

# TRENDS AND DEVELOPMENTS

## California

AIRPLANE SPOTTING FLIGHTS STUDY ABUNDANCE AND DISTRIBUTION OF PACIFIC SARDINES AND ANCHOVIES: Inshore Area between San Francisco and San Diego (Flight 57-8, Cessna "170" 1359D): Pelagic fish distribution, abundance, and behavior (with particular emphasis on Pacific sardine and anchovies) were studied by California Department of Fish and Game airplane spotting flight 57-8 between September 16-20, 1957. The area surveyed was the inshore waters between San Francisco and San Diego. The second purpose of the flight was to experiment with aerial photography as a method of determining and recording the area (in square feet) of fish schools from the air.

Anchovies were more abundant and widespread in Central California than on any other flight over the past three years. Two very large concentrations were observed in Monterey Bay and in the area between Avila and Point Sal. From the reports of commercial and sport fishermen, it was determined that these large masses of fish (as well as the smaller schools scattered all along the coast) are mainly of the 1957 year-class anchovies. This year-class appears to be stronger than the 1954 year-class which was the strongest in Central California since the study of anchovies was started in 1952.

Many schools of 0-age group (1957-year class) anchovies have appeared in Southern California also, but apparently not in as great numbers as in Central California. As on the previous flight (57-7) anchovies were very scarce in the area between San Pedro and San Diego.

Mixed sardine and Pacific mackerel schools were located off Goleta and sardine schools continued to show in scattered amounts along the coast south of Newport. No sardines were seen off Point Mugu where a large school group was observed on the previous flight.

In general, far fewer schools of all species were seen in Southern California than on the last flight. This is probably due to the fact that there was a period of four days of strong winds prior to and during the first two days of the flight. Recent studies on variations in numbers and size of fish schools in a given area has pointed to the fact that winds do tend to make the fish schools remain deeper in the water and thus much harder or even impossible to see. On the last day of the flight calm weather prevailed and fish schools were seen in areas where two days earlier no schools were present.

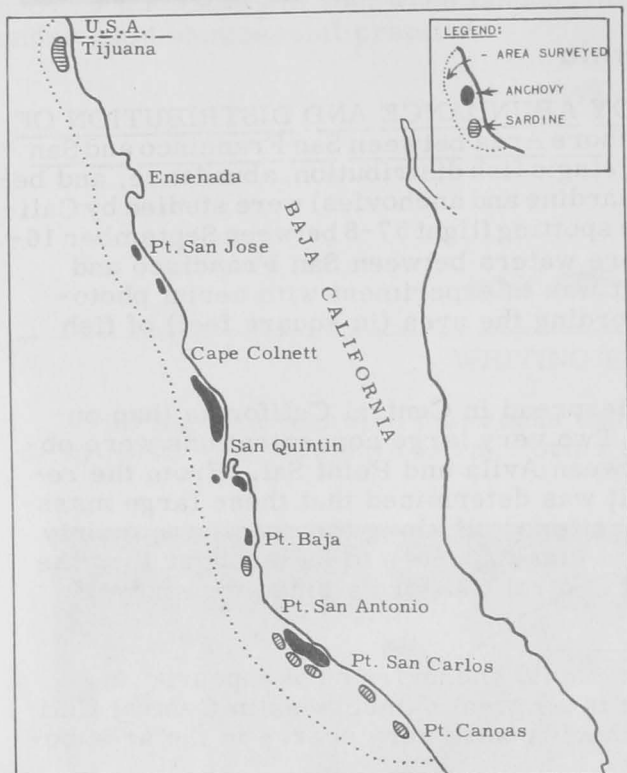
Aerial pictures of anchovy and sardine schools taken on Kodacolor-type film showed improvement over pictures taken on previous flights using color negative-type film. The fish schools on Kodacolor positives were not as sharply defined as those on color negative-type film; however, dim schools that do not appear on color negative film do appear on the Kodacolor film and their area can now be determined by aerial photographs.

During the course of the study made along the Central and Southern California shoreline, 830 anchovy schools (5,604,000 square feet), 53 sardine schools (224,000 square feet), and 9 schools of other species were observed.

The largest concentrations of anchovies were found off San Francisco, Santa Cruz, Avila, Oceano, and Goleta. Most of the sardine schools were sighted off San Clemente, San Onofre, and Oceanside.

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Areas off Southern California, Baja California, and around Catalina Island (Flight 57-9, Beechcraft 4758N.): The inshore area between Santa Barbara and



AIRPLANE SPOTTING FLIGHT, 57-9 (SEPT. 24-28, 1957)

Newport, Calif., the inshore area between San Diego, California and Pt. Canoas, Baja California, and the offshore area around Catalina Island, and in the channel between the island and the mainland was surveyed by California Department of Fish and Game airplane spotting flight 57-9 between September 24-28, 1957. To determine relative abundance and distribution of pelagic fish, with particular emphasis on the Pacific sardine and northern anchovy, was the purpose of the flight.

Scouting in Baja California was hampered due to low fog which extended over the entire coast south of San Diego on both the 24th and 25th. Clear weather was encountered on the 26th in all areas to the north of Pt. Canoas and good coverage of this area was made.

Anchovy schools were less numerous in this same area as compared to last year. In 1956 the largest school groups were in the area between Cape Colnett and Pt. Baja, but on this flight the large concentrations were disposed

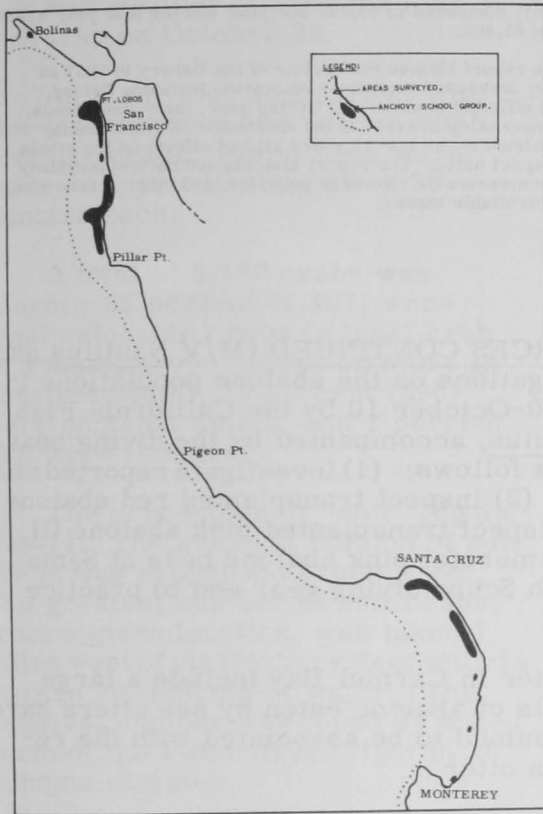
to the south between Pt. Baja and Pt. Canoas. Most of the schools seen in this area were anchovies but some of them appeared "sardine-like" in shape and color. Positive identification of all the schools was not possible and no commercial fishermen were working in the area to confirm the identity of the kind and sizes of fish present. Some estimate, however, will be obtained by the research vessel N. B. Scofield which surveyed this area several days later.

On the flight from San Diego to Santa Catalina Island two sardine schools were sighted in mid-channel, but no schools were seen around the island.

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Inshore Area between Carmel Point and Point Reyes (Flight 57-11, Cessna 3236C): The inshore area between Carmel Point and Point Reyes was surveyed from the air on October 22, 1957, for concentrations of young anchovies and sardines by the California Department of Fish and Game. In addition, a study was made to determine the feasibility of estimating ocean sportfishing intensity by aerial censusing.

Weather conditions were unfavorable for fish scouting as 15- to 20-knot winds prevailed and heavy overcast covered all the area to the north of Santa Cruz.



AIRPLANE SPOTTING FLIGHT 57-11 (OCT. 22, 1957)

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**CURTAILMENT OF SPORT FISHERY FOR SALMON IN 1958 SUGGESTED:** The California Department of Fish and Game announced Nov. 29, 1957, that it is considering asking the Fish and Game Commission in January to curtail slightly the sports take of salmon in the 1958 season.

The announcement came in a nine-page report "Status of the Salmon Resources--1957, A Report to the People of California" on the critical salmon situation. The report pointed out that in 1957 both the sport and commercial fishermen suffered sharp declines from the previous year in their ocean landings of king salmon. The poor fishing year was coupled with a prediction that 1957 will be "a second consecutive poor spawning year."

"Spawning stocks in 1957 could be the smallest on record if preliminary catch figures and early spawning reports prove to be accurate indicators," the report said.

Early in 1957 the Department called attention to a drastic drop in spawners in 1956 over the previous year and warned that if the spawning count did not increase sufficiently in 1957 the salmon stocks would be in sufficient danger to warrant added protection. "Needed annually are 500,000 spawners; the figure last year was 200,000," the report said.

Restriction of commercial fishing by removal of gill-nets from the Sacramento River (by Act of the 1957 Legislature) will not help the spawning picture until next fall, the report noted, and also pointed out that "the progeny of these salmon will not appear in the fisheries for another two or three years--or until 1960 or 1961 when they have grown to legally-catchable sizes."

The report said three possible recommendations for submission to the Commission are under consideration by the Department. (The Commission can control only the sports take of salmon; the commercial take is regulated by the Legislature.) The three are:

(1) Enabling more salmon to escape to the spawning grounds by: (a) shortening of seasons, or (b) reducing the

Three school groups of anchovies were found. In Monterey Bay 329 schools were counted, with the majority occurring in the northern portion of the Bay. In the area between Pillar Pt. and Pt. Lobos, off the San Francisco peninsula, 454 schools were sighted, and three schools of anchovies were found in Bolinas Bay. The tally for Monterey Bay was about one-third that of the previous flight (57-10) when over 1,100 schools were seen. Most probably the inclement weather accounted for the fewer schools this flight.

On the return flight from Pt. Reyes to Carmel Pt. the plane was flown along the beach to make a census of sportfishermen. In all, 25 surf casters, 10 rock fishermen, 61 pier fishermen, 5 sportfishing skiffs, and 5 party boats were tallied. The fishermen were very easily spotted. It was possible to count individual fishing poles being used on piers, on the beaches, and rocks, but it was difficult to determine the poles being used in the skiffs, although the number of individuals in each skiff was easily determined.

NOTE: SEE COMMERCIAL FISHERIES REVIEW, JANUARY 1958, P. 29, FOR FLIGHT 57-10.

catch by making the sport bag limit two fish (present bag limit is three).

(2) Assuring further spawning survival by extension of spawning area closures.

(3) Allowing more young salmon to grow to maturity by raising the minimum size limit of sport-caught ocean fish to 26 inches (the commercial minimum) from its present 22 inches.

Poor salmon fishing extended coastwise as far north as Alaska in 1957. Because of what the report terms "a serious decline of salmon stocks all along the coast," the Pacific Marine Fisheries Commission recommended to the member states of Washington, Oregon, and California on November 20 that all ocean sport fishing seasons be shortened to coincide with the commercial seasons.

"Oregon and Washington have indicated that substantial curtailment will be effected (by shortening the sport seasons), which will afford additional protection to salmon of California origin," the report said. Fish spawned in the Sacramento River are taken in the ocean north of California in substantial quantities and a recent marking experiment has shown that this figure could be as high as 35 percent of the Sacramento River catch.

The report showed 1,500,000 salmon, an all-time high, were landed in 1956 by commercial and recreational fishermen in California rivers and in the ocean. The 41-year average (1916-1956) is 800,000 fish annually. Lowest year was 1939 when only 300,000 fish were landed. The total for 1957 is expected to barely reach the 600,000 level.

This was the gloomy fishing picture as the report noted for 1957:

(1) The fish have been much harder to catch in 1957. Ocean commercial boats averaged only about 90 fish a month, compared to the 260 fish they averaged during the previous four years.

(2) Party boat landings of ocean salmon through September were less than half of the average of the last four years--43,000 fish, compared to 103,500.

(3) Commercial ocean landings were 519,700 fish--down 507,500 from last year's record high and down from the four-year average by about 368,400.

(4) Even though it was their last year in the river, gill-netters found fishing tough. They took only 16,000 king salmon

in 1957, compared to 55,000 last year and the four year-average of 65,400.

The report blamed the decline of the fishery in 1957 on "many increased pressures on stocks, including fishing." More efficient commercial fishing gear, many more boats, and increasing interest of the sportsmen in ocean fishing for salmon in the last 10 years all had effects on the stocks, the report noted. The report also blamed natural mortality, the immeasurable effects of pollution, and other unseen and uncontrollable losses.

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INVESTIGATIONS OF ABALONE RESOURCES CONTINUED (M/V Nautilus and Diving Boat Mollusk, Cruise 57-N-5): Investigations on the abalone populations in California waters were continued from June 10-October 10 by the California Fish and Game Department's research vessel Nautilus, accompanied by the diving boat Mollusk. The objectives of the cruise were as follows: (1) investigate reported abalone predations by sea otters in Carmel Bay; (2) inspect transplanted red abalone (Haliotis rufescens) at Catalina Island; (3) inspect transplanted pink abalone (H. corrugata) at Catalina Island; (4) inspect commercial pink abalone beds at Santa Barbara Island; (5) familiarize personnel with Scuba diving gear and to practice with this equipment.

There seems to be little doubt that sea otter in Carmel Bay include a large number of red abalone in their diet. The shells of abalone eaten by sea otters have a characteristic breakage pattern which is assumed to be associated with the removal of the abalone from the rocks by the sea otter.

The transplanted red abalone at the Isthmus, Catalina Island, were sampled for indication of growth. These abalone have apparently adapted themselves to the new environment and several had put on additional growth to the shell.

Pink abalone transplanted by the investigation in February 1957 were inspected and growth measurements made. It was noted that the tag used to mark these individuals does not hold up although not subject to abrasion. New type tags are being designed and it is planned to use these in future operations.

A period of windy weather, which built up a swell, made diving impractical and it was impossible to examine the commercial abalone beds at Santa Barbara Island during the time scheduled for this operation.

Personnel were able to practice extensively with the Scuba equipment and utilization of this apparatus greatly facilitates the extensive exploratory work necessary to inspect areas where abalone are found in and around the Channel Islands.

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STUDY OF PRESEASON DUNGENESS CRAB POPULATION (M/V Nautilus Cruise 57-N-6): Taking of pre-season samples of adult and juvenile Dungeness or market crabs (Cancer magister) to determine the relative abundance, size composition, and condition of the pre-season crab population was the purpose of the October 14-26, 1957, cruise of the California Department of Fish and Game research vessel Nautilus. The area studied was the Central California Coast between Bodega Bay and Pedro Pt.

A total of 42 crab traps were used on this cruise--22 of the 36-inch traps were rigged with 25 fathoms and 20 of the 42-inch traps were rigged with 50 fathoms of line. The traps were set in two strings: the smaller ones in shallow water, 10 to 15 fathoms; the larger ones in deeper water, 15 to 30 fathoms.



Bad weather caused the loss of three 36-inch traps on October 18, and one 42-inch trap on October 26.

An eight-foot beam trawl with one-inch mesh net was used to catch juvenile crabs. Seven tows were made of approximately 20 to 30 minutes each.

A total of 5,180 crabs was caught--85 percent (4,407) were legal catchable crabs (a legal crab is a male, seven inches or more in greatest width), 13 percent (690) were sublegal males, and 1 percent (83) were females.

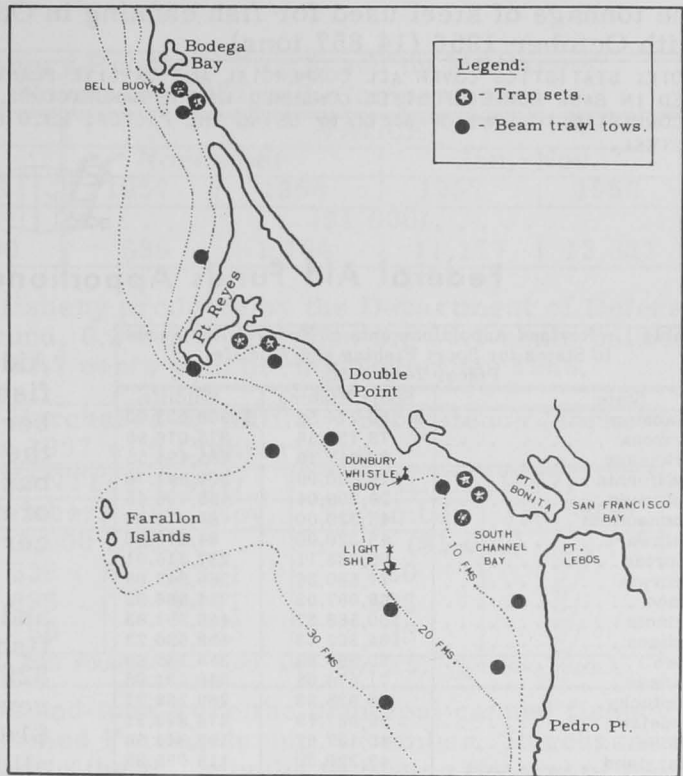
The percentage of "soft" legals was 14. The greatest portion of soft crabs was caught in deeper water. The greatest number of soft crabs, from a given location, was taken 7 miles west of the Duxbury Reef whistle buoy in 29 fathoms of water. The smallest number was found 5½ miles north of the Point Reyes light in 16 fathoms of water.

Twenty-nine percent of the legal crabs were barnacled, while 28 percent of the sublegal males were barnacled. These crabs had not recently molted and were in good condition. A crab was called barnacled when three or more barnacles, of five millimeters or more in diameter, were found on it.

There was an average of 19 legal crabs per trap. The commercial trap samples for November of the two preceding seasons were: 1956/57, 23 crabs per trap; and 1955/56, 16 crabs per trap. The 1956/57 season was a record year.

A legal crab measured by shoulder width (measured just in front of the last spines) is approximately 156 to 162 millimeters wide, depending on the general shape and spine-length.

The average shoulder width of legal crabs caught in the traps was 178.3 millimeters. The average for the sublegals was 147.2 millimeters, and for the females, 143.6 millimeters. Compared to commercial trap samples taken at the same season of previous years, this year's crab sizes are larger than those of the 1954/55, 1955/56, and 1956/57 seasons. The 1957/58 season will be another "jumbo crab" year.



M/V NAUTILUS CRUISE 57-N-6 (OCTOBER 14-26, 1957)



### Cans--Shipments for Fishery Products, January-October 1957



Total shipments of metal cans during January-October amounted to 103,021 short tons of steel (based on the amount of steel consumed in the manufacture of cans) as compared with 100,876 tons in January-October 1956. Canning of fishery products in October was confined largely to tuna, California sardines, shrimp, and Pacific

mackerel. The pack of California sardines was quite light this October as compared with the same month a year ago. This situation may account for the sharp drop in the tonnage of steel used for fish canning in October 1957 (3,133 tons) as compared with October 1956 (14,857 tons).

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.



## Federal Aid Funds Apportioned to States Revised

Table 1 - Revised Apportionments of Federal Aid Funds to States for Sport Fishing and Wildlife, Fiscal Year 1958

| State          | Sport Fishing | Wildlife      |
|----------------|---------------|---------------|
| Alabama        | \$ 89,274.56  | \$ 300,023.00 |
| Arizona        | 78,730.56     | 375,076.95    |
| Arkansas       | 82,841.10     | 285,494.55    |
| California     | 216,600.00    | 809,941.70    |
| Colorado       | 99,309.04     | 455,706.45    |
| Connecticut    | 43,320.00     | 84,870.00     |
| Delaware       | 43,320.00     | 84,870.00     |
| Florida        | 95,038.11     | 237,316.91    |
| Georgia        | 77,680.36     | 269,948.08    |
| Idaho          | 68,087.03     | 314,566.92    |
| Illinois       | 130,586.27    | 466,351.83    |
| Indiana        | 134,303.53    | 499,620.22    |
| Iowa           | 80,399.82     | 375,135.99    |
| Kansas         | 71,576.05     | 340,231.08    |
| Kentucky       | 76,935.83     | 269,268.77    |
| Louisiana      | 55,967.79     | 278,978.51    |
| Maine          | 45,187.97     | 193,344.56    |
| Maryland       | 43,320.00     | 115,995.69    |
| Massachusetts  | 43,320.00     | 92,026.36     |
| Michigan       | 206,436.14    | 848,700.00    |
| Minnesota      | 216,600.00    | 540,635.52    |
| Mississippi    | 46,754.98     | 238,133.39    |
| Missouri       | 112,381.71    | 404,951.85    |
| Montana        | 105,511.32    | 524,844.16    |
| Nebraska       | 68,050.88     | 311,882.68    |
| Nevada         | 62,047.50     | 328,324.99    |
| New Hampshire  | 43,320.00     | 84,870.00     |
| New Jersey     | 43,320.00     | 120,229.94    |
| New Mexico     | 73,866.00     | 384,837.19    |
| New York       | 126,184.99    | 709,502.55    |
| North Carolina | 77,969.77     | 348,952.84    |
| North Dakota   | 45,344.72     | 258,400.26    |
| Ohio           | 143,306.98    | 515,556.94    |
| Oklahoma       | 94,845.84     | 301,533.05    |
| Oregon         | 94,122.30     | 430,175.35    |
| Pennsylvania   | 121,930.14    | 672,440.90    |
| Rhode Island   | 43,320.00     | 84,870.00     |
| South Carolina | 53,014.88     | 175,959.04    |
| South Dakota   | 57,635.91     | 312,053.60    |
| Tennessee      | 121,230.16    | 387,678.84    |
| Texas          | 200,178.19    | 848,700.00    |
| Utah           | 59,520.18     | 320,371.06    |
| Vermont        | 43,320.00     | 84,870.00     |
| Virginia       | 72,392.33     | 336,762.22    |
| Washington     | 91,763.40     | 368,076.52    |
| West Virginia  | 43,320.00     | 228,450.79    |
| Wisconsin      | 172,139.87    | 516,995.92    |
| Wyoming        | 73,053.79     | 351,602.83    |
| Hawaii         | 43,320.00     | 84,870.00     |

Revised apportionments of Federal Aid funds to the states for restoration of fish and game were announced on December 31, 1957, by the U. S. Department of the Interior. The new apportionment is based on revised Treasury certifications of money available from excise taxes on certain sporting goods.

Under the revisions, the 48 States and Hawaii will receive \$21,306,000 for fish and game restoration instead of the \$25,130,000 previously announced. The revised figure for game restoration is \$16,974,000 instead of the \$19,130,000 allotted previously; the amount available for the restoration of fish is \$4,332,000 instead of \$6,000,000.

In addition to the above apportionments, Alaska is to receive \$90,000 for game restoration and \$75,000 for its sport fishery. Guam, Puerto Rico, and the Virgin Islands will each receive \$12,000 for game restoration and each will get \$10,000 for fish restoration. These amounts are fixed by law rather than by formula.

The revised apportionment appears in the table.

NOTE: ALSO SEE COMMERCIAL FISHERIES REVIEW, NOVEMBER 1956 P. 30 AND DECEMBER 1957 P. 18.



## Federal Purchases of Fishery Products

### DEPARTMENT OF DEFENSE PURCHASES, JANUARY-NOVEMBER 1957:

Fresh and Frozen Fishery Products: For the use of the Armed Forces under the Department of Defense, 1.4 million pounds (value \$686,000) of fresh and frozen fishery products were purchased in November by the Military Subsistence Market Centers. This was lower than the purchases in October by 14.7 percent and 36.6 percent less than the purchases in the same month a year earlier. The value of the purchases this November was lower by 15.2 percent as compared with the previous month and lower by 38.7 percent from November a year earlier.

For the first nine months of 1957 purchases totaled 26.7 million pounds, valued at \$11.2 million--a decrease of 11.4 percent in quantity and 9.3 percent in value as compared with the same period of 1956.

| QUANTITY     |       |           |        | VALUE     |       |           |        |
|--------------|-------|-----------|--------|-----------|-------|-----------|--------|
| November     |       | Jan.-Nov. |        | November  |       | Jan.-Nov. |        |
| 1957         | 1956  | 1957      | 1956   | 1957      | 1956  | 1957      | 1956   |
| (1,000 Lbs.) |       |           |        | (\$1,000) |       |           |        |
| 1,372        | 2,163 | 21,696    | 24,580 | 686       | 1,184 | 11,177    | 12,321 |

Prices paid for fresh and frozen fishery products by the Department of Defense in November averaged 50.0 cents a pound, 0.3 cents less than the 50.3 cents paid in October, and 1.7 cents lower than the 51.7 cents paid during November 1956.

| Species           | QUANTITY (1957) |           | VALUE (1957) |           |
|-------------------|-----------------|-----------|--------------|-----------|
|                   | November        | Jan.-Nov. | November     | Jan.-Nov. |
|                   | (1,000 Lbs.)    |           | (\$1,000)    |           |
| Tuna . . . . .    | 1/ 339          | 2/ 2,221  | 120          | 3/        |
| Salmon . . . . .  | 835             | 3,111     | 506          | 3/        |
| Sardine . . . . . | 68              | 193       | 23           | 3/        |

1/ ALL "TUNA AND NOODLES." 2/ INCLUDES 339,000 POUNDS OF "TUNA AND NOODLES." 3/ UNAVAILABLE.

Canned Fishery Products: Salmon and tuna were the principal canned fishery products purchased for the use of the Armed Forces during November. Purchases of canned salmon are usually concentrated in the fall months following the end of the salmon packing season. (See table 2.)



### Frozen Foods

**EFFECTS OF TEMPERATURE FLUCTUATIONS AND STORAGE TIME STUDIED:** The effects on frozen foods of temperature changes and length of time in cold storage is under study by the U. S. Department of Agriculture's Western Utilization Research and Development Division at Albany and Pasadena, Calif., with wide industry cooperation. The studies are planned to give comprehensive new knowledge of the changes that may occur in frozen foods between the processing plant and the ultimate consumer.

Commercially-packed samples of frozen foods from major producing areas over several seasons are being used in the tests. Changes in quality of foods held under a wide range of temperatures--from 0° F., or lower, up to defrosting temperatures and higher--are investigated with special care.

The rapidly growing frozen-food industry needs to know the answers to such questions as: (1) How can top quality be pro-

duced by modifications of handling, packaging, and other operations? (2) Can research develop tests that measure losses at various stages in the storage and distribution of frozen foods, and thus aid in nationwide improvement? Besides helping to answer these questions, much of the new information developed in the "time-temperature-tolerance" studies is useful also in homes and restaurants.

Frozen foods, the researchers point out, decline from top quality as a result of several kinds of change, all of which move increasingly faster as temperature rises. They are barely active at 0° F., but they accelerate at various rates with rising temperature. In fact, some double in rate several times between 0° and 25° F. Damage to foods can result from long exposure to mild temperatures, just as readily as from shorter exposures to more severe temperatures. Also, damage from successive exposures adds to an accumulated total. Quality losses may continue to occur at 15° to 25° F. even in frozen foods that feel solid.

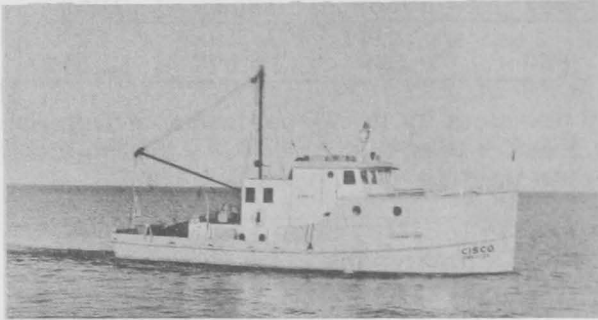


### Great Lakes Fishery Investigations

WESTERN BASIN OF LAKE ERIE SURVEYED (M/V Cisco Cruise 9): Fish populations of the western basin of Lake Erie were surveyed by the U. S. Bureau of Commercial Fisheries research vessel Cisco between October 15-28, 1957. As compared with Cruise 7 (September 3-15, 1957), the last time the area was covered, catches were characterized by generally fewer sheepshead, channel cat-

fish, and white bass, and more silver chubs and smelt, with no notable differences in the other species. Although there was an increase in smelt, there was no indication of a general movement into the western basin.

Bottom trawling operations were carried out in 8 areas, including one station in Sandusky Bay. Yellow perch were the most abundant species taken in the trawls. The largest catch of the year for this species was made south of Middle Sister Island, where in a 15-minute tow 3,900 yearlings and 274 older perch, totaling 475



CISCO, RESEARCH VESSEL OF THE SERVICE'S GREAT LAKES FISHERIES INVESTIGATIONS.

pounds, were caught. Other species taken regularly were walleye, silver chub, emerald shiner, spottail shiner, carp, white bass, smelt (mostly yearlings), sheepshead, trout-perch, gizzard shad, and alewife. Species taken less commonly were pumpkinseed (1), black crappie, smallmouth bass (1 fry), white crappie (Sandusky Bay only), white sucker, blunt-nose minnow (Sandusky Bay only), goldfish, channel catfish, brown bullhead, lake herring (1), burbot (1), johnny darter, logperch, and mooneye (*Hiodon tergisus*)  $\frac{1}{1}$ .

The latter species, only one of which was taken, came from Sandusky Bay and was the first of the year.

Experimental nylon gill nets 250 feet long were set obliquely from top to bottom in 40 feet of water southeast of Kelly's Island and in 40 feet of water east of Pelee Island. Near each of these nets another gill net containing several mesh sizes was set with its float line 6 feet beneath the surface. The oblique net off Kelly's Island caught 2 perch, 2 walleyes, and 1 white bass in the top half and 10 perch, 2 walleyes, 8 sheepshead, 8 gizzard shad, 2 smelt, 1 alewife, and 1 channel catfish in the bottom half. The gill net 6 feet below the surface in the same area took 28 gizzard shad, 23 walleyes, 11 white bass, 4 smelt, 2 alewives, 2 channel catfish, and 1 yellow perch. The oblique net of Pelee Island took 29 large perch in the bottom 10 feet, 4 perch between 20 and 30 feet, 1 alewife near the surface, and 17 smelt and 7 sheepshead scattered throughout. The net nearby, suspended 6 feet beneath the surface, caught 22 smelt, 9 sheepshead, 5 gizzard shad, and 1 walleye.

The water in western Lake Erie cooled rapidly during Cruise 9. Surface temperatures ranged from 9.6° C. (49.3° F.) to 15.7° C. (60.3° F.). There was no thermal stratification in any of the area covered.

This area will not be visited again this season.

$\frac{1}{1}$  FOR SCIENTIFIC NAMES OF OTHER SPECIES, SEE COMMERCIAL FISHERIES REVIEW, NOVEMBER 1957, P. 20.



## Gulf Exploratory Fishery Program

TUNA AND SHRIMP SURVEY IN EASTERN CARIBBEAN AND OFF NORTHEAST COAST OF SOUTH AMERICA (M/V Oregon Cruise 47): Tuna and shrimp resources were sought in the eastern Caribbean and off the northeast coast of South America during a 7½-week exploratory fishing cruise of the U. S. Bureau of Commercial Fisheries exploratory fishing vessel Oregon. The cruise ended December 7, 1957.

Five 600-hook tuna long-line sets were made between Navidad Bank (just north of the Dominican Republic) and the southeastern Caribbean. The highest catch rate was obtained off Bird Island in the Caribbean where 111 yellowfin and one albacore tuna were landed--a catch rate of 22.4 tuna per 100 hooks. With the exception of one 125-pound yellowfin, the other fish uniformly ranged from 60 to 80 pounds each.

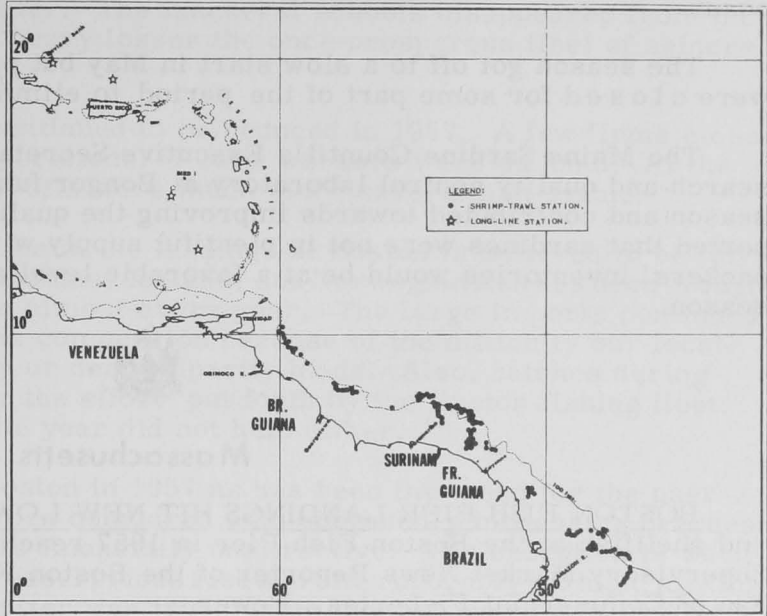


A total of 113 exploratory shrimp trawling tows were made between Trinidad and the Amazon River. All tows were made with 40-foot shrimp trawls and no attempt was made to fish on a commercial scale. Seventy-one tows were made in 10- to 100-fathom depths. Large (7 to 20 count heads on) pink shrimp (*Penaeus duorarum*<sup>1/</sup>) were taken in 23 to 75 fathoms over the entire range. Catches varied from less than one to about 20 pounds per  $\frac{1}{2}$ - to 1-hour tow. Catches in the 15- to 40-fathom range between Surinam and the Amazon River also contained large (10 to 35 count) grooved shrimp (*Penaeus brasiliensis*<sup>1/</sup>), up to 20 pounds per tow. Good trawling bottom was found over extensive areas in these depth ranges.

Forty-two shrimp tows were also made in depths of 100 to 400 fathoms. Shrimp (*Solenocera vioscai*) of 20 to 30 count were found in small numbers in 125-135 fathoms off British Guiana and Surinam. Royal-red shrimp (*Hymenopenaeus robustus*) were found in small numbers along with *Penaeopsis megalops* off British Guiana. Catch rates for both species were under 20 pounds per hour.

A very large (4 to 8 count heads-on) scarlet-red shrimp, *Plesiopenaeus edwardsianus*, was caught in 300 to 400 fathoms off Surinam, at rates of 15 to 25 pounds per 3-hour tow.

<sup>1/</sup> IDENTIFICATION TENTATIVE AND MAY BE REVISED.



M/V OREGON CRUISE 47 (OCTOBER 16-DECEMBER 7, 1957).



## Maine

**CANNED SARDINE PACK, 1957:** An official 1957 pack figure of 2,117,151 actual cases of Maine canned sardines was released by the Maine State Department of Agriculture on January 3, 1958. Approximately 2,000,000 cases were of the standard 100-can per case key and keyless packs in oil, mustard, and tomato. The remainder represented ovals, talls, and 12-ounce flats in a variety of sauces and styles of pack.

Bureau of Commercial Fisheries statistical data show that the Maine sardine (including sea herring) pack in 1956 totaled 2,231,333 standard cases (2,226,425 actual cases), somewhat more than was packed in 1957.



There were 37 plants in operation in 1957 at some intervals during the season. The production was split about half and half between the eastern and western sections of the Maine coast.

Washington County, traditionally the sardine capitol of the world, had its best run of fish in five years, and generally the schools were plentiful all along the coast.

The season got off to a slow start in May but picked up rapidly and many plants were closed for some part of the period to eliminate overproduction.

The Maine Sardine Council's Executive Secretary said that the industry's research and quality control laboratory at Bangor functioned efficiently during the season and contributed towards improving the quality of the pack. He further reported that sardines were not in plentiful supply with the market normal, and that packers' inventories would be at a favorable level at the start of the 1958 sardine season.



## Massachusetts

BOSTON FISH PIER LANDINGS HIT NEW LOW IN 1957: The landings of fish and shellfish at the Boston Fish Pier in 1957 reached a new low, according to the Supervisory Market News Reporter of the Boston Fishery Market News Office, Bureau of Commercial Fisheries. Fewer vessels landing fewer trips, the lack of fish on nearby banks, and the competition of foreign imports were believed responsible for the drop in landings.

Landings at the Boston Fish Pier in 1957 totaled only 135.6 million pounds, the lowest since 1924 (131.0 million pounds) when the Fish Pier was still largely dependent on the less productive line-trawlers for supplies. The previous postwar low was 136.5 million pounds in 1955 when the Fish Pier also had a very poor year. The 1956 total was 147.2 million pounds.



TRAWLERS UNLOADING AT THE BOSTON FISH PIER.

Only 2,457 trips of fish were landed at the Boston Fish Pier in 1957, the lowest since 1944 when the fleet was quite small due to the war.

Boston vessels received more money for fish in 1957--\$11.2 million as compared with \$10.5 million in 1956, and \$9.2 million in 1955. But this is still well below the \$14 million average for the postwar years of 1945-54. Prices to the vessels in 1957 averaged higher than the previous two years, but not high enough to compensate for the small catches, vessel owners claimed.

Haddock is the leading species landed at the Boston Fish Pier, and in 1957 landings of this variety amounted to only 93.9 million pounds. In 1956 haddock landings were 106.6 million pounds. Scrod haddock (fish  $1\frac{1}{2}$ - $2\frac{1}{2}$ -pounds) in 1957 exceeded the large haddock (fish over  $2\frac{1}{2}$  pounds) landings.

Cod landings were also light at the Fish Pier in 1957--only 18.5 million pounds. Pollock landings totaled 11.8 million pounds, and flounders and other varieties were landed in small quantities. Whiting, formerly a leading species at Boston, is now landed chiefly at other New England ports.

Mackerel, once landed in volume at the Pier, has become a rare item. It is 10 years since the large fleets of Gloucester purse seiners fished for mackerel and landed their catches at the Fish Pier. The mackerel schools disappeared from their usual migratory routes and after heavy losses the once prosperous fleet of seiners gave up looking for this species.

Facilities on the Fish Pier continued to be reduced in 1957. A few firms closed their doors and others reduced operations. Fewer workers were on hand. At the close of the year the seasonal lay-offs were much more severe than usual.

One of the causes of the decline in the landings at Boston is believed to be foreign competition. Lower-cost Canadian, Iceland, and Norwegian fish has been brought into this country in larger volume almost every year. The large imports continued in 1957. It is difficult to meet this competition because of the difficulty our local vessels have in obtaining capacity or near-capacity loads. Also, catches during most of the year were meager for the effort put forth by the Boston fishing fleet. Bad weather the last quarter of the year did not help either.

Fewer vessels operated at Boston in 1957 as has been the trend for the past decade. Low ex-vessel prices, when compared with continually increasing overhead, has made operating fishing vessels financially unattractive. The exception is when landings are very light, then ex-vessel prices rise and often probably too high, making for an unhealthy condition. The latter was true during the last quarter in 1957.

As 1957 came to a close, leaders in Boston's fishery intensified their efforts to get help from the Federal government. Many claimed this would be their only salvation.



## North Atlantic Fisheries Investigations

HADDOCK TAGGING AND COLLECTIONS CRUISE (T-79 Cruise 19): The November 14-27 cruise of the U. S. Bureau of Commercial Fisheries small research vessel T-79 to the inshore area off Gloucester, Mass., and Mt. Desert, Maine, was unsuccessful. Eight tows made with a 65-foot head-rope otter trawl in search of haddock for tagging and small or 0-group haddock yielded insufficient quantities.

\* \* \* \* \*

SURVEY OF HERRING LARVAE DISTRIBUTION AND NONTIDAL-DRIFT PATTERNS (M/V Albatross III Cruise 106): No large concentrations of herring larvae were found during a December 3-20, 1957, cruise of the U. S. Bureau of Commercial Fisheries research vessel Albatross III to Georges Bank, the Gulf of Maine, and the Bay of Fundy.

During the cruise 2,500 miles of continuous plankton tows were made at the surface and at a 10-meter depth with the Hardy Plankton Recorders. In addition, 245 bathythermograph lowerings, and 50 oblique meter net tows were made, and 125 salinity samples collected. Drift bottles (800) and transponding buoys (5) were released.



## Oregon

COMMERCIAL FISHERIES REGULATIONS REVISED: Recent actions by the Oregon Fish Commission involving commercial fishing regulation changes were summarized by the Acting State Fisheries Director as follows:

Crabs: A limit of three crab pots or rings per fishermen seeking crabs for personal use only is now in effect.

A conditional 15-day extension of the closed season for commercial crabbing in ocean waters of Oregon north of Cascade head has been approved by the Fish Commission, however the extended closure will not take effect until a similar season is provided for in Washington coastal waters. The northern area season opened in 1957 on December 15, as originally scheduled since no change was made in the Washington season.

Petrale Sole: A longer winter closed season on petrale sole fishing has been set and is now in effect. The new closure extends from December 20 to April 15. Trawlers fishing for other species will be permitted to land only 3,000 pounds of incidentally-caught petrale sole on not more than two fishing trips per month during the closed period.

The extended closure was established by the Fish Commission at the request of the state of Washington and Canada who have invoked similar regulations to protect spawning stocks of petrale sole off Vancouver island. Although Oregon draggers do not normally fish the stocks of petrale sole off northern Washington and British Columbia in the winter months, the Oregon closure was considered necessary to prevent sizable deliveries in Oregon of petrale sole caught from the depleted stocks in the northern area.

Shrimp: the "Gulf type" shrimp trawl is now recognized by the Fish Commission as lawful shrimp fishing gear in Oregon waters. Previous regulations permitted use of only the beam trawl for shrimp fishing in Oregon. The Commission liberalized the shrimp gear designation on the basis of preliminary investigations by staff biologists that indicated the "Gulf type" trawl does not appear to be seriously harmful to young food fish species. The Commission has stated, however, that additional restriction of the shrimp fishery may be necessary at a future date for the protection of the shrimp and other food fish species.

\* \* \* \* \*

LANDINGS OF FISH AND SHELLFISH HIGHER FOR 12 MONTHS ENDED MARCH 31, 1957: Oregon landings of commercially-caught fish and shellfish during the 1956/57 license year (April 1, 1956-March 31, 1957) were the highest of the past nine years, according to figures released by the Oregon Fish Commission on December 23, 1957. A total of 60,456,000 pounds of fisheries items was reported by Oregon fish buyers during the period, an increase of about 14 million pounds over the quantity reported for the previous license year.

The greatest increase was in deliveries of Dungeness crabs. Deliveries of bottom fish (used for mink feed), albacore tuna, and troll-caught salmon were also higher in 1956/57.

The net increase in 1956/57 (April 1-March 31) landings of marine fish, including albacore, crabs, and clams amounted to 13 million pounds. Reported deliveries of salmon (both ocean-troll and river-caught fish), shad, sturgeon, smelt, and striped bass showed a net increase of one million pounds over the 1955/56 landings.



The highest landings of fisheries products in Oregon prior to 1956/57 occurred in 1948 when total landings exceeded 74 million pounds.

\* \* \* \* \*

REVISION OF SHRIMP FISHING REGULATIONS UNDER STUDY: With the imminent development of a new semiballoon trawl-net shrimp fishery off the Oregon coast, three biologists of the Oregon Fish Commission have recently been conducting tests with a Gulf-type semiballoon shrimp trawl to determine what kinds of fish are caught by the net in addition to shrimp.

The biologists are particularly interested to learn the percentages of juvenile English, dover, and petrale soles that come up with shrimp catches during a normal shrimp fishing trip. Another purpose of the experimental fishing is to see if a semiballoon trawl will catch adequate samples of tiny dover sole needed for age and growth studies of this commercially-important species.

Present regulations prohibit the use of anything but a beam trawl (another type of shrimp net used in California and Alaska) for shrimp fishing in Oregon waters. But the net that has apparently been best for shrimp fishing off the Washington Coast is the Gulf-type trawl.

The Commission research staff at Astoria doing the trial fishing reports that initial testing of the Gulf-type trawl has indicated many different species of fish intermingled with good catches of shrimp. The best shrimp catches of 1,600-1,800 pounds an hour of fishing were made 30-35 miles offshore at depths of 70-80 fathoms between the Astoria lightship and Tillamook rock.

Hake, skates, turbot, and two other kinds of soles were the most prominent fish species taken in the net with the shrimp. The Gulf trawl also picked up good samples of juvenile dover sole, which the biologists were particularly interested in collecting. The test fishing was done aboard the Roseann Hess.

Success of the Gulf-type trawl off the Washington coast has stimulated prospective Oregon shrimp fishermen to ask the Commission to alter the beam trawl-only restriction and make the Gulf shrimp trawl legal gear in Oregon waters. Action on the request has been delayed until the Commission's research staff can evaluate possible effect on juvenile sole if use of the Gulf trawl is permitted.

A hearing to consider the advisability of changing the shrimp gear regulations was held by the Commission on November 14, 1957.



## Pacific Oceanic Fishery Investigations

LARGEST INTRODUCTION OF MARQUESAN SARDINES TO HAWAIIAN WATERS: The possibility of large-scale spawning of Marquesan sardines in Hawaiian waters was furthered recently by the liberation of 31,000 live sardines in shallow water off Ewa, Oahu, on December 14, 1957. They were released from the Pacific Oceanic Fishery Investigations' research vessel Charles H. Gilbert following her return from an extensive tuna survey in the Marquesas Islands. Many of the female sardines brought to Hawaii by the vessel were ready for spawning.

The December 14 planting was the largest in the history of the program for introduction of Marquesan sardines into Hawaiian waters. Since January 1955 more than 53,000 sardines have been transported live from the Marquesas and released here. If the sardines can be successfully established in Hawaiian waters, they

could play a large part in relieving the shortage of live bait for catching skipjack tuna (aku), which has bothered local fishermen for years. The recapture of sardines around Oahu on six occasions during 1956 and 1957 has indicated at least some success in the attempted introduction.

Since evaluation of the results of this attempt to help the Hawaiian fishing industry depends on reports from fishermen, all persons who see or catch any unusual sardinelike fish in Hawaiian waters are requested to report them to the Territory's Division of Fish and Game or to the U. S. Fish and Wildlife Service. It is especially important that the fishery scientists be given an opportunity to examine any such fish in order to identify them positively, see what they are finding to eat in local waters, and check for signs of spawning activity.

\* \* \* \* \*

STOMACH CONTENTS OF SKIPJACK TUNA STUDIED FOR CLUES TO CATCH-ABILITY: Laboratory analysis of the stomachs of skipjack tuna, to determine whether or not the diet of the fish is related to the catchability of the skipjack schools has shown some promise, scientists of the U. S. Bureau of Commercial Fisheries Pacific Oceanic Fishery Investigations reveal.

It appears that two things characterize a "good biting school:" (1) the fish has recently been fed, that is, the stomach contains relatively digested natural food; and (2) the stomach is relatively empty, that is to say, skipjack respond well to chum if they are in a feeding mood as evidenced by their having recently eaten and providing that they have not yet secured enough food to satisfy them. Conversely, fish that have not partaken any natural food for a long period, as evidenced by the advanced stage of digestion of their stomach contents, or fish that have recently gorged themselves, do not respond well to the chum. Other factors investigated, such as the kind of food consumed, time of day, etc., apparently bore no relation to the fishing quality of the skipjack schools.

Whether or not a so-called "feeding mood" as evidenced by the presence of freshly-eaten natural food in the stomachs was brought about by some internal mechanism or was precipitated by the presence of natural forage is not known. Though this knowledge may not be of direct benefit to commercial fishermen, indirect benefits are obvious. For instance, in many areas scientists are forced to rely on live-bait catches as an index of tuna abundance. We try to relate these catches to oceanographic and biological factors in the ocean on the assumption that the population of tuna bears a direct relationship to the amount of natural food. If the recent study is correct, good live-bait tuna fishing might not be associated with maximum abundance of food, but rather with some intermediate condition in which tuna are relatively abundant and food is abundant enough to support the tuna, but not so abundant that they are able to gorge themselves with ease.

\* \* \* \* \*

INTERNATIONAL GEOPHYSICAL YEAR STATIONS OCCUPIED AND OCEANOGRAPHIC AND BIOLOGICAL DATA COLLECTED IN MARSHALL ISLANDS AREA (M/V Hugh M. Smith Cruise 41): Two International Geophysical Year (IGY) stations were occupied September 16-17 and October 29-30 in the vicinity of Oahu Island, Hawaii, and a physical and biological survey in the Marshall Islands area was conducted September 28-October 19 by the research vessel Hugh M. Smith.

This vessel of the Pacific Oceanic Fishery Investigations of the U. S. Bureau of Commercial Fisheries made a total 149 bathythermograph casts. Sixteen oceanographic stations were occupied in the offshore area of Eniwetok Atoll and two during each of the IGY stations for a total of 20 for the entire cruise.

Of 21 half-hour open net zooplankton tows completed, 13 were in the offshore area at Eniwetok. Three of the Eniwetok tows were for surface larval tuna electrophoretic and serological studies. Larval tuna were preserved by freezing in plastic bags.

The cruise also included on Eniwetok Atoll a detailed bathymetric survey; the tracking of parachute drogues in the offshore area; seismological stations; one offshore night-light fishing station and 3 stations within the lagoon (collections of fish were generally very poor). Surface trolling was done with 2 and 3 lines during daylight hours on the run between Honolulu and the Marshall Islands and return. On the way to Eniwetok several lures were lost to large fish, apparently yellowfin tuna, but no fish were landed on board during the entire cruise as a result of trolling.

The regular bridge watch for tuna schools, bird flocks, aquatic mammals was maintained between the Marshall Islands and Hawaiian Islands and at Eniwetok when conditions permitted. The following schools were recorded: In Hawaiian waters, 1 skipjack and 5 unidentified tuna; in the Marshall Islands area, 1 skipjack, 1 yellowfin, 1 little tuna, and 3 unidentified tuna; and in the open oceans, 1 yellowfin and 1 skipjack.

\* \* \* \* \*

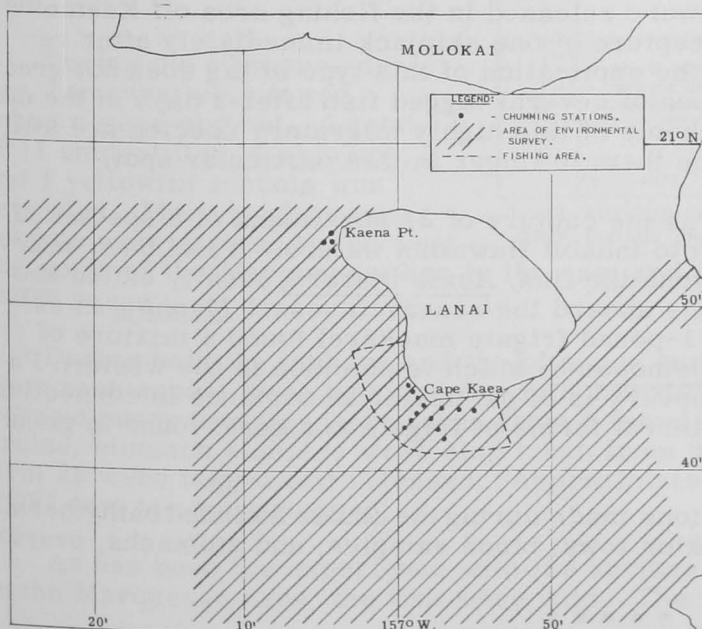
OCEANOGRAPHIC AND BIOLOGICAL DATA COLLECTED (M/V Hugh M. Smith Cruise 42): From November 26-27 the U. S. Bureau of Commercial Fisheries Pacific Oceanographic Fishery Investigations research vessel Hugh M. Smith occupied International Geophysical Year Station 5. The station located at 21° 10.3' N. latitude and 158° 19.0' W. longitude was occupied at highest high and lowest low tide levels.

Bathythermograph (BT) casts were made each hour between station times, plus biological, and other observations. Two shallow hydrographic casts from 0-500 meters and one deep cast from 600-2,500 meters were made at the station. Four 0-60 meter oblique and two Clarke-Bumpus plankton tows were made on the station. A carbon-14 sample was taken and a Secchi disk lowering made.

\* \* \* \* \*

WINTER ABUNDANCE AND DISTRIBUTION OF SKIPJACK TUNA IN HAWAIIAN WATERS SURVEYED (John R. Manning Cruise 38):

A month-long survey of the winter abundance and distribution of skipjack tuna (aku) in Hawaiian waters was completed by the research vessel John R. Manning of the Bureau of Commercial Fisheries Pacific Oceanic Fishery Investigations. The vessel returned to its base at Honolulu on December 4, 1957.



This cruise was part of a continuing program to monitor seasonal and long-term fluctuations in the skipjack population to the Hawaiian area and to gather information on water temperature, salinity, currents, plankton, and other environmental factors which may influence such fluctuations. As on earlier cruises of the series, concentrated observations were carried out in a small area off

CHART 1 - JOHN R. MANNING, CRUISE 38 (11/5-12/4/57).



leeward Lanai, where skipjack, for reasons as yet unknown, tend to congregate and remain for considerable periods of time. It is hoped that the studies of this skipjack concourse may eventually provide clues to the explanation of the larger migratory movements of this commercially-important fish.

Skipjack were found to be somewhat more abundant in Hawaiian waters than during the last previous survey, made during September and October 1957, although still generally scarce, as expected during the winter off-season.

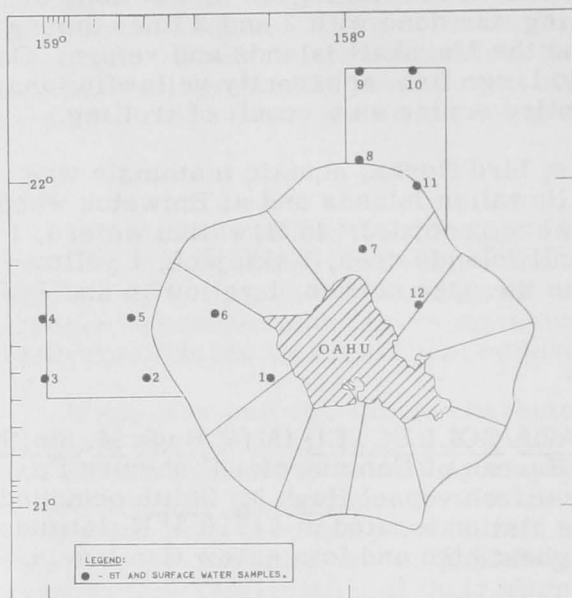


CHART 2 - JOHN R. MANNING, CRUISE 38 (NOVEMBER 5-DECEMBER 4, 1957).

Off Cape Kaea, Lanai, the series of chumming stations was occupied twice, once in the morning and the other in the afternoon. At each station the vessel made a tight circle at a reduced speed and chumming was done for 10 minutes. No skipjack were raised. Little tunny responded to the chum at three stations during the series conducted in the morning.

A series of four chumming stations was occupied just off Kaena Point, Lanai (northwestern point of Lanai) to check on a reported skipjack concourse occurring there during this time of the year. A school of little tuna responded to chumming at one of the stations.

Though no skipjack were taken at the blind chumming stations, a total of 8 skipjack, 7 little tuna, and 1 frigate mackerel schools were fished in the vicinity of the concourse with varying degrees of intensity. In the case of little tuna, fishing was generally terminated as soon as the identity of the fish was determined. The frigate mackerel school was fished only because so little bait remained that there was no point in conserving it for further chumming.

Marking of captured fish with plastic dart tags was continued, and 548 skipjack and 15 little tuna (*Euthynnus yaito*) were released in the fishing area off Kaema Point, Lanai, during the cruise. Recapture of one skipjack immediately after release gave additional evidence that the application of this type of tag does not greatly distress the fish, and the recapture of several tagged fish after 2 days in the concourse off Lanai showed that the schools of this highly migratory species are still finding some conditions which induce them to linger in this particular spot.

Of special scientific interest was the capture of 21 specimens of a species of frigate mackerel hitherto not known to inhabit Hawaiian waters. It had been believed that only one species of this small tunalike fish, *Auxis thazard*, locally called *keo-keo*, occurred here, but the scientists aboard the research vessel *Manning* in examining the catch from a school of 1-pound frigate mackerel found a mixture of this species with another, *Auxis tapeinosoma*, which is common in the western Pacific and the East Indies. This discovery is of particular importance in connection with the identification of the small larval forms of frigate mackerel found in plankton collections in Hawaiian waters.

Other observations and collections made during the cruise included bathythermograph casts; salinity samples; plankton tows; blood samples; and stomachs, ovaries, and caudal vertebrae.



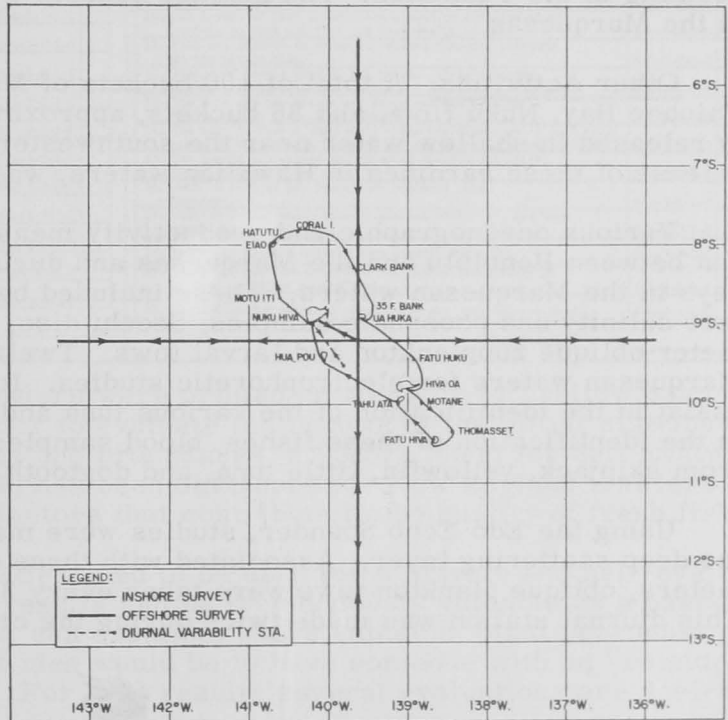
MARQUESAS ISLANDS AREA SURVEYED FOR SURFACE TUNA SCHOOLS AND LIVE BAIT (M/V Charles H. Gilbert Cruise 35): Marquesas Tuna Schools: The location of surface schools of tuna and the collection of information on live bait in the Marquesas, and visual surveys for tuna schools in the Tuamotu Islands area were the principal objectives of the October 2-December 14, 1957, cruise of the Bureau of Commercial Fisheries Pacific Oceanic Fishery Investigations research vessel Charles H. Gilbert.

| Type           | Cruise 32                   |                      |       | Cruise 35       |                 |       |
|----------------|-----------------------------|----------------------|-------|-----------------|-----------------|-------|
|                | Jan. 25-31, 1957            | Feb. 23-Mar. 1, 1957 | Total | Oct. 14-21 1957 | Nov. 24-30 1957 | Total |
|                | (Number of Schools Sighted) |                      |       |                 |                 |       |
| Skipjack . . . | 40                          | 21                   | 61    | 5               | 8               | 13    |
| Yellowfin. . . | 4                           | 7                    | 11    | 3               | 1               | 4     |
| Unidentified.  | 32                          | 61                   | 93    | 25              | 31              | 56    |
| Total . . .    | 76                          | 89                   | 165   | 33              | 40              | 73    |

Fewer than half the number of surface tuna schools were sighted during this cruise in the Marquesas Islands area than during similar surveys in January-March 1957. A summary of the schools sighted during the two surveys appears in table above.

Three standard surveys were made (see chart). Two of them were designated as "inshore," near the Marquesas Islands, and one was designated as "offshore." The two inshore surveys followed the same pattern as those conducted during a previous summer and winter cruise in the Marquesan area. The offshore survey was conducted for the first time during this cruise. It is planned that both the inshore and the offshore surveys will be repeated at frequent intervals until June 1958.

During the offshore survey, comparatively fewer schools were sighted. A total of 11 unidentified, 6 skipjack, and 1 yellowfin schools was recorded. More surface tuna schools were sighted to the west and north of the Marquesas than to the east and south during the period of the offshore survey.



THREE SURVEYS OF TUNA SCHOOLS IN THE MARQUESAS ISLANDS AREA DURING CHARLES H. GILBERT CRUISE 35.

During both the inshore and the offshore surveys, the first 25 fish taken aboard from each school were retained for determination of size frequency and sex. Stomach and ovary samples were taken from 5 females. During the latter half of the cruise, stomach samples were also taken from 5 males. All fish caught after the first 25 were tagged and released. Approximately 1,350 fish were tagged with the POFI dart tag and released.

As has been the experience with the surface schools during the previous cruises in the Marquesan area, the fish were wild. The variation in the biting quality is

reflected in the fact that the catches from a single school ranged from 4 to a maximum of 563. The mean was 72. Most of the skipjack caught were small, less than 15 pounds.

Apparent Abundance and Biology of Live-Bait in the Marquesas: Surveys were conducted in 6 bays of the Marquesas for the Marquesan sardine (*Harengula vittata*). Sardines were abundant in Taiohae, Nuku Hiva. Eighty buckets of bait were caught in four sets prior to the first inshore survey and on another occasion 58 buckets were taken in two sets. Limited quantities of bait were observed in Taa Huku Bay, Hiva Oa. No sardines were found in 4 bays on the north side of Tahu Ata Island.

Experience has shown that mortality of these bait fish can be reduced by preventing crowding during the brailing operation. Bait was carried during the inshore and offshore surveys for periods of 6 to 7 days with a mortality of approximately 15 percent, most of which occurred during the first day.

The size frequency, sex, and gonad development were recorded from 25 sardines at each baiting locality.

Visual surveys in the Tuamotu Islands Area: Four days were spent fishing and scouting in the Tuamotus. The surface schools were somewhat more abundant than in the Marquesas.

Other Activities: A total of 100 buckets of Marquesan sardines were caught in Taiohae Bay, Nuku Hiva, and 86 buckets, approximately 31,000 fish, were subsequently released in shallow water near the southwestern coast of Oahu. This, the fourth release of these sardines in Hawaiian waters, was the largest to date.

Various oceanographic and productivity measurements were made during the run between Honolulu and the Marquesas and during the inshore and offshore surveys in the Marquesan waters. These included bathythermograph lowerings, surface salinity and phosphate samples, Secchi disc, Forel observations, and 0-140 meter oblique zooplankton and larval tows. Twelve surface tows were made in the Marquesan waters for electrophoretic studies. It is hoped that these studies will assist in the identification of the various tuna and tunalike larvae. To further assist in the identification of these fishes, blood samples for serological tests were taken from skipjack, yellowfin, little tuna, and dogtooth tuna.

Using the Edo Echo Sounder, studies were made of the variations in depth of the deep scattering layer. Associated with these observations, duplicate, 0-140 meters, oblique plankton tows were taken every 3 hours over a 24-hour period. This diurnal station was made twice during the cruise.



## Quality

TRAWLER AND WHOLESALER SCORE SHEETS FOR SELF-EVALUATION OF FRESH FISH QUALITY IMPROVEMENT: Rules and standard procedures for New England trawlers and primary wholesalers for quality improvement of fresh fish were introduced in January 1957. For use on a voluntary basis, the procedures were developed by the Technology Division of the National Fisheries Institute under the terms of its contract with the U. S. Bureau of Commercial Fisheries. The contract is financed by funds provided by the Saltonstall-Kennedy Act of 1954.

The quality guidelines for primary wholesalers were printed on an 8½" x 11" white poster for posting in all New England primary wholesaler establishments. In order to evaluate the results of the initial distribution and posting of the quality

rules and procedures, a "Score Sheet for Self Evaluation--New England Primary Wholesalers" (#1) has been developed for New England primary wholesalers to check themselves on the many factors that contribute to the quality of fresh fish.

Score Sheet #1.  
December 2, 1957

**SCORE SHEET FOR SELF EVALUATION -- NEW ENGLAND PRIMARY WHOLESALERS**

(A supplement to the "Rules and Standard Procedures" developed and accepted by the Industry -- with the assistance of the Bureau of Commercial Fisheries and the N.F.I. Technology Division)

Instructions: Evaluate your operation with respect to each of following 20 statements. Assign score points according to following schedule:

|         |   |              |   |        |   |
|---------|---|--------------|---|--------|---|
| Always  | 5 | Often        | 3 | Seldom | 1 |
| Usually | 4 | Occasionally | 2 | Never  | 0 |

The sum of the assigned score points will indicate how well your operation is following the accepted "Rules and Standard Procedures". A score of 100 is possible.

|                                                                                                                                   | Circle one  |
|-----------------------------------------------------------------------------------------------------------------------------------|-------------|
| 1. Conveyances (carts, boxes, trucks, etc.) are in a clean and sanitary condition before receiving fish.                          | 5-4-3-2-1-0 |
| 2. Conveyances (carts, boxes, trucks, etc.) are loaded correctly. (That is, not overloaded)                                       | 5-4-3-2-1-0 |
| 3. Covers are provided for use on all conveyances.                                                                                | 5-4-3-2-1-0 |
| 4. Conveyances are covered as soon as they are loaded regardless of location.                                                     | 5-4-3-2-1-0 |
| 5. Fish stored in conveyances, or stored in areas awaiting handling, are iced at all times.                                       | 5-4-3-2-1-0 |
| 6. Fish awaiting handling are inspected periodically and more ice is added when needed.                                           | 5-4-3-2-1-0 |
| 7. Fresh fish are handled without using forks or hooks.                                                                           | 5-4-3-2-1-0 |
| 8. All containers used for shipment of fresh fish, are clean and new.                                                             | 5-4-3-2-1-0 |
| 9. Returned packages (barrels, boxes, etc.) are refused for credit or re-use.                                                     | 5-4-3-2-1-0 |
| 10. Fish (fillets, etc.) awaiting handling (to and at freezer) are racked in a manner to avoid pressure on the fish below.        | 5-4-3-2-1-0 |
| 11. Fillets, etc. in a fresh condition, being transferred from one place to another are carried in specially provided containers. | 5-4-3-2-1-0 |
| 12. Containers provided for the transferring of fresh fillets are covered and iced regardless of destination.                     | 5-4-3-2-1-0 |
| 13. All carts, boxes and conveyances are washed thoroughly, immediately after they become empty of fish.                          | 5-4-3-2-1-0 |
| 14. Plant and equipment are regularly and frequently washed down when plant is in operation.                                      | 5-4-3-2-1-0 |
| 15. Responsibility for plant cleanliness is specifically assigned to one person.                                                  | 5-4-3-2-1-0 |
| 16. Exterminators are regularly employed for the control of rodents, vermin, flies, etc.                                          | 5-4-3-2-1-0 |
| 17. All fresh fish operations (filleting, cutting, etc.) are performed within doors with proper facilities available.             | 5-4-3-2-1-0 |
| 18. Clothing of all personnel is in a clean condition consistent with the requirements demanded in the handling of food.          | 5-4-3-2-1-0 |
| 19. Smoking is not allowed in the filleting and wrapping rooms - on lines, tables or benches used for processing.                 | 5-4-3-2-1-0 |
| 20. All waste, refuse, trimmings, etc. are disposed of at the end of the day and refuse containers are washed and sanitized.      | 5-4-3-2-1-0 |
| Total Score                                                                                                                       | _____       |

Score Sheet #2  
December 2, 1957

**SCORE SHEET FOR SELF EVALUATION -- NEW ENGLAND TRAWLERS**

(A supplement to the "Rules and Standard Procedures" developed and accepted by the Industry -- with the assistance of the Bureau of Commercial Fisheries and the N.F.I. Technology Division)

Instructions: Evaluate your operation with respect to each of following 20 statements. Assign score points according to following schedule:

|         |   |              |   |        |   |
|---------|---|--------------|---|--------|---|
| Always  | 5 | Often        | 3 | Seldom | 1 |
| Usually | 4 | Occasionally | 2 | Never  | 0 |

The sum of the assigned score points will indicate how well your operation is following the accepted "Rules and Standard Procedures". A score of 100 is possible.

|                                                                                                                                    | Circle one  |
|------------------------------------------------------------------------------------------------------------------------------------|-------------|
| 1. Fish are gutted thoroughly, leaving no part of the gut (livers, etc.) to start spoilage.                                        | 5-4-3-2-1-0 |
| 2. All sizeable fish (over 2 lbs.) are gilled, winter and summer.                                                                  | 5-4-3-2-1-0 |
| 3. Gutted fish are washed thoroughly.                                                                                              | 5-4-3-2-1-0 |
| 4. Water in washing box is changed frequently.                                                                                     | 5-4-3-2-1-0 |
| 5. Fish are put down out of the weather quickly.                                                                                   | 5-4-3-2-1-0 |
| 6. Fish coming out of the hold are sorted with care to cut down on number of deck culls.                                           | 5-4-3-2-1-0 |
| 7. Ice bed in pen is at least six (6") thick.                                                                                      | 5-4-3-2-1-0 |
| 8. Jagged edges in crushed ice are pounded out and made smooth. (Bottom fish carry the weight)                                     | 5-4-3-2-1-0 |
| 9. At least three inches (3") of space is left between fish, pen boards and hull.                                                  | 5-4-3-2-1-0 |
| 10. All layers of fish in pens are gauged to the size of the variety so that all fish get the benefit of ice.                      | 5-4-3-2-1-0 |
| 11. Fish are shelved in order to relieve damaging pressure on the bottom fish.                                                     | 5-4-3-2-1-0 |
| 12. Plenty of ice is used at all times. (This protects against breakdowns, bad weather and accidents or sickness)                  | 5-4-3-2-1-0 |
| 13. The hold and pen boards are dried out and painted thoroughly at least once a year.                                             | 5-4-3-2-1-0 |
| 14. The hold is washed completely after the discharge of each trip and a bactericide is sprayed or hoosed on the cleaned surfaces. | 5-4-3-2-1-0 |
| 15. Pen boards are washed and scrubbed immediately after they come out of the hold.                                                | 5-4-3-2-1-0 |
| 16. Worm or beat up pen boards are replaced with new ones.                                                                         | 5-4-3-2-1-0 |
| 17. Working tools, which come in contact with fish, are kept clean and free of rust.                                               | 5-4-3-2-1-0 |
| 18. Culls are handled quickly when discharging trip.                                                                               | 5-4-3-2-1-0 |
| 19. Culls are not thrown on deck but placed immediately in an iced container on the deck.                                          | 5-4-3-2-1-0 |
| 20. Facilities for personal cleanliness are provided and used.                                                                     | 5-4-3-2-1-0 |
| Total Score                                                                                                                        | _____       |

The quality guidelines for trawlers were printed on an 8 1/2" x 11" yellow poster for posting on all trawlers. In order to evaluate the results of the initial distribution and posting of the quality rules and procedures, a "Score Sheet for Self Evaluation--New England Trawlers" (#2) has been developed for New England trawlers to check themselves on the many factors that contribute to the quality of fresh fish.

Although the score sheets are designed to be used for a private and self-evaluation program, the actual written results can be tremendously valuable as a basis for discussions with crews, mates, sea captains, shore captains, plant personnel, managers, etc. Also, an excellent idea would be to have someone with an "outside eye" make one of the evaluations. For best results several evaluations are desirable.

NOTE: SEE COMMERCIAL FISHERIES REVIEW, FEBRUARY 1957, P. 30.



### South Atlantic Exploratory Fishery Program

EQUIPMENT FOR PRODUCING FILMS OF SHRIMP TRAWLS IN OPERATION TESTED (M/V George M. Bowers Cruise 10): The testing of equipment and working details with reference to the production of films of shrimp trawls under tow were carried out by the U. S. Bureau of Commercial Fisheries exploratory fishing vessel George M. Bowers from November 21-December 4, 1957.

An area west of Eleuthera Island in the Bahama Islands (approximately  $76^{\circ}30'$  W. latitude,  $25^{\circ}10'$  N. longitude) was selected for this work. Features of this area are: (1) excellent water clarity, (2) a clean and even bottom, and (3) a uniform depth of  $4\frac{1}{2}$ -5 fathoms extending over many miles.

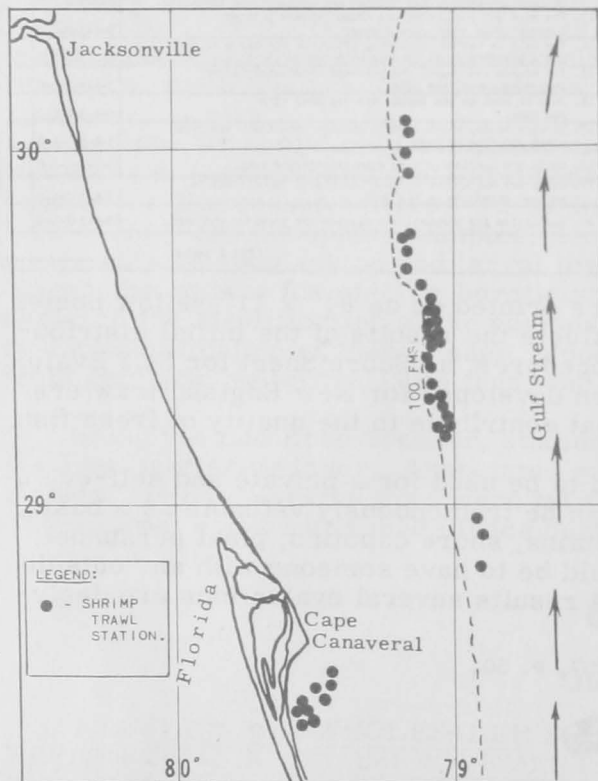
Experience was gained in the coordination of operations with the shrimp trawl, surface skiff, and diving sled under tow. Several rolls of color and black-and-white film were made of the trawl while being towed.

The vessel shakedown was generally successful, but the failure of the new radar set prevented accomplishment of one of the objectives, which was to use this gear to aid in making determinations of the vessel's speeds with and without the trawls.

The experience of this cruise indicates that weather conditions in this area would be more favorable for further photographic work during late spring and summer.

\* \* \* \* \*

EXPLORATORY ROYAL-RED SHRIMP FISHING CRUISE OFF FLORIDA EAST COAST COMPLETED (M/V Silver Bay Cruise 5): A three-week exploratory royal-red shrimp fishing cruise along the Florida east coast by the U. S. Bureau of Commercial Fisheries exploratory fishing vessel Silver Bay was completed on December 8, 1957. The cruise was planned to obtain additional seasonal information on the catch potential for royal-red shrimp between St. Augustine and Cape Canaveral and also to test an experimental 96-foot balloon trawl equipped with a Vigneron-Dahl rig with bracket doors.



M/V SILVER BAY CRUISE 5 (NOV. 14-DEC. 8, 1957)

Strong northerly winds and unusually strong currents continually hampered the offshore operations during the trip. Catches of shrimp varied greatly and no satisfactory gear comparisons could be made. Both 40- and 65-foot flat trawls were used in exploratory dragging which revealed low concentrations over most of the area fished. The best catch in 26 exploratory drags was 245 pounds of 20-25 count (heads-on) royal-red shrimp, averaging 25-60 pounds a tow.

Best fishing was found in the vicinity of  $29^{\circ}26'$  N. latitude,  $80^{\circ}06'$  W. longitude, where in an 18-hour period one drag with the 96-foot net yielded 355 pounds of shrimp and four drags with the 40-foot

net yielded 590 pounds of 15-25 count royal-red shrimp.

Limited shallow water trawling was conducted south of Cape Canaveral on white shrimp. Twin trawling, using two 40-foot flat trawls, yielded combined hourly catches of about 30 pounds of heads-on white shrimp. Hourly catches of the 96-foot balloon trawl were 50 to 100 pounds of shrimp.



Heavy concentrations of subsurface fish schools were observed on depth-recorder tracings south of Canaveral Shoal. Sampling with a high-opening fish trawl indicated that these schools were made up of Harengula (sardinelike fish) and Opis-thonema (thread herring).



## Sponges

RESEARCH SHOWS HOW TO REVITALIZE AMERICA'S RESOURCE: The American natural sponge resource can be placed on a high sustained-yield basis if proper management and harvesting practices are put into effect, the Assistant Secretary of the Interior said on December 11, 1957.

This statement was based upon a study just completed by the University of Miami Marine Laboratory under contract to the United States Fish and Wildlife Service, which shows that the high sustained-yield goal can be reached (1) if harvesting is restricted to sponges not less than six inches in diameter; (2) if a suggested program of transplanting mature sponges during the spawning period is conducted; and (3) if certain other changes in management and harvesting techniques are inaugurated.

The report shows that natural sponge production in the sponge areas off the Gulf Coast of Florida has never regained or even approached its proportions prior to the disease outbreak in 1938. At the time that the natural sponge resource was struggling with the effects of that scourge, the manufacture of synthetic sponges increased. With the outbreak passed, the problem facing the natural sponge industry became one of not only revitalizing the sponge beds of Florida's offshore waters, but also producing sponges at prices which are competitive with synthetic sponges.

The report further declares that because the natural sponge (which is really an animal skeleton) has certain qualities which have not yet been built into the synthetic competitor, any effort which would increase production and insure a steady supply would be welcomed by those who use sponges. In the days when the natural article had the field to itself, one-fourth of the output went to homes and to amateur users, one-fourth went to the pottery industry, and half went to professional painters, decorators, and cleaners.

The report says that good management practice usually dictates that no desirable species be harvested until it has had a chance to reproduce and sustain the yield. A commercial sponge less than six inches in diameter is immature, has had no opportunity to reproduce, and therefore should not be taken.

Between 15 and 25 percent of the sponges currently harvested are less than six inches in diameter, and for a year or two the harvest would be down that much in volume. However, since these smaller sponges bring a lower price the decrease in value would be only 5 to 10 percent. Increased yield after the first year or two would more than make up for this loss, the study indicates. It further shows that there is possibility of a slight increase in the supply on the sponge beds and that this increase in over-all supply would offset some of the loss incurred by not harvesting the smaller sponges.

According to the research, the sponge area could be practically doubled in 10 years under a proper management program. The wool sponge, which constitutes about 90 percent of the commercial harvest, will reach the six-inch size in about three and a half years.

The natural sponge from American sources became commercially important about 1849. Between 1917 and 1938 production of the wool sponge averaged about 350,000 pounds a year, with a peak production of 468,000 pounds in 1936. Production dropped steadily until 1951 when it reached 11,000 pounds. At present it is about 30,000 pounds.

While the wool sponge is by far most important commercially, other sponges which have market value are the yellow, anclote yellow, key grass, gulf grass, finger, and glove.

The sponge study was begun in June 1955 and financed with funds provided by the Saltonstall-Kennedy Act of 1954.



### United States Fishing Fleet<sup>1/</sup> Additions

SEPTEMBER 1957: During September 1957, 48 vessels of 5 net tons and over were issued first documents as fishing craft--14 more than in September 1956. The

Table 1 - U. S. Vessels Issued First Documents as Fishing Craft, by Areas, September 1957 with Comparisons

| Area                  | Sept.              |      | Jan.-Sept. |      | Total |
|-----------------------|--------------------|------|------------|------|-------|
|                       | 1957               | 1956 | 2/1957     | 1956 |       |
|                       | .....(Number)..... |      |            |      |       |
| New England. . . . .  | 2                  | 1    | 17         | 13   | 15    |
| Middle Atlantic. . .  | 2                  | -    | 21         | 21   | 26    |
| Chesapeake . . . . .  | 15                 | 12   | 82         | 87   | 138   |
| South Atlantic . . .  | 7                  | 12   | 91         | 92   | 119   |
| Gulf . . . . .        | 14                 | 6    | 117        | 83   | 100   |
| Pacific . . . . .     | 2                  | 1    | 89         | 68   | 76    |
| Great Lakes. . . . .  | -                  | -    | 5          | 2    | 6     |
| Alaska . . . . .      | 6                  | 2    | 46         | 39   | 40    |
| Hawaii . . . . .      | -                  | -    | -          | 1    | 1     |
| Puerto Rico . . . . . | -                  | -    | 1          | -    | -     |
| Total . . . . .       | 48                 | 34   | 469        | 406  | 521   |

NOTE: VESSELS ASSIGNED TO THE VARIOUS SECTIONS ON THE BASIS OF THEIR HOME PORTS.  
2/REVISED.

1/ INCLUDES BOTH COMMERCIAL AND SPORT FISHING CRAFT.

Table 2 - U. S. Vessels Issued First Documents as Fishing Craft, by Tonnage, Sept. 1957

| Net Tons             | Number |
|----------------------|--------|
| 5 to 9 . . . . .     | 17     |
| 10 to 19 . . . . .   | 10     |
| 20 to 29 . . . . .   | 9      |
| 30 to 39 . . . . .   | 5      |
| 40 to 49 . . . . .   | 3      |
| 50 to 59 . . . . .   | 2      |
| 170 to 179 . . . . . | 2      |
| Total . . . . .      | 48     |

Chesapeake area led with 15 vessels. The Gulf area was second with 14 vessels, followed by the South Atlantic with 7, Alaska 6, and New England, the Middle Atlantic, and Pacific areas with 2 each.



### United States Fishery Landings Down 7 Percent First 10 Months of 1957

The landings of fish and shellfish in the United States and Alaska during the first ten months of 1957 were down sharply as compared with the same period in 1956. Fisheries which yielded about 3.7 billion pounds during the first ten months of 1957 produced 4.0 billion pounds during the same period the previous year.

Menhaden showed the greatest decline, with a catch of 1.6 billion pounds during the first ten months of 1957 as compared with 1.9 billion pounds for the same period in 1956. In New England the catch of ocean perch was down nearly 21 million pounds and haddock 9 million pounds. On the West Coast, the California catch of Pacific sardines declined 23 million pounds;

tuna declined 25 million pounds; and in Alaska the landings of salmon were down about 50 million pounds.

Increased landings during the first ten months of 1957 were reported for Maine herring (up 23 million pounds) and Alaska herring (up nearly 11 million pounds, with the season over). Whiting in New England increased 35 million pounds over 1956; and in Massachusetts, industrial fish (excluding menhaden) increased over 54 million pounds.

In 1956 United States and Alaska fishermen landed a record catch of 5.2 billion pounds. From information reported to date, it appears that the 1957 catch will fall from 300 to 400 million pounds short of that total.

| United States Catch of Fishery Products, Various Periods, 1957 and 1956 1/            |         |                          |           |                    |
|---------------------------------------------------------------------------------------|---------|--------------------------|-----------|--------------------|
| Item                                                                                  | Period  | 1957                     | 1956      | Total 12 Mos. 1956 |
| Maine                                                                                 | 9 mos.  | ..... (1,000 Lbs.) ..... |           |                    |
|                                                                                       |         | 238,414                  | 220,087   | 277,822            |
| <b>Massachusetts:</b>                                                                 |         |                          |           |                    |
| Boston                                                                                | 9 mos.  | 118,783                  | 127,444   | 147,402            |
| Gloucester                                                                            | 9 "     | 230,800                  | 229,185   | 252,038            |
| New Bedford                                                                           | 9 "     | 87,875                   | 77,392    | 87,965             |
| Provincetown                                                                          | 9 "     | 22,603                   | 20,449    | 21,151             |
| <b>Total Mass.</b>                                                                    |         | 460,061                  | 454,470   | 508,556            |
| Rhode Island 2/                                                                       | 10 mos. | 108,712                  | 108,996   | 129,406            |
| New York 2/                                                                           | 10 "    | 33,944                   | 30,358    | 38,268             |
| New Jersey 2/                                                                         | 10 "    | 41,160                   | 41,571    | 46,097             |
| North Carolina 2/                                                                     | 10 "    | 60,195                   | 45,893    | 49,009             |
| Georgia                                                                               | 10 "    | 15,991                   | 14,334    | 16,711             |
| Florida 2/                                                                            | 9 "     | 95,214                   | 95,190    | 142,493            |
| Alabama                                                                               | 9 "     | 9,332                    | 9,297     | 12,320             |
| Mississippi 2/                                                                        | 9 "     | 16,624                   | 17,324    | 22,573             |
| Texas 2/                                                                              | 9 "     | 55,490                   | 41,334    | 61,993             |
| Ohio (Mar.-Oct.)                                                                      | 10 "    | 21,749                   | 24,044    | 24,928             |
| Oregon                                                                                | 9 "     | 49,855                   | 51,512    | 59,256             |
| <b>California:</b>                                                                    |         |                          |           |                    |
| Sardine, Pacific                                                                      | 11 mos. | 34,768                   | 58,026    | 69,554             |
| Certain species 3/                                                                    | 9 "     | 384,822                  | 388,730   | 604,218            |
| Other                                                                                 | 7 "     | 60,431                   | 54,241    | 86,192             |
| <b>Total Calif.</b>                                                                   |         | 480,021                  | 500,997   | 759,964            |
| Rhode Island, Middle Atlantic, Chesapeake, South Atlantic, and Gulf States (menhaden) | 10 mos. | 1,547,733                | 1,835,780 | 2,010,393          |
| Louisiana, shrimp (heads-on)                                                          | 8 mos.  | 20,384                   | 27,445    | 50,541             |
| <b>Washington:</b>                                                                    |         |                          |           |                    |
| Halibut 4/                                                                            | 10 mos. | 15,430                   | 15,874    | 16,604             |
| Otter trawl fishery                                                                   | 11 "    | 39,679                   | 44,965    | 49,530             |
| Salmon                                                                                | 11 "    | 42,771                   | 27,184    | 28,700             |
| <b>Alaska:</b>                                                                        |         |                          |           |                    |
| Halibut 1/                                                                            | 10 mos. | 20,733                   | 24,211    | 33,076             |
| Herring (season over)                                                                 | 11 "    | 114,664                  | 103,759   | 103,759            |
| Salmon (season over)                                                                  | 11 "    | 220,000                  | 269,898   | 269,898            |
| <b>Total of all above items</b>                                                       |         | 3,708,156                | 4,004,523 | 4,711,897          |
| <b>Other (not included)</b>                                                           |         | 5/                       | 5/        | 488,103            |
| <b>Grand Total</b>                                                                    |         | 5/                       | 5/        | 5,200,000          |

1/Preliminary.

2/Excluding menhaden.

3/Includes the catch of: anchovies, jack and Pacific mackerel, tuna and tunalike fishes, and squid.

4/Dressed weight.

5/Data not available.

| United States Catch of Certain Species, Various Periods, 1957 and 1956 1/ |         |           |           |                    |
|---------------------------------------------------------------------------|---------|-----------|-----------|--------------------|
| Item                                                                      | Period  | 1957      | 1956      | Total 12 Mos. 1956 |
| ..... (1,000 Lbs.) .....                                                  |         |           |           |                    |
| Anchovies, California                                                     | 9 mos.  | 42,074    | 43,928    | 54,282             |
| <b>Cod:</b>                                                               |         |           |           |                    |
| Maine                                                                     | 9 mos.  | 1,780     | 2,151     | 2,361              |
| Boston                                                                    | 10 "    | 16,124    | 16,269    | 17,518             |
| Gloucester                                                                | 10 "    | 1,442     | 1,229     | 1,361              |
| <b>Total cod</b>                                                          |         | 19,346    | 19,649    | 21,240             |
| <b>Haddock:</b>                                                           |         |           |           |                    |
| Maine                                                                     | 9 mos.  | 3,344     | 3,601     | 4,340              |
| Boston                                                                    | 10 "    | 85,808    | 93,732    | 106,662            |
| Gloucester                                                                | 10 "    | 6,494     | 7,717     | 8,774              |
| <b>Total haddock</b>                                                      |         | 95,646    | 105,050   | 119,776            |
| <b>Halibut: 2/</b>                                                        |         |           |           |                    |
| Washington                                                                | 10 mos. | 15,430    | 15,874    | 16,604             |
| Alaska                                                                    | 10 "    | 20,733    | 24,211    | 33,076             |
| <b>Total halibut</b>                                                      |         | 36,163    | 40,085    | 49,680             |
| <b>Herring:</b>                                                           |         |           |           |                    |
| Maine                                                                     | 9 mos.  | 129,194   | 105,789   | 140,472            |
| Alaska (season over)                                                      | 10 "    | 114,664   | 103,759   | 103,759            |
| <b>Industrial fish:</b>                                                   |         |           |           |                    |
| Mass. 3/                                                                  | 10 mos. | 99,854    | 45,665    | 124,429            |
| <b>Mackerel, California:</b>                                              |         |           |           |                    |
| Jack                                                                      | 9 mos.  | 65,222    | 45,274    | 76,784             |
| Pacific                                                                   | 9 "     | 26,166    | 22,994    | 47,766             |
| Menhaden                                                                  | 10 mos. | 1,569,396 | 1,901,975 | 2,076,588          |
| <b>Ocean perch:</b>                                                       |         |           |           |                    |
| Maine                                                                     | 9 mos.  | 50,473    | 54,852    | 64,967             |
| Boston                                                                    | 10 "    | 3,275     | 2,424     | 2,839              |
| Gloucester                                                                | 10 "    | 57,250    | 74,621    | 83,303             |
| <b>Total ocean perch</b>                                                  |         | 110,998   | 131,897   | 151,109            |
| Otter trawl fishery Wash.                                                 | 11 mos. | 39,679    | 44,965    | 49,530             |
| <b>Salmon:</b>                                                            |         |           |           |                    |
| Washington                                                                | 11 mos. | 42,771    | 27,184    | 28,700             |
| Alaska (season over)                                                      | 11 "    | 220,000   | 269,898   | 269,898            |
| Sardine, Pacific                                                          | 11 mos. | 34,768    | 58,026    | 69,554             |
| Scallops, sea, New Bedford                                                | 10 mos. | 13,963    | 12,362    | 14,243             |
| <b>Shrimp (heads-on), Gulf States</b>                                     |         |           |           |                    |
|                                                                           | 8 mos.  | 105,752   | 104,408   | 183,862            |
| Squid, California                                                         | 9 mos.  | 10,670    | 10,714    | 15,790             |
| Tuna and tunalike fishes, Calif.                                          | 9 mos.  | 240,690   | 265,820   | 409,596            |
| <b>Whiting:</b>                                                           |         |           |           |                    |
| Maine                                                                     | 9 mos.  | 15,727    | 14,821    | 14,835             |
| Boston                                                                    | 10 "    | 966       | 326       | 413                |
| Gloucester                                                                | 10 "    | 75,676    | 41,729    | 46,432             |
| <b>Total whiting</b>                                                      |         | 92,369    | 56,876    | 61,680             |
| <b>Total of all above items</b>                                           |         | 3,109,385 | 3,416,318 | 4,068,738          |
| <b>Other (not included)</b>                                               |         | 598,771   | 588,205   | 1,131,262          |
| <b>Grand Total</b>                                                        |         | 3,708,156 | 4,004,523 | 5,200,000          |

1/ Preliminary

2/ Dressed weight.

3/ Excluding menhaden.

Note: Round or "as caught" weight unless otherwise indicated.



## U. S. Foreign Trade

**EDIBLE FISHERY PRODUCTS, OCTOBER 1957:** United States imports of edible fresh, frozen, and processed fish and shellfish in October 1957 were higher by 42.4 percent in quantity and 24.6 percent in value as compared with the previous month. Compared with October 1956, the imports for October 1957 were up 1.3 percent in quantity and 1.9 percent in value. Imports in October 1957 were higher than in September for groundfish fillets, dressed salmon, shrimp, canned tuna in brine, and raw tuna. These increases more than offset decreases in swordfish and canned salmon. Compared with the same month in 1956, imports in October 1957 were higher for dressed salmon, shrimp, other fillets, raw tuna, and tuna canned in brine. These increases just about offset the sharply lower imports of groundfish fillets and canned salmon.

Table 1 - United States Foreign Trade in Edible Fishery Products, October 1957 with Comparisons

| Item                                                        | Quantity           |      |       | Value            |      |       |
|-------------------------------------------------------------|--------------------|------|-------|------------------|------|-------|
|                                                             | Oct.               |      | Year  | Oct.             |      | Year  |
|                                                             | 1957               | 1956 | 1956  | 1957             | 1956 | 1956  |
| <b>Imports:</b>                                             | (Millions of Lbs.) |      |       | (Millions of \$) |      |       |
| Fish & Shellfish:                                           |                    |      |       |                  |      |       |
| Fresh, frozen & processed <sup>1/</sup> . .                 | 92.4               | 91.2 | 786.5 | 26.3             | 25.8 | 231.6 |
| <b>Exports:</b>                                             |                    |      |       |                  |      |       |
| Fish & Shellfish:                                           |                    |      |       |                  |      |       |
| Processed only (excluding fresh and frozen) <sup>1/</sup> . | 4.2                | 11.8 | 82.8  | 1.3              | 2.8  | 19.2  |

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

Imports for October 1957 averaged 28.5 cents a pound as compared with 28.3 cents a pound for the same month of 1956.

United States exports of processed fish and shellfish in October 1957 were lower by 19.2 percent in quantity and 43.5 percent in value as compared with the previous month. Compared with October 1956, the exports for this October were down by 64.4 percent in quantity and 55.2 percent in value. The rather sharp decrease in both quantity and value in October this year as compared with a year ago was due primarily to lack of canned California sardines for export. In October 1956 sardine exports amounted to almost 7.0 million pounds.

\* \* \* \* \*

**GROUND FISH FILLET IMPORTS, NOVEMBER 1957:** During November 1957, United States imports of groundfish and ocean perch fillets and blocks amounted to 10.8 million pounds. Compared with the same month in 1956, this represented an increase of 5.2 million pounds (91 percent). Increases of 2.9 million pounds from Canada and about 2.2 million pounds from Iceland accounted for the rather sharp rise in imports in November 1957 as compared with November 1956.

Canada led all other countries exporting groundfish and ocean perch fillets to the United States with 7.9 million pounds. Iceland was next with 2.2 million pounds. Imports from Norway, Denmark, the Netherlands, and West Germany combined totaled over 750,000 pounds. There were no imports reported from the United Kingdom, France, and Greenland during November 1957, although during the same month of 1956 over 500,000 pounds were imported from France and Greenland.

Imports of groundfish and ocean perch fillets and blocks into the United States during the first eleven months of 1957 totaled 135.2 million pounds--an increase of 785,000 pounds, compared with the corresponding period of 1956. Canada accounted for 77 percent of the total imports during the 1957 period, followed by Iceland with 16 percent, while Norway, Denmark, and West Germany together accounted for 6 percent. The remaining 1 percent came from the United Kingdom, Netherlands, France, Greenland, and Miquelon and St. Pierre.

NOTE: SEE CHART 7 IN THIS ISSUE.

\* \* \* \* \*



IMPORTS OF TUNA CANNED IN BRINE UNDER QUOTA PROVISIO: The quantity of tuna canned in brine which may be imported into the United States during the calendar year 1957 at the  $12\frac{1}{2}$  percent rate of duty is limited to 44,528,533 pounds. Any imports in excess of that quantity will be dutiable at 25 percent ad valorem.

Imports under the quota from January 1-November 30, 1957, amounted to 38,071,074 pounds, according to data compiled by the Bureau of the Customs. This leaves a balance of 6,457,459 pounds of the quota which may be imported during the balance of 1957 at the  $12\frac{1}{2}$  percent rate of duty.



## Virginia

BIOLOGISTS FIND THAT CROAKERS GO SOUTH FOR WINTER: From the Rappahannock to the Neuse River, N. C., in about 75 days, an average distance of three miles a day! That was the journey recently taken by a croaker tagged by the Virginia Fisheries Laboratory, Gloucester Point, Va. This is the first definite evidence that some croakers enter the North Carolina sounds when they migrate from Chesapeake Bay in the fall.

It has been known for some years that in the fall croakers migrate southward. In 1950, two fish tagged by the Virginia Laboratory staff in the ocean off Virginia's eastern shore were recaptured south of Cape Hatteras. Another, tagged at Gloucester Point in June 1957, was recovered recently off the North Carolina coast. But never before has it been known for sure that some croakers enter southern inland waters.

Since early April, biologists of the Virginia Fisheries Laboratory have tagged over 2,000 croakers and released them in Virginia rivers. Recovery of tags has shown that, in general, the fish move up river during spring, swim at random throughout the Bay during the summer, and then move oceanward in the fall.

"We are especially eager to receive tags from fish taken in the winter ocean fisheries," declared a spokesman of the Laboratory. "Almost nothing is known of the whereabouts of croakers in winter when they leave the Bay. Knowledge of their winter haunts may help to explain why the abundance of these important fish fluctuates so greatly."

Virginia scientists have been studying croakers for years. Spawning takes place in the fall and winter in the ocean outside the Virginia Capes and probably also to the southward. The young, no more than a quarter of an inch long, are carried by tidal currents into Chesapeake Bay and up the rivers, often into fresh water. As they grow, they slowly move down-river again. By the following fall the croakers are 5 to 6 inches long and appear at the mouths of rivers and in the lower Bay. Before cold weather, most of them move out of the Chesapeake into the Atlantic. It remains to be shown that the same fish which were nurtured in the Bay one season return there the following spring. Return of tags by sport and commercial fishermen to the Virginia Fisheries Laboratory will help answer some of these puzzling questions.



## Washington

STATE OPENS HERRING FISHING FOR REDUCTION: The Washington State Department of Fisheries has established a 15,000-ton quota for herring to be taken in northern Puget Sound during the season which closes February 5, 1958. Until

now herring have not been taken commercially in this area and such fish as have been caught have been utilized almost exclusively as salmon bait. Last year a total of only 261 tons were landed while 40,000 tons were taken in British Columbia waters.

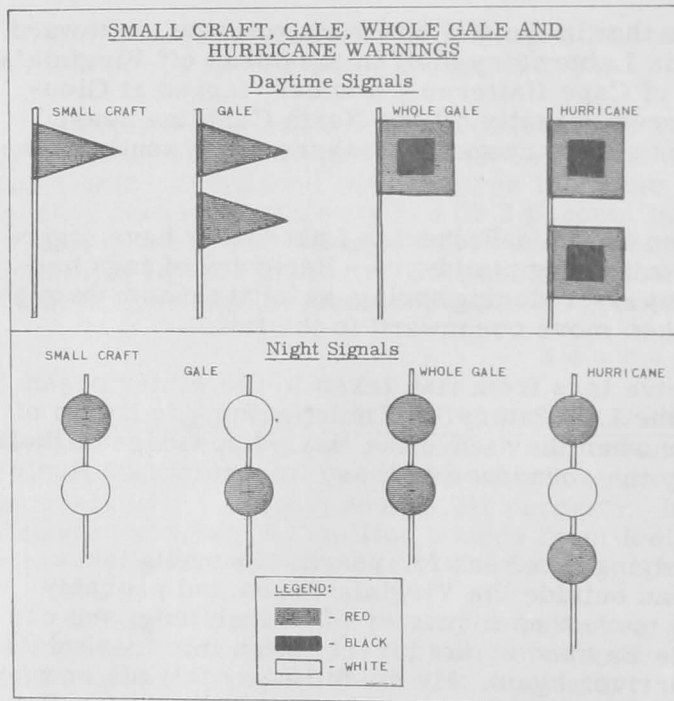
Commenting upon the opening of this Puget Sound herring fishery, the Director of the Washington State Department of Fisheries said: "Our fishermen should share in this harvest. The herring move through American waters and we participate in their protection and regulation. We propose to cooperate with Canadian authorities so the existing annual quota will be shared by fishermen of the two countries without upsetting the balance between yield and spawning."



## Weather

**STORM SIGNALS FOR COASTAL WATERS CHANGED:** The U. S. Weather Bureau announced that a new simplified system of Coastal Warning Displays was placed into effect on and after January 1, 1958. For many years, whenever winds dangerous to navigation have been forecast by the Weather Bureau, storm warning signals

have been displayed along the coasts of the United States, the Great Lakes, the Hawaiian Islands, and Puerto Rico.



THESE NEW STORM WARNING SIGNALS WILL REPLACE THE PRESENT SIGNALS JAN. 1. SMALL CRAFT WARNING INDICATES THAT WINDS UP TO 38 MILES AN HOUR AND/OR SEA CONDITIONS DANGEROUS TO SMALL CRAFT OPERATIONS ARE FORECAST; GALE WARNING, WINDS 39 TO 54 MILES; WHOLE GALE WARNING, WINDS 55 TO 73 MILES; HURRICANE WARNING, WINDS 74 MILES AND ABOVE. THE NEW SIGNALS PROVIDE A NIGHT SMALL-CRAFT WARNING, NOT PREVIOUSLY USED, AND ELIMINATE THE DIRECTIONAL FORECASTS.

Under the new system, only four separate flag signals will be used during the day, instead of the seven separate flag signals previously employed in the Weather Bureau's Storm Warning Display System. During the night, only four comparable lantern signals will be used for Small Craft, Gale, Whole Gale, and Hurricane warnings.

The major differences between the old and the new visual warning display systems are:

(1) The substitution of a single nondirectional gale warning signal for the four separate directional "storm warning" signals that were used to specify northeast, southeast, southwest, or northwest gales.

(2) The introduction of a new lantern signal for use during the night for "small craft warnings." Under the old system displays for small craft warnings were used in daytime only.

(3) The introduction of a new and separate signal for "whole gale" warnings. Under the old system the same signal was used for both "whole gales" and "hurricanes."

The Weather Bureau points out that these visual warning signals which are displayed at stations along the coasts are supplementary to, and not a replacement for, the written advisories and warnings given prompt and wide distribution by radio, television, and press. In most cases, important details of the Weather Bureau's forecasts and warnings in regard to the time, intensity, duration, and direction of storms cannot be given satisfactorily through the display of visual signals.

The explanation of the new display signals that went into effect on January 1, 1958, follows:

**Small Craft Warning:** One red pennant displayed by day and a red light above a white light at night to indicate winds up to 38 miles an hour (33 knots) and/or sea conditions dangerous to small craft operations are forecast for the area.

**Gale Warning:** Two red pennants displayed by day and a white light above a red light at night to indicate winds ranging from 39 to 54 miles an hour (34 to 48 knots) are forecast for the area.

**Whole Gale Warning:** A single square red flag with a black center displayed during daytime and two red lights at night to indicate winds ranging from 55 to 73 miles an hour (48 to 63 knots) are forecast for the area.

**Hurricane Warning:** Two square red flags with black centers displayed by day and a white light between two



## Wholesale Prices, December 1957

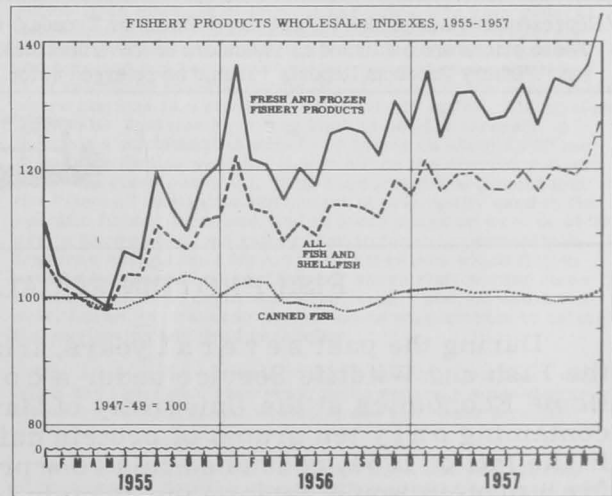
During December 1957 the edible fish and shellfish (fresh, frozen, and canned) wholesale price index (126.6 percent of the 1947-49 average) advanced 4.5 percent as compared with the previous month and was up 9.0 percent from the same month a year earlier. Increases in wholesale prices for fresh and frozen haddock (drawn and fillets) in December 1957 were primarily responsible for the rise.

From November to December 1957 wholesale prices for drawn, dressed, and whole finfish increased 10.2 percent. A sharp increase of 45 percent in fresh drawn large haddock ex-vessel prices at Boston, a small increase in whitefish prices at Chicago, and a slight increase in frozen halibut prices at New York City more than offset declines in the four other varieties in this subgroup. Continued light catches of fresh haddock and low stocks of frozen haddock fillets have kept prices for those commodities at a high level. In December 1957 the wholesale price index for the drawn, dressed, and whole finfish subgroup was 21.6 percent above the same month in 1956 because of much higher prices for fresh haddock (up 122.8 percent) and yellow pike (up 32.0 percent). All other products in the subgroup were substantially lower this December as compared to the same month a year earlier.

Fresh processed fish and shellfish prices in December 1957 were higher by 3.9 percent from the preceding month. High prices for fresh haddock fillets (up 23.7 percent) reflected the increase in ex-vessel prices at Boston. Both fresh shrimp and shucked oysters were priced slightly higher than the preceding month. As compared with December 1956, the index for this subgroup in December 1957 increased by 9.7 percent, due to substantially higher fresh haddock fillet prices (up 88.5 percent) and an increase of 8.5 percent in fresh shrimp prices.

Frozen processed fish and shellfish prices rose 3.7 percent from November to December 1957 due to the firm market for frozen fillets, particularly frozen haddock fillets which were priced 13.6 percent higher. There was no appreciable change in frozen shrimp prices at Chicago. From December 1956 to December 1957 the frozen processed subgroup index was up 9.7 percent due primarily to higher frozen haddock fillet prices (up 34 percent). Ocean perch fillet prices in December 1957 were up by 3.6 percent from the preceding month and the same month in 1956. December 1957

frozen shrimp prices were about the same as the preceding month but were higher by 2.2 percent when compared with the relatively high December 1956 prices.



The canned fishery products subgroup index in December 1957 continued to fluctuate in a narrow range as compared to the previous month and the same month in 1956. Canned Maine sardines declined another 1.5 percent in December 1957 from the preceding month and were down 17.5 percent from December 1956. The short pack of California sardines during the August-December packing season resulted in a 11.6-percent rise in prices from November to December 1957. California canned sardine prices in December 1957 were about 6.7 percent higher than in the same month in 1956. Canning activities for the four products in this subgroup was confined largely to tuna and a small pack of California sardines.

**Table 1 - Wholesale Average Prices and Indexes for Edible Fish and Shellfish, December 1957 With Comparisons**

| Group, Subgroup, and Item Specification                                       | Point of Pricing | Unit | Avg. Prices <sup>1/</sup> (\$)                           |           | Indexes (1947-49=100) |           |           |           |       |
|-------------------------------------------------------------------------------|------------------|------|----------------------------------------------------------|-----------|-----------------------|-----------|-----------|-----------|-------|
|                                                                               |                  |      | Dec. 1957                                                | Nov. 1957 | Dec. 1957             | Nov. 1957 | Oct. 1957 | Dec. 1956 |       |
|                                                                               |                  |      | ALL FISH & SHELLFISH (Fresh, Frozen, & Canned) . . . . . |           |                       |           |           |           | 126.6 |
| <u>Fresh &amp; Frozen Fishery Products:</u> . . . . .                         |                  |      |                                                          |           |                       | 144.8     | 136.1     | 133.1     | 128.6 |
| <u>Drawn, Dressed, or Whole Finfish:</u> . . . . .                            |                  |      |                                                          |           |                       | 144.2     | 130.8     | 134.3     | 118.6 |
| Haddock, lge., offshore, drawn, fresh . . . . .                               | Boston           | lb.  | .20                                                      | .14       | 206.5                 | 142.4     | 118.0     | 92.7      |       |
| Halibut, West., 20/80 lbs., drsd., fresh or froz.                             | New York         | lb.  | .31                                                      | .31       | 96.9                  | 96.4      | 109.6     | 108.3     |       |
| Salmon, king, lge. & med., drsd., fresh or froz.                              | New York         | lb.  | .61                                                      | .64       | 136.0                 | 143.8     | 162.9     | 143.8     |       |
| Whitefish, L. Superior, drawn, fresh . . . . .                                | Chicago          | lb.  | .59                                                      | .58       | 146.3                 | 142.5     | 158.7     | 151.2     |       |
| Whitefish, L. Erie pound or gill net, rnd., fresh                             | New York         | lb.  | .64                                                      | .78       | 128.4                 | 156.7     | 197.2     | 143.6     |       |
| Lake trout, domestic, No. 1, drawn, fresh . . .                               | Chicago          | lb.  | .64                                                      | .74       | 131.1                 | 151.6     | 131.1     | 145.4     |       |
| Yellow pike, L. Michigan & Huron, rnd., fresh .                               | New York         | lb.  | .48                                                      | .49       | 111.4                 | 114.9     | 119.6     | 84.4      |       |
| <u>Processed, Fresh (Fish &amp; Shellfish):</u> . . . . .                     |                  |      |                                                          |           |                       | 147.8     | 142.2     | 133.8     | 134.7 |
| Fillets, haddock, sml., skins on, 20-lb. tins . .                             | Boston           | lb.  | .58                                                      | .47       | 195.7                 | 158.2     | 132.7     | 103.8     |       |
| Shrimp, lge. (26-30 count), headless, fresh . .                               | New York         | lb.  | .89                                                      | .88       | 140.6                 | 138.3     | 122.5     | 129.6     |       |
| Oysters, shucked, standards . . . . .                                         | Norfolk          | gal. | 6.00                                                     | 5.88      | 148.5                 | 145.4     | 148.5     | 148.5     |       |
| <u>Processed, Frozen (Fish &amp; Shellfish):</u> . . . . .                    |                  |      |                                                          |           |                       | 129.7     | 125.1     | 119.2     | 118.2 |
| Fillets; Flounder, skinless, 1-lb. pkg. . . . .                               | Boston           | lb.  | .40                                                      | .39       | 103.4                 | 100.8     | 100.8     | 103.4     |       |
| Haddock, sml., skins on, 1-lb. pkg. . . . .                                   | Boston           | lb.  | .38                                                      | .33       | 117.7                 | 103.6     | 89.5      | 87.9      |       |
| Ocean perch, skins on, 1-lb. pkg. . . . .                                     | Boston           | lb.  | .29                                                      | .28       | 114.8                 | 110.8     | 108.8     | 110.8     |       |
| Shrimp, lge. (26-30 count), 5-lb. pkg. . . . .                                | Chicago          | lb.  | .84                                                      | .84       | 128.8                 | 130.0     | 128.1     | 126.0     |       |
| <u>Canned Fishery Products:</u> . . . . .                                     |                  |      |                                                          |           |                       | 100.8     | 100.0     | 99.7      | 101.2 |
| Salmon, pink, No. 1 tall (16 oz.), 48 cans/cs. . . .                          | Seattle          | cs.  | 22.65                                                    | 22.65     | 120.0                 | 120.0     | 120.0     | 120.0     |       |
| Tuna, lt. meat, chunk, No. 1/2 tuna (6-1/2 oz.), 48 cans/cs. . . . .          | Los Angeles      | cs.  | 11.50                                                    | 11.50     | 82.9                  | 82.9      | 82.6      | 80.8      |       |
| Sardines, Calif., tom. pack, No. 1 oval (15 oz.), 48 cans/cs. . . . .         | Los Angeles      | cs.  | 9.60                                                     | 8.60      | 112.0                 | 100.4     | 99.2      | 105.0     |       |
| Sardines, Maine, keyless oil, No. 1/4 drawn (3-1/4 oz.), 100 cans cs. . . . . | New York         | cs.  | 6.35                                                     | 6.45      | 67.6                  | 68.6      | 68.7      | 81.9      |       |

<sup>1/</sup> 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.



**FISH PROTEIN EQUAL TO BEEF PROTEIN**

During the past several years, trials have been conducted with coeds by the Fish and Wildlife Service under a cooperative project with the College of Home Economics at the University of Maryland. A basal diet has been developed containing only ten grams of protein daily. The girls, for a period of 7½ weeks in the fall of 1954, consumed this low protein diet to determine how effectively fish protein would replace the protein loss compared to beef. One group was fed haddock protein in increasing levels. Another group received beef protein at the same levels. Tests of blood and the determination of the nitrogen balance of the body confirmed previous reports which indicated no differences in the blood-forming ability of fish protein compared to that of meat.

--Sea Secrets, The Marine Laboratory, University of Miami, Coral Gables, Fla.