

# TRENDS AND DEVELOPMENTS

## Additions to the Fleet of U. S. Fishing Vessels

A total of 22 vessels of 5 net tons and over were issued first documents as fishing craft during September 1955, according to the U. S. Bureau of Customs. This was a decrease of 27 vessels (55 percent), compared with the 49 fishing craft documented for the first time during the corresponding month of 1954.

Section	September		Jan. -Sept.		Total 1954
	1955	1954	1955	1954	
. . . . . (Number) . . . . .					
New England . . .	-	1	16	22	23
Middle Atlantic . .	-	1	11	14	15
Chesapeake . . . .	2	9	34	76	93
South Atlantic . .	3	14	50	97	119
Gulf . . . . .	8	11	77	283	313
Pacific . . . . .	6	12	107	100	117
Great Lakes . . . .	1	-	7	3	6
Alaska . . . . .	1	1	31	23	27
Hawaii . . . . .	1	-	3	1	1
Puerto Rico . . . .	-	-	-	-	2
Unknown . . . . .	-	-	-	1	1
<b>Total . . . . .</b>	<b>22</b>	<b>49</b>	<b>336</b>	<b>620</b>	<b>717</b>

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

During September of the current year, the Gulf area led all others with 8 newly-documented craft, followed by the Pacific area with 6, the South Atlantic area with 3, the Chesapeake area with 2, and the Great Lakes, Alaskan, and Hawaiian areas with 1 each. The New England, Middle Atlantic, and Puerto Rican areas had none.

During the nine-month period ending with September 1955, a total of 336 vessels

were documented for the first time as fishing craft, compared with 620 for the corresponding period of last year--a decrease of 46 percent.



### American Samoa

**EXPORTS OF CANNED TUNA AND FISH MEAL INCREASE:** The increasing importance of the tuna and the fish meal industries of American Samoa is indicated by figures recently released at Pago Pago, according to the September 1955 issue of the Pacific Islands Monthly.

During fiscal year 1953/54, a total of 8,176 cases of canned tuna and 456 sacks of fish meal were exported as compared with 66,160 cases and 3,319 sacks for 1954/55. The export value for the tuna and fish meal was about \$1 million in 1954/55.

It was stated that 32 Japanese fishing vessels are supplying the tuna cannery and 300 Samoans are employed ashore. Shipping companies are pleased about the new industry. One ship picked up 18,000 cases of canned tuna in July and a second ship was reported picking up an estimated 40,000 cases in mid-August.

## California

ALL-NYLON PURSE SEINE FOR TUNA VESSEL: The Anthony M, the largest known tuna purse seiner in the world and operating in the California tuna fishery, is now being equipped with an all-nylon purse seine, which is the first known tuna net of all-nylon webbing. The nylon web was manufactured by a netting company, and the price was not revealed. The net, which is approximately 450 fathoms in length, will weigh much less than one-half of the standard cotton purse seine and is completely impervious to the weather and the elements, and requires no preservative treatment, such as tar or chemical net dips. The Anthony M is also being equipped with a new light-weight "Puretic Power Block," for hauling the net aboard after a set.

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NIGHT SPOTTING OF SARDINE SCHOOLS BY AIRPLANE SUCCESSFUL: A new development the latter part of 1955 in the purse-seine night fishery for sardines off the coast of California is the use of small planes for spotting the schools and directing the setting of the seine. The sardine schools are clearly visible from the air at altitudes of from 500 to 1,000 feet, according to the Service's Market News Reporter at San Pedro.

After the schools of sardines are spotted by the airplane, the pilot gives detailed instructions as to when the net skiff should be dropped, and the circle around the fish made. During the course of a six-hour flight, one pilot in a small plane successfully set nine purse seiners on sardine schools estimated to total about 500 tons.

At the present time over one-half of the purse-seine fleet is depending on the spotting planes to locate sardine and mackerel schools. It is believed that this method of spotting and setting on schools of pelagic fish has tremendous possibilities. There are three planes now operating out of San Pedro, and they scout the Southern California fishing areas all night long when the seiners are out.

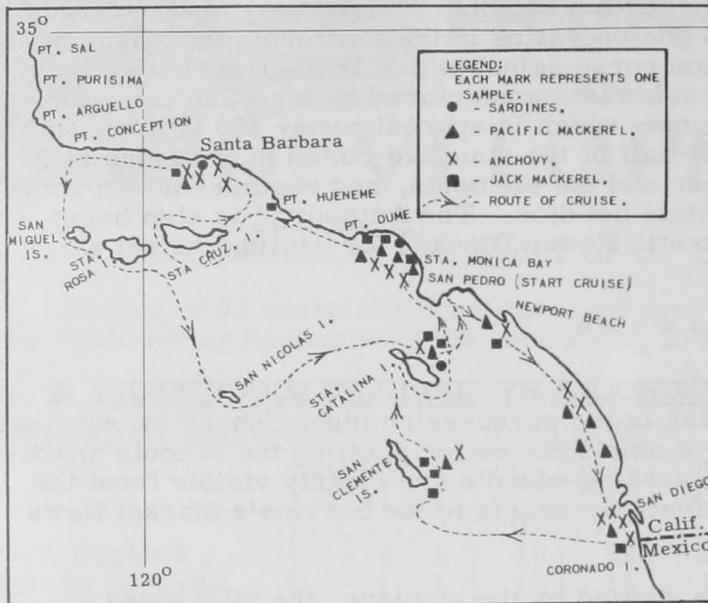
The pilot works on a share basis of 5 percent of the gross stock and it is estimated that his share of the proceeds of the trips will average close to 200 dollars based on an average catch of 100 tons.

In the 1955/56 sardine season there has been an increase in California in the use of airplanes to locate sardine schools and set the seiners on fish. Scouting planes in the past have been used to a small extent in the daytime fishery for anchovies and mackerel.

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SARDINE, ANCHOVY, AND MACKEREL POPULATIONS SURVEYED BY "YELLOWFIN" (Cruise 55-Y-8): A census of the populations of sardines, northern anchovies, jack mackerel, and Pacific mackerel off the Southern California coastal area was the chief purpose of cruise 8 of the Yellowfin, a research vessel operated by the California Department of Fish and Game Marine Fisheries Branch. The secondary purpose was to mark and hold for observation various hook-and-line specimens with experimental tags. The vessel sailed October 5 and returned October 24, 1955, to Los Angeles Harbor. Operations were conducted along the coast of Southern California from Pt. Conception to the California-Mexico boundary including portions of San Clemente, Santa Catalina, San Nicolas, Santa Barbara, Anacapa, Santa Cruz, Santa Rosa, and San Miguel Islands.

A total of 130 light stations were occupied, of which 3 yielded sardines, 14 Pacific mackerel, 12 jack mackerel, 17 northern anchovies. At 7 of the light stations, conditions prevented use of the blanket net but observations were made as follows: 3 stations Pacific mackerel, 1 jack mackerel, 3 anchovies. Of the 3 sardine samples taken, the size range varied from a maximum 228 mm. standard length (10.5 inches total length) to a 191 mm. minimum standard length (8.8 inches total length). Throughout the area surveyed, sardines were most abundant around the northern Channel Islands and Point Huene-me. Pacific mackerel, jack mackerel, and northern anchovies were seen in nearly all the areas surveyed. It appears that sardine distribution and abundance is similar to that of 1954.



M/V Yellowfin Cruise 55-Y-8 of October 5-24, 1955.

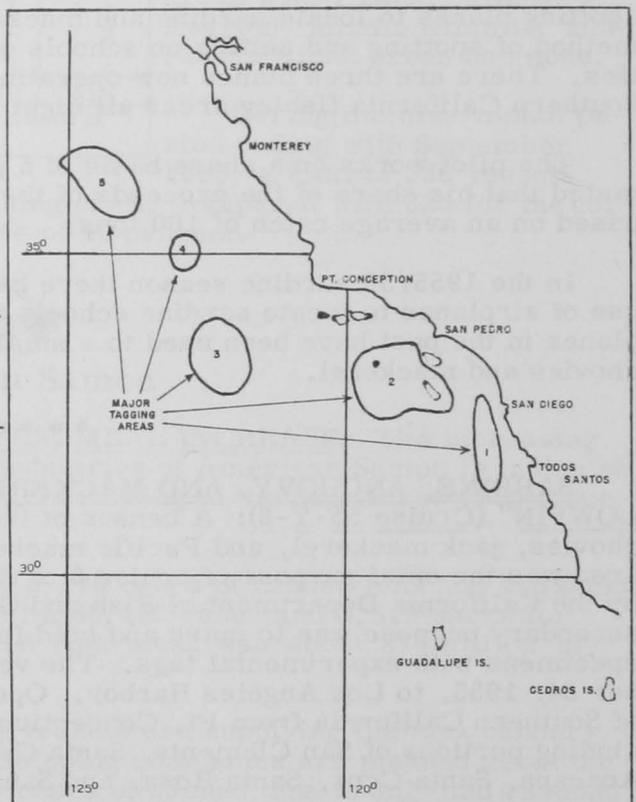
Five specimens of white croaker, kelp bass, and Pacific mackerel were taken by hook and line during daytime anchorages. These fishes were tagged with present and experimental tagging materials and are being held in aquaria.

The Yellowfin scouted for fish schools a total of 506 miles--283 schools were observed visually and on the scanar, of which it was estimated that 23 contained sardines, 87 mackerel, 43 anchovies, 27 sauries, 103 unknown.

Surface temperatures, bathythermograph casts, and reversing thermometer casts were taken at all stations. Surface temperatures throughout the cruise ranged from a minimum of 13.5° C. (56.3° F.) at San Miguel Island to a maximum of 18.7° C. (65.7° F.) at La Jolla (Scripps pier). Sardines were sampled where surface temperatures ranged from 15.2° C. (59.4° F.) to 16.6° C. (61.9° F.).

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**ALBACORE TAGGING TRIP COMPLETED BY THE "ARCTIC":** The commercial fishing vessel Arctic returned from an albacore tuna tagging cruise (Cruise 55-C-6) on October 17, 1955. During the cruise (started from San Pedro on August 4, 1955) 216 albacore ranging 20.4-25.5 inches in size were tagged with type G ("spaghetti") tags. The tagging was conducted to further research



M/V Arctic, albacore tagging (Aug. 4-Oct. 17, 1955), Cruise 55-C-6.

on California's Department of Fish and Game studies of the population, growth rates, and migratory habits of the albacore. Additional experimental work was performed on tags colored pink, blue, and white to determine if the color has any relationship to recovery success.

The area of operations extended from 40 miles WSW. of San Martin to 125 miles SW. of the Farallon Islands. The surface water temperatures at points albacore were caught ranged from 15.0° C. (59° F.) to 20.2° C. (68.4° F.).

Other observations and activities included: 1. Recording daily weather and sea condition, including barometric pressure, depth and color of water, and air temperatures.

2. All albacore were caught by trolling different kinds of lures. The most effective were yellow and green and red and white feathered jigs and light-green rubber squids. Salted anchovies were used to attract the schools of fish to the jigs.

3. On August 5, approximately 40 miles NW. of San Clements Island, 5 whales were sighted. Also in the same area (water temperature 63° F.) there were numerous Verella lata on the surface of the water.

4. Between October 8 and 10 a group of 15 to 20 whales were sighted 130 miles SW. of the Farallon Islands. They were tentatively identified as humpback.



## Cans--Shipments for Fishery Products, January-October 1955



Total shipments of metal cans for fish and sea food during January-October 1955 amounted to 91,356 short tons of steel (based on the amount of steel consumed in the manufacture of cans), compared to 92,468 short tons for the same period last year.

Shipments of metal cans for fishery products increased sharply in October 1955.

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.



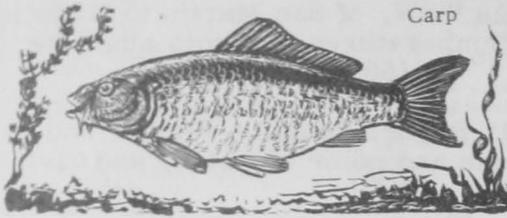
## Carp Control Project Completed at Malheur Refuge

A mammoth carp control project in waters of the Malheur National Wildlife Refuge in southeastern Oregon has been completed, Secretary of the Interior Douglas McKay stated December 8, 1955.

The Malheur rehabilitation project was done primarily in the interest of the migratory waterfowl which use the lake and the adjacent area for a resting and feeding spot. Most such rehabilitation jobs have been done primarily to rid fishing waters of trash fish to permit restocking with more acceptable types.

It is estimated that at least 1,500,000 carp died of the rotenone toxicant placed in Malheur Lake by the Fish and Wildlife Service in late October 1955. It will be several years before the carp again increase to numbers capable of doing serious damage to the waterfowl feeding areas in the lake, Fish and Wildlife Service spokesmen said.

After the main eradication job was complete, careful scrutiny of the lake was made and isolated areas, apparently fresh-water seeps, which still harbored small bunches of carp, were given added treatment. Wildlife officials say that 99 barrels of rotenone toxicant were used in the 10,000-acre lake. Additional amounts were used to treat more than 100 miles of streams and innumerable ponds and lagoons in the area.



Rotenone kills fish by affecting the gill as it is drawn through the gill with the water. It does not enter the body of the fish. Fish killed by rotenone can be and are used as food by human beings.

Malheur Lake is an important link in the Pacific Waterfowl Flyway and until the advent of the carp it was one of the finest feeding grounds in the West. Its shallow waters and broad expanse provided space and feed for hundreds of thousands of migratory birds. During the past two or three years not more than ten percent of the customary numbers of ducks stopped at the lake because of the destruction of waterfowl food plants by the carp. The carp not only root up and consume sago pondweed and other aquatic plants but they so muddy the waters that sunshine cannot penetrate to stimulate growth of new plants.

Malheur Lake had a maximum depth of only 14 inches at the time of the eradication.

In recent years waters in almost every part of the Nation have been rehabilitated by the use of rotenone compounds. The Malheur Lake project is by far the largest as far as water surface is concerned. Two other huge projects conducted by States recently under the Federal Aid in Fish Restoration program are the Marias River job in northwestern Montana and the Diamond Lake project in Oregon. In each of these instances the respective States planned and executed the projects.

The Marias River work was completed a few months ago. It consisted in killing the fish in the Marias River from Tiber Dam to the headwaters of all the tributaries. Willow, Medicine, Cutbank, Francis Lake Creeks, and other tributaries were all given the rotenone treatment. The project was timed to rid these waters of trash fish before the gates were closed on the new Bureau of Reclamation Tiber Dam. The streams will be restocked with game fish.

The 1954 project on Diamond Lake in Oregon was unique in many respects. The lake covered about 3,000 acres. It was 52 feet deep before eight feet of water was drawn off preparatory to the eradication effort. More than 100 tons of rotenone were used and an estimated 32,000,000 Klamath roach, or chubs, totaling about 400 tons, were killed in a few days. It will be open for sport fishing in 1956.



## City Residents Show Greater Preference for Fish Products

In a nationwide survey the U. S. Fish and Wildlife Service has learned that residents of cities show a greater preference for breaded fish sticks and breaded shrimp than do the residents of rural America. And also residents of cities show a much higher preference for fish and shellfish served in restaurants than do residents of rural America.

This is part of the information contained in a report released November 14, 1955, by the Service on the result of the survey. This report is the second of three reports on this project.

The purpose of the survey was to provide the fishing industry with data valuable in adjusting fish-product production to the demand and tastes of the consuming public. The survey was made by National Family Opinion, Inc., of Toledo, Ohio.

The survey showed that breaded shrimp consumption is concentrated in the city areas on a ratio of about two to one over the rural areas.

Fish sticks have shown a spectacular increase in the city areas. About 40 percent of the city housewives report using fish sticks, while only 13 percent of the rural women report their use.

The predominating marketing problem is to get housewives to try the products--90 percent of those who have tried breaded shrimp report satisfaction while about 85 percent of those who have tried fish sticks become regular users.

Data were also obtained on sources of fish cookery information. The cookbook is the chief source of instruction to housewives in cooking fishery products--28 percent of the housewives give that as their source, about 12 percent get their information from newspapers or magazines, and 11 percent look at the label or the wrapper.



### Federal Purchases of Fishery Products

**FRESH AND FROZEN FISHERY PRODUCTS PURCHASED BY DEPARTMENT OF DEFENSE, SEPTEMBER 1955:** For the military feeding of the U. S. Army, Navy, Marine Corps, and Air Force, the Army Quartermaster Corps in September 1955 purchased fresh and frozen fishery products amounting to 1.8 million pounds, valued at \$0.8 million (see table). This was a decrease of 22.5 percent in quantity and 19.8 percent in value as compared with August purchases, and also lower by 36.7 percent and 21.8 percent, respectively, than September 1954 purchases.

QUANTITY				VALUE			
September		Jan.-Sept.		September		Jan.-Sept.	
1955	1954	1955	1954	1955	1954	1955	1954
. (Millions of Pounds) . .				. . (Millions of Dollars) . .			
1.8	2.8	19.3	19.0	0.8	1.1	8.3	7.8

Purchases of fresh and frozen fish by the Army Quartermaster Corps during the first nine months in 1955 totaled 19.3 million pounds (valued at \$8.3 million) as compared with purchases of 19.0 million pounds (valued at \$7.8 million) for the similar period a year earlier.

The Department of the Army paid in September 1955 an average price of 45.9 cents per pound for fresh and frozen fishery products as compared with 44.3 cents in August and 37.1 cents in September 1955.

In addition to the purchases of fresh and frozen fishery products indicated above, the Armed Forces generally make local purchases which are not included in the above figures. Therefore, actual purchases are somewhat higher than indicated, but it is not possible to obtain data on the local purchases made by military establishments throughout the country.

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**QUARTERMASTER CORPS HAS COMPLETED FY 1956 PURCHASES OF CANNED TUNA:** All of its canned tuna requirements for the current fiscal year of 1956 (July 1, 1955-June 30, 1956) have been purchased, the Office of the Quartermaster General announced recently. Requirements of canned tuna for fiscal year 1956 included 3,962,858 pounds for the Army and Air Force, 376,194 pounds for the Navy, and 111,408 pounds for the Marine Corps. All of these procurements were completed on December 7, 1955.

Purchases of canned tuna in the last five fiscal years were as follows (in pounds): FY 1956, 4,450,460; FY 1955, 2,839,000; FY 1954, 1,651,000; FY 1953, 880,000; FY 1952, 2,552,000.

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**THE QUARTERMASTER MARKET CENTER SYSTEM:** A little over two years ago the military procurement of canned foods was transferred by the Quartermaster General from the jurisdiction of three principal QM depots to the Market Center System with headquarters in Chicago. Following this change in procurement responsibility, the Commanding General of the Market Center System in an address at the N.C.A. Convention in Atlantic City in January, 1954, briefly described the operations of the System and outlined the procurement procedures that would be followed in purchasing canned foods.

The Quartermaster Market Center System is the Army agency which, under the single-service procurement mission assigned by the Department of Defense, procures all foods consumed by the Armed Forces except for food items purchased locally by military installations, and, further, which procures subsistence items for resale in military commissary stores, for supplying the National Guard and Organized Reserves while on active duty, for Foreign Aid, and in some instances for other Governmental agencies. As an added responsibility, the System is charged with the storage and distribution of perishable food in the continental United States.

The Quartermaster Market Center System is comprised of 10 market centers, located near the nation's principal food-producing areas and the military installations they supply. The Market Center in Chicago, Ill., functions in a dual role; as market center and as Headquarters for the entire System. Connected with this focal point are the Market Centers in New York, N. Y.; Richmond, Va.; Columbia, S. C.; New Orleans, La.; Fort Worth, Tex.; Kansas City, Mo.; Seattle, Wash.; Los Angeles, Calif.; and Oakland, Calif.

Supplementing the Market Centers are 11 permanent field offices maintained at strategic points within Market Center areas. Such offices are situated in Boston, Mass.; Alexandria, Va.; Orlando, Fla.; Nashville, Tenn.; Mobile, Ala.; San Antonio, Tex.; Denver, Colo.; El Paso, Tex.; Tacoma, Wash.; San Diego, Calif.; and Salt Lake City, Utah.

**PURCHASING PERISHABLES:** The Market Center System was originally brought into being to purchase perishable subsistence only. Such purchases constitute the most important portion of the total annual food purchase of the System (about 70 percent of total military food expenditures).

**THE MACHINERY IN MOTION:** Under direction of the Quartermaster General, Washington, D. C., who established over-all policy, the Chicago Headquarters is the heart of the Market Center System.

Each Market Center maintains direct contact with Chicago and with its counterparts in the System by means of a teletype network. Each maintains close contact with market conditions in its individual area, and advises Headquarters of availabilities, condition of products, prices, and various factors affecting present or future crops. By comparing all information available, Headquarters directs the procurement and distribution programs of the entire System.

The basic reason for the Market Centers' existence is, naturally, the serviceman, who requires about 5 pounds of food daily. In OQMG headquarters, a Master Menu, suggesting the composition of every meal for each day of the year is made up and delivered to all stateside military installations 6 months in advance of designated dates. With this as a guide, and taking into consideration any local situations which require deviation from the Master Menu, installations compute their monthly perishable requirements and submit these to the designated Market Center.

After requirements from individual installations within its area have been received, the servicing Market Center consolidates them into carlot and trucklot quantities wherever possible, taking into consideration the item's perishability, planned consumption dates, and storage and handling facilities at the requesting installation. If less than carlot and trucklot quantities are requisitioned, due to limited demand, such requests are consolidated wherever possible with similar small-lot requisitions from other posts, camps, and stations into more economical carlots and trucklots at special assembly and distribution points maintained within Market Center areas. On carload or truckload quantities, Notices of Intent to Purchase (NIP's) are sent to the trade nationwide, stating the items and quantities required, the destination, and time of closing for offers. The vendor telephones his offer usually within 2 hours before closing to the nearest Market Center. All details concerning these offers are immediately recorded on a summary sheet and compared to determine which offer is the low responsible offer.

Offerings for carlot and trucklot requirements, whether for delivery direct to installation or to a distribution point for redistribution, are solicited and compared on a national basis using the teletype network. Headquarters, Market Center System, determines the low offer on a nationwide basis and issues instructions as to which Market Center is to make the award and administer the contract. Procurements are made on the basis of the best value to the Government, considering the item's quality and desirability, and, where applicable, transportation and distribution costs.

Purchases of perishable subsistence are made from all over the country. With information constantly at hand concerning availability and price of every type of fresh food needed by the Military, the System buys commodities at seasonal production peaks and effects balances by shifting procurement from items in short supply to others more abundant. Purchases are made on the spot for specified amounts and at quoted prices. Payments are made promptly, and, although savings to the taxpayers run into the millions of dollars per year through this unification of purchases as compared with pre-World War II local buying by all of the Services in competition with one another and without uniform standards, suppliers are benefited by knowing the quantities and qualities desired and by the equal opportunity offered all.

Most important is the effect upon the feeding of the military personnel. Fresh foods of all types are delivered in quantity to military installations speedily and in prime condition. Spoilage has become a negligible factor--less than one percent. Thus, America's soldiers, sailors, airmen, and marines are supplied with the finest food any military organization has enjoyed from the beginning of history.

**NONPERISHABLE SUBSISTENCE:** Prior to 1953, nonperishable subsistence items were procured by Quartermaster Procurement Agencies in Chicago, New York, and Oakland. In that year, such procurement was transferred to the Market Center System, thus consolidating all central food-procurement activities.

Requirements for nonperishable foods are received from the components of the Services, and

**Note:** A detailed description of the Market Center System and the policies and procedures that govern its nonperishable as well as perishable subsistence procurement was published in the "Activities Report" of the Quartermaster Food and Container Institute for the Armed Forces for the first quarter of 1955.

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**MILITARY FOOD SERVICE UNIFIED:** All military subsistence--encompassing the entire supply field from research and development through issue or disposal, including cataloging, standardization, requirements determination, procurement, production, inspection, storage, distribution, transportation, and maintenance--have been placed under a "Single Manager Commodity Assignment" in the Department of the Army.

The Secretary of the Army will issue in the near future an implementing directive designating the agency within the Army that will administer the authority. It is expected that the Office of the Quartermaster General will receive this delegation of authority and it is understood that OQMG has been preparing to take over this en-

procurement schedules are arranged in accordance with needs. Canned meats, fruits, and vegetables are procured from seasonal packs. Canned meat and water-food (fishery products) procurement is timed to coincide with peak slaughter periods. Canned tuna and salmon are procured on an annual basis during the peak of seasonal pack. Nonperishable items experiencing little or no seasonal production variation are procured quarterly, or as needed.

Whenever possible, commercial-type products are used by the Armed Services, although certain types of items, such as operational rations, must be purchased under Military specifications to meet military requirements. Likewise, commercial packaging and packing is used to the greatest extent feasible.

Procurement decentralization in Market Center operations permitting industry to deal with a purchasing office in a nearby location is a feature of the System. For example, canned tuna and canned salmon are procured by the Market Centers closest to the area in which production is concentrated--in these instances, Los Angeles and Seattle. This decentralization of purchasing fosters the close relationship between the food industry and procurement personnel essential to the most effective and economical purchasing. Because of this relationship, personnel are kept informed of latest industrial techniques on nonperishable subsistence, and procurement patterns may be periodically revised to coincide with those techniques.

Each Market Center has a QM Inspection Service Command Veterinarian to process contracts awarded by that particular Market Center. These veterinary officers come under direct control of the Chief Veterinarian at Hq., QM Market Center System. Their mission is to arrange for origin inspection of awards made by the contracting officer, wherever he may be. They do not make the inspection themselves--field inspections are conducted by the Army Area Veterinarian or other recognized Federal Agencies. Destination inspections are arranged through established policy by Hq., QM Market Center System through menus and Inspection Handbooks. The branch Market Center veterinary officer arranges to have an inspection made.

larged assignment and has prepared a reorganization program which will establish within OQMG a subsistence organization.

This centralization of subsistence responsibility in the Army with operational authority in the Quartermaster General will have no immediate effect on government procurement policies applicable to the canning industry. The Market Center System will continue to be the principal contact with the industry and will continue to purchase canned foods for all military needs, according to a November 7 release from the Department of Defense.

The new unified supply program is spelled out in a Department of Defense directive dated November 4, 1955. The directive provides for a subsistence advisory group composed of a committee representing each of the military services and the Single Manager of the Department of the Army to coordinate operating problems.

In a press statement accompanying the issuance of the directive, the Department of Defense stated that the system had been "developed over the past year in the Office of the Secretary of Defense, is called the Single Manager Commodity Assignment, and places all supply responsibilities for a given commodity under a single military department which will supply the needs of all services."

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NEW INFORMATION ON MILITARY PROCUREMENT OF FOODS: As a service to all interested elements of the food industry, arrangements have been made to make available additional information on military procurement of foods, it was announced November 9, 1955, by the Food Industries Division, Business and Defense Services Administration, U. S. Department of Commerce.

Division officials, who cooperated with the Office of the Quartermaster General of the Army and food industry representatives in making the arrangements, said that additional information will be posted on the bulletin boards, and thus be available for perusal at the Quartermaster Market Centers.

Generally, notices of intent to purchase food items in small amounts (normally less than trucklot or carlot) have been distributed to interested suppliers on the local mailing list covering the trade area of the Market Center issuing the notice, while the notices for food items in larger amounts have been distributed to interested suppliers on the national mailing list.

A recent change provides that, in addition, notices of intent to purchase non-perishable foods and frozen fruits and vegetables are to be posted on the bulletin board of the issuing Market Center, and if distributed to the national list, on the bulletin boards of all the Market Centers.

All proposed procurements of nonperishable foods in excess of \$10,000 will continue to be summarized and reported to the U. S. Department of Commerce for inclusion in the "Synopsis of U. S. Government Proposed Procurement, Sales, and Contract Awards" issued by the Office of Field Services. In addition, the summaries will now also appear on the bulletin boards of the QM Market Centers preparing the report. Nonperishable food contract awards will continue to be summarized in a weekly report to the Department of Commerce for inclusion in the synopsis. In addition, a copy of the summary of awards over \$25,000 and a summary of all awards of nonperishable foods in amounts between \$1,000 and \$25,000 are now available for perusal on the bulletin board at the awarding Market Center.

For the first time, copies of all contracts in excess of \$1,000 for both perishable items are available for perusal at the issuing Market Center.

The Quartermaster Market Centers are located at 226 W. Jackson Blvd., Chicago 6, Ill.; 1321 Pendleton Street, Columbia 1, S. C.; 623 Hardesty Street, Kansas City 24, Mo.; Felix at Hemphill, Fort Worth 1, Tex.; 1206 Santee Street, Los Angeles 15, Calif.; Gulf Transportation Terminal Command, New Orleans 12, La.; 29th St. and 3rd Ave., Brooklyn 32, N. Y.; 2155 Webster St., Alameda, Calif.; 1709 Kelly Road, Richmond 20, Va.; and NSD, Pier 91, Seattle 14, Wash.



### Fresh and Frozen Fish Consumption in Federal Penal and Correctional Institutions, 1954

The consumption in 1954 of fresh and frozen fish in 27 Federal penal and correctional institutions was surveyed by the U. S. Fish and Wildlife Service. Information about fresh and frozen shellfish purchases was also requested from these sources, but such purchases were so rare, consisting of only a few purchases, that a report on these items will not be made. These institutions had a combined population averaging 21,175 persons, and are located throughout the United States with the greatest concentration (13 out of 27) in the South.

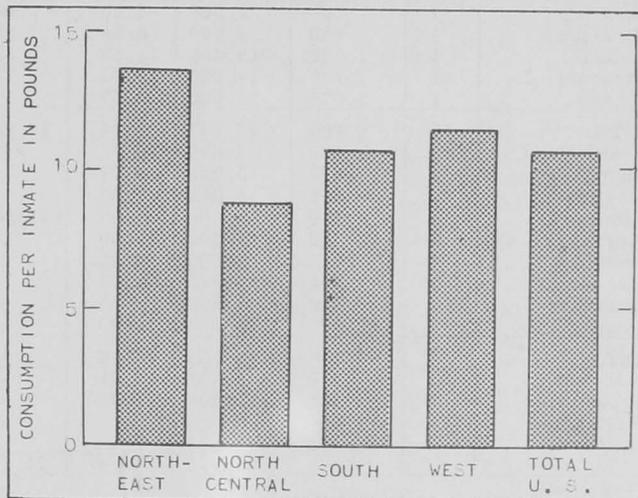


Fig. 1 - Regional consumption per inmate of fresh and frozen fish in all Federal penal and correctional institutions, 1954.

In 1954, all Federal penal and correctional institutions purchased one or more species of fresh and frozen fish. Institutions in the South purchased the greatest quantity of

Table 1 - Fresh and Frozen Fish Purchased By All Federal Penal and Correctional Institutions, 1954

Species	No. of Inst.	Average Pop. of Inst.	Annual Consumption <sup>1/</sup>		Annual Cost	
			Total	Per Inmate	Total Value	Average Price
			Lbs.	Lbs.	\$	¢/Lb.
<b>ALL FRESH AND FROZEN FISH</b>	27	21,175	210,701	9.95	54,088.52	.26
<b>ALL GROUND FISH FILLETS (INCLUDING OCEAN PERCH):</b>	26	20,775	159,590	7.68	42,648.16	.27
Ocean perch . . . . .	21	17,535	70,440	4.02	19,253.52	.27
Haddock . . . . .	16	12,490	41,180	3.30	11,237.25	.27
Cod . . . . .	11	9,765	27,235	2.79	7,156.40	.26
Pollock (Boston bluefish) . .	7	5,730	19,100	3.33	4,650.14	.24
Hake . . . . .	2	1,140	1,635	1.43	350.85	.21
<b>ALL OTHER FILLETS:</b> . . . . .	7	7,925	29,180	3.68	6,375.10	.22
Whiting . . . . .	3	5,175	13,920	2.69	2,722.70	.20
Catfish . . . . .	1	2,600	6,400	2.46	1,280.00	.20
Mackerel . . . . .	4	4,700	4,520	0.96	1,336.40	.30
Flounders . . . . .	3	4,450	2,540	0.57	604.00	.24
Halibut . . . . .	1	650	1,800	2.77	432.00	.24
<b>ALL DRESSED FISH:</b> . . . . .	6	7,960	21,931	2.76	5,065.26	.23
Rock cod (rockfish) . . . . .	3	2,220	8,890	4.00	1,773.80	.20
Salmon . . . . .	2	2,700	6,246	2.31	1,595.76	.26
Halibut . . . . .	1	1,400	4,150	2.96	996.00	.24
Whiting . . . . .	3	3,390	2,135	0.63	590.80	.28
Smelt . . . . .	1	320	360	1.13	68.40	.19
Drum . . . . .	1	640	150	0.23	40.50	.27

<sup>1/</sup> Market weight.

larged assignment and has prepared a reorganization program which will establish within OQMG a subsistence organization.

This centralization of subsistence responsibility in the Army with operational authority in the Quartermaster General will have no immediate effect on government procurement policies applicable to the canning industry. The Market Center System will continue to be the principal contact with the industry and will continue to purchase canned foods for all military needs, according to a November 7 release from the Department of Defense.

The new unified supply program is spelled out in a Department of Defense directive dated November 4, 1955. The directive provides for a subsistence advisory group composed of a committee representing each of the military services and the Single Manager of the Department of the Army to coordinate operating problems.

In a press statement accompanying the issuance of the directive, the Department of Defense stated that the system had been "developed over the past year in the Office of the Secretary of Defense, is called the Single Manager Commodity Assignment, and places all supply responsibilities for a given commodity under a single military department which will supply the needs of all services."

\* \* \* \* \*

NEW INFORMATION ON MILITARY PROCUREMENT OF FOODS: As a service to all interested elements of the food industry, arrangements have been made to make available additional information on military procurement of foods, it was announced November 9, 1955, by the Food Industries Division, Business and Defense Services Administration, U. S. Department of Commerce.

Division officials, who cooperated with the Office of the Quartermaster General of the Army and food industry representatives in making the arrangements, said that additional information will be posted on the bulletin boards, and thus be available for perusal at the Quartermaster Market Centers.

Generally, notices of intent to purchase food items in small amounts (normally less than trucklot or carlot) have been distributed to interested suppliers on the local mailing list covering the trade area of the Market Center issuing the notice, while the notices for food items in larger amounts have been distributed to interested suppliers on the national mailing list.

A recent change provides that, in addition, notices of intent to purchase non-perishable foods and frozen fruits and vegetables are to be posted on the bulletin board of the issuing Market Center, and if distributed to the national list, on the bulletin boards of all the Market Centers.

All proposed procurements of nonperishable foods in excess of \$10,000 will continue to be summarized and reported to the U. S. Department of Commerce for inclusion in the "Synopsis of U. S. Government Proposed Procurement, Sales, and Contract Awards" issued by the Office of Field Services. In addition, the summaries will now also appear on the bulletin boards of the QM Market Centers preparing the report. Nonperishable food contract awards will continue to be summarized in a weekly report to the Department of Commerce for inclusion in the synopsis. In addition, a copy of the summary of awards over \$25,000 and a summary of all awards of nonperishable foods in amounts between \$1,000 and \$25,000 are now available for perusal on the bulletin board at the awarding Market Center.

For the first time, copies of all contracts in excess of \$1,000 for both perishable items are available for perusal at the issuing Market Center.

The Quartermaster Market Centers are located at 226 W. Jackson Blvd., Chicago 6, Ill.; 1321 Pendleton Street, Columbia 1, S. C.; 623 Hardesty Street, Kansas City 24, Mo.; Felix at Hemphill, Fort Worth 1, Tex.; 1206 Santee Street, Los Angeles 15, Calif.; Gulf Transportation Terminal Command, New Orleans 12, La.; 29th St. and 3rd Ave., Brooklyn 32, N. Y.; 2155 Webster St., Alameda, Calif.; 1709 Kelly Road, Richmond 20, Va.; and NSD, Pier 91, Seattle 14, Wash.



## Fresh and Frozen Fish Consumption in Federal Penal and Correctional Institutions, 1954

The consumption in 1954 of fresh and frozen fish in 27 Federal penal and correctional institutions was surveyed by the U. S. Fish and Wildlife Service. Information about fresh and frozen shellfish purchases was also requested from these sources, but such purchases were so rare, consisting of only a few purchases, that a report on these items will not be made. These institutions had a combined population averaging 21,175 persons, and are located throughout the United States with the greatest concentration (13 out of 27) in the South.

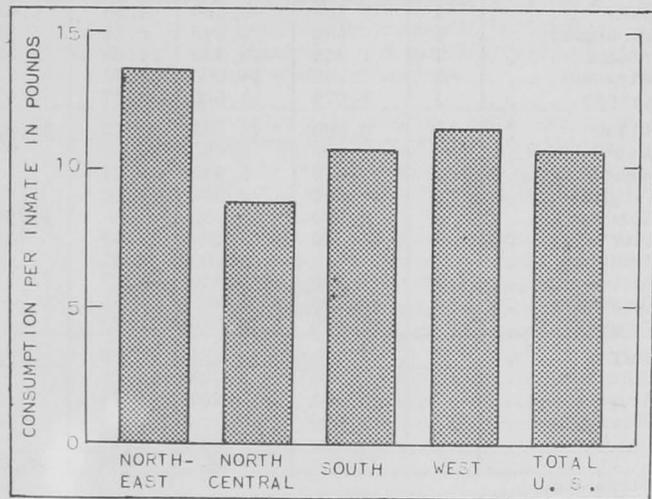


Fig. 1 - Regional consumption per inmate of fresh and frozen fish in all Federal penal and correctional institutions, 1954.

In 1954, all Federal penal and correctional institutions purchased one or more species of fresh and frozen fish. Institutions in the South purchased the greatest quantity of

Table 1 - Fresh and Frozen Fish Purchased By All Federal Penal and Correctional Institutions, 1954

Species	No. of Inst.	Average Pop. of Inst.	Annual Consumption <sup>1/</sup>		Annual Cost	
			Total	Per Inmate	Total Value	Average Price
		No.	Lbs.	Lbs.	\$	¢/Lb.
<b>ALL FRESH AND FROZEN FISH</b>	27	21,175	210,701	9.95	54,088.52	.26
<b>ALL GROUND FISH FILLETS (INCLUDING OCEAN PERCH):</b>	26	20,775	159,590	7.68	42,648.16	.27
Ocean perch . . . . .	21	17,535	70,440	4.02	19,253.52	.27
Haddock . . . . .	16	12,490	41,180	3.30	11,237.25	.27
Cod . . . . .	11	9,765	27,235	2.79	7,156.40	.26
Pollock (Boston bluefish) . .	7	5,730	19,100	3.33	4,650.14	.24
Hake . . . . .	2	1,140	1,635	1.43	350.85	.21
<b>ALL OTHER FILLETS:</b>	7	7,925	29,180	3.68	6,375.10	.22
Whiting . . . . .	3	5,175	13,920	2.69	2,722.70	.20
Catfish . . . . .	1	2,600	6,400	2.46	1,280.00	.20
Mackerel . . . . .	4	4,700	4,520	0.96	1,336.40	.30
Flounders . . . . .	3	4,450	2,540	0.57	604.00	.24
Halibut . . . . .	1	650	1,800	2.77	432.00	.24
<b>ALL DRESSED FISH:</b>	6	7,960	21,931	2.76	5,065.26	.23
Rock cod (rockfish) . . . . .	3	2,220	8,890	4.00	1,773.80	.20
Salmon . . . . .	2	2,700	6,246	2.31	1,595.76	.26
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Smelt . . . . .	1	320	360	1.13	68.40	.19
Drum . . . . .	1	640	150	0.23	40.50	.27

<sup>1/</sup> Market weight.

fresh and frozen fish because of the greater number there. However, consumption per inmate was relatively lower in the South and North Central areas than in the Northeastern and Western areas of the country.

Table 2 - Regional Distribution of Fresh and Frozen Fish Consumption<sup>1/</sup> in All Federal Penal and Correctional Institutions, 1954

Region and State	No. of Inst.	Avg. Pop. of Inst.	Groundfish Fillets (incl. Ocean Perch)		Other Fillets		Dressed Fish		All Fish	
			Total Quantity	Per Inmate	Total Quantity	Per Inmate	Total Quantity	Per Inmate	Total Quantity	Per Inmate
			Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
NORTHEAST: . . .	3	2,000	20,220	10.11	3,320	1.66	2,820	1.41	26,360	13.18
Connecticut . . .	1	500	5,940	11.88	-	-	-	-	5,940	11.88
New York . . .	1	200	3,000	15.00	500	2.50	-	-	3,500	17.50
Pennsylvania . . .	1	1,300	11,280	8.68	2,820	2.17	2,820	2.17	16,920	13.02
NORTH CENTRAL: . . .	5	7,000	50,320	7.19	7,060	1.01	1,460	0.21	58,840	8.41
Ohio . . . . .	1	1,250	5,360	4.29	2,680	2.14	-	-	8,040	6.43
Michigan . . . . .	1	650	3,800	5.85	1,800	2.77	-	-	5,600	8.62
Indiana . . . . .	1	1,325	15,480	11.68	2,580	1.95	-	-	18,060	13.63
Missouri . . . . .	1	1,100	14,000	12.73	-	-	-	-	14,000	12.73
Kansas . . . . .	1	2,675	11,680	4.37	-	-	1,460	0.55	13,140	4.91
SOUTH: . . . . .	13	8,980	72,895	8.12	18,800	2.09	825	0.09	92,520	10.03
Wash., D. C. . . . .	1	460	4,050	8.80	-	-	-	-	4,050	8.80
West Virginia . . . . .	2	890	5,935	6.67	-	-	585	0.66	6,520	7.33
Virginia . . . . .	2	875	6,840	7.82	-	-	240	0.27	7,080	8.09
Georgia . . . . .	1	2,600	15,200	5.85	18,000	6.92	-	-	33,200	12.77
Florida . . . . .	1	600	7,200	12.00	800	1.33	-	-	8,000	13.33
Kentucky . . . . .	1	525	3,900	7.43	-	-	-	-	3,900	7.43
Alabama . . . . .	1	240	3,640	15.17	-	-	-	-	3,640	15.17
Oklahoma . . . . .	1	1,100	7,200	6.55	-	-	-	-	7,200	6.55
Texas . . . . .	3	1,690	18,930	11.20	-	-	-	-	18,930	11.20
WEST: . . . . .	6	3,195	16,155	5.06	-	-	16,826	5.27	32,981	10.32
Colorado . . . . .	1	400	4,725	11.81	-	-	-	-	4,725	11.81
Arizona . . . . .	2	575	5,900	10.26	-	-	-	-	5,900	10.26
Washington . . . . .	1	1,400	-	-	-	-	12,936	9.24	12,936	9.24
California . . . . .	2	820	5,530	6.74	-	-	3,890	4.74	9,420	11.49
Total . . . . .	27	21,175	159,590	7.54	29,180	1.38	21,931	1.04	210,701	9.95

<sup>1/</sup>Market weight.

The average annual consumption of fresh and frozen fish in the 27 institutions studied was 9.95 pounds per inmate. The great bulk of fresh and frozen fish was purchased in the form of fillets. Only a minor part of the purchases consisted of dressed whole fish. The Northeastern area reported the highest consumption per inmate with 13.18 pounds of fresh and frozen fish while the North Central area reported the lowest with 8.41 pounds per inmate.

Of the 3 groups of fresh and frozen fish purchased, groundfish fillets (including ocean perch) were purchased in greatest quantity and by all but one penal institution in the West. Groundfish fillet consumption was 7.54 pounds per inmate with the highest consumption reported in the Northeast (10.11 pounds per inmate), and the lowest in the West (5.06 pounds per inmate).

Ocean perch and haddock ranked first and second in quantities purchased. Ocean perch was purchased by better than three-fourths of the institutions and haddock by over one-half. Annual inmate consumption of ocean perch exceeded that of any other species.

Average cost per pound of fresh and frozen fish purchased ranged from 19 cents per pound for smelts to 30 cents per pound for mackerel. Average cost per pound of groundfish fillets slightly exceeded the average cost per pound of all other types of fish purchased.



## Florida

**FISHERIES RESEARCH, MARCH-SEPTEMBER 1955: Mullet:** Analysis of the mullet tagging work was completed, involving 12,647 tagged fish. Results showed that over 70 percent of the fish were caught within 5 miles of the point of release. The time free and the size of the fish seemed to have little effect on the distance migrated. Fish tagged just before they spawned were returned by the fishery as frequently as those tagged at other times, indicating that fish survive spawning. This is contrary to some fishermen's belief. Judging by the rate of returns, the fishery has a definite effect on the amount of fish in the population.

Extensive field activities marked the economic research on the Florida fresh-fish (principally mullet) industry. All the southeastern states were visited, as well as several northern market areas. Florida was covered as well. Price and distribution information, institutional market needs, and other basic data were collected. Promotional material is being tested and canned mullet development is being pushed, plus tests of mullet fish sticks. Research is continuing on the development of an acceptable quality pack of canned mullet. This product was received favorably by members of the industry attending the annual meeting of the Southeastern Fisheries Association at Miami Beach.

**Shrimp:** Work on the Key West shrimp has consisted of starting a sampling program of the shrimp on the Tortugas grounds. A large section of the Key West shrimp industry is disturbed at the continual landing of small shrimp--more than about 60 to the pound. They claim that the landing of these shrimp depletes the stocks and upsets the market. The purpose of the sampling program will be to devise methods of controlling the landings of small shrimp if this is considered necessary. Three alternative methods of restricting fishing are being considered: closed areas, closed seasons, and mesh regulations.

A Key West shrimp trawler, the *Manboy*, has been chartered for a period of twelve months to carry out two nights' fishing each month. The sampling program is set up to determine the distribution of shrimp by lengths, both seasonally and geographically. Cod ends of different mesh sizes will be used during the course of the sampling trips. These cod ends will be loosely covered with one-inch mesh netting. Thus the escape behavior of shrimp through cod ends of different mesh sizes can be studied. Observations will also be made on the condition of the shrimp which escape and on the escape of industrial or noncommercial species of fish.

It is expected that not only will the use of a larger cod-end mesh allow small shrimp to escape but noncommercial species will also escape and thus ease the problem of sorting out the shrimp. The use of a larger mesh cod end would allow better water filtration, particularly if some of the noncommercial species escaped, and the net should operate more efficiently.

Two days' fishing have been done. The cod end used was of the smallest mesh size at present being used on the Key West grounds, about 1½-inch stretched between opposite knots when wet and in use. Small numbers of small shrimp and noncommercial fish were taken in the cover so it is likely

that the escape through a larger mesh cod end would be considerable. The next tests will use larger meshes.

**Technology: ICE RESEARCH:** Further experiments are conducted with aureomycin and terramycin ices. The method of manufacturing antibiotic ices has been simplified and as many as 11 different ices can be tested at one time.

Aureomycin ice increases the shelf life of fresh shrimp, but its use presents a serious difficulty. The bivalent-metal ions used to chelate the antibiotic to the carrier, catalyze apparently the formation of black spot. Calcium, magnesium, cobalt, nickel, and manganese salts were tested, of which the last two showed the best results in keeping black spot at a minimum. A similar problem complicates the work with terramycin.

The preservative action of ice containing mixtures of aureomycin and terramycin is now under investigation. The next phase in this research is to test the antibiotic ices aboard a fishing vessel.

**ANTIOXIDANTS:** A potent antioxidant IONOL has been tested for its black spot-retarding ability under accelerated oxidation. The results showed some retarding activity and more elaborate IONOL-ice tests were run. These tests, however, produced inconclusive results. It is planned to repeat the experiment. Versenes were also tested but found to be ineffective. Research on sodium bisulphite, which was found to be an effective black spot-retarding agent has been reactivated. Residuals in raw and cooked shrimp, and the amount of destruction of thiamine are being studied. This information is necessary in order to obtain U. S. Food and Drug Administration clearance to use the chemical in shrimp. It is also planned to develop a method to incorporate bisulphite in 300-pound ice blocks. This size of block is commonly used in the industry.

**SPOILAGE STUDIES:** The value of indole as an indicator of spoilage in shrimp has been studied. The method of extracting the indole has been modified and a greater accuracy achieved. Good correlation with odor were obtained. The use of this indicator in the industry does not seem to have a good chance since its determination requires a substantial amount of equipment, but it may be useful as a laboratory test. A paper covering the above research is under preparation.

Tampa shrimp producers using immersion freezers have recently found that in some instances their shrimp develop severe black spotting after 2 to 3 months of storage. Preliminary analysis of the brines has shown that the old brine contained a considerable amount of organic matter, twice as much iron and 7 percent less salt. Further studies are in progress.

**MULLET FISH STICKS:** A test panel tasted mullet fish sticks made up over 12 months ago. The majority of tasters found that mullet fish sticks stored that long in freezer storage developed a strong rancid taste. A final report on this experiment is being prepared.

**BLUE CRAB:** The demonstration soft-shell crab-shedding float installed at Gulf Shore Seafood Inc.,

Punta Gorda, was completed during the period reported on. A self-priming Jaeger pump with a pumping capacity of 35 gallons per minute was installed. The dealer expressed satisfaction with the system and soft-shell crabs are being produced. During the same period a crab fyke patterned after those used in Chesapeake Bay was placed in the Peace River. This gear consists of a wooden frame, 4' x 4' x 4', enclosed by one-inch chicken wire with one funnel through which the crabs can enter. A trap door is located on top to allow the crabs to be dumped out. The funnel side of the trap faces shoreward, and is placed from 300 to 500 feet from shore depending on the slope of the bottom. Extending from the funnel to the shore is a "leader" or wire fence which channels the crabs to the trap when returning from feeding on the outgoing tide. On the shore side of the trap are two wings which curve back to the leader. The fyke is not baited since the crabs are led to the trap by the fence.

This was the second fyke to be put in the Peace River. The first one which was placed in the wa-

ters on December 3, 1954, was destroyed. The second fyke, during the short period of time that it remained in the water, caught from 16 to 75 crabs a day. These figures are low since some crabs were stolen.

An experiment was conducted on the crabs held in the floats to determine the average time necessary for the various stages of crabs to shed. Ninety crabs were tagged with the tag formerly used to tag sailfish, and held in place by looping stainless steel wire from the tag to each of the spines on the carapace of the crab. Results were as follows:

Number	Stage	Avg. No. of Days to Shedding
30	White Margin	7
30	Pink Margin	4
30	Red Margin	2

It is intended to continue this study and to tag many more crabs to get more accurate data. These figures compare well with those made in observations on Chesapeake Bay crabs.



### Maine

CANNED SARDINE STOCKS, NOVEMBER 1, 1955: Distributors' stocks of canned Maine sardines amounted to 354,000 actual cases as of November 1, 1955, and canners' stocks amounted to 625,000 standard cases (100 3/4-oz. cans to the case), according to a U. S. Bureau of the Census survey. Canners' stocks on No-

Level	Nov. 1, 1955	July 1, 1955	April 1, 1955	Nov. 1, 1954
Distributors (actual cases) . . . . .	354,000	235,000	331,000	N.A.
Canners (standard cases--100 3/4-oz. cans)	625,000	723,000	715,000	1,410,000

N.A. - Not available

vember 1, 1954, as reported by the Maine Sardine Industry, were 1,410,000 standard cases; comparable data for distributors' stocks are unavailable. Canners' stocks on November 1, 1955 were 56 percent less than on the same date in 1954, which reflects the lighter pack in 1955. Canners' stocks were 690,000 cases on April 15, 1955 (the beginning of the 1955/56 season), and the pack to November 1, 1955, was 1,167,000 standard cases, giving an available supply in 1955 through November 1 of 1,857,000 standard cases.

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SARDINE PACK SMALLEST IN 15 YEARS: The 1955 Maine sardine canning season closed December 1 with the pack estimated to be the smallest in 15 years, according to a news release from the Maine Sardine Industry.

Although the final production figure is not available at this time, the industry's Executive Secretary stated that it will be about 1,230,000 standard cases (100 3/4-oz. cans to case).

This is less than half of the average annual production during the past 14 years and only slightly more than the last short pack of 1,067,000 standard cases in 1940.

Canners' inventories reflect the shortage and are the lowest they have been on December 1 since World War II, according to the Executive Secretary, who predicted a complete sell-out before the 1956 season opens on April 15, 1956.

He added that from a quality standpoint the pack had been one of the best in years and that consumer demand had been steadily maintained in all sections of the country.

Most of the State's 43 plants were ready to operate when the season opened in April 1955, but of this total 12 plants did not operate at all. The fishing in 1955 was spotty and the situation exasperating throughout the entire packing period. The western area had the best fish supply, while the middle district had catches about 50 percent of average and there were virtually no fish at all in the big packing centers in the eastern district.



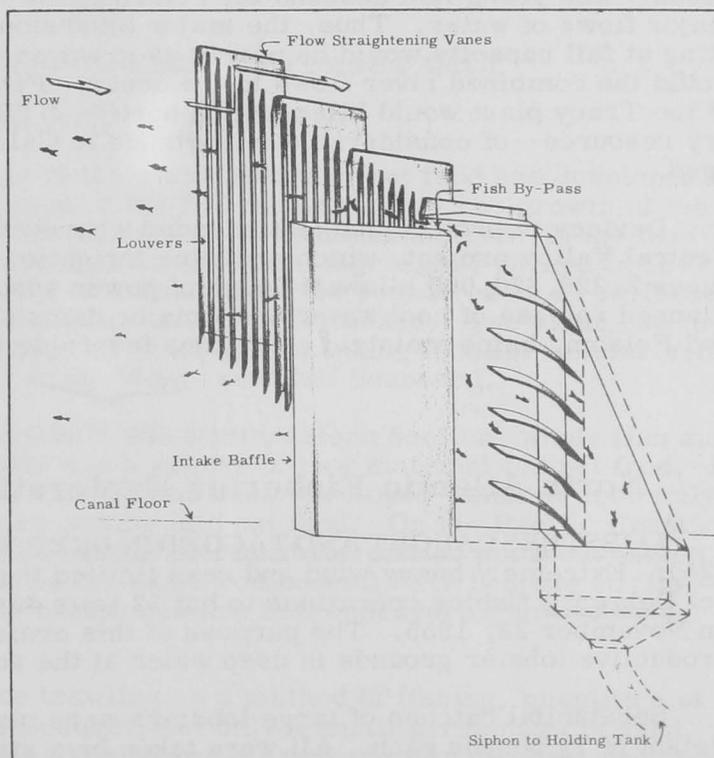
## New Type Fish Screen to Save Young Fish

A unique "fish screen" will save millions of young salmon, bass, shad, and catfish from the turbulence of the world's second largest pumping plant--the Bureau of Reclamation's Tracy Pumping Plant on the Delta-Mendota Canal in central California--Secretary of the Interior Douglas McKay pointed out in announcing details of a \$988,116 contract for constructing the facilities.

A commercial and sport fishery resource estimated to be worth \$10 million annually will be protected by the fish diversion and collecting facilities, said Commissioner of Reclamation W. A. Dexheimer.

Existing temporary fish screens will be replaced by a louver-type diversion that "leads" the fish to safety. The novel design of the new facilities was developed after long and intensive study by Bureau of Reclamation engineers and Fish and Wildlife Service biologists, with the assistance of the California State Department of Fish and Game.

The Commissioner said that at one time the State estimated the cost of constructing conventional fish screens would total \$4 million. The new louver system is not only initially less expensive, he said, but the cost of maintaining it will be much less.



Schematic drawing of louver-type fish screen and fish collecting device.

The fish-protective device will consist of a row of vertical louvers extending approximately 340 feet diagonally across a concrete channel  $83\frac{1}{2}$  feet wide and 25 feet deep. The minute baby fish, averaging an inch long, are carried tail first down the channel by the current, but as they approach the louvers they swim to one side to avoid the disturbing eddies and sounds made by the slats placed at an angle to the current. The fish keep moving over until they are siphoned into a bypass that carries them to a holding tank, from which the young fish are to be counted and trucked 40 to 50 miles to an area where they can swim safely to the sea.

The Tracy Pumping Plant, which draws water from the Delta area of the San Joaquin and Sacramento Rivers at the head of San Francisco Bay, lifts 4,600 cubic-foot-per-second of irrigation water 197 feet into the Delta-Mendota Canal which carries it 120 miles to supply Central Valley lands.

During periods of low flow in the rivers and when the canal is operated at capacity, the pumps will take all of the flow of San Joaquin River and may draw half of the Sacramento River.

The Delta, with its maze of channels, is the most important spawning and rearing area for striped bass and shad on the Pacific Coast. Young king salmon are found in great numbers in the waters of the Delta where they loiter on their way to the ocean. Catfish are an important sport fish taken in large numbers and spend their life cycle in the Delta waters.

Salmon, bass, and shad spawn in fresh water but spend their adult lives in the ocean. The young fish descend the rivers to the sea, carried by and following the major flows of water. Thus, the major diversion of the Delta-Mendota canal operating at full capacity would be nearly as great an attraction to these young fish as would the combined river flows to the ocean. Fish experts believe the great pumps of the Tracy plant would kill a major portion of fish entering the canal, and the fishery resource--of considerable importance to California--would be seriously damaged.

Devices to protect fish are included wherever necessary on all features of the Central Valley project, which provides irrigation water for 634,000 acres and produces 2,226,370,000 kilowatt hours of power annually from its multipurpose dams. Planned release of cool water from major dams such as Shasta, Keswick, Nimbus, and Folsom, helps maintain conditions favorable to salmon.



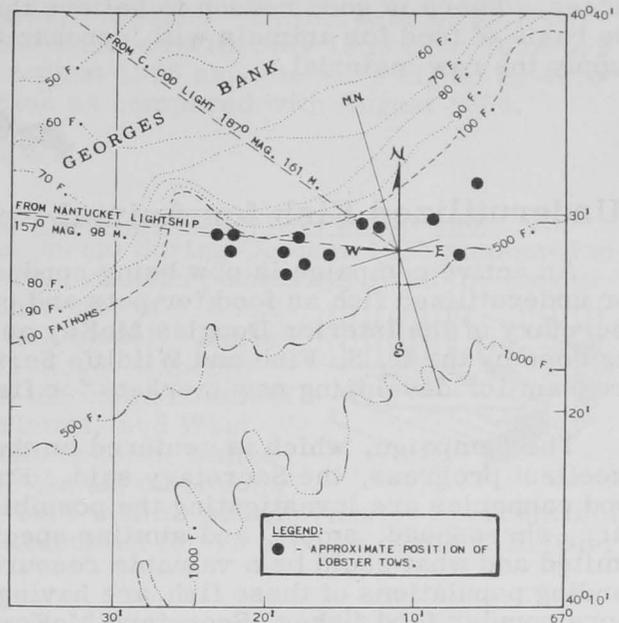
## North Atlantic Fisheries Exploration and Gear Research

LOBSTERS CAUGHT AND TAGGED IN DEEP WATER BY "DELAWARE" (Cruise 12A): Extremely heavy wind and seas limited the Service's exploratory fishing vessel Delaware fishing operations to but 12 tows during an 8-day cruise which ended on November 22, 1955. The purpose of this cruise was to determine the extent of productive lobster grounds in deep water at the southeast edge of Georges Bank.

Substantial catches of large lobsters were made, totaling 1,065 with an average weight of  $7\frac{1}{2}$  pounds each. All were taken by a standard No. 41 otter trawl, rigged with 10-fathom ground cables, and 45 feet of rollers. Average towing time was 90 minutes, and the average catch was 88.6 lobsters per tow. Fishing depths ranged from 100 to 200 fathoms, with the greatest numbers caught at 165 fathoms. The largest single catch made was 149 lobsters, or 1,200 pounds. The catch of other fish was negligible.

All lobsters landed in suitable condition were measured and tagged by biologists of the Massachusetts Division of Marine Fisheries. The tagged lobsters were released at or near the point of capture in order to try and determine if lobsters in the deep-water population intermingle with those living nearer shore. A total of 854 tagged lobsters were released, and 3 of these were subsequently recaptured by tows made in the same area. Of the 1,065 lobsters caught, 769 were females, and 101 of these bore eggs. Sizes caught ranged from less than one pound to a giant weighing 24 pounds.

Deep-water ocean perch will be the target of Delaware's Cruise 12B, scheduled to start on November 30, 1955. Area of the survey will be the edge of the Continental Shelf, East of Sable Island, Nova Scotia.



Cruise 12A of the Service's exploratory fishing vessel Delaware, November 14-22, 1955.



## Underutilized Fish Potential Increases with Pet-Food Industry Growth

The use of fish and fish cuttings in the manufacture of pet food has developed into an increasingly-important segment of the fishing industry. The growth of the pet-food industry is illustrated by comparing the phenomenal increase in the number of standard cases of pet food (with fish as the basic ingredient) packed in 1947 to that of 1954. In 1947, only 940,000 standard cases (48 pounds each) of petfoods were packed; while, in 1954, over 4 million cases were packed. The value has increased from \$4 million to \$19 million. The industry packing food for animal feeding has been growing rapidly on the East, West, and Gulf Seaboard.

Along the Atlantic Coast, particularly the Northeastern Section, whole fish and fish frames from the filleting process are a source of raw material for pet food. In one section of the Gulf Coast, a new fishery has been developed which is primarily devoted to catching whole fish for processing into cat food. On the Pacific Coast, certain species of rockfishes and fish frames are used for canned pet food. Sales of canned pet food (that utilized fish as the basic component) have become so impressive that several large packing companies are now endeavoring to secure a steady supply of raw material.

In most of the fisheries that use trawling as a method of fishing, quantities of unmarketable or undersized fish are caught, but only a small percentage is used with the remainder discarded at sea. The Midwest has a similar disposal problem with fresh-water rough fish. However, there is a possibility that these fresh-water species can be used, and in time, create the backbone of an important pet-food processing industry.

Prospects are for an increasing demand for suitable protein food to be used in animal feeding. An example is the ever-increasing demand of the fur-animal farmers, who are experiencing difficulty in obtaining horse meat at reasonable

prices. There is good reason to believe that the demand for fish and fish scraps as the basis of food for animals will increase and that enterprising fish processors will supply the raw material.



## Underutilized Fish for Animal Food Under Study in the Midwest

An active campaign is now being conducted in the Midwest to develop markets for underutilized fish as food for pets and commercially-reared fur-bearing animals, Secretary of the Interior Douglas McKay announced November 30. The work is being done by the U. S. Fish and Wildlife Service as part of the Saltonstall-Kennedy program for developing new markets for fishery products.

The campaign, which is centered on the shores of Lake Erie, already indicates excellent progress, the Secretary said. Fur-animal ranchers as well as some pet-food canneries are investigating the possibilities of a pet-food business utilizing carp, sheepshead, smelt, and similar species. The markets for these fish are limited and what could be a valuable resource is not being used. In addition, the expanding populations of these fish are having an adverse effect upon the growth of more popular food fishes, Secretary McKay added.

As a result of gradually-declining supplies of horse meat, which has been the basic fur-animal food, fur ranchers are investigating the possibilities of developing underutilized fish as a substitute.

The use of rough fish in the Midwest for animal food will not only help fill a growing demand on the fur-animal ranches but will enable the fishermen to utilize more effectively valuable inland fisheries resources, the Secretary said.

In recent years net fishermen in Lake Erie and other midwestern waters have reported that as much as 90 percent of their daily catches would be composed of fish having only a marginal market. This meant a lot of wasted time and effort, but with the possibility of a new outlet opening in the pet-food and fur-animal field, these rough fish can be made to pay their way.



## U. S. Foreign Trade

Item	Quantity			Value		
	August		Year	August		Year
	1955	1954	1954	1955	1954	1954
Imports:	(Millions of Lbs.)			(Millions of \$).		
Fish & shellfish; fresh, frozen, & processed 1/ . . .	71.1	83.0	801.7	18.6	18.3	202.8
Exports:						
Fish & shellfish; processed 1/ only (excluding fresh and frozen) . . .	5.8	4.1	50.8	1.6	.9	13.2
1/ Includes pastes, sauces, clam chowder and juice, and other specialties.						

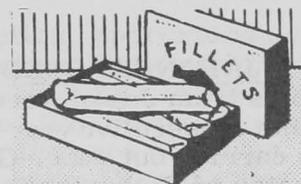
**EDIBLE FISHERY PRODUCTS, AUGUST 1955:** United States imports of fresh, frozen, and processed edible fish and shellfish in August 1955 totaled 71.1 million pounds (valued at \$18.6 million), according to a Department of Commerce summary tabulation (see table). This was a decrease of 3.3 percent in quantity as compared with the July 1955 imports of 73.5 million pounds. The value was approximately the same for both July and August 1955. Compared with a year earlier, August 1955 imports were lower by 14.3 percent in quantity, but increased 1.6 percent in value.

Exports of processed edible fish and shellfish (excluding fresh and frozen) in

August totaled 5.8 million pounds (valued at \$1.6 million)--an increase of 20.8 percent in quantity and 33 percent in value as compared with July 1955 exports of 4.8 million pounds (valued at \$1.2 million). August 1955 exports were higher by 41.5 percent in quantity and 77.7 percent in value as compared with August 1954.

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**IMPORTS OF GROUND FISH FILLETS INCREASED IN OCTOBER 1955:** Imports of groundfish fillets (including ocean perch) during October 1955 amounted to 16.9 million pounds. Compared with the 15.1 million pounds reported for the corresponding month last year, this was an increase of 1.8 million pounds or 12 percent (see chart 7 in this issue). The increase was caused primarily by somewhat larger imports from Canada and Iceland. Compared with the same month of last year, Norway, Denmark, the Netherlands, and West Germany also exported more groundfish fillets to the United States during October 1955. Canada again led all other countries in exports of groundfish fillets with 12.2 million pounds--nearly 7 percent more than reported for October 1954. Canada accounted for 72 percent of the total fillet imports for October 1955.



Total fillet imports into the United States during the first 10 months of the current year amounted to 113.7 million pounds, compared with 120.2 million pounds during the same period of last year. This was a decrease of 5 percent. Canada, with 36.0 million pounds, led all other exporting countries during the ten-month period, followed by Iceland with 16.3 million pounds. These two countries accounted for 90 percent of the total for the 10-month period.



## Vessel Insurance Survey Progress Report

The progress made in the "Study of Fishing Craft Hull and Protection and Indemnity Insurance" was outlined by a representative of the U. S. Fish and Wildlife Service at a meeting of the Atlantic States Marine Fisheries Commission held at Virginia Beach, Va., November 14 and 15. The contract for the study has been let to Boston University by the U. S. Fish and Wildlife Service.

The work to be performed will consist of a study of experience by insurance firms and fishing-craft owners with respect to hull and protection and indemnity risks.

A survey of the problem areas and plans and assignments of personnel for initial interviews with insurance companies have been completed.

During the last weeks of July and the month of August interviews were conducted with 12 insurance agencies, 4 owners' and producers' associations, 2 insurance associations, and 3 fishermen's unions along with 5 other organizations connected with the fisheries.

Cooperation has been most encouraging and has exceeded all expectations. Numerous letters have been received by Boston University from all parts of the country with offers of assistance and encouragement.

Some measures of relationship between factors, such as type of fishing activity, length of time at sea, and age of vessel with the incidence of loss of vessel are presently being examined on the basis of available insurance company records.

The U. S. Customs Bureau's listing of fishing vessels is presently being reconciled with the Service listing to be used as a population list from which to draw samples of vessel owners. It is anticipated that the migratory habits of certain vessels will cause some complications in the attempts to contact vessel captains and for this reason methods of selection and substitutions of vessels are being developed for this study.



## Washington

**JAPANESE SEED OYSTER EXPORTS PROGRAM FOR 1955:** Seed oyster imports from Japan were inspected between January 25 and April 10, 1955, for the ninth consecutive year by Washington's Department of Fisheries. This inspection is carried out under General Order 249 and Amending Order 333 of that State's Director of Fisheries in accord with laws governing the control of oyster pests and predators within the State.

In 1955 there were only two exporting companies and three major buyers involved in the seed oyster business. All Miyagi seed exported was produced by either the Urato Seed Oyster

Annual Seed Oyster Imports to the Pacific Coast, January Through May, 1947-1955					
Year	Miyagi			Kumamoto	Total
	Unbroken	Broken	Hi-Count		
1955	6,174	42,434	5,200	404	54,212
1954	9,619	54,159	1,500	250	65,528
1953	15,945	53,486	-	682	70,113
1952	23,771	58,858	-	600	83,229
1951	23,655	28,094	-	150	51,899
1950	20,615	25,378	-	713	46,706
1949	19,741	25,268	-	1,060	46,009
1948	23,293	9,416	-	80	32,839
1947	35,692	20,897	-	30	56,619

Growers Association (through Nozaki & Co.) or the Miyagi Prefectural Seed Oyster Growers Association (through Tokyo Food Products Co.). The small amount of Kumamoto seed shipped was handled by Tokyo Food Products Co. for the Kumamoto Prefectural Government which is now underwriting the production of this seed.

The table summarizes the statistics on seed shipments January through May since 1947. Generally, most California and all Oregon and British Columbia imports are included in the table. Since 1953 the California January-May shipments have risen substantially with about 1,700 cases in 1953, 2,536 cases in 1954, and 10,036 cases in 1955. There is every reason to expect further increases during the next several years. This increase has been in a large part due to a revision in the State of California policies governing the management and allocation of oyster lands, according to a report by the Washington State Shellfish Laboratory at Quilcene.

Included in the table for 1955, but not distinguished as such, are about 4,000 cases of grade B broken seed, 20 cases of a new type of oyster (the Suminoe) from Kumamoto, and 20 cases of Miyagi seed caught on scallop-shell cultch. The decrease in imports during 1955 (as well as both 1953 and 1954) were in part a function of supply. In both 1953 and 1954 orders exceeded supply by 2,000 or more cases and in 1955 the shortage was between 14,000 and 1,6000

In contrast to the 9 to 11 ships needed to handle imports for the last three years, only 7 ships were utilized in 1955. The reduction of conference shipping rates on seed oysters this year resulted in the total absence of nonconference shipping.

**Oyster Predator Inspection:** From the summation of maximum weekly water temperatures at two representative points in Japan, it is apparent that during 1955 they were neither unusually high nor low and as such the activity of the drills should have been modest at worst.

Actually, the drills, while not excessively active at any time, were present at all stages of processing throughout the entire season. This was the result of three major factors. First, a typhoon during the first week of September 1954 caused nearly 500,000 strings of shell to be swept from the catching racks to the bottom. While the bulk of them were recovered within 10 days, many drills attached themselves to the seed while on the bottom. Secondly, many of the growers, due to dependency and economic pressure resulting from the poor seed crop, were less careful of drills in processing than they normally are. Third, the short crop and pressure from exporters and buyers for more seed caused many growers to process seed intended for domestic use (less carefully handled drill-wise than export seed).

In addition to the production control aspects of the inspection, approximately 2,000 cases (about 4 percent of the packed boxes) were opened and 5-10 percent of the contents examined for the presence of drills and other oyster pests or predators. In the boxes opened, Japanese drill eggs were found twice (one live batch and one hatched out) and drills twice (one live and one dead). In each instance all boxes packed on the same date as the contaminated one, as well as cases packed after that date, were rejected for export. Further operation by the guilty packing group was prohibited, though their seed could be processed through another group. A total of 397 cases of seed was rejected as a result of these findings. As a consequence of these rejections there was a considerable increase in the vigilance of responsible parties on all packing sites and a great deal of concern expressed over the stiffness of our inspection. In past years the Japanese leaders have generally tended to shift all responsibility for drill control onto the American inspector; however, in a meeting at the end of the season between officials of the Japanese Government, Miyagi Prefectural Government, growers and exporters, buyers and their representatives, the Japanese themselves actually proposed to make a greater effort to control drills. Both producers and buyers once again urged Japanese Governmental agencies to apply greater effort to drill inspection and leave the problem of quality control to the processors and purchasers.

Observations on other pests and predators such as flatworms and seaweeds were made. Spat mortalities during time on the hardening racks, processing, time on holding racks, and shipping were observed and a number of experiments conducted to empirically evaluate the losses.

A few cases were sampled on board ship after the seed arrived in the United States to ascertain the effectiveness of our inspection in Japan. No evidences of careless processing or drills were encountered in these inspections.



## Virginia

OYSTER BEDS DAMAGED BY HEAVY RAINFALL IN 1955: Oyster planters in some Virginia areas the latter part of 1955 suffered heavy losses due to factors related to the excessive rainfall that accompanied the two hurricanes (Connie and Diana) in the Chesapeake Bay area on August 12 and August 17, 1955. It is estimated that about one million bushels of oysters were lost in the Rappahannock River. Similar though much lower losses were reported from the upper part of the James and York Rivers and also from certain parts of Virginia rivers tributary to the Potomac, states the November 1955 Maryland Tidewater News of the Maryland Department of Research and Education.

The August 1955 storms generally dumped about a foot or more of rain over most of the section. The most hard-hit area was the Rappahannock River, a tributary of Chesapeake Bay in Virginia. When an emergency situation was recognized, the following series of events took place: (1) the Virginia Fisheries Laboratory

worked day and night on an examination and survey of the disaster area; (2) the Chesapeake Bay Institute began a concurrent detailed investigation of hydrographic conditions; (3) a committee of well-known oyster biologists from the South Atlantic and Gulf Coasts under the chairmanship of the Oyster Institute of North America was organized to evaluate and supplement the data and conclusions reported by the above agencies.

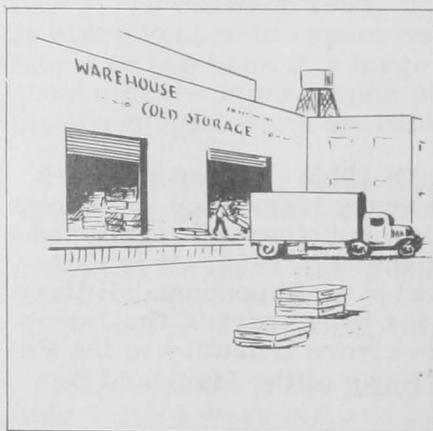
First reports of dead oysters came from planters in the upper part of the Rapahannock River about a week after the passage of hurricane Diane. Most oyster deaths occurred suddenly on beds where the oysters had been found alive only a few days previously. Privately-planted beds, located on less suitable bottom than the natural rocks, suffered losses ranging up to almost 100 percent. Serious losses also occurred on certain natural rocks, but these were not as extensive or severe as those on planted beds.

From the large amount of data gathered it is believed that the oysters succumbed from a combination of adverse factors that developed in conjunction with the sudden and heavy fresh-water runoff. These included a marked drop in salinity; the washing of heavy accumulations of silt and organic matter into the River; and oxygen deficiency in the water that resulted from decomposition of organic matter, strong stratification, and lack of light penetration; the production from organic matter of toxic hydrogen sulphide at the bottom due to lack of oxygen; and the high summer temperatures that had increased oyster susceptibility to other unfavorable conditions that normally are present. River flow at Fredericksburg was more than twice as high as in any previous flood on record for the summer months. For two hurricanes in such rapid succession to visit this area is extremely exceptional. Cooler fall weather lowered water temperatures and produced better mixing so that the water rapidly returned to normal and the surviving oysters fattened and made good growth.



## Wholesale Prices, October 1955

Changes in the wholesale fishery products price index from September to October were slight on the average. The labor-management disputes noted in September were about settled at the end of October. Seasonal changes and marketing conditions caused some marked changes in the price level of a number of items included in the fresh and frozen dressed or whole finfish subgroup. This is a normal condition at this time of the year. The over-all index of edible fish and shellfish (fresh, frozen, and canned) in October 1955 was 107.6 percent of the 1947-49 average (see table)--1.5 percent lower than in September, but 5.7 percent higher than in October 1954.



Prices for all items included in the drawn, dressed, or whole finfish subgroup index were mixed. Ex-vessel prices for large drawn haddock at Boston from September to October rose 81.7 percent, but prices quoted for the fresh-water varieties dropped substantially after the September Jewish holidays. The October 1955 prices for fresh and frozen halibut and salmon declined due primarily to the relatively larger proportion of the cheaper frozen products that enter the markets with the end of the production season. Compared with October 1954, prices were higher this October for this subgroup by about 1.8 percent, with increases and decreases practically offsetting each other.

Fresh processed fish and shellfish prices from September to October were marked by only slight changes as a group. Prices for fresh scrod haddock fillets increased 30.4 percent from September to October, reflecting the seasonal increase in ex-vessel prices of drawn haddock at Boston. Prices for fresh shrimp were down 8.2 percent this October, but were 10.3 percent higher than in October 1954. Light production, due to hurricane damage, pushed shucked oyster prices up 4.8 percent from September to October and 10.0 percent above a year earlier. The fresh processed fish and shellfish subgroup index rose 1.0 percent from September to October due to higher prices for scrod haddock fillets and oysters, and the index for the subgroup was 12.7 percent above that for the same period a year earlier.

Table 1 - Wholesale Average Prices and Indexes for Edible Fish and Shellfish, October 1955 With Comparisons

Group, Subgroup, and Item Specification	Point of Pricing	Unit	Avg. Prices <sup>1/</sup> (\$)		Indexes (1947-49=100)			
			Oct. 1955	Sept. 1955	Oct. 1955	Sept. 1955	Aug. 1955	Oct. 1954
ALL FISH & SHELLFISH (Fresh, Frozen, & Canned) . . . . .					107.6	109.2	111.7	101.8
<b>Fresh &amp; Frozen Fishery Products:</b> . . . . .					110.4	113.8	119.7	104.9
<b>Drawn, Dressed, or Whole Finfish:</b> . . . . .					115.6	125.0	136.6	113.6
Haddock, lge., offshore, drawn, fresh . . . . .	Boston	lb.	.10	.06	106.3	58.5	167.4	94.7
Halibut, West., 20/80 lbs., drsd., fresh or froz.	New York	lb.	.32	.43	99.3	133.1	106.0	98.0
Salmon, king, lge. & med., drsd., fresh or froz.	New York	lb.	.60	.63	135.1	140.4	135.4	140.5
Whitefish, L. Superior, drawn, fresh . . . . .	Chicago	lb.	.65	.95	161.1	235.5	146.3	130.1
Whitefish, L. Erie pound or gill net, rnd., fresh	New York	lb.	.80	1.10	161.7	222.4	171.8	126.4
Lake trout, domestic, No. 1, drawn, fresh. . .	Chicago	lb.	.57	.60	116.8	123.0	111.7	117.8
Yellow pike, L. Michigan & Huron, rnd., fresh .	New York	lb.	.32	.90	75.1	211.0	119.6	117.2
<b>Processed, Fresh (Fish &amp; Shellfish):</b> . . . . .					108.9	107.8	107.3	96.6
Fillets, haddock, sml., skins on, 20-lb. tins . .	Boston	lb.	.30	.23	102.1	78.3	115.7	71.4
Shrimp, lge. (26-30 count), headless, fresh . . .	New York	lb.	.55	.60	87.1	94.5	98.0	79.0
Oysters, shucked, standards . . . . .	Norfolk	gal.	5.50	5.25	136.1	129.9	117.5	123.7
<b>Processed, Frozen (Fish &amp; Shellfish):</b> . . . . .					94.8	93.8	99.3	89.7
<b>Fillets; Flounder (yellowtail), skinless, 1-lb. pkg.</b> . . . . .								
Boston . . . . .	Boston	lb.	.39	.39	102.1	102.1	102.1	98.2
Haddock, sml., skins on, 1-lb. pkg. . . . .	Boston	lb.	.27	.27	84.7	84.7	84.7	84.7
Ocean perch, skins on, 1-lb. pkg. . . . .	Boston	lb.	.27	.27	106.7	108.8	108.8	111.8
Shrimp, lge. (26-30 count), 5-lb. pkg. . . . .	Chicago	lb.	.54	.55	83.3	84.1	94.1	76.4
<b>Canned Fishery Products:</b> . . . . .					103.4	102.7	100.3	97.3
Salmon, pink, No. 1 tall (16 oz.), 48 can/cs. . .	Seattle	case	21.70	21.70	114.8	114.8	109.6	104.4
Tuna, lt. meat, chunk, No. 1/2 tuna (6-1/2 oz.), 48 cans/cs. . . . .	Los Angeles	case	12.80	12.80	92.3	92.3	92.3	93.0
Sardines, Calif., tom. pack, No. 1 oval (15 oz.), 48 cans/cs. . . . .	Los Angeles	case	7.55	7.55	88.1	88.1	88.1	2/
Sardines, Maine, keyless oil, No. 1/4 drawn (3-1/4 oz.), 100 cans/cs. . . . .	New York	case	8.20	7.70	87.3	81.9	79.3	74.0

<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.

<sup>2/</sup>Not available.

Frozen shrimp prices dropped 1.0 percent from September to October, while prices for frozen fillets were about unchanged. The October 1955 index for frozen processed fish and shellfish was 1.1 percent higher than September and 5.7 percent higher than a year earlier. When compared with a year earlier, October 1955 prices for flounder fillets and shrimp were higher, while shrimp and fillets of ocean perch were lower.

Higher canned Maine sardine prices were responsible for the rise of 0.7 percent in the subgroup index for all canned fish from September to October. Canned

fish prices in October 1955 were also higher (6.3 percent) than the same month a year earlier with prices for salmon higher by 3.8 percent and for Maine sardines up 18 percent. Canned tuna prices and California sardines were about unchanged.



#### REPRODUCTION OF FISH SUBJECTED TO ELECTRIC CURRENT

The possibility that fish might become sterile as a result of being subjected to electric current has interested many fishery biologists and fish culturists. As part of a fishery-management and research program on strip-mine impoundments, sponsored by the Truax-Traer Coal Company of Fiatt, Ill., a study was begun on the effect of electrofishing gear upon the reproductive capacity of the largemouth bass (Micropterus salmoides).

The plant was a 2,500-watt, 230-volt alternating-current unit. The electrode system was formed by 2 plates of aluminum wrapped around 2 boards that were 8 feet long. These electrodes were mounted about 10 feet in front of the boat and were about 6 feet apart.

On July 2, 1952, 8 largemouth bass, their total lengths ranging from 10 to 14 inches, were completely stunned by the electric current and collected with dipnets. The bass were transported to a spawning pond that contained no other fish. All specimens had completely recovered by the time they were released; they suffered no apparent harm from the electric current or from the handling.

On September 13-14, 1953, this pond was drained and the fish were removed. In addition to the 8 brood bass, there were 4,266 largemouths that were 2 to 8 inches in total length. Approximately 96 percent of these were less than 5 inches in total length, and approximately 4 percent were 5 to 8 inches in total length. The brood bass were 12 to 15 inches in total length. All fish removed were in good condition.

Although this investigation should be repeated with other species in addition to the largemouth bass in order to obtain more conclusive data, in this particular case the fish were definitely not made sterile by the electric current.

--Progressive Fish Culturist, July 1954.