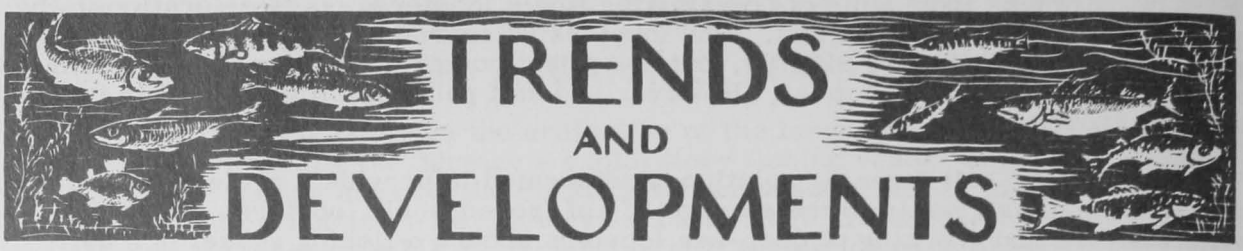


Additions to U. S. Fleet of Fishing Vessels

A total of 47 vessels of 5 net tons and over received first documents as fishing craft during April 1956, according to the U. S. Bureau of Customs. This was 11 vessels more than the number reported for the same month of 1955.

The Gulf area led all others during April 1956 with 14 newly-documented craft, followed by the Pacific area with 10; the Chesapeake and Alaskan areas with 9 each; the South Atlantic with 3; and the New England and Middle Atlantic areas with 1 each.

Table 1 - U. S. Vessels Obtaining First Documents As Fishing Craft, by Areas, April 1956 and Comparisons

Area	April		Jan.-April		Total
	1956	1955	1956	1955	1955
	(Number)				
New England	1	1	6	7	18
Middle Atlantic	1	2	8	5	13
Chesapeake	9	2	21	11	54
South Atlantic	3	6	14	15	65
Gulf	14	10	29	29	103
Pacific	10	9	14	26	117
Great Lakes	-	-	2	2	9
Alaska	9	4	12	12	35
Hawaii	-	2	1	2	3
Virgin Islands	-	-	-	-	1
Total	47	36	107	109	418

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

Table 2 - U. S. Vessels Obtaining First Documents as Fishing Craft, by Tonnage, April 1956

Net Tons	Number
5 to 9	26
10 to 19	7
20 to 29	5
30 to 39	6
40 to 49	1
50 to 59	1
109 to 120	1
Total	47

The State of Texas was credited with 50 percent of the newly-documented craft reported for the Gulf area during April. During the month there were 2 vessels each documented for the first time as fishing craft with registered home ports on the west coast of Florida and in Mississippi and Louisiana. Alabama had 1 newly-documented vessel during the month. Among the Pacific Coast States, Washington led all others with 6 of the 10 vessels credited to the area. The State of California had 3 and Oregon had 1.

During the first four months of 1956, a total of 107 fishing vessels was documented for the first time--only 2 less than the number reported for the corresponding period of last year. During the first four months of 1956, the Gulf area led all others with 29 newly-documented vessels--the same number reported for the corresponding period of last year.

Alaska

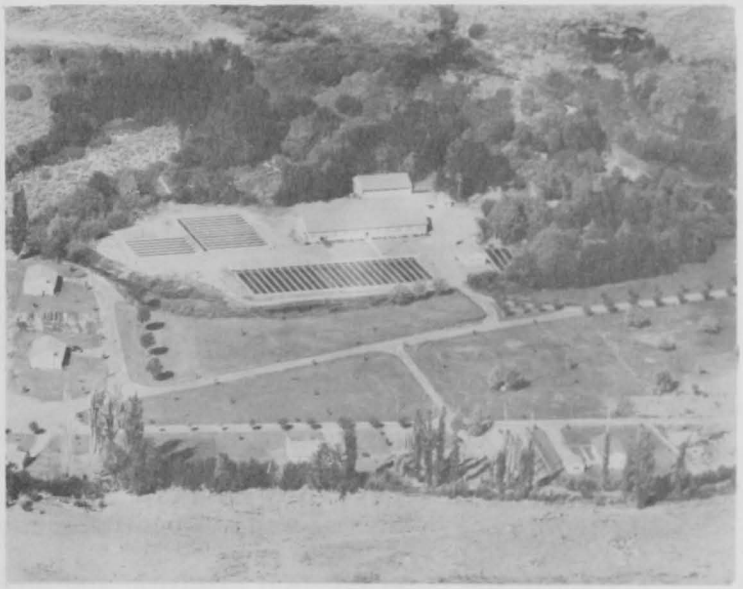
BAIT HERRING PREPARED BY NEW METHOD: Over 3.3 million pounds of herring were frozen this season in the Ketchikan, Alaska, area for use as bait. Of this amount a considerable portion is diverted to the sport fishing trade. At the time herring were being prepared, a different method of preparing bait for sports

fishing was observed. Instead of allowing the fish to die in the usual manner, the herring were brailed alive and placed in a small tank where they were killed by means of an electrical current. The herring were then frozen individually and packaged in convenient size fiber containers. The advantages claimed for this method of preparation are that the herring do not lose their body scales and are therefore brighter and more natural appearing than are herring prepared by other methods. As the herring are frozen individually, it is not necessary for the fishermen to break up a block of fish each time he desires new bait.

Biological Studies Aid Sport Fishermen

Studies designed to put more fish in the sport fishermen's creel are being conducted in eight laboratories operated by the U. S. Fish and Wildlife Service, the Service's Director announced on May 15. Results of these studies are made available to state conservation officials and others interested in the propagation of fish.

Nutritional studies for trout and salmon are being made at Cortland, N.Y., and at Willard, Wash., respectively. At Leetown, W. Va., and at Seattle, Wash., studies are being made on the various diseases of trout and salmon, particularly those diseases which strike at fish in the hatcheries. Studies at Entiat, Wash., relate to various phases of fish culture, and best types of apparatus, pond construction, and other matters pertaining to the physical, biological, and chemical end of fish rearing.



Trout hatchery, Hagerman, Idaho

At three other laboratories--Convict Creek, Calif., Logan, Utah, and in the Great Smoky-Shenandoah National Park area--the studies pertain to stream and other water conditions and their effect on trout, especially hatchery-raised trout. In addition, there is the project designed to rid the Great Lakes of the sea lamprey.

The propagation of warm-water fish also has its problems, although they are quite different from the problems that affect the rearing of trout and salmon. This is mainly because warm-water species are usually placed in earthen ponds to propagate naturally, while trout and salmon are spawned artificially, and warm-water fish are reared in water temperatures that are much higher than the maximum required for trout and salmon. In recent years, more attention is being given to the growth and survival problems of the various types of warm-water fish.

Nutritional studies are important because the food item is a considerable part of the cost of propagating fish and because improper feeding can cause heavy losses in hatchery fish and retard the development the fish need to combat the rigors of life in natural waters.

In the development of practical diets, vitamin needs, the effect of diets upon body tissue, the effect of metabolic products on the carrying capacity of ponds are

among the things studied. Results include getting much more poundage per unit of cost and time and more success in transferring fish from the hatchery to the distant streams.

Numerous studies are being made on fish diseases due, probably, to virus and bacteria. Determining the cause and cure of various infections which have occurred in rainbow trout hatcheries is one objective.

At the salmon cultural station, work is being done on the development of hatchery techniques, improvement of incubation equipment, effects of temperature changes, feeding trials, methods of maturing salmon, electrical diversion of fish into fishways and away from power and irrigation outlets, proper construction of ponds to assure maximum fish production, and numerous other problems.

The field investigations being done in California, Utah, and in the Great Smoky-Shenandoah area cover two general fields. One is a series of studies of the adaptations which a hatchery fish must make to fit into natural stream and high mountain lake environment. The other concerns various things which affect naturally-produced trout in their native waters.

California

LOGGING AND FISHERIES COOPERATE IN ELIMINATION OF SALMON STREAM DAMAGE: Timber operators, owners, and loggers have been called upon by the Department of Fish and Game to cooperate in the elimination of stream damage which is harming silver salmon and steelhead fisheries in California's north coast area, that Department's May 1956 Outdoor California periodical reports.

A series of three bulletins titled "Fish News for Timber Operators and Fishermen" are being mailed to approximately 2,000 operators, owners, and loggers to familiarize all segments of the logging industry with problems such operations pose on salmon and steelhead streams.

In a letter to leaders of the industry, the Department Director said: "We are hopeful that if various segments of the logging industry become familiar with these problems they will cooperate with us in attempting to eliminate the problems for the future welfare of these valuable wildlife resources."

The bulletins point out that siltation and blocking of streams resulting from logging operations are the principal factors harmful to fish. At the same time it is pointed out that there is no reason why salmon, steelhead, and logging can't get along together without too much difficulty.

In pointing up the problems as seen by the department, the bulletins describe the various factors which affect the fish, particularly in relation to their spawning habits and needs.

Excerpts from the bulletins follow:

> "The value of lumber and the lumber industry to the north coast area, of course, is great. The annual value of the salmon and steelhead is less than that of lumber. But the value of each is important to the welfare of California's economy and her people. It need not be a choice between the two, for both can exist without serious conflict. Some loggers today are getting their logs out economically and at the same time are protecting

the streams for salmon and steelhead. Many others could also help with minor changes in their planning and operations."

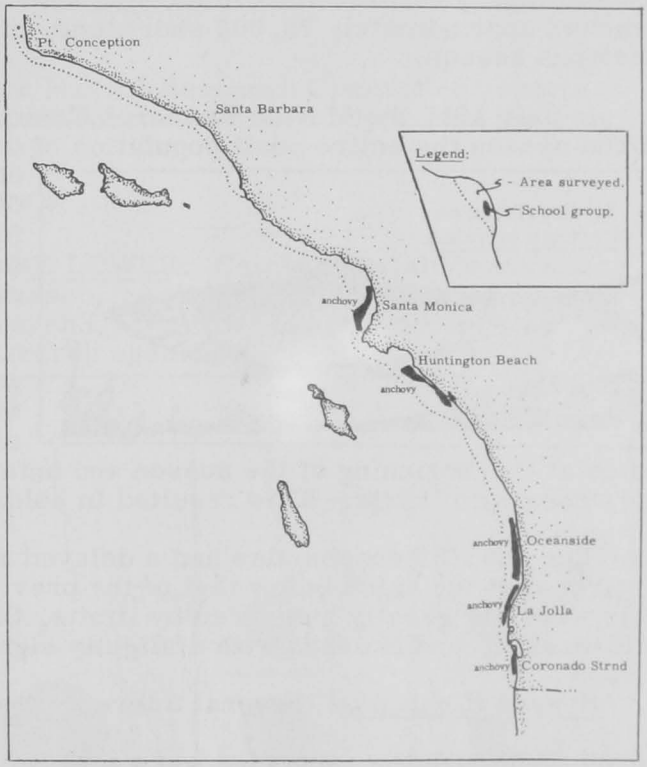
The bulletins further point out that the department has legal responsibility for the welfare of the fish, but seeks to obtain cooperative efforts from loggers in preventing damage to the streams, rather than to prosecute violations after the damage has been done.

* * * * *

PELAGIC FISH DISTRIBUTION AND BEHAVIOR STUDY CONTINUED (Airplane Spotting Flight 56-3): The inshore area from San Francisco to San Diego was studied from the air by the California Department of Fish and Game Cessna "170" (1359D) April 2-6, 1956. This was the third of a series of periodic flights designed to study pelagic fish distribution, abundance, and behavior in 1956.

No schools of fish were sighted in the Central California area (San Francisco to Pt. Conception) during this flight. It is known, however, that schools of anchovies were present in Monterey Bay and it is believed that heavy seas stirred up by strong northwest winds drove the fish to depths below the limit of visibility from the air. Another factor contributing to poor visibility into the water was the presence of very rich "brown" (dyanoflagellate) water along the Central California coastline.

Of particular interest was the presence of hundreds of "swarms" of euphausiids in the Monterey Bay region. These swarms ranged from 5 to 40 feet in diameter and appeared at the surface where they were preyed upon by thousands of gulls. The sport salmon boats were working in the areas of the bay where these swarms were found, indicating that the salmon were also concentrated in these areas, possibly to feed upon the euphausiids.



Airplane Spotting Flight 56-3, April 2-6, 1956.

"Green" (diatom) and "blue" (oceanic) waters occupied the inshore area of southern California with occasional reddish-brown (dyanoflagellate) "blooms" present in the Newport and Pt. Vicente areas.

Species identification of fish schools was possible through a combination of observation from the air and interviews of commercial fishermen working in areas where fish were spotted. Night fishermen could find no anchovies in the Huntington Beach area but in the daytime commercial airplane spotters found large schools. Conversely, night fishermen found jack mackerel schools in this same area at night but fishermen and planes working at day-

Region	No. Schools	Total Area (Sq. Ft.) in Region
Coronado Strand.	62	33,000
La Jolla	32	108,000
Oceanside	118	248,000
Huntington Beach	48	62,000
Santa Monica . .	65	187,000
Total	325	638,000

time found but a few small schools of jack mackerel. All schools seen on this flight were tentatively identified as anchovies.

No schools were seen which contained sardines, and likewise no sardines were taken by commercial fishermen during this period.

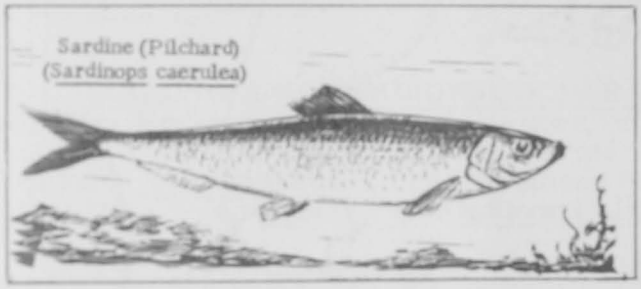
Anchovy: A count of the number of schools and an approximation of the area of each school was made. The results are found in the table.

There was a decided increase in the numbers of anchovies in the San Diego and Santa Monica areas since the March flight. The schools off Huntington Beach and Oceanside remained in about the same number and size.

* * * * *

PRESEASON 1955/56 PACIFIC SARDINE PREDICTION CONFIRMED: When the California 1955/56 Pacific sardine season ended February 1, the catch had reached approximately 75,000 short tons, or only about 7,000 tons more than the previous season.

In July 1955 the Marine Research Committee reported that prior to the start of the season the entire adult population of the Pacific sardine was in the neighborhood of 600,000 tons, that approximately 300,000 tons of adult fish were in California waters, and that 150,000 tons might be taken if economic conditions did not curtail the fleet's efforts.



This, the Committee report stated, was about the same amount of fish as was available to the fishery in the 1954/55, season which was hampered by labor disputes at the beginning of the season and unfavorable market conditions which kept the vessels on limits. This resulted in holding the catch to 67,000 tons.

The 1955/56 season also had a delayed start because of labor disputes which at first kept the catch below that of the previous season. However, since the vessels were not greatly hampered by limits, they exceeded last season's landings by mid-season, and finished with a slightly higher total catch.

Season Highlights: Several interesting aspects of the season are apparent:

1. Although the canneries were accepting fish and the infrequent imposition of limits had little effect on the size of the individual boat catches, the fishermen's success declined markedly as the season progressed.

2. About 50 percent of the commercial catch by number was of fish born in 1952.

3. Evidence to date indicates that the spawn success since 1952 has been poorer than in 1952, which was considered weak.

4. According to the Marine Research Committee preseason report, the adult sardine population was smaller preceding the 1955/56 season than it was before the 1954/55 season, but that a higher percentage (about 50 percent) was off California in 1955/56.

5. The evidence at hand indicates that the sardines off Southern California the past two years were chiefly fish which had been born off Lower California.

Outlook for Future: From the foregoing it would seem that the sardine population is still at a low level and that unless favorable conditions allowed for a good spawn survival the outlook for the industry is not good.

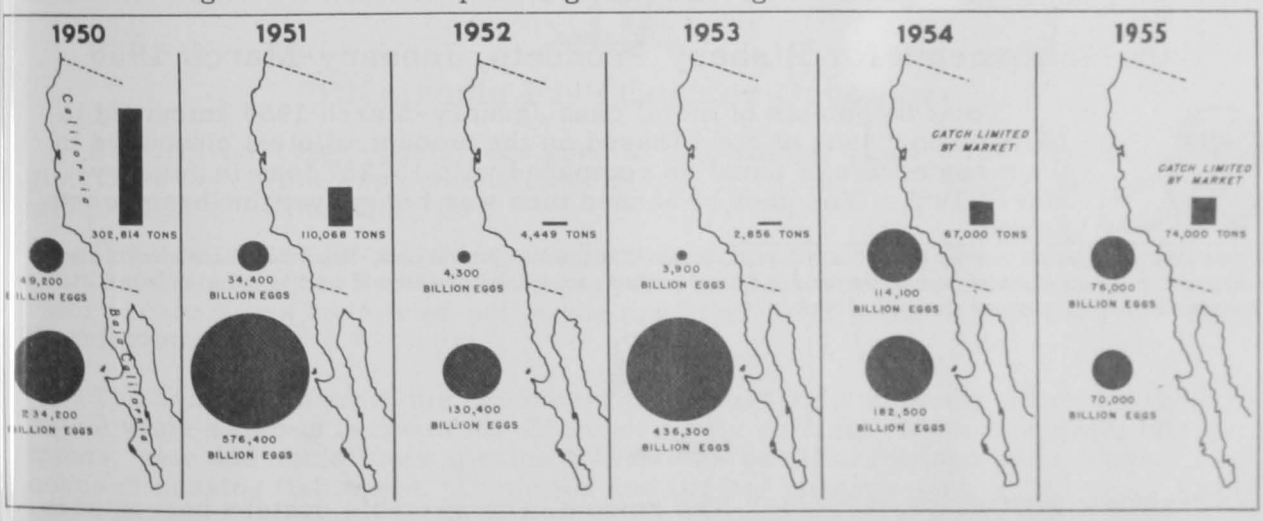
Of course, a higher percentage of sardines could possibly move in from Mexico and yield an increased catch, but without the favorable recruitment of young fish this would only result in a further decline in the total population.

There are a number of hypotheses regarding reasons for the poor recruitment of recent years. Two are discussed in the recent Marine Research Committee publication "Progress Report, California Cooperative Oceanic Fisheries Investigations, 1 July 1953--31 March 1955." The two hypotheses discussed are: (1) total survival of sardines from spawning is not dependent upon brood stock size except at stock levels lower than any yet experienced in the sardine population; and (2) above and below certain population levels the survival of sardines from spawning depends on the size of the brood stock, and these critical levels have occurred in the history of the sardine fishery. The effect of the brood stock size on recruitment definitely needs further study.

This paper is a departure from former Marine Research Committee reports since this is the first time that a technical discussion of fishery dynamics has been included.

* * * * *

SARDINE CATCH FOR 1956/57 MAY BE LOWER: Catches of California's once great sardine fishery may be lower next season, as the total sardine population continues to decline, the State's Marine Research Committee was told recently by fisheries investigators of five cooperating research agencies.



Comparison of Pacific sardine spawning and California catch, 1950 through 1955 (Source - U. S. Fish and Wildlife Service).

The Committee, which coordinates and helps finance a Statewide research program, met in San Francisco to hear the scientists' report and pass on division of its $100,000 budget among the five agencies.

The sardine catch for the season just ended totaled 74,000 short tons, up about 7,000 tons from the previous season. Economic factors held the catch somewhat below what the resource could have provided, the researchers pointed out, according to a March 30 release from the California Department of Fish and Game.

Agencies cooperating in the program include the California Academy of Sciences, California State Department of Fish and Game, Stanford University's Hopkins Ma-

rine Station, University of California's Scripps Institute of Oceanography, and the U. S. Fish and Wildlife Service.

* * * * *

WHALING INDUSTRY REACTIVATED: The catching and rendering of whales, formerly conducted at Fields Landing, Calif., has been reactivated by the establishment of the two land stations at Point San Pablo, Richmond (near San Francisco), and the licensing of two catcher boats. The whale catchers are the M/V Dennis Gayle and the M/V Donna Mae. The Dennis Gayle formerly operated out of the Fields Landing station.

The catcher boats and the land stations expect to catch and process from one to four whales a day during the whaling season. The first catch, made on May 9, was a 36-ton humpback whale. In addition to utilizing the whales for meal and oil, it is believed that suitable parts of the whale meat will be chopped and frozen for mink or other animal food. This venture is the first attempt to catch and process whales in the United States since 1953.

As whales are plentiful in the offshore waters of California during the summer months, it is possible that another shore plant will be established at Morro Bay in Southern California.

For catchers attached to land stations, the open season for baleen (blue, fin, humpback, sei, or minke) whales is May 1-October 31 and for sperm whales April 1-November 30.

Cans--Shipments for Fishery Products, January-March 1956

Total shipments of metal cans January-March 1956 amounted to 16,560 short tons of steel (based on the amount of steel consumed in the manufacture of cans) as compared with 15,237 tons in January-March 1955. The pack of canned tuna was heavy over the three-month period.

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.

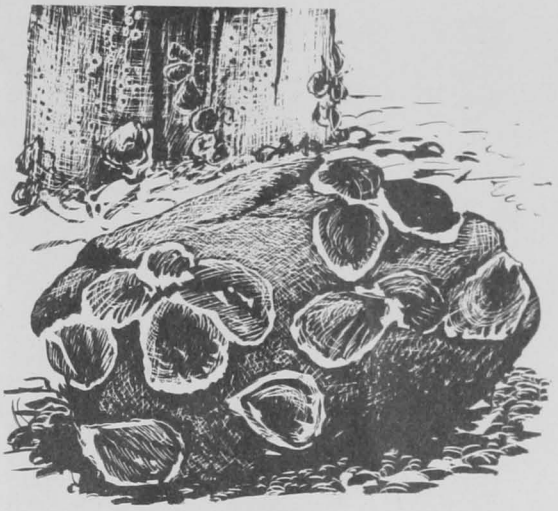
Delaware

OYSTER INDUSTRY, 1954/55: The amount of marketable oysters harvested in Delaware July 1, 1954-June 30, 1955, dropped because hurricane "Hazel" inflicted considerable damage to the oyster beds, the Annual Report of the Delaware Commission of Shell Fisheries points out.

Also, during the summer months of 1954 there was an even greater death toll in marketable oysters, but the cause was unknown.

The natural seed beds of Delaware did not catch a natural growth during the year and seed in Delaware Bay was very scarce. Approximately 18,000 bushels of seed oysters were taken from the natural beds in the Delaware Bay. Only 14 oyster boats worked on the natural oyster beds in the Bay. The Commission restricted part of the natural rocks in Delaware Bay and did not allow the oyster boats to work in that area.

A total of 40,000 bushels of shells was planted on the natural rocks in Delaware Bay. Also, shells were planted in the Murderkill River, Leipsic River, and Simons Creek. Approximately 150,000 bushels of seed oysters were tonged from the rivers in Delaware and sold to the Delaware oyster planters for the purpose of planting on leased oyster bottoms. Also, about 300,000 bushels of seed oysters were bought by the Delaware oyster planters for their leased bottoms. Most of these seed oysters came from Virginia.



Oyster spat (magnified many times) on small pebble.

About 60,000 bushels of seed oysters were planted in the Rehoboth and Indian River Bays. About 45,000 bushels of marketable oysters were taken from these two Bays.

Delaware has a large frozen sea-food plant which has expanded extensively during the year under review. During that period (July 1, 1954-June 30, 1955) the oyster products packed by all Delaware plants consisted of 4 million cans of oyster stew; about 600,000 pounds of frozen canned oysters; around 100,000 pounds of breaded frying oysters; and 300,000 gallons of fresh shucked oysters. The oyster industry in Delaware has close to 3,000 employees.

The value of the oyster industry in Delaware is currently estimated at $5 million. The oyster industry is one of the largest natural resources of the State of Delaware.

Electronic Fish Counter Developed

An electronic fish counter designed to help answer some of the questions biologists have about fish was demonstrated March 13 at the U. S. Department of the Interior building at Portland, Ore.

The device was developed by the Service's Pacific Salmon Investigations fish-counting laboratory at Seattle. Although the instrument was demonstrated on laboratory scale it has been tried out on the practical level at the Billard Locks of Lake Washington.

The basic element of the equipment is an electronic detector which gives a signal when a fish is between its electrodes. By suitable choice of electrode elements, size and sometimes species of fish may be differentiated and accurate records of passing fish made. Direction and time of passage also are shown. The electrodes are normally installed in tunnels through which the fish must pass.

The device does not use photoelectric methods, hence rocks and water-logged vegetable matter are not falsely counted, and water turbidity offers no problem. The system will work at any depth and in murky water where visual observation is impossible.

The detector utilizes the difference of conductivity between fish and water. By connecting the detectors to a third unit, a logic device, the direction of complete passages may be separately recorded while incomplete passage is ignored.

The detector may also be used as an alarm device to aid in visual counting, alerting the personnel at the counting board, thus giving them greater freedom be-

tween periods of light run. Operation is possible either from batteries or power lines. The high-frequency electric field between the electrodes is less than one-third of a volt in amplitude, well below the threshold of sensitivity of fish.

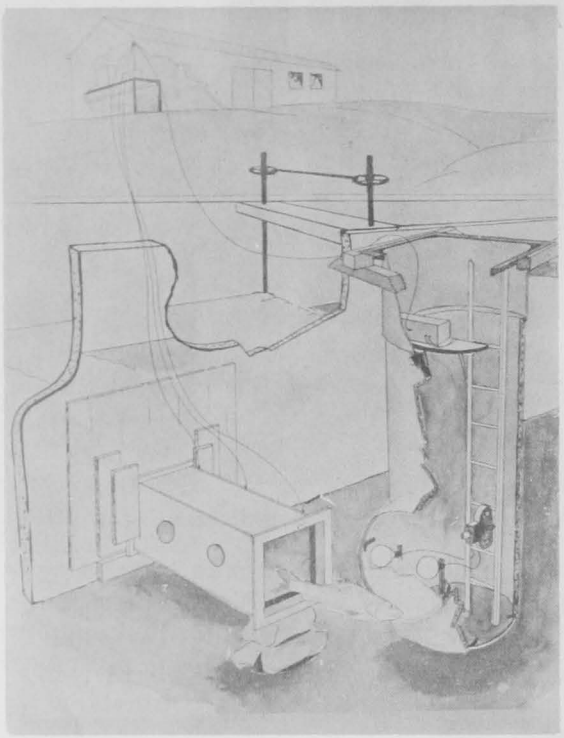


Diagram of an electronic fish counter.

The basic detector circuit was developed and is to be used as a triggering device for a split-field camera which will photograph fish allowing identification of tag numbers, species, net marks, etc. The potential of the detector as a research and management tool appeared so great, however, that primary emphasis was placed on securing its early commercial availability at a reasonable price without maintenance worries.

The detector may be used with troughs, some crested weirs, posts in stream beds, etc., where tunnels are not desirable. Tunnels are available in transparent, opaque, and pigmented materials to suit a particular installation.

The U. S. Army Corps of Engineers has purchased a multiple-bank counter for installation at its fish orientation laboratory at Bonneville. This counter has electrodes connected to a honeycomb of tunnels for counting large numbers of fish in the stream.

Exploratory Vessels Find New Shrimp and Yellowfin Tuna Areas

New fishing waters for small cocktail-size shrimp off the State of Washington and the locations of concentrations of yellowfin tuna in the southern part of the Gulf of Mexico were made recently by the exploratory fishing vessels of the U. S. Fish and Wildlife Service.

Prior to the recent development in the Gulf, yellowfin tuna was not known to be available in the Gulf of Mexico during the period from January to May, the time of their disappearance from the northern waters of that area. The discovery may lead to a year-round tuna fishery. The find was made by the exploratory fishing vessel Oregon in the offshore waters of the Gulf of Campeche.

The exploratory work on the shrimp was done by the Service's exploratory fishing vessel John N. Cobb. Previously small shrimp had been found in commercial quantities in the waters off Oregon and California. Work done during the fall of 1955 indicated that there were extensive shrimp beds from Cape Disappointment to Destruction Island, Wash., principally in waters between 50 and 100 fathoms deep. On its April exploratory cruise the John N. Cobb discovered what might become an excellent shrimp fishery off the Gray's Harbor area.

During the test, the Gray's Harbor area yielded shrimp at the rate of 2,000 pounds per hour for the best catches. Fairly consistent catches of 500 pounds an hour are reported. One day seven 30-minute drags made during the morning re-

sulted in 5,210 pounds of shrimp. Random samples showed that the shrimp ranged from 110 to 122 per pound.

One commercial shrimp vessel has begun operations in the area.

Fish and Wildlife Service officials feel that the discovery of the shrimp grounds off Washington will be an important addition to the local fishing industry.

Note: Also see Commercial Fisheries Review, June 1956, pp. 25 and 31.

Federal Purchases of Fishery Products

FRESH AND FROZEN FISHERY PRODUCTS PURCHASED BY THE DEPARTMENT OF DEFENSE, APRIL 1956: A total of 1.8 million pounds (valued at $0.8 million) of fresh and frozen fishery products were purchased during April 1956 by the Army Quartermaster Corps for the use of the Army, Navy, Marine Corps, and Air Force. This was 16.6 percent less in quantity and 24.8 percent less in value than purchases in March 1956. Compared with April 1955, the purchases this April dropped about 18.2 percent in quantity and 12.8 percent in value.

Purchases of Fresh and Frozen Fishery Products by Department of Defense (April and the First Four Months, 1956 and 1955)

QUANTITY				VALUE			
April		Jan.-April		April		Jan.-April	
1956	1955	1956	1955	1956	1955	1956	1955
(1,000 Lbs.)				($1,000)			
1,835	2,242	6,778	8,686	832	953	3,533	3,718

Prices paid for these products by the Department of Defense in April 1956 averaged about 45.3 cents a pound as compared with 50.3 cents in March 1956 and 42.5 cents a pound in April 1955.

During the first four months of 1956 purchases totaled 6.8 million pounds (value $3.5 million)--lower by 22.0 percent in quantity and 5.0 percent in value than for the first four months in 1955.

In addition to purchases of fresh and frozen fishery products indicated above, the Armed Forces generally make some local purchases which are not included in the above figures.

CANNED FISHERY PRODUCTS PURCHASED THROUGH MARKET CENTERS, JANUARY-MARCH 1956: Canned tuna, salmon, and some sardines were the principal canned fishery products purchased for the use of the U. S. Army, Navy, Marine Corps, and Air Force by the Army Quartermaster Corps through its Market Centers during the first quarter of 1956. Purchases amounted to 1,396,000 pounds of canned tuna, 601,000 pounds of canned salmon, and 8,000 pounds of sardines.

It is believed that only a portion of the requirements for canned sardines are represented in the data given since some canned sardines and canned fishery products other than tuna and salmon are procured locally and no information is available on these local purchases. Therefore, actual purchases of canned fishery products are higher than indicated in the data given.

* * * * *

QUARTERMASTER CORPS RESEARCH EMPHASIZES NEW LIGHTWEIGHT FOODS: In order to adapt military subsistence to the modern defense strategy of extreme dispersal, the Army Quartermaster Corps is seeking to develop dehydrated and concentrated foods and irradiated foods.

Maj. Gen. K. L. Hastings, The Quartermaster General of the Army, described the food picture of the future in a speech April 11 before the 10th anniversary meeting of the Research and Development Associates.

He said that for research and development men the big question is, "How will the strategic and tactical requirements of the future affect the military subsistence picture?" General Hastings answered this question as follows:

"A complete answer to this question lies only in the realm of prophecy. However, there are already a few basic principles which are becoming fairly obvious. The outlines of streamlined supply systems for a possible future all-out war are taking shape. Weapons research and development in recent years have catalyzed modes of logistical thinking. As before in conventional wars, enemy strategy in future atomic warfare on land will be directed toward finding the most profitable targets. Defense strategy will be directed to eliminate these profitable targets--including avoidance of massed forces of men engaged in combat or in support operations such as food distribution, food preparation, and related activities.

"It is here that the food picture of the future begins to take shape. We must accommodate our rations and our feeding systems to the new doctrine of extreme dispersal. To do this we must reduce food tonnage, simplify the lines of supply over which food must travel, and eliminate to the extent possible all vast food storage and food preparation centers that in the very nature of things require a massing of support forces, and therefore a profitable target.

"Fortunately, conventional warfare has long been concerned with this objective of reducing food tonnage. Palatable concentrates and dehydrates are presently available to us in sufficient variety to compose an adequate meal. You are perhaps aware of the fact that dehydrated orange juice, green beans, fish sticks, and soluble coffee, potatoes, eggs, and other items have been brought to a high state of acceptability. Many other items have been substantially improved under the Quartermaster research and development program on dehydrated products. I have tried these items at various times and I can say that they compare most favorably with other forms of preserved food.

"Inspired by the requirements of possible atomic warfare, we are at work on dehydrated foods that will lend themselves to a completely dehydrated precooked meal. New items in addition to those that have shown themselves to be satisfactory will be required. Prospects for success are good--a compliment to the energy that has been devoted to attaining new and greatly improved techniques of drying. If we assume the desired reduction in food tonnage is 50 percent--a percentage that has been suggested--we already have exceeded that percentage in the instance of many dehydrated and concentrated foods--and I mean palatable, nutritious, readily reconstituted dehydrated foods. In some foods, the weight reduction achieved runs as high as 80 percent.

"Besides reducing tonnage, we must simplify the lines of food supply. The far-ranging nuclear ships of the Navy, the long-distance bombers of the Air Force, and the fast-moving troops of the Army must be free of bulky and heavy paraphernalia. Our subsistence planning must be geared to the realization that in any future all-out war the equipment, as well as the labor, required to store and issue food must be kept to the barest possible minimum. One of the ways we hope to achieve this is through our current food irradiation program. In fact we have already demonstrated, theoretically at least, that irradiation preservation will permit a tremendous reduction of facilities required for proper storage of food.

"There is another potential benefit of irradiation I would like to mention. If we increase the burden on industry by requiring more highly-processed concentrated foods for use in combat areas, we must decrease to the extent possible the time, labor, and effort needed to provide food for noncombat areas. This probably means a greater dependence in noncombat areas upon fresh market produce. And it is in preserving and extending the storage life of fresh foods that our program of irradiation preservation of food has been particularly successful.

"The prospects for the widespread military use of foods preserved by irradiation are excellent. The current emphasis on the benefits of irradiation as a 'pasteurization' technique does not mean that we have sidetracked our interest in the possibilities of irradiation for long-term preservation. Investigations are continuing in this phase of the program, and we are definitely gaining ground.

"As I have said, we must reduce our subsistence handling and storage operations to the absolute minimum. We must find the lowest common denominator of both facilities and functions required to supply and feed this dispersed, flexible, mobile fighting force of the future. . . ."

Florida

FISHERIES RESEARCH, OCTOBER-DECEMBER 1955: The following are some excerpts from the Quarterly Report on Fisheries Research, December 1955, of The Marine Laboratory of the University of Miami.

Mullet Fish Sticks: The last taste tests were run on the mullet fish sticks. Briefly, fish sticks made of mullet were acceptable to many testers, but more people expressed a preference for cod or haddock sticks than for mullet sticks. The high fat content of mullet sticks will make it necessary to hold them for only comparatively short periods of time in frozen storage.

Shrimp Technology: ANTIBIOTIC ICES: With the work of the past quarter included, seven series of experiments have now been completed testing the effect of antibiotics on shrimp freshness. The latest experiments have tested aureomycin and terramycin frozen in ice, according to the new methods developed last year. As in the case of the dips, the antibiotic ices show definite improvement of quality of shrimp, in terms of bacterial counts and organoleptic criteria. The excessive formation of black spot remains a problem. In attempts to avoid this, four different ions were used in place of calcium (manganese, magnesium, cobalt and nickel), but with no success. Ice has now been made up, for use in the January experiments, avoiding the use of bivalent ions, and substituting methylcellulose and carboxy methylcellulose for the alginate carrier.

BLACK SPOT CONTROL: Another chemical has been tested as a possible control for black spot. This is butylated hydroxytoluene (Ionol), a powerful antioxidant. Results were negative in the first test, but this may be due to the uneven distribution of the chemical through the ice block. The technique for distributing Ionol has been altered and the experiment will be repeated.

Commercial ice manufacture involves bubbling air through the water to be frozen. This produces a clear block, but may add enough oxygen to encourage black spot. Tests were run some months ago with ice made without the air being bubbled through it. Further work is being done on this, and results have been encouraging enough to cause some shrimp boats to use the new type ice.

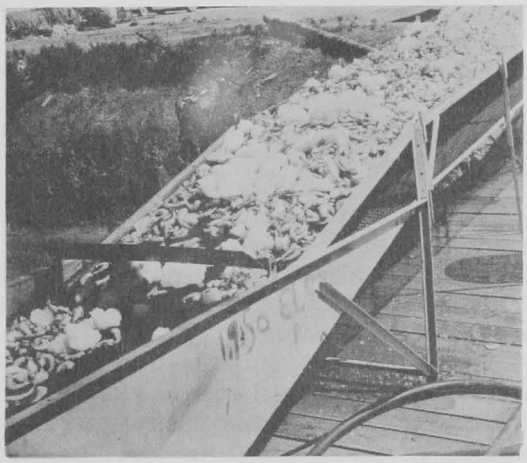
The effectiveness of dipping newly-caught shrimp in dilute solutions of sodium bisulfite was established earlier as a black-spot control. Latest work has been to establish the amount of this chemical which remains in the muscle of shrimp dipped in the solution, and to measure the destruction of thiamine. The SO_2--equivalent residual of the bisulfite has proven to be encouragingly low, in the order of 30 to 45 parts per million in both raw and cooked shrimp. This is compared to about 3,000 ppm. in dried apricots, about 1,800 ppm. in dried apples and about 1,200 in raisins. Thiamine destruction appears to be slight, which is also very encouraging.

Investigation is also under way on occasional lots of bisulfite--treated shrimp which turn yellowish or brownish. This may be associated with overexposure in the dip solution.

FRESHNESS TESTS: A final series of indole determinations were run in continuing attempts to find a satisfactory chemical test for freshness of shrimp. This was the follow-up of the report made in November, suggesting that the simultaneous operation of three sets of apparatus, with a larger number of shrimp being used for the samples, might improve the consistency of results. This expectation was borne out and indole is thought to be useful as a laboratory test for shrimp freshness.

Small Shrimp Survey: During the last quarter of 1955, four trips were made out of Key West in connection with the small shrimp study. Four of these were charter trips and the fourth one a shrimp boat pursuing its regular commercial-fishing operations.

Hauls were made on grounds expected to yield small shrimp. A standard shrimp trawl was used, except that the cod end was of smaller mesh than in general use, being of $1\frac{3}{4}$-inch stretched mesh. In order to catch shrimp and fish which escape through the cod end, a cover bag of one inch stretched mesh was attached to the cod end. All three charter trips during the quarter used this mesh and gear arrangement. Altogether 23 hauls were made.



Unloading a commercial shrimp vessel with a conveyor system.

The amount of shrimp caught in each haul was recorded, as well as the amount and general composition of the trash. The amount of shrimp retained by the cod end and those caught in the cover net were recorded, and measurements made of the sizes of the individuals. Identification has been made of the fish making up the trash. Of interest is a small shrimp caught in the cover bag, of a different species from the commercial shrimp. The small species is Trachypenaeus constrictus. At present few, if any, are caught in commercial gears, but this unused shrimp is as big as some now used, especially in the canning and drying trade.

Blue Crab: This program has been concerned with the problem of helping Florida crab producers retain markets, particularly in the north, in the

Great Lakes Fishery Investigations

CHUB FISHERY NOT RESPONSIBLE FOR DECLINE OF LAKE MICHIGAN TROUT: The decline of Lake Michigan's trout fishery, which plunged from an annual catch of 6,500,000 pounds in 1946 to a mere 34 pounds in 1955, is due to the sea lamprey rather than to destruction of young lake trout by the chub fishery or to failure of natural reproduction, a study made by the Fish and Wildlife Service indicates. The study was made by Paul H. Eschmeyer, biologist for the Service. Overfishing as a reason for the decline was ruled out by earlier studies.

To further emphasize the decrease of lake trout in Lake Michigan, the research shows that in the first seven months of 1954 gill-net settings totaling 8,794,000 feet (or 1,666 miles) brought up only 326 trout and that in a four-months period in 1955 more than 1,400 miles of net caught only 8 trout.

The three possible reasons for the decline--(1) the destruction of young trout by the use of small-mesh nets by the chub fishermen, (2) the near or complete failure of natural reproduction, and (3) the sea lamprey--are discussed in turn.

The heavy loss of young lake trout through chub fishing activities had no adverse effect upon trout abundance, according to the report. During the period, 1935 to 1939, the number of small trout destroyed by chub fishing varied from 688,000 to 927,000. If such destruction had been detrimental to the abundance of trout, a serious decline in that abundance could have been expected during the 1939-1944 period. Yet during these years the abundance index varied from 100 percent to 126 percent. This index is based upon the 1929-1944 average. Conversely, in 1940-1944 chub fishing was less intense and destruction of trout was correspondingly lower. But just when the trout fishery should have benefitted by the decreased destruction, the fishery collapsed completely in the later 1940's.

Studies also showed that failure of natural reproduction first exerted a major influence in 1954, and that the enormous decline in abundance occurred well in advance of the time when failure of natural reproduction could have been a factor.

A study of the correlation between the size of lake trout and the percentage of individuals bearing sea lamprey scars and other studies in the field of lamprey depredations, plus the ruling out of the other possible causes, leads to the conclusion that the Lake Michigan trout have been brought to near extinction by the lethal attack of the sea lamprey.

The sea lamprey was noted in Lake Michigan as early as 1937. By 1946 it was spawning in great numbers in many streams tributary to Lake Michigan. Fish and Wildlife Service biologists who have been working on selective poisons and other methods of controlling the sea lamprey report considerable progress in their efforts.

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OPERATIONAL PLANS FOR SERVICE'S RESEARCH VESSEL "CISCO" FOR 1956: During the 1956 operational season of the U. S. Fish and Wildlife Service research vessel Cisco, a comprehensive survey will be made of the Saginaw Bay area of Lake Huron.

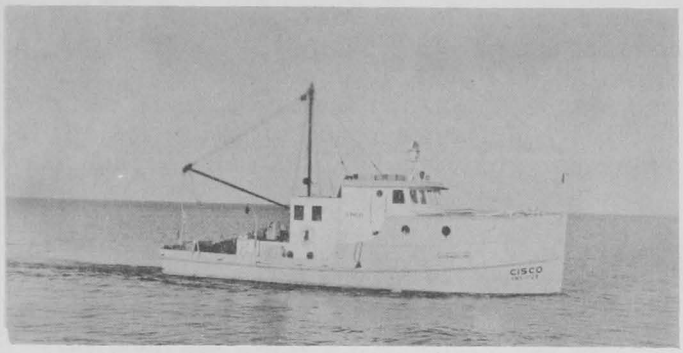
The objectives of the survey will be to study the species of fish inhabiting Saginaw Bay, their distribution, and relative abundance. In addition:

1. Determine the seasonal movements and summer distribution of the walleye and lake herring.

2. Measure and otherwise evaluate the physical or biological factors that may have contributed to changes in the composition of the Saginaw Bay fish population that have occurred in recent years.

3. Determine the conditions required for natural reproduction of important species of the Bay and factors that may influence the success of spawning, incubation, hatching, and juvenile growth.

4. Establish the occurrence and distribution of larval, fry, and yearling stages of species that may be important in influencing the status and structure of the fish population.



Cisco, research vessel of the Service's Great Lakes Fishery Investigations.

5. Establish measures that may be used as a base to follow future changes of the physical and biological conditions in Saginaw Bay.

6. Describe the current systems in Saginaw Bay and the adjacent portion of Lake Huron, and determine the amount of interchange between the bay and lake.

In the course of the survey, gill nets, otter trawls, and other nets will be used to sample the population (both adult and larval) of the Bay. All walleyes or yellow pike taken alive and in good condition will be tagged and released. Several types of tags will be tested for effectiveness. Additional scientific data will be collected for population studies; stomach contents and fish-food organisms; environmental factors such as water temperatures, water turbidity, chemical composition, and condition of the bottom; drift bottles will be released at regular stations along the route of the cruises; and routine plankton collection made at all hydrographic stations.

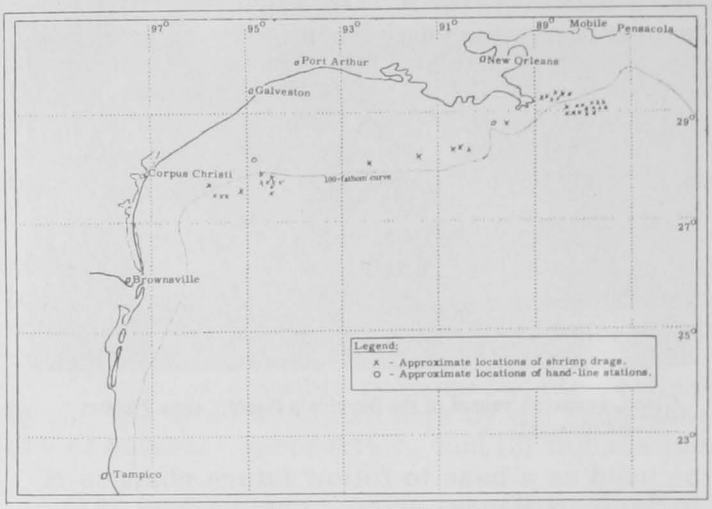
Gulf Exploratory Fishery Program

RED SHRIMP CAUGHT IN GULF OF MEXICO BY "OREGON" (Cruise 38): Large red shrimp (Hymenopenaeus robustus) were taken in all drags beyond the 200-fathom curve by the M/V Oregon during a three-week exploratory shrimp-trawling cruise in the northwestern and north-central Gulf of Mexico. A total of 41 drags and two hand-line stations were completed during the trip which ended on May 22. A total of 28 drags were made in depths of 100 to 300 fathoms and 13 in 30 to 60 fathoms.

Using 80-foot balloon and 100-foot flat trawls, catches ran from 90 to 210 pounds per three-hour drag in the area east of the Mississippi Delta as compared to catches of 5 to 30 pounds off the Texas coast. Catches in the 200- to 240-fathom range also included from 10 to 100 pounds of 50-count Penaeopsis megalops, a smaller deep-water shrimp. Catches of 300 to 500 pounds of scrap fish were common in both areas. Hake and whiting accounted for the bulk of the catch.

Catches of brown-grooved shrimp (Penaeus aztecus) ran from 2 to 22 pounds per hour using a 40-foot flat trawl at the 13 shallower-water stations. Following up reports of a "new" species of shrimp entering the fishery in the Mississippi Delta area, a series of six drags were made in 30 to 60 fathoms off Pass a Loutre.

Small numbers (from ½ to 3 pounds) of 31-35 count "humpback" shrimp (Solenocera vioscai) were found mixed with the brown-grooved shrimp in the 30- to 45-fathom drags. This species has been commonly taken in very small numbers in commercial catches off the Mississippi Delta area.



M/V Oregon (Cruise 38).

Severe gear losses due to bogging were encountered in the deep-water dragging, particularly in the northwestern Gulf. During the cruise three complete rigs were lost including bridle, doors, and trawl. Five additional rigs were badly damaged.

During the trip an uncharted rock "ridge" was found, orignating in the vicinity of 27°57' north latitude, 94°55' west longitude, and extending several miles in an east-southeasterly direction. Echo-recorder tracings showed good indications of bottom fish along the entire ridge. On May 8 a series of hand-line stations at various points along its length yielded approximately 1,600 pounds of red snapper and 300 pounds of several species of groupers.

Maryland

OYSTER PROSPECTS BRIGHT ON SOME MARYLAND BARS: Lack of sufficient oyster set is one of the chief limiting factors in oyster production on many bars in the Chesapeake area. Certain oyster beds are known for the production of fat well-shaped oysters but seldom receive enough spat on them to replace the oyster populations as rapidly as the crops are harvested. These bars will usually yield only meagre crops that are far below their full capacity unless adequate supplies of young oysters can be introduced as seed. To a limited extent the State has been able to stimulate yields on such bars by planting seed, but this is expensive and available public funds are used primarily for planting shells where spat are likely to attach. Even if all such funds were used for planting seed on low-setting bars, only a small fraction of their potentially-productive areas could be planted. Thus the crop on unplanted bars may almost reach the vanishing point when setting fails over a long period of years. This has been the case on many good oyster-growing bottoms of the State where a marked reduction in yield has occurred.

Examinations of oyster bars early in 1956 in the Patuxent River have shown that the best sets for many years occurred during 1954 and 1955 on bars all the way up to the head of the oyster-producing area, a relatively short distance above the Patuxent River Bridge. Reports indicate that a similar condition exists on the upper Severn River bars and in parts of the South River area. Increased sets also occurred on the Eastern Shore side of the upper Bay. In the Patuxent, counts of about 200 per bushel of the 1954 set on natural cultch were found in the upper river together with a scattering of 1955 set. The 1954 set decreased gradually downstream although counts of over 100 per bushel were found on some bars in the middle section, ranging down to an average of approximately 50 per bushel in the lower river. The 1955 set was highest in the lower river except near the mouth and ranged up to around 200 per bushel. State shell plantings in the lower half of the River also received good catches, in one sample as high as 442 spat per bushel on 1955 shell. The set was not uniform but was quite general.

Counts made in the Patuxent during a period of more than ten years prior to 1954 have shown an average of less than 10 spat per bushel per year on natural cultch. On the other hand, the count for a good seed-producing area, such as St. Mary's River, often is 1,000 or more spat per bushel. Survival of spat in the Patuxent River has been quite good in the past. Hence it is expected that the marked increase in the quantity of spat now present on available cultch should be followed by a period of increased production from the River's natural rocks. It should be pointed out, however, that the extent of the set is limited by the available cultch and that cultch has become progressively scarcer as shell and cinder become covered by silt on depleted bars.

The set for 1954 and 1955 was something less than average over most other oyster bars in Maryland, especially in the lower or saltier oyster-producing areas. These years were both exceptionally dry, up to the August storms of 1955. The drought condition resulted in the salinity of the water at Solomons averaging about 25 percent above normal during the oyster-spawning season of the two years. Less detailed observations indicate that a similar rise in salinity occurred over most of the Chesapeake. This probably was even more marked in the uppermost oyster-producing areas where salinities usually are kept down by the flow of fresh water downstream.

A tentative theory of how this condition may have brought about the observed increased set follows: Tidal action in an estuary tends to move saltier water upstream near the bottom and this, when accompanied by a lessened dilution with fresh water during dry seasons, may have tended to concentrate more larvae than usual in the upper reaches of the River. Activity of oysters and the presence of tiny marine organisms upon which oysters and oyster larvae feed would also be affected by the rise in salinity. Resultant changes of this nature may have favored better production and survival of larvae and spat. The exact mechanism by which the better sets were brought about is not understood, however, and the association with the conditions caused by dry weather may be only a coincidence. Continued studies of the factors that influence oyster spawning and setting will be made and certainly any future occurrence of exceptionally dry years will be noted carefully in relation to the oyster setting pattern, according to the March 1956 Maryland Tidewater News of the Maryland Department of Research and Education.

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SUSPENDED CULTCH FOR OYSTER SET TESTED IN CHINCOTEAGUE BAY: Experiments which were designed to test several methods of holding cultch for oyster set above the bottom have been tried this past season in Chincoteague Bay, Md. Results indicate that due to the high cost and scarcity of seed oysters it may be economically feasible to grow seed oysters above the bottom where enemies cannot gain access to them. This should insure better survival and higher quality in the seed oysters and so justify the cost of the operation. In the past the cost of seed oysters was low and the quantity was sufficient to meet the demand. Any method of producing seed which involved high labor costs was economically out of the question. In other countries where labor is cheaper similar methods have been used for many years with good results, the March 1956 issue of Maryland Tidewater News of the Department of Research and Education points out.

The shells which were used as cultch in Chincoteague Bay were put on metal trays or held in wire bags and placed so that they would be in the intertidal zone. Tidal amplitude averages about one foot in that part of the Bay. The results of this experiment indicate that the method could be successful commercially as far as receiving a set of oysters is concerned. The operation, however, was on too small a scale to obtain any cost data. The shells held in the wire bags or trays retained a set of oyster spat which was about sixteen times as great as that on the shells which were planted on the bottom directly beneath the suspended shells. This was tested in two areas of the Bay and the figure given is the lowest set obtained.

Several factors may contribute to the success of the suspended cultch, but certainly the fact that they were divorced from nearly all of their enemies is very important. Another important consideration is that none of the shells were in the mud. Both sides of the shells were available to receive the set of oysters. Another important point is that this method may be used to utilize good setting areas which may have a very soft muddy bottom which would not support shells planted there. Many potentially-good setting areas are not now being used for the above-mentioned reason.

The investigation will be carried on during the 1956 season. The costs will be noted so that an accurate estimate of the per bushel cost of seed raised in this manner may be obtained. This will, it is hoped, give some idea to oyster planters of the feasibility of raising their own seed oysters on a commercial basis. It is expected that this year seed oysters will sell for $1.35 to $1.50 per bushel plus freight to the planting area. These prices leave a good margin for the labor and material involved in handling shells and making wire bags if some thought is given to devise economical methods of carrying out the operation. Some of the answers to the problem should be available after this summer's work so that the method can be evaluated. It is felt that at the present prices the work offers some promise of alleviating the problem of seed-oyster costs.

Massachusetts

REGULATIONS FOR WEIGHING, SORTING, AND CULLING FISH AT LANDING PORTS: Certain rules and regulations for the weighing, sorting, and culling of fish were adopted by the Massachusetts State Commissioner of Labor and Industries. The regulations, which became effective May 1, 1956, follow:

General Laws, Chapter 94, Section 86 (Ter. Ed.)
as Amended by Chapter 415 Acts of 1956

The Commissioner of Labor and Industries may adopt, amend or repeal, and shall enforce, all such reasonable rules and regulations, and orders thereunder, as may be necessary or suitable in relation to the weighing, sorting and culling of fish when landed from a vessel or boat. Whoever violates said rules or regulations or orders thereunder shall be punished by a fine of not less than fifty nor more than one hundred dollars.

Rules and Regulations Relative to the Weighing, Sorting and Culling of Fish Adopted by the Commissioner of Labor and Industries.

Cull of Fish in All Ports

Haddock	Over $2\frac{1}{2}$ lbs.	Cusk	Over 3 lbs.
Scrod haddock	$1\frac{1}{2}$ to $2\frac{1}{2}$ lbs.	Scrod cusk	$1\frac{1}{2}$ to 3 lbs. incl.
Cod, extra large	Over 25 lbs.	Halibut, extra large	Over 125 lbs.
Large cod	10 to 25 lbs., incl.	Large halibut	60 to 125 lbs.
Market cod	Over $2\frac{1}{2}$ lbs. to 10 lbs.	Medium white halibut	12 to 60 lbs.
Scrod cod	$1\frac{1}{2}$ to $2\frac{1}{2}$ lbs., incl.	Chicken halibut	7 to 12 lbs.
Lemon sole	4 lbs. and over	Snapper halibut	Under 7 lbs.
Blackbacks	2 lbs. to 4 lbs.	Medium grey halibut	12 to 60 lbs.
Medium blackbacks	1 lb. to 2 lbs.	Large mackerel	$2\frac{1}{4}$ lbs. and over
Small blackbacks	Under 1 lb.	Medium mackerel	$1\frac{1}{2}$ to $2\frac{1}{4}$ lbs.
Grey sole	2 lbs. and over	Small mackerel	1 to $1\frac{1}{2}$ lbs.
Small grey sole	Under 2 lbs.	Tinker mackerel	$\frac{1}{2}$ to 1 lb.
Yellowtails	$\frac{3}{4}$ lb. and over	Tack mackerel	Under $\frac{1}{2}$ lb.
Dabs	1 lb. and over	Butterfish	325 fish or less per 100 lbs.
Small dabs	Under 1 lb.	Small butterfish	More than 325 fish per 100 lbs.
Pollock	4 lbs. and over	Redfish (ocean perch)	120 fillets or less per 10 lbs.
Scrod pollock	$1\frac{1}{2}$ to 4 lbs.	Small redfish (ocean perch)	More than 120 fillets per 10 lbs.
Large fluke	4 lbs. and over	Whiting	No cull but designated "round" or "h. & g."
Medium fluke	3 to 4 lbs.		
Small fluke	$1\frac{1}{2}$ to 3 lbs.	Swordfish	Over 110 lbs.
Large hake	6 lbs. and over	Baby swordfish	110 lbs. and under
Medium hake	Over $2\frac{1}{2}$ to 6 lbs.		
Small hake	$1\frac{1}{2}$ to $2\frac{1}{2}$ lbs., incl.	Scallops	9 lbs. per gallon, no cull

Weighing of Fish

In all ports, an allowance shall be made for tare weight of $\frac{1}{2}$ lb. per bag on scallops. Tare weights of vehicles, barrels, boxes or other containing units shall be regularly taken. All weighing operations shall be in accordance with the Rules and Regulations established by the Director of Standards and Necessaries of Life1/.

In the Port of Boston, an allowance of five percent for ice and other foreign substance shall be made in bulk weighing, except in the circumstance where an abnormally large amount of ice is in the fish a percentage allowance may be mutually agreed upon by the buyer and the seller.

In the Port of Gloucester, on grey sole and dabs, an allowance for ice and other foreign substance of 10 lbs. per 250-lb. barrel of fish shall be made unless other allowance is mutually agreed upon by the buyer and the seller. No allowance to be made for ice and other foreign substance on groundfish.

In the Port of New Bedford, on groundfish and flounders, an allowance shall be made of 4 lbs. per 100-lb. box or basket for ice or other foreign substance.

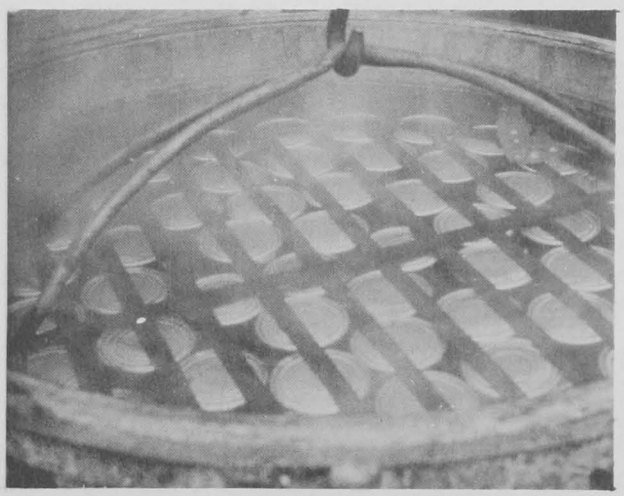
Ernest A. Johnson,
Commissioner of Labor & Industries

1/ General Laws, Chapter 94, Section 176, " 'Weight' in a sale of commodities by weight shall mean the net weight of all commodities so sold; and contracts concerning such sales shall be so construed;. ..."

New York City

SUGGESTIONS FOR CRAB MEAT PACKERS: The Director of the Bureau of Food and Drugs of New York City's Department of Health in a letter addressed to fresh crab meat packers makes suggestions for shipping crab meat to New York City. The letter points out that fresh crab meat shipped to the City of New York must conform to the bacterial standards prescribed in Section 163A of New York City's Sanitary Code. In order to meet these standards, it is absolutely essential that crab meat be prepared, handled, and packed under strict sanitary precautions in a plant that is certified by the state inspection authority controlling the crab meat industry in your State.

To prevent rise in bacterial content, it is also essential that the crab meat be adequately refrigerated from the period of packing to the time it reaches its destination and that delay be avoided between packing and shipment.



Pasteurizing crab meat in hermetically-sealed cans.

The following suggestions are made to aid in maintaining bacterial quality control during the long haul in shipments of crab meat to the City of New York.

1. Use shipping containers of sufficient size to provide maximum space for storage of ice.

2. Pack cans into barrels or other shipping containers in a manner that will allow spaces between the cans to facilitate thorough icing and re-icing all around can surfaces. Avoid overloading or stacking cans directly on top of each other.

3. Eliminate delays in time and additional handling by direct shipments from your plant to New York City instead of reshipments through another dealer.

4. Check your carrier's equipment relative to refrigeration or ability to maintain cold temperatures; also location of icing stations en route.

5. Request re-icing of your shipments in transit at suitable intervals, especially in warm and hot weather.

6. Arrange for direct deliveries of your shipments if possible without long delays resulting from consolidations or transfers of loads, lay-overs at transfer points, circuitous routing, etc.

It is well to bear in mind that attempts at savings in shipping costs per package is negligible in comparison with losses resulting from spoilage or increase in bacterial counts in the product due to inadequate refrigeration or icing during transportation.

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SUGGESTIONS FOR TRANSPORTERS OF FRESH CRAB MEAT: At a recent meeting held at the New York City Department of Health with health officials of the Southern states which ship fresh crab meat to New York City, considerable discussion centered around methods of refrigeration used on vehicles during long hauls of shipments from the crab-meat packing plants to market destinations. It was decided that the City's Department of Health send a letter to every trucking and express firm before the coming warm weather season and point out the necessity for proper care during transportation.

The Director of the Bureau of Food and Drugs of New York City's Department of Health in the letter points out that fresh crab meat is a ready-to-eat food that is generally consumed without further cooking. Continuous adequate refrigeration is a very important factor in maintaining quality control. If it is not kept at a very cold temperature at all times from point of departure to point of destination, bacteria may multiply to enormous numbers and cause spoilage of the crab meat or food poisoning to the consumers. You are urged to alert your employees to take all precautions necessary to assure that crab meat be kept cold while transported in your carriers, the letter to the transportation companies continues.

The importance of refrigeration is being constantly stressed to the crab meat packers. However, the following suggestions to trucking and other transportation companies may aid in preserving quality during transportation:

1. Check amount of ice and salt carried to assure that it is adequate for the entire load. Check insulation for defects.

2. If mechanical refrigeration is used, check for proper working order and if adequate to maintain sufficiently low temperatures for the load carried. If necessary, supplement with dry ice.

3. Precool vehicles during hot weather before loading.

4. Place loads in such a manner as to allow circulation of air around the shipping containers. Use of floor racks for this purpose is advisable.

5. Where ice is used for refrigeration, check drains to insure against stoppages. Plugs for ice bunkers should be tight-fitting.

6. Do not skimp on ice in warm and hot weather and see that all cans inside barrels and boxes are well re-iced. Arrange with packers for re-icing of their shipments en route.

7. Provide re-icing stations at suitable intervals along routes and make certain that stops are made for the purpose of re-icing.

8. Avoid the alleged practice of skipping re-icing stations and then re-icing just before arrival in New York City to mislead receivers.

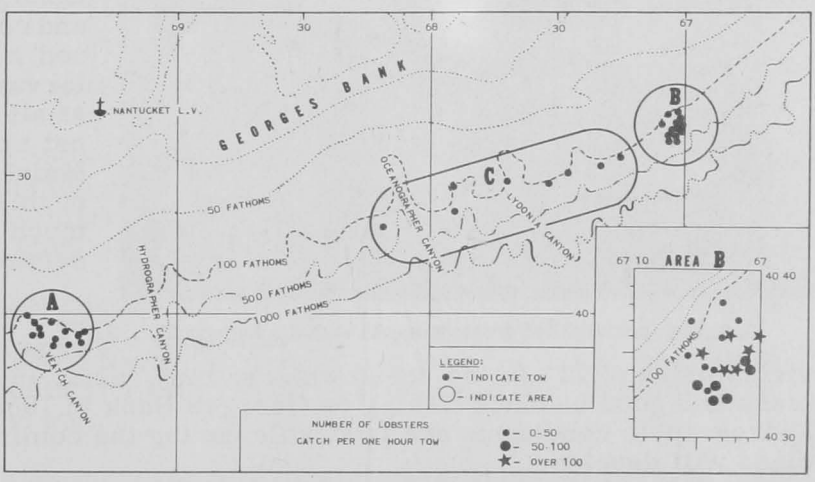
9. Avoid long delays in transit caused by consolidations or transfer of loads, lay-over at transfer points, circuitous routing, etc.

10. Make employees aware of precautions to be taken during long hauls in hot weather when vehicles are subject to a great deal of heat over the highways.

North Atlantic Fisheries Exploration and Gear Research

EXCELLENT CATCHES OF DEEP-WATER LOBSTERS BY "DELAWARE" (Cruise 19): Excellent catches of deep-water lobsters were made by the Service's exploratory fishing vessel Delaware. The 12-day cruise was completed with return of the vessel to East Boston on May 11. The purpose of the cruise was to evaluate the commercial fishing potential for deep-water lobster at this season.

Over 8,900 pounds of deep-water lobsters averaging 5 pounds each were taken by 41 exploratory tows of 1-hour duration. Gear used was a standard No. 41 otter trawl and catches ranged from a low of three lobsters per one-hour tow in the Veatch Canyon area to 211 per one-hour tow east of Lydonia Canyon. The largest catches were made in the 175- to 225-fathom range.



M/V Delaware Cruise 19, April 30-May 11, 1956.

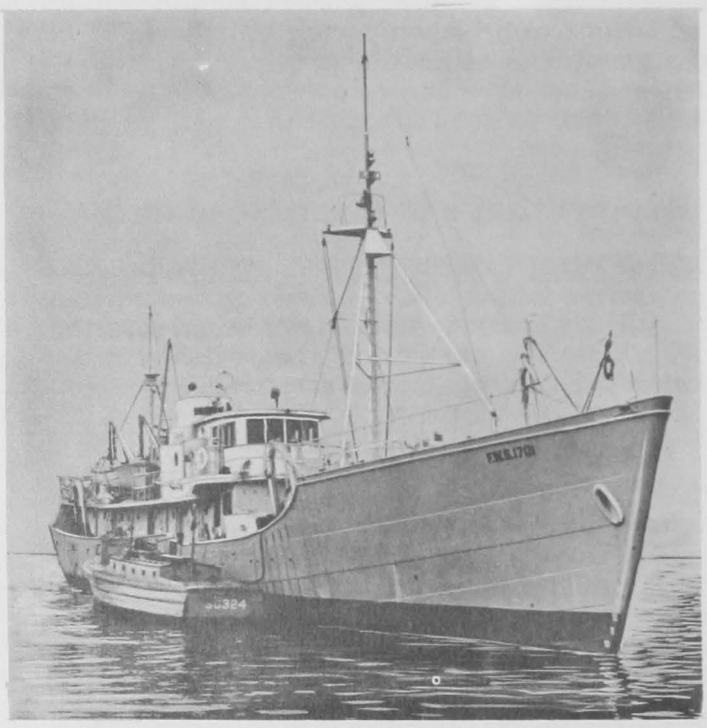
A total of 1,032 lobsters was tagged and released where caught. Approximately 200 large egg-bearing females were turned over to the Massachusetts Division of Marine Fisheries for use in stocking inshore waters. In addition, two tagged lobsters were recaptured by the Delaware on May 5 and 6, both in the same locality as released. One was tagged November 19, 1955, and the other May 6, 1956.

During the cruise radio contact with the commercial trawler R. W. Griffin, Jr. indicated that two tagged lobsters were recaptured in the vicinity of Veatch Canyon on May 10, 1956. One of these was tagged and released from the Delaware on January 26, 1956, and had moved approximately 90 miles westward along the edge of the Continental Shelf. The other was tagged and released from the Delaware on May 1, 1956, and was recaptured in the same area as released.

The Delaware left East Boston on May 21 for a 13-day trip (Cruise 20) to the Sable Island area South of Nova Scotia to continue studies of the deep-water distribution of ocean perch.

North Atlantic Fisheries Investigations

SURVEY OF HADDOCK EGGS AND LARVAE DISTRIBUTION CONTINUED BY ALBATROSS III (Cruise 73): Georges Bank, Browns Bank, and the Gulf of Maine were surveyed for haddock eggs and larvae by the Service's research vessel Albatross III during Cruise 73 (April 17-28). In addition, the temperature, salinity, and the general circulation pattern in the Gulf of Maine and Georges Bank area were studied.



U. S. Fish and Wildlife Service research vessel Albatross III.

Continuous plankton tows at the surface and 10 meters with Hardy Plankton Recorders, 241 bathythermograph lowerings, 120 salinity samples, and 20 surface tows with the standard meter net were made. Eighteen samples of eggs were hatched out for identification purposes and a total of 800 drift bottles were released throughout the area of the cruise.

The cruise provided collections of haddock, cod, sea crab, and rockling eggs plus haddock, cod, herring, hake, and sand launce larvae. Haddock eggs were found at all locations sampled with the net except in the central Gulf of Maine indicating that the spawning of this species extended over a much greater area than that observed during any previous cruises.

The widely-spread haddock eggs if successful in meeting the vicissitudes of life in the ocean waters, may result in an abundant haddock year-class and good haddock fishing on Georges Bank in 1959. If meteorological and hydrographic conditions are favorable during the coming months a strong year-class will develop.

Future cruises of the Albatross III will follow the drift of these young fish in May and June and a census will be made in September after they have taken up life on the bottom and are no longer at the mercy of tide and current.

The Albatross III sailed on May 2 to study the effectiveness of different sizes of nylon mesh in releasing small unmarketable sizes of haddock on George Bank and Browns Bank.

* * * * *

SELECTIVITY OF NYLON COD ENDS TESTED BY "ALBATROSS III" (Cruise 74): To determine the selectivity of sizes of haddock with nylon cod ends of $4\frac{1}{4}$, 5, and $5\frac{3}{4}$-inch meshes (between centers) was the purpose of Cruise 74 of the Service's research vessel Albatross III. The trip took place from May 2-May 10, 1956.

A total of 69 tows were made on Georges Bank using $4\frac{1}{4}$, 5, and $5\frac{3}{4}$-inch nylon mesh cod ends and a 5-inch dacron cod end. An abundance of one- to six-year old haddock provided good catches for all four cod ends tested. A total of 69 tows were made of which 62 produced usable results. Approximately 26,000 haddock were taken and all were measured.

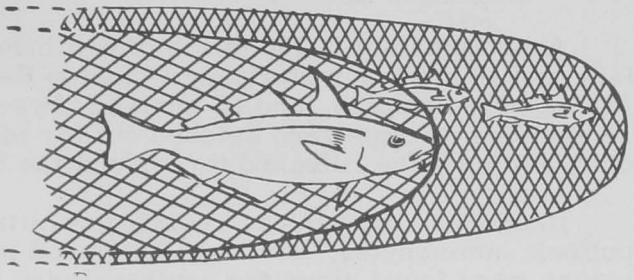


Diagram of experimental cod end used to test selectivity.

A summary of results is presented in the table. These can be considered only tentative because of the large quantity of data involved which cannot be completely analyzed at sea.

Both the nylon and dacron cod ends were of braided twine of single construction. Two gauges were used during the cruise: the ICNAF-type pressure (wedge) gauge and the Scotch-type (longitudinal pressure) gauge. The mesh sizes given represent averages of measurements made with both gauges. No consistent difference between the two gauges was observed for the nylon twines when the Scotch gauge was set for 10-12 pounds and the ICNAF gauge was used with 8-10 pounds pressure. The Scotch gauge did give rather smaller measurements for the dacron cod end.

Cod End (Size Between Knot Centers New)	No. of Tows	No. of Fish			50% Points (cm.) Range for Individual Tows			Mesh Size Avg. for All Meshes	(Internal) Avg. for the Last 10 Rows
		Cover	Cod End	Total	High	Low	Avg.		
$4\frac{1}{4}$" nylon	11	2,831	2,378	5,209	42	39	40	$4\frac{1}{4}$ in.	$4\frac{7}{16}$ in.
5" nylon (1)	10	931	2,460	3,391	35	42	37	$4\frac{13}{16}$ "	$4\frac{11}{16}$ "
5" nylon (2)	12	3,254	2,143	5,402	49	41	44	$4\frac{7}{8}$ "	$5\frac{1}{4}$ "
$5\frac{3}{4}$" nylon	14	2,113	3,073	5,186	56	41	46	$5\frac{1}{4}$ "	$5\frac{1}{4}$ "
5" dacron	15	2,106	4,659	6,765	43	37	39	5 "	$4\frac{7}{8}$ "

The rather large range in 50-percent points for individual cod ends was due to (1) changes in mesh size during the cruise; (2) random error caused by small catches for certain tows; (3) diurnal differences in escapement, the high selection points occurring in mid-day; and (4) other variables.

The division of the 5" nylon results into two parts is a result of reversing the cod end after the first 10 tows. This cod end had been used before causing the meshes to be enlarged at one end. Nylon (1) results are with the large meshes at the forward end, nylon (2) results are with the large meshes in the "normal" position, at the after end of the cod end.

Changing ends resulted in an increase of 7 centimeters in the 50-percent point, indicating that fish escape primarily through the after part of the cod end. This was further demonstrated by the improvement in the 50-percent-point-mesh size relationship when only the average of the last 10 rows of meshes in the cod end was used (see table).

The braided nylon provided a greater escapement of haddock than double manila cod ends of the same mesh size, in general, would be expected to provide.

Twenty large cod were returned alive to the laboratory to be used by the Retina Foundation for eye research. Some live haddock and flatfish were also returned.

The Albatross III sailed again May 16 (Cruise 75) for the purpose of sampling haddock eggs and to obtain hydrographic data.

* * * * *

HADDOCK EGGS AND LARVAE DISTRIBUTION (ALBATROSS III, Cruise 75): To determine the distribution of haddock eggs and larvae, temperature, and salinity, and the general circulation pattern in the Gulf of Maine, Georges Bank, and the Southern New England Banks was the purpose of Cruise 75 of the Service's research vessel Albatross III (May 16-29, 1956).

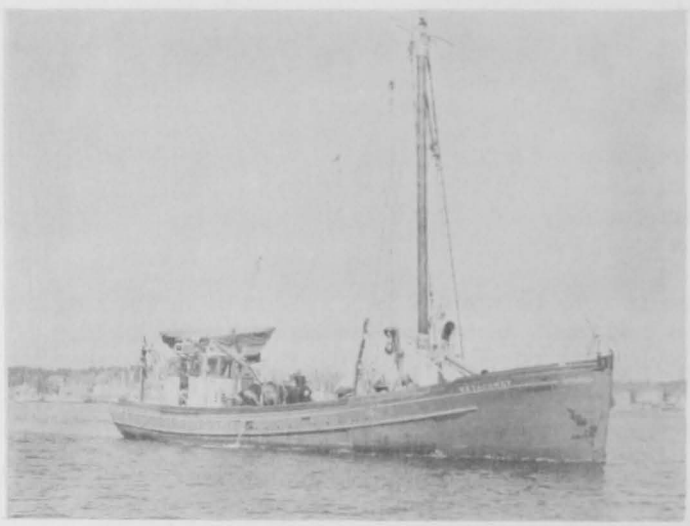
Approximately 3,200 miles of continuous plankton tows were made at the surface and 10 meters with Hardy Plankton Recorders; 325 bathythermograph lowerings, 165 salinity samples, and 22 surface tows with the standard meter net were made; 18 samples of eggs were hatched out for identification purposes. A total of 1,068 drift bottles were released throughout the area.

Haddock, cod, plaice, rockling, whiting, and yellowtail eggs; haddock, cod, pollock, ammodytes, herring, hake, and butterfish larvae were found. Haddock larvae were found along the southern edge of Georges Bank and 60 miles south of Montauk Point, Long Island.

The Albatross III was scheduled to sail again on June 11, 1956, for the final egg and larval fish survey of the year.

North Atlantic Herring Research

VESSEL CHARTERED TO CONTINUE HERRING EXPLORATIONS AND GEAR RESEARCH: The program of exploratory fishing and gear development for the Maine herring started by the Service's vessel Theodore N. Gill in 1955 will be continued in 1956 by the chartered 62-foot Gloucester motor vessel Metacomet. The Metacomet departed for its first cruise on May 9 and is scheduled to return May 18.



Metacomet, vessel chartered by the Fish and Wildlife Service to continue program of exploratory fishing and gear development for the Maine herring.

The objectives of the first cruise were to (1) make echo-soundings along the Maine Coast and in the offshore waters to locate schools of herring that may be made available to the sardine fishermen, and (2) make trial sets with a one-boat midwater trawl when schools are located by the echo-sounder, in an attempt to develop a dependable method of sampling the schools located at various depths.

In case commercial-size schools of sardines are located, the size and the location of the schools will be broadcast to the sardine fishermen over radio frequencies 2638 kc. and 2738 kc.

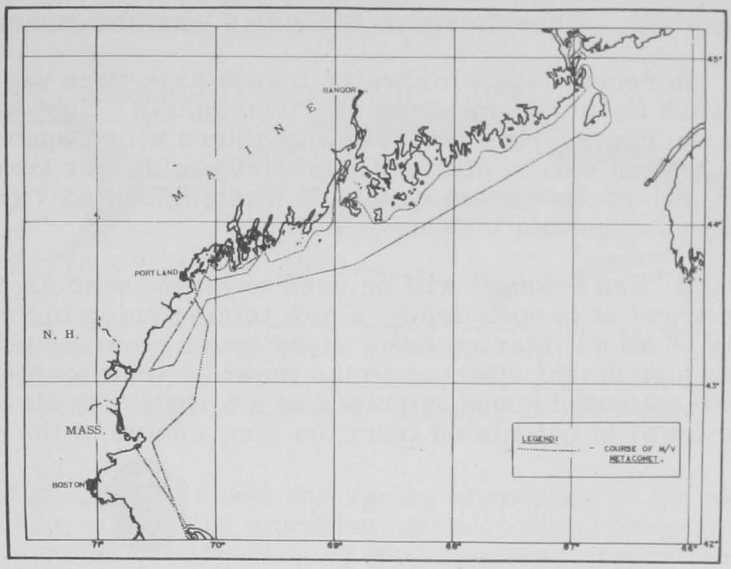
* * * * *

ECHO-SOUNDINGS AND SAMPLES OF HERRING TAKEN BY "METACOMET" (Cruise 1): Herring were located on the echo-sounder and samples taken by the midwater-trawl in Middle Bay part of Casco Bay and at Spruce Point, near Long Island in Penobscot Bay by the M/V Metacomet on its first cruise. This vessel,

which has been chartered by the U. S. Fish and Wildlife Service to continue exploratory fishing and gear development for the Maine herring started by the Service's vessel Theodore N. Gill in 1955, left port on May 9 and returned on May 18. The samples of the fish taken were 0-year-class herring brit from last autumn's spawning. Sounder traces similar to those in Middle Bay were also recorded in New Meadows River.

Fish were located on the echo sounder on May 9 and May 11 near Portland Head and on May 11 and May 16 near the Portland Lightship. These soundings were scattered and small. The midwater trawl was not set at these points due to rough seas.

Small traces of schooled fish, apparently herring, were recorded in St. Andrews Bay (Passamaquoddy Bay) during the evening and night of May 13. The largest tracings were recorded near Ministers Island and McAnns Head.



M/V Metacomet (Cruise 1).

Widely-spaced scattered traces were recorded between the Portland Lightship and Boon Island on May 16.

Small scattered schools were also recorded near Race Point, Cape Cod, on May 18.

During this cruise the coastline of the Gulf of Maine was surveyed with a recording-type echo-sounder along the course lines shown in the diagram. This was done in an attempt to locate populations of sardine-size herring. No such schools were located and positively identified. However, the schools sounded in Passamaquoddy Bay and near the Portland Lightship appeared likely to be herring of sardine size.

A run was made to the Cape Cod area to test the midwater trawl on larger herring. During the one day and night spent there no schools in suitable position for trawling were located. The herring in this area appeared to be close in near the beaches.

North Pacific Exploratory Fishery Program

EXPERIMENTAL MIDWATER TRAWLING TO BE TRIED BY "JOHN N. COBB" (Cruise 27): Experimental midwater trawling is being tried by the Service's exploratory fishing vessel John N. Cobb on Cruise 27 which started from Seattle on May 14. On this six-week cruise several sizes of midwater trawls, both nylon and cotton, will be tested, ranging from a 30-foot to 50-foot square opening at the mouth. These nets were made at the Service's gear research station at Coral Gables, Fla., where underwater television and skin divers were used to observe the action of the gear under actual towing conditions.

Arrangements were made for gear experts from the Biological Station of the Fisheries Research Board of Canada at Nanaimo, B.C., to join the John N. Cobb for part of the cruise to try the successful Canadian midwater herring trawl in offshore waters and to compare the operation of the Canadian trawls with those furnished from Coral Gables. A biologist from the trawl-fish division of the State of Washington Department of Fisheries was also scheduled to participate.

In recent years midwater trawls have been used successfully in Europe and in British Columbia for herring. The John N. Cobb will try to determine if fish such as Pacific ocean perch, cod and others which spend at least part of their time off the bottom can be efficiently taken by midwater trawling. Special attention will be given to rocky bottom areas off Washington and Vancouver Island which are too rough for bottom trawls.

A "Sea Scanar" will be used to locate schools of fish at middepths. To keep the trawl at proper depth, a new telemetering instrument developed at the University of Miami Marine Laboratory under contract with the Service will be employed. The instrument attaches to the trawl or trawl cable and sends out continuous battery-activated sound impulses to a hydrophone streamed by the vessel. Depth of the trawl is calculated from the frequencies of the signals received.

Pacific Halibut Fleet Began Fishing May 20

Although the International Pacific Halibut Commission in its regulations for the 1956 North Pacific halibut season set May 12 as the opening date, reports from the West Coast indicated that the halibut fleet did not sail in order to begin fishing by that date. In an effort to level off some of the heavy landings that occur on some days, fishermen of vessels fishing out of Puget Sound, British Columbia, and Alaska ports voted to delay actual fishing for eight days or until May 20.

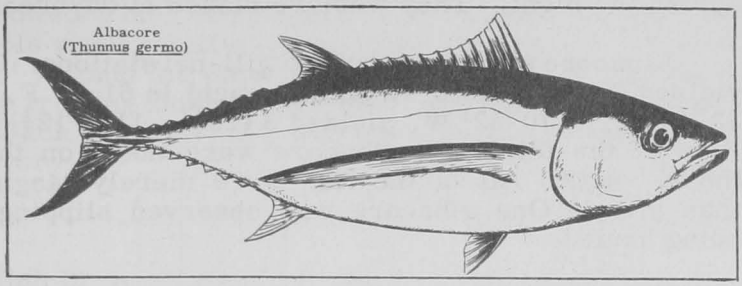
Landing a halibut aboard a West Coast long-liner.

The fishermen's unions also voted that (1) halibut vessels carrying three or more men would tie up for seven days between trips to the grounds and (2) small vessels carrying either one or two men will be permitted to fish for 14 days to begin the season and then tie up and fish for alternating periods of seven days.

However, although most of the North Pacific halibut fleet did not begin fishing until May 20, small amounts of halibut caught by independent vessels which are not a party to the agreement or caught incidentally to other fishing were expected to reach port early in the week of May 14.

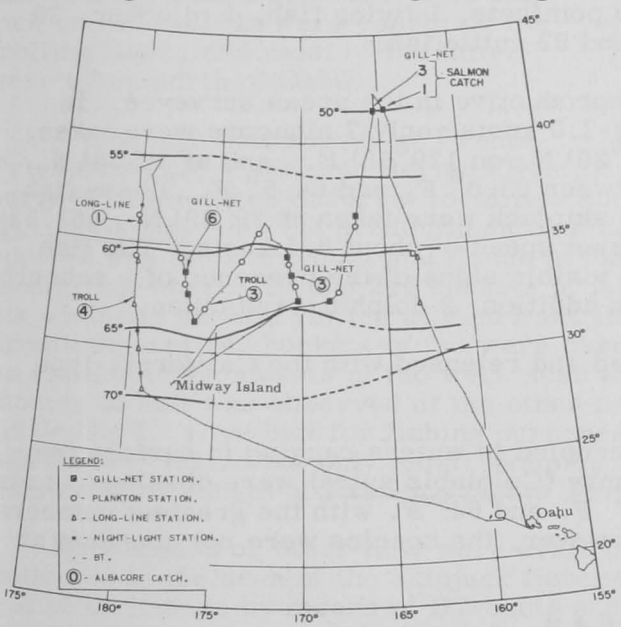
Pacific Oceanic Fishery Investigations

SPRING ABUNDANCE OF ALBACORE TUNA NORTH OF HAWAIIAN ISLANDS CHECKED BY "CHARLES H. GILBERT" (Cruise 27): Studies of potential albacore tuna fishing grounds by the research vessel Charles H. Gilbert of the Service's Pacific Oceanic Fishery Investigations have been extended so far up into the North Pacific that observations of whales and fur seals at the more northern fishing stations have become commonplace.



There was some surprise, however, when the Charles H. Gilbert, which returned May 4 from a 2-month cruise in the area north of Midway Island, brought back 4 small salmon. The salmon, which were estimated to weigh about one pound each, were caught in gill nets set to capture albacore tuna at about 41° N. latitude. These fish will be sent to the Pacific Salmon Investigations at Seattle, Wash., for study.

This cruise of the vessel was planned to check the spring abundance of the albacore north of the Hawaiian Islands, as part of a continuing year-round program of study of the distribution of this valuable wide-ranging tuna species. Experimental fishing was done with long lines, gill nets, and trolling lines along the albacore zone between 180° and 165° W. longitude as far as 42° N., an area which is centered roughly north of Midway Island. Albacore appeared to be scarce in the area at this season, but small numbers were taken on all the types of fishing gear used. Those captured in the gill nets and on trolling lines weighed 7-8 pounds each; the fish taken at greater depths on the long line weighed about 40 pounds each.



Charles H. Gilbert Cruise 27 (3/17/56-5/4/56).

Plankton was sampled on the fishing grounds, and the scientists aboard reported that this basic fish food appeared to be somewhat more abundant in the western part of the survey area. Large squid, weighing 2-3 pounds, were also captured on the western survey section.

The weather was rough throughout much of the cruise, and the vessel rode out one storm with winds over 70 miles an hour.

Five long-line stations were fished along 180° longitude between 28° N. and 36° N. latitude in waters with surface temperatures ranging between 57.7° F. and 69.0° F. and two stations along 163° W. longitude between 32° N. and 34°30' N. latitude, in 60.8° F. and 63.0° F. surface temperatures. Only one albacore (57 pounds) was taken. This catch was made at the northernmost station at 36°08' N., 179°55' W. in 57.7° F. water. The remaining long-line catch consisted of 35 great blue sharks, 1 mako shark, 9 lancetfish (Alepisaurus sp.), 2 broadbill swordfish, and 2 dolphin (Coryphaena hippurus).

Eleven gill-net stations were occupied during the cruise. The gear consisted of 12 shackles of nylon netting on loan from the Pacific Salmon Investigations (PSI) in Seattle, Wash., and 1 shackle of POFI nylon net. Each of the 12 shackles of the PSI nets measured 20 feet in depth and 300 feet in length and the mesh sizes ranged from $2\frac{1}{4}$" to $5\frac{1}{4}$" stretched measure. The POFI net had 7" mesh, was 30 feet deep and 300 feet in length. The nets were set at dusk and left to drift free of the vessel during the night. They were retrieved at daybreak.

Albacore were taken at two gill-net stations. One station at 33°45' N., 176°57' W. yielded 6 albacore (6-12 pounds each) in 61.8° F. water and the other station at 33°49' N., 170°32' W. yielded 3 ($10\frac{1}{2}$-, 11-, $12\frac{1}{2}$-pound) fish in 62.3° F. water. Five of the total of 9 albacore were taken on the $5\frac{1}{4}$"-mesh nets and four on the $4\frac{1}{2}$"-nets. All of the fish were merely tangled on the tail or fins rather than gilled. One albacore was observed slipping off the net while the gear was being hauled.

Two net stations were occupied in 50° F. and 50.7° F. waters and both resulted in the capture of small sockeye salmon (Oncorhynchus nerka). At 41°28' N., 165°18' W. (50° F. surface temperature) 3 salmon (36.1, 39.5, and 40.0 cm. fork length) were taken close together on a $4\frac{1}{2}$"-mesh net. Another salmon, 37.6 cm. in length, was taken at 41°30' N., 164°33' W. (50.7° F.) on a $3\frac{1}{4}$"-net. All of the salmon were gilled. The last fish taken was alive when the nets were retrieved.

Two amberjacks (Seriola dumerili) were taken at 32°46' N., 176°42' W. in 62.5° F. water. They were taken on a $5\frac{1}{4}$"-mesh net. Additional gill-net catches included: 1 small broadbill swordfish, 6 pomfrets, 1 flying fish, 1 pilotfish, 36 great blue sharks, 2 mackerel sharks, and 92 cuttlefish.

Surface trolling proved to be very unproductive in the areas surveyed. In 1,598 line-hours of direct trolling at 6.0-7.0 knots, only 7 albacore were taken. These were taken at 32°08' N. and at 32°20' N. on 179°58' E., and at 32°30' N., 175°17' W., in surface temperatures between 63.0° F. and 64.5° F. These fish weighed between 11 and 14 pounds. Two skipjack were taken at 29°39' N., 161°52' W. in 70.2° F. water while trolling at a vessel speed of about 8.5 knots. The fish weighed $7\frac{1}{2}$ pounds each. There were no visible signs of the presence of a school of fish when these skipjack were caught. In addition, 9 dolphin were taken.

A total of 6 albacore tuna were tagged and released with the California-type plastic tube tags.

Thirteen night-light stations were occupied in waters ranging in surface temperatures from 50.0° F. to 68.5° F. Saury (Cololabis saira) were observed at stations with water temperature between 57° F. and 64° F. with the greatest numbers occurring between 60° F. and 62° F. However, the species were not abundant at any of the stations.

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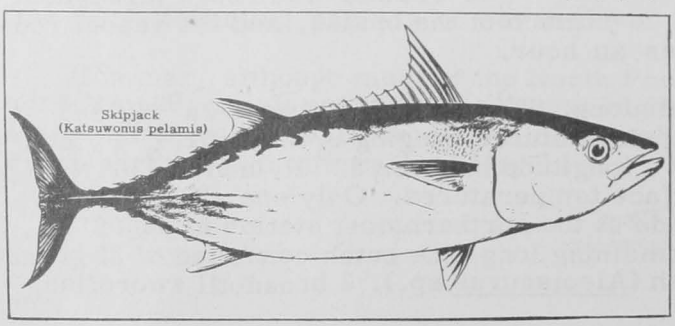
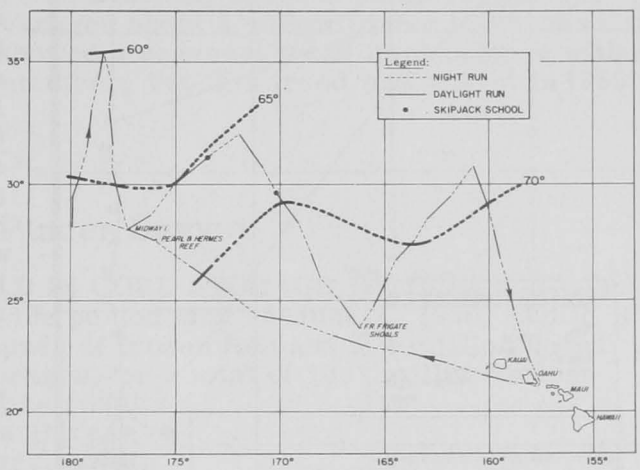


SKIPJACK TUNA SPRING DISTRIBUTION NORTH OF LEEWARD ISLANDS SURVEYED BY "JOHN R. MANNING" (Cruise 30): A survey of the bait resources of the Leeward Islands and ascertaining the abundance of skipjack tuna to the north and west of the Hawaiian Islands during the preseason period was the purpose of the month-long (March 15-April 20) cruise of the research vessel John R. Manning, operated by the Service's Pacific

Oceanic Fishery Investigations. Moderately-abundant stocks of bait were found in the Leeward group, but there was a dearth of skipjack tuna schools in the area covered. This was somewhat surprising as earlier cruises, incidental to studies on albacore tuna, had detected surprisingly large numbers of skipjack during midwinter.

Direct trolling with 6 lines showed a lack of skipjack in the waters north of the Leeward Islands as only two schools were positively identified as skipjack. These schools, one at 31°06' N., 173°26' W. and the other at 29°44' N., 170°10' W. were observed only after fish struck the trolling lines. Both were small schools and were composed of 10-lb. and 4-lb. skipjack respectively, and were found in water with surface temperature of 68° F. Every attempt at fishing the schools with live bait failed.



John R. Manning Cruise 30 (3/15/56-4/20/56).

There was a general lack of fish in the northern area scouted, and besides the two skipjack schools, only one other dolphin school and two bird-accompanied schools were encountered; the latter schools were unidentified. Seven other fish schools were seen in Hawaiian waters (within 200 miles from land) and these were one dolphin, 2 skipjack, and 48 unidentified schools. Two skipjack and 17 dolphin were caught on the trolling lines, and most of the latter were taken north of Oahu.

A thorough bait survey of French Frigate Shoals, Pearl and Hermes Reef, and Midway Island was conducted. Bait surveys at the three different localities showed that the Hawaiian silverside or iao (P. insularum) was the predominant and most readily-caught bait species. This species was found in equal abundance at Sand and Eastern Islands of the Midway Island group where 217 and 246 buckets of iao were seen respectively. Among the six southern islands visited at Pearl and Hermes Reef, Seal Island was the most promising and 140 buckets of iao were observed there. At French Frigate Shoals an estimated 90 buckets of iao were seen at East Island and none or only small amounts of bait was observed at the other northern islands, extending from Tern to Little Gin I. Live bait for fishing purposes was taken from Pearl and Hermes Reef and Midway Island but only small samples of bait for length frequency and maturity studies were caught at French Frigate Shoals.

No skipjack or other tuna were available for tagging. Environmental data were collected in the area of the skipjack fishery adjacent to Oahu at the beginning and end of the cruise by means of BT casts and double-oblique 60-meter plankton tow with the 1-meter net; surface salinity and phosphate samples were also taken.

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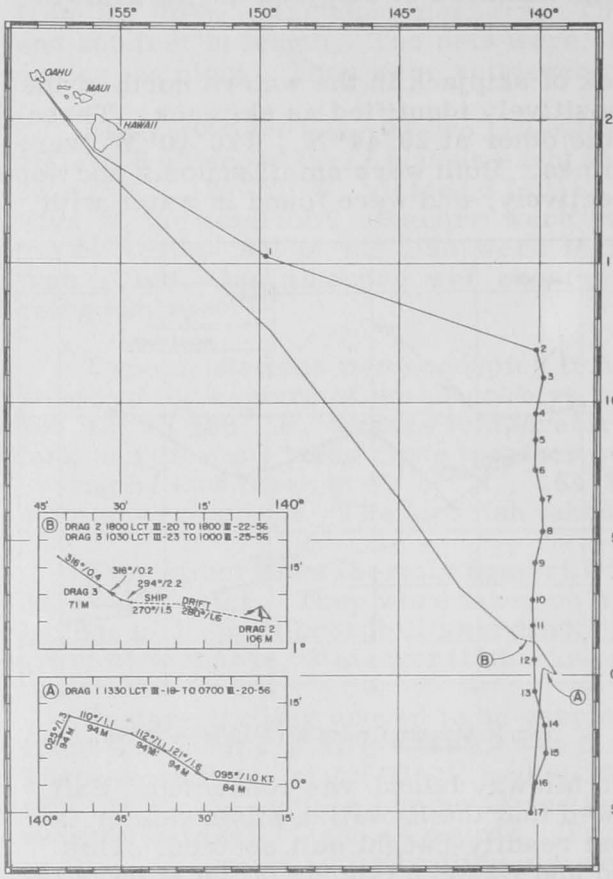
OCEANOGRAPHY AND BIOLOGY ALONG THE EQUATOR STUDIED BY "HUGH M. SMITH" (Cruise 33): Study of the oceanography and biology of waters along the equator, about 1,000 miles south of Hawaii, was the purpose of the one-month cruise by the research vessel Hugh M. Smith of the Service's Pacific Oceanic Fishery Investigations. The vessel returned to port April 20.

On this cruise the vessel operated in an area where previous investigations by Fish and Wildlife Service ships have indicated that there is a considerable movement of water from the depths up to the surface. This upwelling brings fertilizing

chemical substances up into the sunlit layer of the ocean and results in a rich growth of minute plant and animal life--the plankton--to feed the small fish and squid which in their turn support the large stocks of tuna in the area.



Hugh M. Smith Cruise 33 (3/2/56-4/1/56).

The temperature and chemical content of the water, the speed and direction of the ocean currents, and the abundance of plankton were studied in a 1,000-mile strip of ocean which spans the equator to the southeast of Hawaii. Preliminary results indicate that the upwelling of the deeper cooler waters at the equator was more pronounced than it had been at the time of earlier cruises. Water temperatures near the equator were found to be lower, and the abundance of plankton in the surface waters was considerably higher. The results of fishing cruises by Fish and Wildlife Service vessels scheduled to be carried out in this area this summer will show whether or not these apparently favorable conditions will produce a corresponding abundance of tuna.

The scientific party aboard the Hugh M. Smith also made two special studies at the equator and at 1° N. latitude to discover the speed at which the sea water was flowing away from the area of upwelling near the equator. In this work drags were hung deep in the water from floats, which were then followed by the ship to trace their course and speed. The objective of these studies is to find out where a drifting mass of fertile water, with its freight of developing fish food, is likely to be when it becomes a good feeding ground for tuna, and thus ultimately to be able to predict where the tuna fishing will be good at any given time.

Only two night-light stations were occupied while tracking the drags and only one of these yielded fish. The scarcity of fish may have been due either to the large schools of squid and/or white-tipped sharks (1 to 7) which were present at all times.

Only eight fish schools were sighted, of which three were identified as skipjack tuna and the remainder unidentified. Five were sighted between 0°28' N. and 5°00'S., one at 12°59' N., 149°33' W., and one southwest of Maui on the return voyage.

The total catch on the trolling lines consisted of two dolphins (Coryphaena hippurus).

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1955/56 SAMPLING PROGRAM ON EQUATORIAL TUNA COMPLETED: The year-round equatorial tuna sampling program begun in March 1955 was completed in February 1956. The abundance of yellowfin tuna continued to be low during the first months of 1956. The highest catch rates were observed close to the islands, particularly those to the north of the equator, i.e., Palmyra and Kingman Reef. Long-line catches made in 1955 at the same time of year and in the same area as a United States commercial fishing venture in 1954 showed comparatively low catch

rates. This may be related to sea surface temperature conditions which at Christmas Island were lower than usual throughout 1955 with the trend continuing during January and February 1956. Tagging of viable yellowfin for migration studies continued. To date over 1,000 yellowfin have been tagged in this area.

The analysis of these year-round cruises has begun. One interesting aspect of the data is that maximum fishing depth, determined by chemical sounding tubes attached to the deepest hooks of long-line gear, shows considerable variation with area and time of year. Knowledge of this variation is important, for the deeper hooks on long-line gear have the higher catch rates.

The catch rates in the open ocean were consistently below 2 yellowfin per 100 hooks. Those very close to the islands averaged about 3 yellowfin per 100 hooks with a range of 1 to 13. Previous years showed a seasonal trend in abundance with higher catch rates during July through September, but this trend was absent in 1955.

Public Eating Places Survey

FROZEN FISH AND SHELLFISH HELD IN COLD STORAGE BY PUBLIC EATING PLACES: It is estimated that during the period May 25-June 2, 1955, public eating places were holding 4.7 million pounds of frozen fish and 5.4 million pounds of frozen shellfish in freezers or cold storages, or a total of 10.1 million pounds of frozen fish and shellfish, according to the results of a sample survey conducted by the U. S. Bureau of Census for the U. S. Fish and Wildlife Service with funds provided by the Saltonstall-Kennedy Act of 1949.

The breakdown of this total of 10.1 million pounds by types of establishments shows that 57 percent or 5.8 million pounds were held by restaurants as compared with an inventory of 1.3 million pounds for cafeterias and about 800,000 pounds for drinking places, lunch counters, and refreshment stands (see table).

The average frozen fish and shellfish inventory per eating place for the United States was about 49 pounds with a range of 55 pounds for the average for restaurants to 11 pounds for the average for drinking places, lunch counters, and refreshment stands.

A breakdown by regions shows that the South accounted for the greater part (49 percent) of the total frozen fish inventory held by public eating places, whereas, the Northeast showed the largest inventory of frozen shellfish (1.9 million pounds).

As might be expected, when public eating places are grouped according to their reported total annual sales, the holdings of fish and shellfish per establishment varied directly with total sales. Eating places in the $100,000 or more category averaged about 366 pounds of frozen fish and shellfish in cold storage, compared with less than 8 pounds in the less than $10,000 annual sales size group.

This study on total cold-storage inventory of frozen fish and shellfish in eating establishments is one part of a broader study of fish and shellfish consumption characteristics in public eating places. The findings are based on a nationwide scientific sample survey of approximately 4,500 establishments during the week of May 25-June 2, 1955.

Frozen Fish and Shellfish Cold-Storage Stocks Reported by Public Eating Places Serving Fish or Shellfish (Estimated)

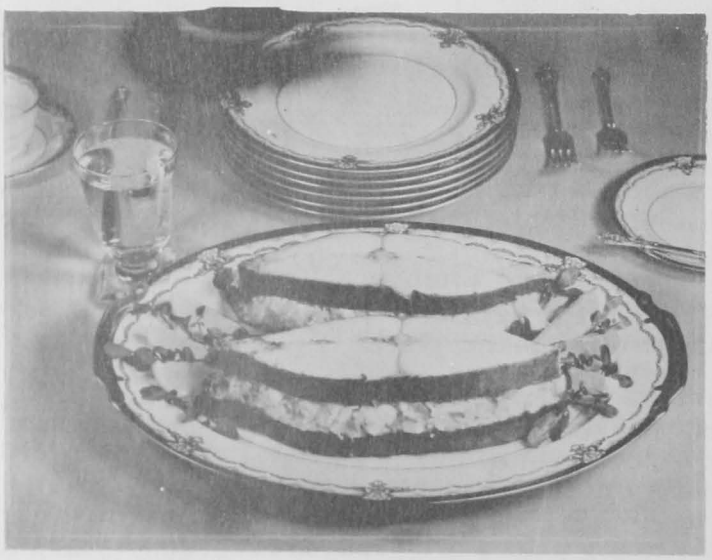
	Total		Fish		Shellfish		Average Inventory Per Establishment		
	Quantity	Percentage of Total	Quantity	Percentage of Total	Quantity	Percentage of Total	Total	Fish	Shellfish
	Million Lbs.	%	Million Lbs.	%	Million Lbs.	%	(Pounds)		
United States Total	10.1	100.0	4.7	100.0	5.4	100.0	48.5	22.6	25.9
Region:									
Northeast	2.7	26.7	0.8	17.0	1.9	35.2	39.7	11.8	27.9
North Central	1.8	17.8	1.0	21.3	0.8	14.8	30.2	16.8	13.4
South	3.8	37.7	2.3	48.9	1.5	27.8	82.8	50.1	32.7
West	1.8	17.8	0.6	12.8	1.2	22.2	52.2	17.4	34.8
Type of Establishment:									
Restaurants	5.8	57.4	2.3	48.9	3.5	64.8	54.9	21.8	33.1
Cafeterias	1.3	12.9	1.1	23.4	0.2	3.7	30.2	25.6	4.6
Restaurants or Cafeterias in Hotels	2.2	21.8	0.8	17.0	1.4	25.9	14.4	5.2	9.2
Drug or Proprietary Stores with Fountain	-	-	-	-	-	-	-	-	-
Other1/	0.8	7.9	0.5	10.6	0.3	5.6	10.9	6.8	4.1
City Size:									
500,000 or more	3.0	29.7	1.5	31.9	1.5	27.8	70.4	35.2	35.2
100,000 to 499,999	1.3	12.9	0.4	8.5	0.9	16.7	49.8	15.3	34.5
25,000 to 99,999	1.2	11.9	0.5	10.6	0.7	13.0	43.8	18.2	25.5
2,500 to 24,999	1.7	16.8	0.7	14.9	1.0	18.5	42.6	17.5	25.1
Less than 2,500	2.9	28.7	1.6	34.0	1.3	24.1	40.2	22.2	18.0
Sales Size:									
$100,000 or more	5.6	55.4	2.6	55.3	3.0	55.6	366.1	170.0	196.1
$ 40,000 to $99,999	1.8	17.8	0.7	14.9	1.1	20.4	72.6	28.2	44.4
$ 10,000 to $39,000	1.6	15.9	0.8	17.0	0.8	14.8	25.6	12.8	12.8
Less than $10,000	0.7	6.9	0.4	8.5	0.3	5.5	7.6	4.4	3.3
No Reply	0.4	4.0	0.2	4.3	0.2	3.7	29.0	14.5	14.5

1/ Includes drinking places, lunch counters, and refreshment stands.

Note: Detail does not necessarily add to totals, because of rounding. Above data represent estimates of the number of pounds of frozen fish and shellfish held in cold storage at the time the report was completed for the establishments in the survey (sometime during the period May 25-June 2, 1955).

* * * * *

SURVEY INDICATES FISH AND SHELLFISH DINNERS MORE PROFITABLE: Public eating places make as much or more profit from a serving of fish and shellfish as from a serving of steak, roast beef, roast pork, or chicken. This is the opinion of 64 to 69 percent (depending on the item compared) of managers or operators of 208,000 public eating places distributed throughout the United States which serve fish or shellfish and other foods. These findings are based on a scientific sample of 4,500 establishments, representing all public eating places in the United States. About 40 percent of the eating places estimated that more profit was made from a serving of fish and shellfish than from a serving of steak, while about 29 percent indicated the profit was the same. Similar percentages were obtained for roast beef, roast pork, and chicken, according to a survey made in May 1955 by the U. S. Bureau of the Census under contract to the U. S. Fish and Wildlife Service.



The opinions on profit per serving were obtained without regard to variations in size or price of a serving, or other factors which might offset profits. These facts are of importance to the fishing industry and proprietors of public eating places because they indicate that increased sales of fish and shellfish may lead to increased profits for public eating places.

Information obtained from the same survey also shows that of the total number of main-dish meals served in public eating places during the survey week, only 17 percent were fish and shellfish meals.

Final results of the survey, which is being financed by funds provided by the Saltonstall-Kennedy Act o f 1954, are scheduled for publication later in 1956.

Saltonstall-Kennedy Act Fisheries Projects

FISHERY ADVISORY GROUP RECOMMENDS CONTINUANCE OF PROGRAM: The American Fisheries Advisory Committee, at its third meeting in Long Beach, Calif., on May 1 and 2, went on record for the continuance of a balanced program of technological, economic, market development, and biological research and services through an enlarged and extended Saltonstall-Kennedy Act as the best way to aid the domestic fishing industry, Under Secretary of the Interior Clarence A. Davis stated May 17.

American Fisheries Advisory Committee. Left to right, seated: Lawrence W. Strasburger, New Orleans, La.; H. F. Sahlman, Fernandina Beach, Fla.; Alphonse J. Wegmann, Pass Christian Isles, Miss.; Arnie J. Suomela, Asst. Director, Fish & Wildlife Service; Wesley A. D'Ewart, Asst. Secretary, Department of the Interior; John L. Farley, Director, Fish & Wildlife Service; Harold R. Bassett, Salisbury, Md.; Lawrence Calvert, Seattle, Wash.; James S. Carlson, Boston, Mass.; Moses B. Pike, Eastport, Me.; standing: Norman B. Wigutoff, Exec. Secretary to the Committee; Dr. Lionel A. Walford, Chief, Branch of Fishery Biology, Fish & Wildlife Service; Thomas F. Sandoz, Astoria, Oreg.; J. Richards Nelson, Madison, Conn.; Arthur Sivertson, Duluth, Minn.; Paul Thompson, Asst. Chief, Branch of Fishery Biology, Fish & Wildlife Service; Donald P. Loker, Terminal Island, Calif.; Leon S. Kenney, St. Petersburg, Fla.; A. W. Anderson, Chief, Branch of Commercial Fisheries, Fish & Wildlife Service; David H. Hart, Cape May, N.J.; R. T. Whiteleather, Asst. Chief, Branch of Commercial Fisheries, Fish & Wildlife Service; Mark L. Edmunds, Garibaldi, Oreg.; Arthur H. Mendonca, San Francisco, Calif.

Established under the terms of the Saltonstall-Kennedy Act, which was passed in 1954 to promote increased production and marketing of domestic fishery products, this group meets periodically to advise the Secretary of the Interior on the various research and marketing activities which the Fish and Wildlife Service is conducting under the terms of the Act.

Assistant Secretary of the Interior Wesley A. D'Ewart, who is chairman of the Advisory Committee, served as presiding officer during the two-day meeting. In his opening remarks Secretary D'Ewart reaffirmed the Department's determination to give all possible aid to the industry.

A report on accomplishments since the last meeting in September 1955 was presented by Fish and Wildlife Service Director John L. Farley; A. W. Anderson, Chief, Branch of Commercial Fisheries; and Dr. L. A. Walford, Chief, Branch of Fishery Biology.

The Committee commented favorably on the program so far undertaken but urged expansion of the activities through continuance of the Act and the provision of a substantial increase in the funds which are available annually. At present the limit of expenditures in any one year is $3 million.

The Committee discussed a number of broad problems on production and marketing of domestic fishery products revolving essentially around two major points.

First, the problem of how to increase fish production to keep abreast of population growth so as to maintain or increase the present per capita consumption of fish came in for considerable attention. The Committee recommended market studies to determine areas of low consumption, as well as promotional campaigns, development of new products, and improvement in quality to aid in raising the present per capita consumption figure of about 10 pounds. Emphasis on exploration of new fishery resources and the development of more efficient gear to increase production was also stressed.

Secondly, the Committee also discussed the need for a well-rounded long-range program of biological research directed toward understanding the causes of fluctuations in fishery stocks in order to explain them, to predict their occurrence, and to use such understanding for the benefit of the fishery industries.

While in Long Beach the members of the Committee had an opportunity to visit the world's largest tuna cannery at Terminal Island where they observed tuna canning, from the unloading of the vessels to the finished product.

The next meeting of the Committee will be held in New Orleans, La., in January 1957.

Note: Also see Commercial Fisheries Review, April 1956, p. 21.

Shrimp

BETTER INSULATION OF SHRIMP VESSEL HOLDS NEEDED: Shrimp vessel fishing costs may be cut by reducing excessive ice consumption through the proper insulation of holds, according to an engineering study made for the U. S. Fish and Wildlife Service. Careful insulation of the holds, the study revealed, may reduce the consumption of ice in the hot summer months by as much as 700 pounds every day the vessel is at sea.

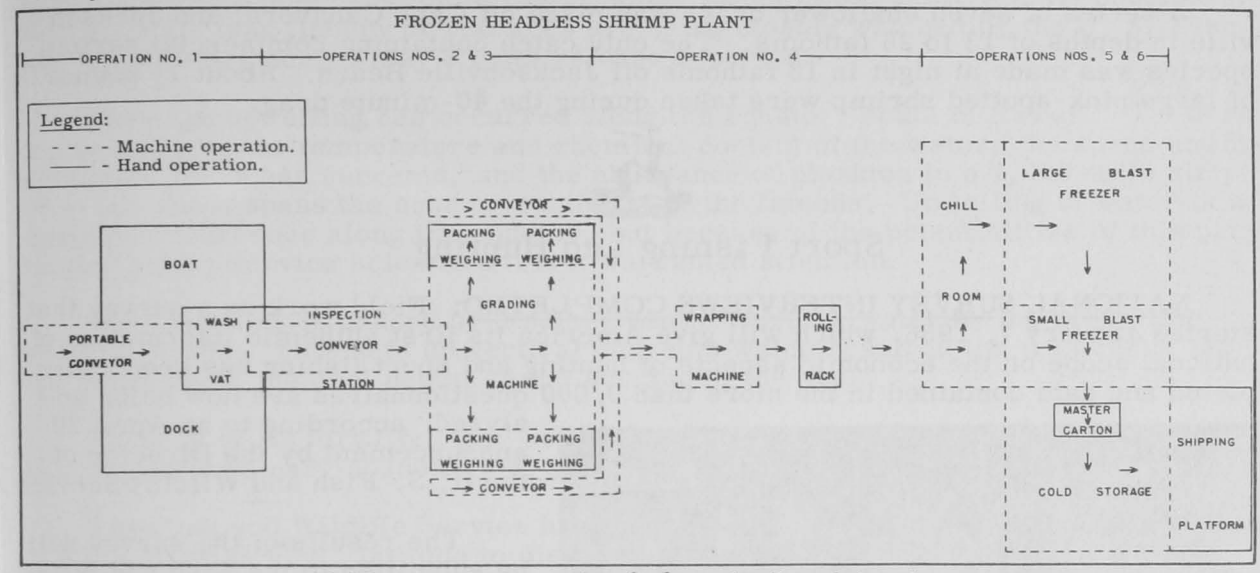
A balance must be struck between conserving ice and bathing the shrimp in the holds with water from the melting ice. Three inches of insulation on the hull and four inches on the deck and engineroom bulkheads appears to approximate this balance. An additional inch is recommended for steel hulls. Too heavily insulated holds will save on ice, but may result in the formation of "black spot" on the shrimp shell when the water film from melting ice is inadequate to reduce direct access to oxygen from the air.

The study was made by fishing methods and gear specialists E. Isaac Camber and Gordon C. Broadhead, employed by Harwell, Knowles & Associates, Coral Gables, Fla. It was financed by funds made available under the Saltonstall-Kennedy Act of 1954.

* * * * *

IMPROVED PLANT LAYOUT CAN CUT COSTS IN FROZEN SHRIMP PACKING PLANTS: Frozen shrimp packing costs can often be cut by modifying plant layout. Man-hours required to perform substantially the same operation vary as much as 90 percent between plants, according to an engineering survey in the Gulf Area made by the First Research Corporation of Miami, Fla., under the supervision of the U. S. Fish and Wildlife Service. The survey was financed by funds made available under the Saltonstall-Kennedy Act of 1954.

In a special study of freezer-room facilities, the engineers found that more economical operation resulted from dividing the freezing area into large and small freezing rooms. This arrangement, with a prechilling area, provides greater flexibility in the relation of workload to total freezer capacity.



Model engineering layout plan of a frozen headless shrimp plant.

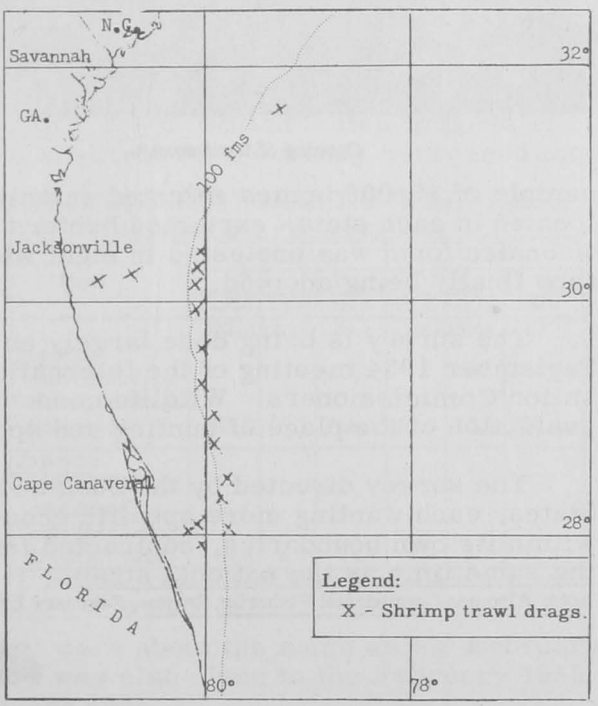
A synthesized plan for a model plant layout (see schematic diagram) was developed for maximum efficiency using equipment and machinery in common use in the industry. In many cases, the adoption of some phase only of the synthesized layout plan offers real savings in man-hour costs.

South Atlantic Exploratory Fishery Program

DEEP-WATER RED SHRIMP CAUGHT BY "PELICAN" (Cruise 2): In April, deep-water exploratory shrimp trawling by the exploratory fishing vessel Pelican extended from Cape Canaveral to off Savannah in depths of 138 to 250 fathoms. All drags were made with a 40-foot flat shrimp trawl using a single trawling warp and bridle. The Pelican is under charter by the U. S. Fish and Wildlife Service and is exploring for deep-water shrimp with funds provided by the Saltonstall-Kennedy Act of 1954.

Between Cape Canaveral and St. Augustine seven 4-hour drags in depths of 150 to 212 fathoms caught 20-30 count red shrimp at rates of about 40 pounds a drag. The largest catch (70 pounds) was made in 150 to 156 fathoms off False Cape, Fla.

North of St. Augustine increasingly rough bottom was encountered. Three of four drags made off Jacksonville resulted in gear damage and no shrimp catch. The other drag caught 45 pounds of 16-20 count red shrimp.



Location of shrimp trawl drags by the Pelican during Apr. 1956.

A depth-recorder survey in deep water from Jacksonville to Savannah revealed apparently untrawlable bottom. Off Savannah a clear spot was located in 182 to 250 fathoms and a 1-hour drag caught 13 pounds of red shrimp.

A series of seven shallower drags was made off Cape Canaveral and Jacksonville in depths of 13 to 26 fathoms. The only catch containing commercial shrimp species was made at night in 13 fathoms off Jacksonville Beach. About $1\frac{1}{2}$ pounds of large pink-spotted shrimp were taken during the 40-minute drag.

Sport Fishing and Hunting

NATIONAL SURVEY INTERVIEWS COMPLETED: Field work on a survey that started January 7, 1956, which will give America its first authentic information of national scope on the economic aspects of hunting and sport fishing has been completed and data contained in the more than 9,000 questionnaires are now being analyzed, according to an April 20 announcement by the Director of the U. S. Fish and Wildlife Service.

Opening of trout season.

The results of the survey will be submitted to the Fish and Wildlife Service this summer in time to permit preparation of a detailed report for presentation at the September meeting of the International Association of Game, Fish and Conservation Commissioners. Printed copies of the Service report will be available at that time.

The survey under the direction of the Fish and Wildlife Service was made by the Crossley, S-D Surveys, Inc., of New York, successful bidder from among nine firms which submitted proposals for the task. Two hundred Crossley interviewers, working with a sample of 15,000 homes selected scientifically throughout the country with some located in each state, contacted hunters and fishermen in 5,200 homes. The questionnaire form was pretested in eight widely-separated sections of the country before finally being adopted.

The survey is being done largely as the result of a resolution adopted at the September 1954 meeting of the International Association of Game, Fish and Conservation Commissioners. Wildlife conservationists generally have felt the need for evaluation of the place of hunting and sport fishing in the national economy.

The survey directed by the Fish and Wildlife Service is national in scope. Eight States, each wanting more specific economic information about hunting and fishing within its own boundaries, contracted for special state surveys which were made at the same time as the national study.

Note: Also see Commercial Fisheries Review, February 1956, p. 31; July 1955, p. 39.

Tuna Fishery

MID-PACIFIC UPWELLING EFFECT ON TUNA FISHERY STUDIED BY SERVICE: A greater than usual upwelling of water in the mid-Pacific and its possible effect upon the tuna fishery of that area are being closely watched by the U. S. Fish and Wildlife Service, a May 8 news release reported.

The huge upwelling has occurred along the equator, south of Hawaii. The Service is studying the temperature and chemical content of the water, the speed and direction of the ocean currents, and the abundance of plankton in a 1,000-mile strip of ocean which spans the equator southeast of the Islands. Upwelling of water is a common occurrence along the equator, but because of the potentialities of this particular action Service scientists felt it warranted attention.

The upwelling is caused by displacement of surface water by the prevailing easterly winds. This sets up vertical currents which result in the transfer of fertile water from the cool depths to the surface of the sea.

Because of its fertility, the "new" water has the ability to produce and maintain an extraordinary abundance of plankton.

The Fish and Wildlife Service has made two special studies, one on the equator and the other at 1° N. latitude to discover the speed at which the sea water was flowing away from the area of the upwelling. In this work, drags were hung deep in the water from floats which were followed and checked for speed and direction.

The objective of the study is to find out where the drifting mass of fertile water, with its cargo of developing plant food, will be when it becomes a good tuna feeding ground.

Service officials believe that if this objective is achieved, predicting the location of a good tuna-fishing area will be possible.

U. S. Foreign Trade

EDIBLE FISHERY PRODUCTS, FEBRUARY 1956: United States imports of edible fresh, frozen, and processed fish and shellfish for February decreased about 15 percent in quantity and 9.6 percent in value as compared with January 1956, but were higher by 11 percent in quantity and 31.6 percent in value than for February 1955. The dollar value in February 1956 was close to 29 cents a pound, compared with 24.4 cents a pound in February 1955. Shrimp imports were about 2.7 million pounds higher in February 1956 when compared with February 1955 and this increase will account for most of the increase in value, according to a U. S. Department of Commerce summary (see table).

United States Foreign Trade in Edible Fishery Products, February 1956 with Comparisons

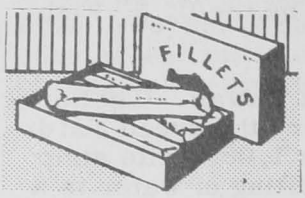
Item	Quantity			Value		
	Feb.		Year	Feb.		Year
	1956	1955	1955	1956	1955	1955
	(Million of Lbs.)			(Millions of $)		
Imports:						
Fish & Shellfish: Fresh, frozen & processed 1/	61.8	55.7	768.3	17.9	13.6	206.4
Exports:						
Fish & Shellfish: processed 1/ only (excluding fresh & frozen)	6.8	6.8	91.0	1.5	1.5	21.8

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

Exports of processed fish and shellfish in February 1956 decreased about 37.5 percent from the January 1956 total, but were about the same as for February 1955. The value of exports in February 1956 was also close to the February 1955 value, but was down 28.6 percent from January 1956.

* * * * *

GROUNDFISH FILLET IMPORTS UP IN APRIL: United States imports of groundfish (including ocean perch) fillets during April 1956 totaled 11.9 million pounds compared with nearly 11.0 million pounds imported during April of last year. This was a gain of 8 percent. The primary cause for the gain was a 3.5-million-pound increase in imports of groundfish and ocean perch fillets from Iceland. Increases of lesser importance were also noted for Norway, the Netherlands, and Miquelon and St. Pierre. Imports of groundfish fillets from Canada, Denmark, the United Kingdom, and West Germany were somewhat lower during April of this year than during the same month of 1955. France, Greenland, and the Union of South Africa exported groundfish fillets to the United States during April 1956 but did not export any during the corresponding month of last year.

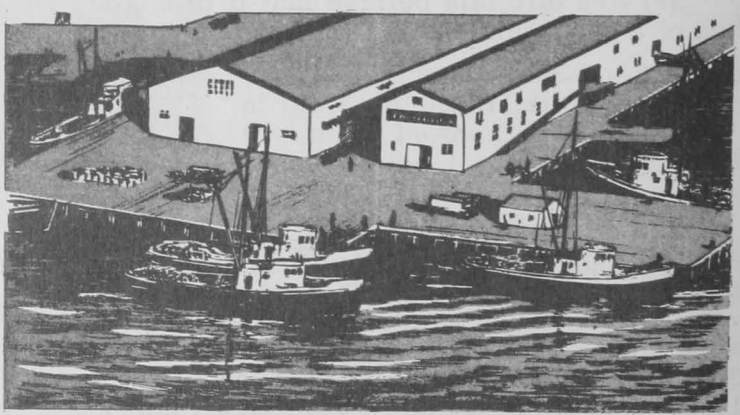


Canada continued to lead all other countries exporting groundfish and ocean perch fillets to the United States with 5.9 million pounds during April 1956--49 percent of the groundfish fillets imported during that month. Iceland was in second place with 4.5 million pounds.

Total groundfish and ocean perch fillet imports into the United States during the first four months of 1956 amounted to 50.1 million pounds. This was 6 percent more than the quantity imported during the corresponding period of last year. Canada, with 31.4 million pounds, led all other countries exporting fillets to the United States during that period, followed by Iceland (13.9 million pounds) and Norway (2.1 million pounds).

* * * * *

IMPORTS AND EXPORTS OF SELECTED FISHERY PRODUCTS, APRIL 1956: United States imports of frozen tuna during April and the first four months of 1956 were less than the same period a year ago, but canned tuna imports were larger. Frozen albacore imports during January-April this year were 27 percent less than a year earlier while imports of other frozen tuna gained 15 percent. Canned albacore imports were 16 percent greater and other canned tuna imports 5 percent over those for the comparable four-month period a year earlier. For the first four-months of 1956, 45.1 million pounds of frozen tuna were imported as compared with more than 50 million pounds in the similar period of 1955; almost 10.7 million pounds of canned tuna were received as compared with 9.8 million pounds a year earlier.



Imports of groundfish fillets in April 1956 and for the first four months of 1956 were larger than during the corresponding periods of 1955. However, a substantial drop occurred in imports of fillet blocks and slabs, which was more than compensated by an increase in ordinary fillets. Imports of haddock, hake, pollock, and cusk fillets totaled 15.9 million pounds for the first four months of 1956, an increase of 54 percent over the same 1955 period; imports of cod fillets likewise gained 28 percent and totaled 15.4 million pounds. Imports of fillet blocks and slabs January-April 1956 were 40 percent less than for the same period in 1955.

Imports of shrimp in the first four months of 1956 were 80 percent larger than the previous year--22.8 million pounds as compared with 12.7 million pounds. A small increase was shown in imports of lobster which totaled nearly 14 million pounds for the first four months of 1956--a small increase over a year earlier.

Fish meal imports were greater for both April and the first four months this year than for the same period the previous year. Imports during April amounted to 12.7 million pounds; January-April 1956 imports totaled 40.1 million pounds, 9 percent above a year ago for that period.

Canned salmon imports totaled 3.3 million pounds in April and 9.7 million pounds for the first four months of 1956. This compared with slightly over 1 million pounds imported during January-April 1955.

United States exports of canned salmon January-April 1956 totaled only 0.5 million pounds as compared with 3.9 million in the same period of 1955. Exports of canned sardines totaled 19.4 million pounds--18 percent greater. Fish oils exported totaled 41.6 million pounds, about the same as in the comparable four months a year ago.

Veterans' Hospitals Consumption of Fish

An estimated total of 1,378,812 pounds of fresh and frozen fish and 710,386 pounds of canned fish were purchased by the U. S. Veterans' Administration Hos-

Table 1 - Amount of Fresh and Frozen Fish Purchased by Veterans' Administration Hospitals, October 1954-September 1955

Species	Northeast		North Central		South		West		Total	
	Total Quantity	Avg. Cost Per Lb.	Total Quantity	Avg. Cost Per Lb.	Total Quantity	Avg. Cost Per Lb.	Total Quantity	Avg. Cost Per Lb.	Total Quantity	Avg. Cost Per Lb.
	Lbs.	$	Lbs.	$	Lbs.	$	Lbs.	$	Lbs.	$
GROUNDFISH:										
Ocean perch	69,544	.30	87,840	.26	99,816	.28	17,628	.28	274,028	.28
Haddock	97,684	.30	54,280	.26	58,428	.29	13,564	.30	223,956	.29
Cod	37,484	.28	37,204	.25	24,460	.29	21,912	.27	121,060	.27
Other (pollock, hake, and cusk)	35,496	.24	-	-	4,800	.22	-	-	40,296	.24
Total Groundfish	240,208	.29	179,324	.26	187,504	.28	53,104	.28	660,140	.28
OTHER:										
Flounder	51,568	.42	25,760	.42	49,344	.42	18,924	.26	145,596	.40
Halibut	28,320	.40	53,112	.33	24,056	.35	39,608	.30	145,096	.34
Salmon	25,664	.65	22,732	.41	5,156	.42	30,944	.39	84,496	.47
Sea bass	868	.42	-	-	13,628	.39	32,424	.33	46,920	.35
Catfish	-	-	12,432	.32	23,608	.40	4,372	.32	40,412	.37
Mackerel	24,348	.27	-	-	15,308	.37	-	-	39,656	.31
Whiting	17,724	.30	6,620	.27	10,020	.19	-	-	34,364	.26
Red snapper	-	-	-	-	18,844	.52	15,456	.29	34,300	.42
Pike	204	.55	24,268	.41	-	-	-	-	24,472	.42
Swordfish	11,092	.43	-	-	1,616	.59	10,280	.31	22,988	.39
Corvina	-	-	-	-	-	-	18,440	.28	18,440	.28
Rockfish	-	-	-	-	720	.52	15,200	.29	15,920	.30
Trout	-	-	1,420	.40	11,464	.30	-	-	12,884	.31
Smelts	4,012	.34	392	.27	-	-	3,084	.34	7,488	.34
Drumfish	-	-	-	-	5,600	.38	-	-	5,600	.38
Bluefish	5,572	.38	-	-	-	-	-	-	5,572	.38
Whitefish	516	.52	4,616	.49	168	.45	-	-	5,300	.50
Scup	-	-	-	-	5,212	.17	-	-	5,212	.17
Croaker	-	-	-	-	4,924	.35	-	-	4,924	.35
White bass	-	-	3,300	.33	-	-	-	-	3,300	.33
Yellow perch	-	-	2,904	.63	-	-	-	-	2,904	.63
Tortuava	-	-	-	-	-	-	2,600	.34	2,600	.34
Butterfish	2,412	.31	-	-	-	-	-	-	2,412	.31
Herring	-	-	-	-	2,200	.12	-	-	2,200	.12
"Deep sea white"	1,516	.38	-	-	-	-	-	-	1,516	.38
Mullet	-	-	-	-	1,308	.31	-	-	1,308	.31
Woldfish	-	-	1,244	.36	-	-	-	-	1,244	.36
Barracuda	-	-	-	-	-	-	904	.38	904	.38
Ling cod	-	-	-	-	-	-	484	.26	484	.26
Fresh-water fish	160	.70	-	-	-	-	-	-	160	.70
Total Other Fish	173,976	.41	158,800	.38	193,176	.38	192,720	.31	718,672	.37
Total Fresh and Frozen Fish	414,184	.34	338,124	.31	380,680	.33	245,324	.31	1,378,812	.33

pitals during October 1954 through September 1955. (Shellfish purchases are not included.)

FRESH AND FROZEN FISH: In all, 35 species of fresh and frozen fish were purchased, with ocean perch and haddock fillets accounting for better than one-third (36 percent) of the total quantity bought. Six species of groundfish (cod, haddock, ocean perch, pollock, cusk, and hake), as a group, accounted for almost half (660,000 pounds) of the purchases.

Although the total pounds of fresh and frozen fish purchased accounted for 56 percent of all fishery products purchased by these hospitals, the estimated expenditure of $448,561 for fresh and frozen fish represents only two-fifths (42 percent) of the total dollars expended by these hospitals for all fishery products during the survey period. The average cost per pound of fresh and frozen fish was $0.33, ranging from a low of $0.12 for fillets of lake herring to a high of $0.70 per pound for assorted fresh-water fillets.

Table 2 - Annual Per Capita Consumption of Fresh and Frozen Fish in Veterans' Hospitals, Oct. 1954-Sept. 1955

Region	Average No. of Patients	Groundfish (Incl. Ocean Perch)	Other Fresh or Frozen Fish	Total
		(Pounds)		
Northeast	28,686	9.00	6.52	15.52
North Central	29,340	6.11	5.41	11.52
South	34,040	5.51	5.67	11.18
West	15,681	3.39	12.29	15.68
Total	105,747	6.24	6.80	13.04

Regionally, Veterans' Administration Hospitals located in Northeast (see table 2) purchased the greatest total number of pounds of fresh and frozen fish while those in the West purchased the smallest quantity. Veterans' Administration Hospitals in the West, however, served more pounds of fish per patient than did hospitals in other regions. It is interesting to note, in this connection, that the average yearly consumption per patient in the Northeast and West were both significantly higher than the averages in either the North Central or South.

These findings are based on a mail inquiry of a sample of 105 Veterans' Administration Hospitals located throughout the United States. Included in this study were all Veterans' hospitals averaging a thousand or more patients, and a systematic random sample of hospitals with an average patient load of less than a thousand during the survey period.

Table 3 - Canned Fish Issued to Veterans' Administration Stations, Oct. 1954-Sept. 1955

	Quantity (1,000 Lbs.)
BY SPECIES:	
Salmon:	
Red	300.2
Chum	102.8
Total Salmon	403.0
Tuna	227.0
Sardines	80.4
Grand Total	710.4
BY AREAS:	
East (Somerville, N. J.)	283.7
North Central (Hines, Ill.)	335.7
West (Wilmington, Calif.)	91.0
Grand Total	710.4

CANNED FISH: Over 700,000 pounds of canned fish were issued to Veterans' Administration Stations from October 1954 through September 1955. More than half (57 percent) of the canned fish issued was canned salmon and almost three-fourths of this was of the red variety.

Of the total pounds of canned fish issued, canned tuna accounted for approximately one-third and sardines for one-tenth.

The effect of seasons on canned fish issued is not too distinct. The quantity of salmon issued throughout the year was relatively stable, while sardines show a definite high point in the summer months (July-September). On the other hand, over half of the canned tuna was issued during the fall and winter months (October through March).

Washington

PROGRAM FOR REMOVAL OF SCRAP FISH, 1955/56: Otter trawlers in southern Puget Sound removed 1,094,870 pounds of scrap fish and sole infested with parasites during the four-month season ended March 31, the Washington State Department of Fisheries announced on April 23, 1956. This is part of a program by the State to remove predatory dogfish populations and eliminate parasitized sole in order to improve the catch of marketable fish.

The landings included 494,870 pounds of dogfish, ratfish, skate, octopus, and hake, and 600,000 pounds of English sole infested with parasites fit only for reduction to fish meal or for use as animal food.

The total food-fish catch of marketable sole, true cod, flounder, and other species totaled 182,600 pounds, evidence that the opening of the southern Puget Sound area and Hood Canal after long closure is increasing the proportion of marketable fish. The food-fish catch in 1954/55 was only 72,435 pounds.

During the first season (1953/54), the reopened areas produced a catch of 2,042,000 pounds of scrap fish and a food-fish catch of 248,000 pounds in southern Puget Sound waters. The 1955/56 special season on Hood Canal resulted in a scrap fish take of only 13,700 pounds as against 584,900 pounds in 1954/55.

The reduction in landings of scrap fish is regarded as significant progress toward restoration of the areas for food-fish production.

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STATE FISH HATCHERIES TO PLANT RECORD NUMBER OF SALMON IN 1956: The 19 salmon hatcheries and rearing stations of the Washington State Department of Fisheries will release close to 33.5 million salmon fingerlings and yearlings in 1956, according to an announcement made on April 17.

More than 4 million of the baby salmon will be marked in various ways for experimental purposes.

The planting program is one of the largest involving reared fish in the Department's history. It will involve 24.2 million fingerlings and 9.3 million yearlings (including 23,440,000 fall chinook, 529,000 spring chinook, 8,676,000 silver, 520,000 pink, 250,000 chum, 46,000 sockeye, and 29,000 steelhead).

Puget Sound district hatcheries will be making the most plants, with a total of 17.3 million of all species. The Columbia River district is next, with a total 12.1 million. Willapa Harbor and Grays Harbor hatcheries will release 4.1 million.

Wholesale Prices, May 1956

During May 1956 the over-all wholesale index for all edible fish and shellfish (fresh, frozen, and canned) increased 3 percent over that for April 1956 (111.7 percent as compared with 108.6 percent of the 1947-49 average). The index for May 1956 was also higher by 14 percent when compared with May 1955. Changes in the indexes during May 1956 were due primarily to higher prices for the drawn, dressed, or whole finfish subgroup.

Table 1 - Wholesale Average Prices and Indexes for Edible Fish and Shellfish, May 1956 with Comparisons

Group, Subgroup, and Specification	Point of Pricing	Unit	Avg. Prices1/ ($)		Indexes (1947-49 = 100)			
			May 1956	Apr. 1956	May 1956	Apr. 1956	Mar. 1956	May 1955
ALL FISH & SHELLFISH (Fresh, Frozen, & Canned)					111.7	108.6	113.1	98.1
Fresh & Frozen Fishery Products:					120.6	115.2	120.6	97.9
Drawn, Dressed, or Whole Finfish:					113.3	100.5	114.6	85.6
Haddock, lge., offshore, drawn, fresh	Boston	lb.	.07	.05	70.9	50.1	78.5	57.6
Halibut, West., 20/80 lbs., drsd., fresh or froz.	New York	"	.40	.34	123.8	106.2	98.0	68.1
Salmon, king, lge.& med., drsd., fresh or froz.	"	"	.63	.61	140.5	137.1	137.6	111.8
Whitefish, L. Superior, drawn, fresh	Chicago	"	.62	.69	153.7	171.0	204.5	141.3
Whitefish, L. Erie pound or gill net,rnd.,fresh	New York	"	.74	.60	148.6	121.3	161.8	146.6
Lake trout, domestic, No. 1, drawn, fresh	Chicago	"	.51	.54	104.5	110.6	168.0	96.3
Yellow pike, L. Michigan & Huron,rnd.,fresh	New York	"	.29	.21	68.0	49.3	123.1	93.8
Processed, Fresh (Fish & Shellfish):					126.1	126.6	126.5	108.5
Fillets, haddock, sml., skins on, 20-lb. tins	Boston	lb.	.27	.24	91.9	81.7	102.1	85.1
Shrimp, lge.(26-30 count),headless, fresh or froz.	New York	"	.79	.79	124.8	124.8	120.9	108.6
Oysters, shucked, standards	Norfolk area	gal.	5.50	5.62	136.1	139.2	139.2	114.4
Processed, Frozen (Fish & Shellfish):					115.2	114.3	112.3	95.6
Fillets: Flounder, skinless, 1-lb. pkg.	Boston	lb.	.40	.40	103.4	103.4	102.1	99.5
Haddock, sml.,skins on,1-lb. pkg.	"	"	.29	.29	91.0	91.0	91.0	80.0
Ocean perch, skins on, 1-lb. pkg.	"	"	.29	.29	114.8	114.8	114.8	106.7
Shrimp, lge. (26-30 count), 5-lb. pkg.	Chicago	"	.76	.76	118.1	116.5	113.0	91.0
Canned Fishery Products:					99.0	99.2	102.4	98.3
Salmon, pink, No.1 tall (16 oz.), 48 can/cs.	Seattle	case	21.27	21.27	120.0	120.0	120.0	109.6
Tuna, lt.meat, chunk, No. 1/2 tuna (6-1/2 oz.), 48 can/cs.	Los Angeles	"	10.60	10.70	76.4	77.1	85.1	90.1
Sardines, Calif., tom. pack, No. 1 oval (15 oz.), 48 cans/cs.	" "	"	7.50	7.38	87.5	86.1	83.2	88.1
Sardines, Maine, keyless oil, No. 1/4 drawn (3-1/4 oz.), 100 cans/cs.	New York	"	8.45	8.45	89.9	89.9	89.9	71.3

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.

The May 1956 index for the drawn, dressed, or whole finfish subgroup increased 12.7 percent from April 1956 and was higher by 32.4 percent as compared with May 1955. Prices for haddock at Boston increased from the seasonally low April 1956 level and frozen halibut prices continued to move upward due to light supplies. The May 1956 indexes for haddock and halibut were higher by 23.1 and 81.8 percent, respectively, as compared with May 1955. All other items in this subgroup for May 1956 were higher when compared with May 1955 except for yellow pike, which was lower by 27.5 percent.

The fresh processed fish and shellfish subgroup index in May 1956 was down slightly as compared with April 1956, however it rose 16.2 percent when compared with May 1955. Higher ex-vessel costs for fresh drawn haddock were

reflected in the increase in fresh haddock fillets (up 12.5 percent). Fresh shrimp prices were steady from May to April 1956 but the index value for May 1956 was up about 19 percent compared with the same month a year ago.

The May 1956 index for the frozen processed fish and shellfish subgroup was higher by less than 1 percent as compared with April 1956, but increased sharply by 20.5 percent when compared with May 1955. The May 1956 index for the frozen fillets that make up this subgroup increased close to 8 percent and frozen shrimp was higher by 30 percent when compared with May 1955.

Display case for fishery products.

The canned fishery products subgroup index for May 1956 was about unchanged from April 1956 and less than 1 percent above the index for May 1955. Increases in 1956 prices of canned pink salmon and Maine sardines were offset by a 15.2 percent decrease in canned light meat tuna from May 1955 to May 1956.

UNUSUAL METHOD FOR CATCHING MULLET

An unusual and interesting but efficient method for catching mullet is used in Malta.

A large raftlike structure, composed of canes bound together, is built to conform to the width of the place where it is to be used, usually the mouth of a creek. This is anchored across the entrance of the creek by its four corners, and a vertical wall of netting is hung from the side heading towards the creek. Several men in boats pass up the creek beyond the raft; then fishing begins. The men come downstream towards the raft, beating the water, splashing frantically, and in general making as much noise as possible, driving the mullet before them. This species, one of the best jumpers among fish, cannot pass the wall of webbing, but many attempt to leap over the obstruction. Their leap sends them onto the raft which has much loose straw and branches of trees to prevent further leaps of the fish. The fish are then gathered up and carried off to market, where they are much esteemed.

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