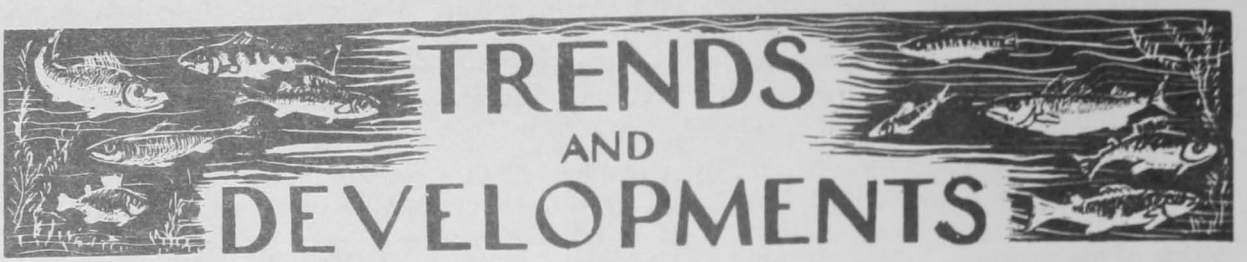


Additions to the Fleet of U. S. Fishing Vessels

First documents as fishing craft were issued to 38 vessels of 5 net tons and over during October 1954--18 less than in October 1953. Virginia led with 8 vessels, followed by Florida east coast with 7 vessels, and Louisiana with 5 vessels.

Vessels Obtaining Their First Documents as Fishing Craft, October 1954 and Comparisons

Section	October		January-October		Total 1953
	1954	1953	1954	1953	
	(Number)				
New England	-	-	22	18	20
Middle Atlantic	-	1	14	17	19
Chesapeake	8	6	84	73	83
South Atlantic	13	10	110	89	116
Gulf	10	29	293	212	264
Pacific	4	5	104	153	164
Great Lakes	2	1	5	6	7
Alaska	1	3	24	49	53
Hawaii	-	1	1	3	3
Unknown	-	-	1	-	-
Total	38	56	658	620	729

Note: Vessels have been assigned to the various sections on the basis of their home port.

During the first 10 months of 1954, 658 vessels were issued first documents as fishing craft, compared with 620 during the same period in 1953. The gain in documentation took place mostly in the Gulf States where 293 vessels were added to the fleet as compared with 212 in the first 10 months of 1953.

California

COMMERCIAL FISH CATCH IN 1953 HITS 22-YEAR LOW: Landings of commercial fish at California ports during 1953 slumped to the lowest mark in 22 years, reports the California Department of Fish and Game. The 546,360,000 pounds of fish brought in by the commercial fishing fleet was off 21 percent from 1952, according to the annual statistical report just published by the Marine Fisheries Branch of the Department.

A total of 694,977,000 pounds was brought ashore for sale or processing in 1952 and 904,088,000 pounds in 1951. The last time the California catch dropped below 550,000,000 pounds was in 1931, when landings totaled 502,390,000 pounds.

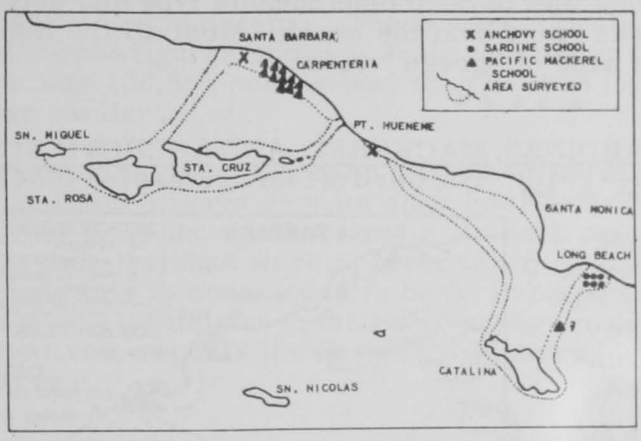
Fisheries specialists credited the decline to the virtual disappearance of the sardine from Pacific coastal waters. Since the 1930's they have repeatedly warned of the dangers of overfishing and called for protective legislation. (Commercial fishing laws are set by the Legislature and not by the Fish and Game Commission.)

Catches soared to nearly 1½ billion pounds a year in the 1930's and 1940's before sardine and mackerel shortages brought totals tumbling.

The 1953 landings reflected a general drop for nearly all species. Tuna, the fishery's top cash crop since World War II, led in total poundage for the third straight year with landings of 298,000,000 pounds. This was off about 18 percent from the 1952 total, however, to mark the lowest catch since 1948. The 1953 sardine landings stood at 9,469,000 pounds, compared with 14,330,000 pounds in 1952.

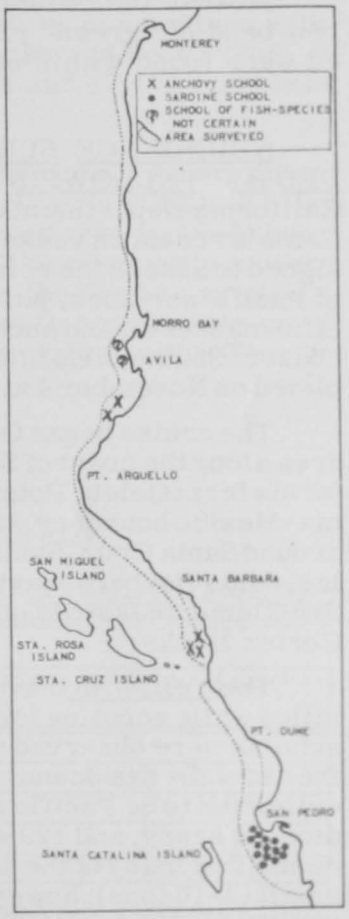
* * * * *

SPOTTING SURVEY PLANE OBSERVES FEWER SARDINES OFF SOUTHERN CALIFORNIA (Airplane Spotting Flight 54-3): In a spotting flight from October 25-28, 1954, the California Department of Fish and Game's plane Beechcraft 4758N observed that sardine schools were fewer in number, smaller in size, and more scattered in distribution than those observed on October 2, 1954. The flights were made to determine the coastal distribution and approximate abundance of commercial pelagic species with emphasis on the Pacific sardine. Visibility was excellent from the air over the entire area except for a portion of the coast near Ensenada where a forest fire caused haze over the water, according to a November 8 bulletin from the California Department of Fish and Game. The area surveyed included the inshore area from Monterey, California, to San Jose Pt., Baja California, and the area adjacent to the channel islands and Santa Catalina Island.



Airplane spotting flight 54-3 Beechcraft 4758N on October 26, 1954.

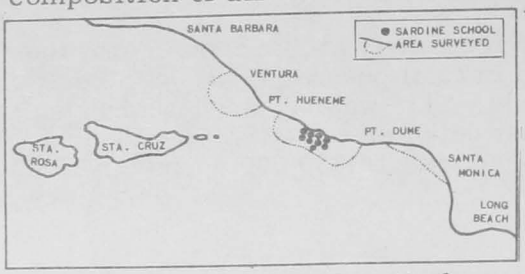
Airplane spotting flight 54-3 Beechcraft 4758N on October 27, 1954.



Airplane spotting flight 54-3 Beechcraft 4758N on October 25, 1954.

This flight survey consisted of a series of four daily flights. Since some of the same area was surveyed on successive days, a tally of species for each day's flight was prepared. A total of 88 schools of fish were tallied over the four-day period, but only a portion of these schools could be identified with certainty. Schools of each species of fish have a characteristic shape and color when the school is near the surface, but when the schools are deeper in the water, identification as to species becomes difficult. By observing catches made by commercial fishermen

in cooperation with aerial spotters it was possible to give an estimation of the species composition of all the schools observed. Of the 88 schools tallied it was estimated that at least 50 were sardines, 21 anchovies, 15 Pacific mackerel, and 2 were unidentifiable.



Airplane spotting flight 54-3 Beechcraft 4758N on October 28, 1954.

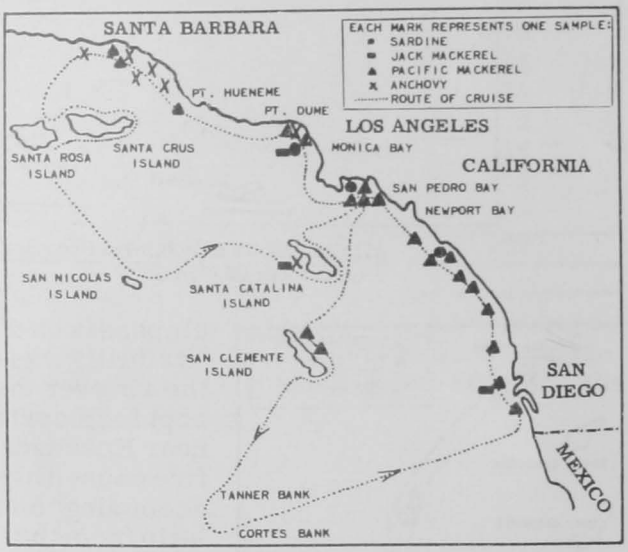
It was noteworthy to observe how rapidly a concentration of sardines would vary in abundance within a certain area over a period of only a few days. The largest concentration of sardines was off Long Beach and on October 25 and 26 fair numbers were sighted. Most all the commercial fleet operated in this area, and by October 27 only anchovies were seen in this area. No sardines were seen in the Port Hueneme area until October 28 when several small schools were sighted between Pt. Dume and Pt. Mugu. All schools of fish were reported to be "wild" by the fishermen.

Most of the coastal water mass was of deep blue oceanic type and only a narrow band of "green" rich water was found near the beach. Most all the fish observed were found within or near this band of "green" water.

* * * * *

ABUNDANCE SURVEY OF SARDINES, MACKEREL, AND ANCHOVIES CONTINUED BY "YELLOWFIN" (Cruise 54-Y-10): The third of four cruises for 1954 by the California Department of Fish and Game's research vessel Yellowfin designed to assess the relative abundance of Pacific sardines, jack mackerel, Pacific mackerel, and anchovies off the coast of Southern California, was completed on November 4 at Los Angeles.

The cruise began October 16 in the area along the coast of Southern California from Goleta Point to the California-Mexico boundary, including the area around Santa Cruz, Santa Rosa, San Nicholas, Santa Barbara, Santa Catalina and San Clemente Islands, and Tanner and Cortez Banks.



M/V Yellowfin Cruise 54-Y-10, October 16-Nov. 4, 1954.

The Yellowfin traveled a total of 415 miles while scouting for fish, and 190 schools were observed visually or with the aid of the Sea Scanar--35 of these were estimated to be Pacific mackerel, 15 sardine, 11 saury, and 129 were unknown. There is considerable evidence, however, to indicate that many of the unidentified schools were sardines. Most sardine schools were small (3-10 tons); however four large schools (50-300 tons) were observed in the vicinity of Santa Barbara Island. Small schools of Pacific mackerel (up to 20 tons) were seen throughout the area surveyed.

A total of 90 light stations were occupied. Sardines were sampled at 3 stations, anchovies at 7, Pacific mackerel at 20, and jack mackerel at 3. In addition to the samples collected, Pacific mackerel were observed but not collected at 6 stations, anchovies at 3, sardines at 1, and unidentified schools at 3.

In addition, squid were noted at 22 light stations, sauries at 20, jack smelt at 6, grunion at 5, bay smelt, mola, and blue shark at 1 each.

Cans--Shipments for Fishery Products, January-September 1954

Total shipments of metal cans for fish and sea food during January-September 1954 amounted to 81,651 short tons of steel (based on the amount of steel consumed in the manufacture of cans), compared to 83,258 short tons for the same period in 1953.

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.

Connecticut

CONNECTICUT RIVER SHAD FISHERY, 1954: The 1954 catch of shad in the Connecticut River amounted to 291,427 pounds, consisting of 34,243 bucks in number and 49,585 roes in number, according to the records of the Connecticut State Board of Fisheries and Game. There were 93 nets registered. A comparison with the Board's 1953 figures shows a 27-percent drop for both bucks and roes. The 1954 catch was 108,654 pounds less than in 1953 (15,218 bucks and 17,131 roes less than a year earlier.)

The decline in catch has been attributed to two principal factors. First, the Connecticut River always gets its shad later than the Hudson River and Raritan Bay, and generally after the market has hit its peak prices. This was true in 1954; but also at the time the shad were present to any positive extent, the river waters were very high and this is considered to be an important reason for the drop in catch. Second, a good alewife run in the river caused many fishermen to concentrate on seining alewives, reports the Service's Fishery Marketing Specialist in the Connecticut area.

Federal Purchases of Fishery Products

FRESH AND FROZEN FISHERY PRODUCTS PURCHASED BY DEPARTMENT OF DEFENSE, OCTOBER 1954: Fresh and frozen fishery products purchased for

Purchases of Fresh and Frozen Fishery Products by Department of the Army
(October and the First Ten Months of 1954)

QUANTITY				VALUE			
October		January-October		October		January-October	
1954	1953	1954	1953	1954	1953	1954	1953
Lbs.	Lbs.	Lbs.	Lbs.	$	$	$	$
1,978,862	2,236,975	20,963,762	23,643,186	860,937	1,120,493	8,644,835	10,415,224

the military feeding of the U. S. Army, Navy, Marine Corps, and Air Force by the Army Quartermaster Corps in October 1954 amounted to 1,978,862 pounds, valued at $860,937 (see table). This was a decrease of 30.4 percent in quantity and 19.5 percent in value as compared with September purchases and lower by 11.5 and 23.2 percent, respectively, than in October 1953.

Army Quartermaster Corps purchases of fresh and frozen fish during the first 10 months in 1954 totaled 20,963,762 pounds (valued at $8,644,835) 11.3 percent lower in quantity and 17.0 percent less in value as compared with the similar period a year earlier.

Prices paid for fresh and frozen fishery products by the Quartermaster Corps in October averaged 43.5 cents per pound as compared with 37.1 cents in September and 49.9 cents per pound in October 1953.

Great Lakes Fishery Investigations

CHUB TRAWLING AND GILL-NET TESTS CONTINUED BY "CISCO" IN SOUTHERN LAKE MICHIGAN (Cruise IX): Experimental trawling for chubs by the Service's research vessel Cisco produced no new results on a 13-day cruise completed November 1. A 45-minute tow between 14 and 25 fathoms of Grand Haven produced 350 pounds of yellow perch which is somewhat unusual for this depth. The cruise itinerary included Grand Haven, Michigan, October 19-21; Racine, Wisconsin, October 22; Milwaukee, Wisconsin, October 23-30; Grand Haven, October 31-November 1.

Transects were made across Lake Michigan from Holland to Racine, and from Milwaukee to Grand Haven. Three hydrographic stations were visited along each transect. Experimental gill nets were set on the bottom at 25 and 50 fathoms off Grand Haven, and at 25, 50, and 80 fathoms off Racine. A gill net was set obliquely from surface to bottom in 20 fathoms off Milwaukee. Trawling was done off Grand Haven, Milwaukee, and in the area between Racine and Milwaukee. Bathythermograph tests were made at 5-mile intervals along the transects and at all stations.

A gill net set obliquely from surface to the bottom in 20 fathoms of water off Milwaukee took chubs at all depths. In oblique sets made during midsummer months, chubs were not taken in the upper 60 feet of water. In this set, 19 percent of the total catch was taken between the surface and 60 feet of depth and 38 percent of the catch was taken between 60 and 100 feet. Chubs have been thought to live in very close proximity with the bottom but in this set only 43 percent were taken within 20 feet of the bottom.

Surface temperatures across the lake near the start of the cruise (October 22) ranged between 55.8°-58.6° F. and the thermocline had an average depth of 110 feet. Near the end of the cruise (October 31) surface temperatures had fallen to from 52.3° to 55.4° F. and the thermocline had dropped to an average depth of 122 feet.

Returns from the 1,100 drift bottles released during July-September are still coming in at a rate close to 100 per week despite the onset of unfavorable weather. Almost no returns are being made from an equal number of drift cards enclosed in plastic envelopes that were released simultaneously with the bottles.

Gulf Exploratory Fishery Program

FISHING GEAR STUDY METHODS TESTED BY "OREGON" (Cruise 27): Tests on several types of equipment to determine their effectiveness as tools for the study of fishing gear were made by the Service's research units at Coral Gables and Pascagoula, the Navy Bureau of Ships, the Navy Bureau of Aeronautics, and the Geological Survey.

Underwater television cameras were used to observe the action of a midwater trawl as it was towed by the Oregon in the Gulf Stream off Miami. These observations were recorded on motion picture films. Also, the diving team from the Oregon made its first dives to watch shrimp nets.

On the return trip to Pascagoula two long-line sets were made southwest of Tortugas. Two large yellowfin tuna were taken on one set and three on the other. Several small white skipjack (Katsuwonus pelamis) were taken also.

On this cruise the Oregon left Pascagoula on October 28 and was based at Miami Beach from October 31 through November 13 for gear tests in the Gulf Stream off Miami and off the Bahamas. The Oregon left Miami Beach on November 14 and made long-line sets for tuna southwest of Tortugas, Florida, returning to Pascagoula November 23, 1954.

Gulf States Marine Fisheries Commission

FIFTH ANNUAL MEETING AT SAN ANTONIO: The Fifth Annual Meeting of the Gulf States Marine Fisheries Commission was held October 21-22, 1954, at San Antonio, Texas. The principal subjects discussed at the meeting included: reports by representatives of member States on the progress of fishery projects under way and in the planning stage; the effect of purse seining in the Gulf menhaden fishery, and otter trawling in fishing for species for animal food and fish meal; the possibility of increased weather reporting in the Gulf; explorations for shrimp and tuna by the Fish and Wildlife Service's vessel Oregon; the biological survey in the Gulf by the Service's research vessel Alaska; the red tide problems off the Florida coast; and the proposed new Fish and Wildlife Service projects to be financed by funds provided by the Saltonstall-Kennedy Fisheries Act (P. L. 466).

Among the resolutions adopted at the Meeting were:

(1) An economic survey of the shrimp industry was recommended.

(2) A weather-ship station in the Gulf of Mexico was recommended.

(3) Extension of the shellfish certification program was recommended.

(4) No action reference proposed change Maritime Administration General Order 59 to permit chartering of fishing vessels to aliens before receiving Administration approval.

(5) Montgomery, Alabama, was chosen for the next regular meeting, March 17-18, 1955.

Iowa

1955/56 FRESH-WATER MUSSEL SEASON SET: The 1955/56 Iowa fresh-water mussel season has been set by the State Conservation Commission with no changes from the previous season's regulations, according to a November 25, 1954, bulletin from that agency. The entire lengths of the Mississippi and Missouri Rivers will be open to mussel fishing from June 15, 1955, to June 15, 1956.

Inland streams open to mussel fishing will be open from June 15, 1955, to November 30, 1955. These include the Des Moines, Cedar, Iowa, Wapsipinicon, Turkey, and Shellrock Rivers. Certain portions of these rivers are closed, and commercial fishermen may consult last year's regulations to determine these areas. All other waters of the State are closed to the taking of mussels.

All the mussels produced in Iowa are used in the production of mussel-shell products, principally buttons.

Note: See Commercial Fisheries Review, August 1954, p. 38.

Michigan

STATE AND FEDERAL LONG-RANGE STUDY OF LAKE TROUT: Although sea lampreys have nearly wiped out lake trout populations in Lakes Michigan and Huron, Michigan's Department of Conservation and the U. S. Fish and Wildlife Service are continuing hatchery and research work with an eye toward the future of the fish. There is hope that combined efforts of man and nature will control future lamprey depredations.

If this occurs, conservationists want to be ready with additional research knowledge and "brood stock" fish for inland and Great Lakes plantings. Specialists from the U. S. Fish and Wildlife Service are making a long-range study of the little-known fish.

At the Conservation Department's Marquette hatchery, a pilot brood-stock experiment has been under way about six years. A number of the fish, raised from eggs hatched in 1948, have reached maturity and the important question of whether or not they will spawn in captivity is expected to be answered soon.

Lake, or Mackinaw, trout experiments are also being conducted at Higgins Lake. Conservationists want to know if wild lake trout netted from this lake can be used to provide spawn should the remaining stock of lake trout in Lake Superior disappear as it has in Lakes Huron and Michigan.

Missouri

FISH AND SHELLFISH CONSUMPTION, 1953: Missourians ate about $9\frac{3}{4}$ million pounds of marine and fresh-water fish during 1953, according to reports from fish dealers received by the Missouri Conservation Commission. The most popular was whiting, with almost 5 million pounds sold during the year.

Missouri commercial fishermen provide only a small part of the total fish consumed in that State. The local catch is only about 7 percent of the 2.6 million pounds of river fish handled by dealers.

In addition, during 1953 Missourians consumed about 29,449 pounds of frogs, 80,296 pounds of shrimp, and 4,175 pounds of oysters.

New York

HUDSON RIVER SHAD CATCH UP IN 1954: The 1954 Hudson River shad catch in New York waters amounted to 613,236 pounds, 34 percent more than the 456,858 pounds caught in 1953, according to preliminary figures supplied by the Service's Fishery Marketing Specialist in that area. Fishing was conducted under special shad gill-net permits issued by the State of New York.

The breakdown of the 1954 catch is as follows:

Stake nets: roe shad 160,133 pounds (39,987 fish); buck shad 64,893 pounds (22,193 fish). Total value to the fishermen: approximately $34,000.

Drift gill nets: roe shad 244,500 pounds (66,162 fish); buck shad 143,710 pounds (58,932 fish). Total value to the fishermen: approximately $38,000.

* * * * *

LONG ISLAND FISHERMEN TRY GILL-NET FISHING FOR COD: Fishing for cod off Long Island with a nylon anchor gill net (5¼-inch mesh) was tried as an experiment by a crew of fishermen in November 1954, according to the Service's Fishery Marketing Specialist in that area. The thread of the net was very light. The venture proved successful and the fishermen are now building more gear. The cod caught, weighing from 4 to 20 pounds, were larger than the usual catch of the area. In addition, the gill nets caught roe shad, striped bass, and mackerel. The appearance of roe shad at this time of the year in these waters was most unusual.

It is too early to predict the extent to which anchor gill nets will be used in the future for cod fishing off Long Island but it has possibilities.

North Atlantic Exploratory Fishery Program

SHRIMP EXPLORATIONS IN GULF OF MAINE COMMENCED BY "DELAWARE" (Cruise 32): Exploratory operations to evaluate commercial shrimp possibilities in the northern Gulf of Maine were commenced by the Service's Exploratory Fishing and Gear Development Section's research vessel Delaware, during a 12-day cruise completed at Boston, Mass., on November 21. A series of 7 tows in waters varying in depth from 70-100 fathoms resulted in small catches of shrimp. During three of the tows the net caught on bottom obstructions and was badly damaged. Operations were carried out in the general area of 42°55'-43°35' north latitude and 69°20'-70°15' west longitude.

In addition, standard commercial otter-trawl nets were operated for bottom species in the South Channel fishing grounds, and a total of 23 tows was made with this type gear. Approximately 6,000 pounds of mixed species, consisting of haddock, ocean perch, hake, whiting, and cod, were frozen or iced aboard the vessel and landed at the Service's East Boston Technological Laboratory for experimental studies.

A standard Iceland otter trawl, with a 116-foot sweep rope and 76-foot headrope, and lined with 1¾-inch mesh netting in the cod end and top belly section, was used for the shrimp fishing. Substantial catches of small whiting, ocean perch, and dogfish were made in this region. Due to the irregular nature of the bottom, a center section of rollers was used with the trawl on all of the tows. While results indicated the existence of shrimp concentrations in the general area at this season of the year, extensive exploration utilizing smaller boats equipped with standard shrimp trawls seems warranted to determine if commercial quantities of shrimp are present.

Pacific Oceanic Fishery Investigations

"JOHN R. MANNING" SURVEYS ALBACORE TUNA DISTRIBUTION OFF HAWAII (Cruise 22): To determine the distribution and abundance of albacore in the area to

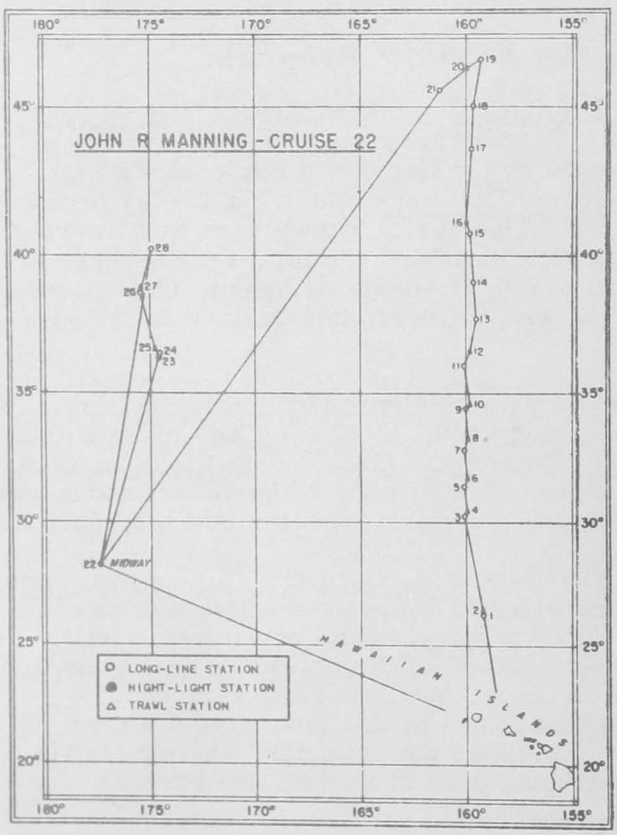
the north and northwest of Hawaii was the purpose of the cruise by the Service's research vessel John R. Manning from September 13 to November 9, 1954. The total catch for the 16 long-line stations fished was: 27 albacore, 22 big-eyed, 5 marlin, 1 broadbill swordfish, 30 dolphin, 180 sharks, 1 wahoo, and 59 Alepisaurus.

In addition to long lining, 5 lines were trolled for 2 hours at each fishing station. Albacore were taken on 160° W. longitude on those stations where albacore were caught on the long-line gear. The 7 troll-caught albacore were of the same size as those taken on the long-line, averaging 15.7 pounds.

Of the 16 stations fished, 13 were on 160° W. and 3 on 175° W. longitude. At each station, 40 to 60 baskets of 13-hook gear were fished. One-half of the baskets were of 5-fathom float lines and the remainder were 15-fathom float lines.

Based on chemical sounding tubes the average depth of the deepest fishing hooks on the 5-fathom float-line gear was 394 feet, while that of the 15-fathom float-line gear averaged 413 feet.

On 160° W. longitude the best albacore catches were made on the two northernmost stations where 9 and 4 albacore were caught. Fishing farther north than 46° 30' N. was prevented by a fuel shortage. Albacore were found farther south on 175° W. than on 160° W. longitude. Small catches were made on all 3 stations fished. The best catch of 9 albacore was made 38° 40' N. latitude.



There was a marked difference in the size of the long-line caught albacore between 160° W. and 175° W. longitude. On 160° W. the albacore were small ranging from 12-23 pounds and averaging 16.1 pounds, while those caught on 175° W. ranged from 6.5-69 pounds and averaged 28.2 pounds.

A tuna-bait survey was conducted at Midway Island. Bait fish observed, by order of abundance, were Hawaiian silversides (iao), small round herring (piha), mountain bass (aholehole), and golden goatfish (weke). The amount observed during the 2 days of survey was in excess of 1,000 buckets (10,000 pounds).

A total of 26 fish were tagged and released. The breakdown by species was: 18 albacore, 6 big-eyed, 1 yellowfin, and 1 great blue shark.

The modified 6-foot Isaacs-Kidd trawl was used successfully on 10 stations; however, the small catches (in most instances not more than a handful) indicate the trawl may not be catching tuna food present in the water layers sampled.

Body measurements for racial studies were taken on 12 albacore, 10 big-eyed, 4 sharks, 3 marlins, and 1 broadbill swordfish (this small broadbill has been preserved for the POFI collection). For food and feeding habits and spawning studies, 9 albacore stomachs and 6 tuna ovaries were preserved.

Surface temperatures were recorded continuously and BT casts made at prearranged intervals. The thermograph was run continuously and showed a gradual decrease in temperature (excepting a few minor fluctuations) up to approximately 43° 45' N. latitude on 160° W. longitude. The temperature then decreased rapidly from 64.5° F. at that position to 60.3° F. at 45°00' N. Subsurface temperatures as obtained with the bathythermograph showed a very sharp thermocline ranging in depth from 90-135 feet on the 160° W. longitude section and from 150-220 feet on the 175° W. longitude section.

One large flock of petrels exceeding 300 in number was sighted at 40°12' N., 174°56' W. longitude. Other bird flocks sighted in northern waters were small migrating flocks.

The two night-light stations (Midway Island and 36°22' N., 174° 35' W.) with the Banner-King trap resulted in very small catches, the latter station having a catch of only one squid.

Approximately 50 percent of the planned work was accomplished. Five storms of varying intensity forced substantial revisions of the cruise plan, and prevented all of the planned fishing on 170° E. longitude. During the most severe storm the winds blew from 60 to 70 knots and the seas were from 25 to 35 feet in height. Of 31 days spent north of 35° N. latitude (area of possible albacore fishing), 16 fishing days were lost due to bad weather.

This program has been intensified with the allocation of funds provided by the Saltonstall-Kennedy Bill, P. L. 466 (83rd Congress).

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ALBACORE TUNA RESEARCH OFF HAWAII CONTINUED BY "CHARLES H. GILBERT" (Cruise 17): Oceanographic observations, plankton sampling, and trolling for albacore tuna were done by the Service's research vessel Charles H. Gilbert as it continued the research on albacore tuna north of Hawaii. The cruise which lasted 50 days and was completed on November 7, was designed to: (1) make detailed observations of the chemical and physical characteristics of the subtropical convergence north and west of the Hawaiian Islands; (2) make standard 100-meter zooplankton hauls; (3) observe the abundance of surface tunas; (4) make routine meteorological observations; (5) obtain bottom profiles.

Albacore were caught by surface trolling on each crossing of the zone of temperature discontinuity. The total catch was 48 fish ranging from 6-22 pounds 25 of which were taken during an hour at about 42° N. latitude, 172° E. longitude.

Forty hydrographic stations were occupied, but 25 of the stations on the original cruise plan were omitted because of rough weather. Except for a small area north of 39° N. on 180° the vertical temperature structure was that which is typical of the higher latitudes in summer. The depth of the thermocline was about 100-120 feet and the temperature gradient at the top of the thermocline was very steep, frequently dropping 5°-6° F. in as many feet. Along 180° longitude north of 39° N., the warm surface layer was starting to break down. The thermocline varied greatly in depth and often represented a temperature drop of only 1°-2° F. This condition may have been the result of mixing induced by the high winds resulting from a series of low pressure cells that passed over the area just prior to the cruise period.

Standard 100 M zooplankton hauls with a 30XXX net were made at all hydrographic stations. The hauls were very slight over the southern part of the area, the uncorrected volumes being as low as 10 ml. The largest hauls were made in the vicinity of the temperature discontinuity where the average uncorrected volume was between 150 and 200 ml. with a maximum of 2,000 ml. at the station at 42°14' N., 169°53' W.

Synoptic weather observations were made. Radio conditions prevented the transmission of some observations over the U. S. Coast Guard to the Fleet Weather Central at Pearl Harbor.

The EDO depth recorder failed completely after about 10 days of operation.

* * * * *

AUTOMATIC DEVICE FOR ATTACHING FLOAT AND HOOK DROPPERS TO STEEL MAIN LINE TESTED BY "MAKU" (Cruise 2): A new automatic device for attaching float and hook droppers to the steel main line of long-line gear ("D"-ring) was tested by the Hawaiian Fish and Game vessel Makua under the direction of a Fishery Methods and Equipment Specialist from the Service's Pacific Oceanic Fishery Investigations. The gear was fished for one day in the Waianae area, yielding a catch of two dolphin (mahimahi) and one yellowfin tuna. Field tests of the long-line gear were conducted one day of the two-day cruise (November 4-5) and a fishing station (lat. 21°24' N., long. 158°22' E.) was occupied on the second day. The gear tested was classified as "D"-ring gear because of the arrangement for attaching droppers. One setting failure was noted out of 178 droppers attached.

No serious difficulties were encountered either in setting or recovering gear. The "D"-rings aligned themselves properly on the winch drum and it was not necessary to stop the winch to insure that they were straight. Setting and recovery times were slower than for cotton gear but this was due in part to inexperience of the crew in handling a new type of gear.

Saltonstall-Kennedy Act Fishery Projects

NORTH ATLANTIC EXPLORATORY FISHERY PROGRAM ACTIVATED: The 140-foot research vessel Delaware, which recently completed a technological study on freezing fish at sea, has been transferred to the Exploratory Fishing and Gear Development Section of the Service's Branch of Commercial Fisheries. A comprehensive program of exploration and gear research is being developed for the New England area. This new project is being activated with funds made available by the Saltonstall-Kennedy legislation, P. L. 466, (83rd Congress). This program includes a systematic exploration of potential fishing grounds in waters beyond the depths presently fished by the fleet, midwater trawling experiments, and shrimp exploration, among other objectives. The Delaware will be operated on a year-round basis, and results of the program will be made immediately available to the fishing industry.

The Delaware left East Boston on December 8 to explore potential shrimp fishing grounds in the Gulf of Maine. On return from this trip, new electronic navigation aids and fish-finding equipment will be installed. Additional trawling cable will be installed to allow fishing to depths of 400 fathoms. Other modifications will be made to equip the vessel for full-scale exploratory fishing.

Robert C. Wilson has been appointed Chief of the North Atlantic Exploratory Fishery Program. He reported for duty at the East Boston headquarters on December 6, 1954, and his experience in fisheries research qualifies him well for this position. A graduate of the University of Washington School of Fisheries, he has spent considerable time in and around the commercial fisheries of the Pacific Coast and Alaska. For four years, during World War II he was a deck officer in the Navy. His experience in fisheries research includes $7\frac{1}{2}$ years with the California Department of Fish and Game, during which time he was in charge of one of the State's large sea-going research vessels. Wilson has had experience in trawling, gill netting, long lining, trolling, and live-bait tuna fishing.

Service to Produce Another Shrimp Film

The Fish and Wildlife Service on December 7, 1954, signed a contract with The Peelers Company of New Orleans for the production of a new educational film on shrimp. The Peelers Company, manufacturers of automatic shrimp peeling and deveining machinery, will finance the film which will be in sound and color and have a running time of 13 or 14 minutes.

Tentatively titled Shrimp Tips from New Orleans, this motion picture will have a New Orleans locale and will emphasize shrimp recipes that are characteristic of that part of the country. It will contain information of value not only to the housewife and home economist but also to all purchasers of shrimp, including institutional users.

The new motion picture will not duplicate any of the material shown in Shrimp Please, the Service film released in October depicting Gulf of Mexico shrimp fishing operations, canning, breading, drying, and freezing processes, as well as methods of preparation. The decision to make another film on shrimp was reached because Shrimp Please stimulated so much interest in shrimp and produced so many requests for additional information on the purchasing, preparation, and serving of shrimp dishes.

The Service's Branch of Commercial Fisheries will supervise the production. Although work is due to begin shortly, almost a year will be required to complete the film for distribution.

The Fish and Wildlife Service will distribute the film through some 65 film libraries without charge. It will also be available for television use.

Shrimp Production in South Atlantic and Gulf States, 1953/54 Season

The catch of shrimp in the South Atlantic and Gulf States during the 1953/54 season (July 1-June 30) was larger than during the previous season, according to

Table 1 - Shrimp (heads on) Production in South Atlantic and Gulf States 1953/54 Season (July 1, 1953-June 30, 1954)

Month	North Carolina	South Carolina	Georgia 2/	Florida	Alabama	Mississippi & Louisiana	Texas
1953	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
July	1/	710,048	353,605	5,216,543	748,356	8,095,080	6,604,324
August	1/	944,684	276,096	4,130,844	100,212	10,951,920	8,886,419
September	1/	891,902	189,504	4,917,403	585,060	10,353,105	8,642,186
October	1/	741,814	662,088	6,656,798	542,798	15,612,660	10,021,777
November	1/	455,574	234,360	5,879,720	492,922	9,419,260	7,459,168
December	1/	94,752	31,752	5,510,610	380,020	6,472,515	4,313,341
1954							
January	34,600	-	1/	5,332,270	1/	3,807,384	4,810,424
February	1,900	-	1/	4,195,101	1/	3,305,505	2,843,810
March	-	-	1/	5,606,451	1/	1,292,760	2,653,636
April	-	-	1/	2,569,237	103,687	4,490,191	2,886,880
May	66,500	-	1/	2,603,645	247,380	8,913,240	3,068,453
June	1,545,800	655,924	1/	2,271,692	692,580	11,922,960	3,153,585
Total	1/	4,494,653	1/	53,789,747	1/	94,636,580	65,344,003

1/ Data not available.
2/ Data for Georgia represent the sale of prepaid tax stamps instead of actual landings.
Note: As reported by respective state agencies. Original data in barrels; converted to heads-on shrimp on basis of 210 pounds per barrel (equivalent to 125 pounds heads-off shrimp). To convert to headless shrimp, multiply by .595.

preliminary data compiled by the U. S. Fish and Wildlife Service from reports received from the various state fishery agencies (see table). Higher production was reported in South Carolina, Florida, Mississippi, Louisiana, and Texas. Data were

not complete for North Carolina, Georgia, and Alabama, but the increase in those states for which information is available is sufficient to indicate that the 1953/54 season was probably a new record.

During the 1953/54 season the catch of shrimp on a heads-on basis by states was: Florida 53.8 million pounds; Louisiana and Mississippi 94.6 million pounds; and Texas 65.3 million pounds.

U. S. Foreign Trade

EDIBLE FISHERY PRODUCTS, SEPTEMBER 1954: United States imports of fresh, frozen, and processed edible fish and shellfish in September 1954 amounted

United States Foreign Trade in Edible Fishery Products, Sept. 1954 with Comparisons

	Sept. 1954		Sept. 1953		Year 1953	
	Quantity	Value	Quantity	Value	Quantity	Value
	1,000 Lbs.	Million $	1,000 Lbs.	Million $	1,000 Lbs.	Million $
Imports:						
Fish & shellfish: fresh, frozen & processed 1/ . .	60,285	15.3	59,345	15.9	724,656	193.2
Exports:						
Fish & shellfish: processed 1/ only (excluding fresh and frozen) . . .	5,416	1.3	5,616	1.2	58,920	14.4

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

to 60.3 million pounds (valued at $15.3 million), according to a Department of Commerce summary tabulation (see table). This was a decrease of 27 percent in quantity and 16 percent in value as compared with August imports of 83.1 million pounds (valued at $18.3 million). Compared with a year earlier, September 1954 imports were up 2 percent in quantity but down 4 percent in value.

Exports of processed edible fish and shellfish (excluding fresh and frozen) in September 1954 totaled 5.4 million pounds (valued at $1.3 million)--an increase of 33 percent in quantity and 44 percent in value as compared with August exports of 4.1 million pounds (valued at $0.9 million). September 1954 exports were down 4 percent in quantity from a year ago but were 8 percent higher in value.

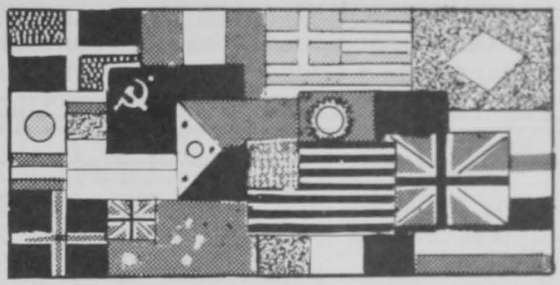
* * * * *

EXPORTS OF FATS AND OILS SET NEW RECORD IN 1953/54: A phenomenal expansion in the exported quantities of fish oils and other oils pushed the total United States export volume of fats, oils, and oilseeds--in terms of oil equivalent--to a new high level in the 1953/54 marketing year ending last September 30.

Exports of fish oils (includes hydrogenated fish oils and fish-liver oils) totaled 157,443,000 pounds in 1953/54, setting a new record, compared with 92,059,000 pounds in 1952/53.

* * * * *

WATER-BORNE FISHERY PRODUCTS IMPORTS AND EXPORTS, 1953: United States water-borne fishery products (all fish and shellfish and unmanufactured shells) imports and inbound "in-transit" shipments in 1953 totaled 265,997 long tons (shipping weight) as compared with 250,602 tons in 1952 (table 1). (Fish and marine-animal oils, fish-liver oils, fish meal, and other miscellaneous products are not included.) There was an increase of 5 percent in shipments into Great Lakes ports and 6 percent in shipments into seaboard ports, according to an October 1954 bulletin from the Bureau of the Census.



Water-borne fishery products exports and outbound "in-transit" shipments decreased for seaboard ports in 1953 but increased substantially for Great Lakes ports

Table 1 - U. S. Water-Borne Fishery Products Imports and Inbound In-Transit Shipments (Shipping Weight), 1953 and 1952

Item	1953			1952		
	Total U. S.	Great Lakes Ports	Seaboard Ports	Total U. S.	Great Lakes Ports	Seaboard Ports
	(Long Tons)					
Fish, fresh or frozen	100,672	991	99,681	108,601	1,197	107,404
Fish and fish products, otherwise prepared	121,920	3,128	118,792	104,093	2,749	101,344
Shellfish and products	38,516	29	38,487	34,191	12	34,179
Sea shells, unmanufactured	4,889	-	4,889	3,717	-	3,717
Total	265,997	4,148	261,849	250,602	3,958	246,644

Note: Fish and marine-animal oils, fish-liver oils, fish meal, and other miscellaneous products are not included.

(table 2). The total shipments for all ports amounted to 48,817 long tons (shipping weight) in 1953 as compared with 51,699 tons in 1952. (Fish and marine-animal oils, fish-liver oils, fish meal, and other miscellaneous products are not included.)

Table 2 - U. S. Water-Borne Fishery Products Exports and Outbound In-Transit Shipments (Shipping Weight), 1953 and 1952

Item	1953			1952		
	Total U. S.	Great Lakes Ports	Seaboard Ports	Total U. S.	Great Lakes Ports	Seaboard Ports
	(Long Tons)					
Fish & products, fresh	1,988	169	1,819	1,081	-	1,081
Fish & products, canned	30,668	5	30,663	34,901	-	34,901
Fish & products, n.e.c.	5,141	1	5,140	8,164	-	8,164
Shellfish & products	6,439	-	6,439	5,165	1	5,164
Sea shells, crude	4,541	-	4,581	2,388	-	2,388
Total	48,817	175	48,642	51,699	1	51,698

Note: Fish and marine-animal oils, fish-liver oils, fish meal, and other miscellaneous products are not included.

These data have been made available by the Bureau of the Census in answer to a large number of recent requests for statistical information on the foreign water-borne trade handled by United States ports in the Great Lakes region. These requests are due to the United States participation in the St. Lawrence Seaway Project. To facilitate the analysis of this trade with that of the seaboard regions, some comparative data for all coastal areas has been compiled.

Washington

PUGET SOUND CANNED SALMON PACK, 1954: The total pack of canned salmon in the Puget Sound area of Washington in the 1954 season amounted to 532,598 standard cases (Puget Sound-caught fish only), according to a preliminary report

Puget Sound Canned Salmon Pack, in Standard Cases, 1/ 1954 with Comparisons

Species	1954 2/	1953	1952	1951	1950
	(Standard Cases 1/)				
Red or sockeye	480,180	178,323	114,638	118,151	116,458
Chinook or king	2,096	2,965	5,750	7,570	6,407
Silver or coho	16,047	35,705	108,161	76,580	78,360
Pink	25	443,524	760	438,732	967
Chum or keta	34,250	35,598	126,372	94,113	182,119
Total 3/	532,598	696,115	355,681	735,146	384,311

1/ Converted to the equivalent of 48 1-pound cans.
2/ Preliminary.
3/ Puget Sound-caught fish only. In addition, the pack by Puget Sound canneries of salmon received from Alaska and British Columbia included: chinook 3,025 cases, chum 203,742 cases, pink 7,304 cases, silver 6,404 cases, sockeye 44,539 cases--total 265,014 cases.

from the State of Washington Department of Fisheries (see table). This was a decline from the 696,115 standard cases packed in 1953, but the 1954 season was an off-year for pink salmon. There was an excellent run of red or sockeye salmon and the pack for this species was almost 3 times greater than in 1953 and over 4 times higher than any of the previous 3 years. The packs of the other salmon species were down slightly in 1954.

Wholesale Prices, November 1954

Higher prices for fishery products in November 1954 were attributed to light production and improved demand. The month's over-all edible fish and shellfish (fresh, frozen, and canned) wholesale index was 102.8 percent of the 1947-49 average (see table)--1.0 percent higher than October 1954, but 3.1 percent below a year earlier.

Because the groundfish catch in New England was light in November, the price for large offshore drawn haddock at Boston rose 21.2 percent above the previous month, but was still 9.2 percent lower than in November 1953. West Coast halibut and salmon prices at New York City in November were down 4.7 and 9.3 percent, respectively, from October, but were higher than a year earlier. Prices of whitefish and lake trout at Chicago were higher in November than the previous month, while whitefish and yellow pike prices at New York City were lower. All fresh-water fish prices were higher than the previous year, except yellow pike which was substantially lower. The November index for the drawn, dressed, or whole finfish subgroup was 1.8 percent higher than October and 2.5 percent above November 1953.

New York's Fulton Fish Market.

Fresh haddock fillet prices at Boston in November were substantially above (47.8 percent) October due to higher ex-vessel prices, but were still 18.4 percent below a year earlier. November shrimp production was good and prices remained unchanged. The November subgroup index for fresh processed fish and shellfish was 3.0 percent higher than in October but 6.6 percent lower than in November 1953.

Lower prices for frozen shrimp and ocean perch fillets only partially offset higher haddock fillet prices and caused the index for the frozen processed fish and

shellfish subgroup to drop 0.9 percent from October to November. Flounder fillet prices were the same as in October. The November 1954 index for this subgroup

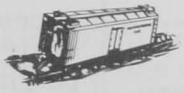
Table 1 - Wholesale Average Prices and Indexes for Edible Fish and Shellfish, November 1954 and Comparisons

Group, Subgroup, and Item Specification	Point of Pricing	Unit	Avg. Prices1/ ($)		Indexes (1947-49=100)			
			Nov. 1954	Oct. 1954	Nov. 1954	Oct. 1954	Sept. 1954	Nov. 1953
ALL FISH & SHELLFISH (Fresh, Frozen, & Canned)					102.8	101.8	113.9	106.1
Fresh & Frozen Fishery Products:					106.8	104.9	124.8	114.0
Drawn, Dressed, or Whole Finfish:					115.6	113.6	144.9	112.8
Haddock, lge., offshore, drawn, fresh	Boston	lb.	.11	.09	114.8	94.7	167.3	126.4
Halibut, West., 20/80 lbs., drsd., fresh or froz.	New York	lb.	.30	.32	93.4	98.0	139.3	91.8
Salmon, king, lge. & med., drsd., fresh or froz.	New York	lb.	.57	.63	127.5	140.5	127.5	115.7
Whitefish, L. Superior, drawn, fresh	Chicago	lb.	.63	.53	154.9	130.1	142.5	85.5
Whitefish, L. Erie pound or gill net, rnd., fresh	New York	lb.	.57	.63	115.2	126.4	151.6	101.1
Lake trout, domestic, No. 1, drawn, fresh.	Chicago	lb.	.63	.58	128.1	117.8	108.6	107.6
Yellow pike, L. Michigan & Huron, rnd., fresh	New York	lb.	.35	.50	82.1	117.2	129.0	102.0
Processed, Fresh (Fish & Shellfish):					99.5	96.6	104.5	119.3
Fillets, haddock, sml., skins on, 20-lb. tins	Boston	lb.	.31	.21	105.5	71.4	139.5	129.3
Shrimp, lge. (26-30 count), headless, fresh	New York	lb.	.49	.50	77.4	79.0	77.4	107.9
Oysters, shucked, standards	Norfolk	gal.	5.00	5.00	123.7	123.7	126.8	129.9
Processed, Frozen (Fish & Shellfish):					88.9	89.7	91.6	107.0
Fillets: Flounder (yellowtail), skinless, 1-lb. pkg.	Boston	lb.	.38	.38	98.2	98.2	100.8	108.7
Haddock, sml., skins on, 1-lb. pkg.	Boston	lb.	.29	.27	91.0	84.7	95.7	100.4
Ocean perch, skins on, 1-lb. pkg.	Boston	lb.	.27	.28	109.8	111.8	111.8	105.9
Shrimp, lge. (26-30 count), 5-lb. pkg.	Chicago	lb.	.47	.50	70.5	76.4	74.8	109.9
Canned Fishery Products:					96.8	97.3	97.7	94.5
Salmon, pink, No. 1 tall (16 oz.), 48 cans/cs.	Seattle	case	19.70	19.70	104.4	104.4	104.4	93.9
Tuna, lt. meat, chunk, No. 1/2 tuna (6-1/2 oz.), 48 cans/cs.	Los Angeles	case	12.90	12.90	93.0	93.0	95.5	95.5
Sardines, Maine, keyless oil, No. 1/4 drawn (3-1/4 oz.), 100 cans/cs.	New York	case	6.70	6.95	71.3	74.0	71.3	87.3

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

was well below (16.9 percent) a year earlier because all items were priced substantially lower, except ocean perch fillet prices which were 3.6 percent higher.

Canned Maine sardine prices were down 3.6 percent from October to November as the season closed with a good pack. Canned salmon and tuna prices in November remained the same as the previous month. The salmon canning season closed with a moderate pack. The canned fishery products index in November 1954 was 2.4 percent higher than November 1953 because higher salmon prices were not completely offset by lower prices for canned tuna and Maine sardines.



Haddock Fillet Promotion Campaign

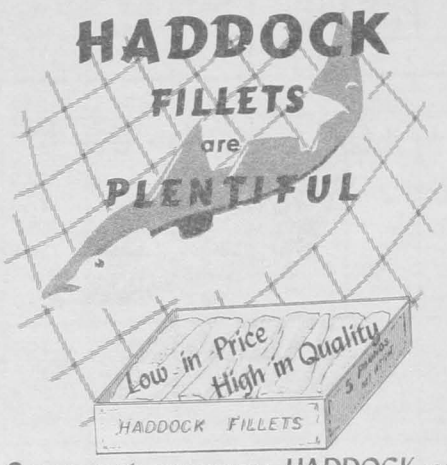
SERVICE SEEKS SUPPORT OF FOOD TRADES: Full support by the food trades to a special haddock fillet promotion campaign which the Boston haddock industry is sponsoring to move the liberal supplies on hand was asked by the Secretary of the Interior on January 13.

After investigating the critical nature of the problem, the Department of the Interior through its Fish and Wildlife Service is cooperating in the program at

SPECIAL FISHERIES BULLETIN

MARKETING

Department of the Interior — Fish and Wildlife Service



Government encourages HADDOCK use

THE DEPARTMENT OF INTERIOR IS COOPERATING WITH THE HADDOCK INDUSTRY IN A SPECIAL MARKETING PROGRAM TO INCREASE HADDOCK USE. THE DEPARTMENT OF AGRICULTURE LISTS HADDOCK AS A PLENTIFUL FOOD FOR JANUARY AND FEBRUARY.

TWO GOVERNMENT-TESTED RECIPES ESPECIALLY FOR INSTITUTIONAL USE

BAKED HADDOCK FILLETS

YIELD: 100 PORTIONS — PORTION: 3½ OUNCES

INGREDIENTS	WEIGHTS	MEASURES
Haddock fillets, frozen	30 pounds	
Butter or other fat, melted	2 pounds	1 quart
Lemon juice	1 pound	1 pint
Onions, grated	1 pound	1 pint
Paprika	1 ounce	¼ cup
Salt	2½ ounces	5 tablespoons
Pepper, black	½ ounce	1 tablespoon
Parsley, chopped	½ ounce	¼ cup

1. Thaw frozen fillets.
2. Divide fillets into 100 portions, using 4½ ounces as average weight.
3. Combine butter, lemon juice, onion, paprika, salt and pepper.
4. Place fish in a single layer in well-greased baking pans and pour sauce over fish.
5. Bake in a moderate oven, 375° F., for 30 to 40 minutes depending on the thickness of the fillets.
6. Sprinkle parsley over fish and serve with sauce and lemon wedges.

DEEP-FAT FRIED HADDOCK FILLETS

YIELD: 100 PORTIONS — PORTION: 4½ OUNCES

INGREDIENTS	WEIGHTS	MEASURES
Haddock fillets, frozen	30 pounds	
Egg, beaten	2 pounds	1½ dozen
Milk		3/4 quart
Salt	2½ ounces	5 tablespoons
Pepper, black	½ ounce	1 tablespoon
Bread crumbs, dry	2 pounds	2 quarts
Flour	2¼ pounds	2 quarts

1. Thaw frozen fillets.
2. Divide fillets into 100 portions, using 4½ ounces as an average weight.
3. Combine egg, milk, salt and pepper.
4. Dip fish in egg-wash
5. Combine crumbs and flour.
6. Roll fish in crumb mixture.
7. Fry in deep fat, 350° F., for 2 to 4 minutes depending on the thickness of the fillets.
8. Drain on absorbent paper.
9. Serve with lemon wedge or a sauce.

the request of fishery trade associations and the fishermen's union. During the subsequent four-weeks's period, a concentrated effort was scheduled to move these surplus stocks of fish into trade channels.

Although record stocks of frozen small haddock fillets were reported in storage, leaders of the haddock industry were confident that this inventory could be substantially reduced by the special "Eat More Haddock" campaign. The surplus holdings, reports the industry, consisted of recently-packed merchandise.

To move this frozen haddock as rapidly as possible, the campaign concentrated on expanding the use of haddock by institutional and food service consumers, such as schools, hospitals, and restaurants. The industry also prepared point-of-sale and other merchandising aids for use in encouraging consumer consumption of these haddock fillets. Since most of the surplus stock was in cellophane-wrapped small fillets (about two to a pound), it offered consumers an extra good buy.

The Fish and Wildlife Service aided the industry's promotional efforts through intensified work with schools, institutions, and food-trade groups. Likewise, information and educational activities were increased so as to attract additional consumer attention. The Service also work closely with the United States Department of Agriculture in this campaign.

The campaign was given it biggest push in the so-called "haddock belt" which includes the northeastern and northcentral States, extending as far south as North Carolina.

The Service's phase of this campaign is being financed by funds provided by the Saltonstall-Kennedy Act, P. L. 466 (83rd Congress).

As of Tuesday, January 18, assurances of support for this cooperative industry-Government haddock fillet campaign had been received from the top executives of the following food trade associations and organizations:

The Great A. & P. Tea Company
U. S. Wholesale Grocers Association
National Food Brokers Association
National Restaurant Association
Walgreen Drug Stores

For its part, the National Restaurant Association was mailing a special Service-prepared bulletin on the haddock supply situation to its 7,000 members.

By the same date the Service had completed arrangements for the immediate distribution of a special Service-prepared haddock marketing bulletin to a total of 13,500 schools with lunch programs within the states of New York, Pennsylvania, New Jersey, Virginia, Ohio, Massachusetts, West Virginia, and Kentucky.

The industry, represented by the Massachusetts Fisheries Association, the National Fisheries Institute, and the Atlantic Fishermen's Union was giving all possible assistance to this marketing program. The industry prepared point-of-sale and other merchandising material, and enlisted the cooperation of its distributors to give this program greatest effectiveness.

January 28 was set as the date on which all segments of the food industry and the Government would be fully united behind this haddock promotion.

TECHNOLOGICAL PROGRESS IN THE MEATPACKING INDUSTRY

Marketing Research Report No. 59, Technological Progress in the Meatpacking Industry, 1919-47, by Vernon W. Ruttan, recently issued by the U. S. Department of Agriculture, points out:

This study was an attempt to determine the extent of technological progress in the meatpacking industry. A satisfactory approximation of the progress to date in this industry is an important step in comparing the rate of technological change in the meatpacking with other industries. This subject is of economic importance not only because of the magnitude of the livestock and meatpacking industries, but also because of uncertainty as to the effects of newer production techniques developed during the last few decades.

During the last several decades, developments in refrigeration, transportation, power, and chemical and biological research have had a pronounced effect on the meatpacking industry. The resulting technological progress has not been spectacular, but it has made a significant contribution to increasing the output of the industry.

Computations based on the net input-output approach indicate that the input required by the meatpacking industry to produce a given output probably fell, by roughly 25 percent or more, from 1919 to 1947. Reduced input of capital and an increased output from a given volume of livestock are the two principal reasons for this progress.

No doubt a number of meatpacking plants could make better use of presently known production techniques than they are now doing. It is probable, however, that further significant increases in efficiency in the industry as a whole will be dependent on further technological developments--particularly those that will make possible the performance by mechanical means of certain tasks that are now done by labor--rather than on the wider adoption of present techniques.

This publication with 40 pp. is for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., at 20 cents per copy.