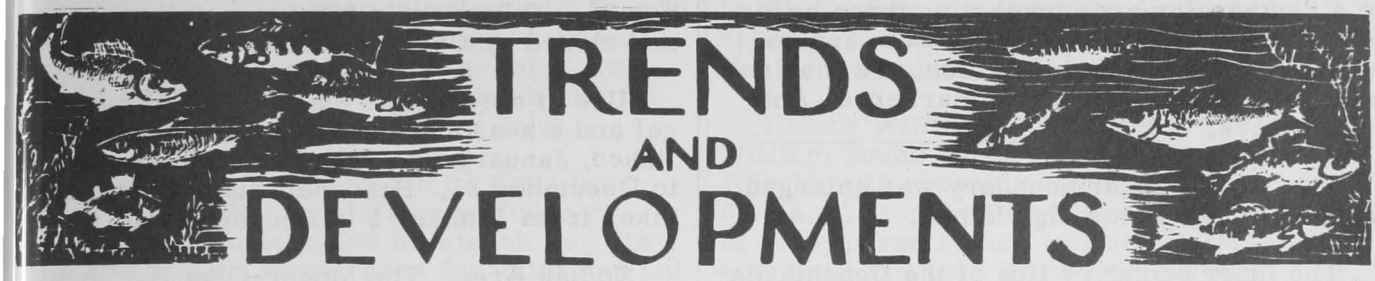

Alaska

MAJOR CHANGES IN COMMERCIAL FISHING REGULATIONS FOR 1964:

Major changes in Alaska's commercial fisheries regulations for 1964, which were adopted by the Board of Fish and Game at Ketchikan in December 1963, were as follows:

The definition of long-line gear was amended to include the type which can be used for fishing salmon. This change coupled with an amendment to the International Water Area section prohibits United States nationals taking salmon by both net or long-line gear in International Waters. This action is being taken by all Pacific Coast States as well as Canada to prevent the possibility of such a high-seas fishery becoming established.

Under the General Provisions section, applicable to all Alaska waters or designated areas, the use of mechanical clam diggers is permitted in the Kodiak, Chignik, Alaska Peninsula, and Aleutian Islands areas.

A further amendment to this section prohibits aliems not lawfully admitted to the United States from engaging in fishing activities in waters of the State of Alaska.

Under the International Waters section, the species and covered waters was broadened to include tanner and dungeness crab besides king crab, and the area was increased to include any waters seaward of that officially designated as the territorial waters of Alaska to a depth of 200 meters, or beyond that limit, to where the depth of the superjacent waters admits of the exploitation of these crabs. This action, expanding the covered International Waters from only those seaward of Cook Inlet and Kodiak, was taken by the Board to assert and demonstrate Alaska's interest in the conservation of the resources of the continental shelf as outlined in the 1958 Geneva Conference on the Law of the Sea. Regulations promulgated by the Board for these species in Cook Inlet and Kodiak will apply in the International Waters previously described in the regulations for these areas.

Arctic-Yukon-Kuskokwim Area: Subdistrict No. 3 of the Yukon River, which is located from Owl Slough near Marshall upstream to the mouth of the Koyukuk River, will be open to commercial fishing 6:00 p.m. Monday to 6:00 p.m. Friday, four days a week, until the quota of 3,000 king salmon is taken. Commercial fishermen fishing this subdistrict cannot transfer and fish in subdistricts No. 1 and No. 2 at a later date.

Commercial fishing for king salmon in subdistrict No. 1 of the Kuskokwim River is open two days a week, 6:00 p.m. Monday to 6:00 p.m. Tuesday and from 6:00 p.m. Friday to 6:00 p.m. Saturday. It was the Board's decision that the king salmon run in this subdistrict should be managed by a weekly fishing period which can be adjusted according to the abundance of fish, rather than on a quota basis. Also, commercial fishing in subdistrict No. 1 of the Kuskokwim River will be allowed four days a week after August 1.

Those persons licensed to fish commercially in Norton Sound, with the exception of subdistrict No. 1, and the Kotzebue district, shall not be allowed to subsistence fish for six hours before each commercial fishing period. The intent of this regulation is to limit the illegal selling of fish, reduce fish wastage, and still allow commercial fishermen to take sufficient quantities of salmon for subsistence.

A permit will be required for all subsistence fishermen fishing in the Tanana drainage above the mouth of the Wood River and in the Pilgrim River drainage near Nome on the Seward Peninsula. Permits are free and may be obtained from the local Department of Fish and Game office prior to fishing.

Bristol Bay Area: The outer Naknek-Kvichak boundary was extended approximately five miles at the west end to Tank Creek.

The Egegik outer boundary was enlarged to a rectangular area projecting three miles offshore from Big Creek, due south approximately eight and one-half miles, and then due east three miles to a shore marker at Abalama Creek.

The Egegik inner boundary was enlarged slightly to just below Egg Island.

The inner boundary line of the Ugashik district was adjusted slightly to a straight line across the Ugashik River 500 yards below the terminus of King Salmon River.

A new regulation was adopted which requires each fisherman to indicate at the time of initial registration whether he is operating as an independent or a company.

Other slight changes were made in the dates to allow for calendar changes in 1964.

Alaska Peninsula Area: The Herendeen-Moller Bay section will open to fishing with set nets, drift nets, hand purse seines, and purse seines from May 4 through July 17. Closures were placed on the heads of the bays to give the milling areas protection.

All other changes concerned closed areas. Sandy and Bear Rivers will be closed 2,000 yards off the mouths during the peak of the runs, after which they will be reduced to 500 yards.

Warmsprings Bay will be closed 1 mile from the mouth of the main stream.

The closure at Thin Point Cove and Lagoon was extended to encompass the entire cove. The closure at the head of Cold Bay was enlarged.

Also adopted was an extension of the closure at San Diego Bay to 1 mile after July 18, and the upper end of Stepovak Bay, from Dent Point to Kupreanof Point, will close after July 15.

A razor clam season was opened with hydraulic dredges, forks, and shovels as legal gear.

No changes were made in the Aleutian Islands Area.

Chignik Area: Opening and closing dates for the Eastern district were adopted for taking salmon as follows: June 8 through August 14 and from August 31 through September 25. This district formerly was opened and closed by field announcement.

Use of a hydraulic clam digger is now legal and a season for razor clams was established, January 1 to July 15 and September 15 to December 31. Hardshell clams may be taken from January 1 to December 31.

Kodiak Area: The Moser-Olga Bay and Alitak Bay sections of the Alitak district will open on July 13 and close on August 14. The weekly fishing period during this time will be seven days.

The Inner Karluk and Uyak sections of the Karluk district will have a mid-season closure from July 3 to July 13. The weekly fishing periods will be seven days to July 3, five days from July 13 to August 7, three days from August 10 to August 21, and seven days from August 24 to September 25.

The Uganik and Afognak sections of the Karluk district will be closed from July 3 to July 13 with a seven day weekly fishing period.

The Red River, Sturgeon River, Uyak Bay, Uganik, Afognak, General and Mainland districts will have a five day weekly fishing period from June 1 to July 17, and a seven day weekly fishing period from July 20 to September 25.

The inshore end of all set nets must be attached to the shore above mean low water in 1964.

The Deadman Bay, East Arm (Mush Bay), Sharatin Bay, and Seal Bay closures were enlarged.

Legal gear for taking razor clams will include hydraulic mechanical diggers.

Cook Inlet-Resurrection Bay Area: Regulatory changes enacted by the Board of Fish and Game for the Cook Inlet-Resurrection Bay Area for 1964 include closing the king salmon season to commercial fishing. Provision was made that king salmon caught accidentally while fishing for other species may be used for subsistence and welfare purposes only. Along with this major conservation move, the Board set June 25 as opening date for other species of salmon in the Northern, North Central, and South Central districts. Opening date for these districts last year was

June 6; most of the Inlet's king salmon catch in recent years has been taken prior to June 25. In another move aimed at helping to re-build depleted king salmon runs in the Inlet, the Board established a maximum mesh size of six inches for all gill nets in the Inlet.

Other action by the Board on Cook Inlet-Resurrection Bay regulations includes re-defining the Southern and Kamishak Bay districts to allow a larger area for unlimited pot fishing by king crab fishermen, and a southern boundary at the latitude of Cape Douglas was established for both the Outer and Eastern districts. June 8 was set as opening date for the Southern district, and all opening and closing times for salmon fishing were changed to 9:00 a.m. A seven day week fishing period was established for the Kamishak Bay district. Gill nets were made illegal in the eastern district, except for subsistence fishing, and all set nets are now to be restricted to 45 meshes in depth.

The east shore of Port Graham was closed to fishing by set nets, and three traditionally fished set net areas near Harriet Point were opened to set nets.

New subsistence fishing regulations include a mandatory permit for salmon and freshwater species (except that no trout, grayling, or char may be taken for subsistence in fresh water), and a report is required of all subsistence fish taken. A limit of 50 salmon was set for subsistence fishermen, and no subsistence fishing will be allowed in areas closed to commercial fishing for salmon except for the northwest shore of Knik Arm. Subsistence fishing will not be allowed north of Cottonwood Creek on Knik Arm.

Except for the opening dates, subsistence fishing in the Northern, North Central, South Central, and Southern districts will be in conformance with all commercial regulations, with identification of gear to consist of name and address of owner. August 20 has been set for opening dates for subsistence fishing in the North Central, South Central and Southern districts, with August 3 for the Northern district, except for that part of the district in the Moquawkie Indian Reservation, which opens June 25 for subsistence fishing.

Subsistence fishing in the Eastern and Outer districts will be in conformance with commercial regulations, and identification of fishing gear shall consist of name and address of owner. Subsistence set nets will be allowed in the Eastern and Southern districts in all areas of these districts open to commercial fishing for salmon.

Prince William Sound Area: The Prince William Sound purse seine season will open July 13 with a weekly fishing period from 6:00 a.m. Monday to 6:00 a.m. Saturday. Also in 1964, purse seines will be allowed to fish with drift gill nets in the early Coghill district fishery. Eshamy district will be closed again in 1964.

Changes in the crab fishery included a color-marking system for crab-pot buoys instead of the present numbering system. To allow additional crab fishing area, open throughout the year, the "Inside" area north boundary was changed to run from Johnstone Point to Sheep Point.

Copper and Bering River drift gill-net districts will open May 14. Changes in the subsistence fishery were made to restrict the up-river fishing to the main Copper River. In addition, the lower Copper River subsistence limit was reduced, allowing a catch of five kings, ten reds, and ten silvers.

Yakutat Area: No changes were made in the Yakutat regulations from those in effect during 1963.

Southeastern Alaska Area: Several of the fishing districts had minor changes in that some sections were renumbered and one district, number 9 in Southern Chatham Strait, was divided into two sections: 9-A on the west side and 9-B on the east.

District 1 in the Ketchikan area was re-divided into six sections.

Seymour Canal in District 11 was designated as Section 11-D.

The section changes are to simplify emergency regulations and will be incorporated into the new Southeastern maps that accompany the printed regulations.

Trolling 7 days per week in District 8 was extended to include the whole district instead of the old "extended area;" this to be effective except during the gill net season, when both types of gear will fish three days per week.

Troll restrictions were relaxed in Kootznahoo Inlet, Idaho Inlet, Tenakee Inlet, Port

Althorp and off the Salmon River in Icy Passage.

Commercial dungeness crab fishing was prohibited in several bays near Ketchikan: Carroll Inlet, George Inlet, Bostwick Inlet, Traitors Cove, Smugglers Cove, Spacious Bay, Moser Bay, Helm Bay, Yes Bay, and Port Stewart.

Minimum mesh sizes for shrimp trawls were prescribed for cotton and synthetic mesh in Districts 6, 8, and 10.

The purse seine regulations had one minor change adopted requiring the marking on the cork line of all purse seines, every ten fathoms of length by double corks, that must be of a color that is in contrast with the color of the corks in the cork line.

All purse seine openings are to be by field announcement.

Amendments to the gill net section of the regulations provide for opening dates in sections 1-A and 1-B (formerly 1-B and 1-C), on June 14, sections 6-A and 6-B open on June 15.

Additional areas were added to the list of closed waters in 115.21. Among them were Edwards Passage, Nakat Bay, Nossuk Bay, Salt Lake Bay, Navy Creek, Canoe Pass, Menefee Inlet and Union Bay. The closure in Redfish Bay in District 13 was relaxed. (Alaska Department of Fish and Game, December 20, 1963.)

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COOK INLET CLOSED TO KING SALMON FISHING IN 1964:

In December 1963, the Alaska Board of Fish and Game issued regulations closing Cook Inlet to all king salmon fishing (both sport and commercial) during 1964. It had become apparent that this once important run of fish was declining in abundance. The most obvious cause was overfishing.

During the late 1930's and the 1940's the annual commercial catch of king salmon in the Cook Inlet area was steady at around 77,000 fish and in 1951 it increased to a high of 187,000. But the largest catch since 1958 was only 28,000 fish with a low of 17,600 in 1963. The sport fishery has brought increasing pressure on the resource as the number of people in the Anchorage and Kenai areas has grown.

Since 1959, sport and commercial fishing for Cook Inlet king salmon has been increasingly restricted, but king salmon escapement has not improved. It was felt, therefore, that drastic action was needed to rebuild the run before it declined to a point where extensive and expensive artificial aids would be needed for recovery. The Alaska Commissioner of Fish and Game pointed out that many miles of spawning streams used by Cook Inlet king salmon remain intact and have the fish-producing potential of the 1940's. What is required is a greater number of fish on the rearing grounds. This should be provided by the action taken by the Alaska Board of Fish and Game. (Alaska Department of Fish and Game, December 14, 1963.)

* * * * *

FOREIGN FISHING EFFORTS REDUCED IN OCTOBER 1963:

With the onset of autumn storms in the Gulf of Alaska and Bering Sea, Soviet and Japanese fishing efforts continued to decline. By the end of October most vessels had departed the Gulf area. The Soviet fleet strength diminished to less than 20 vessels in waters off Alaska and Japanese fisheries comprised about 20 vessels in the eastern Bering Sea at the close of October 1963.

U.S.S.R.: The trawl fisheries off southwest Kodiak Island, which since early summer 1963 have received the major Soviet effort, were continually reduced throughout October and by the last week of that month had entirely withdrawn from the area. Soviet fisheries had then dwindled to relatively minor trawling efforts in the mid-Aleutian chain region and a whaling fleet operating far west in the Attu Island area.

Japan: Japanese fishing efforts during October were reduced to a shrimp fishery near the Pribilof Islands and two factory trawlers conducting "exploratory" fishing off southwest Kodiak. The Japanese "exploratory" efforts in the Gulf of Alaska were scheduled to terminate at the end of October 1963.

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UNIVERSITY OF ALASKA APPOINTS FISHERY EXTENSION COURSE SPECIALIST TO FACULTY:

The University of Alaska has appointed John P. Doyle as a member of its faculty to

to conduct extension education courses for commercial fishermen patterned after the University's prospecting and mining extension courses. This development is a direct result of the enthusiastic acceptance of the Fisherman's Short Courses offered the past two years by the University of Alaska in cooperation with the Ketchikan Technological Laboratory.

Alaska Fishery Investigations

LARGE RED SALMON SPAWNING POPULATION DISCOVERED IN NAKNEK RIVER:

In early October 1963, while preparing the King Salmon station for the winter, several trips were made by U. S. Bureau of Commercial Fisheries biologists to the outlet of Naknek Lake to observe the progress of red salmon spawning. In the past it was known that reds spawned in the upper end of the Naknek River, but it was thought their numbers were insignificant in relation to those occupying the better known areas in the upper lakes of the system. Observations made in the fall of 1963 indicate that, at times, spawners utilizing that area represent a substantial segment of the Naknek run. That section may have escaped notice up to now because the spawners are difficult, if not impossible, to observe from the air because of water depth and coloration of the bottom.

Spawning took place over a distance of about three miles, from one-half mile below Gull Island to the head of the rapids. Spawning began in the first week in September and continued through the first week in October, occurring first in the area just above the rapids. By mid-October 1963 only a few spawners were left on the shallow shelf at the outlet.

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KARLUK RIVER RED SALMON SPAWNING VERIFIED:

The upper Karluk River study was terminated on October 1, 1963, and Portage weir was removed. A mark and recapture technique was used to estimate the number of red salmon spawning in the upper Karluk River. Salmon were tagged at Karluk Portage, on the Karluk River seven miles downstream from the lake outlet, and tagged fish entering the lake were recorded as they passed through Karluk weir. An estimated 47,000 red salmon, representing 10 percent of the total escapement, remained in the river to spawn. The fraction remaining in the river to spawn is in close agreement with past estimates based on aerial surveys. Adult escapement of red salmon to Karluk Lake numbered 404,543 by October 14.

* * * * *

HEAVY FISHING RATE SHOWN ON TAGGED KING CRABS:

About 20 percent of the tagged king crab released during August and September 1963, have been recaptured by fishermen on the Portlock and Albatross Banks north and east of Kodiak. It was expected that a further substantial percentage of the 1963 tags would be returned during the 1963/64 winter as the fishing effort intensifies in the offshore areas.

* * * * *

SHRIMP POTS IN VERTICAL STRING FISH BETTER WITH BLACK MESH:

After preliminary trials in August 1963, a vertical string of six shrimp pots was set again in Tutka Bay in 45 fathoms of depth. Since there was a question of avoidance by shrimp of the pots covered with white nylon mesh, the pots were fished in black mesh--white mesh pairs at each level.

The results of this preliminary experiment were interesting. Light catches of shrimp were taken at all levels and the black mesh-covered pots appeared to be more effective than the natural white nylon at all levels except the topmost. At the 1-fathom level mostly pink shrimp were taken, pinks and coonstripe were caught at the 10-fathom level, and mostly coonstripes were taken at from 10 to 45 fathoms.

California

FISHERMEN'S INCOME, 1962:

About $17,596,000 was paid in wages during 1962 to approximately 2,076 California fishermen covered by State unemployment insurance. The annual average wage paid the covered California fishermen was $8,476. About one-half of California's covered fishermen worked out of ports in San Diego County and a little over one-third of the fishermen were from Los Angeles and Orange Counties.

The average wage paid to fishermen in 1962 was $10,427 in San Diego County and $7,956 in Los Angeles and Orange Counties. The average wage paid covered California workers in "all industries" in 1962 was $5,891. (State of California, Department of Employment.)

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GROWTH STUDIES OF ENGLISH SOLE AND BOTTOMFISH IN MONTEREY BAY:

M/V "Nautilus" Cruise 63-N-5a-b-Bottomfish (October 8-12 and December 3-7, 1963): These two cruises to collect juvenile and adult English sole in Monterey Bay in the vicinity of Moss Landing were the first of a series by the California Department of Fish and Game research vessel Nautilus. The fish were measured, and interopercle bones were taken for age determinations to be used in growth analysis.

A modified $1\frac{1}{4}$-inch mesh Gulf of Mexico shrimp trawl with a 1-inch cod end was used on these cruises. Trawling covered both sides of Monterey Canyon in depths of 5 to 48 fathoms and the net was towed about 15 minutes at each station.

A total of 44 trawls was made during both cruises. From the stations worked, 1,372 juvenile and adult English sole were measured and their sex determined. The fish ranged from 86 to 380 millimeters (about 3.4 to 15 inches) long. Females were most abundant in the 200-250 millimeter (about 7.9 to 9.8 inches) size group. Two interopercle bones from each centimeter size group were selected for each sex. Samples of Dover sole (Microstomus pacificus) and petrale sole (Eopsetta jordani) were also measured and their sex determined. All cephalopods were preserved for study.

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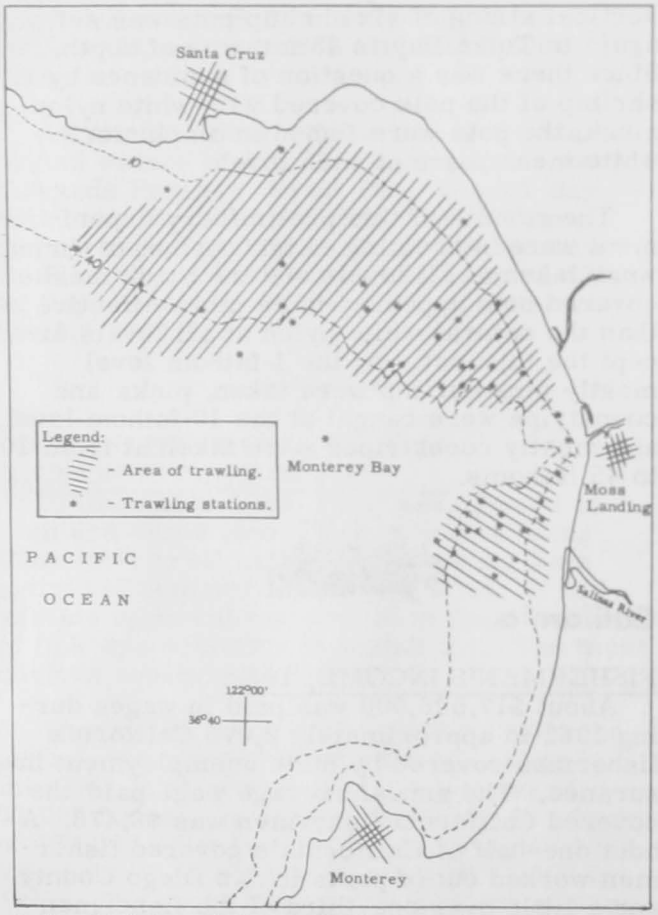
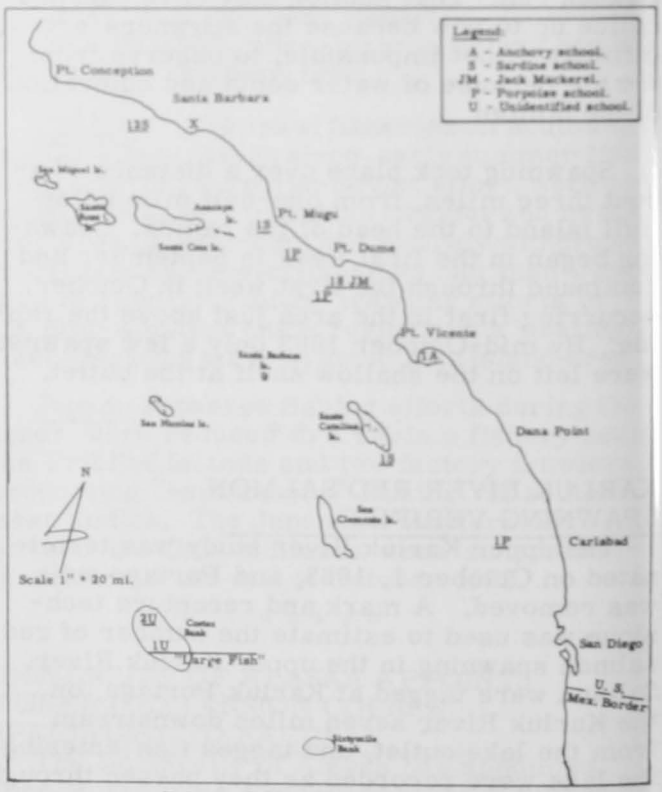
PELAGIC FISH POPULATION SURVEY CONTINUED:

Airplane Spotting Flight 63-10 (October 8-9, 1963): Surveys to determine the distribution and abundance of pelagic fish schools in the southern California area were continued by the California Department of Fish and Game Twin Beechcraft N5614D in the inshore area from Point Conception to San Diego and the



Cruises 63-N-5a and b (bottomfish) by research vessel Nautilus, showing trawling area and stations.



Pelagic fish survey flight 63-10.

offshore islands and banks off southern California and northern Baja California, Mexico.

General haze throughout the flight area (Pt. Vicente to San Diego, Sixtymile and Cortez Banks, and San Clemente and Santa Catalina Islands) on October 8, reduced aerial visibility to 15 miles. Water visibility was good although there was some surface glare.

At Cortez Bank, one school of large tuna-like fish was seen but not identified as to species. Two schools of smaller unidentified fish were also seen. Positive identification was not possible because those fish sounded whenever the plane passed overhead. One small school of Pacific sardines (Sardinops caeruleus) was seen off Church Rock at the south end of Santa Catalina Island.

On October 9, the inshore area between Pt. Vicente to Point Conception and the offshore area in the vicinity of San Miguel, Santa Cruz, and the Anacapa Islands were surveyed.

Air and water visibilities were fair. No fish schools were sighted around the islands. In northeast Santa Monica Bay, between Pt. Vicente and Pt. Dume, 18 jack mackerel (Trachurus symmetricus) and 2 unidentified porpoise schools were seen. Twelve schools of sardines were noted north of Santa Barbara and one off Pt. Mugu.

Note: See Commercial Fisheries Review, December 1963 p. 17, November 1963 p. 21, September 1963 p. 14.

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Airplane Spotting Flight 63-11 (October 14-17, 1963): The survey to determine the inshore distribution and abundance of pelagic fish schools was continued by the California Department of Fish and Game Cessna "182" 9042T during flights over the inshore area from the United States-Mexican Border to Monterey, California.

The area from Point Vicente to Monterey was flown on October 14. Weather and visibility were poor south of Jalama Park (Point Arguello) but very good to the north. Water visibility followed the same pattern.

A large school group of northern anchovies (Engraulis mordax) was seen between Mussel Point and Piedras Blancas. This group, comprising 293 separate schools, was one of the largest observed from the air in several months. Many of the schools were being harassed by sea lions and porpoises from below and birds from above. Twenty-four anchovy schools were counted in exceptionally clear water between Piedras Blancas and Point Sur where fish schools are seldom seen.

Coastal waters from the United States-Mexican Border to Point Vicente were scouted on October 15. Water visibility was poor. Air visibility was limited to 10 miles by haze and smoke. Thirty-two anchovy schools were sighted, all off the La Jolla-Torrey Pines area.

On October 16, the scheduled flight was cancelled by bad weather.

The inshore area from the United States-Mexican Border to Jalama Park was flown on October 17. Air and water visibility were only fair. Twenty-five schools of "pinhead" anchovies were seen off of the "barn," a sailor's landmark on Camp Pendleton. Eight killer whales (Orcinus orca) were seen 2 miles north and $\frac{3}{4}$ miles offshore from Point Dume; the 6 adults and 2 juveniles were slowly swimming south. This was only the second sighting of those mammals since the monthly flights were inaugurated in 1956.

Note: See Commercial Fisheries Review, Dec. 1963 p. 19.

Central Pacific Fisheries Investigations

TUNA STUDIES CONTINUED:

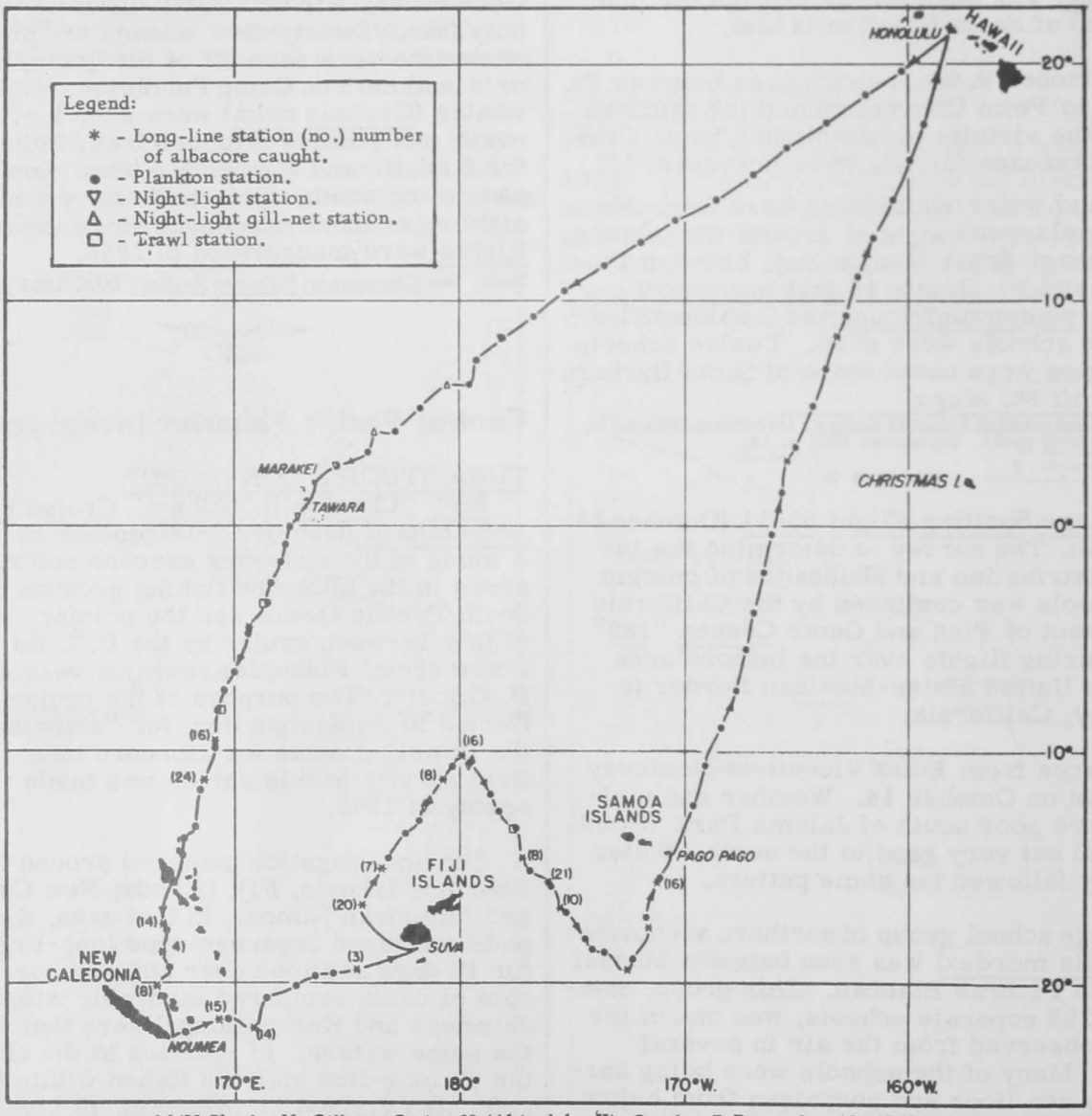
M/V "Charles H. Gilbert" Cruise 69--Ahipalaha II (October 7-December 13, 1963): A study of the spawning seasons and spawning areas in the albacore fishing grounds of the South Pacific Ocean was the primary objective of this 10-week cruise by the U. S. Bureau of Commercial Fisheries research vessel Charles H. Gilbert. The purpose of the cruise is reflected in its designation, for "ahipalaha" is the Hawaiian name for albacore tuna. The first survey in this series was made in the spring of 1962.

The investigation centered around the New Hebrides Islands, Fiji Islands, New Caledonia, and American Samoa. In that area, the expedition fished Japanese-type long-line gear for 19 days and took over 200 albacore. The rate of catch compared favorably with that of Japanese and Korean long-liners that work the same waters. In addition to the albacore, the 19 long-line stations fished within that area also yielded 21 yellowfin, 17 big-eyed, and 4 skipjack tuna, as well as 6 other tuna

which were damaged beyond recognition. Other species caught were: 10 spearfishes, 20 sharks, and 51 miscellaneous fish. The albacore (48 females, 147 males, and 9 unsexed) were generally large adults ranging in size from 85 to 108 centimeters (33.5 to 42.5 inches). Of the females, 21 percent had either spent or immature ovaries, 73 percent had maturing ovaries, and 6 percent had near-ripe ovaries, indicating that the albacore were not quite ready to spawn.

Scientists on the Charles H. Gilbert reported that the albacore were generally approaching a spawning condition, but were not quite ready to spawn. The expedition also made many hauls in the survey area with fine-mesh nets designed to collect the young of tuna. Detailed laboratory study of the larval and juvenile specimens will provide a check on the information drawn from examination of adult spawners. The stomachs of large fish which prey on young tuna were also collected to provide an additional check on spawning information inferred from the examination of the adults.

Blood samples were collected from albacore, yellowfin, big-eyed, and skipjack tuna, and blue marlin. In addition, blood samples were collected from white-tip and great blue sharks. A sample of bloods was airshipped to the Bureau's Honolulu Laboratory from Suva, Fiji.



M/V Charles H. Gilbert, Cruise 69 (Ahipalaha II), October 7-December 13, 1963.

A total of 152 surface and 140-meter oblique plankton tows, three 6-foot Isaacs-Kidd trawl hauls, 8 night-light collections, and 4 small-mesh gill-net stations were made in order to capture larval and juvenile tunas. Gross examination of plankton samples at sea indicated the presence of a fair number of larval tunas. One juvenile tuna was caught by night-light fishing but nothing was taken by the small-mesh gill nets.

None of the tuna ovaries examined contained eggs in suitable condition for artificial fertilization. One sample of albacore eggs which was quite advanced in development, though not fully ripe, and measuring 0.88 to 1.06 millimeters (0.03 to 0.04 inches) in diameter, was fertilized, but due probably to unsuitable milt condition none of the eggs showed any sign of embryonic development. The milt used in this instance was quite thick and not freely flowing as those usually encountered in running ripe males.

One juvenile tuna of undetermined species about 4 centimeters (1.6 inches) long was caught at a night-light fishing station (latitude 08°10' N.; longitude 178°07' W.) on October 13. Shipboard rearing was not attempted because the juvenile tuna was in an extremely weakened condition.

Since emphasis was placed on the collections of data for serological and gonad condition studies, only a few albacore tuna were tagged. Seven albacore which were considered to be in good condition were tagged and released. Those albacore ranged in length from 89 to 99 centimeters (35 to 39 inches). In addition, three small yellowfin, 67 to 75 centimeters (26.4 to 29.5 inches) long, which came up in viable condition were tagged and released.

Other developments and observations during this cruise were as follows:

1. The condition of all albacore ovaries was noted. Although no ripe ovaries were encountered, a few ovaries were preserved for laboratory examination.

2. No ripe ovaries of other tunas or marlins were found.

3. Stomach contents of 128 fish were preserved.

4. Enough drift cards to make 34 releases were available for this cruise. These were released with the first 35 bathythermograph (BT) observations.

5. The thermograph and barograph were operated continuously during the cruise.

6. A total of 197 weather observations were made at 0000, 0600, 1200, and 1800 G.C.T. daily and transmitted to the Weather Bureau whenever possible.

7. A total of 172 BT casts were made during the cruise. Surface salinity samples were collected with each BT cast.

8. Two lures were trolled during daylight hours. The catch consisted of only one dolphin.

9. During the cruise, 55 surface fish schools and bird flocks were sighted. Twelve were identified as skipjack tuna and 43 were unidentified.

10. All remoras found attached to fish and other objects were collected and brought back alive in the research vessel's bait tank, as requested by the University of Hawaii. The remoras will be used for physiological studies.

11. Flying fish that landed on deck were preserved.

12. Two long-line stations were fished in "big-eyed tuna waters," yielding only 2 big-eyed tuna, 2 yellowfin, 1 skipjack, 2 sharks, and 12 miscellaneous fish.

13. At Marakei Atoll, Gilbert Islands, a poison station was conducted to collect reef fishes for ichthyotoxism studies by a scientist of the University of Hawaii.

14. A participant scientist of the Agency for International Development (AID), studying tuna long-line fishing, completed the first phase of his training program aboard the Charles H. Gilbert. He disembarked at Pago Pago, American Samoa, to continue on the second phase of his training.

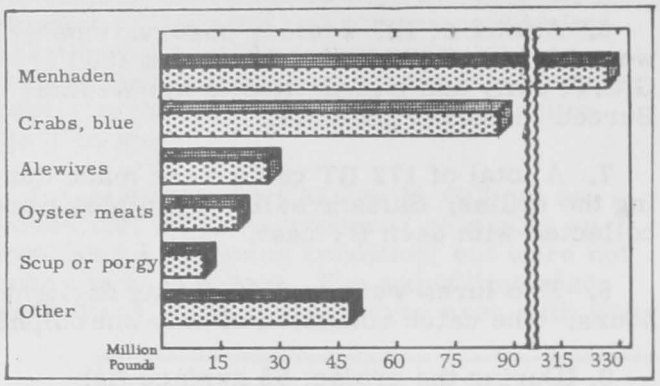
Note: See Commercial Fisheries Review, December 1963 p. 25.

Chesapeake States

FISHERIES LANDINGS, 1962:

The 1962 commercial catch of fish and shellfish landed in the Chesapeake States

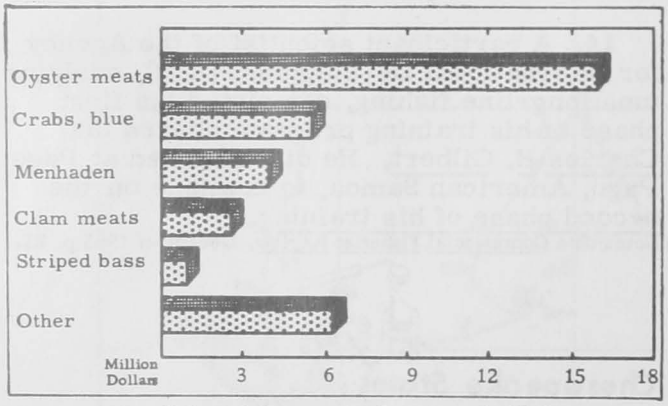
(Maryland and Virginia) totaled 521.5 million pounds valued at $33.6 million ex-vessel. This was an increase of 43.6 million pounds or 9 percent but a decline of $3.5 million (9 percent) compared with 1961.



Chesapeake States catch, 1962.

The gain in quantity was due chiefly to menhaden landings of 327.9 million pounds--29.2 million pounds more than in 1961. The catch of hard blue crabs (81.3 million pounds) exceeded the peak production of 1950 by 7.4 million pounds and established a new record. The production of alewives (more than 27 million pounds) was up about 10 million, and there were moderate increases in production of sea bass, spot, white perch, and clams over the previous year. The yield of oyster meats (20 million pounds) declined 7.6 million pounds, while slighter decreases occurred in the catch of croaker and striped bass.

The decline in value resulted largely from reduced landings of high-priced oysters. The value would have dropped even more except for the increased production of crabs and menhaden.



Value of Chesapeake States catch, 1962.

Virginia landings of 454 million pounds accounted for 87 percent of the total production in the Chesapeake States. Virginia also led in value of the catch with $21.7 million or 65 percent of the total. The Maryland and Virginia catch was taken by 16,806 fishermen operating in 1,191 vessels of 5 or more net tons, 8,759 motor boats, and 1,045 other boats.

Films

NEW FILM ON OCEANOGRAPHY PRODUCED BY U. S. NAVY:

A new motion-picture film, "Oceanography--Science for Survival," was previewed by the Interagency Committee on Oceanography (ICO) on November 21, 1963. The film is in color, has a sound track, and runs 42 minutes. It was financed by the United States Navy and produced by the Naval Photographic Center.

This picture of an oceanographic survey ship under way is taken from the Navy's newest motion picture, "Oceanography--Science for Survival."

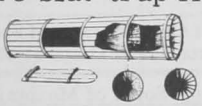
Early in 1964 the film will be distributed under the auspices of the ICO. The film gives an excellent, fast-moving account of Government oceanography activities, including those of the U. S. Bureau of Commercial Fisheries. It begins and ends with scenes

in which the late President Kennedy speaks in behalf of a strong National Oceanographic Program. The work of the Federal Council for Science and Technology and of the ICO in coordinating the oceanographic program is strongly emphasized. The film serves a useful purpose in explaining oceanography to Members of Congress, to students, and to the public in general.

Fish Farming

SLAT TRAPS TESTED FOR HARVESTING FISH PONDS:

To determine their effectiveness for catching small numbers of catfish on short notice, slat traps were tested in the fall of 1963 in an Arkansas fish pond. The testing was done by gear experts of the U. S. Bureau of Commercial Fisheries. An apparent relationship to the catch rate was the decoying effect of early-caught catfish attracting others to the same trap. One fairly high catch of 121 pounds of channel catfish made during a 48-hour set emphasized the decoying effect. Over one-half of the fish were reported taken by one of the 10 traps set, and it was jammed so full that one more fish could not have forced itself through the opening. This behavior is successfully used in other fresh-water fisheries and Bureau personnel will continue to study it in future slat-trap fishing tests.

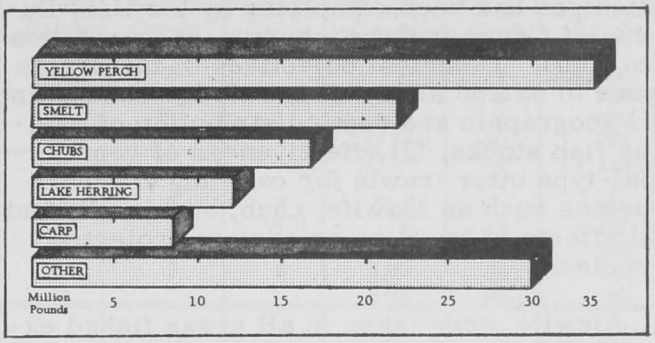


Great Lakes

FISHERIES LANDINGS, 1962:

The 1962 United States and Canadian commercial catch of fishery products in the Great Lakes, Lake St. Clair, and the International Lakes of northern Minnesota amounted to 123.4 million pounds. The catch was 3 million pounds more than in 1961, with domestic landings accounting for slightly more than half of the total volume.

From those lakes in 1962, United States fishermen took 65.6 million pounds of fish valued at $5.5 million. The quantity declined 5 million pounds (7 percent) and the value, $1.4 million (21 percent) compared with 1961. The reduction in value resulted largely from increased landings of low-priced fish taken for industrial use and a decline in the catch of fish taken for human food.



United States and Canadian catch, 1962.

United States landings of sheepshead, chubs, and lake herring declined sharply in 1962 and slighter decreases occurred in the production of smelt, white bass, catfish, yellow pike, carp, common whitefish, and suckers. There was a substantial increase in the catch of yellow perch and alewives during 1962 while tullibee landings were up slightly compared with the previous year.

The State of Michigan led in production with a catch of over 22 million pounds--a loss of more than 2 million compared with 1961. Wisconsin was next with landings totaling 19 million pounds (down nearly 3 million from 1961), while Ohio was in third place with a catch of 15 million pounds--slightly less than a year earlier.

For the third successive year, Lake Michigan was the leading contributor to the United States catch with a take of 23.5 million pounds--down 2 million from 1961. Lake Erie was second with 19.7 million pounds, followed by Lake Superior with landings of 12.6 million pounds. The Lake Erie production was about the same as the previous year but the Lake Superior catch fell 2 million pounds below the 1961 level. Catches in the remaining lakes showed little change compared with 1961.

Great Lakes Fisheries

Exploration and Gear Research

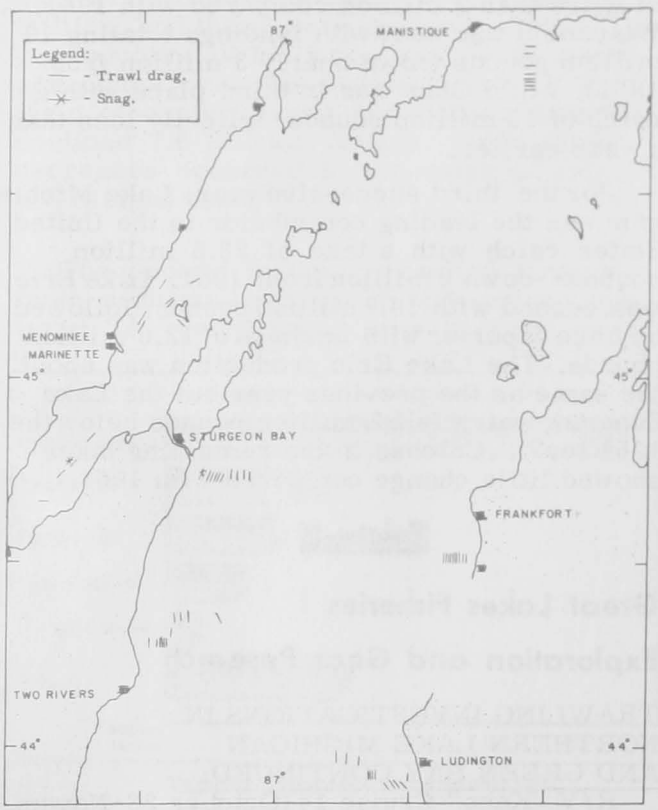
TRAWLING INVESTIGATIONS IN NORTHERN LAKE MICHIGAN AND GREEN BAY CONTINUED:

R/V "Kaho" Cruise 14 (October 23-November 25, 1963): The fourth in a series of cruises

to determine the commercial feasibility of otter trawling in Green Bay and northern Lake Michigan has been completed by the U. S. Bureau of Commercial Fisheries research vessel Kaho. Technical objectives of the cruise were to extend seasonal knowledge concerning (1) geographic and depth distribution of various fish stocks, (2) effectiveness of commercial-type otter trawls for catching abundant species such as alewife, chub, and smelt, and (3) effects of trawling on certain protected species.

Alewife were taken in all areas fished except off Frankfort, and chubs were taken in all areas fished except in Green Bay and off Manistique. Although the four cruises have provided good indications that trawling is feasible in these waters, production rates have been somewhat smaller and species composition of catches is different from that experienced in the lower end of Lake Michigan.

A portion of the time originally scheduled for this cruise was utilized for a short survey in the Whitefish Bay area of Lake Superior in an effort to determine the suitability of otter-trawl gear for taking lake herring (cisco).



Lake Michigan explorations R/V Kaho Cruise 14 (October-November, 1963).

A total of 65 drags was made with a 52-foot (headrope) Gulf of Mexico type fish trawl during 17 days of operation. Twelve drags were made in Green Bay and 53 were made at 5 stations in Lake Michigan proper. Depths fished ranged from 4 fathoms in Green Bay to 80 fathoms in Lake Michigan.

All drags were of 30 minutes except for three shorter ones in Green Bay which included one that hung up and two that were terminated when set nets were encountered and one other drag in Green Bay which lasted 80 minutes.

Bottom topography and bathymetric distribution of fish were continuously recorded with a high-resolution, "white-line" type depth recorder. Obvious rough bottom areas were avoided during the cruise, and relatively minor gear damage was experienced during only two drags.

FISHING RESULTS, GREEN BAY: Two catches of alewife--800 and 900 pounds--were taken at 4 and 5 fathoms in the southern end of the bay (see table 1). Four catches of alewife, ranging from 480 to 625 pounds, were made at depths of 10, 12, and 20 fathoms just north of Menominee. Significant individual catches of smelt, spottail shiner, carp, and sucker of 320, 125, 85, and 50 pounds, respectively, were taken in separate drags. Other than the above, the catches included

Table 1 - Summary of Catch Rate and Species Composition Resulting from 30-Minute Trawl Drags at Stations in Green Bay

Depth (Fms.)	Green Bay--South of Menominee						Total Pounds Caught
	Alewife		Smelt		Other Species		
	Pounds Caught	% of Catch	Pounds Caught	% of Catch	Pounds Caught	% of Catch	
4	800	86	1/Tr.	-	2/125	14	925
5	900	96	Tr.	-	40	4	940
7	-	-	-	-	-	-	3/
7	Tr.	-	Tr.	-	4/285	100	5/285
9	100	100	-	-	Tr.	-	5/100
Green Bay--North of Menominee							
10	530	100	Tr.	-	Tr.	-	6/530
12	480	97	15	3	Tr.	-	495
12	625	99	5	1	Tr.	-	630
12	100	100	Tr.	-	Tr.	-	100
19	160	80	40	20	-	-	200
20	150	83	30	17	-	-	180
20	480	60	320	40	Tr.	-	800

1/Tr. - trace, less than 1 pound.
2/Includes: 85 lbs. carp, 33 lbs. yellow perch, 7 lbs. sucker.
3/Snagged, tore net.
4/Includes: 190 lbs. spottail shiner, 75 lbs. sucker, 20 lbs. yellow perch.
5/Terminated drag in less than 30 minutes when gill nets were encountered. Catch figures equated to 30-minute period.
6/Equated to 30-minute period--actual catch was 1,400 lbs. in 80-minute drag.

Table 2 - Summary of Catch Rate and Species Composition Resulting from 30-Minute Trawl Drags at Certain Stations in Wisconsin Waters of Northern Lake Michigan

Area	Nearest 5-Fathom Depth Interval	Alewife		Small Chubs		Large Chubs		Other Species		Total Pounds Caught
		Pounds Caught	% of Catch	Pounds Caught	% of Catch	Pounds Caught	% of Catch	Pounds Caught	% of Catch	
Two Rivers	10	-	-	-	-	-	-	-	-	-
	15	985	98	7	1	2	-	6	1	1,000
	20	700	93	20	3	1	-	1/ 29	4	750
	25	500	61	260	32	10	1	1/ 50	6	820
	30	400	52	275	36	14	2	1/ 76	10	765
	35	100	9	930	84	30	3	1/ 50	4	1,110
	2/40	-	-	-	-	-	-	-	-	-
	45	3/Tr.	-	300	98	5	2	Tr.	-	305
	50	Tr.	-	150	96	2	1	5	3	157
	60	-	-	100	82	2	2	4/20	16	122
	70	-	-	40	33	2	2	4/80	65	122
	80	5	13	10	25	-	-	4/25	62	40
Sturgeon Bay	5/10	-	-	-	-	-	-	-	-	-
	15	700	97	1	-	-	-	1/24	3	725
	20	400	84	40	8	20	4	1/20	4	480
	25	600	61	250	26	30	3	1/100	10	980
	30	200	50	150	37	5	1	1/50	12	405
	35	150	25	400	67	12	2	1/38	6	600
	40	20	6	250	81	8	3	1/32	10	310
	45	Tr.	-	220	98	5	2	Tr.	-	225
	50	Tr.	-	100	89	2	2	4/10	9	113
	60	-	-	80	36	-	-	4/140	64	220
	70	-	-	15	33	-	-	4/30	67	45

1/Mostly smelt.
2/No effort--rough bottom conditions.
3/Tr. - trace, less than 1 pound.
4/Mostly sculpin.
5/Cod end damaged--no fish caught.

Table 3 - Summary of Catch Rate and Species Composition Resulting from 30-Minute Trawl Drags at Certain Stations in Michigan Waters of Northern Lake Michigan

Area	Nearest 5-Fathom Depth Interval	Alewife		Small Chubs		Large Chubs		Other Species		Total Pounds Caught
		Pounds Caught	% of Catch	Pounds Caught	% of Catch	Pounds Caught	% of Catch	Pounds Caught	% of Catch	
Ludington	10	40	98	1/Tr.	-	-	-	1	2	41
	15	275	92	10	3	4	1	11	4	300
	20	650	70	250	27	14	2	11	1	925
	25	250	28	600	68	25	3	10	1	885
	30	100	9	1,000	88	30	3	Tr.	-	1,130
	35	50	8	550	90	9	2	1	-	610
	40	-	-	370	97	10	3	-	-	380
	45	-	-	370	99	5	1	Tr.	-	375
	50	-	-	270	88	5	2	2/30	10	305
	60	Tr.	-	100	67	5	3	2/45	30	150
	70	Tr.	-	30	65	1	2	2/15	33	46
	80	-	-	20	57	-	-	2/15	43	35
Frankfort	20	Tr.	-	170	85	29	15	1	0	200
	25	Tr.	-	335	86	54	14	1	0	390
	30	Tr.	-	1,100	98	19	2	1	0	1,120
	35	Tr.	-	630	96	24	4	1	0	655
	40	-	-	605	92	20	3	2/35	5	660
	45	-	-	540	89	20	3	2/45	8	605
	50	-	-	245	91	20	7	5	2	270
	60	-	-	500	84	15	3	2/80	13	595
	70	-	-	90	34	5	2	2/170	64	265
	80	-	-	10	5	-	0	2/200	95	210
Manistique	10	23	70	1	3	-	-	9	27	33
	15	41	57	2	3	3	4	3/26	36	72
	20	385	79	7	1	7	1	3/91	19	490
	25	360	84	45	11	16	4	4	1	425
	30	36	16	170	74	22	9	2	1	230
	35	23	11	180	84	11	5	1	-	215
	40	12	8	120	86	7	5	1	1	140
	45	35	21	125	73	6	4	4	2	170
	50	250	75	70	21	10	3	5	1	335

1/Tr. -trace, less than 1 pound.
2/Mostly sculpin.
3/Mostly smelt.

very small quantities of bullheads, burbot, lake herring, sculpin, trout-perch, whitefish, and yellow perch.

FISHING RESULTS, WISCONSIN WATERS OF LAKE MICHIGAN: Good to excellent catches of alewife, ranging from 400 to 985 pounds, were taken at 15, 20, and 25 fathoms in both areas fished and also at 30 fathoms off Two Rivers (see table 2). One large catch of chubs (960 pounds) was taken at 35 fathoms off Two Rivers. Other significant catches of chubs were obtained at 25 to 45 fathoms in both areas. Smelt and sculpins were the most common other species taken.

FISHING RESULTS, MICHIGAN WATERS OF LAKE MICHIGAN: The best catch of alewife made in Michigan waters was 650 pounds taken at 20 fathoms off Ludington. Fair catches were made at 20 and 25 fathoms off Manistique (see table 3). There is evidence that the 250 pounds of alewife taken in 50 fathoms off Manistique were caught from midwater concentrations as the net was being set or hauled. Very good catches of chubs, ranging from 515 to 1,120 pounds, were taken at 25, 30, and 35 fathoms off Ludington and at 30, 35, 40, 45, and 60 fathoms off Frankfort. Smelt and sculpins accounted for most of the other fish taken in these waters.

HYDROGRAPHIC DATA: Thirty-six bathythermograph casts were made, and air and surface water temperatures were recorded continuously. Surface water temperatures ranged from 56°-57° F. off Ludington early in the cruise to 45°-46° F. off Manistique late in the cruise.

* * * * *

TRAWL GEAR TESTED FOR CATCHING LAKE HERRING IN EASTERN LAKE SUPERIOR:

R/V "Kaho," Special Cruise, November 16-20, 1963: As part of the U. S. Bureau of Commercial Fisheries program to assist the Great Lakes fishing industry adjust to changing conditions, a preliminary exploratory cruise in the Whitefish Bay area of Lake Superior was conducted by the Bureau's research vessel Kaho. Fishing industry members had requested that trawl fishing gear be tested for catching lake herring when they are concentrated during the spawning season and most readily available. Usually at that time of year, prices for lake herring drop to a level that makes production with the traditional gill-net fishing gear marginal. It is felt that trawling may prove to be an economical method under those conditions. The Michigan Department of Conservation cooperated fully in the operation.

It was not expected that a thorough investigation could be completed in a 5-day period. However, in spite of the slim chances for attaining success during the brief survey, the collection of general information in respect to bottom conditions and fish distribution in the Whitefish Bay area will be helpful in planning future Lake Superior operations.

Although lake herring fishing was the primary consideration this cruise, other information was gathered as follows: (1) seasonal abundance and distribution of various species (2) commercial availability of all species to otter trawls, and (3) delineation of areas suitable for otter trawl fishing.

Fair catches of alewife and chub were taken in bottom trawls at depths greater than 30 fathoms. Smelt appeared to be widely scattered at depths between 20 and 38 fathoms and those of salable size were caught in only small amounts. Lake herring, lake trout, and whitefish trawl catches were insignificant. Concentrations of lake herring near the surface were not located.

Seventeen trawl drags were made with a 52-foot (headrope) Gulf of Mexico-type fish trawl. Although efforts were made to keep each drag at a uniform depth, this was not always possible due to the uneven bottom topography. All trawl drags were of 30 minutes' duration, except 2, which were terminated when the net became fouled on bottom obstructions.

Commercially significant catches of chubs and alewife were taken at several localities in eastern Lake Superior. The best catch of chubs, 305 pounds, was obtained north of Whitefish Point at 34-36 fathoms. Alewife were taken in 6 drags and appeared to be most abundant in southern Whitefish Bay, where one drag yielded 200 pounds.

Herring apparently were either scarce or had not as yet concentrated prior to spawning because of the unseasonable mild weather this year. Only a few individuals were taken at 6 stations during the survey. Lake trout, both native and planted, appeared in 4 catches in amounts of 6 pounds or less. Two trawl drags

depths of 20-21 and 32-34 fathoms yielded itefish in amounts of $5\frac{1}{2}$ and 5 pounds, respectively.

Smelt appeared to be widely dispersed roughout Whitefish Bay. Ten stations yielded smelt in amounts of 15 pounds, or less, wever, most catches were small individuals (40 or more per pound).

Miscellaneous species appearing in very all numbers in the trawl catches were: my whitefish, round whitefish, sculpin, ottail shiner, stickleback, and trout-perch.

Continuous echo-sounding (using a Kelvin ghes MS-28 echo-sounder--30 kc/s, pulse length 1 to 3 milliseconds) was carried on during both cruising and fishing operations. Although the Kaho cruised over 250 statute miles in and near Whitefish Bay, no surface or extensive midwater concentrations of fish were located. Near bottom concentrations of fish were noted at various depths beyond 15 fathoms. The survey revealed a bottom configuration inconsistent in form and composition. In general, shoal areas display highly irregular bottom topography while, beyond 10 fathoms, the slope becomes very steep until maximum depths are reached. A fair amount of good trawling bottom was located in the southern reaches of Whitefish Bay and north of Whitefish Point.

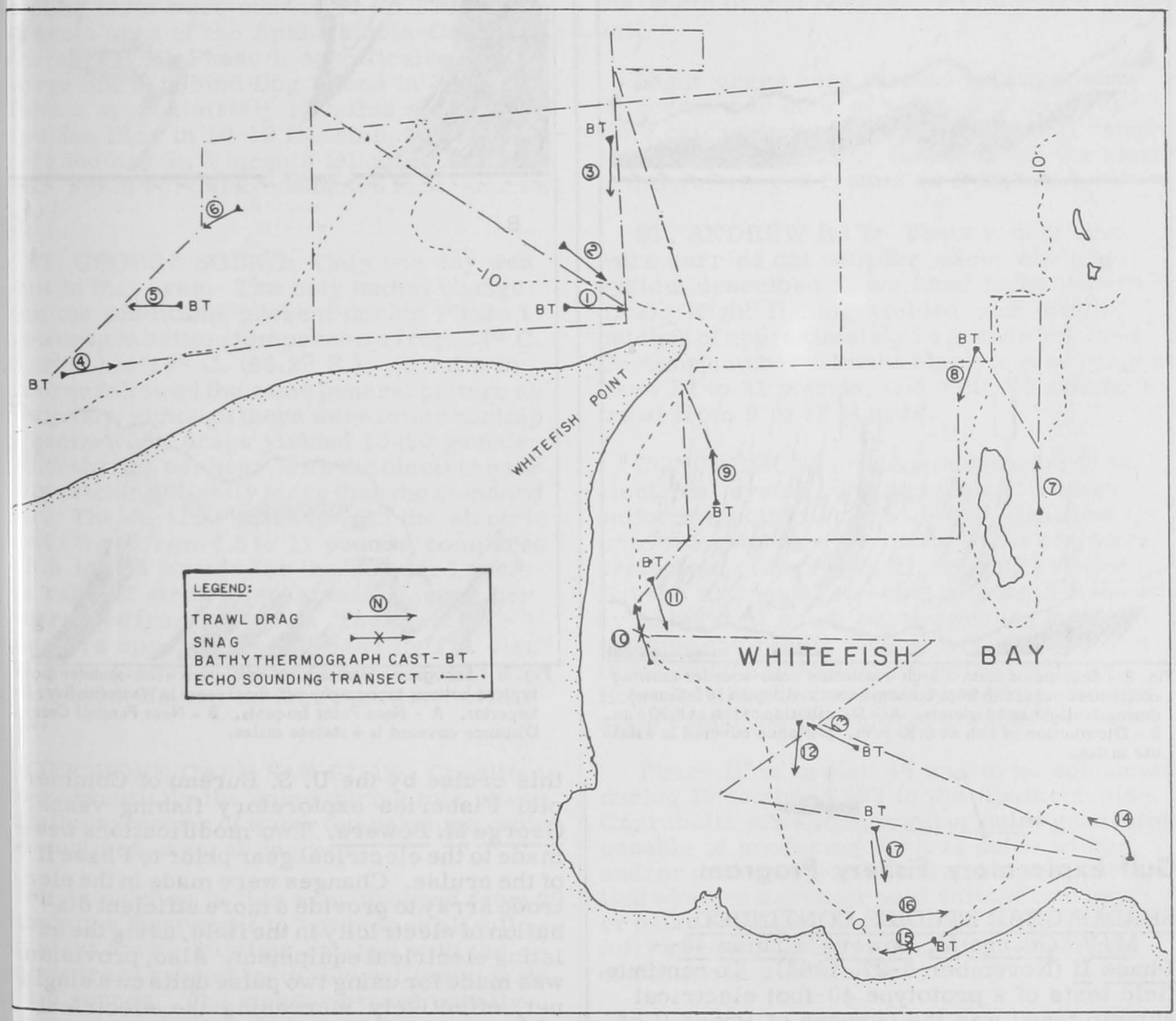


Fig. 1 - R/V Kaho Lake Superior explorations (November 16-20, 1963).

Ten bathythermograph casts were made at various stations to determine verticle thermal gradients. Surface water temperature ranged from 45.0° F. to 46.0° F. Bottom temperature ranged from 45.0° F. at depths less than 2 fathoms to approximately 39.0° F. at depth of 36 fathoms.

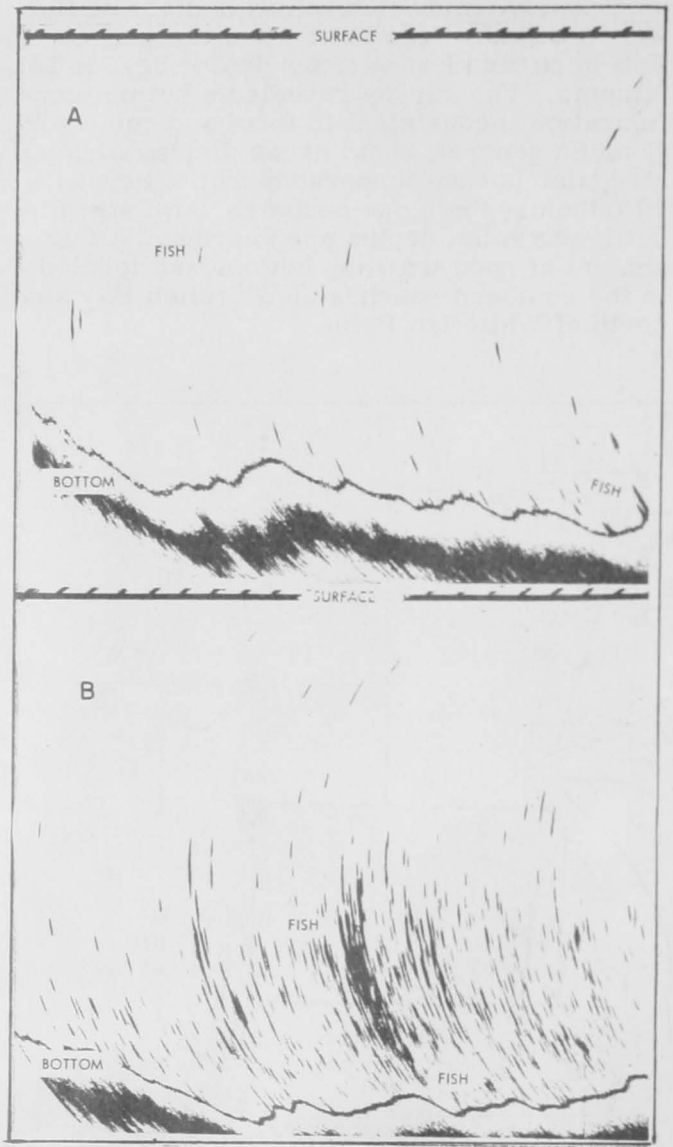


Fig. 2 - Echograms from a high-resolution echo-sounder showing concentrations of fish from the same area and depth (36 fathoms) during daylight and darkness. A - Distribution of fish at 8:30 a.m. B - Distribution of fish at 6:30 p.m. Distance covered is 4 statute miles.

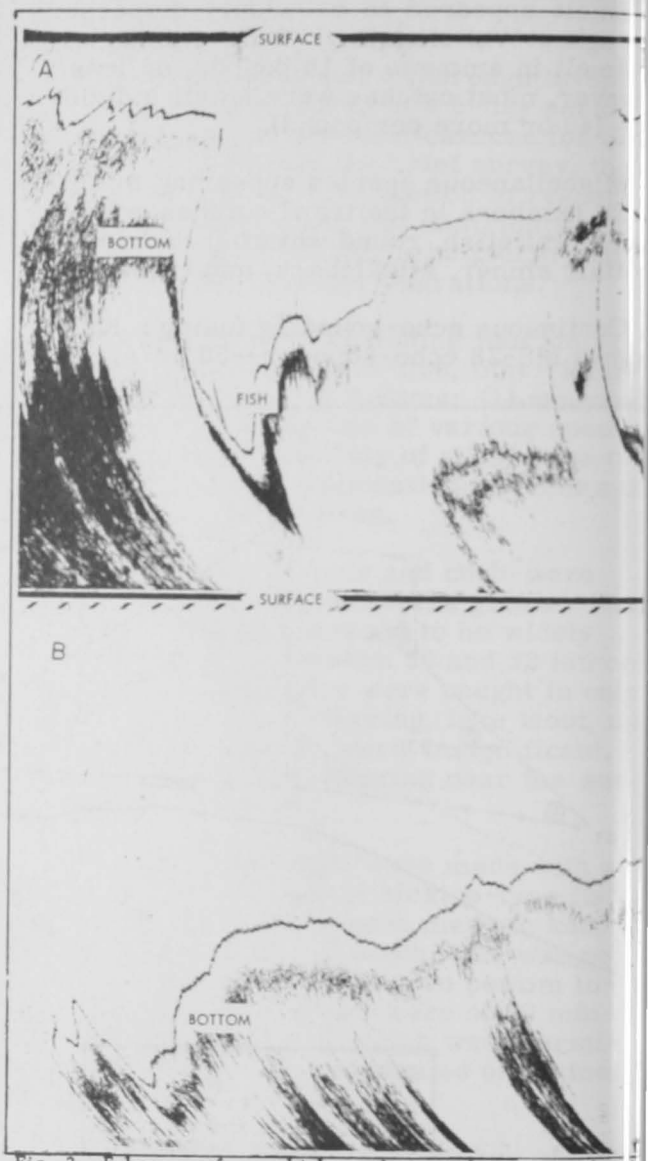


Fig. 3 - Echograms from a high-resolution echo-sounder show typical bottom topography off shoal areas in Whitefish Bay, L Superior. A - Near Point Iroquois. B - Near Pendell Creek. Distance covered is 4 statute miles.

Gulf Exploratory Fishery Program

SHRIMP GEAR STUDIES CONTINUED:

M/V "George M. Bowers" Cruise 48--Phase II (November 6-27, 1963): To continue field tests of a prototype 40-foot electrical shrimp trawl was the purpose of Phase II of this cruise by the U. S. Bureau of Commercial Fisheries exploratory fishing vessel George M. Bowers. Two modifications were made to the electrical gear prior to Phase II of the cruise. Changes were made in the electrode array to provide a more efficient distribution of electricity in the field, using the existing electrical equipment. Also, provision was made for using two pulse units on a single net, effectively increasing the electrical strength at the net. The specific objectives

f Phase II were to determine the effectiveess of the modified electrical gear as comared with the equipment used during Phase of cruise 48.

METHOD OF OPERATION: A 40-foot flat awl with 6-foot by 32-inch doors rigged with tickler chain was fished on the starboard outgger. The electrical trawl was fished simltaneously on the port side. The two nets were t and hauled at the same time and fished with entical warp lengths. Drags were of one ur duration. Tests were conducted at night d during the day. The night tests were priarily to establish the approximate quantity of rimp available in the area.

AREA OF OPERATIONS: Comparative awling tests were conducted off Florida in e same area of the Apalachicola-Carrabelle ea as during Phase I; specifically, in St. eorge Sound behind Dog Island in 3 fathoms, ffshore approximately 15 miles southeast of ape San Blas in 10-12 fathoms, and immediately south of St. Vincents Island in 4-5 fathms. Tests were also conducted in St. Andrew ay.

ST. GEORGE SOUND: Only one day was pent in that area. The only known change om the conditions present during Phase I as a drop in bottom temperature from 23° C. 3.4° F.) to 19° C. (66.2° F.). Results in is area followed the same general pattern as eviously, although there were fewer shrimp esent. Night drags yielded 15-20 pounds pink shrimp per hour, with the electric gear ain catching slightly more than the standard ar. The daytime catches with the electric awl ranged from 6.5 to 11 pounds, compared 3.5 to 4.5 pounds for the standard gear. e ratio of electric to standard catch per ag ranged from 1:5 to 2:1. The same facrs were apparent as in Phase I. The elecic gear produced more shrimp during dayght hours, but not as many as were availble.

OFFSHORE CAPE SAN BLAS: Conditions ere essentially the same during this phase, ith the exception of water temperature, which ad declined several degrees.

Night catches in this area dropped from 20 ounds the first night to 7 pounds on all following night tows. Daytime catches with the ectric trawl ranged from several individuals 4.5 pounds. The standard trawl usually roduced no shrimp, but on one occasion 0.5 pound was caught. Attempts were made on several drags to slow the bottom speed and also to drag at an angle to the bottom contours and prevailing current. Weather and bottom conditions made it impossible to secure enough information to draw any conclusions.

ST. VINCENTS ISLAND: Physical conditions in the area were: bottom type--brown mud; water (surface)--green, turbid; bottom salinity--35.6-35.9 parts per thousand; bottom temperature--17.0° C.-17.5° C. (62.6°-63.5° F.). The electrode array used on drags in the area was modified by using two pulse generators simultaneously. Each pulse generator powered one-half of the electrodes. This provided a pulse of approximately twice the width of that obtained with a single power unit.

Night drags here yielded approximately 18 pounds per hour of white shrimp. Daytime catches with the electrical trawl ranged from 13 to 27 pounds; catches with the standard trawl ranged from 2 to 8 pounds.

ST. ANDREW BAY: Tests in this area were carried out with the same electrical system described above (dual pulse generators). Night fishing yielded pink shrimp catches of approximately 14 pounds per hour. Daytime catches with the electric gear ranged from 14 to 21 pounds, and with the standard trawl from 9 to 12 pounds.

CONCLUSIONS: The modification to the electrical system which produced a more uniform electrical field did not significantly improve catches over the original electrical system on either the soft or hard bottoms. But the increased strength of pulses achieved by using dual pulse generators appeared to produce the result sought, i.e., the electric trawl caught what shrimp were available. However, due to the limited testing, the results cannot be considered conclusive.

Phase III of cruise 48 was to be conducted during December 1963 in the Apalachicola-Carrabelle area using another pulse generator capable of producing various pulse widths and/or peak voltages. This unit should establish whether a greater peak voltage or a longer pulse than that used to date will successfully and consistently stimulate 100 percent of the shrimp available.

* * * * *

M/V "George M. Bowers" Cruise 48--Phase III (December 4-14, 1963): This Phase continued experimentation with the Bowers electrical shrimp trawl. Following Phase II, modifications were made to the electrode array to reduce line loss and a new pulse generator was acquired. This unit is capable of producing a much greater field strength than previously possible and is also capable of producing pulse characteristics not attainable with previous gear.

The primary objective of this phase was to determine whether or not inadequate field strength was the principal reason for reduced effectiveness of the electrical trawl on the offshore grounds. Bad weather severely limited tests on the offshore grounds; consequently tests were not as comprehensive as desired.

AREA OF OPERATIONS AND METHODS: Three areas were worked; (1) southeast of Cape San Blas in 10 fathoms, (2) immediately south of St. Vincents Island in 4 fathoms, and (3) in St. George Sound behind Dog Island. The latter two areas were worked when weather conditions precluded operations offshore. The experimental methods were the same as used during Phases I and II.

OFFSHORE CAPE SAN BLAS: The pink shrimp density, as indicated by night trawling here, was approximately 20 percent of that during Phase I, i.e., $4\frac{1}{2}$ pounds per hour per trawl (starboard and port trawls fished simultaneously) versus 22 pounds per hour. This was accompanied with significant changes in water temperature and general catch composition.

Daytime catches with the electric trawl ranged from $5\frac{1}{2}$ pounds to 7 pounds; with the standard gear from 0 to $1\frac{1}{4}$ pounds. Night catches with both trawls were 4 to $4\frac{1}{2}$ pounds.

ST. VINCENTS ISLAND: Catches of white shrimp both day and night in this area were too erratic to allow evaluation of the effect of the electrical gear. This was due probably to "schooling," vertical movements, burrowing behavior, or all three.

ST. GEORGE SOUND: Bottom temperature was down to 13° C. (55.4° F.) and the night catch density was down to 14 pounds per hour early in the trip and to 6 to 7 pounds at the end of the trip. Earlier work here yielded 30 pounds per hour. Day catches with the electric trawl ranged from 4 to 14 pounds per hour and with the standard trawl from $\frac{3}{4}$ to $4\frac{3}{4}$ pounds. In all day tows the electric gear produced significantly greater catches than the standard gear.

DISCUSSION OF RESULTS: Results obtained during Phase III indicate the improved electrical characteristics achieved with the new pulse generator and electrode array produced daytime catches equal to or greater than night catches with the standard trawl. However, quantitative evaluation is difficult due to the changes in environment. These changes produced known reduction in shrimp density and unknown variations in their behavior patterns.

CRUISE 49: This cruise was scheduled for the Tortugas shrimp grounds during January-February 1964 to verify cruise 48 results on commercial concentrations. In addition to providing greater shrimp concentrations, the Tortugas grounds will provide a more stable environment than that which has existed in the Apalachicola-Carrabelle area recently. This should facilitate evaluation of results. Also, tests will be conducted with the electrode array built into the trawl. To date, the array has been operated separately in the manner of a tickler chain.

Note: See Commercial Fisheries Review, December 1963 p. 12.

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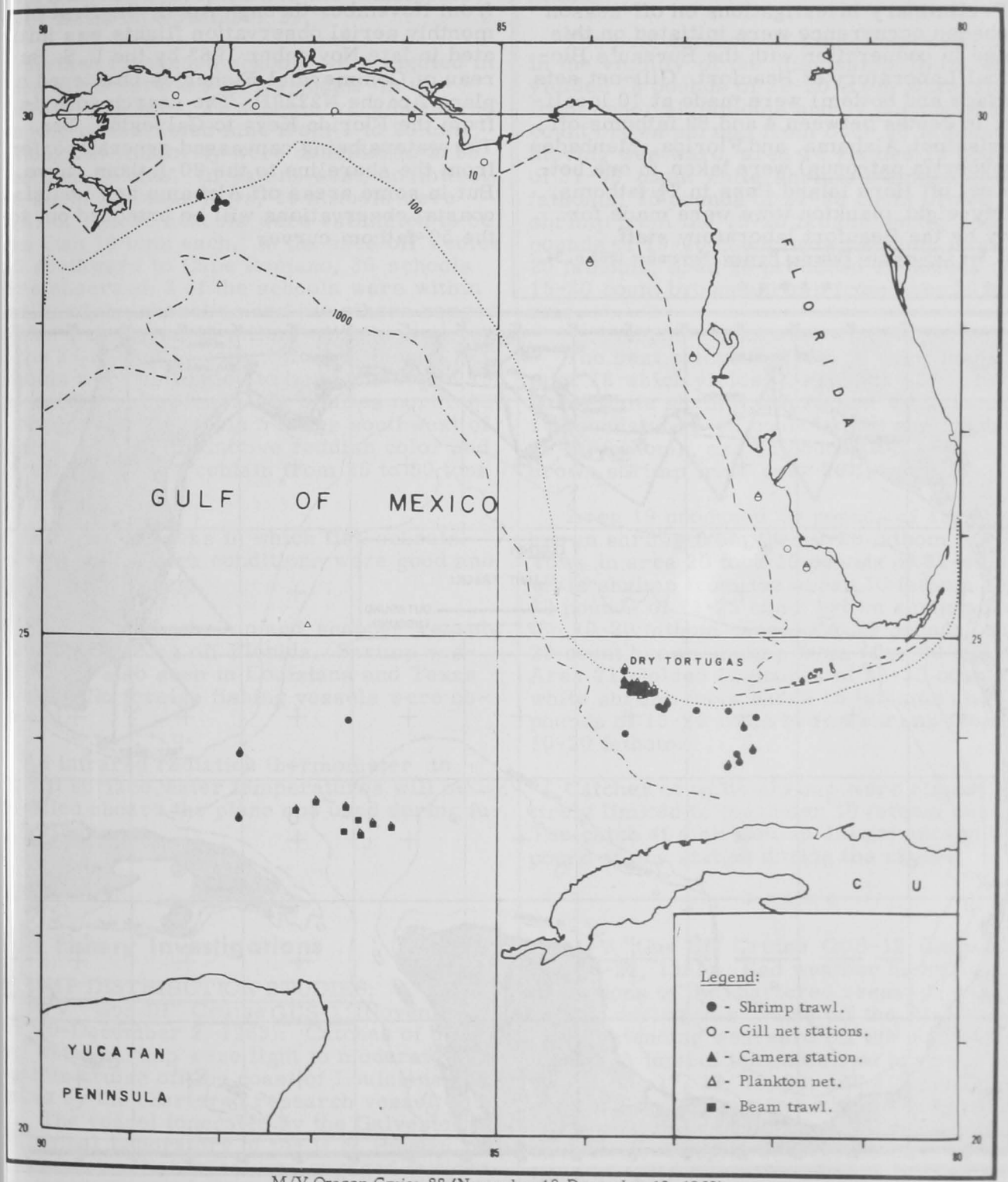
SURVEY OF SEASONAL DISTRIBUTION OF ROYAL-RED SHRIMP CONTINUED:

M/V "Oregon" Cruise 88 (November 18-December 13, 1963): To obtain seasonal data on the availability of royal-red shrimp Hymenopenaeus robustus) in the Tortugas area and to conduct deep-water faunal transects in the Florida Straits, off the northest coast of Yucatan, and off the Mississippi River Delta were the principal objectives of this 26-day cruise by the U.S. Bureau of Commercial Fisheries exploratory fishing vessel Oregon.

Shrimp catches were extremely light compared with previous efforts in the Tortugas area. A total of 28 drags yielded slightly over 1,200 pounds of shrimp (heads on) compared with some 5,000 pounds in 31 drags on the same grounds in August 1963. Previously established optimum bottom temperatures for royal-red shrimp fishing (49°-51° F.) occurred over a more extensive depth range than usual--from 190 to 235 fathoms. Several hundred feet of still and movie film, exposed in the red shrimp depth range, will be studied closely for indications of lowered

rimp density as well as for gear perform-
ce.

Faunal transects were conducted in the
rida Straits and on the northeastern slope of Yucatan at 100 fathom intervals to 800 fathoms. A 10-foot beam trawl was used when bottom conditions were unsuitable for shrimp trawls. The scheduled transect off the Mississippi River Delta was only extended to 500



M/V Oregon Cruise 88 (November 18-December 13, 1963).

fathoms due to wire losses on the Yucatan slope. Rattail fishes (Macrouridae) predominated the transect catches; other faunal elements were represented by several rare specimens, especially along the Yucatan slope.

Preliminary investigations on off-season menhaden occurrence were initiated on this cruise in cooperation with the Bureau's Biological Laboratory at Beaufort. Gill-net sets (surface and bottom) were made at 10 localities, in depths between 4 and 62 fathoms off Mississippi, Alabama, and Florida. Menhaden (Brevoortia patronus) were taken in one bottom set off Horn Island Pass in $7\frac{1}{2}$ fathoms. Thirty-eight plankton tows were made for study by the Beaufort laboratory staff.

Note: See Commercial Fisheries Review, November 1963 p. 34.

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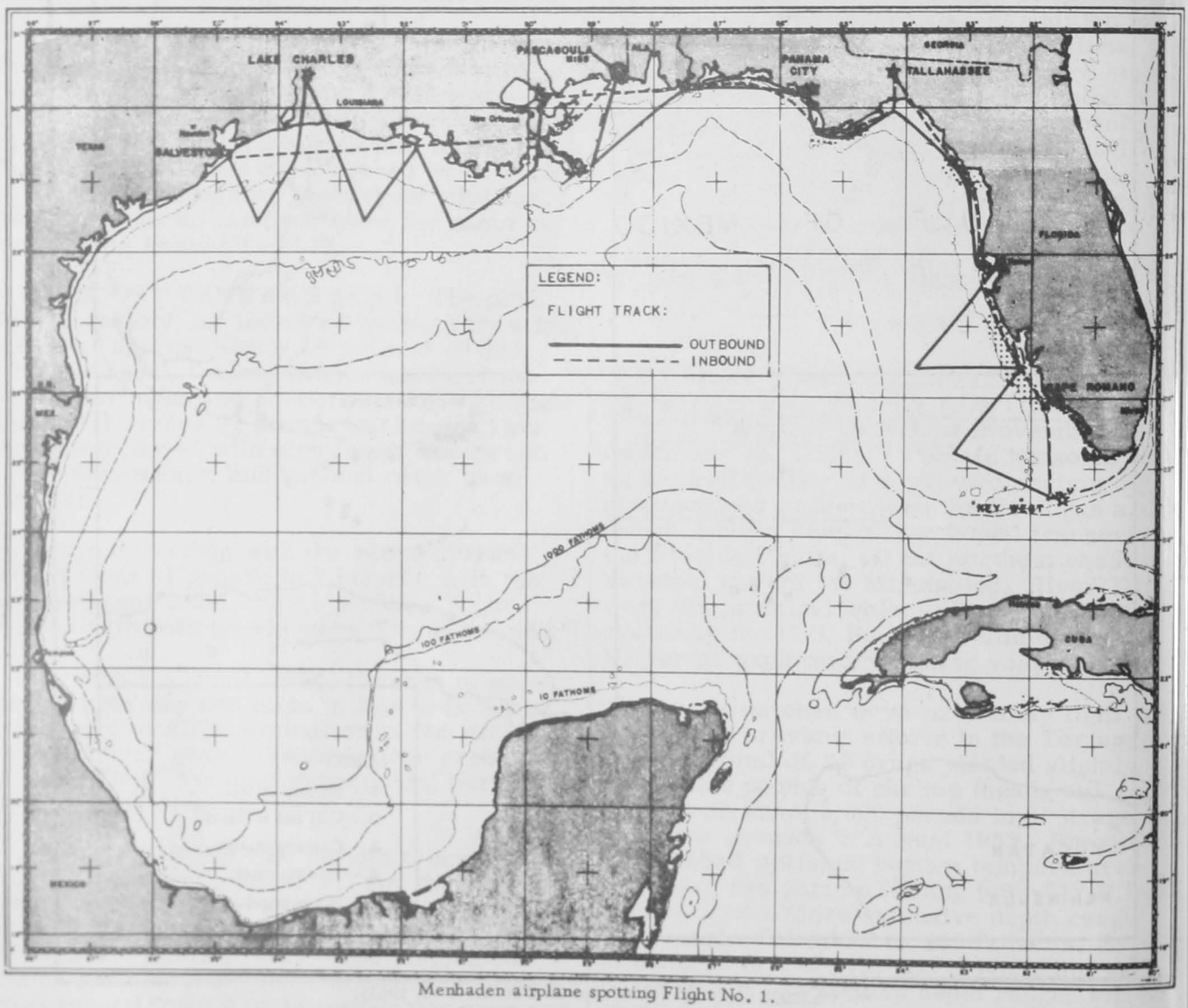
MENHADEN OFF-SEASON POPULATION SURVEY:

Airplane Spotting Flight 1 (November 19-22, 1963): To determine the occurrence of adult menhaden and related species in the Gulf of Mexico during the off-season period from November through April, the first of si monthly aerial observation flights was initiated in late November 1963 by the U. S. Bureau of Commercial Fisheries chartered airplane Apache N2229P. The search zone is from the Florida Keys to Galveston, Tex. The waters being canvassed generally extend from the shoreline to the 20-fathom curve. But in some areas off Alabama and Louisiana coastal observations will be extended out to the 50-fathom curve.



Menhaden airplane spotting Flight No. 1.

During the initial flight heavy seas off Mississippi, Louisiana, Texas, and the west coast of Florida limited the effectiveness of aerial observations. In addition, low ceilings and overcast skies interfered with observations between Galveston and the Mississippi River Delta on November 22.

Surface menhaden schools were sighted in three areas off the Florida coast. In the Apalachicola area, 31 schools were observed, ranging in estimated size from 1 to 20 tons; although the majority were considered to be less than 10 tons. In waters west, southwest, and south of Cedar Keys, 16 schools were sighted. Those schools were estimated to be less than 10 tons each. In the area off Venice and southward to Cape Romano, 36 schools were observed; 3 of the schools were within 1 mile of the shoreline and the others ranged offshore as far as 12 miles, with the majority in the 2- to 4-mile zone. Most of those schools were estimated to be in the 10- to 15-ton category, but 2 schools 3 miles northwest of Naples and 2 schools 5 miles southwest of Venice, showed distinctive reddish color and were estimated to contain from 25 to 50 tons each.

In all three areas in which fish schools were observed, sea conditions were good and birds were present.

United States shrimp and snapper vessels were seen fishing off Florida. Shrimp vessels were also seen in Louisiana and Texas waters. No foreign fishing vessels were observed.

An infrared radiation thermometer to record surface water temperatures will be installed aboard the plane and used during future flights.

Gulf Fishery Investigations

SHRIMP DISTRIBUTION STUDIES:

M/V "Gus III" Cruise GUS-11 (November 20-December 2, 1963): Catches of brown and white shrimp were light to moderate during this cruise off the coast of Louisiana and Texas by the chartered research vessel Gus III. The vessel (operated by the Galveston Biological Laboratory of the U.S. Bureau of Commercial Fisheries) was engaged in a continuing study of the distribution of shrimp in the Gulf of Mexico. Eight statistical areas (13, 14, 16, 17, 18, 19, 20, and 21) were covered. One 3-hour tow with a 45-foot shrimp trawl was made in each of 3 depth ranges (0-10, 10-20, and over 20 fathoms) in those areas.

The best catches off Louisiana were taken in the vicinity of the Mississippi Delta which yielded 73 pounds of 26-30 count white shrimp from under 10 fathoms and 37 pounds of 21-25 count brown shrimp from over 20 fathoms. Moving westward, area 14 yielded 28 pounds of 31-40 count white shrimp from under 10 fathoms, 15 pounds of 21-25 count brown shrimp from the 10-20 fathom depth, and 11 pounds of 15-20 count brown shrimp from over 20 fathoms; area 16 produced 17 pounds of 15-20 count brown shrimp from over 20 fathoms.

The best catches off Texas were made in area 18 which yielded 24 pounds of 31-40 count white shrimp from under 10 fathoms, 14 pounds of 26-30 count brown shrimp from 10-20 fathoms, and 56 pounds of 12-15 count brown shrimp from over 20 fathoms.

Area 19 produced 39 pounds of 15-20 count brown shrimp from the 10-20 fathom range. Tows in area 20 took 10 pounds of 31-40 count white shrimp from the under 10-fathom depth, 19 pounds of 21-25 count brown shrimp from the 10-20 fathom range, and 29 pounds of 15-20 count brown shrimp from over 20 fathoms. Area 21 yielded 11 pounds of 26-30 count white shrimp from under 10 fathoms and 15 pounds of 15-20 count brown shrimp from 10-20 fathoms.

Catches of white shrimp were almost entirely limited to the under 10 fathom depth. The catch of pink shrimp did not exceed one pound at any station during the cruise.

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M/V "Gus III" Cruise GUS-12 (December 10-22, 1963): Bad weather hampered operations of the chartered research vessel Gus III during this cruise off the Alabama coast extending westward off the coast of Texas. A total of ten statistical areas (10, 11, 13, 14, 16, 17, 18, 19, 20, and 21) were covered and one 3-hour tow with a 45-foot shimp trawl was made in the three depth ranges of each area. Despite adverse weather conditions all stations were fished. Catches were generally spotty but good white shrimp catches

Industrial Fishery Products

TRENDS IN USE OF FISH MEAL IN MAINE AND MASSACHUSETTS:

Animal feed manufacturers and experiment station scientists in Maine and Massachusetts, fish reduction plants in Maine, and a feed mill in New Hampshire were visited in December 1963, by the Chief of the U. S. Bureau of Commercial Fisheries Technical Advisory Unit and the Animal Nutritionist attached to the Unit. Observations made during the trip were as follows:

The State of Maine is among the 10 leading states in the production of broilers and therefore is a relatively large consumer of fish meal. On the other hand, swine, which like poultry, consume fish meal, are reared in relatively small numbers, and there appears to be an opportunity in that State for an increase in pork production. Only half the eggs consumed in Massachusetts are produced in that State; this offers poultrymen an opportunity for expansion. These possible increases in poultry and swine production obviously would work to the advantage of fish meal producers by increasing the total consumption of fish meal.

The average levels of fish meal utilization in northeastern broiler, layer replacement, and laying rations appear to be about the same as those in the Southeastern States, namely, 2.5 percent in rations for broilers and chicks reared as layer replacements and 0.5 percent in laying rations. This is true despite the fact that fish meal is produced in the area. However, the level of utilization may be influenced by the fact that it has been necessary to import fish meal from abroad in order to supply the demand, and, as is true in the southeast, the necessity of using imported meal tends to depress the level of utilization.

Almost without exception, the animal nutritionists expressed high regard for fish meal. In the opinion of one nutritionist employed by a large concern, there is, without doubt, no other product available having as much potential as a balanced source of amino acids as has fish meal; this appears to be the opinion of most poultry nutritionists. Some of the feed manufacturers stated that they would prefer bulk shipments to sacked shipments of fish meal.

Most animal nutritionists and laboratory directors expressed lively interest in any advances that can be made in determinations of protein quality of fish meal. One concern is carrying out active research to determine to what extent enzymatic digestibility tests can be relied upon in comparison with the much more time-consuming chick or rat tests. Another feed mill depends upon chemical tests to tell whether or not there is a great deal of variation between different shipments of meal from a given source.

A poultry nutritionist at the University of Maine has recently completed some experiments in which fish meal significantly stimulated growth of layer flock replacement chicks during the first 9 weeks following hatching. Also, a Maine professor said that a number of egg producers in his State are building their own feed mills. Operators of these mills, in an effort to decrease the variety of feed ingredients that must be stored, have been exploring the possibility of eliminating fish meal and some other feed ingredients from their formulas. The Maine professor, who had been consulted concerning the proposed formula simplification, indicated that the elimination of fish meal from poultry feed formulas would be highly inadvisable, in his opinion, because it would mean the lowering of the quality of the rations.

At the University of Massachusetts, some very basic experiments on the endocrinology of fowl are being carried out. Such studies usually lead to a better understanding of physiology and, eventually, to increased economy and profits.

* * * * *

UPWARD TREND IN USE OF FISH MEAL IN SOUTHERN STATES:

Mixed animal feed manufacturers and experiment station scientists in Alabama, Georgia, Mississippi, and Louisiana were visited during mid-November 1963 by the Chief of the U. S. Bureau of Commercial Fisheries Technical Advisory Unit and the animal nutritionist attached to the Unit. Fish reduction plants in Mississippi and Louisiana also were visited. The observations and conclusions resulting from the trip were as follows:

Interacting factors are discernible, in the area visited, that tend on the one hand to encourage and on the other to discourage liberal use of fish meal in poultry rations. A factor encouraging more liberal utilization has been the feed-ingredient price structure. During November 1963, relative prices of feed ingredients encouraged a trend toward relatively liberal utilization of fish meal. This trend was exemplified by commercial broiler rations that contained 6, 8, and even 10 percent fish meal. In general, such rations are formulated on a "maximum profit" basis, i.e., the cost per pound of feed is disregarded and the feed is formulated to produce a maximum of broiler meat per dollar invested in feed.

A number of factors tend to depress the level of fish meal utilization. One such factor is the result of competition between firms to produce rations of given quality to be sold at competitive prices. In order to reduce costs, formulators may substitute less expensive protein concentrates for part of the fish meal of a ration. Such concentrates are likely to be inferior to fish meal because of lower coefficients of digestibility, less desirable balance of essential amino acids, and lower content of the essential amino acids methionine and lysine. In addition, most protein concentrates other than fish meal lack the unidentified growth factor (UGF) of fish. Thus, as most formulators freely acknowledge, a reduction in the level of fish meal to lower the sale price of the feed mixture usually results in a somewhat less desirable ration.

A second factor tending to discourage liberal use of fish meal is the present unavailability of domestic meal. Of the feed mixers visited, most either had exhausted their supplies of domestic fish meal or were rapidly depleting their remaining stores. Many feed producers expressed a definite reluctance to use imported meal in liberal amounts. This reluctance is based upon what feed mill operators appear to believe is the extreme variability in the quality of imported meal. For example, according to one feed mill operator, in amounts no larger than a carload lot, sacks of meal have been found that appear to have originated in six different reduction plants, and variations in quality within such carload lots are, as one would expect, considerable.

According to an industrial nutritionist, a third factor historical in nature has tended to depress fish meal utilization in broiler rations in the Southern States. The nutritionist said that when the broiler-producing industry first got its start, rations ordinarily consisted of such suitable grain products as were readily available, plus a protein-mineral-vitamin mixture purchased from one of the firms specializing in such "premixes." The latter ordinarily contain fish meal in amounts too small to represent a liberal supply of fish meal in the finished ration. Fish meal utilization subsequently has tended to follow the levels established earlier by feed producers using premixes.

As a result of the interplay of factors, just described, the average fish meal content of broiler rations produced in the Southern States appears to be about 2.5 percent. This estimate is based upon information given both by experiment station specialists and by industrial nutritionists. Even though the average utilization level is relatively low percentage-wise, very large amounts of fish meal are utilized in the Southern broiler-producing States because of the tremendous poultry production in that region.

The evidence collected on this trip, and earlier, suggests that the demand for fish meal will continue to increase in the

Southern broiler-producing States but that the rate of increase cannot be expected to be rapid.

Several industrial nutritionists expressed some concern with present methods of quality control of fish meal, pointing out, as have many others in the past, that biological (chick and rat) tests are too protracted to yield the desired data before the feed mixtures containing the protein being tested have been sold and perhaps consumed. The need for a rapid test for quality is apparent. One nutritionist pointed out that microscopic examination of fish meal by a skilled technician reveals a great deal concerning the quality of the meal, as for example, whether or not even slight scorching has taken place.

Broiler production is still on the increase in the Southern broiler-producing States, but such increase is taking place at a decelerating rate. In contrast with this decline in rate of increase in broiler production, a marked increase in egg production is now taking place. Some new egg production units are of 1-million hen size and a few are even larger. This increase in egg production will add to the demand for fish meal for the reason that laying mashes usually contain some fish meal and rations for layer replacement flocks ordinarily contain relatively liberal amounts of such meal.

The production of dogfood and other petfoods seems to be increasing in the states visited. A large portion of the output of some large concerns now consists of petfoods. Because fish meal is used in low concentrations in some of these petfoods, this expanding branch of the mixed feed industry can be expected to have a limited but positive influence on the demand for fish meal. (U. S. Bureau of Commercial Fisheries, Technical Advisory Unit, Boston, Mass., December 16, 1963.)

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

U. S. Production[1] of Fish Meal, Oil, and Solubles, November 1963 (Preliminary) with Comparisons

Area	Meal	Oil	Solubles	Homogenized[3]
	Short Tons	1,000 Pounds	. . (Short Tons) . .	
November 1963:				
East & Gulf Coasts	9,537	9,283	3,520	-
West Coast[2]	2,447	1,026	1,084	-
Total	11,984	10,309	4,604	-
Jan.-Nov. 1963 Total	221,654	178,273	88,514	7,216
Jan.-Nov. 1962 Total	295,730	255,129	111,532	10,964

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

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Major Indicators for U. S. Supply, November 1963: United States production of fish meal and fish oil in November 1963 was higher by 17.8 and 24.9 percent, respectively, as compared with November 1962. Fish solubles production was down 4.5 percent.

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

Item and Period	1963	1962	1961	1960	1959
	. . . . . (Short Tons)				
Fish Meal:					
Production 1/:					
December	-	2,683	12,763	9,178	15,378
November	2/ 11,984	10,175	10,071	10,805	11,840
Jan.-Oct.	2/ 209,670	285,555	268,503	250,360	255,026
Jan.-Dec.	-	311,232	311,265	290,137	306,551
Imports:					
December	-	18,977	23,268	15,564	5,538
November	-	11,904	25,649	6,149	3,673
Jan.-Oct.	335,259	221,426	168,565	109,848	124,464
Jan.-Dec.	-	252,307	217,845	131,561	133,955
Fish Solubles 3/:					
Production:					
December	-	1,838	4,936	2,897	5,429
November	2/ 4,604	4,819	5,140	3,524	4,628
Jan.-Oct.	2/ 91,126	117,677	102,165	92,508	155,302
Jan.-Dec.	-	124,334	112,241	98,929	165,359
Imports:					
December	-	387	472	60	420
November	-	435	3,649	282	3,089
Jan.-Oct.	3,442	5,486	2,618	2,832	23,121
Jan.-Dec.	-	6,308	6,739	3,174	26,630
Fish Oils:	. . . . . (1,000 Lbs.)				
Production:					
December	-	679	11,562	7,981	14,094
November	2/ 10,309	8,254	10,599	12,464	9,416
Jan.-Oct.	2/ 167,964	246,875	244,507	195,209	169,814
Jan.-Dec.	-	255.808	266,668	215,653	193,324
Exports:					
December	-	172	10,484	15,807	19,586
November	-	171	1,425	14,640	6,096
Jan.-Oct.	228,934	122,707	110,575	113,229	118,801
Jan.-Dec.	-	123,050	122,486	143,659	144,481

1/Does not include crab meat, shrimp, and misc. meals.
2/Preliminary data for 1963 based on reports which accounted for the following percentage of production in 1962: Fish meal, 93 percent; solubles and homogenized fish, 97 percent, and fish oil, 75 percent.
3/Includes homogenized fish.
4/Beginning with March 1963 fish oil is shown in pounds instead of gallons. Conversion factor, 7.75 pounds equal 1 gallon.
Note: Data for 1963 are preliminary.

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Production, October 1963: During October 1963, 15,608 tons of fish meal and 14.2 million pounds of oil were produced in the United States. Compared with October 1962, this was a decrease of 20,357 tons or 57 percent in meal production, and 24.8 million pounds or 64 percent in oil production.

Menhaden meal production for October amounted to 11,420 tons--a decrease of 20,708 tons or 64 percent. Menhaden oil (12.3 million pounds) was 25.7 million pounds or 68 percent less than in October 1962.

Fish solubles manufactured in October 1963 amounted to 6,678 tons. This was a decrease of 6,636 tons (approximately 50 percent) below the production of the same month in 1962. Menhaden solubles (4,494 tons) made up 67 percent of the October fish solubles production.

Fish meal production amounted to 209,670 tons during the first 10 months of 1963. This was a decrease of 75,885 tons or 27 percent. Oil production for the same period of 1963

amounted to 168.0 million pounds--a decrease of 78.9 million pounds. Production of fish solubles for the first 10 months of 1963 amounted to 83,902 tons--a decrease of 23,355 tons or 22 percent.

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

Product	October		Jan.-Oct.		Total
	1/1963	1962	1/1963	1962	1962
	(Short Tons)				
Fish Meal and Scrap:					
Herring	824	487	7,283	5,035	5,095
Menhaden 2/	11,420	32,128	165,168	231,100	238,680
Sardine, Pacific	13	16	29	689	702
Tuna and mackerel	2,225	2,074	18,283	22,669	26,559
Unclassified	1,126	1,260	18,907	26,062	27,297
Total	15,608	35,965	209,670	285,555	298,333
Shellfish, marine-animal meal and scrap	3/	3/	3/	3/	12,899
Grand total meal and scrap	3/	3/	3/	3/	311,232
Fish Solubles:					
Menhaden	4,494	10,738	68,422	82,198	84,885
Other	2,184	2,576	15,480	25,059	28,353
Total	6,678	13,314	83,902	107,257	113,238
Homogenized condensed fish	-	850	7,224	10,420	11,096
	(1,000 Pounds)				
Oil, Body:					
Herring	346	295	5,261	5,054	5,255
Menhaden 2/	12,268	37,931	150,498	230,134	237,815
Sardine, Pacific	4	2	6	166	167
Tuna and mackerel	1,155	516	4,850	4,357	5,175
Other (including whale)	398	246	7,349	7,164	7,396
Total oil	14,171	38,990	167,964	246,875	255,808

1/Preliminary data.
2/Includes a small quantity of thread herring.
3/Not available on a monthly basis.

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U. S. FISH MEAL AND SOLUBLES:

Production and Imports, January-October 1963: Based on domestic production and imports, the United States available supply of fish meal for January-October 1963 amounted to 544,929 short tons--37,948 tons (or 7.5 percent) more than during the same period in 1962. Domestic production was 75,885 tons (or 26.6 percent) less, but imports were 113,833 tons (or 51.4 percent) higher than in the same period in 1962. Peru continued to lead other countries with shipments of 256,433 tons.

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

Item	Jan.-Oct.		Total
	1/1963	1962	1962
	(Short Tons)		
Fish Meal and Scrap:			
Domestic production:			
Menhaden	165,168	231,100	238,680
Tuna and mackerel	18,283	22,669	26,559
Herring	7,283	5,035	5,095
Other	18,936	26,751	40,898
Total production	209,670	285,555	311,232
Imports:			
Canada	43,735	37,488	42,806
Peru	256,433	164,573	186,249
Chile	23,197	8,255	9,247
So. Africa Republic	8,275	9,884	10,084
Other countries	3,619	1,226	3,921
Total imports	335,259	221,426	252,307
Available fish meal supply	544,929	506,981	563,539
Fish Solubles:			
Domestic production 2/	91,126	117,677	124,334
Imports:			
Canada	1,753	1,236	1,335
Iceland	55	2,205	2,332
So. Africa Republic	191	1,442	1,717
Other countries	1,443	603	924
Total imports	3,442	5,486	6,308
Available fish solubles supply	94,568	123,163	130,642

1/Preliminary.
2/50-percent solids. Includes production of homogenized condensed fish.

The United States supply of fish solubles (including homogenized fish) during January-October 1963 amounted to 94,568 tons--a decrease of 23.2 percent as compared with the same period in 1962. Domestic production and imports dropped 22.6 percent and 37.3 percent, respectively.

Inventions

"BATHYKYMOGRAPH" MEASURES SPEED AND DEPTH OF NET WHILE FISHING:

A device known as a bathykymograph has been designed to measure how deep and how fast a net sinks while fishing. The information may help fishermen in placing their nets.

The bathykymograph is cylindrical, 12 inches long and 4 inches in diameter. The cylinder is equipped with a sealed piston and stylus. The device is attached to the net. As the capsule sinks, water pressure on the pis-

Frank J. Hester, the inventor, holds bathykymograph which can tell how fast and deep a fish net sinks.

ion compresses a spring which moves the stylus and a clock-like device, recording depth and time.

The bathykymograph has been patented by Frank J. Hester, 2033 Abbott Street, San Diego, Calif.

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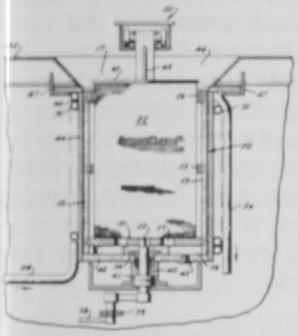
MULTI-IMMERSION QUICK FREEZER:

The inventor claims this is a quick-freezing process designed for enterprises having limited complementary facilities other than freezer storage. It is said to decrease the cost of operation by maintaining higher refrigeration efficiency and low energy load by freezing in stages with very simple devices. (Patent No. 3,078,687, SIC No. 3585, granted Willis R. Woolrich, 700 Texas Avenue, Austin 5, Texas.)



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METHOD OF ATTACHING FISHING SINKERS:

The inventor claims this is a simple method of handling split-shot type weights and attaching them to a fishing line. It involves joining the weights together in a chain effect with a plastic ribbon, gummed paper tape, or integrally cast connectors. It is said that attachment of one or more of the weights is then simplified by their symmetric arrangement on the connector. (Patent No. 3,084,469, SIC No. 3949, granted Thomas H. Stratton, Box 454, State Farmers Market, Columbia, South Carolina.)

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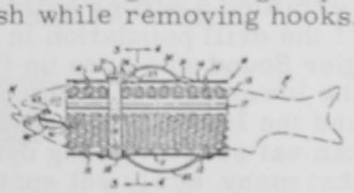
FISH HOLDER PATENTED:

A new device has been designed for grasping the body of live fish while removing hooks. The risk of hand injury from fins, scales, or spines is thereby avoided, according to the inventor. The device is adjustable in size and can be made of various corrosive-resistant materials. (Patent Number 3,081,576, granted Harry C. Collins, 11 West Third Street, Ocala, Florida.)



Irradiation Preservation

PRELIMINARY TESTS ON OILY FISH INDICATE FLAVOR AND STORAGE PROBLEMS:

Research on the irradiation of fish and fish products in the Seattle Laboratory of the U.S. Bureau of Commercial Fisheries have consisted primarily of the investigation of non-oily species such as sole and crab. During the Atomic Energy Commission contract year (July 1963-June 1964), a series of species of oily fish (either containing a high oil content or oil with a high degree of instability) are to be irradiated and their storage-keeping quality tested. Such fish as the various species of salmon, herring, sablefish, and some of the rockfishes will be included. The first species (pink salmon) tested has presented some very serious problems. Not only does rancidity limit the storage life of the irradiated samples to a shorter period than that of the unirradiated controls, but also the initial desirable, normal salmon flavor is largely destroyed by the irradiation process. It is obvious that considerable basic research will be necessary if satisfactory results are to be realized using irradiation as a tool for increased storage life of fish with high oil content.

Maryland

OYSTER STUDIES IN 1963 INDICATE FAVORABLE CONDITIONS FOR SPAWNING AND SETTING:

The late 1963 oyster spat in Maryland's tidewaters was generally light and ended by mid-September at all stations where test shells were exposed. This was earlier than usual, as evidenced by a number of years when fair sets were recorded as late as mid-October. Factors that contributed to the early end of setting were the lower than normal water temperatures that occurred during late summer and early fall and the completely spawned out condition of most oysters that had produced such excellent midsummer sets. At most stations water temperatures dropped below 70° F. shortly after mid-September, about three weeks earlier than normal.

A survey of the commercial or surviving set on all State plantings was conducted in late 1963 by the Tidewater Fisheries Depart-

ment survey vessel Tiny Lou with a biologist cooperating full time in making the observations. Excellent spat counts on bars in many areas confirmed the good sets whose potential had previously been indicated by the test shell bags.

In general, 1963 has produced one of the best oyster sets on record with high counts of spat particularly in the Eastern Chesapeake Bay area, lower Choptank tributaries, Little Choptank River, and St. Marys' River. An exceptionally heavy set was found in the upper Wicomico tributary of the Potomac River, the third such set recorded in the past 24 years with little or no set during intervening years.

The conditions needed to bring about a good oyster set result from a complicated combination of factors that are not all fully understood. However, certain features of 1963 that favored a good set in Maryland were: Weather during March was much warmer than normal and accompanied by copious rainfall. This started oysters feeding vigorously with an abundance of food early in the season. May was cooler than normal so that feeding conditions were excellent while the beginning of oyster spawning was delayed. The result was that oysters generally were exceptionally fat and in top condition by the beginning of June before spawning commenced.

Late spring and summer 1963 were marked by drought conditions and an absence of storms or strong winds. Salinity of the bay was much higher than normal and the lack of fresh water run-off retarded the formation of low oxygen conditions in deep water that are caused in part when a layer of fresher water floats near the surface. The spawning of oysters is known to be favored by the higher salinities, and two periods of sharp temperature rises occurred during the summer that would tend to trigger mass spawning. The above conditions favored production of an abundance of oyster larvae wherever brood stock was present.

Newly hatched oysters while in the 2-week swimming stage are microscopic and, though able to swim slowly up or down, are entirely at the mercy of water currents in their long distance movement. Since only a small percentage of the bottom is shell covered and suitable for setting it is not unusual for a large part or even all of a good brood of larvae to be swept away from the oyster beds and into deep channels or over unfavorable bottom where they will smother and be lost at the time when setting must occur. Thus good broods of larvae often are observed in the water that become totally lost in storms before they can set. The relatively calm waters of last summer permitted a greater portion than usual of the oyster larvae to be retained in the creeks and bays where there were shell beds upon which they could set.

The flow of heavier salt water from the ocean along the Bay's bottom and the spinning of the earth tend to carry oyster larvae near the bottom upstream and swing them towards their right as they move up the channel. Thus concentrations of larvae can occur in the upper part of small tributaries or embayments where there is no strong downstream flow of fresh water. They also concentrate along the right hand bank, as you look upstream, of the Bay proper and of large tributaries such as the Potomac and James Rivers. This is one of the reasons why setting usually is higher along the eastern side of the Bay than along its western side.

A sustained flow of wind from one direction may produce currents that carry larvae into a given area and at the same time carry them away from another location so that ideal setting conditions do not occur in all places at the same time. That is one of the reasons why, even in a particularly good setting year, some areas failed to receive good sets.

Still another factor that can sharply reduce an oyster set is the presence or absence of oyster enemies such as the oyster drill or "screw borer." Oyster drills must have quite salty water and so are seldom a serious problem in Maryland except on the seaside and in the lower portions of Somerset County waters. There have now been several years that were drier than normal and this has permitted a strong build-up of the drill population in Tangier Sound and even up into the lower part of Fishing Bay, Hooper Straits and the lower Honga River. Each young drill can eat several young oyster spat per day so that many newly set spat never get big enough to be easily seen by the naked eye. The abundance of drills in 1963 in the Tangier Sound area was quite destructive and was a major factor in the sharp reduction in the surviving oyster set.

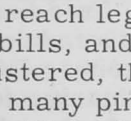

Oyster Drill

Oysters grew quite well during 1963 and there were no reports of serious oyster mortalities since the late 1963 winter. A survey showed that the fungus Dermocystidium, while favored by high salinity, was apparently checked by cooler water temperatures and though present in the lower part of the Maryland area, and in some instances found further upstream than usual, produced no serious problem where it had been monitored.

The parasite "MSX" has remained as a light infestation on certain bars in the Pocomoke and Tangier Sound areas. It is possible that the higher salinities may result in some increase of infection by this parasite with the extent of future damage somewhat dependent upon salinity conditions in 1964. The reports of much lower losses in 1963 from "MSX" in Delaware Bay and in the lower Chesapeake continue to be a most hopeful sign.

The condition of oyster meats was better in the fall of 1963 than in the fall of 1962. Oysters were generally fat on most bars except for a few localities. Water temperatures had fallen rapidly during the 1963 fall period to curtail fattening. Late fall 1963, temperatures were too low for effective feeding so that oyster condition is expected to decline slowly during the winter period of hibernation and not improve until warming in the spring of 1964.

A few reports of oysters that were poor and shucking out only a few pints were received. These were checked as of early December 1963 and no parasite had been found associated with the condition. One apparent cause of poor yields in pints per bushel was the rapid growth in 1963 that enabled many young oysters to reach legal size but with thin shells, long bills, and shallow cups. Especially when clustered, these thin flat oysters cannot yield many pints even when fairly fat. (Chesapeake Biological Laboratory, Solomons, Md., December 10, 1963.)



Michigan

STOCKS OF LAKE TROUT INCREASE DUE TO RESEARCH:

Latest studies give United States and Canadian conservation agencies another solid vote of confidence behind their joint efforts to control the parasitic sea lamprey and rebuild lake trout populations in the upper Great Lakes.

Good survival and growth among lake trout in Lake Superior continue as the result of lamprey control and fish plantings in recent years, according to reports made during the December 1963 meeting of the Great Lakes Fishery Commission in Ottawa, Canada. Also, catches of adult sea lamprey remained relatively low in 26 streams along the south shore of Lake Superior where electrical barriers are in operation.

Although up somewhat from 1962, the 1963 lamprey take is still 79 percent below the average catch of these eel-like predators during the 1957-61 period.

Barrier operations and commercial catches underline the combined effectiveness of lamprey control and fish plantings in Lake Michigan. Through September 1963, commercial operators had taken 26,000 pounds of lake trout in those waters, their highest total since 1949. A year earlier they had netted only 325 pounds from Lake Michigan.

Lamprey catches in 1963 declined 55 percent from 1962 in 2 of 3 Lake Michigan streams where barriers are in use. The reduction was recorded in the Bark and Sturgeon Rivers which were chemically treated. In the untreated Cedar river, there was a 12-percent jump in the number of lampreys captured.

Lake trout studies show a drop in the number of lamprey-scarred fish caught in Lake Superior. Too, they reveal a continued improvement in the average size of lake trout which has increased from 2.5 to 3.4 pounds during the last five years.

The U. S. Bureau of Commercial Fisheries reported that lake trout 29-32 inches long were more abundant in 1963; those in the 25-28-inch group made smaller gains. Fewer fish were available from 1962 to grow into the 21-24 inch category. Lake trout less than 21 inches long were more numerous in 1963, virtually all of them being hatchery fish.

As expected, hatchery-reared fish again accounted for a larger percent of lake trout catches in Michigan's Lake Superior waters. East of the Keweenaw Peninsula, hatchery fish made up almost 55 percent of the legal catch through September 1963 as compared

to only 1.2 percent in 1959. Among the undersized fish, the hatchery figure climbed from less than 3 percent in 1959 to 94 percent in the fall of 1963.

In Wisconsin waters there also had been a marked increase in the abundance of juvenile lake trout in Lake Superior, due almost entirely to large plantings of hatchery fish.

Fisheries officials are particularly encouraged by signs of lake trout spawning in most areas along the Michigan shore of Lake Superior from Grand Marais westward. Last fall's spawning run was the largest since 1958 in Wisconsin's waters, and there is good reason to expect that 1964 will see another large increase of spawning fish in these and other parts of Lake Superior.

The lake trout restoration program is coordinated by the Great Lakes Fishery Commission. Federal, Canadian, and state agencies, including the Michigan Department of Conservation, are cooperating in the long-range effort. (Michigan Department of Conservation, Official News Bulletin, December 12, 1963.)

New England Fisheries

BOTTOMFISH AND SCALLOP LANDINGS IN 1963 AND FORECAST FOR 1964:

Changes in the abundance of groundfish on New England fishing banks are expected to be mixed during 1964, and the abundance of sea scallops will decline, according to the Acting Director of the North and Middle Atlantic Region of the U. S. Bureau of Commercial Fisheries. This forecast is based on information provided by biologists of the Bureau's Woods Hole Laboratory who monitor the landings of commercial fishermen, and study the population of fish and shellfish on offshore fishing banks by sampling with the Bureau's new fishing research vessel Albatross IV.

Haddock landings in New England in 1963 will be about 112 million pounds, a decline from the 117 million pounds landed during 1962. The stocks of haddock on New England banks are expected to remain in only fair supply during 1964, so landings in 1964 will not improve. The drop will be most noticeable in the scrod category because of the scarcity of small fish which has been due to the age groups spawned in 1960, 1961, and 1962 being below average in abundance.

However, things will be brighter in the haddock fishery after 1964. The survival of fish spawned in 1963 appears to have been unusually high. Both the summer and fall surveys of the offshore banks by the Albatross IV indicate the greatest abundance of young fish since the surveys were started in 1953. These young fish will reach marketable size and thus begin to be important to the fishery in the summer of 1965. This 1963 age group is expected to support the fishery for several years.

Landings of cod in 1963 will be slightly less than the 35 million pounds landed in 1962. There has been an upward trend in cod landings during the past few years, and abundance in 1964 is expected to remain at a relatively high level. Surveys by the Albatross IV show a fairly strong age group spawned in 1963 which should enter the fishery in late 1964 and early 1965.

Landings of ocean perch in 1963 will be somewhat over 100 million pounds with abundance holding steady. There is some indication that there will be more fishing in the Gulf of St. Lawrence in 1964. If so, total United States landings in 1964 will exceed those of 1963.

Yellowtail flounder landings in 1963 will be nearly 75 million pounds, an all time high. This is due to increased abundance of fish which resulted from excellent survival of the age groups spawned in 1958, 1959, and 1960. The oldest of these age groups will be of less importance in 1964, and the following age group (1961) appears to be a poor one. Therefore, abundance and landings are expected to be lower in 1964, although still at a relatively high level.

United States landings of whiting (silver hake) in 1963 will total about 92 million pounds which is slightly less than the figure for 1962. The U.S.S.R. fleet probably removed an equal quantity of whiting from the area during the year. What effect the Russian fishing will have on the stocks of whiting cannot be determined at this time, according to Bureau biologists. Thus they are withholding any estimate of the availability of this species to United States fishermen during the year 1964. There is, however, no indication at present of any serious decline in abundance.

Sea scallops have suffered a decline in abundance during 1962 and 1963 although total landings by United States and Canadian fishermen did not slip much in 1963. United States vessels landed about 19.7 million pounds of scallop meats in 1963, which was 16 percent less than the 23.5 million pounds landed in 1962. Canadian landings, however, increased from 13.9 million pounds in 1962 to 16.4 million pounds in 1963. Research vessel surveys show that the downward trend in abundance is continuing and landings are expected to decrease again in 1964.

North Atlantic Fishery Investigations

GROUNDFISH DISTRIBUTION AND ABUNDANCE STUDIES:

M/V "Albatross IV" Cruise 63-7-2 (December 2-16, 1963): To determine the fall distribution and relative abundance of groundfish species from Georges Bank to Hudson Canyon and to study marine food and its availability to a number of groundfish species were the main objectives of this cruise by the U. S. Bureau of Commercial Fisheries research vessel Albatross IV.

Around-the-clock fishing operations were conducted with a No. 36 trawl (lined). A total of 86 fishing and 2 hydrographic-plankton stations were occupied, 128 bathythermograph casts were made, and 300 sea-bed drifters were released. Otoliths were removed from 31 cod, scales were taken from 473 haddock and 1,190 yellowtail flounder, and 1,760 stomachs from many species were examined. Hy-

drographic and plankton data were collected. Temperature data were collected on a specific transect to compare with the temperature readings taken from an airplane with infrared equipment.

There were on the cruise two biologists from the Marine Fisheries Laboratory of the New Jersey Division of Fish and Game. Fluke and porgy are extremely important to New Jersey commercial and sport fishermen, and the present cruise provided an opportunity for cooperative work on the winter distribution of those two species.

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

North Atlantic Fisheries Exploration and Gear Research

TUNA DISTRIBUTION STUDIES IN NORTH ATLANTIC CONTINUED:

M/V "Delaware" Cruise 63-11 (November 13-25 and December 2-10, 1963): This exploratory long-line cruise continued seasonal coverage of the tuna populations in waters east of New England and south of Nova Scotia by the U.S. Bureau of Commercial Fisheries exploratory fishing vessel Delaware. The objectives of the cruise were to: (1) investigate the distribution, abundance, and migration of tuna and swordfish; (2) evaluate the tuna and swordfish commercial fishing potential in the Northwest Atlantic; and (3) collect descriptive oceanographic data.

Previous pelagic long-line explorations in the Northwest Atlantic during November and December had been limited to the work of the Japanese exploratory fishing vessel Shoyo Maru in December 1959, and that of the Woods Hole Oceanographic Institution research vessel Crawford in November 1960.

New information was obtained by the Delaware during cruise 63-11. The known range of albacore (Thunnus alalunga), yellowfin (Thunnus albacares), big-eyed (Thunnus obesus), and skipjack (Katsuwonus pelamis) in the late fall season was extended north to 41° latitude and east to 60° longitude by a significant catch at station No. 4 (see table). The catch of 12 albacore on 420 hooks at Station No. 8 (2.9 fish per 100 hooks) proved to be the highest known catch rate for this species in the Northwest Atlantic. The conspicuously small catch of bluefin tuna (Thunnus thynnus) suggested that this species had not moved into the oceanic (Gulf Stream front) area from continental slope waters.

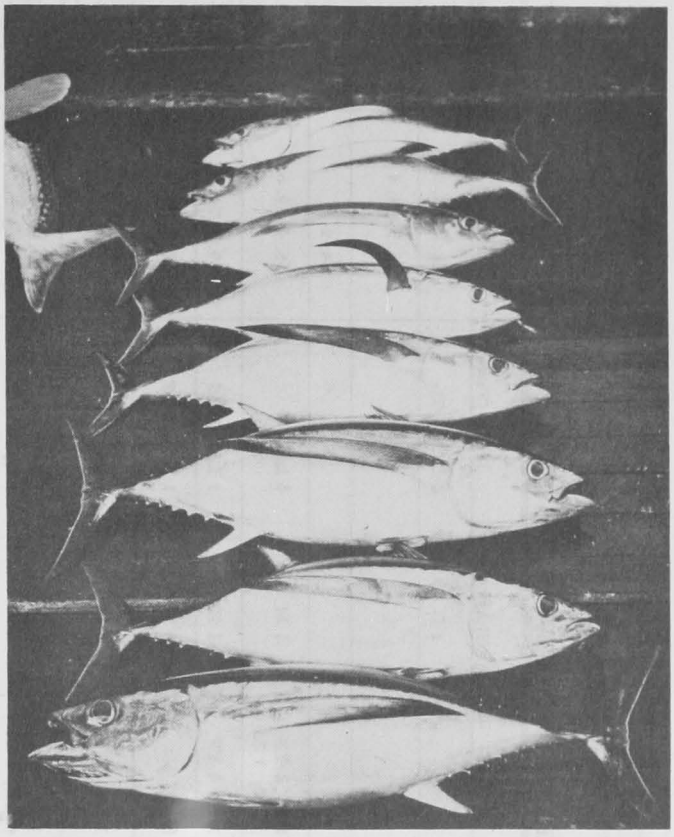


Fig. 1 - Albacore tuna from a Delaware long-line set off New England on November 23, 1963.

Of the 12 long-line sets (3,570 hooks) completed during the cruise, 8 were daylight sets and 4 were night sets. Gear consisted of Japanese-type long-line (160 fathoms of mainline with 7 branchline assemblies per "basket"). Several "baskets" were modified to test new long-line gear components: polypropylene mainline and branchline, vinyl-covered galvanized wire leaders, and aluminum leader crimping ferrules. Floatline lengths were varied at 10, 20, and 30 fathoms to determine relationships of catch to depth and temperature. A minimum of four bathythermograph casts were made at each long-line station. Squid, herring, and mackerel were used to determine bait selectivity.

Seven temperature transects between stations provided thermal environmental data to assist in positioning long-line sets. The long-line set at Station No. 4 was of particular interest because of its position across a "thermal wall;" on the warm side, the catch pro-

Station Data and Catches for M/V Delaware Cruise 63-11

Sta. No.	Date 1963	Time	Position Lat.	Position Long	Gear & Set No.	No. of Hooks	Tuna	Sharks	Misc. Fish	Surf Temp. ° F.	Remarks 1/
1.	11-15	0730-1445	42-02N	64-06W	LL#1	420		1 P	2 LL, 2 SL	52.7-53.0	
2.	11-17 11-18	2150- -0815	42-00N	62-45W	LL#2 DNNL	210				52.3-53.4	
3.	11-20	0000-0200	41-28N	60-12W	DNNL					54.5	
4.	11-20	0635-1410	41-14N	59-56W	LL#3	420	5 A, 2 YF 1 BE, 1 SJ	1 M	4 LL	55.4-69.6	1A - Lost
5.	11-21	0625-1355	40-39N	62-16W	LL#4	420	1 A, 4 YF	1 B	1 LL, 1 LS	69.3-71.9	3 YF - Tagged
6.	11-21 11-22	2150- -1050	41-00N	62-48W	LL#5 DNNL	210	6 BE	3 M	1 LL, 1 LF 2 SW	59.7-60.9	5 BE - Tagged
7.	11-22	0645-1315	41-06N	62-45W	LL#6	210	1 YF, 2 BE	1 M	1 LL	50.4-59.9	1 YF - Tagged 2 BE - Tagged
8.	11-23	0625-1415	40-22N	64-00W	LL#7	420	12 A, 6 YF 4 BE, 2 BF	1M	3 LL 1 Opah	50.6-54.5	4 A - Tagged 4 YF - Tagged 2 BE - Tagged 2 BF - Tagged
9.	12- 5	0620-1420	40-15N	64-12W	LL#8	420	6 A, 5 BE	1 M	1 LL	51.5-64.1	1 A - Tagged 3 BE - Tagged 1 A - Lost 1 M - Tagged
10.	12- 5 12- 6	2140- -1050	40-13N	65-45W	LL#9	210	1 A		1 SW, 1 C 1 LF	53.9-63.0	1 A - Tagged
11.	12- 6	0700-1305	40-12N	65-44W	LL#10	210			2 SL 1 Opah	53.9-61.8	
12.	12- 7 12- 8	2135- -1025	39-06N	66-26W	LL#11 DNNL	210	1 BE	1 B, 1 M		62.5-63.0	
13.	12- 8	0635-1235	39-07N	66-30W	LL#12	210			1 SL, 1 R	62.9-63.0	
Totals						3,570	25 A, 13 YF, 19 BE, 2 BF, 1 SJ	1 B, 8 M 1 P	13 LL, 1 R 5 SL, 2 Opah 3 SW, 2 LF 1 C, 1 LS		6 A - Tagged 8 YF - Tagged 12 BE - Tagged 2 BF - Tagged 1 M - Tagged 2 A - Lost

1/Fish tagged and released are included in the catch; fish lost at the rail are not included in the catch.
Abbreviations: Gear: LL = Long line; DNNL = Dip net, Night light.
Tuna: A = Albacore; BE = Big-eyed; BF = Bluefin; YF = Yellowfin; SJ = Skipjack.
Sharks: B = Blue; M-Mako, P = Porbeagle.
Misc. Fishes - LL = Long-nose lancetfish; SL = Short-nose lancetfish, SW = Swordfish; R = Pelagic ray; C = Centrolophus sp.; LF = Lepidocybium flavobrunneum; LS = Longbill spearfish.

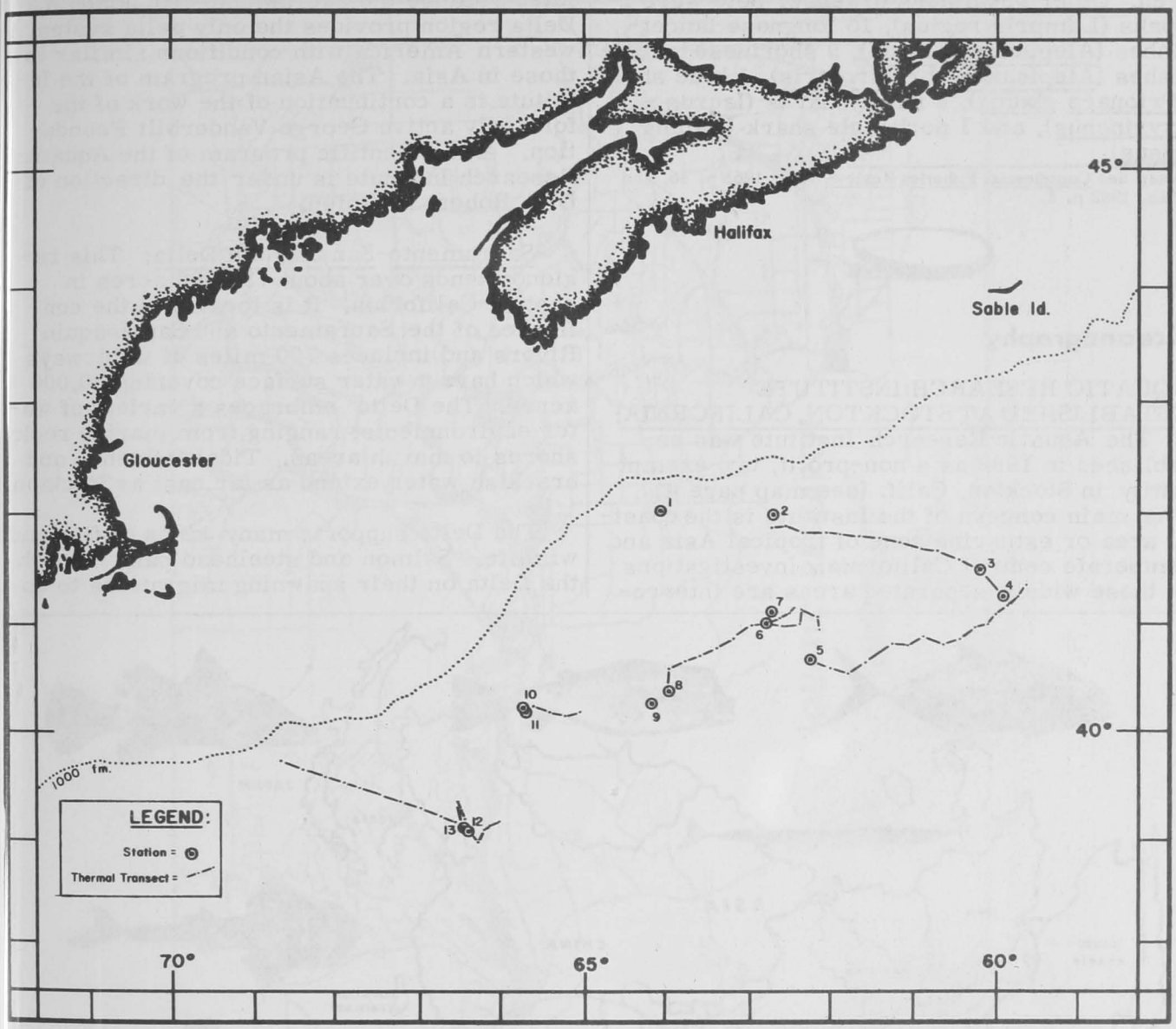


Fig. 2 - Area of operations during M/V Delaware Cruise 63-11, November 13-25, and December 2-10, 1963.

gressed from skipjack to albacore and yellowfin at the "wall," and ended with a single big-eyed tuna on the colder side of the "wall."

During the bait selectivity tests at station nos. 4, 5, 7, and 8, herring and squid baits were used on alternate "baskets." The albacore catch on herring was eight times that on the squid bait, and all yellowfin taken at those stations were caught on herring. Mackerel and squid were fished during night sets; the catch was too small to indicate a bait preference although two small swordfish (Xiphias gladius) (41 and 75 pounds) were caught on mackerel, while a 300-pound swordfish was taken with herring bait.

The average weight of the tuna in the catch were: albacore 31 pounds, big-eyed 60 pounds, yellowfin 52 pounds, bluefin 65 pounds, and skipjack 21 pounds. The only tuna that sustained shark damage was a 125-pound big-eyed. Fish that were not needed for additional study were tagged and released.

Aside from the tuna and swordfish catch, several other specimens of scientific interest were taken during the cruise, including the longbill spearfish (Tetraturus pfluegeri), 1 specimen; the gempylid (Lepidocybium flavo-brunneum), 2 specimens; the black ruff (Centrolophus niger), 1 specimen; and the pelagic stingray (Dasyatis violacea); 1 speci-

men. Other specimens of lesser note were 2 opahs (Lampris regius), 13 longnose lancetfishes (Alepisaurus ferox), 5 shortnose lancetfishes (Alepisaurus brevirostris), 1 blue shark (Prionace glauca), 8 mako sharks (Isurus oxyrinchus), and 1 porbeagle shark (Lamna nasus).

Note: See Commercial Fisheries Review, Aug. 1963 p. 36, and Feb. 1962 p. 1.

Oceanography

AQUATIC RESEARCH INSTITUTE ESTABLISHED AT STOCKTON, CALIFORNIA:

The Aquatic Research Institute was established in 1962 as a non-profit, tax-exempt entity in Stockton, Calif. (see map page 41). The main concern of the Institute is the coastal area or estuarine zone of tropical Asia and temperate central California. Investigations in those widely separated areas are interrelated because the Sacramento-San Joaquin Delta region provides the only delta system in western America with conditions similar to those in Asia. The Asian program of the Institute is a continuation of the work of the formerly active George Vanderbilt Foundation. The scientific program of the Aquatic Research Institute is under the direction of Dr. Robert R. Rofen.

Sacramento-San Joaquin Delta: This region extends over about 738,000 acres in central California. It is located at the confluence of the Sacramento and San Joaquin Rivers and includes 700 miles of waterways which have a water surface covering 50,000 acres. The Delta embraces a variety of water environments, ranging from marine rocky shores to marsh areas. Tidal influence and brackish water extend as far east as Stockton.

The Delta supports many kinds of fish and wildlife. Salmon and steelhead pass through the Delta on their spawning migrations to up-

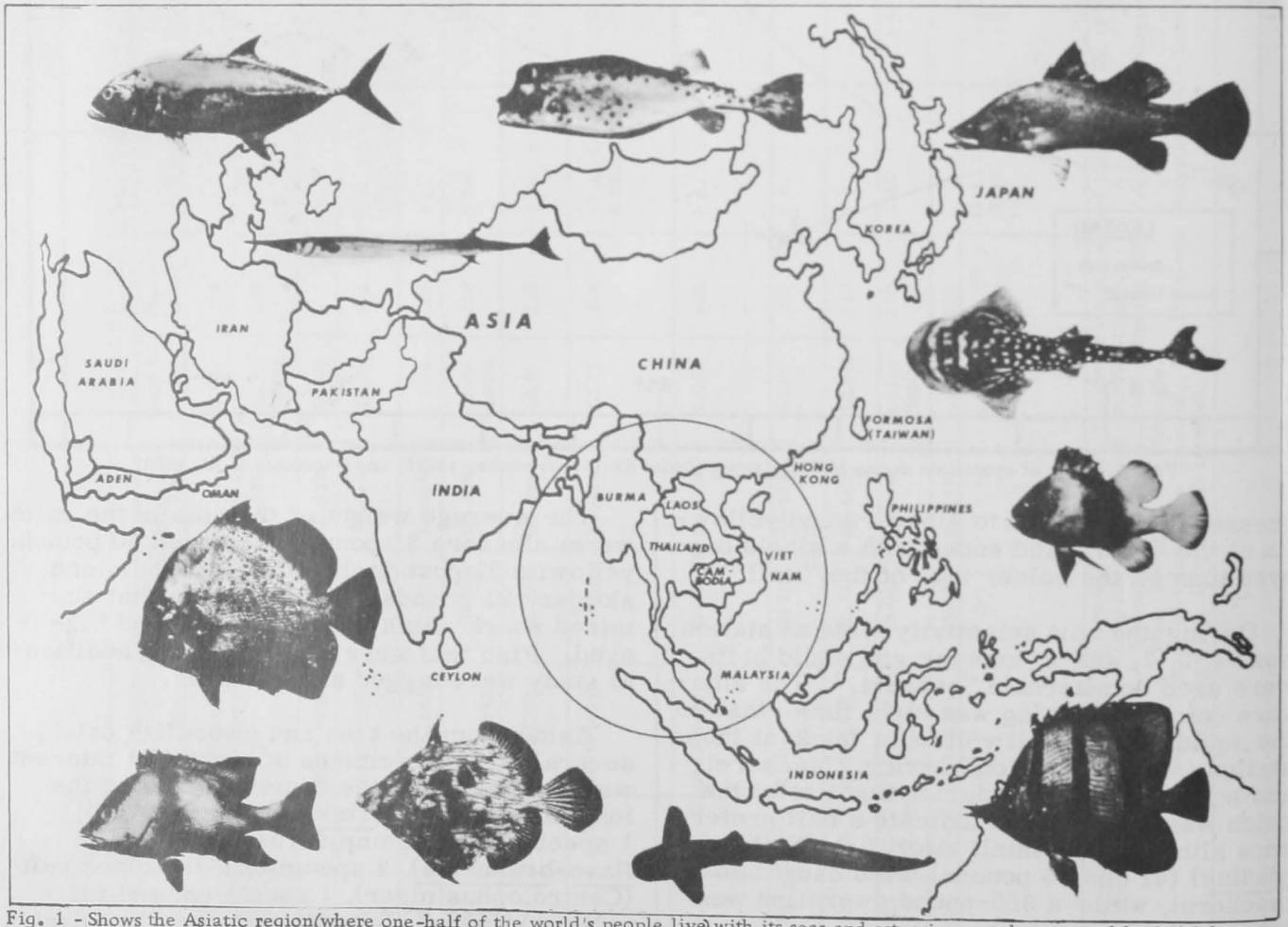


Fig. 1 - Shows the Asiatic region(where one-half of the world's people live) with its seas and estuaries, good sources of food if fishery resources can be properly developed.

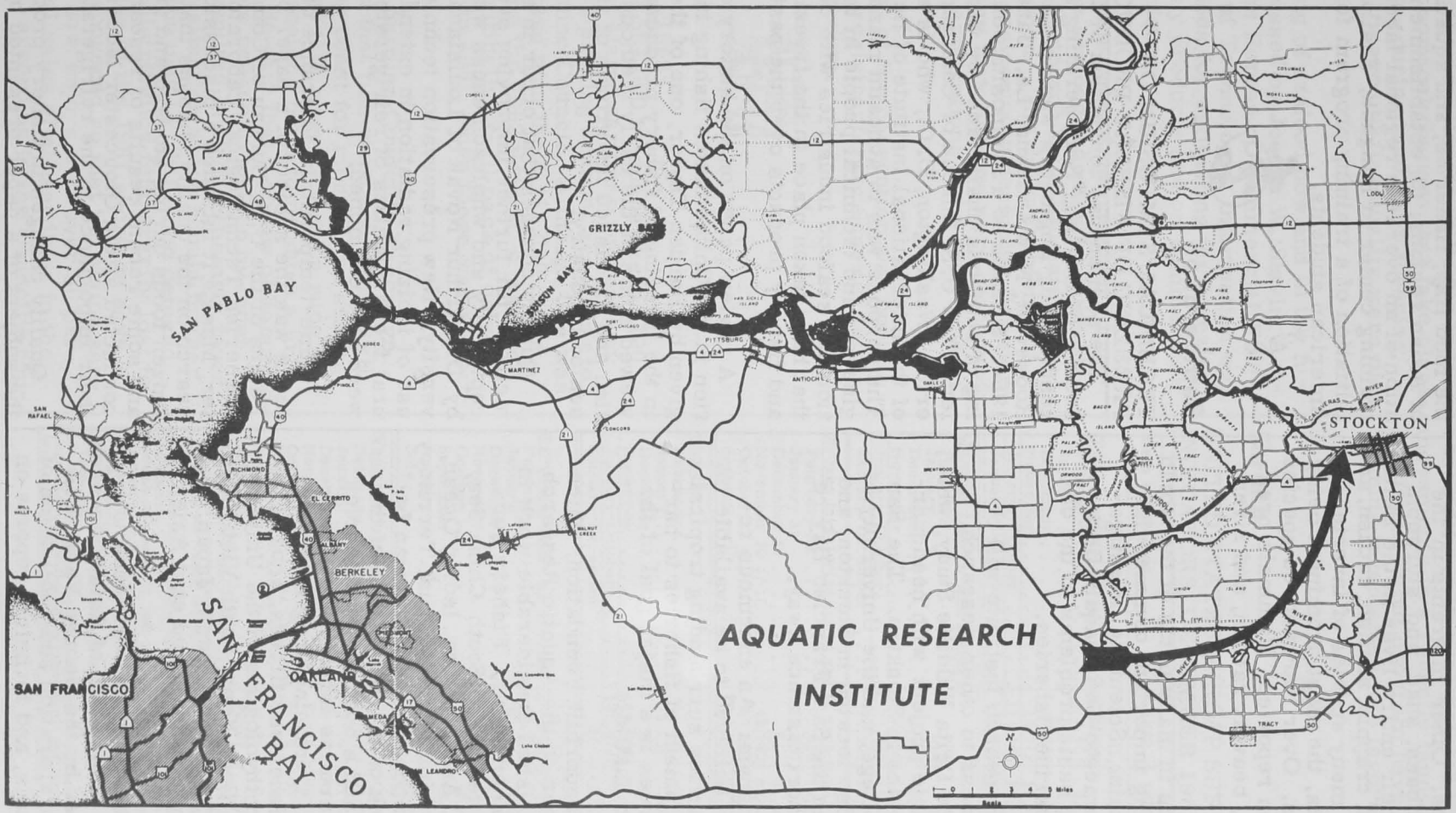


Fig. 2 - Shows the Sacramento and San Joaquin Delta area in central California.

stream tributaries. Other migrants in the Delta are striped bass, shad, and sturgeon. Fish which live their entire lives in the Delta area include bass, crappie, sunfish, catfish, and carp. There are many species of invertebrates in the Delta, the most prominent being shrimp and clams. Over two hundred species of birds have been reported. Mammals present include mink, beaver, racoon, and river otter.

Tidal estuaries in many parts of the world today are providing important commercial quantities of protein. Scientific investigations in the Sacramento-San Joaquin Delta can aid in solving basic problems in the development of estuarine fisheries.

The Aquatic Research Institute will be aided by its nearness to other research groups such as the Delta Wildlife Study, which is a California State project with headquarters and laboratories in Stockton. The San Joaquin Delta College, and the University of the Pacific are also located in Stockton, and the universities in the San Franciso Bay region are only a short distance away.

The Asian Program: An enormous resource of food is believed to be available in the seas and estuaries surrounding tropical Asia. The development of fisheries to harvest those resources is a major goal of the Aquatic Research Institute.

The George Vanderbilt Foundation, which was the forerunner to the Aquatic Research Institute, accomplished considerable work in Asia between 1950 and 1961. Fishery surveys were conducted in the South China Sea, Gulf of Thailand, Andaman Sea, Indian Ocean, French Oceania, Line Islands, Trust Territory of the Pacific Islands, and the Hawaiian Islands. A handbook of the food fishes of the Gulf of Thailand and a book on the fisheries of the Western Caroline Islands were completed. In addition, training programs were carried out for fisheries officers, aquatic biologists, and ichthyologists of the United States, Thailand, Hong Kong, South Viet Nam, Philippines, South Korea, Taiwan, Japan, and other countries of southeast and east Asia.

The plans of the Aquatic Research Institute call for: (1) completion of Asian research programs initiated by the George Vanderbilt Foundation; (2) preparation and publication of handbooks, manuals, and technical reports on the food fish, fisheries, and aquatic ecology of Asian regions; (3) establishment and operation of an overseas regional laboratory and training center in Bangkok, Thailand; and (4) initiation of a training program for Asian and American students.

Refrigeration

TECHNICAL SYMPOSIUM ON FREEZING OF FISHERY PRODUCTS:

The semiannual convention of the American Society of Heating, Refrigerating and Air-conditioning Engineers was held at the Hotel Roosevelt, New Orleans, La., January 27-29, 1964. It featured a symposium on the freezing of seafoods chairmaned by Charles Butler of the U. S. Bureau of Commercial Fisheries, Washington, D. C., who is a member of the International Institute of Refrigeration. The purpose was to acquaint managers, engineers, and technical people in the refrigeration and seafood industries with developments that have taken place in the freezing of fish and fishery products over the past 40 years.

A review paper on the history of refrigeration in the United States fishing industry was given by Harden Taylor, one of the pioneers in the freezing of fishery products. It reviewed some of the early methods of freezing fish and discussed the growth of the frozen seafood industry.

Quality changes that occur in shrimp and methods for further improving product acceptability and wholesomeness were discussed by Dr. Arthur Novak of Louisiana State University. New preservation techniques on the use of ionizing radiation in extending the natural fresh qualities of refrigerated shrimp were also described.

Time-temperature tolerance of frozen foods was the subject of a paper by John Peters of the U. S. Bureau of Commercial Fisheries Technological Laboratory, Gloucester, Mass. It included a discussion of research on the quality changes that occur in frozen foods during storage and distribution; and some recent results of research being conducted at the Gloucester laboratory and their importance to the refrigeration industry.

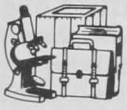
Quality changes in fishery products was the subject of a paper presented by Dr. William

Dyer of the Fisheries Research Board of Canada. The biochemical changes that take place in fish prior to, during, and after freezing, and their significance to fish quality were discussed.

The freezing of seafood now and in the future was discussed by Joseph W. Slavin, Acting Chief of the Bureau of Commercial Fisheries Branch of Technology. Information was given on methods for estimating the freezing rates of fishery products and on commercial freezing techniques.

A paper on the role of the refrigeration engineer in the seafood industry by Luke St. Onge of V. C. Patterson and Associates concluded the session. The daily problems of refrigeration engineers in designing fish storage and freezing installations were discussed; some specific applications were dealt with in detail.

Registration at the convention was open to the public and registrants were invited to attend the symposium.



Sardines

MAINE PACK, 1963:

A total of 1,584,000 standard cases (100 3¾-oz. cans) of Maine sardines was canned during the 1963 packing season, according to the Maine Sardine Council. Although this was considerably less than the 2,117,000 cases produced during the 1962 season, it was well ahead of the critically small pack of only 671,000 cases in 1961, when there was a shortage of fish.

The Maine Sardine Council's Executive Secretary said that fish were abundant in all areas along the coast for most of the season in 1963 and that this gave canners a wide selection which enabled them to produce a high quality pack. He said that a policy of balanced production from season to season by most canners had resulted in an increasingly favorable inventory situation which should further improve with the usual high Lenten demand. "Markets and distribution temporarily lost to imports because of the 1961 shortage have been mostly recovered so that the Maine sardine industry now enjoys well over 50 percent of the total sales of all sardines in the United States," according to the Council's representative. He also pointed out that volume movements in a recently launched export market development program have further helped to bring inventories into favorable balance.

Shrimp

UNITED STATES SHRIMP SUPPLY INDICATORS, DECEMBER 1963:

Item and Period	1963	1962	1961	1960
	...(1,000 Lbs., Heads-Off)...			
Total landings, So. Atl. and Gulf States:				
February	3,986	4,123	3,910	3,784
January	3,993	3,833	5,686	5,402
December	10,300	8,615	6,538	7,099
November	13,212	12,177	9,996	14,454
January-October	115,448	85,047	74,861	119,481
January-December	138,960	105,839	91,396	141,035
Quantity canned, Gulf States 1/:				
February	281	241	90	204
January	592	492	183	266
December	2,180	1,879	816	894
November	2,400	2,727	2,175	1,535
January-October	24,752	18,604	11,508	23,965
January-December	29,332	23,210	14,500	26,394
Frozen inventories (as of end of each mo.) 2/:				
February 28	28,039	19,012	37,612	29,063
January 31	28,487	21,328	37,842	34,332
December 31	3/	31,577	19,755	40,913
November 30 4/	42,142	27,500	20,668	37,264
October 31 4/	37,418	21,315	17,811	31,209
September 30	27,356	12,843	13,361	24,492
Imports 5/:				
February	12,100	10,599	8,932	7,657
January	13,139	12,907	12,338	8,596
December	3/	15,798	15,442	12,411
November	14,759	17,964	14,852	13,516
January-October	120,474	107,421	95,988	87,492
January-December	3/	141,183	126,268	113,418
	(¢/lb., 26-30 Count, Heads-Off)			
Ex-vessel price, all species, So. Atl. and Gulf Ports:				
February	85.7	78.9	53.5	51.8
January	85.0	76.3	52.5	49.5
December	6/54-65	82.9	75.2	54.2
November	6/52-62	84.5	73.5	54.0
October	6/51-64	90.0	68.7	53.0
September	6/55-64	90.9	70.1	52.2
August	59.0	83.6	66.1	52.0
July	63.5	82.1	55.8	54.6
Wholesale price froz. brown (5-lb. pkg.) Chicago, Ill.:				
February	102-106	93-95	69-71	65-67
January	102-106	91-94	69-71	64-66
December	75-82	101-107	91-92	68-70
November	71-78	105-110	89-92	69-73
October	67-75	108-115	83-90	69-73
September	73-77	113-118	87-90	65-70
August	75-81	110-112	76-91	64-67
July	77-97	3/	70-75	72-77

1/Pounds of headless shrimp determined by multiplying the number of standard cases by 30.3. The figures in the section (Quantity canned, Gulf States) have been completely revised beginning with February 1963 on the basis of a new conversion factor (formerly 33.0 pounds per case).
2/Raw headless only; excludes breaded, peeled and deveined, etc.
3/Not available.
4/Inventory of September 30, 1963, includes 2,868,000 pounds; and November 30, 1963, includes 1,189,000 pounds for firms not reporting previously.
5/Includes fresh, frozen, canned, dried, and other shrimp products as reported by the Bureau of the Census.
6/Range in prices at Tampa, Fla.; Morgan City, La., area; Port Isabel and Brownsville, Texas, only.
Note: December 1963 landings and quantity used for canning estimated from information published daily by the New Orleans Fishery Market News Service. To convert shrimp to heads-on weight multiply by 1.68.

* * * * *

POSTLARVAL STUDIES INDICATE POSSIBLE VALUE AS INDEX OF ADULT POPULATION:

The first year of the postlarval shrimp study being made by the Mississippi Gulf Coast Research Laboratory under a U. S. Bureau of Commercial Fisheries contract was completed in October 1963. Although identification of all specimens to species has not been completed, it seems likely that a satisfactory index for prediction of the adult population of commercial species of shrimp is being established. Retention of all samples has produced a large quantitative collection of many species living along the shores of Mississippi Sound and adjacent bays. Records of hydrographic data are extensive.

The contract with the Bureau has been renewed and data for another year will be collected and compared to what has already been completed.

Smoked Fish

STATUS REPORT ON SMOKED FISH-PROCESSING STUDIES CONDUCTED IN GREAT LAKES REGION:

The progress made on smoked fish processing studies to test the effects of certain process time/temperatures for the production of smoked chub is outlined in a report issued on January 10, 1964, by the Regional Director, U. S. Bureau of Commercial Fisheries, Ann Arbor, Mich. The studies were conducted at the Bureau's Great Lakes Technological Laboratory in Ann Arbor.

One of the first objectives of these smoked fish-processing studies was to evaluate product quality as affected by interim processing guidelines provided by the U. S. Food and Drug Administration (FDA) and States concerned with the subject. Initial tests were completed by early January, and procedures that were used, results obtained, and their significance to the fishing industry follow:

General Procedures:

1. Raw Material: Fifty-pound blocks of dressed "medium" chub frozen at 0° F. in alginate were used.

2. Thawing of Blocks: The 50-pound blocks were removed from frozen storage and thawed by immersing in a tank of cold tap water for periods of time ranging from 8-12 hours.

3. Brining: The brining operation was conducted in a large plastic tank. Granulated salt was poured into the empty tank in an amount estimated to make a sufficient quantity of brine. Cold tap water was then added to the tank by use of a hose. Hose pressure was used to stir the mixture to facilitate solution. Salometer readings were made at frequent intervals to achieve desired brine strength.

4. Smoking: After brining, the fish were individually hung head-down on "smoke-sticks." The weight of fish on each stick was then obtained to the nearest 0.1 pound for "brined weight." These sticks have a series of pairs of sharp-pointed nails protruding on two sides. The fish are hung on the sticks by skewering them at the tail-end on the nails. Each stick held about 5 pounds of fish, and 2 sticks were used to evaluate each of the subsequent treatments.

Traditional wood-fired ovens were used for tests 1 and 2. For subsequent tests, a small gas-fired smokehouse was used in order to achieve controlled conditions of temperature (no control of relative humidity).

During each test, thermocouples were inserted into several representative fish and others were left exposed in several locations within the smokehouse. Continuous recordings were made of internal temperature of product and smokehouse temperature by use of a gas-fired 24-point recording potentiometer.

For all tests using the gas-fired oven, the smokehouse remained cold until the fish were loaded therein. After loading, heat was applied to the oven, at which time the smoke generator was turned on and smoking was continued throughout the process.

After processing, the fish were removed from the smokehouse and placed in a 0° F. freezer for a minimum of one hour to cool. After cooling, the fish were weighed to the nearest 0.1 pound to obtain "smoked weight."

5. Holding Conditions: Upon completion of weighing, the fish were packaged either in bulk or vacuum packs, and either frozen at 0° F. or stored at 36° F.

Yield: Percentage yield was obtained by the following formula:

$$\frac{\text{smoked wt.}}{\text{brined wt.}} \times 100 = \% \text{ yield}$$

Results:

1. Raw Fish: Analyses of frozen, raw control samples were as follows:

% water - 75.9
% fat - 7.0
% salt - 0.1

2. Smoked Fish: Analyses of smoked samples heated to various internal temperatures were as follows:

Test No.	Brine Strength	Maximum Internal Temp. °F.	Percentage of Water	Fat	Salt	Yield
1	25° - 12 hrs.	165°	68.7	9.6	4.0	70
2	25° - 12 hrs.	180°	63.4	9.3	4.5	57
3	25° - 15 hrs.	180°	69.0	8.2	4.9	72
4	25° - 15 hrs.	180° for 30 min.	67.3	7.2	6.0	67
5	25° - 15 hrs.	160° for 5 hrs.	57.8	9.5	7.6	54

Note: Unless otherwise indicated, product was removed from oven when maximum internal temperature was attained. Otherwise, maximum internal temperature was maintained for time period indicated.
Tests 1-2 conducted in wood-fired smokehouse.
Tests 3-5 conducted in gas-fired smokehouse.
Tests 3-4 total process time of $2\frac{3}{4}$ hours.
Test 5 total process time of $6\frac{3}{4}$ hours.

3. Pasteurization after Smoking: Samples of smoked fish were vacuum-packaged in plastic pouches and placed in water heated to 190° F. It required 40 minutes for the internal temperature of the product to reach 180° F.; this temperature was then maintained for an additional 30 minutes.

The plastic pouch used for water-bath pasteurization was a lamination of cellulose and polyethylene. Although the pouch remained intact during the treatment, it acquired a "frosted" appearance. However, more suitable materials would be readily available commercially.

It was noted that little or no moisture or oil was rendered from the smoked fish into the pouch as a result of pasteurization such that the product's appearance would be objectionable. The meat of the pasteurized fish remained firm and moist.

Discussion:

The primary purpose of the tests was to determine the effect on product quality of processing smoked chub to an internal temperature of 180° F. for 30 minutes. The attribute of quality was considered, for this purpose, to be the general eating qualities of flavor, texture, and degree of moistness of the edible portion, plus the general appearance of the product as contrasted with that of chub smoked in the traditional manner. Also considered were such economic factors as percentage of yield of smoked product and time required to process.

The results of the tests indicated that chub can be processed in a controlled smokehouse to an internal temperature of 180° F., maintained at this temperature for 30 minutes, and produce an acceptable product in terms of eating quality. Comparison of this product to chub smoked to lower internal temperatures (i.e., 165° F.) in wood-fired ovens permits the following general observations:

1. Over-all appearance of the new product seemed reasonably acceptable. Some wrinkling of the skin was noted, but was not judged to be excessive. Color was poor (light), but could probably be corrected with a more suitable smoke generator.

2. Yield of products smoked conventionally in a wood-fired smokehouse equalled 70 percent. Yield of products processed to 180° F. for 30 minutes in a gas-fired smokehouse equalled 67 percent (total process time = $2\frac{3}{4}$ hrs.).

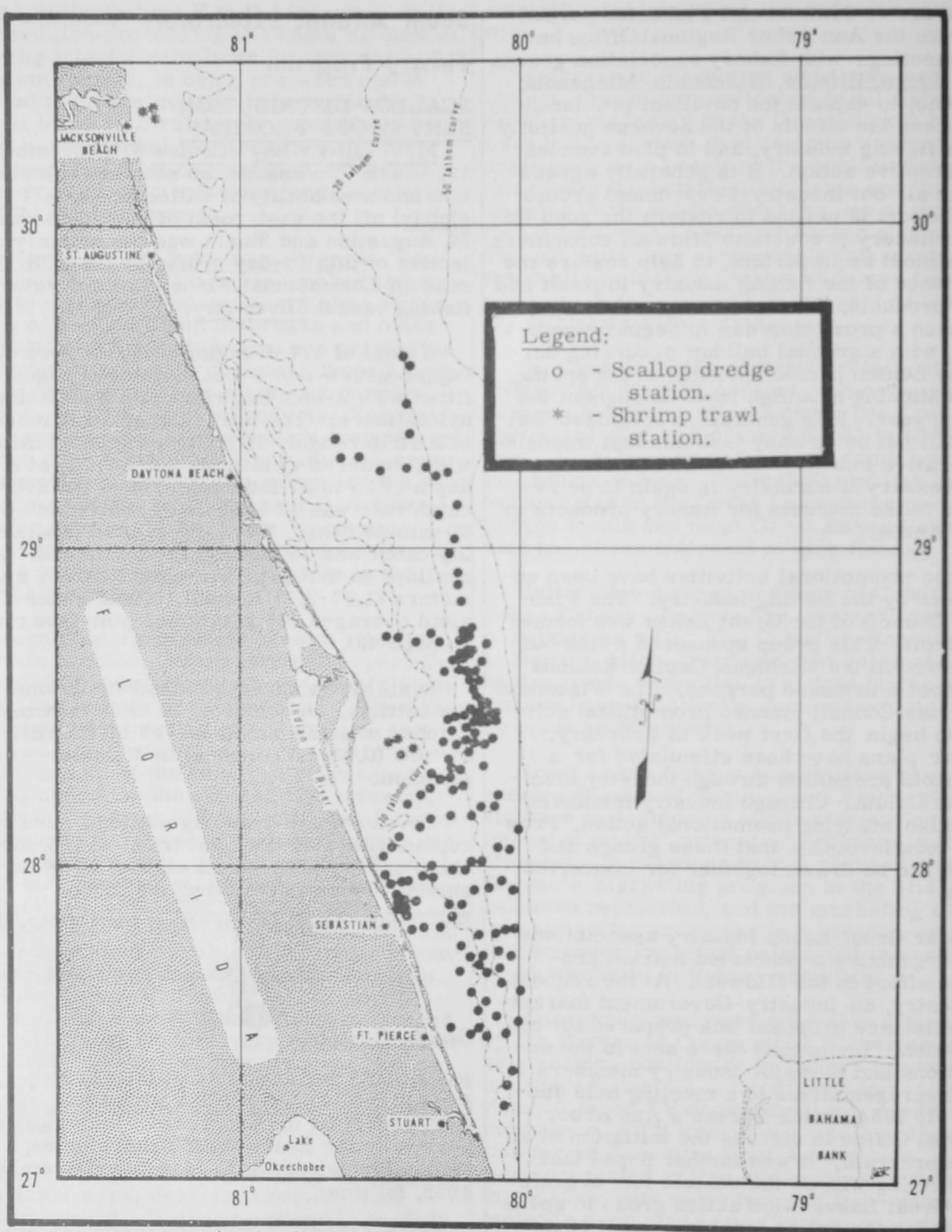
3. Incidence of fish dropping from the smoke sticks during heating was extremely low (of 300 pounds processed, a total of 3 fish fell to the bottom of the oven).

4. Taste test indicated the meat to be somewhat less moist than the conventional product, but not objectionably so.

5. Texture of meat was somewhat firmer than the conventional product.

6. Preliminary comparisons of frozen versus refrigerated samples clearly indicated significant "softening" of the texture as a result of freezing.

Smoked Fish Manual: One action the Bureau of Commercial Fisheries planned was the preparation of a manual that would describe good commercial sanitary processing and handling techniques and the significance



Area investigated off Florida during Cruise 51 of the M/V Silver Bay.

three 12 x 12 foot concrete tanks. The overflow in the tanks was arranged so that each tank held approximately 1,350 gallons of water. Approximately 100 oysters were used in each experiment. Each feeding experiment lasted 30 days. Individual oysters used for controls in one experiment were fed in the second experiment. In some experiments the situation was reversed and oysters which had been fed during one month were used as controls during the second month. In all experiments those oysters which were fed with various forms of carbohydrates increased in weight over the control experiments. In broad generalities, the gain in weight of the fed oysters was usually three times that of the controls. Further work will continue on the supplemental feeding of oysters.

Shrimp Studies: Brown shrimp were slightly more numerous at regular survey stations during the last half of 1963 than in that period of 1962. White shrimp, however, were almost five times less plentiful at regular survey stations from July through December of 1963 as during that time in 1962. Of the major kinds of commercial fish and shellfish sampled by experimental trawling, white shrimp were the only species which showed a marked decline during the last half of 1963 as compared with that period in 1962. The reasons for the decline in the numbers of white shrimp this year are not known, but it is possible that the extremely cold winter of 1962/63 was responsible. White shrimp, considerable numbers of which normally winter-over in coastal sounds and rivers, disappeared from inshore waters during the winter of 1962/63 and very few roe shrimp appeared in the spring of 1963.

Fin Fish: Experimental trawling at regular stations from July through December revealed that croakers were slightly more abundant in inshore waters during that period than during the same period of 1962. The catch for spot was also approximately the same during the two periods, indicating that there has been no major changes in population of those fish during the past two years.

Fish Tagging: Through December 1963, over 300 fish of various species had been tagged with Peterson disc tags and released throughout coastal waters. Only five tags were returned (all by sports fishermen) as of the end of 1963. The principal species tagged were croaker, spot, flounder, pigfish, whiting, sea trout, and black fish. Tags from two croakers, two pigfish, and one large king whiting were returned. The croakers and pigfish had moved only short distances from the place where they originally were caught and tagged, in spite of the fact that one fish had been free for 85 days before it was caught. The king whiting was caught on hook and line about one month after being tagged and released, approximately 22 miles from where it was originally captured.

This study will continue during 1964 and it is felt that valuable information will be obtained concerning the movements, growth rates, etc., of various species of marine fishes in South Carolina waters.

Blue Crabs: Blue crabs were slightly more abundant in experimental trawling in coastal waters during July through December 1963 as compared with that period of 1962. The average catch per unit of effort for immature crabs at regular survey stations for the July-December period of 1963 was 9.9 crabs, as compared with a catch per unit of effort of 7.5 in 1962. The average catch per unit of effort for adult blue crabs was 15.2 during the 1963 period, whereas in 1962 the average catch per unit of effort was 13.9.

Large female blue crabs were very plentiful in sounds and offshore during November and early December, but the sudden drop in water temperatures in mid-December apparently caused a migration to deeper waters offshore as trawl catches declined markedly at this time.

Pond Cultivation: Two one-acre ponds were harvested in October 1963. One of the ponds, the "fish pond," had been allowed to stock naturally by opening the flood gates on March 11 and allowing postlarval shrimp to "flow" into the pond until it was closed on May 7. The flood gates were reopened again from June 25 to August 30 for further inflowing of postlarval shrimp. The other pond, the "oyster pond," was stocked by hand during May to September with approximately 1,100 shrimp of mixed species. Both ponds were treated with rotenone on May 7 and August 7, 1963 (each pond treated twice), to remove predaceous fishes. Crab pots were used in each pond to remove crabs. As food for the shrimp over 500 pounds of chopped trash fish was put in each pond during June to September.

In 1963 the fish pond yielded 14 pounds of shrimp, heads-on, in $7\frac{1}{2}$ months. However, in

1962 the same pond treated in the same manner yielded a harvest of 163 pounds of shrimp, heads-on, in 4 months.

In 1963 the oyster pond, hand-stocked with 1,100 shrimp, gave a harvest of 855 shrimp weighing 43 pounds 6 ounces in $7\frac{1}{2}$ months. In 1962 the same pond, hand-stocked with 8,164 shrimp, gave a harvest of 15,500 shrimp weighing 238 pounds 14 ounces in 4 months. Obviously in addition to the hand-stocking some shrimp as postlarval or as small juveniles entered the pond naturally when exceptionally high tides forced open the flood gates.

The difference in the yield of the ponds, particularly the fish pond, seems to be a reflection of the scarcity of postlarval shrimp in estuarine waters of South Carolina.

New Research Vessel: On September 7, 1963, the hull of the new research vessel for Bears Bluff Laboratories was launched at Cainhoy, S. C. The boat was designed to fit specifications for estuarine research. She is 58 feet long with a beam of 18 feet and draws only 42 inches of water. After launching, the boat was towed to Wadmalaw Island and a Diesel motor was installed by the staff of the Laboratories. Carpenter work and finishing of cabin, laboratory space, and living quarters is now under way. Trial runs to check the engine were made just before Christmas. The performance of the boat was excellent.

Note: See Commercial Fisheries Review, August 1963 p. 51.

Sports Fishing

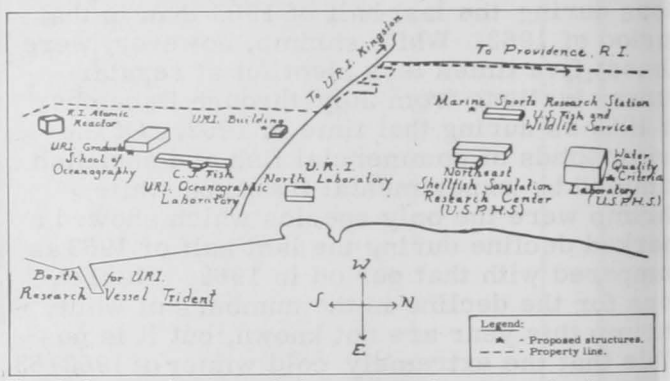
NEW FEDERAL SPORTS FISHING RESEARCH LABORATORY TO BE BUILT ON UNIVERSITY PROPERTY:

One of the final steps to locate a Federal sports fishing research laboratory in Rhode Island, was taken when the University of Rhode Island President reported on December 16, 1963, that the University and the U. S. Department of the Interior had reached an agreement, allocating a three-acre site of land for the laboratory. The University is processing the deed which will give the Federal Government a parcel of land on its Narragansett Bay Campus, directly to the west of the Northeast Shellfish Sanitation Research Center.

The Narragansett Bay Campus of the University of Rhode Island is well on its way to becoming one of the world centers for research in the marine sciences, the University's President stated. He added, the location of a third Federal facility in the area will give added impetus to this trend.

He also stated that the area will be of great benefit to the economy of Rhode Island and the nation. Though popularly neglected, there is a growing feeling that research into the sea may hold as great a potential for the future as space science.

The initial Federal investment in the area is expected to exceed $3.5 million. Counting the staff at the headquarters for the University of Rhode Island Graduate School of Oceanography, this will result in the employment of over 300 scientists, technicans, and staff people.



Sketch showing the site and where proposed structures for the new Federal sports fishing research laboratory is to be built on the University of Rhode Island's Narragansett Bay Campus.

Shortly after receipt of an allotment for site selection and engineering design, the Chief of the Division of Sports Fisheries of the Interior Department's Bureau of Sport Fisheries and Wildlife said his Unit wanted to find out what it takes to produce game fish and how they can spawn in large numbers, and get enough food.

In addition, the Division is interested in studying the effects of pollution and pesticides on fish. The Rhode Island facilities would also be used as a base to move up or down the coast to check fish migration.

Previously, the University donated 5.3 acres of land for the $1,165,000 Northeast Shellfish Sanitation Research Center, now nearing completion, and 7.2 acres for the proposed $1,750,000 Water Quality Laboratory. Still another parcel was given to the Rhode Island Atomic Energy Commission for the $1

illion nuclear reactor. (Public Information epartment, University of Rhode Island, Dember 13, 1963.)

riped Bass

G RETURNS SOUGHT FROM
NG ISLAND MARKING PROGRAM:

A total of 579 large striped bass have been gged along the south shore of Long Island by e New York State Bureau of Marine Fishies. The fish--ranging in size from 6 to 50 unds--were marked with red and white plasdisc tags.

The Fish Research Unit of the New York ate Bureau of Marine Fisheries late in 1963 d completed a three-year program of tagng striped bass from the surf along the south ore of Long Island (Fire Island), New York. ly fish of six pounds or heavier were tagged an effort to learn more about the moveents and seasonal migration of larger, mare striped bass. Although many thousands striped bass have been tagged at various nes and stations along the Atlantic Coast, ry few of the fish have been of considerable ze.

Biologists of the U.S. Bureau of Commerl Fisheries, having consolidated and anazed data from several sources in North arolina and Chesapeake Bay, concluded that rge striped bass which concentrate on the rth Carolina coast in winter and in Chesake Bay in later winter and spring move rthward as far as Massachusetts in spring d summer. It is important to know, from e point of view of striped bass management d utilization, if this great movement is anally cyclic and to learn if fish from the ore northern part of this species' extensive nge return in the fall as far south as the rth Carolina coast and the major southern awning grounds.

During the past three years almost 4,200 riped bass from the ocean front along Fire land Beaches were carefully examined and, those, 579 (about 14 percent) were in the large ategory. The larger fish--ranging from 6 to pounds--were marked with two red and hite plastic, serially numbered Petersen isc tags by fastening the discs on the upper ck between the dorsal fins with a stainless teel pin.

For efficient management and utilization, it is important to investigate further the extent and time of striped bass migrations. Cooperation of fishermen is needed to insure the success of the current study. Tags recovered from the striped bass tagged off Long Island should be returned, together with the date and location of capture, to New York State Conservation Department, D-J Fish Research Unit, Oakdale, New York, 11769. A nominal reward of one dollar, as well as information concerning the tagged fish, will be given for each set of red and white discs.

Transportation

RATE INCREASE SOUGHT BY
NEW ENGLAND TRUCKERS:

The New England Motor Carrier Rate Bureau held public hearings on December 18, 1963, on its proposal to increase rates and wages approximately $8\frac{1}{2}$ percent to cover higher cost of labor and supplies. Over 100 shippers and trade associations voiced strenuous opposition to the proposal.

This proposal is not intended to cover any increases in wages which may result from the current negotiations between the Teamsters Union and the trucking industry for nationwide wage increases totaling $200 million a year. It is reported that an official of the Teamsters Union opened the negotiations with a statement that truckers will be required to increase rates 7 percent to cover the cost of increased wages, and should get a 15-percent increase to cover past increases.

* * * * *

REA EXPRESS FILES TARIFFS
TO INCREASE CHARGE:

Tariffs have been filed by REA Express which would increase charges on all express movements by 25 cents per shipment effective January 27, 1964. On February 8, 1962, an increase of 10 cents per shipment was effected by this carrier and a widespread adjustment to fishery rates was made in November 1961.

Any protests by the fishing industry on the proposed increase were to be filed with the Interstate Commerce Commission (ICC) before January 17, 1964.

* * * * *

ALASKA-WASHINGTON RAIL-BARGE SERVICE EXPANDED:

A West Coast firm announced the launching, on December 11, 1963, of the Kenai, a hydro-train barge, reported as being the largest ocean vessel of that type ever built. The barge is 342 feet long with a capacity of 42 normal length railroad cars. The Kenai is to be used in weekly sailings from Seattle, Wash., to Whittier, Alaska. It will supplement the service provided by the Clair Engle, the original barge link in the all-rail route between Seattle and Whittier.

Tuna

RESULTS OF BLUEFIN TAGGING IN ATLANTIC OCEAN BY WOODS HOLE OCEANOGRAPHIC INSTITUTION:

Included in the Cooperative Game Fish Tagging Program of the Woods Hole Oceanographic Institution is the bluefin tuna in the Atlantic Ocean. The 1963 report on the game fish-tagging program points out that the most important results concern the bluefin tuna. Increasing commercial pressure on that species is shown by the dramatic increase in returns from the northwestern Atlantic fishing area, from Maryland waters to off southern New England. These rose from a total of 6 for the years 1954-1962 combined to 19 for the 1963 season alone. No less than 7 of 29 bluefin marked in the inshore waters of that area last summer have been already recaptured, as have 4 of 29 marked further offshore early in June, about 120 miles southeast of Nantucket. The other 1963 returns were obtained from 4 fish marked in 1962, 3 in 1961, and 1 in 1960. These returns suggest that in the 1963 season a group of bluefin in the 100-pound class moved west southwest from off Oceanographer Canyon to coastal waters off Ocean City, Md., then northward and eastward to off Block Island and finally into Massachusetts Bay, while smaller individuals moved from off Montauk eastward toward the Martha's Vineyard grounds and then back to the westward again. Unfortunately these samples are too small to be of conclusive statistical significance.

More tags from all species of game fish tagged by the Institution's cooperative game fish-tagging program were returned in 1963 than in the 8 previous years combined.

Since May 1954, about 1,500 bluefin tuna, 4,350 Atlantic sailfish, 2,350 white marlin, 950 Pacific sailfish, 600 striped marlin, 200 blue and black marlins, 750 greater amberjack, 200 yellowfin tuna, and 875 other fish have been marked--a grand total of nearly 12,000 fish. Returns have been obtained fro 32 bluefin tuna, 31 Atlantic sailfish, 3 white marlin, 1 striped marlin, 70 greater amberjack, 2 yellowfin tuna (from only 6 Pacific taggings), 7 striped bass, 5 crevalle jack, 1 bar jack, 3 dolphin, 2 great barracuda, 1 flul and 1 sea bass--a total of 159 returns.

Participation by individuals and clubs co tinues to increase, the Institution reports. Acknowledged is the valuable cooperation from the U. S. Bureau of Commercial Fisheries in marking fish and also in recovering tags with the necessary data. Assistance in the latter endeavor has also been furnished by the Inter-American Tropical Tuna Commission and by the Cape Cod Tuna Corporation, Eastport, Maine, and the Maryland Tun Corporation, Cambridge, Md. Basic financi support for the program is from the National Science Foundation, supplemented by grants from the Charles W. Brown, Jr. Memorial Foundation, the National Geographic Society, the Sport Fishing Institute, the International Game Fish Association, the Van Camp Foundation, the Associates of the Woods Hole Oceanographic Institution, and numerous oth er organizations and individuals.

Increased tagging of Atlantic bluefin tuna in all possible areas is the Institution's mo urgent objective at present. The importanc of prompt and accurate reporting of tagging is emphasized. Some very important retur have proved of dubious value due to lack of tagging data.

U. S. Fishing Vessels

FISHERIES LOANS AND OTHER FINANCIAL AID FOR VESSELS, OCTOBER 1-DECEMBER 31, 1963:

From the beginnning of the program in 1956 through December 31, 1963, a total of 1,341 loan applications for $35,872,047 were received by the U. S. Bureau of Commercial Fisheries, the agency administering the Federal Fisheries Loan Fund. Of the total, 689 applications ($15,737,240) have been approve

49 ($11,531,721) have been declined or found ineligible, 157 ($6,084,422) have been withdrawn by applicants before being processed, and 36 ($1,442,733) are pending. Of the applications approved, 273 were approved for amounts less than applied for. The total reduction was $1,675,931.

The following loans were approved from October 1, 1963, through December 31, 1963:

New England and Middle Atlantic Areas: Bradford Reed, Boothbay Harbor, Maine, $1,800; Silver Sea, Inc., Boston, Mass., $5,000; Agatha and Patricia, Inc., Medford, Mass., $50,000; Dias Fishing Corp., New Bedford, Mass., $18,296; and Peter Edson Sprague, Narragansett, R. I., $32,000.

California Area: Michael F. Schroeder, Watsonville, $5,365; Dean Holder, Crescent City, $1,000; and Donald E. Dodson, Santa Cruz, $10,000.

Pacific Northwest Area: Frank A. Taylor, Newport, Oregon, $3,000.

Alaska Area: Fred L. Birch, Auke Bay, $1,472; Albert Lauth, Craig, $2,600; and Walter R. and Leota Farmer, Valdez, $6,000.

Under the Fishing Vessel Mortgage Insurance Program (also administered by the Bureau) during the last quarter of 1963, 6 applications for $330,162 were received and 1 application for $36,412 was approved. Since the program began (July 5, 1960), 36 applications were received for $3,889,129. Of the total, 28 applications were approved for $2,359,046 and 8 applications for $1,503,750 were pending as of December 31, 1963. Since the mortgage program began, applications received and approved by area are:

New England Area: Received 10 ($1,025,365), approved 8 ($775,365);

California: Received and approved 1 ($57,000);

South Atlantic and Gulf Area: Received 18 ($1,780,468), approved 12 ($437,164);

Pacific Northwest: Received 6 ($1,486,296), approved 4 ($507,546);

Alaska: Received 1 ($40,000). Not yet approved.

No applications for the Fishing Vessel Construction Differential Subsidy were received from July through December 31, 1963, as the authority to accept applications expired on June 12, 1963. Since the beginning of that program on June 12, 1960, 13 applications were received for $1,101,770, of which 6 applications were approved for $546,103, and 7 applications for $555,667 were pending.

* * * * *

DOCUMENTATIONS ISSUED AND CANCELLED:

November 1963: During November 1963, a total 37 vessels of 5 net tons and over was issued first documents as fishing craft, as

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

Area (Home Port)	Nov. 1963	Nov. 1962	Jan.-Nov. 1963	Jan.-Nov. 1962	Total 1962
	(Number)				
Issued first documents 2/:					
New England	1	2	21	27	28
Middle Atlantic	1	-	17	2	3
Chesapeake	6	6	60	41	43
South Atlantic	6	6	71	46	47
Gulf	20	12	229	106	110
Pacific	2	5	152	127	130
Great Lakes	1	1	5	5	5
Puerto Rico	-	2	2	2	2
Total	37	34	557	356	368
Removed from documentation 3/:					
New England	2	1	43	20	24
Middle Atlantic	2	1	44	34	39
Chesapeake	4	1	23	23	23
South Atlantic	2	3	49	38	38
Gulf	11	3	111	98	104
Pacific	7	11	82	103	111
Great Lakes	1	3	14	21	22
Hawaii	-	-	3	3	3
Puerto Rico	-	-	-	1	1
Total	29	23	369	341	365

1/For explanation of footnotes, see table 2.

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

Gross Tonnage	Issued 2/	Cancelled 3/
	(Number)	
5-9	6	9
10-19	8	8
20-29	3	5
30-39	1	-
40-49	1	2
50-59	-	2
60-69	3	-
70-79	12	-
80-89	1	3
290-299	1	-
450-459	1	-
Total	37	29

1/Includes both commercial and sport fishing craft. A vessel is defined as a craft of 5 net tons and over.
2/Includes 2 redocumented vessels in November 1963 previously removed from records. Vessels issued first documents as fishing craft were built: 27 in 1963; 1 in 1956; and 9 prior to 1951.
3/Includes vessels reported lost, abandoned, forfeited, sold alien, etc.
Source: Monthly Supplement to Merchant Vessels of the United States, Bureau of Customs, U. S. Treasury Department.

compared with 34 in November 1962. There were 29 documents cancelled for fishing vessels in November 1963 as compared with 23 in November 1962.

* * * * *

October 1963: During October 1963, a total of 36 vessels of 5 net tons and over was issued first documents as fishing craft, as compared with 25 in October 1962. There were 28 documents cancelled for fishing vessels in October 1963 as compared with 30 in October 1962.

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

Area (Home Port)	Oct. 1963	Oct. 1962	Jan.-Oct. 1963	Jan.-Oct. 1962	Total 1962
	(Number)				
Issued first documents 2/:					
New England	2	1	20	25	28
Middle Atlantic	-	-	16	2	3
Chesapeake	9	6	54	35	43
South Atlantic	6	3	65	40	47
Gulf	15	7	209	94	110
Pacific	4	7	150	122	130
Great Lakes	-	1	4	4	5
Puerto Rico	-	-	2	-	2
Total	36	25	520	322	368
Removed from documentation 3/:					
New England	3	-	41	19	24
Middle Atlantic	-	2	42	33	39
Chesapeake	3	3	19	22	23
South Atlantic	2	6	47	35	38
Gulf	13	9	100	95	104
Pacific	7	10	75	92	111
Great Lakes	-	-	13	18	22
Hawaii	-	-	3	3	3
Puerto Rico	-	-	-	1	1
Total	28	30	340	318	365

1/For explanation of footnotes, see table 2.

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

Gross Tonnage	Issued 2/	Cancelled 3/
	(Number)	
5-9	11	7
10-19	6	13
20-29	2	5
30-39	-	1
40-49	1	1
60-69	5	-
70-79	5	1
80-89	1	-
100-109	1	-
140-149	2	-
160-169	1	-
240-249	1	-
Total	36	28

1/Includes both commercial and sport fishing craft. A vessel is defined as a craft of 5 net tons and over.
2/Includes 3 redocumented vessels in October 1963 previously removed from records. Vessels issued first documents as fishing craft were built: 29 in 1963; 1 in 1962; 5 prior to 1951; and 1 unknown.
3/Includes vessels reported lost, abandoned, forfeited, sold alien, etc.
Source: Monthly Supplement to Merchant Vessels of the United States, Bureau of Customs, U. S. Treasury Department.

U. S. Foreign Trade

IMPORTS OF CANNED TUNA UNDER QUOTA

United States imports of tuna canned in brine during January 1-November 30, 1963, amounted to 48,238,342 pounds (about 2,297,0 std. cases), according to data compiled by the Bureau of Customs. This was 6.9 percent less than the 51,796,996 pounds (about 2,466,524 std. cases) imported during January 1-December 1, 1962.

The quantity of tuna canned in brine whic could be imported into the United States dur ing the calendar year 1963 at the 12½-percen rate of duty was limited to 63,130,642 pounds (or about 3,006,221 std. cases of 48 7-oz. cans). Any imports in excess of the quota were dutiable at 25 percent ad valorem.

* * * * *

IMPORTS OF FISH MEAL AND SCRAP BY CUSTOMS DISTRICTS, OCTOBER 1963:

U. S. imports of fish meal and scrap in October 1963 totaled 31,449 short tons, a decline of 9.3 percent from the 34,666 tons imported in the previous month, but a sharp increase from the 12,732 tons imported in October 1962.

About 87.9 percent of the fish meal and scrap imports in October 1963 entered through the Customs Districts of Maryland, Georgia, Mobile (Ala.), Galveston (Tex.), Los Angeles (Calif.), San Francisco (Calif.), and Washington.

U. S. Imports of Fish Meal and Scrap by Customs Districts, October 1963

Customs Districts	October 1963
	Short Tons
Maine and New Hampshire	120
Maryland	6,338
North Carolina	1,378
Georgia	4,253
Mobile (Ala.)	4,435
Sabine (Tex.)	1,114
Galveston (Tex.)	2,989
Los Angeles (Calif.)	2,639
San Francisco (Calif.)	4,063
Washington	2,943
Dakota	195
Duluth (Minn.) and Superior (Wis.)	456
Michigan	397
Other Customs Districts	1/129
Total	31,449

1/Includes 30 tons of fish meal classified as fertilizer.
Note: A list of the entry ports included within each Customs District is given in Schedule D, Code Classification of United States Customs Districts and Ports, which may be obtained free from the Foreign Trade Division, Bureau of the Census, U. S. Department of Commerce, Washington, D. C. 20233.

* * * * *

TRENDS IN UNITED STATES EXPORTS OF FISHERY PRODUCTS BY COUNTRY, 1962:

In 1962, the annual value of United States exports increased slightly over 1961. The value of fishery products exported during 1962 was $35,728,000, up 3 percent from the previous year.

Table 1 - Value of United States Exports of Fishery Products, 1953-1962

Year	Edible	Inedible	Total
	(US$1,000)		
962	22,470	13,258	35,728
961	19,594	15,116	34,710
960	25,622	18,543	44,165
959	26,747	17,495	44,242
958	19,440	11,564	31,004
957	20,549	15,403	35,952
956	22,939	16,564	39,503
955	24,923	15,054	39,977
954	16,238	15,289	31,527
953	17,084	10,794	27,878

Trend by Countries: During 1962, U.S. fishery products ere exported to 103 countries. Of total exports, 63 per- nt was shipped to five countries: Canada, United King- m, Netherlands, Switzerland, and West Germany (table 2).

Table 2 - United States Exports of Fishery Products by Selected Countries of Destination, 1958-62

Country	1962	1961	1960	1959	1958
			(US$1,000)		
anada	8,846	10,265	10,309	8,644	9,200
nited Kingdom	8,249	4,554	8,460	8,928	5,785
etherlands	2,273	2,385	4,350	4,352	2,007
witzerland	1,712	738	1,082	762	387
est Germany	1,467	1,555	2,201	2,888	3,043
weden	1,076	1,665	2,613	3,176	681
rance	1,073	1,007	1,048	766	68
apan	939	2,984	3,295	928	501
aly	869	423	643	303	158
elgium and Luxembourg	547	351	537	746	948
reece	487	364	313	306	136
orway	403	2,390	1,390	1,296	1,063
ong Kong	383	368	269	229	127
exico	375	459	616	663	393
hilippines	320	582	2,494	5,587	2,578
enezuela	274	360	461	614	641
uba	243	-	175	787	490
ustralia	198	458	444	157	31
cuador	171	82	293	193	236
ther	5,823	3,720	3,172	2,917	2,531
otal	35,728	34,710	44,165	44,242	31,004

CANADA: Canada has been the principal market for nited States fishery products. In 1962, Canada took prod- cts valued at $8,846,000 or about 25 percent of the total .S. exports of fishery products. Fresh or frozen fish and ellfish made up most of the U.S. exports of fishery prod- cts to Canada. Some of the important commodities ex- orted to Canada were:

	1962	1961
hrimp, fresh or frozen	$2,081,000	$ 1,675,000
hrimp, canned	1,462,000	1,570,000
eal furs	1,024,000	1,777,000
ish, fresh or frozen	766,000	891,000
ish, shellfish, and other marine animal products, inedible	703,000	703,000
hellfish, fresh or frozen	1,874,000	2,928,000
ther	936,000	722,000
Total	$8,846,000	$10,266,000

UNITED KINGDOM: In 1962, exports to the United King- om rose to the 1959 and 1960 level of $8,000,000, an 81-percent increase over 1961. Sharp increases in the major commodities accounted for this rise as fish oil alone more than doubled in value. Major fishery commodities exported to the United Kingdom were:

	1962	1961
Salmon, canned	$5,622,000	$3,056,000
Fish and marine-animal oils	1,511,000	568,000
Shrimp, canned	682,000	557,000
Salmon, fresh or frozen	138,000	141,000
Other	296,000	232,000
Total	$8,249,000	$4,554,000

OTHER COUNTRIES: Exports to Norway, Sweden, Netherlands, and West Germany consisted mainly of fish oils. Switzerland took largely seal furs. Principal products exported to Japan were frozen shrimp and unmanufactured shells. France received significant amounts of frozen salmon and canned and frozen shellfish.

Trend by Areas: During 1962, Europe remained the principal destination for fishery products exported from the United States (table 3). Products valued at $18,800,000 or 53 percent of total exports went to Europe. North America was second with $10,856,000 or 30 percent.

Table 3 - United States Exports of Fishery Products by Area of Destination, 1962

Area	Edible	Inedible	Total
	(US$1,000)		
North America	8,104	2,752	10,856
Asia	2,234	1,385	3,619
Europe	9,957	8,843	18,800
South America	572	135	707
Africa	1,220	97	1,317
Oceania	383	46	429
Total	22,470	13,258	35,728

Trend by Commodities: Canned salmon was the principal dollar earner among U.S. fishery exports. Fish oil was second in importance. Exports of seal furs showed some gain with Canada and Switzerland taking 65 percent of the total.

Table 4 - Value of United States Exports of Fishery Products by Selected Commodities, 1958-62

Commodity	1962	1961	1960	1959	1958
			(US$1,000)		
Fish oils	6,047	8,908	10,688	11,902	7,761
Seal furs	3,851	3,097	3,309	2,580	1,511
Shells, unmanufactured	1,285	1,380	2,636	977	624
Miscellaneous fish (mostly freshwater), fresh or frozen	1,135	809	947	622	1,036
Oysters, shucked	311	448	497	575	567
Salmon:					
Fresh	872	647	1,677	659	476
Cured	528	593	435	372	357
Canned	7,292	5,580	9,830	10,639	6,669
Mackerel, canned	671	581	211	135	333
Miscellaneous fish (mostly California anchovies), canned	460	391	355	326	496
Sardines, canned not in oil	1,285	1,336	3,443	5,843	3,231
Shrimp:					
Fresh or frozen	3,299	3,694	2,303	1,682	1,463
Canned	2,572	2,487	3,383	2,898	2,548
Squid, canned	729	353	691	906	501

* * * * *

TRENDS IN UNITED STATES FISHERY IMPORTS, BY COUNTRY 1962:

The value of annual imports of fishery products entering the United States increased to a new high in 1962. In that year, 113 countries shared in the United States market for fishery products. The value of fishery products imported was $475,248,000--19.7 percent over the 1961 value. The imports of edible fishery products amounted to $400,882,000; inedible $74,366,00.

Trend by Countries: Canada, Japan, and Mexico continued to be the leading suppliers of fishery products to the United States (table 1). These countries accounted for 58 percent of the value of fishery imports. Canada provided 24 percent of the total, Japan 22 percent, and Mexico 11 percent. Peru, South Africa Republic, Norway, Australia, and Iceland were the next leading suppliers with imports ranging from $11,000,000 to $24,000,000. Imports from Brazil, El Salvador, Ecuador, Panama, Portugal, India, and Denmark, each were valued over $5,000,000.

CANADA: Canada, with fishery products valued at $116,168,000, continued to be the principal supplier of fishery products to the United States. The value of fishery imports increased 7.5 percent over 1961. Leading commodities were as follows:

	1962	1961
Fresh or frozen:		
Lobster	$ 15,000,000	$ 14,570,000
Fresh-water fish	11,737,000	12,173,000
Fish blocks	15,162,000	14,294,000
Groundfish fillets	12,526,000	11,581,000
Salmon	5,298,000	5,860,000
Halibut	7,791,000	6,133,000
Flounder fillets	5,422,000	5,210,000
Fresh-water fillets	2,187,000	5,404,000
Scallops	4,810,000	3,322,000
Other fresh or frozen	7,310,000	5,110,000
Canned lobster	5,507,000	4,682,000
Fish meal and scrap	5,193,000	3,544,000
Cod, haddock, etc., pickled or salted	6,698,000	7,420,000
Other fishery products	11,527,000	8,732,000
Total	$116,168,000	$108,035,000

JAPAN: The value of fishery imports from Japan was $105,246,000, an increase of 19 percent over 1961. Tuna and pearls remained the leading commodities. U.S. imports of fishery products from Japan were as follows:

	1962	1961
Fresh or frozen:		
Albacore	$ 9,759,000	$ 8,544,000
Albacore loins and discs	669,000	1,127,000
Other tuna	16,025,000	9,462,000
Other loins and discs	3,118,000	1,626,000
Shrimp	2,740,000	1,201,000
Swordfish	6,232,000	6,391,000
Fresh-water trout	747,000	776,000
Frog legs	1,362,000	740,000
Canned:		
Light meat tuna in brine	12,053,000	11,269,000
White meat tuna in brine	7,912,000	7,487,000
Salmon	2,238,000	2,667,000
Crab meat	4,635,000	5,756,000
Clams	809,000	972,000
Pearls, cultivated	17,934,000	16,136,000
Other	19,013,000	14,107,000
Total	$105,246,000	$88,261,000

MEXICO: Mexico ranked third as a supplier of fishery products to the United States. Shrimp was the principal commodity. Mexico furnished 51 percent of the total value of all U.S. shrimp imports. The value of imports from Mexico is:

	1962	1961
Shrimp	$46,700,000	$40,094,000
Other	6,827,000	5,672,000
Total	$53,527,000	$45,766,000

OTHER COUNTRIES: Other leading suppliers of fishery products to the United States market are listed below showing the principal product shipped and the value of U.S. imports of that product:

South Africa Republic - Rock lobster tails	$14,277,000
Peru - Fish meal	16,828,000
Australia - Lobster, frozen	13,867,000
Panama - Shrimp	7,787,000
Norway - Sardines in oil, not skinned	7,625,000
El Salvador - Shrimp	4,982,000
Brazil - Rock lobster tails	4,538,000
Ecuador - Shrimp	1,823,000
Portugal - Sardines in oil, skinned	3,001,000

Area of Origin: During 1962, North American countries continued to be the principal source of supply for fishery products imported into the United States (table 2).

Products valued at $192,624,000 or 41 percent of total fishery imports came from North American sources. Imports from Asian countries were second, Europe third.

Table 1 - Value of United States Imports of Fishery Products (Edible and Inedible) by Selected Countries of Origin, 1962 1/

Country	1962	1961	1960	1959	1958
	(US$1,000)				
Canada	116,168	108,035	102,877	101,967	107,005
Japan	105,246	88,263	85,256	96,226	84,872
Mexico	53,527	45,766	36,705	32,869	28,005
Peru	24,819	16,729	14,270	16,374	10,907
So. Afr. Rep.	19,688	14,468	12,030	12,090	9,332
Norway	18,937	15,101	12,506	16,405	12,087
Australia	14,884	10,856	9,839	8,180	7,665
Iceland	11,602	11,528	9,306	10,000	8,775
Repub. of Pan.	7,884	6,707	5,767	6,458	5,852
Brazil	6,825	5,074	3,916	3,002	2,359
Denmark	6,553	5,246	4,342	8,239	5,728
Ecuador	6,443	4,619	4,467	4,159	3,510
Portugal	5,983	6,525	5,289	5,452	5,177
India	5,638	2,777	2,363	2,239	1,547
El Salvador	5,100	5,510	4,215	1,297	660
W. Germany	4,499	4,160	4,100	1,814	1,805
Netherlands	2,997	1,736	2,562	2,628	1,509
France	2,457	2,087	2,317	2,230	1,169
United Kingdom	2,520	2,309	1,759	2,388	1,787
Chile	2,155	2,089	2,630	1,282	2,007
Angola	554	500	267	3,023	2,065
Cuba	98	1,793	3,901	4,810	5,542
Other	50,671	35,180	29,381	23,368	17,806
Total	475,248	397,058	360,065	366,500	327,171

1/Value at the foreign port of shipment.

Table 2 - Value of United States Imports of Fishery Products, by Area of Origin, 1962 1/

Area	Edible	Inedible	Total
	(US$1,000)		
North America	184,885	7,739	192,624
South America	30,493	23,114	53,607
Europe	51,177	10,504	61,681
Asia	89,551	29,979	119,530
Oceania	20,727	480	21,207
Africa	24,049	2,550	26,599
Total	400,882	74,366	475,248

1/Value at the foreign port of shipment.

Table 3 - Value of United States Imports of Fishery Products, by Selected Commodities, 1958-62 1/

ommodity	1962	1961	1960	1959	1958
	.....(US$1,000).....				
ible Products:					
resh or frozen:					
Shrimp.....	91,898	68,538	56,406	52,306	43,162
Tuna	45,715	30,228	31,713	29,728	25,377
Groundfish fillets and blocks	46,937	42,595	33,265	38,759	30,431
Lobster	57,182	49,039	44,768	38,635	35,661
Other.....	71,822	63,547	61,845	60,940	63,243
Total fresh or frozen	313,554	253,947	227,997	220,368	197,874
anned:					
Tuna	22,884	22,175	19,142	21,688	16,882
Salmon.....	3,435	3,545	7,541	11,130	11,271
Sardines.....	16,291	12,543	9,115	8,370	8,564
Crab meat....	4,701	5,780	5,514	7,947	6,116
Lobster	5,811	4,779	5,239	6,441	3,952
Other.....	18,878	17,530	16,067	17,083	15,561
Total canned .	72,000	66,352	62,618	72,659	62,346
her edible products.....	15,328	15,458	16,765	18,006	19,992
dible products:					
Fish meal.....	24,298	16,740	11,068	15,884	11,335
Pearls	18,935	16,925	14,563	13,678	10,944
Other.....	31,133	27,636	27,054	25,905	24,680
Total inedible .	74,366	61,301	52,685	55,467	46,959
tal fishery imports	475,248	397,058	360,065	366,500	327,171

alue at the foreign port of shipment.

Duties Collected: Duties collected on imports of fishery oducts into the United States during 1962 were $17,910,000 6 percent higher than in 1961. Duties collected (with the erage ad valorem equivalent) for the years 1958-62 are ed below:

ar	Duties Collected	Average Ad valorem Equivalent (Percent)
2	$17,910,000	3.8
1	16,904,000	4.3
0	15,837,000	4.4
9	17,737,000	4.8
8	16,645,000	5.1

holesale Prices

DIBLE FISH AND SHELLFISH, ECEMBER 1963:

The December 1963 wholesale price index for edible fish d shellfish (fresh, frozen, and canned) rose 1.3 percent om the previous month as a result of higher prices for ost fishery products. Compared with December 1962, the dex in December 1963 at 107.5 percent of the 1957-59 erage was lower by 11.1 percent. Prices during the same nth a year earlier were substantially higher for nearly l items in the index.

The drawn, dressed, or whole finfish subgroup index opped 2.2 percent from November to December 1963 and

was down 14.0 percent from December 1962. Prices at New York this December were lower for frozen dressed king salmon (down 4.8 percent) and frozen western dressed halibut (down about 1.0 percent). A sharp drop in prices for fresh Lake Superior whitefish (down 26.8 percent) at Chicago was partly offset by higher prices for Great Lakes round yellow pike at New York and an increase in prices for ex-vessel large haddock (up 6.7 percent) at Boston because of lighter landings. Compared with December 1962, wholesale prices in December 1963 were lower for all products in the subgroup--halibut (down 24.4 percent), king salmon (down 12.7 percent), fresh large haddock (down 7.5 percent), and Lake Superior whitefish (down 40.6 percent).

Higher prices in December 1963 for South Atlantic fresh shrimp (up 12.4 percent) at New York City and for fresh haddock fillets (up 5.3 percent) at Boston were responsible for a 4.0-percent increase from the previous month in the subgroup index for processed fresh fish and shellfish. December prices for standard shucked oysters at Norfolk were down 3.2 percent from the previous month as production got into full swing. Compared with December 1962, fresh shrimp prices in December 1963 were down 22.4 percent. Prices for other items in the subgroup also were lower than a year earlier bringing the December 1963 subgroup index down by 13.2 percent.

Higher prices in December 1963 for all processed frozen fish and shellfish products caused a 2.7-percent increase from the previous month in the subgroup index. A rising trend in frozen shrimp prices (wholesale price up 2 cents a pound at Chicago) was indicated in December 1963 although those prices were still sharply lower (down 24.8 percent) than a year earlier. Prices for small haddock fillets and ocean perch fillets also rose from November to December because of seasonally light landings. The December 1963 subgroup index was down 13.0 percent from the same month a year earlier mainly because of lower frozen shrimp prices and a slight drop in prices for flounder fillets.

Prices for canned fish products were generally higher in December 1963 as a result of low end-of-the-year stocks and the subgroup index rose 1.3 percent from the previous month. As compared with December 1962, prices in December 1963 were lower for all canned fish and the subgroup index was down by 6.3 percent.

Wholesale Average Prices and Indexes for Edible Fish and Shellfish, December 1963 with Comparisons

Group, Subgroup, and Item Specification	Point of Pricing	Unit	Avg. Prices 1/ ($)		Indexes (1957-59=100)			
			Dec. 1963	Nov. 1963	Dec. 1963	Nov. 1963	Oct. 1963	Dec. 1962
ALL FISH & SHELLFISH (Fresh, Frozen, & Canned)					107.5	106.1	106.8	120.9
Fresh & Frozen Fishery Products:					110.5	109.0	110.0	127.6
Drawn, Dressed, or Whole Finfish:					114.4	117.0	121.6	133.1
Haddock, lge., offshore, drawn, fresh	Boston	lb.	.17	.16	133.0	124.7	104.0	143.8
Halibut, West., 20/80 lbs., drsd., fresh or froz.	New York	lb.	.33	.33	96.1	97.1	129.9	127.1
Salmon, king, lge. & med., drsd., fresh or froz.	New York	lb.	.85	.89	118.0	124.0	132.7	136.2
Whitefish, L. Superior, drawn, fresh	Chicago	lb.	.41	.56	61.2	83.6	78.3	103.0
Yellow pike, L. Michigan & Huron, rnd., fresh	New York	lb.	.51	.46	83.5	75.3	83.5	88.5
Processed, Fresh (Fish & Shellfish):					111.5	107.2	106.6	128.5
Fillets, haddock, sml., skins on, 20-lb. tins	Boston	lb.	.57	.54	138.0	131.1	114.1	139.6
Shrimp, lge. (26-30 count), headless, fresh	New York	lb.	.82	.73	95.5	85.0	87.9	123.1
Oysters, shucked, standards	Norfolk	gal.	7.50	7.75	126.5	130.7	128.6	132.8
Processed, Frozen (Fish & Shellfish):					101.3	98.6	97.5	118.4
Fillets: Flounder, skinless, 1-lb. pkg.	Boston	lb.	.39	.39	98.9	98.9	100.1	100.1
Haddock, sml., skins on, 1-lb. pkg.	Boston	lb.	.40	.38	115.8	111.4	114.3	107.0
Ocean perch, lge., skins on 1-lb. pkg.	Boston	lb.	.35	.34	121.0	119.2	118.4	117.5
Shrimp, lge. (26-30 count), brown, 5-lb. pkg.	Chicago	lb.	.78	.76	91.9	89.5	86.0	122.2
Canned Fishery Products:					102.5	101.2	101.7	109.4
Salmon, pink, No. 1 tall (16 oz.), 48 cans/cs.	Seattle	cs.	23.50	23.25	102.4	101.3	102.4	111.1
Tuna, lt. meat, chunk, No. 1/2 tuna (6-1/2 oz.), 48 cans/cs.	Los Angeles	cs.	11.06	10.88	98.2	96.6	96.6	104.4
Mackerel, jack, Calif., No. 1 tall (15 oz.), 48 cans/cs.	Los Angeles	cs.	5.75	5.75	97.5	97.5	97.5	2/100.0
Sardines, Maine, keyless oil, 1/4 drawn (3-3/4 oz.), 100 cans/cs.	New York	cs.	8.96	8.84	114.9	113.3	113.3	119.4

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

2/ New product replaced California canned sardines starting December 1962; entered wholesale price index at 100 under revised procedures of Bureau of Labor Statistics.

DDT RESISTANCE SEEN IN MINNOW-LIKE FISH

Mosquitofish (Gambusia affinis), a top-feeding minnow found in the southern United States and other warm climates, is believed to be the first fish to demonstrate an apparent resistance to DDT. Mosquitofish are valuable in the destruction of mosquito larvae because of their surface feeding habits.

Three Mississippi scientists reported that mosquitofish from waters near cotton fields that had been long treated with chlorinated hydrocarbon pesticides showed a marked resistance to DDT compared with fish from areas where insecticides had not previously been used. They tested 1,175 fish.

In the past mosquitofish usually died within a few hours after exposure to DDT. Among vertebrates, fish are notable for their susceptibility to pesticides, although resistance among insects is quite common, and two species of frogs have been found resistant.

Scientists from Mississippi State University, said "one could easily imagine that a genetically resistant population (of mosquitofish) might result from periodic applications of insecticide." (Science News Letter, 83:73, February 2, 1963.)