# TRENDS AND DEVELOPMENTS

## American Samoa

MORE KOREAN TUNA FISHING VESSELS TO FISH FOR CANNERY:

As a result of difficulties with Japanese crews while ashore in American Samoa, 10 additional Korean tuna fishing vessels are expected to fish for the American Samoa tuna cannery in 1960. One Korean tuna vessel began fishing for the cannery in June 1959 (reports from other sources state that first Korean vessel arrived early in 1958) and two more Korean vessels arrived later in the year. In contrast to the Japanese crews, the Koreans have a good reputation.

The American Samoan Government has decided to place two Samoan fishermen aboard each of the Korean vessels for training. (The Suisan Keizai, June 3, 1960.)

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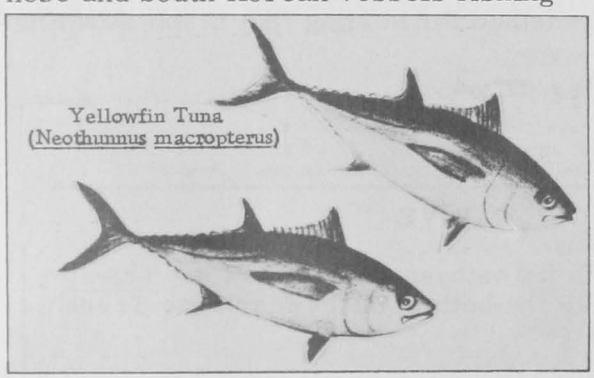
TUNA LANDINGS, MAY 1960:

In May 1960, tuna landings by Japanese and South Korean vessels fishing



Yellowfin Tuna
(Neothunnus macropterus)

for the tuna cannery in American Samoa totaled about 1.5 million pounds, or about 19.2 percent below the 1.8 million pounds landed in May 1959. However, the landings for January-May 1960 of 10.6 million pounds were 5.2 percent higher than the 10.1 million pounds landed during the first five months of 1959.

American Samoa Tuna Landings, May 1960

| Species | May | | Jan.-May | |
|---|---|---|---|---|
| | 1960 | 1959 | 1960 | 1959 |
| | . . . . (1,000 Lbs.) . . . | | | |
| Albacore | 1,295 | 1,268 | 8,997 | 7,545 |
| Yellowfin | 109 | 420 | 1,232 | 2,055 |
| Big-eyed | 54 | 130 | 369 | 485 |
| Skipjack | 1/ | - | 10 | 1/ |
| Total | 1,458 | 1,818 | 10,608 | 10,085 |

1/ Less than 500 pounds.
Note: Most of the tuna was landed by Japanese long-line vessels; a small amount was landed by a South Korean long-line vessel.

## California

PELAGIC FISH POPULATION SURVEY CONTINUED:

Airplane Spotting Flight 60-7-Pelagic Fish: The inshore area from Punta Banda, Baja California, Mexico, to Fort Bragg, Calif., was surveyed from the air (April 11-15, 1960), by the California Department of Fish and Game Cessna "180" 3632C to determine the distribution and abundance of pelagic fish schools.

Although complete coverage was possible, strong winds hampered observations off central and northern California. No fish schools were seen north of Point Conception and only 131 were found in southern California and Mexico; 17 of the 131 schools were not identified.

Although 34 anchovy schools were observed there were no large concentrations; 17 of the 34 were scattered between Ensenada and the border, 5 were near Huntington Beach, 10 near Rocky Point in Santa Monica Bay, and 2 between Santa Barbara and Point Conception.

Sixty-one sardine schools were observed 1 mile off Laguna Beach and 19 Pacific mackerel schools were counted between Torrey Pines and La Jolla.

A large mass of extremely rich water was encountered between Halfmoon Bay and Davenport. It ranged in color from dirty brown to a soupy-appearing deep red, and the inner margin was 2 to 3 miles offshore. Its westerly extension was not determined . Low passes over the denser portions disclosed, in addition to the predominant dark red

and presumably miscroscopic organisms, many large jellyfish and small "swarms" of what were

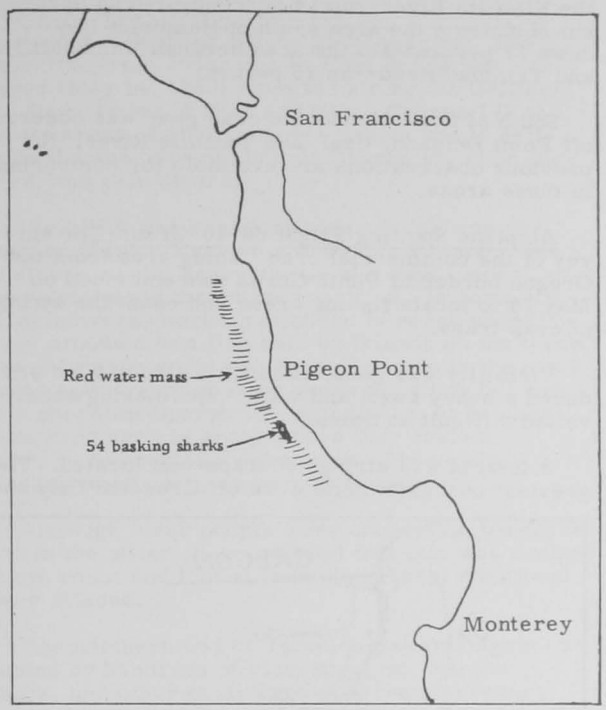



Fig. 1 - Airplane Spotting Flight 60-7 (April 11-15, 1960).

probably euphausiids. The line of demarcation between this water mass and the green to blue-green inshore water was very abrupt and many basking sharks were actively feeding along the "front." A total of 54 basking sharks was seen between Pigeon Point and Ano Nuevo Point.

Since the observers were able to cover only a small part of the water mass it can be assumed

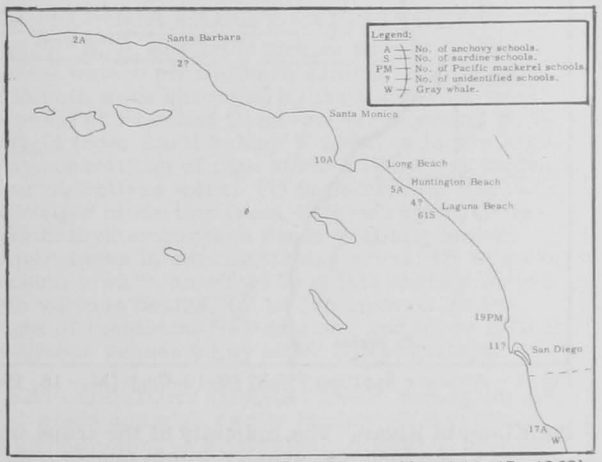



Fig. 2 - Airplane Spotting Flight 60-7 (April 11-15, 1960).

that many more basking sharks (and probably other forms) were feeding in the area.

Unlike surveys of the previous 2 months, only 1 gray whale was seen. It was near Punta Salsipuedes, Baja California. /

Airplane Spotting Flight 60-11-Pelagic Fish: The aerial survey to determine the distribution and abundance of pelagic fish schools was continued (May 16-20, 1960), by the Department's Cessna "180" 3632C along the inshore area from the California-Mexico border north to the Russian River.

Strong winds off central and northern California created unfavorable conditions for aerial observations, but weather and visibility were good south of Point Conception.

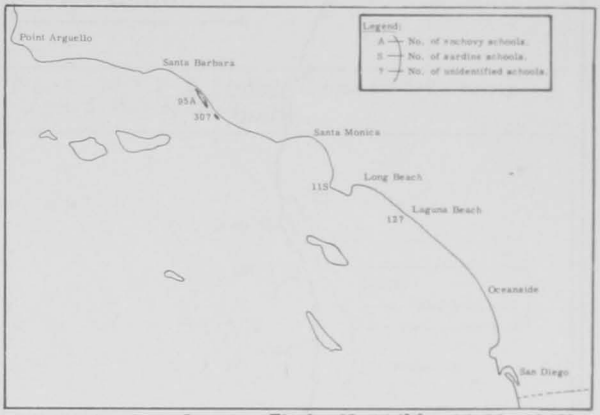



Fig. 1 - Airplane Spotting Flight 60-11 (May 16-20, 1960).

The only concentration of fish schools found during the survey was in the Ventura-Port Hueneme area. A group of 83 anchovy schools was seen close to shore between Ventura and Rincon Point, 12 more off Port Hueneme, and 30 deep unidentified schools between Point Mugu and Point Dume.

Only 23 other schools were seen during the flight. Of these, 11 observed were about 1 mile south of Point Vicente. The rest were off Laguna Beach and could not be identified.

Note: Also see Commercial Fisheries Review, July 1960 p. 21.

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## CRAB FISHING AREA AND INTENSITY STUDIES CONTINUED:

Airplane Spotting Flight 60-8-Crab: Commercial dungeness crab fishing areas from Pt. Arena to the California-Oregon border were surveyed from the air on April 18-19, 1960, by the Department's Cessna 182 to determine the fishing localities and the relative density of crab gear of the northern California crab fleet.

Conditions for observing the strings of crab gear were generally good throughout the 2-day survey.

A total of 177 lines of crab gear was counted, 155 (87.5 percent) north of Cape Mendocino and 22 (12.4 percent) south of the Cape but north of Pt. Arena. The 155 strings observed north of Cape Mendocino were 33 less than for the same area in March. Most of the gear was within 2 miles of the beach. Some gear was even in the breaker zone.

When compared with the March survey, several shifts in gear density are noted. This includes

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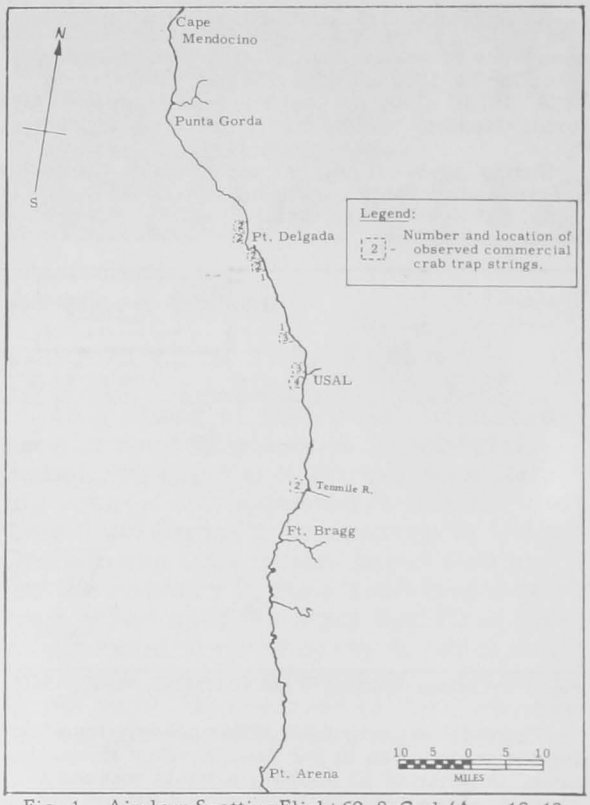


Fig. 1 - Airplane Spotting Flight 60-8-Crab (Apr. 18-19, 1960).

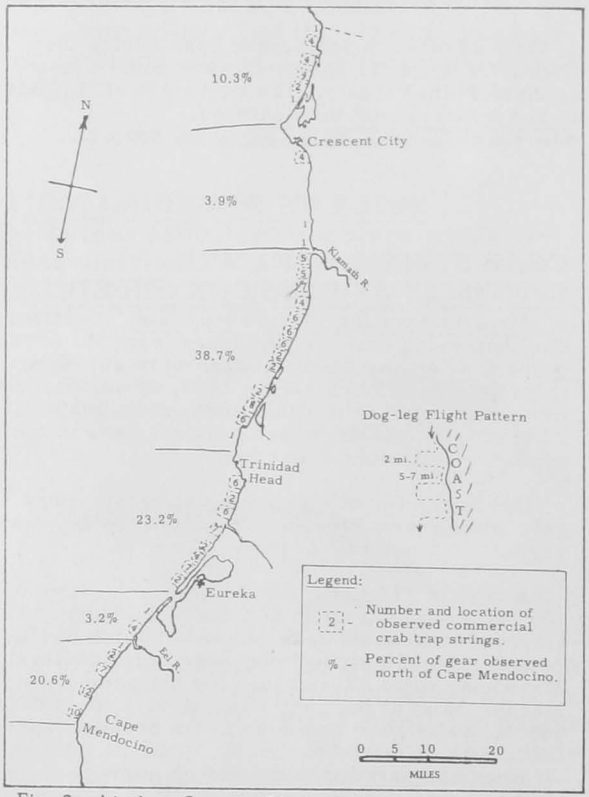


Fig. 2 - Airplane Spotting Flight 60-8-Crab (Apr. 18-19, 1960).

shifts from the area immediately south of Crescent City--down 11 percent--to the area south of the Klamath River--up 14 percent--and an apparent shift from the area south of Humboldt Bay--down 17 percent--to the area between Humboldt Bay and Trinidad Head--up 15 percent.

South of Cape Mendocino crab gear was observed off Point Delgado, Usal, and Tenmile River. No previous observations are available for comparison in these areas.

Airplane Spotting Flight 60-10-Crab: The survey of the commercial crab fishing area from the Oregon border to Punta Gorda was continued on May 16 to locate fishing areas and count the strings of crab traps.

Visibility was good, although a strong wind produced a heavy swell and white caps making observation difficult at times.

A total of 126 strings of traps was located. The greatest concentrations were off Crescent City and

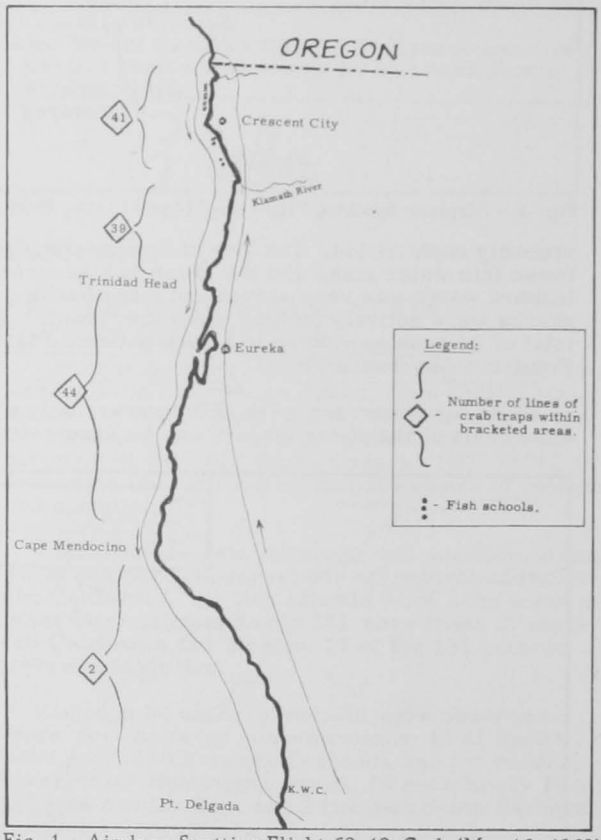


Fig. 1 - Airplane Spotting Flight 60-10-Crab (May 16, 1960).

the Klamath River. The majority of the traps was located close inshore, usually within one-fourth mile of the beach. A few strings were as far off as 2 miles.

Several dense schools of fish, on which birds and seals were feeding, were observed. It was not possible to determine the species but they had the appearance of anchovy schools.

Note: Also see Commercial Fisheries Review, June 1960 pp. 19-21.

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## AERIAL CENSUS OF COMMERCIAL AND SPORT FISHING FOR ABALONE CONTINUED:

Airplane Spotting Flight 60-9-Abalone: The shoreline from Princeton to Fort Bragg was surveyed (May 14, 1960) from the air by the California Department of Fish and Game Cessna 182 to locate areas of abalone sport fishing and to estimate the numbers of abalone fishermen, clam diggers, and skin divers.

Visibility was excellent although fog was encountered from Princeton to San Francisco. Due to strong winds, heavy swells and waves were prevalent along the entire coastline. In some areas skindivers, working offshore in rough water, were attached to a line held by friends on the shore. Not only were great numbers of people in the more commonly-known abalone areas but along the entire shoreline sportsmen, skindivers, and fishermen were seen in areas where they seldom, if ever, were previously observed. Many school classes were seen, as well as fishermen.

Although 3,720 people were counted on the shore and in the water, it is believed that this was a minimum count and that at least 20 percent additional were missed.

The northern end of Tomales Bay was again occupied by hundreds of clam diggers. Barges, skiffs, and other craft were observed ferrying sportsmen out to the mud flats.

The greatest numbers of abalone fishermen (690) were seen at Fort Ross, with the next greatest numbers (320) at Montara Beach in San Mateo County.
Note: Also see Commercial Fisheries Review, June 1960 p. 19.

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## SHRIMP STUDY OFF CALIFORNIA COAST CONTINUED:

M/V "N. B. Scofield" Cruise 60-S-2-Shrimp: Coastal waters off southern central and northern California were surveyed by the California Department of Fish and Game research vessel N. B. Scofield from April 5-May 3, 1960, to locate areas of concentrations of pink shrimp (Pandalus jordani). Other objectives were: (1) to determine size, sex, and weight of shrimp from different beds; (2) to make bathythermograph casts to obtain bottom temperatures in shrimp fishing areas; (3) to make plankton tows in an effort to obtain shrimp larvae from various depths; (4) to determine size and weight of incidental fish catches; and (5) to collect specimens requested by other investigations.

EXPLORATORY OPERATIONS: Strong northwest winds and high swells hampered operations throughout most of the cruise. A total of 69 tows was made with a 20-foot beam trawl having a net of $1\frac{1}{4}$-inch mesh.

Off Santa Monica, pink shrimp were found in 100 and 110 fathoms of water. The best of 3 tows in that locality produced 2 pounds in a half hour.

Off Gaviota, pink shrimp were caught in 2 of 3 tows. The most productive, in 110 fathoms, produced 8 pounds of shrimp in a half hour.

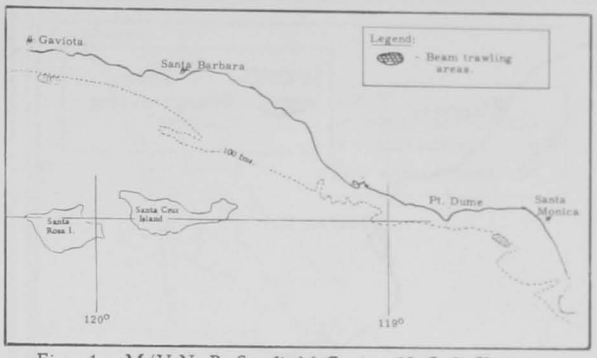



Fig. 1 - M/V N. B. Scofield Cruise 60-S-2-Shrimp (April 5-May 3, 1960).

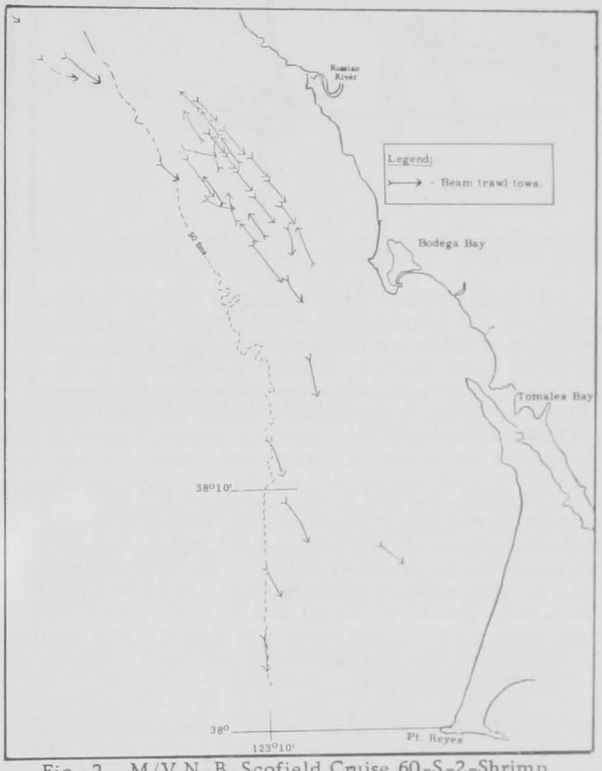



Fig. 2 - M/V N. B. Scofield Cruise 60-S-2-Shrimp (April 5-May 3, 1960).

A total of 23 tows was made in the Avila area. Shrimp could not be found in commercial conoentrations, even though catches were made in 21 of the 23 tows. The best tows produced 82 pounds in 45 minutes at 105 fathoms off Pt. San Luis and 52 pounds in 30 minutes off Pt. Sal in 120 fathoms. An area approximately 20 miles in length was covered and trawling was conducted in depths of 80 to 130 fathoms.

In the Bodega area, shrimp were caught in 26 of 39 tows. A concentration of shrimp was found in commercial quantities off the Russian River in 40-47 fathoms. The area was approximately 7 miles long and 2 miles wide. Within this area 22 tows produced catches averaging 746 pounds per hour. Calculations based upon catch-per-hour, trawling area covered, and total area, gave an estimate of 880,000 pounds of shrimp inhabiting this area. Six tows from Salt Point to Ft. Ross in 58 to 52 fathoms of water yielded few shrimp.

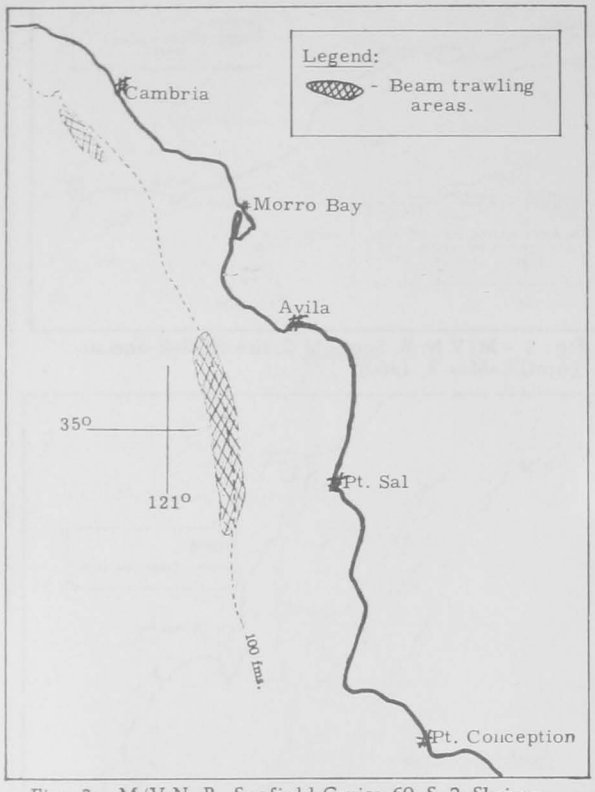



Fig. 3 - M/V N. B. Scofield Cruise 60-S-2-Shrimp (April 5-May 3, 1960).

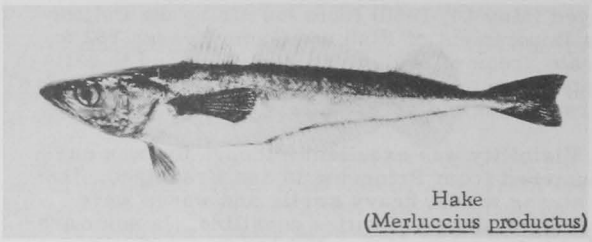
SIZE, SEX, WEIGHT, AND COUNT OF SHRIMP: Samples of shrimp were obtained from 3 tows off Santa Monica, 2 off Gaviota, 18 off Avila, and 23 off the mouth of the Russian River. Approximately 100 shrimp from each of these samples were sexed and measured. Heads-on count and weight determinations were made at sea except at Bodega Bay where samples from the commercial fleet were counted and weighed shoreside.

TEMPERATURES: Fifty-six bathythermograph casts were made in depths ranging from 38 to 130 fathoms. Casts were made in all areas where shrimp were caught and also in areas where shrimp were not taken.

Reversing thermometer casts were made in the center of the shrimp concentration off the Russian River. The temperatures were 7.9° C. (46.2° F.) on April 29 in 44 fathoms and 8.5° C.(47.3° F.) on May 1 in 40-44 fathoms. Vessel thermograph and surface temperatures were recorded during all tows for the entire cruise. These ranged from 8.4° C. (47.1° F.) off the mouth of the Russian River on April 24 to 15.2° C. (59.4° F.) off Santa Monica on April 5.

PLANKTON TOWS: A one-half-meter plankton net was secured to the beam trawl framework. Fifty plankton samples were thus obtained in conjunction with beam trawl tows. These samples are to be examined for shrimp larvae.

INCIDENTAL FISH: The catch of incidental fish was small because a small unweighted foot rope was tied onto the beam from 6 to 12 inches above the runners. Counts and average weight of all species taken in 47 tows were recorded. In addition, all fish taken in 8 of the tows were measured.



Hake
(Merluccius productus)

Hake (Merluccius productus), slender sole (Lyopsetta exilis), stripetail rockfish (Sebastodes saxicola), and splitnose rockfish (Sebastodes diploproa) were the major incidental fish in the catches in the Santa Monica, Gaviota, and Avila areas. Hake, rex sole (Glyptocephalus zachirus), and Pacific sanddabs (Citharichthys sordidus) were the principal fish species in the Bodega area catches.

Note: Also see Commercial Fisheries Review, December 1959 p. 42.

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## OPERATIONS IN 1960 OF WHALING LAND STATIONS:

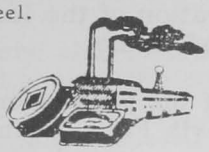
As of June 1, licenses for 1960 baleen whaling were issued for two primary and two secondary land stations for processing whales and for 5 whale catcher vessels. These whaling operations, which are located in the San Francisco Bay area, are the only licensed operations in the United States, and are at the same level as in 1959. In 1959, 309 whales were taken for oil, animal food, and other byproducts.

## Cans--Shipments for Fishery Products, January-April 1960

Total shipments of metal cans during January-April 1960 amounted to 32,874 short tons of steel (based on the amount of steel consumed in the manufacture of cans) as compared with 29,974 tons in the same period a year ago. Canning of fishery prod-

ucts in January-April this year was confined largely to tuna, Gulf oysters, and Pacific jack mackerel.

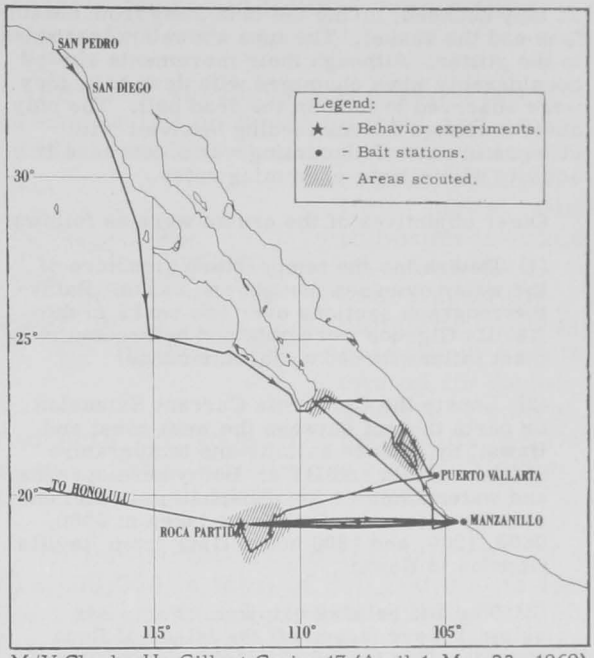
Note: Statistics cover all commercial and captive plants known to be producing metal cans. Reported in base boxes of steel consumed in the manufacture of cans, the data for fishery products are converted to tons of steel by using the factor: 23.0 base boxes of steel equal one short ton of steel.



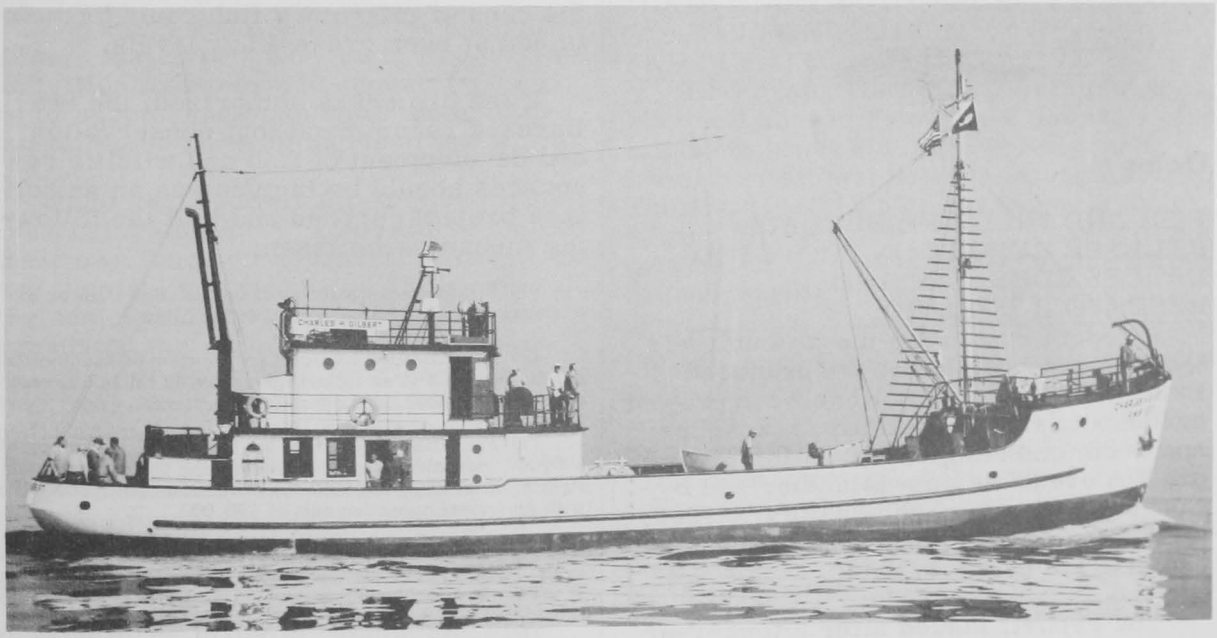
## Central Pacific Fishery Investigations

### SKIPJACK TUNA BEHAVIOR STUDIES IN EASTERN PACIFIC:

M/V "Charles H. Gilbert" Cruise 47: The research vessel Charles H. Gilbert of the U. S. Bureau of Commercial Fisheries Biological Laboratory at Honolulu, returned to her home port after an absence of 27½ weeks. Departing from Honolulu on November 12, 1959, the Charles H. Gilbert proceeded to a shipyard in Oregon where a new bulbous bow with underwater observations ports was installed and extensive alterations were made to the berthing, bridge, and laboratory facilities. After a shakedown cruise from Portland, Oreg., to San Pedro, Calif., the vessel carried out (April 1-May 23, 1960) an oceanographic, biological, and fishery survey in Eastern Pacific waters off the west coast of Baja California, Cape San Lucas, and the Las Tres Marias and Revilla Gigedos Islands. Experiments designed to study the behavior of skipjack and yellowfin tuna and bait fishes were carried out. These experiments included underwater observations, primarily from the stern chamber in the Charles H. Gilbert, of the behavior pattern of fish in response to water sprays, to different species of bait, to "tinsel glitter" ( a potential bait enhancer), to live and dead bait, and to rates of chumming. Preliminary analyses of the resulting data indicate that the tuna did not exhibit any difference in behavior whether sprays were on or off. They did exhibit different responses to different baits, with the most pronounced excitation resulting from the most elusive bait, thread herring. As to the behavior of the bait, the northern anchovy sounded immediately and, upon sighting the tuna, reversed direction and headed to the surface. Two other species of anchovy (both unidentified) assembled into schools and moved away from the vessel. The thread herring sounded, but unlike the northern anchovy, they exhibited considerable evasive action




M/V Charles H. Gilbert Cruise 47 (April 1-May 23, 1960).



The Service's research vessel Charles H. Gilbert.

as they sounded, luring the tuna away from the surface and the vessel. The tuna showed no response to the glitter. Although their movements slowed considerably when chummed with dead bait, they were observed to feed on the dead bait. The only obvious change in tuna feeding behavior with changes in rate of chumming was a decrease in activity with slower chumming rates.

Other objectives of the cruise were as follows:

(1) Determine the temperature structure of the water over sea mounts and banks. Bathythermograph sections over two banks in the Revilla Gigedos were obtained before equipment failure forced a discontinuance.

(2) Locate the California Current Extension or parts thereof between the west coast and Hawaii by surface salinity and temperature measurements and BT's. Bathythermographs and water samples for phosphate, nitrate, and salinity determinations were taken at 0000, 0600, 1200, and 1800 hours GMT from Revilla Gigedos to Hawaii.

(3) Tag and release skipjack. Forty-six skipjack were tagged off the Island of Roca Partida. One tagged skipjack was recovered seven days after being tagged.

(4) Transport collection of live fish and personnel of Hawaii State Division of Fish and Game from Mexico to Hawaii. A total of 3,800 snappers, Lutianus sp., were transported from Manzanillo with 89 percent survival.

Fishing was poor. Only six schools of tuna were sighted beyond the immediate vicinity of Roca Partida. None of these responded to live-bait chumming. Fishing incidental to the behavior experiments produced 545 skipjack, 678 yellowfin, and 30 little tuna.

Note: Also see Commercial Fisheries Review, January 1960 p. 30, and June p. 25.

## Dams

### FISH AND WILDLIFE BUREAUS RELEASE REPORT ON PROPOSED BRUCES EDDY DAM AND RESERVOIR IN IDAHO:

A report evaluating the probable effects of construction of the proposed Bruces Eddy Dam and Reservoir project in Idaho on fish and wildlife resources and recommending conservation measures in event the dam is authorized by Congress was released on July 7, 1960, by the Fish and Wildlife Service of the Department of the Interior.

The report, issued after a four-year study, was signed by D. L. McKernan, Director of the Bureau of Commercial Fisheries, and by A. V. Tunison, Acting Director of the Bureau of Sport Fisheries and Wildlife. The document was addressed to Arnie J. Suomela, Commissioner of Fish and Wildlife of the Department of the Interior. The study was made with the cooperation of the Idaho Department of Fish and Game.

The effect of the project on big-game herds in the North Fork drainage would be highly adverse, according to the report. The Clearwater elk herd is one of the largest in the United States.

The report states the project also would damage both resident and migratory fishes. The most damaging effects would be to the steelhead trout, 60 percent of which spawn above the Bruces Eddy Dam site. If the project were to be constructed there is no assurance that the runs of migratory fish could be maintained at even present low levels.

If the project is authorized, the two Bureaus recommend that conservation and development of fish and wildlife resources should be included as an authorized project purpose and that the following measures be taken:

(1) Fish passage facilities at Bruces Eddy Dam be undertaken at an estimated cost of $15 million.

(2) Facilities for artificial propagation of anadromous fish be included at an estimated cost of $2 million for construction and $200,000 a year for operation.

(3) Facilities be provided for the annual production of 500,000 catchable-size trout for stocking the reservoir and its tributaries at an estimated construction cost of $600,000 with an annual operating cost of $90,000.

(4) A flow of not less than 2,000 second-feet of water in the North Fork of the Clearwater be made below the dam at all times and the temperature of the water is to be maintained between 45 degrees and 65 degrees Fahrenheit.

(5) Stream improvement work above the reservoir at a cost of $1 million to be carried out with outlet structures in the dam so designed and located that downstream migrating fish will not be drawn into them.

(6) Lands additional to project needs be acquired and made available for management and habitat improvement for big game, especially elk, at an estimated cost of $1,900,000 for acquisition of the necessary land and initial development.

There were also recommendations which would assure the public the fullest possible use of the area, provide for consultation and cooperation in minimizing the adverse effect of transporting logs downstream, and assure cooperation between the Forest Service, the Fish and Wildlife Service, and the Idaho Department of Fish and Game in the management of the acquired lands.

## Federal Aid Funds for Sport Fish and Wildlife Restoration

State fish and wildlife restoration projects received an apportionment of $12,800,000 in Federal aid, with funds made available July 1, 1960, the Secretary of the Interior Fred A. Seaton announced. The balance of Federal Aid fish and wildlife restoration program funds for the year ending June 30, 1961, will be apportioned at the usual time in the fall.

The early apportionment is designed to help states program their Federal Aid activities more advantageously. It will be of special importance to those states operating on a revolving-fund basis.

Under the Federal Aid fish and wildlife restoration programs, states expend their own funds on approved projects and are then reimbursed up to 75 percent of the cost. On July 1, 1959, 14 states had exhausted their Federal Aid money available for obligation for fish-restoration programs and 16 states were without Federal Aid funds for obligation on wildlife restoration activities. Several other states had less than $5,000 in Federal Aid funds available for obligation. The partial apportionment will make it possible for states to immediately claim reimbursement after July 1, 1960, for expenditures made in connection with projects approved for the year ending July 1, 1961.

Federal Aid funds are derived from an excise tax on sporting guns and ammunition and on sporting rods, reels, creels, and artificial lures. Distribution is made on a formula based upon the number of license holders in a state and on its area. The two Federal Aid Acts are administered by the Bureau of Sport Fisheries and Wildlife, U. S. Fish and Wildlife Service.

Of the partial apportionment of $12,800,000, a total of $10,300,000 is for the restoration of wildlife and $2,500,000 for the restoration of fish. No indication was given relative to the probable total apportionment, but in recent years wildlife restoration funds have been between $12 and $13 million exclusive of a $2,693,000 backlog which no longer exists) and fish restoration funds have been something in excess of $5 million.

## Florida

MIAMI UNIVERSITY RECEIVES GRANTS FOR FISHERY AND OCEANOGRAPHIC STUDIES:

The Physical Science Division of the Marine Laboratory of the University of Miami is in receipt of several grants from the National Science Foundation. The first for $18,600 was given in order to study the feasibility of the use of the catamaran, or twin-hull, principle for an oceanographic research vessel.

"It has been clear for a long time that the conventional type of boat construction does not correspond to the needs of oceanographic research vessels," says the head of the Physical Science Division. "For oceanographic research the scientists need a platform from which they can work with as little interference as possible from the boat movement and the weather conditions prevailing on the sea. They want to have as many laboratories

as possible and a rather large free deck area. The vessel should have a rather high speed but still be able to reduce its speed below a knot. The deck officer in charge should be able to watch all operations and be able to maneuver the vessel quickly in such a way that sudden changes in speed and position of the vessel can be achieved. The classical concept of ship construction does not take care of these requirements in the most economical way. Ships are getting too large and expensive to build before the requirements are fulfilled."

The catamaran principle would automatically enlarge the deck area by the increase of the beam. Furthermore it gives a center well between the two hulls which can be used for nearly all observations and would allow handling of deep-sea gears in a shielded position. As the beam of each of the two hulls can be kept rather small, an economical high speed is easily achieved. The twin-hull construction provides for a more stable platform. The over-all length could be about 120 to 150 feet as compared with 250 feet for the conventional type vessel. Naval architects have not yet studied the structural design of large catamarans. Consequently, in order to be able to build a larger vessel based on this principle, structural studies and model experiments have to be carried out.

Such a vessel should be designed to carry a 16-man ship's crew, a 15-man scientific crew, should be 120 feet long with a 50-foot beam, have a top speed of 15 knots and the possibility to reduce the speed to one-tenth of a knot, three center wells for easy handling of all gears between the hulls, three articulated booms for handling of all gears on deck and over the side of the ship, and eight laboratories.

Naval architects Friede and Goldman, Inc., have been subcontracted for carrying out the feasibility study. They will work in close cooperation with Marine Laboratory scientists to assure the most functional design of the vessel.

A second grant for $28,000 is to cover the expenses of the operation of The Marine Laboratory research vessel Gerda. This grant will be used for geophysical studies, for development of instruments where boat time is required, for studies in Florida Bay, Straits of Florida, and the Bahamas.

A third grant for $64,000, for a period of two years, is for the establishment of a Carbon-14 laboratory. Facilities are being built for the dating of Late Pleistocene events by the radiocarbon method. The Marine Laboratory intends to apply this method to a program of dating deep-sea as well as near-shore sediments.

The several objectives of this program include the establishment of accurate assays of the geochemical balance in the oceans, and the dating of major climatic, oceanographic, and geological events. In particular, the techniques will be used to assess the various rate changes accompanying the changing physical-chemical conditions of the sedimentary environments.

A grant for $14,600 is for basic research on coral reef fishes. This work will be carried out on the reefs around St. John Island in the Virgin Islands. It is a continuation of work already started there November 1958.

Photographs and descriptions of each species studied will be prepared, along with data on habitat, food habits, growth, spawning, et cetera.

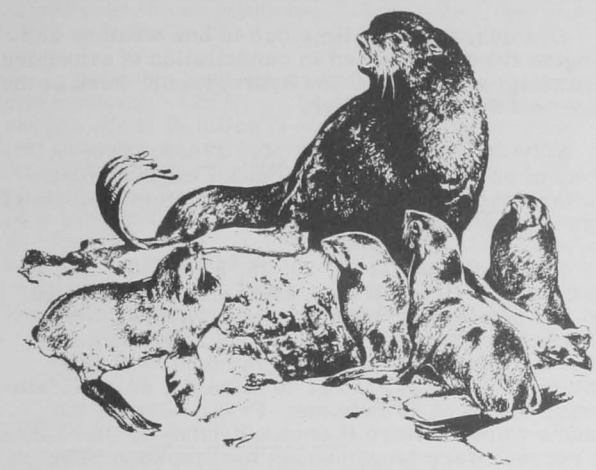
## Fur Seals

PELAGIC SEALING STUDIES OFF ALASKA:

The vessel Windward under charter to the U. S. Bureau of Commercial Fisheries left Seattle, Wash., on April 18 for the Sitka area to continue the International North Pacific Fur Seal Commission's high-seas research program.

Few seals were found in West Crawfish Inlet, Silver Bay, or Sitka Sound, and the vessel went on to the Gulf of Alaska. Near Kodiak, fur seals began to appear in appreciable numbers about April 18. The chartered vessel Tacoma observed 796, mostly about 30 miles off Cape Barnabas on Kodiak, and collected 242 from

April 18 to 30. The seal concentration, which was accompanied by a great num-



ber of seabirds (shearwaters), Steller sea lions, and an estimated 30 to 40 humpback whales, was feeding on capelin, sand launces, and some small herring. As previously observed in the Gulf of Alaska, early-arriving seals were predominately adult females. About 430 seals have been collected since the start of pelagic operations. With two vessels, a quota of 1,250 is planned. If as hoped, a substantial part of these can be taken in the Gulf of Alaska by mid-June, the vessel remaining on charter (Windward) will be free to carry out more exploratory work in the Bering Sea than has been possible before.

## Great Lakes Fisheries

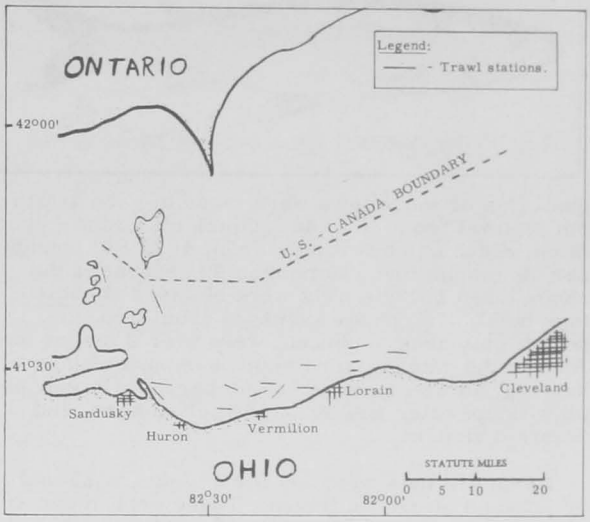
## Exploration and Gear Research

### SEASONAL DISTRIBUTION OF COMMERCIAL FISH STOCKS IN LAKE ERIE:

M/V "Active" Cruise 9: The first in a series of cruises scheduled for Lake Erie during 1960 was conducted (May 18-28, 1960), by the U. S. Bureau of Commercial Fisheries fishing vessel Active. Objectives of the cruise were to obtain additional information on the seasonal distribution of fish stocks and to provide gear demonstrations for commercial fishermen from ports within the area of operation.

Systematic echo-sounding operations were carried out in United States waters between Sandusky and Avon Point, Ohio.

During the 10-day cruise, 15 exploratory trawl drags were completed in the 3- to 10-fathom depth




M/V Active Cruise 9 (May 18-28, 1960).

range using a 50-foot two-seam balloon trawl equipped with a 1½-inch mesh cod end.

Catches of up to 200 pounds of smelt were made per drag over the entire area. The majority of the smelt in this area was 16 to 20 to the pound. Several drags made north of Lorain, Ohio, produced catches of smelt, 9 to 10 to the pound. Commercial quantities of yellow perch were taken in trawling operations completed off Lorain, Ohio.

Thermal stratification was recorded from near Kelleys Island eastward throughout the cruise area. Surface water temperatures recorded during the cruise ranged from 57°-60° F. Bottom water temperatures ranged from 59° F. at 3 fathoms to 45.7° F. at 10 fathoms.

The Active was scheduled to depart Vermilion, Ohio, about June 6 on the second 10-day exploratory fishing and gear research cruise. Area of operations were to be from Avon Point, Ohio, to Erie, Pa.

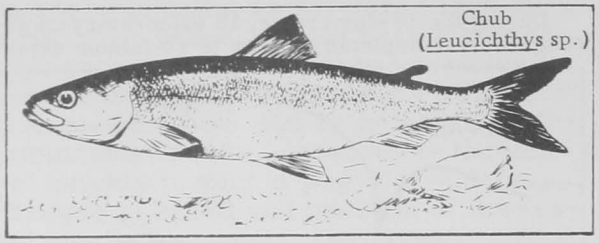
Note: Also see Commercial Fisheries Review, July 1960 p. 28.

## Great Lakes Fishery Investigations

### LAKE MICHIGAN FISH POPULATION SURVEY:

M/V "Cisco" Cruise 1: The 1960 program to estimate the status of the chub (Leucichthys sp.) population of southern Lake Michigan was initiated April 26-May 10, 1960, by the U. S. Bureau of Commercial Fisheries research vessel Cisco. Throughout the season trawls and gill nets of standard design will be fished intensively at selected locations to measure the species composition, distribution and abundance of chubs and associated species.

The Cisco began trawling operations with a 52-foot, two-seam balloon trawl, similar to those presently used by commercial trawlers in Lake Michi-




gan. One or more tows were made at each 5-fathom interval from 15 to 40 fathoms off Grand Haven, Mich. Chub catches ranged from 41 to 342 pounds per 30-minute tow. More than 99 percent of the chubs taken in the trawls were bloaters (Leucichthys hoyi). The chubs averaged about 9 to the pound; only about 5 percent were over 9 inches long. Also in the catches were small numbers of lake herring, alewives, smelt, trout-perch, slimy sculpins, deep-water sculpins, spottail shiners, and emerald shiners.

Linen gill nets were set for 4 nights at 25 and 50 fathoms off Grand Haven. These nets, made up of equal amounts of $2\frac{3}{8}$-, $2\frac{1}{2}$-, $2\frac{5}{8}$-, $2\frac{3}{4}$-, and 3-inch mesh, extension measure, are the identical ones which were set in southern Lake Michigan in 1954. The catch in the 25-fathom set was light (129 chubs, 3 lake herring, 2 alewives, 2 smelt in 1,275 feet of net), but the net was so badly fouled with weeds that it undoubtedly did not fish effectively. Bloaters made up 93 percent of the identified chubs; the remainder were L. alpenae, except for 1 L. zenithicus and 1 L. reighardi. At 50 fathoms 279 chubs and 5 alewives were taken in 2,550 feet of net. Here bloaters constituted 94 percent of the chub catch, L. reighardi 4 percent, and L. alpenae and L. kiyi 1 percent each. Some of the L. reighardi were freshly spent.

Nylon gill nets (50 feet each $1\frac{1}{4}$- and $1\frac{1}{2}$-, and 300 feet each 2-, $2\frac{3}{8}$-, $2\frac{1}{2}$, $2\frac{3}{4}$-, 3-, $3\frac{1}{2}$-, and 4-inch mesh), set for one night at 50 fathoms in the same area as the linen nets, caught 142 chubs, 60 of them in the $1\frac{1}{4}$- and $1\frac{1}{2}$-inch meshes. All chubs were bloaters except for 2 L. kiyi and 1 L. reighardi.

In order to study the differences in catches of gill nets set for various lengths of time, several identical gangs of nylon nets (same mesh composition as the gang at 50 fathoms) were set at 25 fathoms off Grand Haven. Three sets were for 1 night, 2 for 2 nights, 1 for 3 nights, and 1 for 5 nights. No thorough analysis of the differences in catches has been made, but an obvious conclusion that may be drawn is that chub catches may vary widely from night to night. On successive nights the one-night sets took 361, 637, and 384 chubs, respectively. The 2-night sets made numerically similar catches of 801 and 843 chubs, respectively, but the size composition of the fish was appreciably different in the 2 sets.

A hydrographic station was established at 25 fathoms off Grand Haven. Collections, which will be standard for all stations during 1960, included bottom fauna, net plankton, nannoplankton, and water for chemical analysis. Water temperatures in southern Lake Michigan were very cold, mostly 2-3° C. (35.6°-37.4° F.) except near shore. Extremes were 1.8° C. (35.3° F.) and 15.7° C. (60.3° F.). The latter was recorded at the mouth of the Grand River. A peculiar temperature inversion was observed 5 miles offshore (25 fathoms) from Grand Haven. The water was vertically homothermous at 2.4° C. (36.3° F.) except for a shallow layer at 4.6° C. (40.3° F.) near the bottom.

Considerable lost time due to bad weather and engine trouble resulted in cancellation of scheduled trawling, gill-netting, and hydrographic work in the area off St. Joseph, Mich.

M/V "Cisco" Cruise 2, May 17-31, 1960: A loss of several days due to major engine repairs to the Cisco resulted in the cancellation of some of the work planned for cruise 2.

Trawl catches at 15, 20, 25, 27, 30, 35, and 40 fathoms off Grand Haven, Mich., ranged from 80 to 523 pounds per 30-minute tow. Average chub catches per tow were 163 pounds at 15 fathoms, 360 at 20 fathoms, 173 at 25 fathoms, 442 at 27 fathoms (one tow), 116 at 30 fathoms, 80 at 35 fathoms, and 88 at 40 fathoms. Practically all the chubs were bloaters (Leucichthys hoyi). Less than 5 percent were large enough for smoking. The proportion of larger chubs was somewhat greater at shallower depths. A fairly large number (42 pounds per tow) of deep-water sculpins was taken at 40 fathoms. At other depths the trawls caught only a few deep-water sculpins, slimy sculpins, alewives, smelt, lake herring, and yellow perch.

Catches at the beginning of the cruise were greater than at the end, when fathometer tracings indicated that there were many fish off the bottom. New, larger trawl doors were put into use at the beginning of the cruise. They appeared to spread the net better, but catches continued to be mostly small. Further trawling will be necessary before it can be determined whether these small catches are the result of the trawl fishing improperly, or whether there has been a scarcity of fish on the bottom.

Linen gill nets set in 25 fathoms (255 feet each of $2\frac{3}{8}$-, $2\frac{1}{2}$-, $2\frac{5}{8}$-, $2\frac{3}{4}$-, and 3-inch mesh) and 50 fathoms (510 feet of each of the above mesh sizes) off Grand Haven took more bloaters and less of the other species of chubs than did identical sets on about the same date in 1954). At 25 fathoms the catch this year was 213 L. hoyi, and 1 L. alpenae; in 1954 it was 78 L. hoyi, 3 L. alpenae, 8 L. zenithicus, and 8 L. reighardi. At 50 fathoms the catches were 378 L. hoyi, 4 L. alpenae, 1 L. zenithicus, 18 L. reighardi in 1960, and 258 L. hoyi, 6 L. alpenae, 14 L. zenithicus, 24 L. reighardi, and 18 L. kiyi in 1954.

Regular gangs of nylon gill nets (50 feet each of $1\frac{1}{4}$- and $1\frac{1}{2}$-inch mesh, 300 feet each of 2-, $2\frac{3}{8}$-, $2\frac{1}{2}$-, $2\frac{3}{4}$-, 3-, $3\frac{1}{2}$-, and 4-inch mesh) set overnight at 25 and 50 fathoms off Grand Haven produced many more chubs than the linen nets, but the species composition was similar. The 2-inch mesh proved the best chub mesh. At 25 fathoms it took 216 chubs weighing $46\frac{1}{2}$ pounds as compared with 59 chubs weighing 7 pounds in the $2\frac{1}{2}$-inch mesh. The $2\frac{3}{8}$-inch mesh caught 73 chubs weighing $13\frac{1}{2}$ pounds. This same relationship between catches in these mesh sizes was also true at 50 fathoms, but catches were smaller.

Rather light chub catches were made in regular gangs of nylon gill nets set overnight in 25 fathoms

and for 2 nights in 50 fathoms off Racine, Wis. One hundred ninety-five L. hoyi, 1 L. zenithicus, and 4 L. reighardi at 25 fathoms, and 381 L. hoyi, 4 L. alpenae, and 30 L. reighardi at 50 fathoms, constituted the chub catches. A few alewives were taken at both depths.

Appreciable surface warming (surface temperature mostly 7-12° C. or 14.6-53.6° F.) extended out for about 10 miles from both shores in southern Lake Michigan, but was more pronounced on the east side. In the central area the water remained practically homothermous vertically--surface temperature mostly 3.5-5.0° C. or 38.3-41.0° F. The minimum recorded was 3.4° C. (38.1° F.), and the maximum 18.8° C. (68.8° F.) near the mouth of the Grand River, Mich.

Note: Also see Commercial Fisheries Review, July 1960 p. 29.

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## WESTERN LAKE SUPERIOR FISHERY SURVEY:

M/V "Siscowet" Cruise 1: The first of three cruises of the U. S. Bureau of Commercial Fisheries research vessel Siscowet, scheduled in 1960 to study the bathymetric and areal distribution of fish stocks by systematically fishing standard gangs of experimental gill nets (mesh sizes 1" to 5" by $\frac{1}{2}$" intervals), was conducted (April 26-May 19, 1960) in western Lake Superior.

Standard gangs were fished at various depths south of Stockton Island and north of San Island. At the Stockton Island station the nets were set at 5, 15, 25, 35, and 54 fathoms. At the station north of San Island the nets were set at 15, 25, 52, and 82 fathoms. An oblique set from the surface to 50 fathoms was also made at both stations with nets having a mesh of $2\frac{1}{4}$ inches.

Trawling operations were conducted at the Stockton Island station, Pike's Bay, north of Sand Island, and north of Houghton Point. A limited amount of inshore work was done along the southwest shore of Cat Island and the north shore of Stockton Island with the skiff powered by an outboard motor. Small trawls and plankton nets were towed in shallow waters immediately adjacent to shore in an effort to capture recently hatched fry.

Catches in the oblique sets were very sparse at both the Stockton Island station and the Sand Island station. Trawl catches were light at all areas trawled. One 15-minute tow in Pike's Bay (20 fathoms) took about 500 smelt, 2-3 inches in length. A 15-minute tow north of Houghton Point (12 fathoms) took 74 yellow perch averaging 3 inches in length. Tows made north of Sand Island (54 fathoms) took small numbers of ninespine sticklebacks, muddlers (3 species), and chubs (L. hoyi).

Catches in the inshore areas were also extremely light. Attempts to capture recently-hatched fry in both the trawl and larva net were unsuccessful.

Surface temperatures varied from 34.9° F. north of Sand Island to 38.4° F. south of Stockton Island. In the deeper areas (below 50 fathoms) the bottom temperatures were slightly warmer (about 40° F.).

M/V "Siscowet" Cruise 2: This cruise was a continuation of a long-term observation of environmental conditions and fish populations at three index stations established by the Siscowet in 1958. These stations are located southeast of Stockton Island, northeast of Bear Island, and east of Pike's Bay.

At each station standard gill-net gangs (1- to 5-inch mesh by $\frac{1}{2}$-inch intervals) were fished and limnological data and materials were collected including: records on water temperatures; water samples for chemical analyses; plankton and bottom samples; and Secchi-disc readings. Trawls were fished where possible but concentrations of commercial gill nets on the trawling grounds hampered operations at two of the stations.

The "bloaters" (L. hoyi) taken in Pike's Bay differed from those taken in deeper areas or in the open lake. The Pike's Bay variety were fatter fish and had larger eyes and less pigment on the head. The fins were often red. A large sample of these fish was preserved for morphological studies.

Trawl catches at the index stations were light and consisted mainly of slimy muddlers, ninespine sticklebacks, L. hoyi, and smelt.

Other activities included continuation of standard gangs of gill nets at various depths and locations to learn more of the bathymetric and areal distribution of fish. The fishing localities were: south of Oak Island (22 fathoms); east of Frog Bay (18 fathoms); east of Outer Island (65 fathoms); and north of Ironwood Island (27 fathoms).

In an attempt to capture fry and yearling stages, trawl tows were made southeast of Cat Island, west of Outer Island, east of Frog Bay, southeast of Michigan Island, and north of Ironwood Island. A $\frac{1}{2}$-meter plankton net (32 grit cloth) was also towed at these locations. Fish larvae were captured north of Ironwood Island at depths of 9 and 25 feet below the surface in 27 fathoms of water. The species most commonly caught in the trawl at nearly every location were slimy muddlers, ninespine sticklebacks, trout-perch, and smelt. In addition, L. hoyi and 4 small lake trout (8.2 to 13.6 inches) were taken southeast of Cat Island; whitefish (3.0 to 8.0 inches), pygmy whitefish, and one 4-inch lake trout were taken west of Outer Island; round whitefish (3 to 4 inches) and small (3 to 6 inches) unidentified coregonids were taken southeast of Michigan Island; lake trout (4 to 14 inches), whitefish (6 to 15 inches), L. hoyi, and pygmy whitefish were taken north of Ironwood Island.

Trawl tows were made east of Frog Bay to locate the 18-month-old lake trout planted from shore by the Wisconsin Conservation Department in early May. A tow in 9 to 11 fathoms just offshore from the planting site took no fish. Another tow farther offshore in 17 fathoms captured 19 small lake trout, 9 of which were 6 to 8 inches long and had the left pectoral fin clipped. These individuals were obviously from the Wisconsin plant. This discovery is comforting, as these young trout planted from shore apparently found a desirable environment as quickly as fish planted from a boat (the usual planting method).

A skiff powered with an outboard motor was used to make several tows with a $\frac{1}{2}$-meter plankton net

along the south shore of South Twin Island over a rocky bottom in 6 to 15 feet of water. Several extremely small fish larvae were captured.

The water was vertically homothermous at all stations. Surface temperatures varied from 37.4° F. northeast of Bear Island to 45.5° F. east of Frog Bay.

Note: Also see Commercial Fisheries Review, July 1960 p. 29.

## Gulf Exploratory Fishery Program

EXPERIMENTAL MIDWATER TRAWLING OFF THE MISSISSIPPI DELTA:

M/V "Oregon" Cruise 67: A 6-day cruise (ending June 2, 1960) was made by the U. S. Bureau of Commercial Fisheries exploratory fishing vessel Oregon off the Mississippi Delta. The objective was to evaluate a newly designed midwater trawl, but a scarcity of midwater schools and a malfunctioning telemeter prevented any testing. Transects were made over the 30- to 40-fathom areas which had large concentrations of midwater fish during the previous December and March cruises, without finding any indications of fish at this time.

When traversing the 65-70 fathom area, just before sunset, fish were observed, on the echograph, rising from the bottom, forming into schools at 50 fathoms, and rising to 10-15 fathoms at sunset, then dispersing over the surface at dusk. The reverse cycle was observed the following morning at dawn. An unsuccessful attempt was made to capture these schools where they were forming at 50 fathoms and at 10-15 fathoms before dispersal. A mercury-vapor light failed to draw fish to the surface at night, although fish were observed at 5-10 fathoms below the vessel on echograph tracings. During daylight several short tows with a 40-foot shrimp trawl over the rough bottom where the schools dispersed produced the same species of scad (Decapterus punctatus) that had been taken in midwater schools in the earlier cruises.

Ten bushels of scallops (Pecten gibbus) were dredged from 16 fathoms between Pensacola and Mobile for study.

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SHRIMP-TRAWL UNDERWATER PERFORMANCE STUDIES CONTINUED:

M/V "George M. Bowers" Cruise 26: The study of shrimp-trawl performances was continued by the U. S. Bureau of Commercial Fisheries exploratory fishing vessel George M. Bowers off Eleuthra, British West Indies, and Panama City, Fla., between April 12-June 10, 1960. Observations and 9,600 feet of motion picture film of shrimp trawls were made by divers who rode a diving sled towed by the George M. Bowers. Trawls photographed were a 40-foot flat net, 2- and 4-seam semi-balloon nets, and a try net.

Note: Also see Commercial Fisheries Review, November 1959 p. 39, and January 1960 p. 39

## Hawaii

BELOW-AVERAGE SKIPJACK TUNA SEASON PREDICTED:

Although the early part of the year is the "off-season," 1960 skipjack landings in Hawaii through April were only 70 percent of last year's landings and 87 percent of the average for the last 10 years. Three size-groups were present in the catch: 2.5 lbs., 9.5 lbs., and 25.7 lbs. Fish in the first two groups were the most common. Live bait (nehu) was also scarce.

Surface temperature data from Koko Head, Oahu, indicate that the advection of California Current Extension water into the Hawaiian Islands area will be weak and/or late this year. In previous years this condition has been associated with below-average skipjack catches. A below-average season was predicted by the U. S. Bureau of Commercial Fisheries at the end of March. Temperature data for April have not changed the prediction.

## King Crab

TAGS FROM UNITED STATES TAGGING PROGRAM RETURNED BY RUSSIANS:

The King Crab Investigation of the U. S. Bureau of Commercial Fisheries received 34 tags recovered by the Russians while fishing in the Bering Sea. The recoveries were made between

July 17 and September 12, 1959, and included tags from live king crabs tagged


and released by United States biologists in 1957-59. The Russians also supplied recovery information.

## Maine Sardines

CANNED STOCKS, JUNE 1, 1960:

Distributors' stocks of Maine sardines totaled 197,000 actual cases on June 1, 1960, the same amount on hand June 1, 1959. Stocks held by distributors on January 1, 1960, amounted to 235,000 cases, and on April 1, 1960, totaled 252,000 cases, according to estimates made by the U. S. Bureau of the Census.

Canners' stocks on June 1, 1960, totaled 235,000 standard cases (100 $3\frac{3}{4}$-oz. cans), a decrease of 37,000 cases (14.0 percent) as compared with June 1, 1959. Stocks held by canners on January 1, 1960, amounted to 843,000 cases and on April 1, 1960, totaled 397,000 standard cases.

The 1960 pack (from the season which opened on April 15, 1960) as of June 25 was about 194,000 standard cases as compared with 272,000 cases packed in the same period of 1959. The 1959 pack for the season which ended on December 1, 1959, was 1,753,000 standard cases.

The total supply (pack plus carryover beginning of season) for the season from April 15 to December 1, 1959, was 2,171,000 standard cases, somewhat lower than the total supply of 2,434,000 cases the previous season. The carryover on April 15, 1960, was 335,000 cases as compared to 420,000 cases on April 15, 1959.

## Michigan

USE OF OTTER TRAWLS PERMITTED IN SOUTHERN LAKE MICHIGAN:

Conditioned by a zone restriction, a change was approved in Michigan's commercial fishing regulations in May 1960, by the Conservation Commission which would permit the use of otter trawls in southern Lake Michigan. The State's Governor signed an emergency order which placed the regulatory change in effect June 12.

Under the new regulation, the Conservation Department is authorized to issue trawling permits for netting "bloater" chubs, herring, alewives, and smelts. It also is charged with regulating the kind and size of trawls, their mesh sizes, and the areas, and time and manner in which this new type of fishing gear may be used. How many permits will be issued and on what basis remains to be determined as do a number of other administrative matters.

The Commission gave Department officials clear-cut instructions in a resolution limiting the use of trawls to Lake Michigan in an area south of Ludington to the Indiana border and west to Wisconsin waters.

Table 1 - Canned Maine Sardines--Wholesale Distributors' and Canners' Stocks, June 1, 1960, With Comparisons 1/

| Type | Unit | 1959/60 Season | | | | 1958/59 Season | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 6/1/60 | 4/1/60 | 1/1/60 | 11/1/59 | 7/1/59 | 6/1/59 | 4/1/59 | 1/1/59 | 11/1/58 |
| Distributors | 1,000 Actual Cases | 197 | 252 | 235 | 296 | 176 | 197 | 254 | 268 | 312 |
| Canners | 1,000 Std. Cases 2/ | 235 | 397 | 843 | 1,001 | 422 | 272 | 474 | 891 | 1,037 |

1/ Table represents marketing season from November 1-October 31.
2/ 100 $3\frac{3}{4}$-oz. cans equals one standard case.
Note: See Commercial Fisheries Review, July 1960 p. 32 and March 1960 p. 22.
Correction: In table 1 on p. 22 of March 1960 Commercial Fisheries Review, the season heading "1957/58 Season" should read "1958/59 Season."

## North Atlantic Fishery Investigations

DECREASE IN HERRING DISEASE IN GULF OF ST. LAWRENCE:

Gulf of St. Lawrence herring were sampled during May 1960 by U. S. Bureau of Commercial Fisheries Biologists as part of the continuing epidemiological study of a fungus (Ichthyosporidium) disease. Examination of the samples disclosed that the incidence of disease in the Gulf has continued to slump following the 1954/55 outbreak, and is now at a very low ebb. These results agree with the general picture that emerged following the 1947 Gulf of Maine outbreak--a rapid decrease in incidence during the five years immediately following the epidemic.

Herring landings in the Gulf of St. Lawrence have shown signs of increasing this year--the first time this has been true since the disease outbreak. If the trend continues, it may indicate that year-classes spawned after the outbreak have not been seriously affected by the disease. This is supported by the observation that much of this year's catch is composed of disease-free recruit spawners.

* * * * *

POPULATION AND DENSITY OF SEA SCALLOP BEDS ON GEORGES BANK STUDIED:

M/V "Delaware" Cruise 60-8: A survey of the population structure and density of the sea scallop beds on Georges Bank was conducted (May 23-29, 1960), by the U. S. Bureau of Commercial Fisheries research vessel Delaware.

The Service's research vessel Delaware.

A total of 60 10-minute tows was made using a 10-foot dredge with a 2-inch ring bag. An odometer was towed behind the dredge to measure the distance traveled over the bottom. All live scallops and clapper shells were measured; sex ratios taken; gonads collected; and meats collected for length-weight ratio.

Results of the survey have not yet been analyzed, but in general the biologists did not find large numbers of the year-class which will be recruited this year and did find an unusually large number of clapper or dead shells in some areas.

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UNDERWATER TELEVISION OFFERS NEW OPPORTUNITIES FOR FISHERY RESEARCH:

Biologists at the Woods Hole Biological Laboratory of the U. S. Bureau of

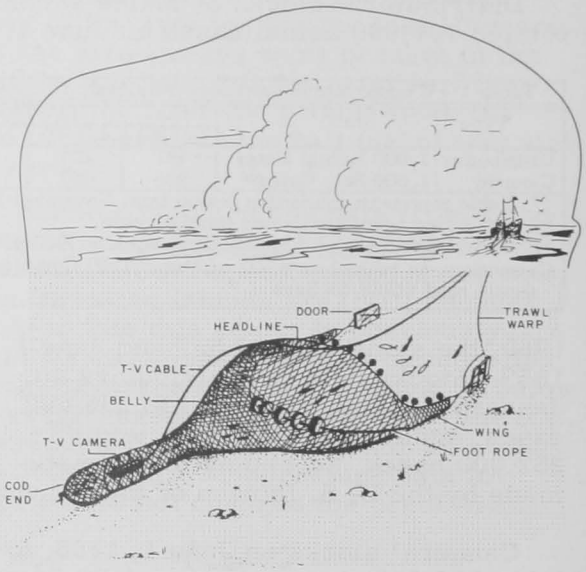


Fig. 1 - An otter trawl with the underwater television camera in the cod end.

Commercial Fisheries now are able to extend their studies with the help of underwater television to include observations of fishes as they are caught in otter trawls. The specially-designed television camera is suspended within the cod end of the trawl and the image transmitted over a coaxial cable to a receiver on board the

vessel. Continuous observations or motion picture recordings of the fish in the submerged net can be made by biologists in the comparative comfort of a shipboard laboratory.

A major problem in savings-gear studies has been the behavior of fishes in the trawl. Do the small fish actually try to escape through the meshes, as the biologists hoped they would? Do trash fishes clog the meshes, thus blocking the escape of immature cod fishes? Underwater television will now help to supply answers to these and other questions.

Fig. 2 - Biologist on board observing fish.

Careful analysis of motion picture recordings of the television screen has uncovered some interesting facts of species differences in behavior. For example, haddock seem to explore the confined area within the cod end, crossing from one side of the trawl to the other. In contrast, sand launce, an important marine forage species, seem in a hurry to escape through the meshes and usually do so in very rapid fashion.

Many future underwater television studies are planned by the Woods Hole Laboratory. One such study will examine the relationship between the swimming ability of fishes and the speed of the trawl moving over the ocean floor.

## Oysters

UNDERWATER HARROW SHOWS PROMISE IN CONTROL OF STARFISH:

Experiments previously carried on at the U. S. Bureau of Commercial Fisheries Biological Laboratory at Milford, Conn., demonstrated that oyster drills can be killed by burial in soil. In order to further test this method as a means of controlling oyster predators, the Bureau has entered into a contract with a New Haven, Conn., Oyster Company. A disc harrow, similar to equipment used in agriculture, is being used on an oyster bed in Long Island Sound to turn over the bottom sediment and bury any drills and starfish present. SCUBA divers are being used to observe the harrowed areas at periodic intervals.

Further tank experiments using three types of substratum are also being conducted. Starfish completely buried in one inch of mud could not emerge and died in three to four days. Even when incompletely buried, with one or two rays protruding, approximately 80 percent were killed. Similar results were obtained in substrates of mud and shell and in sand.

## Radioactive Waste

DISPOSAL SITES OFF NEW ENGLAND COAST SURVEYED:

A survey of a site off Boston Harbor formerly used for the disposal of limited quantities of packaged radioactive wastes has not revealed any radioactivity attributable to the disposal operations.

Samples of water, sediments, and marine organisms living in the area were collected by the U. S. Coast and Geodetic Survey and were analyzed for radioactivity by the U. S. Public Health Service at its Engineering Center in Cincinnati. The radioactivity detected was found to be in the same range as that of background activity at other ocean locations where there has been no disposal of radioactive wastes.

The site was used under Atomic Energy Commission (AEC) authorization and license from 1952 to August 1959, by a Boston disposal corporation, for the disposal of low-activity packaged radioactive wastes which had a total of 2,434 curies at the time of disposal. The former site is an area two miles in diameter located at 42° 25.5' N. lat. and 70° 35' W. long., 15 miles off Boston Harbor in Massachusetts Bay.

The license of the company was amended by the AEC in August 1959 to require the firm to carry out its operations in deep water (1,000 fathoms) off the continental shelf. No further use of the area off Boston Harbor for disposal purposes is contemplated. The Commission's present policy is to require that wastes be disposed of in water at

least 1,000 fathoms deep and the Commission is not contemplating any change in that policy.

The Massachusetts Bay site is one of four off the New England coast studied during the past year by scientists from the University of Connecticut, the U. S. Coast and Geodetic Survey, and the U. S. Public Health Service, working in conjunction with the Bureau of Commercial Fisheries of the U. S. Fish and Wildlife Service. The work was part of a research program financed by the Atomic Energy Commission.

While the studies have indicated that each of the four inshore locations would be capable of providing sufficient dilution to dispose safely of 250 curies per year of strontium 90 or its equivalent, the Commission has no plan to use or approve the use of these sites. The surveys were conducted from a long-range point of view--to gather information for use should a need ever arise.

One of the four locations surveyed, the southern half of a restricted area known as No Mans Land (off Martha's Vineyard Island) and used as a Naval gunnery range, was dropped from consideration. The scientists agreed that the site was safe for the disposal of limited amounts of packaged radioactive wastes, but pointed out that nearby ocean locations are popular with fishermen, and tidal and nontidal currents through the site are predominantly landward.

The two remaining sites studied were a 25-square mile area centered at 42° 13.4' N. lat. and 69° 45' W. long., approximately 75 nautical miles northeast of the No Mans Land area and a 25-square mile area centered at 40° 45' N. lat. and 70° 52.7' W. long., approximately 28 nautical miles south of the No Mans Land site.

Note: Also see Commercial Fisheries Review, June 1959 p. 28.

## Salmon

CALIFORNIA COMPLETES KING SALMON MARKING FOR 1960 SEASON:

Despite a disease outbreak in the salmon hatchery this spring which threatened to scuttle the program, the California Department of Fish and Game's Marine Resources Branch completed its king salmon marking project for this year. It is expected that marking will be resumed next year.

The disease broke out in the U. S. Fish and Wildlife Service's Coleman Hatchery in March, halting marking, which had begun in February. The disease, still under study, disappeared in April and the marking project was completed by mid-May.

Over 1 million marked fish were released into the Sacramento River drainage in three lots, each lot with a different marking. One group was placed in a river tributary near the hatchery; another group was trucked to Rio Vista; and the third lot was taken by boat from Rio Vista to water of about 50-percent salinity usually upper San Pablo Bay.

Purpose of the experiment is to learn the effect of fresh-water hazards on the king salmon run. These hazards include predation, stream diversions, and pollution.

None of the fish marked in 1959 has shown up in the 1960 catch yet, but a Department Biologist says some may show up in the sport catch as two-year-old fish this summer. The majority are expected to appear in the sport and commercial catch beginning in the winter of 1961.

Between 50,000-68,000 fish in each lot were released weekly. The State's Darrah Springs Hatchery hauled fish from Coleman to Rio Vista and a Federal truck took the fish from Coleman Hatchery to Battle Creek, a Sacramento River tributary not far from Coleman.

## Tuna

ALBACORE CATCHES BY CALIFORNIA PARTY BOATS MAY INDICATE GOOD SEASON:

California party-boat fishermen late in June 1960, had their first chance in nearly two years at albacore tuna and may get a few more chances, if the favorable oceanic conditions continue, biologists of the California Department of Fish and Game's Marine Resources Operations predicted on July 1.

A few albacore had been caught near San Clemente Island by June 22 and by June 25 at least 500 had been recorded by party-boat fishermen. The fish were taken between 10 and 40 miles off San Clemente Island at the extreme outer range of the sport fleet and right where the Department figured they would be.

In all of last year, only 39 albacore were reported taken by sports fishermen and the previous year only 6,482 had been caught. These figures are a far cry from the peak years of 1955, 1956, and 1957 when sports fishermen landed 78,000, 65,000, and 41,000 albacore, respectively.

While the initial success off San Clemente is no guarantee of a good albacore season in 1960, the Department has

reason to believe the early catches may herald a return to the good days of the recent past. At the very least, fishermen should experience successes at least as well as they did off San Clemente in late June.

Reason for the Department's cautious optimism about the 1960 season may be found in the log book of the State's Fish and Game research vessel N. B. Scofield, which recently completed an extensive 3,000-mile 26-day cruise into the offshore waters of California and Baja California. Purpose of the trip was to intercept albacore schools prior to their appearance on the local fishing grounds and to follow them into areas of commercial concentrations.

Fisheries scientists concluded that local conditions seem more suitable than they have for the last several years for the fish to move relatively close to shore as the season progresses.

The initial albacore catch on the research vessel's cruise was made about 500 miles west of San Francisco. From that point catches continued throughout the survey in a generally southeasterly direction to as far south as 275 miles west of San Quintin, Baja California. The southernmost catches tend to bear out once again the Department's earlier prediction, based on April oceanic conditions, that fishing south of Guadalupe Island, Mexico, should be comparatively poor.

No commercial concentrations of fish were found. The albacore were widely scattered throughout most of the survey area in water temperatures ranging from 60-64° F. Best fishing was found in the small temperature range of 61-62° F.

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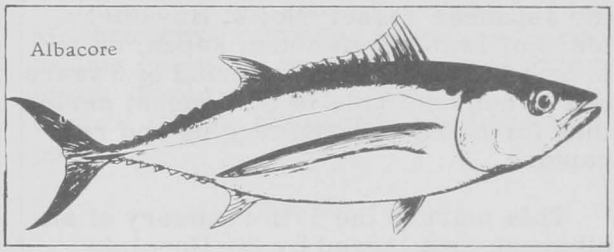
## ALBACORE MIGRATIONS AND DISTRIBUTION STUDIED BY OREGON BIOLOGISTS:

Another albacore tuna exploratory cruise by biologists of the Oregon Fish Commission was scheduled to start the last week of June. A vessel chartered by the Commission will collect basic oceanographic data and study the migration and distribution of the albacore tuna.

The albacore, which was recognized commercially when first caught off the coast of Oregon in 1936, reached a production peak of 22 million pounds in 1944 and about 10 years later the catch fell to 0.5 million pounds. The decline in catch is not a case of depletion, but rather is due to the migration of these fish. It is with this erratic behavior of the albacore that Commission biologists are concerned.

Oregon offshore waters will be studied and the albacore caught will be tagged and returned to sea. Water temperature, salinity, and clearness will be related, if possible, to the presence or abundance of albacore. The findings will be ultimately passed along to the commercial troll fleet so that the fishery can be developed to a greater efficiency.

Albacore, it is now known, follow a drift of warm clear blue water between 30 and




100 miles offshore, beyond a colder, murkier band of water closer to shore. According to the biologists, most of the albacore caught and tagged in 1959 were about 25 inches long. It is believed, too, that no albacore were taken during the 1959 cruise north of the line approximately west from the Umpqua River, in spite of the high temperatures (in excess of 61° F.) encountered north of that point.

The spawning areas of albacore are probably somewhere in the mid-Pacific. The young fish make extensive feeding migrations to distant reaches of the Pacific. It is during these feeding journeys that albacore appear along the coast of Oregon. One tagged by the Oregon Fish Commission was recovered 10 months later off the coast of Japan--a journey of 5,000 miles.

Albacore catches vary widely from year to year. The reasons for this great fluctuation are not fully understood. Ocean currents, water temperature, or food supply undoubtedly influence the availability of fish. Some years landings by the commercial vessels are influenced by market conditions.

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An Oregon State College Department of Oceanography biologist was to take part in the Oregon Commission's cruise. Other College biologists also will make studies of their own at the same time in a separate vessel.

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ALBACORE TAGGED IN 1956 OFF SAN FRANCISCO RECOVERED BY JAPANESE:

An albacore tuna tagged and released off San Francisco, Calif., by biologists of the U. S. Bureau of Commercial Fisheries, Honolulu Biological Laboratory, was recaptured by a Japanese tuna longliner about 1,000 miles southeast of Tokyo Bay, in the vicinity of Marcus Island. This fish was tagged by the Bureau's research vessel Charles H. Gilbert on November 15, 1956, and was recaptured by the Japanese vessel, No. 2, Hayatori Maru of Iwate Prefecture, Japan, on March 13, 1960, after a period of 3 years and 4 months. This is the longest period thus far noted between tagging and recapture.

This marked the 17th recovery of an albacore tuna tagged by the Honolulu Laboratory. Other recoveries in the past have also demonstrated considerable trans-Pacific movements extending from the United States west coast to the vicinity of Tokyo Bay, indicating that there is probably a single population of this valuable tuna species in the North Pacific.

## U. S. Foreign Trade

CONFERENCE HELD ON UNITED STATES FISHERY EXPORT TRADE PROMOTION:

A special conference was held on June 20, 1960, between representatives of the fishing industry and Federal Agencies to consider the present export situation and to obtain the advice of industry as to specific moves the Government might undertake to give maximum assistance in increasing sales of United States fishery products abroad. This meeting was part of a series of conferences being held under the Executive Department's program to promote the expansion of United States exports.

Consideration was given to ways of strengthening the trade promotion services of the Government, to expanding and giving higher priority to the commercial activities of the Foreign Service, to placing greater emphasis on the prompt reporting of information useful to United States exporters, to making fuller use of trade fairs, trade missions, and other means to stimulate the interest of foreign buyers in United States fishery products. Also, specific suggestions were sought on the following subjects: (1) kinds of fishery products that could be sold abroad; (2) where these products could be marketed; (3) reductions in duties, or in quantitative restrictions that might benefit our exports; (4) other barriers to trade that, if lessened or removed, might benefit our exports; and (5) other actions that the Government can take to serve the fishing industry better abroad.

The meeting was held in Washington, D. C., and was open to interested industry representatives who wished to participate. Those planning to attend were asked to submit, prior to the meeting, a summary concerning specific ways that the Government may facilitate the export of fishery products. Interested persons, unable to attend, submitted in writing, prior to the meeting, their comments and recommendations on the items considered.

Methods by which Government agencies can help the American fishing industry increase exports to foreign markets are being studied by the U. S. Department of the Interior as a result of the Government-industry export conference.

The conference was sponsored by the Department of the Interior with cooperation of the Departments of Commerce and State. It was attended by representatives of a number of the major fishing and fish processing industries. Also, participating in the meeting were representatives of the Export-Import Bank and the Federal Trade Commission.

At the conference it was suggested that the industry should aim specifically at foreign markets by preparing fishery products to meet the consumer preference of persons in other countries and not merely attempt to market abroad products prepared for the American consumer. Numerous examples of differences of consumer preferences were given. It was generally agreed, however, that more knowledge of the tastes and desires of consumers in other countries is necessary if the American processor is to gear for the foreign market. It was also suggested that more active price competition might increase exports.

Industry spokesmen at the conference also pointed out numerous trade impediments such as high tariffs and taxes, import licenses, excessive exchange guarantees as well as transportation cost differentials, and labelling requirements.

Other speakers pointed out the need for more prompt and precise reporting of foreign market conditions, on prices of foreign products, costs of production and the intent of foreign countries to purchase fishery products, the need for better export credit facilities and risk insurance, especially for small companies.

Other matters stressed included the need for more promotion of American fishery products in foreign fields and the necessity of having commercial officers abroad who have experience in fisheries.

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## EDIBLE FISHERY PRODUCTS, APRIL 1960:

Imports of edible fresh, frozen, and processed fish and shellfish into the United States during April 1960 decreased by 5.5 percent in quantity and 6.2 percent in value as compared with March 1960. The decrease was due primarily to substantially lower imports of frozen albacore tuna (down 6.3 million pounds) and, to a lesser degree, a decrease in the imports of frozen shrimp, frozen and canned salmon, canned sardines, and fillets other than groundfish. The decrease was partly offset by increases in the imports of groundfish fillets (up 2.6 million pounds), frozen tuna other than albacore, and canned tuna in brine.

Compared with April 1959, the imports in April this year were lower by 16.1 percent in quantity and 12.7 percent in value due to substantially lower imports of groundfish fillets (down 4.6 million pounds), frozen tuna other than albacore (down 7.5 million pounds), and to a lesser extent, frozen albacore, canned and frozen salmon, and frozen shrimp. Offsetting the drop were increases in the imports of canned sardines and canned tuna in brine.

United States Imports and Exports of Edible Fishery Products, April 1960 with Comparisons

| Item | QUANTITY | | | VALUE | | |
|---|---|---|---|---|---|---|
| | April | | Year | April | | Year |
| | 1960 | 1959 | 1959 | 1960 | 1959 | 1959 |
| | (Millions of Lbs.) | | | (Millions of $) | | |
| Imports: | | | | | | |
| Fish & Shellfish: Fresh, frozen, & processed[1/] . . | 75.8 | 90.4 | 1,070.5 | 22.6 | 25.9 | 309.8 |
| Exports: | | | | | | |
| Fish & Shellfish: Processed only[1/] (excluding fresh & frozen) . . . | 3.5 | 5.2 | 68.0 | 1.3 | 1.1 | 22.8 |

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

United States exports of processed fish and shellfish in April 1960 were higher by 1.9 percent in quantity and 44.4 percent in value as compared with March 1960. Compared with the same month in 1959, the exports this April were lower by 18.2 percent in quantity, but were higher by 18.2 percent in value. The lower exports in April this year as compared with the same month in 1959 were due to the small supplies available of fishery products that contribute substantially to the United States export trade in these products.

The relatively high value of the fishery products exported this April over April 1959 would indicate that the April 1960 exports were made up of the higher-priced products such as canned salmon and frozen shrimp.

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## IMPORTS OF CANNED TUNA IN BRINE UNDER QUOTA AS OF JUNE 4:

The quantity of tuna canned in brine which may be imported into the United States during the calendar year 1960 at the 12½-percent rate of duty is 53,448,330 pounds. Any imports in excess of the quota will be dutiable at 25 percent ad valorem.

Imports from January 1-June 4, 1960, amounted to 18,262,874 pounds, according to data compiled by the Bureau of Customs. From January 1-May 30, 1959, a total of 17,689,773 pounds had been imported.

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## IMPORTS AND EXPORTS OF SELECTED FISHERY PRODUCTS, JANUARY-MARCH 1960:

During the first quarter of 1960, groundfish and ocean-perch fillets and blocks, frozen tuna, canned tuna, and fish meal were imported into the United States in lesser quantities than during the same first quarter of 1959. Lobster and shrimp imports were higher than for the 1959 period. In the fishery export trade there were gains in shrimp, fish oils, and squid; declines were noted in canned salmon and canned sardines.

Imports: GROUNDFISH AND OCEAN-PERCH FILLETS AND BLOCKS: Imports (32,194,000 pounds) were 14 percent less than during the first three months of 1959. Icelandic, Norwegian, and Danish shipments were lower than those of the like period of 1959; Canadian shipments were higher.

TUNA, FRESH OR FROZEN: The frozen tuna imported during the first quarter of 1960 (51,214,000 pounds) was below imports for the comparable period of 1959. A 70-percent increase in imports of frozen albacore tuna was not sufficient to overcome a 47-percent decrease in receipts of other frozen tuna, primarily yellowfin. Japanese shipments of other frozen tuna were less than one-half those for the same 1959 period; Peruvian shipments were less than two-thirds the level of the first quarter of 1959.

TUNA, CANNED IN BRINE: During January-March 1960, total imports of canned white-meat tuna in brine (2,284,000 pounds) were 4 percent above those of the comparable period of 1959. Imports from Japan, however, were down 23 percent. Increased imports were received from Spain and other countries. Larger receipts of Spanish canned albacore have resulted from the devaluation of the Spanish currency.

Total imports of canned light-meat tuna in brine (6,649,000 pounds) were 26 percent below those of the first quarter of 1959. Imports from Japan were down 37 percent. The 1960 quota of all canned tuna in brine which may enter the United States at the 12-1/2-percent rate of duty was fixed at 53,448,330 pounds.

SHRIMP, MOSTLY FROZEN: Imports of shrimp (24,798,000 pounds) were 2 percent higher than those of the first quarter of 1959. Mexico, the largest supplier, accounted for nearly two-thirds of the total. Receipts from Japan fell to less than one-third those of the similar period of 1959.

SALMON, CANNED AND FRESH OR FROZEN: Imports of canned salmon (10,083,000 pounds) declined 21 percent from those of January-March 1959; Japan supplied nearly all of this product. Likewise, imports of fresh and frozen salmon (1,427,000 pounds) were down 35 percent from those during the like months of 1959; Canada supplied the entire amount.

LOBSTER AND SPINY LOBSTER, FRESH OR FROZEN: During the first quarter of 1960, both imports of northern lobster (2,857,000 pounds) and spiny lobster (10,319,000 pounds) were higher than those of the same period of 1959. Imports from Canada were up 36 percent. The principal increases in receipts of spiny lobster were noted from the Union of South Africa and Australia, each of which were up 65 percent.

CANNED CRABMEAT AND CANNED OYSTERS: Imports of canned crab meat (929,000 pounds) fell 46 percent; imports of canned oysters (1,477,000 pounds) rose 5 percent. Japan supplied nearly all of these products.

FRESH OR FROZEN SEA SCALLOPS: During the first quarter of 1960, Canada shipped 70 percent more than in the like period of 1959. Imports from Japan fell 30 percent. Total imports of sea scallops (888,000 pounds) were 29 percent higher than during January-March 1959.

CANNED SARDINES: Imports of canned sardines in oil (5,483,000 pounds) were 3 percent higher during the first quarter of 1960. Imports of canned sardines not in oil (3,079,000 pounds) rose sharply, and receipts for the first quarter were three times those received during the entire calendar year of 1959. This was due primarily to the lower supplies of domestic packs of sardines not in oil.

FISH MEAL: During the first quarter of 1960, imports of fish meal (35,704 tons) were down 37 percent from the same period of last year. Peruvian fish meal accounted for nearly 50 percent of the total trade. No fish meal was received from Angola, which supplied almost one-third of the imports in the first three months of 1959.

FISH SOLUBLES: Denmark supplied 85 percent of the fish solubles during January-March 1960. Total imports (2,176,000 pounds) were down about 8 percent from the same period of 1959.

Exports: CANNED SARDINES, NOT IN OIL: Exports for the first quarter of 1960 (6,912,000 pounds) were down about 19 percent from those of the same period of 1959. The sharpest decline was in exports to Cuba, which took only 29,000 pounds as compared with 1,277,000 pounds during January-March 1959.

CANNED SALMON: Owing to reduced shipments to the Philippines in the first quarter of 1960, exports of canned salmon (1,350,000 pounds) declined 53 percent. The United Kingdom took more than twice as much canned salmon as in the comparable period of 1959.

SHRIMP, FRESH OR FROZEN AND CANNED: Exports of canned shrimp (604,000 pounds) were 9 percent above those of January-March 1959; exports of fresh or frozen shrimp (636,000 pounds) were 70 percent higher. Canada took the major share of these products.

CANNED SQUID: During January-March 1960, exports (4,577,000 pounds) were over nine times those of the same period of 1959. The Philippines took 86 percent of the total. In April 1960, however, the Central Bank of the Philippines changed the import classification of squid from the decontrolled category to the nonessential consumer category. This change will make foreign exchange, necessary to pay for imports of squid, more expensive as well as more difficult to obtain. An adverse effect may be expected in the trend in Philippine imports of United States canned squid.

FISH OILS: During the first quarter of 1960, northern European countries took practically all the fish oil exports. Total exports in that period of 29,053,000 pounds were 56 percent more than during the same quarter of 1959.

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## WORLD MARKETS FOR UNITED STATES FISHERY PRODUCTS IN 1959:

The value of United States exports of fishery products in 1959 was the highest since 1947. Exports, valued at $44,241,000, were 43 percent above those of 1958, although 16 percent less than the peak level reached in 1947.

Table 1 - United States Exports of Fishery Products by Selected Countries of Destination, 1955-59

| Country | 1959 | 1958 | 1957 | 1956 | 1955 |
|---|---|---|---|---|---|
| | (US$1,000) | | | | |
| United Kingdom | 8,928 | 5,785 | 3,708 | 2,204 | 3,706 |
| Canada | 8,644 | 9,200 | 7,253 | 8,107 | 10,037 |
| Philippines | 5,587 | 2,578 | 6,027 | 8,065 | 8,556 |
| Netherlands | 4,352 | 2,007 | 2,969 | 4,961 | 7,201 |
| Sweden | 3,176 | 681 | 1,844 | 848 | 308 |
| West Germany | 2,888 | 3,043 | 5,099 | 6,121 | 1,900 |
| Norway | 1,296 | 1,063 | 970 | 1,065 | 991 |
| Japan | 928 | 501 | 669 | 595 | 610 |
| Mexico | 663 | 393 | 175 | 143 | 112 |
| Cuba | 787 | 490 | 721 | 743 | 676 |
| Venezuela | 614 | 641 | 573 | 586 | 442 |
| Belgium & Luxembourg | 746 | 948 | 447 | 504 | 464 |
| France | 766 | 68 | 259 | 428 | 206 |
| Switzerland | 762 | 387 | 463 | 473 | 317 |
| Italy | 303 | 158 | 259 | 339 | 139 |
| Greece | 306 | 136 | 195 | 261 | 213 |
| Other | 3,495 | 2,925 | 4,321 | 4,060 | 4,099 |
| Total | 44,241 | 31,004 | 35,952 | 39,503 | 39,977 |

In value of products taken, the United Kingdom was the leading foreign market for United States fishery products during 1959. In September 1958, British import restrictions were completely removed on canned salmon imports from the dollar area. In 1959, United States shipments of canned salmon to the United Kingdom increased $2,569,000 above the previous year. In 1959 the United Kingdom received from the United States: canned salmon $8,321,000, other fishery products $607,000; total $8,928,000.

Canada, another leading market in recent years, was only slightly behind the United Kingdom. Canada purchased a wide variety of United States products: canned shrimp $1,894,000; fresh or frozen shrimp $1,396,000; oysters $571,000; seal fur $1,537,000; fish and marine-animal oils $361,000; other fishery products $2,885,000; total $8,644,000.

The Philippines has been a good market for United States fishery products. Although United States products still receive preferential tariff treatment in that market, the margin of preference is being gradually reduced. In 1959, the principal products taken were: canned California sardines $3,851,000; canned salmon $1,005,000; canned squid $594,000; other fishery products $137,000; total $5,587,000.

Table 2 - United States Exports of Fishery Products to Four European Countries, 1959

| Country | Fish and Marine-Animal Oils | Other | Total Fishery Products |
|---|---|---|---|
| | (US$1,000) | | |
| Netherlands | 3,828 | 524 | 4,352 |
| Sweden | 2,989 | 187 | 3,176 |
| West Germany | 2,552 | 336 | 2,888 |
| Norway | 1,193 | 103 | 1,296 |

In 1959, United States fishery exports to the Netherlands, West Germany, Norway, and Sweden were primarily fish and marine-animal oils. The importance of fish oils, mainly menhaden oil, to the total, is shown in table 2. Canned salmon provided a large part of the "other" products: $363,000 for the Netherlands; $166,000 for West Germany; and $133,000 for Sweden.

United States exports to Japan, valued at $928,000 in 1959, consisted primarily of unmanufactured shells, valued at $867,000. Shipments of unmanufactured shells were nearly double those during 1958 and accounted for most of the increase in the total export of fishery products to Japan.

Europe was the leading foreign market for United States fishery products during 1959, taking $23,671,000, or more than the value of trade to the rest of the world combined (table 3). The European market was based primarily on two products, fish oils valued at $11,290,000 and canned salmon at $8,816,000.

Table 3 - United States Exports of Fishery Products by Area of Destination, 1959

| Area | Edible | Inedible | Total |
|---|---|---|---|
| | (US$1,000) | | |
| North America | 8,081 | 3,537 | 11,618 |
| South America | 902 | 58 | 960 |
| Europe | 10,923 | 12,748 | 23,671 |
| Asia | 6,093 | 1,098 | 7,191 |
| Africa | 251 | 6 | 257 |
| Oceania | 495 | 49 | 544 |
| Total | 26,745 | 17,496 | 44,241 |

In recent years, four products--fish oils, canned salmon, canned sardines, and canned shrimp--have provided over half of the annual exports of United States fishery products (table 4).

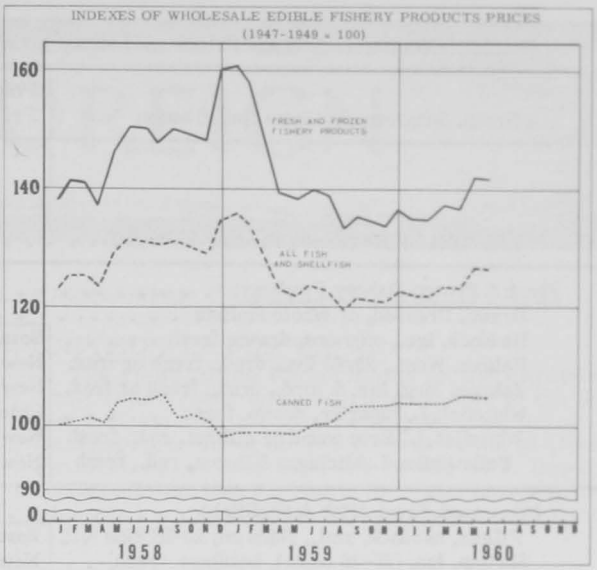
Table 4 - Four Products Provided Over Half of United States Fishery Products in 1959

| Product | Value | Percent of Total |
|---|---|---|
| Fish oils | $11,902,000 | 27 |
| Canned salmon | 10,639,000 | 24 |
| Canned sardines | 5,843,000 | 13 |
| Canned shrimp | 2,898,000 | 7 |
| Other | 12,959,000 | 29 |
| Total | $44,241,000 | 100 |

## Wholesale Prices, June 1960

The wholesale price index for edible fishery products (fresh, frozen, and canned) for June 1960 at 126.5 percent of the 1947-49 average was about unchanged from the preceding month. Increases in wholesale prices for fresh small haddock fillets, dressed halibut, fresh king salmon, and minor price increases for several other items were more than offset by price declines in shrimp and fresh-water items from the Great Lakes. From June last year to this June the index rose 2.4 percent due primarily to higher prices for fresh salmon, shucked oysters, frozen shrimp, and canned fish prices.

The index for the drawn, dressed, and whole finfish subgroup this June at 149.7 percent was down 0.3 percent as compared with May, but was 1.2 percent higher than in the same month of 1959. From May to June, price declines for large drawn haddock (down 6.2 percent) and fresh-water species (due to more normal supplies) more than offset price increases of 10.9 percent for fresh halibut and 2.4 percent for fresh salmon. June 1960 prices




were higher than in the same month of 1959 because higher prices for dressed salmon (up 7.7 percent) and Lake Superior whitefish (up 1 percent) offset lower prices for fresh haddock, Lake Erie whitefish, and Great Lakes yellow pike.

The fresh processed fish and shellfish subgroup index this June declined 0.7 percent from May due to a 4.7-percent decrease in the fresh shrimp price at New York City. A sharply higher price for fresh haddock fillets at Boston did not offset the lower price for fresh shrimp. Fresh shucked oyster prices were unchanged in June from a month earlier. The June 1960 subgroup price index was up about 5.9 percent from June a year ago due principally to higher prices for shucked oysters (up 19.5 percent) because they are out-of-season in most areas. Lower prices for fresh haddock fillets and fresh shrimp offset to a certain extent the higher shucked oyster prices.


In June this year the index for processed frozen fish and shellfish rose less than one percent from a month earlier. An increase of about one cent a pound in the frozen flounder fillet price and a fractionally higher frozen shrimp price offset declines of about one-half cent a pound in frozen haddock and ocean perch fillet prices. From June 1959 to this June the index for this subgroup dropped 3.3 percent due primarily to lower prices at Boston for frozen haddock fillets (down 25.4 percent) and frozen ocean perch fillets (down 1.8 percent). But these increases were partly offset by an increase of 2.2 percent for frozen shrimp at Chicago.

The canned fish price index remained unchanged in June this year from the preceding month and has moved in a very narrow range since late 1959. However, whole-

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

| Group, Subgroup, and Item Specification | Point of Pricing | Unit | Avg. Prices[1] ($) | | Indexes (1947-49=100) | | | |
|---|---|---|---|---|---|---|---|---|
| | | | June 1960 | May 1960 | June 1960 | May 1960 | Apr. 1960 | June 1959 |
| ALL FISH & SHELLFISH (Fresh, Frozen, & Canned) | | | | | 126.5 | 126.6 | 123.3 | 123.5 |
| Fresh & Frozen Fishery Products: | | | | | 142.0 | 142.2 | 136.7 | 139.9 |
| Drawn, Dressed, or Whole Finfish: | | | | | 149.7 | 150.1 | 144.3 | 147.9 |
| Haddock, lge., offshore, drawn, fresh | Boston | lb. | .09 | .09 | 88.3 | 94.1 | 60.8 | 109.1 |
| Halibut, West., 20/80 lbs., drsd., fresh or froz. | New York | lb. | .34 | .30 | 103.7 | 93.5 | 92.8 | 105.2 |
| Salmon, king, lge. & med., drsd., fresh or froz. | New York | lb. | .84 | .82 | 189.3 | 184.8 | 179.2 | 175.8 |
| Whitefish, L. Superior, drawn, fresh | Chicago | lb. | .57 | .74 | 141.3 | 183.4 | 241.7 | 140.1 |
| Whitefish, L. Erie pound or gill net, rnd., fresh | New York | lb. | .83 | 1.05 | 166.9 | 212.5 | 212.5 | 177.0 |
| Yellow pike, L. Michigan & Huron, rnd., fresh | New York | lb. | .67 | .73 | 155.9 | 170.0 | 234.5 | 158.3 |
| Processed, Fresh (Fish & Shellfish): | | | | | 144.8 | 145.8 | 137.1 | 136.7 |
| Fillets, haddock, sml., skins on, 20-lb. tins | Boston | lb. | .37 | .27 | 125.9 | 91.9 | 93.6 | 129.3 |
| Shrimp, lge. (26-30 count), headless, fresh. | New York | lb. | .82 | .86 | 128.8 | 135.1 | 123.2 | 133.5 |
| Oysters, shucked, standards | Norfolk | gal. | 6.88 | 6.88 | 170.1 | 170.1 | 164.0 | 142.3 |
| Processed, Frozen (Fish & Shellfish): | | | | | 118.4 | 117.7 | 116.2 | 122.4 |
| Fillets: Flounder, skinless, 1-lb. pkg. | Boston | lb. | .39 | .38 | 102.1 | 98.1 | 99.5 | 102.1 |
| Haddock, sml., skins on, 1-lb. pkg. | Boston | lb. | .25 | .26 | 78.5 | 80.1 | 84.8 | 105.2 |
| Ocean perch, skins on, 1-lb. pkg. | Boston | lb. | .28 | .28 | 110.8 | 112.8 | 116.8 | 112.8 |
| Shrimp, lge. (26-30 count), 5-lb. pkg. | Chicago | lb. | .80 | .80 | 123.8 | 123.5 | 118.0 | 121.1 |
| Canned Fishery Products: | | | | | 104.8 | 104.8 | 104.8 | 100.4 |
| Salmon, pink, No. 1 tall (16 oz.), 48 cans/cs. | Seattle | cs. | 24.50 | 24.50 | 127.8 | 127.8 | 127.8 | 122.6 |
| Tuna, lt. meat, chunk, No. 1/2 tuna (6-1/2 oz), 48 cans/cs. | Los Angeles | cs. | 11.10 | 11.10 | 80.0 | 80.0 | 80.0 | 77.9 |
| Sardines, Calif., tom. pack, No. 1 oval (15 oz.), 48 cans/cs. | Los Angeles | cs. | 8.00 | 8.00 | 93.9 | 93.9 | 93.9 | 83.9 |
| Sardines, Maine, keyless oil, No. 1/4 drawn (3-3/4 oz.), 100 cans/cs. | New York | cs. | 8.75 | 8.75 | 93.1 | 93.1 | 93.1 | 87.5 |

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

sale prices this June were up about 4.4 percent from June 1959. Over-all stocks of canned fish remained very light with distributors still depending on the 1959 packs of Pacific salmon and Maine sardines. Supplies of California tomato-pack sardines in 15-oz. cans in the hands of primary distributors have been practically exhausted in recent months, but South African imports have filled the gap.

## Wisconsin

### EXPERIMENTAL OTTER TRAWLING SUCCESSFUL:

Wisconsin has issued experimental trawling permits to interested industry members; three fishermen with technical assistance from the U. S. Bureau of Commercial Fisheries have been successful. During four months last fall and winter the fishermen took well over a million pounds of fish. One of them recently purchased a Gulf shrimp trawler which is now fishing in Lake Michigan. The catch of this one firm now averages about 40,000 pounds of fish per day, and they are striving to bring it up to 100,000 pounds per day.

### FISH FACT

Lean fish may contain as little as 0.5 percent fat, whereas a few species of fat fish may contain as much as 20 percent fat. Fish can thus be chosen to fit into either low-calorie diets designed for weight reduction or high-calorie diets designed to provide a high level of energy.