,938	3,247	1,504
July	4,102	2,227	2,161
August	3,453	2,796	1,516
September	4,447	3,558	1,566
October	-	4,314	2,560
November	-	3,483	1,979
December	-	3,262	2,060
Total	-	37,147	21,790

1/Preliminary (includes revisions for first six months).
2/Revised.

During the first nine months of 1960, a total of 46.7 million pounds of fish sticks was produced--an increase of 4 percent compared with the corresponding period of the previous year. Fish portions(34.2 million pounds) were 31 percent greater than the nine-months period of 1959.

Note: See Commercial Fisheries Review, September 1960 p. 33.

Wholesale Prices, October 1960

The mid-October 1960 wholesale price index for edible fishery products (fresh, frozen, and canned) at 129.4 percent of the 1947-49 average was up slightly (1.0 percent) from the preceding month and up 6.9 percent from the same month of 1959. From September to October, higher prices for fresh large haddock, oysters, frozen fillets, frozen shrimp, and canned fish were just about balanced out by lower prices for fresh haddock fillets, fresh shrimp, frozen halibut, and the fresh-water varieties. Wholesale prices in October 1960 increased over October 1959, due mainly to higher prices for fresh and frozen shrimp, oysters, fresh large haddock, frozen salmon, and canned fish. These increases more than offset lower wholesale prices for fresh and frozen haddock fillets, fresh-water whitefish and yellow pike, and frozen halibut.

The wholesale price index for the drawn, dressed, and whole finfish subgroup in October declined 2.0 percent from the preceding month. Normal price declines for fresh-water whitefish and yellow pike at New York following the Jewish holidays, plus a slight drop (1.0 percent) in the frozen dressed halibut price and a drop of 4.0 percent in salmon prices (due to change-over from fresh to frozen pricing) accounted for the change. An increase of about 2 cents a pound (17.5 percent) in large haddock prices at Boston partially compensated for the decline. From October 1959 to this October, the wholesale price index increased 8.2 percent, due to higher large haddock prices (up 10.6 percent) and frozen dressed salmon prices (up 14.1 percent). These increases were offset in part by lower prices for fresh-water whitefish and yellow pike, and frozen dressed halibut (down 4.2 percent).

The fresh processed fish and shellfish subgroup wholesale price index in October declined 1.2 percent from September. A

slight drop (1 cent a pound) in the small haddock fillet price at Boston plus a sharper drop of about 10.0 percent in fresh shrimp prices at New York more than offset a 7.2-percent higher shucked oyster price at Norfolk, Va. However, from October 1959 to October 1960, the subgroup price index rose by 5.0 percent due to a higher (11.1 percent) oyster price and a 4.1-percent increase in the fresh shrimp price. These increases were partly offset by a sharply lower price (28.2 percent) for fresh small haddock fillets.

In mid-October 1960 the wholesale price index for the frozen processed fish and shellfish subgroup rose by 5.1 percent as compared with September. A jump of about 5 cents a pound or 7.2 percent in the frozen 26-30 count shrimp price at Chicago plus increases of $\frac{1}{2}$-1 cent a pound in the frozen fillet items (due in part to healthier inventories) were responsible for the increase. From October a year ago to October 1960 the subgroup price index increased 8.7 percent. Frozen shrimp prices were up sharply (19.8 percent). This, plus less pronounced increases of 3.7 percent in ocean perch and 2.6 percent in flounder fillet prices, more than offset a drop of 10.8 percent in the frozen small haddock fillet price.

The canned fish subgroup price index continued to inch upward in October as compared with the preceding month and the same month of 1959 due mainly to short supplies of canned pink salmon. The October 1960 index for canned fish at 109.6 percent of the 1947-49 average was up 2.9 percent from September and 5.6 percent above October 1959. In October 1960 the canned pink salmon price

Table 1 - Wholesale Average Prices and Indexes for Edible Fish and Shellfish, October 1960 With Comparisons

Group, Subgroup, and Item Specification	Point of Pricing	Unit	Avg. Prices 1/ ($)		Indexes (1947-49=100)			
			Oct. 1960	Sept. 1960	Oct. 1960	Sept. 1960	Aug. 1960	Oct. 1959
ALL FISH & SHELLFISH (Fresh, Frozen, & Canned)					129.4	128.1	124.4	121.1
Fresh & Frozen Fishery Products:					143.7	143.7	138.5	134.0
Drawn, Dressed, or Whole Finfish:					166.4	169.8	158.1	153.8
Haddock, lge., offshore, drawn, fresh	Boston	lb.	.14	.12	141.5	120.4	88.9	127.9
Halibut, West., 20/80 lbs., drsd., fresh or froz.	New York	lb.	.31	.31	94.4	95.4	109.9	98.5
Salmon, king, lge. & med., drsd., fresh or froz.	New York	lb.	.90	.94	202.2	210.6	202.2	177.2
Whitefish, L. Superior, drawn, fresh	Chicago	lb.	.74	.74	183.5	183.5	158.7	185.9
Whitefish, L. Erie pound or gill net, rnd., fresh	New York	lb.	.74	1.00	149.7	202.3	149.7	202.3
Yellow pike, L. Michigan & Huron, rnd., fresh	New York	lb.	.58	.77	134.8	179.4	170.0	161.8
Processed, Fresh (Fish & Shellfish):					135.3	137.0	131.6	128.9
Fillets, haddock, sml., skins on, 20-lb. tins	Boston	lb.	.31	.32	103.8	108.9	90.2	144.6
Shrimp, lge. (26-30 count), headless, fresh.	New York	lb.	.65	.72	102.7	114.1	106.6	98.7
Oysters, shucked, standards	Norfolk	gal.	7.50	7.00	185.6	173.2	173.2	167.1
Processed, Frozen (Fish & Shellfish):					115.7	110.1	112.6	106.4
Fillets: Flounder, skinless, 1-lb. pkg.	Boston	lb.	.39	.39	102.1	100.8	102.1	99.5
Haddock, sml., skins on, 1-lb. pkg.	Boston	lb.	.29	.28	91.0	87.9	84.8	102.0
Ocean perch, skins on, 1-lb. pkg.	Boston	lb.	.28	.27	112.8	108.7	108.7	108.8
Shrimp, lge. (26-30 count), 5-lb. pkg.	Chicago	lb.	.74	.69	114.2	106.5	111.5	95.3
Canned Fishery Products:					109.6	106.5	104.8	103.4
Salmon, pink, No. 1 tall (16 oz.), 48 cans/cs.	Seattle	cs.	27.00	25.50	140.9	133.0	127.8	127.8
Tuna, lt. meat, chunk, No. 1/2 tuna (6-1/2 oz.), 48 cans/cs.	Los Angeles	cs.	11.10	11.10	80.0	80.0	80.0	77.9
Sardines, Calif., tom. pack, No. 1 oval (15 oz.), 48 cans/cs.	Los Angeles	cs.	7.75	7.65	91.0	89.8	93.9	88.1
Sardines, Maine, keyless oil, 1/4 drawn (3-3/4 oz.), 100 cans/cs.	New York	cs.	8.75	8.75	93.1	93.1	93.1	93.1

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

rose $1.50 a case or 5.9 percent from the preceding month and was 10.3 percent ($2.50 a case) above October a year earlier. Other items in the canned fish subgroup were about unchanged in October 1960 from a month earlier and either unchanged (Maine sardines) or slightly higher for California sardines (up 3.3 percent) and light meat tuna (up 2.3 percent). The packing season for Maine sardines was about over at the end of October with a pack up moderately from the 1959 season. The catch and pack of southern California sardines for the first two months of the September 1-December 31 season were extremely poor. The California pack of canned tuna, although very good, was falling 1-2 percent behind the good pack of 1959 as October 1960 ended.

American Samoa

TUNA LANDINGS, SEPTEMBER 1960:

In September 1960, tuna receipts at the tuna cannery in American Samoa amounted to about 2.5 million pounds, or close to 1.4 percent above the landings in August. Landings for January-September 1960 of 20.6 million pounds were up 5.9 percent from the 19.5 million pounds landed during the first nine months of 1959.

American Samoa Tuna Landings, September 1960

Species	September		January-September	
	1960	1959	1960	1959
	(1,000 Lbs.)			
Albacore	2,356	2,077	17,450	15,284
Yellowfin	130	322	1,991	3,431
Big-eyed	10	63	1,165	748
Skipjack	-	-	10	4
Total	2,496	2,462	20,616	19,467

Note: Majority of the tuna was landed by Japanese long-line vessels; a small amount was landed by a South Korean long-line vessel.

Whiting

FISH HELD IN REFRIGERATED SEA WATER STAYS FRESH LONGER:

Applied research on methods of extending the storage life of fresh dressed whiting while being held for processing has been completed by the Gloucester Technological Laboratory of the U. S. Bureau of Commercial Fisheries. With the completion of organoleptic tests and proximate analyses of whiting held in refrigerated sea water and in crushed ice, commercial-scale experiments are to be carried out in a fish plant in Rhode Island. A 3,000-pound-capacity refrigerated sea-water unit has been installed in the plant to conduct the tests in the near future.

Results of the laboratory experiments have shown that fresh dressed whiting stored in refrigerated sea water are of good quality after 11 days of storage. In contrast, fresh whiting stored in ice (similar to the usual commercial practice of storage before processing) are of good quality only up to 7 days and are of only fair quality after 11 days.

DEEPEST OCEAN DIVE

The recorded depth reported in under this title in the August 1960 issue (p. 13) of the Commercial Fisheries Review was based on preliminary data. Later studies of the data revealed that the bathyscaph Trieste, operated by the United States Navy Electronics Laboratory, dived 35,805 feet to the bottom of the Challenger Deep in the Marianas Trench, in the Pacific, on January 23, 1960. At that time a preliminary figure, for the depth of the dive, of 37,800 feet was released, but it was emphasized that it was an uncorrected figure.

During the first week of February, the depth gauge used on the deep dive was recalibrated at the Naval Weapons Plant at Washington, D. C. On the basis of this new calibration, the true depth of the Challenger Deep was recalculated from assumed density structure and gravity anomalies. Thus the latest depth computation of the dive is 35,805 feet. To this figure should be added the height of the pressure sensor above the bottom when the Trieste was at rest on the bottom. The greatest uncertainty in this figure of 35,805 feet is probably in the value adopted for gravity. The gauge reading may be considered reliable to ± 5 fathoms (± 30 feet).