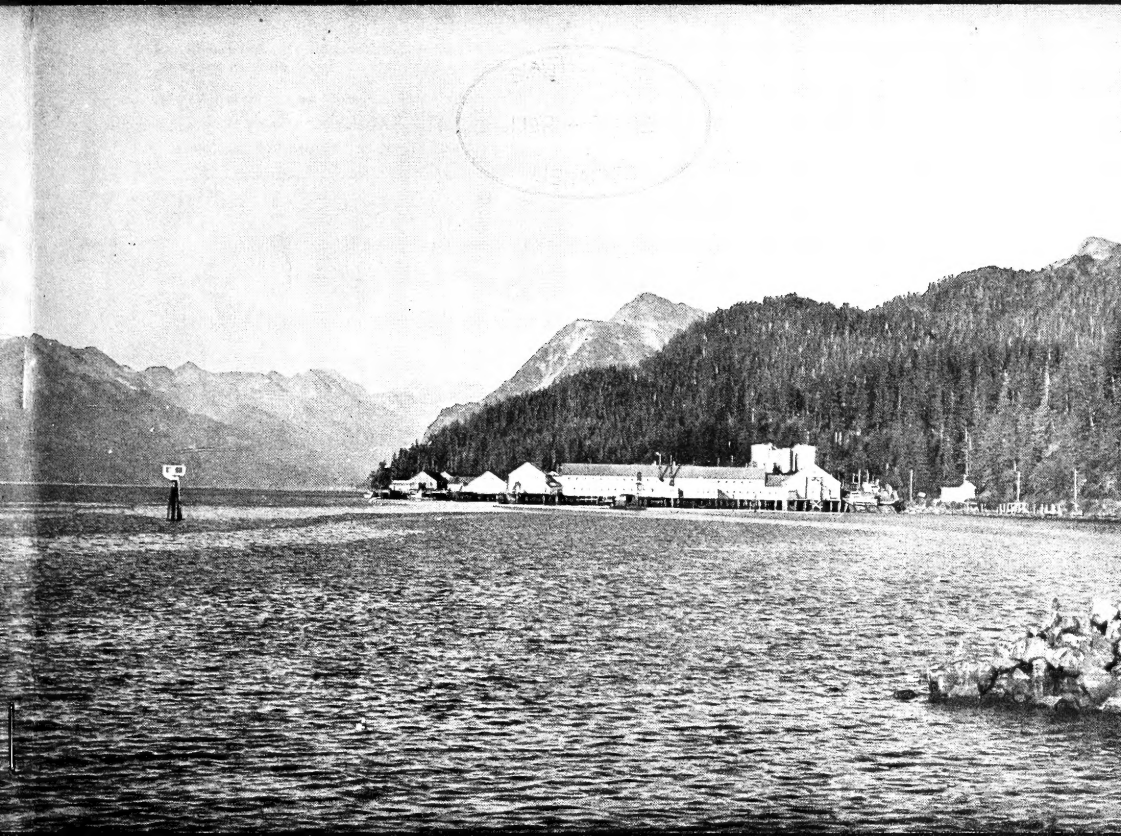


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COMMERCIAL FISHERIES REVIEW



Vol. 20, No. 6

JUNE 1958

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United States Department of the Interior
Washington, D.C.



COMMERCIAL FISHERIES REVIEW



A review of developments and news of the fishery industries prepared in the BUREAU OF COMMERCIAL FISHERIES.

Joseph Pileggi, Editor
H. M. Bearse, Assistant Editor

Mailed free to members of the fishery and allied industries. Address correspondence and requests to the Chief, Branch of Market News, Bureau of Commercial Fisheries, U. S. Department of the Interior, Washington 25, D. C.

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DAMARISCOTTA (MAINE) ALEWIFE FISHERY

By James P. Cating *

Migrations of alewives (*Pomolobus pseudoharengus*) from the sea to spawning grounds in fresh water occur each spring along the Atlantic coast of North America from the Carolinas to Nova Scotia. In colonial times the sluggish rivers or streams, draining lake or pond systems, supported large alewife runs. In recent years



FIG. 1 - STREAM APPROACH TO TRAP, SLUICEWAY, AND PROCESSING PLANT.

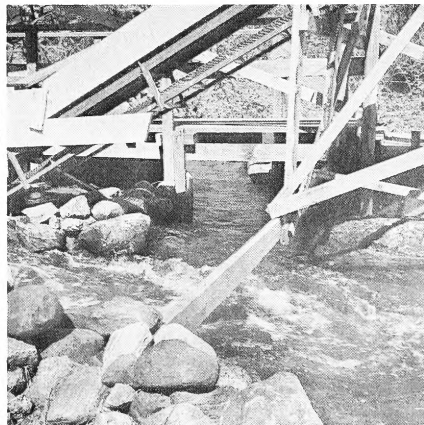


FIG. 2 - DIVISION POINT, RIGHT TO LAKE, LEFT TO TRAP.

the construction of tidewater dams preventing upstream movement of alewives, pollution and exploitation have greatly reduced and in instances eliminated alewife runs.

The alewife spends most of its life in the ocean where it may reach a foot in length and attain a weight of one-half pound. In the spring mature fish enter the streams and move up into the ponds and lakes where they spawn. Most adult alewives do not die after spawning, as do the Pacific salmon, but survive to return to the sea. The young of the year begin their seaward migration and downstream movement during summer and fall months. The alewives remain in the ocean until they mature at an age of 3 or 4 years.

The sight of these hordes of fish, working their way up small streams to the lake, is one that never fails to fascinate. The instinct to propagate the race is so

* FISHERY METHODS AND EQUIPMENT SPECIALIST, MAINE HERRING EXPLORATION AND GEAR RESEARCH, BRANCH OF EXPLORATORY FISHING AND GEAR RESEARCH, DIVISION OF INDUSTRIAL RESEARCH AND SERVICES, BUREAU OF COMMERCIAL FISHERIES, BOOTHBAY HARBOR, ME.

strong in these fish that they never cease trying to get upstream no matter what obstruction is placed in their path. At the entrance to West Harbor pond at Boothbay Harbor, Maine, they can be observed at times trying to penetrate a net that some-



FIG. 3 - LOWER SECTION OF FISHWAY.



FIG. 4 - FISHWAY POOL

times cuts off the fishway entrance to the pond. They are so oblivious to everything but reaching the spawning ground that they can be easily caught by hand.

Alewives are important to man in several ways: (1) as a source of food and (2) as a fine supply of forage fish for the game fish in the waters where they are spawned and spend most of the summer. Sometimes new runs are started in suitable lakes with outlets to the sea just to provide an adequate summer supply of food for the trout, salmon, or bass residing there.

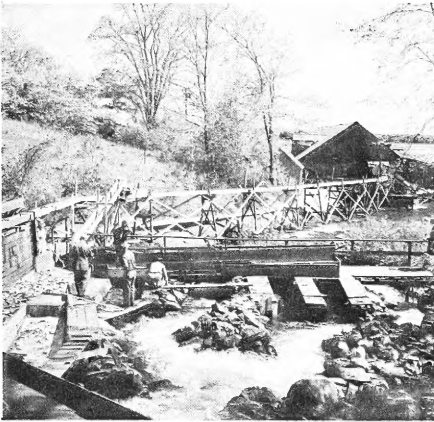


FIG. 5 - TRAP, SLUICWAY, AND PLANT.

Alewives are good food fish either fresh or processed. Most of them, commercially processed for food, are either cold-smoked or pickled. Many people prefer them to sea herring processed in the same manner. Many of the alewives caught in Maine go into cat food and more and more are being processed for meal and oil. Some are utilized for lobster bait.

One of the larger runs of these fish occurs in the Damariscotta River and lake system near Damariscotta, Maine. The location of the fishing operation is handy to U. S. Route 1. Each spring the migrating alewives are an attraction to many local and out-of-state people. The fishery is owned by the Town of Damariscotta, but the production is leased each year to a private party. The town is paid a percentage for the fish utilized. Visitors are definitely welcome.

The methods by which these fish are taken and handled at Damariscotta are depicted in Figures 1 to 10. It is probably one of the simplest and easiest methods of catching fish that has ever been developed, and it is possible only because of the single-minded purpose of the alewife to go upstream to the lake. Figure 1 is a downstream view from the fishway and fish trap, showing the stream approach up which the fish come. The wooden structure at the left of the picture is the sluiceway down which the captured fish are washed to the scaling machine and processing plant shown in the background. In the plant the fish are mechanically headed, gutted, and filleted. Then they pass through a series of salt brines until properly preserved. Finally they are packed in barrels in a mild vinegar pickle for shipment to other locations for final processing into a retail pack of pickled herring. A few of the fish are smoked whole in a small smokehouse nearby and some are sold as lobster bait.



FIG. 6 - TAKING BLOOD SAMPLES.

Figure 2 is a view of the division point where the fish can, by choice, turn right and ascend the fishway to Damariscotta Lake or turn left and be caught. The rate of

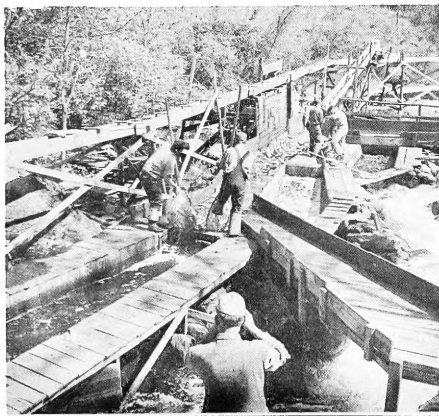


FIG. 7 - DIPPING ALEWIVES FROM TRAP.

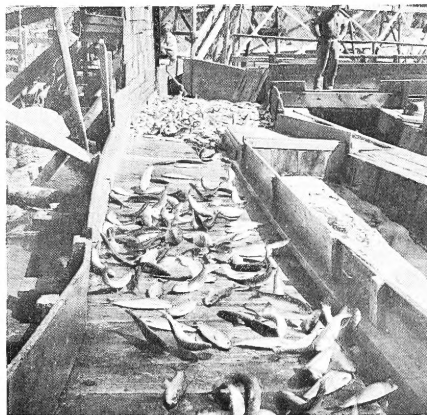


FIG. 8 - ALEWIVES ON RAMP.

flow from the trap is greater than that from the fishway which no doubt attracts a higher percentage of fish to the trap than to the fishway.

Figure 3 is a view looking upstream in the fishway from the division point.

Figure 4 depicts a resting pool in the fishway part way to the lake. There are a number of these pools above and below this one through which the fish must pass.

Figure 5 shows the fishing area from which the alewives are carried via an elevated wooden chute or sluice to the processing plant.

At the lower left fish netted with dip nets can be seen lying on the wooden ramp beyond the wooden trap chamber where the fish congregate. More of these wood trap



FIG. 9 - IMPASSABLE FALLS ABOVE TRAP.

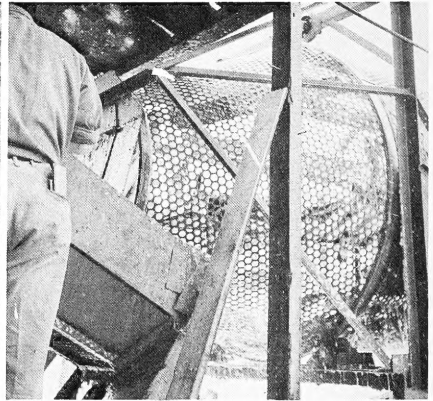


FIG. 10 - SCALING MACHINE.

chambers can be seen on the right. The fish come up the stream beside the man farthest right and when they are turned back by the falls they concentrate in the chambers where they are easily caught.

Figure 6 - A blood sample is being collected from an alewife for later analysis. Through classification based on blood types and other characteristics scientists may be able to separate the alewife population into different racial groups. These biological studies being conducted by the Division of Biological Research of the Bureau of Commercial Fisheries are aimed at improving the alewife fishery.

Figure 7 shows workman dipping fish from the channel on the left onto the ramp leading to the conveyor which carries the fish into the sluiceway.

Figure 8 shows alewives, just dipped, flopping on the ramp. A pile of alewives can be seen in the background ready to be shoveled onto the conveyor.

Figure 9 - In the background the impassable falls above the trap area can be seen. The water operating the sluiceway is taken from the falls. A wooden trapping chamber is in the foreground.

Figure 10 - This is a cylindrical perforated mechanical scaler at the end of the sluiceway. From here the fish are taken into the plant for processing.

The alewife is a very hardy fish and stands handling and transporting alive from one area to another well. It is estimated that only 5 percent are allowed to escape to spawn in some of the more heavily-fished streams along the coast of Maine, and these runs have not diminished significantly. Rounsefell & Stringer (1943) point out . . . "artificial maintenance, for more than a century, of a commercial run in Jones Stream (West Goldsboro) by planting about ten percent of each year's run in Jones Pond for spawning." There are many streams along the coast in the range of this fish in which runs could be established again providing pollution were abated

and fishways over impassable dams and falls were built. The alewife unlike the shad, can pass quite steep fishways. Establishment of new runs and better management of already established runs could increase the production tremendously. Rounsefell & Stringer (1943) state "Production from alewife runs in Maine can be easily doubled by carrying out the suggestions embodied in this report in regard to fishways, natural obstructions, management methods to guarantee an adequate annual spawning stock, and by continuation of the stocking program."

Increased interest by Maine towns, stimulated by the reports of Rounsefell & Stringer (1943) and Baird (1953-1956) in increasing the production of alewives by better management of present runs and the establishment of new ones by stream improvement and stocking gives promise of steady progress towards a practical maximum yield from waters suitable for Maine alewife production in the future. The biologists of the State of Maine Sea and Shore Fisheries and Inland Fish and Game Departments are encouraging this progress and assisting the towns by doing the needed research for establishing suitable management plans.

It might be said that there is no market for alewives at this time and, therefore, it is not desirable to increase the catch. This would be partly true if they are considered for human consumption only. Baird (1956) interviewed present alewife producers and was told that they could handle any steady increase in production with ease. He states . . . "our problem is not one of markets, but one of sufficient production to satisfy these markets." At the present rate of population increases in this country and most other countries any direct source of protein will by all present indications be of maximum importance in 10 to 15 years if not sooner. In the meantime the surpluses can be utilized by the producers of fish meal and oil and cat food who are definitely interested in any source of fish at competitive prices.

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EUROPE SHIPS FRESH SALMON BY AIR FREIGHT

Fresh salmon packed in polyethylene bags with crushed ice are being transported by air freight from Ireland to British and European Markets. The packaging costs are said to be less than those normally encountered. (Der Fischwirt, February 1957.)

THE BLUE CRAB AND ITS FISHERY IN CHESAPEAKE BAY^{1/}

Part 1 - Reproduction, Early Development, Growth, and Migration

By W. A. Van Engel*

ABSTRACT

BLUE CRABS ARE ABUNDANT ON THE EAST AND GULF COASTS OF NORTH AMERICA, ON THE EAST COAST OF SOUTH AMERICA, AND HAVE BEEN REPORTED FROM FRANCE, HOLLAND, AND DENMARK, AND THE EAST COAST OF THE MEDITERRANEAN. IN CHESAPEAKE BAY, FISHING HAS BEEN INTENSIVE FOR OVER 80 YEARS; IN THE LAST TEN YEARS THE AVERAGE ANNUAL PRODUCTION HAS BEEN ABOUT 60 MILLION POUNDS, VALUED ABOUT THREE MILLION DOLLARS, APPROXIMATELY TWO-THIRDS OF THE ENTIRE UNITED STATES BLUE CRAB HARVEST.

MATING OF BLUE CRABS BEGINS IN EARLY MAY AND CONTINUES INTO OCTOBER; SPERM LIVE IN THE FEMALE RECEPTACLES FOR AT LEAST A YEAR, AND MAY BE USED AS OFTEN AS THE FEMALE SPAWNS, TWICE OR MORE. AFTER MATING, FEMALES MIGRATE TO THE SALTIER WATERS OF THE SOUTHERN END OF THE BAY, SOME PASSING INTO THE OCEAN. SPAWNING IS DELAYED AT LEAST TWO MONTHS AFTER MATING, AND OCCURS FROM EARLY MAY THROUGH SEPTEMBER. EGGS ARE CARRIED ON THE ABDOMEN OF THE FEMALE FOR ABOUT TWO WEEKS BEFORE HATCHING.

THERE ARE TWO LARVAL STAGES--FOUR OR FIVE ZOEAL MOLTS AND THE MEGALOPS--LASTING ABOUT A MONTH. LARGE NUMBERS OF CRABS REACH THE "FIRST CRAB" STAGE EARLY IN AUGUST AND BEGIN MIGRATING INTO THE RIVERS AND TO THE UPPER BAY. ADULT SIZE MAY BE REACHED IN ONE YEAR TO A YEAR AND A HALF, SHEDDING 18 OR MORE TIMES AFTER THE LAST LARVAL STAGE.

TWO MAJOR MIGRATIONS OF ADULT FEMALES TO THE SOUTHERN END OF THE BAY OCCUR, IN OCTOBER AND NOVEMBER AND THE FOLLOWING MAY. NONE OF THESE FEMALES SPAWNED BEFORE THEIR MIGRATION. SCHOOLS OF "SEA-RUN" OR "OCEAN" CRABS, THAT HAVE SPAWNED BEFORE, MIGRATE FROM THE OCEAN OR THE VIRGINIA CAPES AREA INTO THE BAY IN MID-SUMMER. ADULT MALES REMAIN IN THE BRACKISH RIVER WATERS THE YEAR ROUND.

THE DIET OF BLUE CRABS INCLUDES FRESH AND DECAYING FISH OR MEAT, AND VEGETATION. YOUNG SETS OF CLAMS AND OYSTERS MAY OCCASIONALLY BE DESTROYED, BUT ON GROUNDS IN OPEN WATERS THE BLUE CRAB IS NOT GENERALLY CONSIDERED A SERIOUS PEST.

BACKGROUND

The blue crab, *Callinectes sapidus* Rathbun, belongs to the class Crustacea, which includes many familiar marine and fresh-water forms, such as lobsters, crayfish, shrimp, and barnacles. This crab is a common inhabitant of muddy and sandy shores of the East Coast and Gulf Coast of North America, from Massachusetts to Texas, and a few have been reported as far north as Nova Scotia and as far south as Uruguay on the east coast of South America (Rathbun 1930). Occasional specimens have been reported in European waters, from France, Holland, and Denmark, and it has become abundant in recent years on the Mediterranean coast of Israel, where the crabs were probably transported in the ballast tanks of ships (Holthius and Gottlieb 1955).

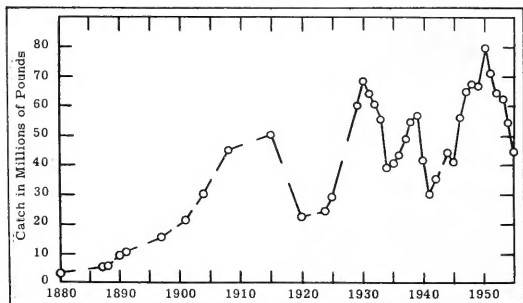


FIG. 1 - CHESAPEAKE BAY CATCH. (SOURCE: U. S. BUREAU OF FISHERIES, 1922-1941; U. S. FISH AND WILDLIFE SERVICE, 1942-1957.)

Commercial fishing for blue crabs has been especially intensive in estuaries like Chesapeake

^{1/} CONTRIBUTIONS FROM THE VIRGINIA FISHERIES LABORATORY, NO 79.

*ASSOCIATE BIOLOGIST, VIRGINIA FISHERIES LABORATORY, GLOUCESTER POINT, VA.

Bay. It is caught by many and diverse forms of fishing gear in salty, deep channels of the Bay and in brackish waters of its river tributaries, often quite far up the rivers in water of extremely low salinity.

Total catch in Chesapeake Bay has fluctuated considerably in its 80-year history (fig. 1), although in the early years, from 1880 to 1915, fluctuations were unnoticed. Since 1929, the average annual catch has been about 55 million pounds. In the last ten years, Chesapeake Bay has had an average annual production of about 60 million pounds, currently valued at about \$3 million, approximately two-thirds of the entire United States blue crab harvest.

Many closely-related crabs have the same characteristic body form, the flatly-expanded final segment of the fifth leg, and nine pairs of spines lateral to the eyes. The best diagnostic character of *Callinectes sapidus* is a set of four, instead of six, teeth on the margin of the shell between the eyes (two frontal and two inner-ocular teeth)--Rathbun 1930. Detail which will not be repeated here may be found in the authoritative accounts on taxonomy and distribution (Rathbun 1896, 1930); anatomy and histology (Cochran 1935; Cronin 1942, 1947; Hopkins 1943, 1944; Pyle and Cronin 1950); bibliography (Cronin, Van Engel, Cargo and Wojcik 1957).

MATING

Sex of the blue crab is easily recognized by differences in shape of the abdomen, or apron as it is frequently called (fig. 2), and by the abdominal appendages. The

male abdomen, long, slender and T-shaped, carries two pairs of appendages used in mating, two long intromittent organs and two shorter accessory organs. The abdomen of an immature male is tightly sealed to the ventral surface of the shell, while on a mating male the abdomen hangs free or is held in place by a pair of "snap-fastener-like" tubercles. In the young female the abdomen is triangular and sealed to the body, while in the adult it is broadly rounded, almost semi-circular, and free of the ventral shell. There are four pairs of swimmerets on the female abdomen: small, hairless rods on the immature and large, fringed rods on the adult. Abdomens of young females are grayish-white, adult females blue-green. In the last few days of immaturity, however, just before the young female sheds to become an adult, the dark green of the inner, soft, adult abdomen shows through the transparent whiteness of the hard, outer, immature skeleton.

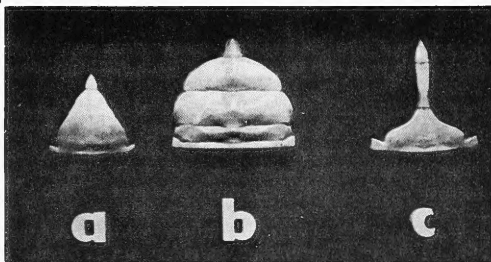


FIG. 2 - ABDOMENS OF IMMATURE FEMALE (A), MATURE FEMALE (B), AND MALE BLUE CRAB (C).

Young females sometimes are called "Sally" crabs, while an adult female is a "sook," a twist of the word "sow." Although millions of crabs were handled yearly in the last 75 years, only a few "adult" females were found with an inner, new skin showing beneath the outer skeleton, and where legs were missing, the buds of new legs often were found. All such crabs were abnormal and died before shedding was complete (Hay 1905; Churchill 1919; Cronin, personal communication). This is taken as proof that once the sook stage is reached, females cease to grow and molt.

Males, called "Jimmies," "Jimmy-dicks," or "Channelers," reach sexual maturity before they are fully grown, and during each of their last three growth stages may mate with more than one female (Truitt 1939). The female mates usually while it is in the soft crab state (Rathbun 1896), but not until after it has shed for the last

time. Mating two or three days after shedding, sometimes with two or more males in succession, occurs in experimental ponds, but in nature mating probably is seldom delayed this long. Summer is the mating season in Chesapeake Bay, beginning in early May and continuing into October, reaching a peak in late August and early September.

Having found a mate, the male cradle-carries the female beneath him by hooking his first walking legs and pinching claws between the first walking legs and pinching claws of the female (fig. 3). She is carried two or more days until she sheds her immature shell. While she is shedding, the male hovers over her. After the soft female emerges from the shed she turns over on her back and unfolds the abdomen to expose the two genital pores. Mating may occur day or night and may last from five to twelve hours. Sperm are transported in microscopic, oval-shaped bundles called spermatophores to a pair of sacs in the female called seminal receptacles or spermathecae. Sperm will live in the female receptacles for at least a year, to be used as often as the female lays eggs. After mating, the adult female is again carried, cradle-fashion, beneath the male, for another two days or more. While the male is carrying and mating with the female, the pair is called "doubler" or "buck-and-rider."

Since the female mates only once, in the soft-shell state or shortly thereafter, the cradle-carry is undoubtedly important to ensure that a male is present at the critical moment of shedding, and to protect the soft female until her shell is hard.

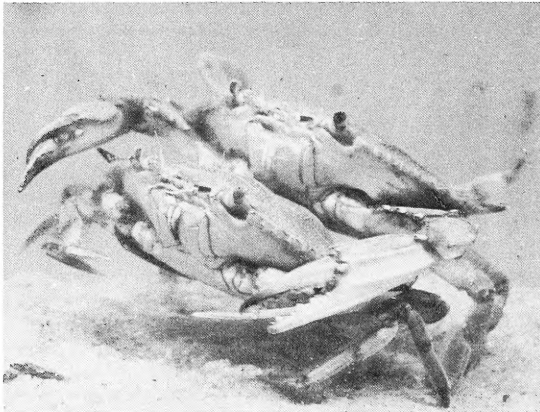


FIG. 3 - DOUBLERS. THE MALE CRADLE-CARRIES THE IMMATURE FEMALE FOR TWO OR MORE DAYS UNTIL SHE SHEDS.

Soon after mating, females migrate to the saltier waters of the southern end of Chesapeake Bay, some passing through the Capes into the ocean. This migration results in a concentration of adult females in the lower Bay; near the mouth of the Bay the catch is almost 100 percent female (Fiedler 1930; Truitt 1934).

SPAWNING

Two to nine months may elapse between mating and egg laying by the female (Churchill 1919). If mating occurs as early as May, the first egg mass may be laid in August. Although most females mature and mate in August and September, and eggs in the ovaries of each female develop almost to completion within the next two months, egg-laying is delayed until the following May or June. In early spring females in the southern end of the lower Bay move first shoreward to warmer banks and near river mouths, but by June begin to retreat from excessive shoal water temperatures to spawn offshore. Far upstream in low salinity waters of Virginia rivers and in Chesapeake Bay north of the mouth of the Rappahannock River, sponges (masses of eggs released by female crabs) seldom are seen except in unusually dry seasons (Truitt 1939). Egg laying is rapid and may be complete in two hours (Truitt 1939), eggs passing from the ovaries to the outside by way of the seminal receptacles where fertilization occurs. Outside the body, the fertilized eggs are attached by adhesives to hairs of

four pairs of appendages (swimmerets) on the abdomen. Appropriate names for egg-bearing females are sponge crab, cushion crab, lemon or orange crab, berry or berried crab, ballie, punk, and busted sook. In the same way that poultry pullets produce infertile eggs, unmated crabs may produce sponges of unfertilized eggs, but this is extremely infrequent for there is always an abundance of males, each capable of mating with several females.

When first laid eggs are bright orange in color, but during the two weeks before hatching they become yellow, brown, and then dark brown. These color changes are caused by a gradual absorption of yellow egg yolk by the crab embryo and development of dark pigment in the eyes. The dominant color of sponges changes from bright orange near river mouths to dark brown at the Virginia Capes.

A few sponge crabs may be seen before the end of April, but normally the first peak of sponge production occurs during the last week of May and the first two weeks in June. A second, smaller peak occurs in August, after which there is a rapid decrease in number of spawning females, and usually none can be found by the middle of September. On rare occasions a sponge crab has been caught as late as mid-December. Accompanying the rapid decrease in number of sponge crabs in September is an almost complete disappearance of females which had spawned. It is believed that most of them move to deeper waters of the Bay, or to the ocean, and die, or perhaps join an ocean-going population that may return to the Bay as "sea-run" or "ocean" crabs the following year. The few spent females that remain in the lower Bay over winter comprise five percent or less of the dredge catch. They are markedly different in appearance, with dark-colored shells, quite unlike the bright colored shells of newly-mated, down-river migrants, but devoid of the fouling organisms so characteristic of "ocean" crabs (Newcombe 1945; Hopkins 1947).

Some females may spawn twice or more. Those that mate in August usually produce their first sponge the following May or June and a second sponge the succeeding August, using only a portion of the sperm in the receptacles at each spawning. Empty egg cases on the swimmerets are conclusive evidence that a crab has spawned, but do not reveal whether the sponge was the first, second, or a later one to be released (Churchill 1919). Absence of egg remnants, on the other hand, is not proof that the crab has not spawned. Although remnants are most numerous immediately after the hatch, most are soon lost except for an occasional case at the bases of swimmeret hairs. However, proof can be obtained from a parasitic worm, the nemertean Carcinonemertes, whose spawning is intimately dependent on the crab laying eggs. The presence of only small worms on crab gills is evidence that the crab had not spawned; adult-sized worms are evidence of spawning. (Humes 1942; Hopkins 1947).

EGGS AND YOUNG

The number of eggs in a sponge ranges from 700,000 to over 2,000,000 (Churchill 1919; Robertson 1938; Truitt 1939). Many of the eggs do not hatch, and still fewer larvae and very small crabs live to become adults. On the average only one ten-thousandth of one percent (0.000001) of the eggs survive to become mature crabs. Eggs may be killed by a fungus, may be eaten by small worms, suffocate in stagnant or slow-moving water, or die from temperatures too high or too low (Couch 1942; Humes 1942; Rogers-Talbert 1948).

After hatching the young crab passes through two larval stages, zoea and megalops, before it takes the form of a crab. The zoea looks like a shrimp and bears a heavily-spiked hood, while the megalops looks like a miniature toad that still retains its tadpole tail (figs. 4 and 5). The zoeal form lasts about a month, during which it molts at least four times, growing from $\frac{1}{100}$ to about $\frac{1}{25}$ of an inch in width

(Churchill 1919, 1942; Hopkins 1943, 1944; Sandoz and Rogers 1944). It has been impossible to rear larvae in the laboratory past the third instar, but some zoea identical with the third, except for larger size and better developed appendages, have been tentatively identified as "fourth zoea." These have been found among the numerous, minute organisms found in surface water near the mouth of the Bay. It has been suggested that there may also be a "fifth zoea" (Hopkins 1944), and perhaps a sixth intermediate form, a meta-zoea, preceding the megalops stage (Snodgrass 1956).

When the water has a very low salinity, larvae hatch prematurely and die in a prezoetal stage. Those that hatch normally at average or high salinities may be eaten by jellyfishes, comb-jellies, fishes, and many other enemies. Survival should be best in the southern part of Chesapeake Bay because salinity, temperature, and food conditions there compare well with optimum conditions determined for hatching and growth in the laboratory (Sandoz and Rogers 1944). The greatest concentrations of zoeae are found in the channel region between Cape Charles and Cape Henry and diminishing numbers both up-Bay and seaward. Almost no zoeae have been found up-Bay above the Virginia-Maryland line (Truitt 1934, 1939; Churchill 1942; Graham and Beaven 1942; Sandoz and Rogers 1944). Thus the horizontal distribution of zoeae is consistent with experimental evidence that salinity has an influence on success of hatching. An attraction to light may also have survival value. Concentration of zoeae in the upper levels in open waters is consistent with experimental evidence that zoeae reared in darkness do not molt (Sandoz and Rogers 1944).

Following the fourth (or fifth) molt is the megalops stage. Many of the larvae that hatch in early June reach this stage by mid-July or the first of August.

Little is known of the conditions that are most favorable for survival and development of megalops. A few have been caught in the southern part of the Bay and on the ocean coast, on the bottom in 20- to 40-foot depths, near the surface in open water, but none at intermediate levels (Truitt 1934; Robertson 1938; Goellner 1941; Churchill 1942). It is attracted to light, but settles to the bottom when swimming

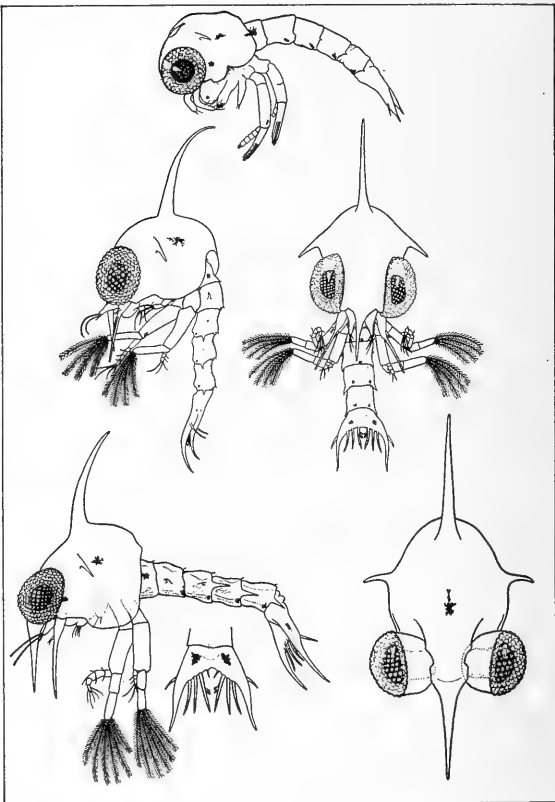


FIG. 4 - PREZOEAL, FIRST ZOEAL, AND SECOND ZOEAL OF THE BLUE CRAB. FROM CHURCHILL 1942.

ceases (Robertson 1938; Van Engel, personal observation). Occasionally in late August or early September large numbers of megalops appear along the ocean front at Virginia Beach, biting swimmers with their minute pinching claws and giving rise to numerous complaints of "water fleas" (Truitt 1939). No explanation has been offered for these concentrations of megalops in breaking waves.



FIG. 5 - MEGALOPS OF THE BLUE CRAB.

The megalops stage lasts only a few days. When it molts the "first crab" appears, with the typical body shape of an adult crab.

Migration of large numbers of adult females past the Capes to the ocean, and subsequent appearance of megalops along the ocean beaches, suggest that a substantial amount of spawning may occur outside the Bay. As yet, no estimate of the importance of this ocean spawning in providing crabs to the Chesapeake Bay supply has been possible.

Early in August, when many crabs reach the "first crab" stage, one-tenth of an inch wide, they begin migrating from the southern part of the Bay and

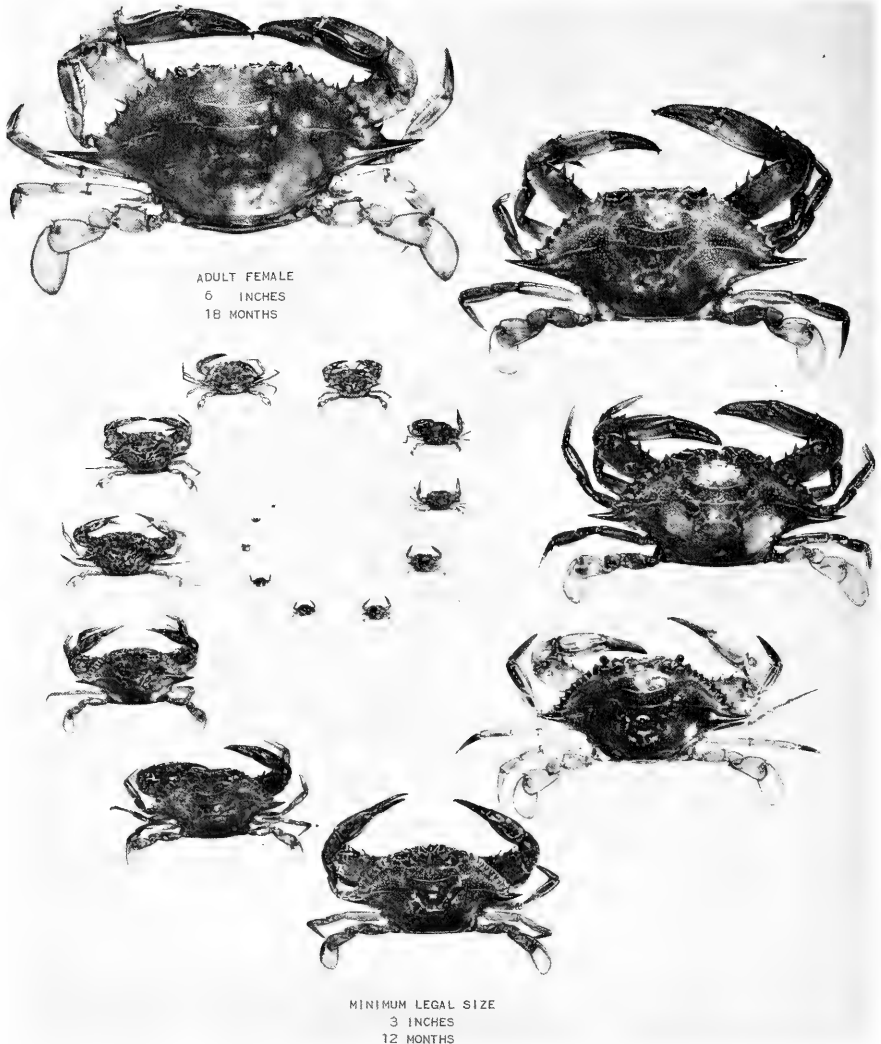
the ocean adjacent to the Capes into the rivers and to the upper Bay. The first wave of migration reaches the rivers on the western shore of Virginia about the third week of August, and crabs one-quarter to one-half inch in width are commonly seen during September and October. In most years small crabs do not migrate farther north than the mouth of the Potomac River before cold weather begins, and most of them remain in Virginia waters over winter. Movement up-Bay is resumed the following spring. Crabs one-half to one inch in width usually are first seen in the upper Bay in late April or May the year following the hatch (Hay 1905; Truitt 1934, 1939).

GROWTH

Growth is rapid and adult size may be reached one year to a year and a half after hatching (fig. 6). Those hatched early, in late May, become two and one-half inches wide by November and five-inch adults or larger by August the following year. Those that hatch in late August or September may reach only one-half inch in width the first fall. By November the next year these will have become only three or four inches wide and will not become adult until May of the third summer. After reaching adult size, crabs are known to live at least one more year, and a few may reach the maximum age of three to three and one-half years. The average life-span, however, probably is less than one year (Hay 1905; Churchill 1919; Truitt 1939; Van Engel and Wojcik unpublished data).

Because the crab is covered by a hard, inflexible shell, an increase in size occurs only when it sheds. Small crabs shed frequently, but the time between molts increases as crabs grow larger. The smallest crabs, about one-fifth inch wide, shed every 3 to 5 days, those one-half to one inch wide every 10 to 15 days. At four inches and larger shedding occurs at intervals of 20 to 50 days (Churchill 1919; Robertson 1938; Van Engel, Wojcik and Sandoz, unpublished data). Shedding does not usually occur in Chesapeake Bay from November through the first week in April, although on rare occasions a soft crab has been caught in deep water in December.

In preparation for shedding, a new shell is formed beneath the hard, outer shell, becoming darker in color as it develops and visible through several parts of the outer shell, especially in the last two sections of the fifth pair of legs, the swimming



paddles. Around the outer edges of those sections are many fine hairs, called setae, at the base of which there is a thin, dark brown line which represents the outer edge of the hard shell. It is just inside this brown line that the color of the new shell can be observed.

The earliest recognized color stage is the "white-rim," which requires the longest time to shed, from one to two weeks. The following stage, "pink-rim," may be expected to shed in 3 to 6 days, while the "red-sign" peeler will shed in 1 to 3 days. "Peeler" is the name given by most watermen to the red-sign crab, although the term is sometimes loosely applied to all crabs showing color signs of approaching shedding.

To free the developing new skeleton from the old, some carbohydrates and proteins and about five percent of the calcium are resorbed from the base of the old shell. These are stored in the soft tissues of the crab, principally in the hepatopancreas, and may be used for building and later hardening the new shell (Hecht 1914; Scheer 1948, 1957). Muscle attachments on the old shell are loosened and shifted to new origins on the future exoskeleton. Feeding ceases, sometimes a day or two before shedding, probably as a result of weakened muscles and inability to grind food, and in preparation for the eventual loss of the stomach lining at shedding.

When shedding starts, the outer shell cracks along definite lines so that the upper and lower halves of the shell may gape. The cracked-shell stage is called a "buster." Once this stage is reached, the crab slowly backs out of the partially-opened shell; shedding of 4- to 5-inch crabs is completed within 2 or 3 hours. When completely free from the old shell, the crab is called a "soft crab." During the few minutes preceding and immediately following shedding large amounts of water are taken in by the crab. Absorption of water occurs through permeable membranes, in many crustaceans the gills, and in some the stomach (Robertson 1957). Expansion to full size, when all wrinkles in the new skin are smoothed, is completed about two hours after shedding and the soft, pliable covering then begins to harden. Over the next 9 to 12 hours the shell has a papery or leathery texture and the crab then is called a "paper shell." During the next 12 to 24 hours the shell becomes stiff and brittle, and the crab is referred to as a "buckram." More and more frequently, "paper shell" and "buckram" are being used as synonyms for the stage between soft and hard crab, with less attention being given to whether the shell is leathery or stiff and brittle. Another three days will pass before the shell is rigid. Since the interval of time between molts is less for small than for large crabs, time intervals between various peeler and hardening stages are much shorter than those given above. In the post-molt period, the shell thickens and hardens with the addition of new layers and deposition of calcium and some organic substances. About 95 percent of the minerals are absorbed directly from the water or derived from food (Hecht 1914; Scheer 1948; 1957).

At each normal shedding, there is an increase in width one-quarter to one-third the initial size (Churchill 1919; Gray and Newcombe 1939; Van Engel, Wojcik, and Sandoz, unpublished data). Amount of increase may be genetically controlled in part, but it is believed that environmental conditions have an equal if not greater influence. Unfavorable water conditions, inadequate food, and injuries, such as the loss of one or more legs, result in smaller percentage increases, as low as 5 to 10 percent and possibly even no increase in size. In normal soft crabs, an increase in size is due to swelling of the body by absorption of water. Since the amount of water absorbed is related to the salt content of the surrounding water, greater increases in size should occur in water of low salt content (Baumberger and Olmstead 1928; Scheer 1948; Knowles and Carlisle 1956). That this is probable is demonstrated by the large size of crabs in tributaries of low salt content and the small size of crabs along the salty ocean coast of the Eastern Shore (Newcombe 1945; Henry 1951; Porter 1955). It has been shown that the eyestalks of certain crabs produce a water-regulating hormone (Knowles and Carlisle 1956).

It is possible that the number of molts is fixed and that a crab stops growing after shedding a certain number of times. Thus, the great difference in size of crabs of the same age, or of adult crabs, may be simply the result of different percentage increases in size at each molt.

Recent studies on other crustaceans show that the eyestalks and the second maxillae produce hormones which either prevent or encourage molting (Kleinholz 1957). The quantities of these chemical substances are partly controlled by temperature, light, and by other hormones (Knowles and Carlisle 1956). The failure of blue crab larvae to molt when reared in darkness (Sandoz and Rogers 1944) may be an example of hormonal regulation. Molting may also be controlled by hormonal secretions from the ovary, which develops rapidly following the last molt, or from the eggs after they are laid (Donahue 1955).

Definitions of Blue Crab Terms	
1. Abdomen or apron--the "tail" of a crab.	21. Orange crab--sponge crab.
2. Ballie--sponge crab, a female with an egg mass beneath the abdomen.	22. Paper-shell crab--having a hard shell which is easily cracked, following the buckram stage.
3. Berried crab or crab in berry--sponge crab.	23. Peeler crab--hard crab which has a fully formed soft shell beneath the hard outer shell; a red-sign crab. Sometimes applied to white-rim, pink-rim, and red-sign crabs.
4. Buck and rider--pair of mating crabs; a doubler.	24. Pink-rim--following the white-rim condition; there is a thin pink line along the inner border of the back fin; may be expected to shed within a week.
5. Buckram crab--having a pliable, leathery shell, following the soft crab condition.	25. Punk--sponge crab.
6. Buffalo crab--soft crab with large claws missing, often lost in shedding.	26. Rank peeler--red-sign peeler just before the shell begins to crack; almost a buster.
7. Busted sook--sponge crab.	27. Red-sign peeler--following the pink-rim stage; there is a thin red line along the inner border of the backfin; may be expected to shed within two days.
8. Buster--shedding crab which is beginning to emerge from its shell.	28. Sally crab--young female crab; an immature female.
9. Channeler or chandler--large male that remains in the deeper channels of a river during the summer; jimmy crab.	29. "Seconds"--crabs that have just turned from a white-rim to a pink-rim condition.
10. Cushion crab--sponge crab.	30. Shed--meaning either the empty shell or the casting off of the shell.
11. Doubler--pair of mating crabs; buck and rider.	31. Snot crab--white-rim crab named because of the watery substance which issues from the break of the crab claws when they are nicked.
12. Fat crab, green crab, or snot crab--these terms are used by most watermen in referring to a crab approaching the shedding period and showing a white-rim color sign just within the margins of the two outer segments of the swimming legs; the terms are more popularly used in referring to any hard crab with firm meat, somewhere between the buckram and peeler phases.	32. Soft crab--crab which has just emerged from the old shell and has a new, soft, pliable shell.
13. Green crab--white-rim crab.	33. Sook--an adult female crab.
14. Hard crab--crab having a hard shell, following the buckram condition.	34. Sponge crab, ballie, berried crab, crab in berry, busted sook, cushion crab, orange crab, punk, and lemon crab--names given to the female carrying an egg mass on the abdomen.
15. Jimmy crab, jimmy dick, or jimmy channeler--a very large male crab; channeler.	35. Swimmerets--the finlike attachments to the underside of an adult female crab, on which the eggs are carried until they hatch.
16. Lemon crab--sponge crab.	36. White-rim crab--the fat, green, or snot crab condition; there is a thin white line along the inner border of the back fin; may be expected to shed within two weeks.
17. Life history stages--there are four main stages: the egg, zoea, megalops, and crab. The zoeal and megalopal stages combined are called larval stages, while the crab stage is a post-larval stage.	37. "Ticky" crab--one that smells of iodoform, probably because it had eaten a marine bottom animal called <i>Balanoglossus</i> .
18. Megalops--crab larva, between the zoeal and crab stages; about $\frac{3}{8}$ th of an inch wide.	38. Zoea--the larva that hatches from the crab egg; about $\frac{1}{8}$ th of an inch long.
19. Metazoea--larval stage thought to occur between the fifth zoea and megalops stages; should have well developed thoracic appendages.	
20. Nicking a crab--to break the movable fingers of the claws to prevent the use of the claws as pincers.	

Females in the family of swimming crabs (Portunidae), of which the blue crab is a member, may be the only crustaceans known to complete their growth in size at the time they become sexually mature. Males in this family and both sexes of many other crustaceans continue to molt and grow after the gonads are fully developed.

The female blue crab becomes sexually mature and stops growing after 18 to 20 molts, not counting the 4 (or 5) molts in the larval stage (Van Engel, unpublished data). As stated previously, this event is accompanied by a change in shape of the abdomen, from triangular to semicircular. Internally, however, few abrupt changes occur, since the growth of tissues is gradual throughout the life of the female (Cronin, 1942); the seminal receptacles grow to full size in the interval between the last two molts; the ovary expands to full size after the last molt (Van Engel, unpublished data).

Sexual maturity in males is probably reached in about 18 or 19 molts following the last larval stage, but growth does not cease, for they may shed 3 or 4 more times. One male reared from the megalops stage reached six and one-half inches in width after 23 post-larval molts, after almost 3 years of confinement in laboratory aquaria (Van Engel, unpublished data).

MIGRATIONS

Two major migrations of sooks have been observed along the western shore of Chesapeake Bay, the first in October and November, following the peak of the mating season, and the second the following May. The fall migrations results in a concentration of sooks in the lower Bay in the deep channels which are the continuations of the river channels. Large schools occasionally have been seen passing through the Capes into the ocean, where they have been taken by crab dredges and fish trawlers close to shore in depths less than 40 feet, but rarely in deeper waters farther offshore (Truitt 1934).

Schools of adult females migrating down river in May consist in part of females recently mated, but mostly of those that mated late the previous fall and were forced by low temperatures to over-winter en route to the lower Bay. Large concentrations of these migrants are caught in May near the mouths of the rivers of the western shore.

Some schools are especially noticed because the crabs are unusually large, and because often many are heavily fouled with ribbed mussels (Hay 1905; Van Engel, unpublished data).

Apart from the migration of sooks each fall and spring toward the southern end of the Bay prior to first spawning, schools of "sea-run" or "ocean" crabs appear in late July or early August in the Lynnhaven Roads area. Familiar to commercial fishermen along the southern shore of the Bay, these schools of old-looking, moss-covered, barnacle-encrusted females crowd close to the beaches, where they remain from one to four weeks (Newcombe 1945). Large concentrations occasionally migrate into the James River, where, as in the summer of 1954, they may add substantially to the commercial catch. These crabs usually are sighted first in the ocean as they move north toward the Capes. The growth of fouling organisms on their shells is in marked contrast to the brilliant blue and white colors of down-river migrants. On rare occasions, following strong northerly winds, the remains of many thousands of dead "ocean" crabs litter the beaches (Hay 1905; Truitt 1939; Newcombe 1945).

Crab dredgers report that in winter in the vicinity of Cape Henry crabs are often of strong odor, have shells deeply pitted, and produce a very small quantity of very inferior meat, and catches of this kind are quickly dumped overboard. These crabs may be the remnants of "ocean" schools (Truitt 1939). Those with a strong odor are called "ticky" crabs, possibly because the odor is similar to iodoform which in turn is similar to the odor of bed bugs (bed ticks).

When females migrate down-river to the lower Bay, adult males remain in brackish river waters and many move farther upstream, mating with other females. In the first 20 to 25 miles upstream from the mouth of the York River the sexes are about equal in numbers, but the percentage of males increases gradually with distance upstream (Wojcik, unpublished data). This distribution is probably dependent on the salinity gradient and may vary seasonally and between rivers.

FOOD

The diet of blue crabs includes fresh and decaying fish or meat, as well as vegetation. Roots, shoots, and leaves of common seaweeds are regularly eaten, especially parts of eelgrass (*Zostera*), ditch grass (*Ruppia*), sea lettuce (*Ulva*), and salt-marsh grass (*Spartina*)--Truitt 1939. Destruction of young quahogs (*Venus*) and seed oysters (*Crassostrea*) in experimental ponds and tanks has been frequently reported (Lunz 1947; Loosanoff and Chestnut 1948; Carriker 1951; Carver 1957). On clam and oyster grounds in open waters, however, the blue crab cannot be considered a serious pest, although transplants of young sets may be destroyed

when other food is less available (Loosanoff and Chestnut 1948; Menzel and Hopkins 1956).

Because its diet is varied, the blue crab is attracted to almost any bait; tough trash fish or slaughterhouse trimmings are preferred for trotlines, but oily fish are preferred for crab pots.

The food requirements of larval crabs are not well known. Zoeae will eat many microscopic plants and animals but will not grow unless fed certain protozoans, the yellow dinoflagellates (Robertson 1938; Sandoz and Rogers 1944). The megalops is omnivorous, however, and may be fed bits of fresh fish or shellfish or green aquatic plants.

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NEW BEDFORD SCALLOP FISHING FLEET

There are about 70 or 80 boats of the New Bedford fishing fleet rigged for sea scalloping. They range from 60 to 100 feet long and are powered by Diesel engines up to 550 horsepower. All are equipped with depthfinders, Loran navigating sets, and ship-to-shore radiotelephones. Almost all of them are fairly new and extremely seaworthy craft. A winter gale on Georges Bank will soon seek out the weaknesses of any vessel. Construction and deck arrangement is very similar to the usual medium-size New England dragger. Many of the boats change over from trawling to scalloping and back again to accommodate themselves to changing fishing and marketing conditions. Any well-found dragger can rig up for sea scalloping by removing the nets and otter boards and taking aboard the shucking boxes, wash tank, and the booms necessary for handling the dredges. The same double-drum fishing winch, wire rope, and forward gallews frames are used.

--Fishery Leaflet 442,
Sea Scallop Boats and Gear (August 1957).



FROZEN PACKAGED HALIBUT VOLUNTARY STANDARDS DISCUSSED AT MEETING

A public meeting to discuss the first proposed draft for voluntary standards for frozen packaged halibut was held on April 1, 1958, at the Bureau of Commercial Fisheries Technological Laboratory, Seattle, Wash.

In attendance were 10 representatives of the fishery industry, a representative of the National Fisheries Institute, and technical personnel of the Seattle Technological Laboratory. All halibut producers, processors, and related members of industry were invited by an advance notice which appeared in the Bureau of Commercial Fisheries Market News Service "Fishery Products Reports."

Local industry displayed a positive, helpful, and interested approach toward the development of a realistic and meaningful standard by their numerous questions, discussions, and critical evaluation of each of the various quality factors considered. The proposed standard for determination of grade is based on (1) the evaluation of quality factors rated by score points in the frozen, thawed, and cooked states and (2) the evaluation of the quality factors of flavor and odor in the cooked state, but not rated by score points; the dual results thus obtained fix the maximum grade limit that the product can achieve.

Copies of the latest draft are available upon request from the Bureau of Commercial Fisheries Technological Laboratory, Seattle, Wash.

Funds made available by Public Law 466 (83rd Congress), commonly referred to as the Saltonstall-Kennedy Act, have been used to expedite progress on the Bureau's program for the development of voluntary Federal standards. The National Fisheries Institute, acting as a contract research agency for the Bureau, has supplied the industry liaison essential to the standards program and has furnished consulting services at meetings and conferences on these standards.



PROGRESS IN FISH-OIL RESEARCH

In the past, the bulk of the fish oil produced by the United States fisheries went into the manufacture of paint and soap. With the development and use of synthetic substitutes for oil in these products, the major part of American-produced fish oil is exported to Europe, where it is made into margarine. Should unanticipated developments upset or eliminate this market, new uses would have to be found for fish oils, or they would undergo a drastic reduction in price. The present research program of the U. S. Bureau of Commercial Fisheries is aimed at developing uses for fish oil that could replace the European margarine market, should this become necessary.

The characteristics and the potential uses of fish oils long have been subjects of great interest to research workers in the Bureau. The unique composition and structure of fish oils, consisting of long-chain fatty acids with many double bonds, present a challenge to the oil chemist and to the food technologist. Most uses for which fish oils are employed at present make no use of these properties. In many cases, the characteristics of fish oils even are considered a distinct disadvantage.

Instead of trying to overcome the alleged disadvantages of fish oils in order to make them competitive with animal and vegetable oils, Bureau chemists decided to take advantage of these unique properties and to investigate their potential for the manufacture of industrial and pharmaceutical products. Development of these products requires an extensive research program.

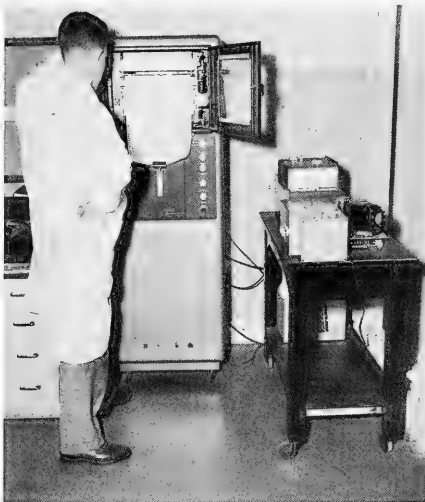
Less is known about the chemical structure of fish oils than is known about the structure of animal or vegetable oils. The reasons for this are (1) the complex nature and instability of fish oils and (2) lack of funds to pursue the investigation.

In 1955, with the availability of more adequate funds from the Saltonstall-Kennedy Act of 1954, the U. S. Bureau of Commercial Fisheries was able to expand this research. Since that time, 21 projects in 16 different laboratories have been undertaken. Twelve of these projects essentially are basic investigations of the structure and reactions of fish oils, whereas the other nine projects are designed to develop practical uses for fish oils and for the compounds manufactured from them.

The basic research projects are varied. They include analyses of (1) the composition, structure, and chemical reactions of fish-oil fatty acids, (2) the composition of the fish-oil components other than fatty acids, and (3) the physiological effect on animals of ingesting fish oils or their components. The fundamental information developed from these investigations forms the foundation for an intelligent applied research program.

The applied research projects also are varied. They include investigations of the value of fish oils or their derivatives (1) in poultry and swine feed, (2) as fungicides and insecticides in agriculture, (3) as a basic ingredient in the manufacture of resins, (4) as leather lubricants, and (5) as ore-flotation agents. Work also is being done on improving methods of processing fish oils.

During the relatively short period since 1955 when the stepped-up research program on fish oils got under way, a number of papers have been written. In addition to those that are in the process of being prepared, 32 papers either have been published, or are in press.



RUNNING A SPECTROGRAM ON A FRACTION OF ALKALI-ISOMERIZED LONG-CHAIN FATTY ALCOHOLS FROM FISH OIL.



REPORT ON DEVELOPMENT OF FUNGICIDES FROM FISH OIL

This investigation has been under the supervision of Dr. Boris Sokoloff, Director of the Southern Bio-Research Laboratory, assisted by I. Chamelin, Akira Kato, George Renninger, and Maxwell S. Simpson.

The object of the investigation was to modify whole crude fish oil in relatively simple ways, without purification or separation of active ingredients, so as to increase the anti-fungal activity of the oil to an effective level.

Simple laboratory screening tests for fungicidal activity were developed using cultures of various fungi isolated from citrus trees and fruit. At later stages, pure cultures of a selected group of fungi and bacteria of pathological significance were used for the screening tests to provide a wider spectrum for determining general antibiotic activity. In this manner more than 170 fish-oil preparations were tested, and the more active compounds were also used in limited tests on citrus seedlings to determine whether they caused detrimental effects on foliage.

Ideally a compound costing less than 25 cents a pound was desired which was stable, water-soluble, nontoxic, and biologically active at 0.1 percent concentration. Various combinations were tried of saponification, chlorination, and sulfation of the crude fish oils, with addition of chemicals such as ammonia, formalin, several metallic hydrides, and metal ions to the process.

As indicated, none of these preparations or mixtures was purified to the extent that identification of the individual chemical compounds was possible. Because of the complexity of the fatty-acid mixture in the crude fish oils, this step would have been too expensive and time consuming to consider with the funds granted for the investigation. The contractor was successful in materially increasing the fungicidal and fungistatic properties of fish oils as evidenced in laboratory screening tests. However, it was found in the course of testing on citrus seedlings that none of the compounds was satisfactory enough to justify pilot-plant scale preparations and more extensive field tests. Most of the active fish-oil compounds were not water soluble or proved to have toxic effects on the plants, and the emulsified preparations were unstable and had poor distribution and penetration due to their oily nature. The water-soluble compounds unfortunately were usually low in antifungal activity.

One preparation--essentially a crude fish oil treated with ammonium hydroxide in acetone, saponified with sodium hydroxide, and then mixed with a small amount of potassium borohydride--was judged to be fairly satisfactory. The unknown chemical composition of this preparation and the probable difficulty in adapting the laboratory procedure to pilot-plant processing led to the decision to terminate the work at this stage.

However, the officials of the U. S. Food and Drug Administration have emphasized the hazards of toxic residues from insecticides and fungicides on fruits and vegetables. Most of the newer organic pest control chemicals are highly toxic and very low tolerances have been set, or in some cases no residue is permissible. Fish-oil compounds on the other hand are essentially nontoxic to humans. It is the opinion of the contractor that this fact will eventually counterbalance the relatively high cost and low activity of fish-oil derivatives, and that these may yet be developed to compete with the new synthetic compounds for insect and fungi control, especially for leafy vegetables and mature fruit.

--BY CHARLES F. LEE, CHEMICAL ENGINEER,
FISHERY TECHNOLOGICAL LABORATORY,
DIVISION OF INDUSTRIAL RESEARCH AND SERVICES,
U. S. BUREAU OF COMMERCIAL FISHERIES,
COLLEGE PARK, MD.



TECHNICAL NOTE NO. 44 - INDUSTRY TESTS SHOW BRINE-FROZEN HADDOCK TO BE OF GOOD QUALITY

Practical commercial tests now in progress show that whole and eviscerated haddock, brine-frozen at sea and kept in frozen storage for 8 months, produced good-quality marketable frozen fillets. This test is being further continued to see if the frozen fish can be held even longer in cold storage and still produce high-quality fillets.

The East Boston Technological laboratory of the U. S. Bureau of Commercial Fisheries initiated this commercial-scale test in July 1957, to stimulate further interest in freezing fish at sea among vessel operators and shore-plant processors. The test is designed to acquaint the industry with the commercial-handling of fish

frozen at sea. This test will also provide additional information on the length of time the whole and eviscerated fish can be held in frozen storage, at a high level of quality, prior to being processed into fillets. The latter point is of major importance in the practical commercial application of the freezing-fish-at-sea process.



VIEW OF THE BOSTON FISH PIER.

In July 1957, the Bureau's experimental trawler Delaware returned to the Boston Fish Pier with 54,000 pounds of round and eviscerated haddock that were brine-frozen at sea. The fish were glazed with fresh water during unloading and put directly into a cold-storage warehouse. Nineteen dealers in the Boston area, who indicated a desire to take part in these tests,

have been removing large lots of these fish from storage at bimonthly intervals. The fish are being thawed and filleted and the fillets packaged, refrozen, and marketed in the customary manner.

A total of 36,000 pounds of the brine-frozen fish have been handled in this manner since the beginning of this study. Oral and written accounts of the observations made by the processors show that fillets prepared from brine-frozen haddock stored at 0° F. for 8 months, while slightly darker in color than fillets prepared from iced fish, are still of good quality. Examinations conducted at the Laboratory on similar samples of fish apparently substantiate these observations. The color of the brine-frozen haddock fillets, which is associated with the freezing process, was not considered to be objectionable in marketing these fillets in the frozen fish trade.

--BY JOSEPH W. SLAVIN, REFRIGERATION ENGINEER,
FISHERY TECHNOLOGICAL LABORATORY,
DIVISION OF INDUSTRIAL RESEARCH AND SERVICES,
U. S. BUREAU OF COMMERCIAL FISHERIES,
EAST BOSTON, MASS.





TRENDS AND DEVELOPMENTS

California

ANCHOVY AND MACKEREL FISHERIES EXPERIENCE POOREST SEASON IN MANY YEARS: The California anchovy and mackerel fisheries are experiencing their poorest season in many years. While 1957 was an excellent year, it was unusual also to the extent that it was the best year for mackerel fishing in several years.

Table 1 - California's Anchovy and Mackerel Landings, January-May 7--1958 and 1957, and Tonnage and Ex-Vessel Value Loss in 1958 through May 7

Species	Landings January 1-May 7		Loss in 1958 through May 7 when Compared with the Same Period in 1957	
	1958	1957	Quantity	Ex-vessel Value
	... (Tons) ...		Tons	\$1,000
Anchovy	1,091	10,450	9,359	234
Jack mackerel	1,326	19,444	18,118	770
Pacific mackerel	3,111	4,577	3,251	138
Total	5,528	34,471	30,728	1,142

A comparison of the landings of anchovies and mackerel for January 1 through May 7 this year with the same period in 1957 reveals that this year those fisheries are operating at a very low level.

Table 1 shows the amount of tonnage loss, but when transposed to dollars the figures are even more staggering.

In the San Pedro-Long Beach area there are approximately 100 vessels engaged in the two fisheries at present, which means the average loss per vessel is about \$11,423, which breaks down to somewhere between \$700-900 per crew member depending on the size of the vessel.

The packers also are greatly affected by this shortage, as they are faced with the loss of foreign markets which have been developed over the years. Anchovies are especially hard hit since the foreign markets for canned anchovies are relatively new. Canned anchovies did not gain ready acceptance, and were just at the point of becoming a real factor in the Far East markets, when they disappeared. Both canned anchovies and mackerel are in heavier demand than usual, due to the sardine shortage this past season in California, but cannery are not able to take advantage of the situation due to the shortage. In fact cannery will probably lose many of the advances made during the last year in consumer acceptance of canned anchovies unless enough are packed to keep them on the shelf.

The effect on fishermen has been exceptionally severe, as during the first quarter of the year no other species is available that can be substituted for anchovies and mackerel. In the latter part of May local bluefin tuna show up off Southern California, and the San Pedro fishermen receive some income from bluefin, but without mackerel and anchovies the normal earnings are upset. Therefore, this probably will be a poor year for the San Pedro-Long Beach purse-seine vessels.

--A. D. SOKOLICH, MARKET NEWS REPORTER
BRANCH OF MARKET NEWS, BUREAU OF
COMMERCIAL FISHERIES, SAN PEDRO, CALIF.

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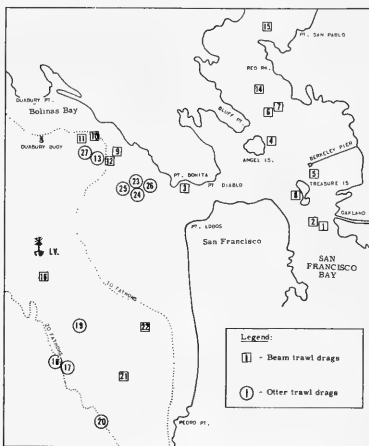
DUNGENESS CRAB--YEAR-CLASSES SURVEYED AND OTTER TRAWL AND BEAM TRAWL TESTED FOR SAMPLING (M/V *Nautilus* Cruise 58-N-1-Crab); The January 10-January 24, 1958, cruise of the California Department of Fish and Game's small research vessel *Nautilus* was made in San Francisco Bay and in the ocean area from Pedro Point to Bolinas Bay to continue studies being made on the dungeness crab (*Cancer magister*). During the cruise, 27 tows with the 10-foot shrimp-mesh beam trawl and the 12-foot shrimp-mesh otter trawl yielded a catch of 33 male and 113 female dungeness crabs. The trip was planned to (1) determine the year-classes of the Dungeness crab (market crab) present in San Francisco Bay and in the ocean from Pedro Point to Bolinas Bay; (2) determine the size of the "crabs-of-the-year" in these two areas; (3) determine the expediency of using the 12-foot shrimp-mesh otter trawl compared to the 10-foot shrimp-mesh beam trawl in crab sampling.

The gear used was shrimp experimental gear consisting of a 10-foot beam trawl with a net of 1-inch mesh. This net was fished with floats on the anterior portion of the mouth. The lead line had just enough weight to keep it on the bottom. The otter trawl was a 12-foot wide net of 1½-inch mesh. The doors were 4 by 5 feet and weighed approximately 80 pounds each.

The size of the crabs was recorded. This is the shoulder width, i. e. a caliper measurement just anterior to the most lateral spines. Preliminary inspection of the size frequency record of male crabs was made for groupings reflecting the age classes. This inspection was made with consideration of data from previous cruises. There were 4 and possibly 5 year-classes present. The fifth year-class appears as crabs over 190 millimeters in width; the fourth from 160 to 190 millimeters; the third from 130 to 160 millimeters; the second from 90 to 130 millimeters; and the first from 28 to 60 millimeters. The youngest crabs were very nearly one year old. Crabs in the first two years of life molt more than once per year, hence the gaps in the size distribution. This year-class breakdown was made for males only because a different growth ratio for females has been observed in other studies.

The sample of the first year-class (or crabs-of-the-year) numbered 28. These crabs were taken at stations 5 and 14 in San Francisco Bay and at stations 25 and 26 in the ocean (see chart). The crabs taken in the bay had an average size larger than those taken outside.

Dungeness crabs of the same size range were taken by the beam trawl and the otter trawl. Thirty crabs were taken by the otter trawl and 116 crabs by the beam trawl. There was an average of 11.6 crabs per tow of the beam trawl and 10 crabs of the otter trawl. Over-all, 11.2 crabs were taken per tow. These figures were computed from the tows that contained crabs. Fourteen tows did not contain crabs. There was no difference in the selectivity of the two nets for different size crabs. Both nets are useful in collecting crab samples. The beam trawl is easier to handle with the manpower and gear on the *Nautilus*, a 50-foot research vessel.



M/V NAUTILUS CRUISE 58-N-1 (JANUARY 10-24, 1958).

LOSS OF SPAWNING BEDS BELIEVED MAJOR FACTOR IN DECLINE OF KING SALMON: One of the major reasons for the decline in California's king salmon resource is loss of spawning beds, the March 1958 issue of the Department of Fish and Game's Outdoor California reports. At one time in the early history of the State over 6,000 miles of spawning streams were available to the king salmon in the Central Valley area. By 1928 the spawning streams had shrunk to 520 miles and at present consist of only about 300 miles. Dams which have cut off and flooded former spawning beds have accounted for most of this loss of spawning areas. This damage to the spawning streams of the Central Valley started with first miners who panned for gold in the Sierra foothills and it continues at present throughout the salmon and steelhead trout waters of the State.

A major factor on the north coast streams has been careless logging, which has destroyed or impaired about 1,000 more miles of spawning area.

Salmon have an instinctive urge to return to their home stream. If they find it blocked or otherwise unsuitable when they come in from the sea, most of them will not seek out a substitute stream or spawning bed but will batter themselves to death or languish at the point of their frustration, dying without fulfilling their mission to replenish the stock.

As the Department of Fish and Game sees it, the other factors responsible for today's plight of the salmon (not in order of importance) are:

- (1) Watershed damage, caused by mining, grazing, logging, agriculture, and forest fires.
- (2) Damage to spawning streams, caused by mining, logging, flood control projects, gravel extraction, and highway construction.
- (3) Changes in water flow below dams, including actual drying of stream, temperature increase and manipulation of releases, stranding spawning nests and fish.
- (4) Water diversions for power, industrial processing, irrigation, domestic use, duck clubs, etc., which cause reduction or elimination of stream flow.
- (5) Pollution, which causes loss of fish and fish food and creates blocks to migration.
- (6) Poorly planned and executed artificial propagation in early days.
- (7) Predation and competition, including introduced species and changed conditions that favor predators.
- (8) Increased fishing pressure, sport and commercial, both in California and in the migration area to the north, coupled with increased fishing mortality of small fish and genetic downbreeding by selective fishing.

* * * * *

YELLOWFIN AND SKIPJACK TUNA STUDIES OFF WEST COAST OF SOUTH AMERICA (M/V Southern Pacific Cruise 57C5-Tuna): A total of 1,230 yellowfin and skipjack tuna were tagged off the coasts of Mexico, Central America, Peru, and Chile by biologists of the California Department of Fish and Game aboard the commercial tuna clipper Southern Pacific during a 99-day cruise that ended on February 11, 1958. The objectives of the cruise were as follows: (1) To study the population structure of the Eastern Pacific "tunas" by tagging yellowfin and skipjack tuna. (2) To field test two methods of securing the ends of "spaghetti" tags and to test a new dart tag. (3) To make collections of related marine life in baiting and fishing areas. (4) To make limited oceanographic observations.

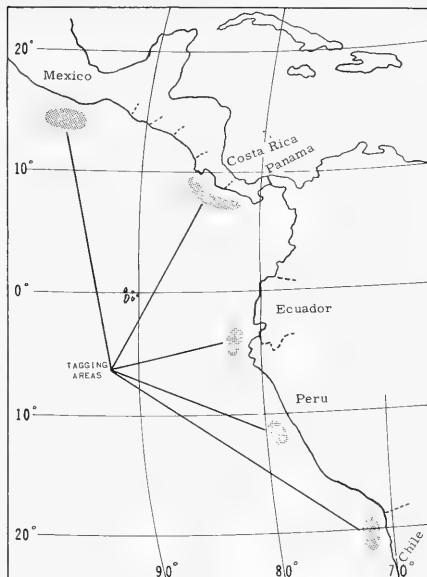
The 1,230 yellowfin and skipjack tuna were tagged with yellow type G (clamp), type G (knot), and dart tags, and released in the following areas: Southern Mexico, 32 yellowfin; Central America, 155 yellowfin and 27 skipjack; Peru Bank, 70 yellowfin and 309 skipjack; North Central Peru, 115 yellowfin and 62 skipjack; Southern Peru, 1 yellowfin and 142 skipjack; Northern Chile, 63 yellowfin and 254 skipjack.

A total of 932 fish were tagged with "spaghetti" tags; 532 of this series were knotted in the standard way, while 400 were reinforced with 40-pound test monofilament nylon cores and the ends secured by means of a small metal clamp. Although the clamp does not increase tagging speed, the nylon core gives a tag of superior strength.

A total of 298 fish were tagged with experimental "spaghetti" dart tags. This tag could be applied faster than conventional "spaghetti" tags. (One of these dart tags was recovered before the completion of the cruise.)

The boat schedule and the areas fished did not permit extensive collecting of marine life. However, live-bait hauls produced 8 collections; night lighting, 16; examination of tuna stomachs, 9; and early morning deck inspections, 2. This material is presently being processed.

Surface water temperatures in the areas fished ranged from 65°-85° F. The 14-fathom bank off Peru showed the greatest variation, 65°-72° F. Other surface temperatures ranged from 71°-81° F.



M/V SOUTHERN PACIFIC CRUISE 57C5-TUNA (NOVEMBER 4, 1957-FEBRUARY 11, 1958).

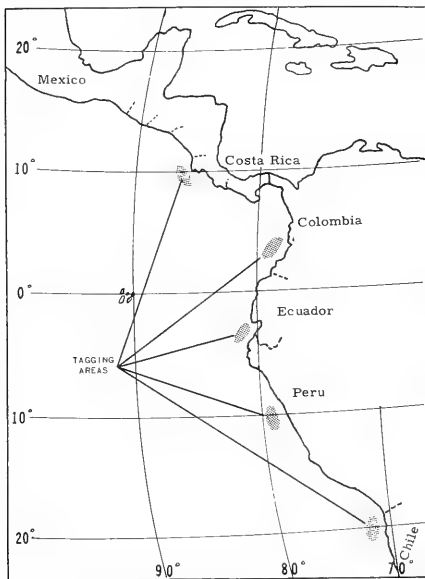
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YELLOWFIN AND SKIPJACK TUNA STUDIES OFF WEST COAST OF SOUTH AMERICA (M/V Ruthie B Cruise 57C6-Tuna): The commercial tuna clipper Ruthie B with two biologists of the California Department of Fish and Game aboard collected biological and oceanographic data on the tunas of the eastern Pacific during an extended cruise lasting from November 12, 1957, to March 15, 1958.

The purpose was to: (1) To study, by tagging techniques, the migrations, ages, rates of growth, and other salient features of the eastern Pacific yellowfin tuna and skipjack populations. (2) Obtain biological and other information concerning "tuna" schooling habits, by sampling the size and species composition of individual schools. (3) Delineate "tuna" spawning areas and seasons by collecting post larvae and juveniles under a night light. (4) Make routine biological and oceanographic observations that may be related to the occurrence of "tuna." (5) Collect marine organisms associated with "tunas" in fishing areas and also on the baiting grounds with important live bait species.

During the cruise, 134 yellowfin and 313 skipjack tuna were tagged and released at the following locations: off Costa Rica, 2 yellowfin; off Colombia, 18 yellowfin and 7 skipjack; off Peru (Peru Bank) 35 yellowfin and 95 skipjack; off Peru (14 Fathom Spot), 72 yellowfin and 92 skipjack; off Northern Chile, 7 yellowfin and 119 skipjack. Two skipjack tagged off Peru (14 Fathom Spot) were recaptured during the cruise and returned to the Terminal Island Laboratory. These two fish were recaptured in the release area after being at liberty for 15 and 22 days, respectively.

It was found that tagging speed could be improved by using plastic coated metal clamps to secure the two ends of the tags, particularly if properly designed pliers were available.



TUNA TAGGING BY COMMERCIAL TUNA CLIPPER RUTHIE B
(CRUISE 57-C-6-TUNA, NOVEMBER 12, 1957-MARCH 10
1958.

These have been processed and individuals saved for future study at the laboratory or sent to other scientific institutions.

Unusually poor fishing was encountered during the cruise. Poor fishing, in general, was experienced by the California tuna fleet operating in these areas.

Six yellowfin and five skipjack tuna were sampled for size and species composition. These data indicate that "pure" schools, those consisting of a single species, tended to school by size. Schools of yellowfin tuna and skipjack mixed, however, sometimes contained several sizes of each. For example, one mixed school was made up of 4.5- and 7.5-pound skipjack plus 7.5- and 15-pound tuna.

Fifty-six bottles of formalin-preserved specimens, primarily obtained from night-light stations, are being identified and processed for "tuna" larvae.

Oceanographic and meteorological observations were made throughout the cruise. There was no obvious relationship found between "tuna" catches and sea surface temperatures or between "tuna" catches and water clarity. Sea surface temperatures on the fishing grounds ranged from 18.0° C. to 29.5° C.

Twenty packages of frozen specimens were obtained from bait net hauls, night-light stations, and by hook and line.



Cans--Shipments for Fishery Products, January-February 1958



Total shipments of metal cans during January-February 1958 amounted to 12,756 short tons of steel (based on the amount of steel consumed in the manufacture of cans) as compared with 13,382 tons in the same month a year ago. Canning of fishery products in January-February this year was confined largely to tuna, jack and Pacific mackerel, anchovies, and Gulf oysters.

NOTE: STATISTICS COVER ALL COMMERCIAL AND CAPTIVE PLANTS KNOWN TO BE PRODUCING METAL CANS. REPORTED IN BASE BOXES OF STEEL CONSUMED IN THE MANUFACTURE OF CANS. THE DATA FOR FISHERY PRODUCTS ARE CONVERTED TO TONS OF STEEL BY USING THE FACTOR: 23.0 BASE BOXES OF STEEL EQUAL ONE SHORT TON OF STEEL.



Federal Purchases of Fishery Products

DEPARTMENT OF DEFENSE PURCHASES, JANUARY-MARCH 1958: Fresh and Frozen Fishery Products: For the use of the Armed Forces under the Department of Defense, 1.7 million pounds (value \$1.0 million) of fresh and frozen fishery

Table 1 - Fresh and Frozen Fishery Products Purchased by Military Subsistence Market Centers, March 1958 with Comparisons

QUANTITY				VALUE			
March		Jan.-Mar.		March		Jan.-Mar.	
1958	1957	1958	1957	1958	1957	1958	1957
(1,000 Lbs.)				(\$1,000)			
2,635	2,715	10,002	9,494	1,274	1,322	5,106	4,855

products were purchased in March by the Military Subsistence Market Centers. This exceeded the quantity purchased in February by 3.9 percent and was 3.5 percent above the amount purchased in the same month a year ago. The value of the purchases this March was higher by 0.7 percent as compared with the previous month and higher by 13.9 percent from March a year ago.

For the first three months of 1958 purchases totaled 5.0 million pounds, valued at \$3.0 million--a decrease of 9.2 percent in quantity, but higher by 3.1 percent in value as compared with the same period of 1957.

Prices paid for fresh and frozen fishery products by the Department of Defense in March 1958 averaged 59.4 cents a pound, about 2.0 cents less than the 61.3 cents paid in February, but 5.4 cents higher than 54.0 cents paid during March a year ago.

Table 2 - Canned Fishery Products Purchased by Military Subsistence Market Centers, March 1958 with Comparisons

Product	QUANTITY				VALUE	
	March		Jan.-Mar.		March	Jan.-Mar.
	1958	1957	1958	1957	1958	1958
(1,000 Lbs.)				(\$1,000)		
Tuna . . .	96	573	412	841	54	218
Salmon . .	546	-	1,241	992	295	673
Sardine . .	3	8	24	19	1	8

Canned Fishery Products: Salmon and tuna were the principal canned fishery products purchased for the use of the Armed Forces during March.

NOTE: ARMED FORCES INSTALLATIONS GENERALLY MAKE SOME LOCAL PURCHASES NOT INCLUDED IN THE DATA GIVEN; ACTUAL TOTAL PURCHASES ARE HIGHER THAN INDICATED, BECAUSE IT IS NOT POSSIBLE TO OBTAIN LOCAL PURCHASES.



Fishery Marketing Specialist Examination GS 7-14

The U. S. Civil Service Commission announced on February 18, 1958 (Announcement No. 147B and Supplement), unassembled examinations for the position of Fishery Marketing Specialists, GS-7 through GS-14. The examination remains open until further notice.

The positions to be filled from this examination are located in the U. S. Fish and Wildlife Service of the Department of the Interior, and other Federal agencies in Washington, D. C., and throughout the United States, its Territories and possessions.

Fishery Marketing Specialists' work relates to fishery production and marketing. The duties involve investigation and market research concerning commercial fisheries or fishery commodities; also perform work relating to Fishery Market News reporting services. Persons appointed to any one of these positions will be required to write articles or reports for publication, radio, or the press.



Announcement No. 147 B
Issued: February 18, 1958
No Closing Date
X-118 Modified

The U. S. Civil Service Commission
announces an examination for

**Agricultural Marketing
Specialist**

**Fishery Marketing
Specialist**

\$4,525 to \$10,320 a year
(Grades GS-7 through GS-14)

**Agricultural Market
Reporter**

\$4,525 to \$6,390 a year
(Grades GS-7 through GS-11)

File applications
as directed on page 5

To qualify for these positions you must have a responsible and successful experience in appropriate marketing specialties and activities. Except for the substitution of education as provided, the amount of experience required for each grade level is as follows: GS-7 (\$4,525) 4 years; GS-9 (\$5,440) 5 years; GS-11 (\$6,390) 6 years; GS-12 (\$7,570) 6 years; GS-13 (\$8,990) 6 years; and GS-14 (\$10,320) 6 years.

To be rated eligible at grades GS-12 through 14, at least 1 year of the experience must have been comparable in difficulty and responsibility to the work of the next lower grade in the Federal service; and for grades GS-7 through 11, at least 1 year must have been comparable in difficulty and responsibility to the work of at least the second lower grade in the Federal service. Positions at the GS-12 through 14 are very few.

The total experience must have been of such scope and character as to demonstrate clearly that you are fully capable of performing the duties of the grade of the position for which you apply.

Undergraduate study satisfactorily completed in an accredited college or university, with specialization in appropriate subjects, may be substituted for experience at the rate of 1 full year of study for 9 months of the required experience, up to a total of 3 years of experience.

You must also show that you are a United States citizen; that you are physically able to do the work involved in the position for which you apply; and that you have reached your 18th birthday on the date of filing application. There is no maximum age limit for this examination.

All persons who attained eligibility under Announcement 6B and have been on the Fishery Marketing Specialist register for one year and have not received appointments may apply for the new examination. Registers to be established under Announcement 14B will supersede those currently in use under Announcement 6B. Those rated during the past year will have eligibilities transferred.

For full information on how to apply for this examination, write to the U. S. Civil Service Commission, Washington 25, D. C., or any of its field offices.



Fish Listed as Essential H-Bomb Survival Item

The Office of Defense Mobilization has listed fish as one of the six major groups of foods classified as "essential survival" items that would be needed to sustain life after a nuclear attack on the United States. It was announced that the list is

being used as a basis for supply-requirement studies, and that it may recommend Governmental stocking of these items in strategic and protected locations. The agency emphasized that many of the items might not be required in the first few days following an attack, but would be necessary during the first few months.



Fish Predators

BOUNTY PAYMENTS OPPOSED: The bounty system has not proved to be the most effective and practical way to control pest species, Assistant Secretary of the Interior Ross L. Leffler said on March 20, 1958, in submitting to Congress a report opposing enactment of Senate bill S. 2719. The purpose of the proposed legislation is to provide for the payment of bounties for the control of certain predators such as hair seals and sea lions in the fisheries of the Pacific coast and Alaska.

The Assistant Secretary stated that the U. S. Fish and Wildlife Service, backed by 40 years of experience, has found that bounties generally serve more as a means of harvesting an annual crop of the pest species being bountied, rather than as an effective measure of control of the predators. Under such a system, predators are taken where the task is easiest and least expensive, and not necessarily where their taking does the most good, he said.

For many years the Alaskan Territorial Legislature has authorized bounties on hair seals along most of the southern coast of Alaska. More recently the bounty has been applied to hair seals in the Bering Sea and part of Norton Sound. Many thousands of dollars have been spent on these bounties, however, without any appreciable benefit to the salmon or other fishery resources.

In preference to paying bounties, the Assistant Secretary declared that direct control measures which provide for the employment of professional hunters and trappers who concentrate their efforts in problem areas are much more effective and less expensive. In the Copper and Stikine River districts, for example, where hair seals prey on the salmon runs and also cause damage to fishing gear, the Alaska Department of Fish and Game has applied direct control measures which are proving to be far more practical than a bounty system.

The U. S. Fish and Wildlife Service is now conducting a vigorous restoration program to rehabilitate the Alaska salmon runs. Studies are being carried on in cooperation with the Fishery Research Institute of the University of Washington to ascertain what effect hair seals, sea lions, and other predators have on the abundance of salmon.

The Pacific halibut fishery is in a very productive condition, according to reports of the International Pacific Halibut Commission, and has yielded maximum catches in recent years. Assistant Secretary Leffler, in his report to the Congress, pointed out that the Commission has never made any attempt to control halibut predators.



Great Lakes Fishery Investigations

SEA LAMPREY LARVAE DESTROYED BY CHEMICAL: About a mile above the point where Michigan's Black Mallard River, Presque Isle County, empties into Lake Huron, a lamprey-killing chemical was fed into the 30-foot wide stream at a beaver dam to study effects on sea lamprey larvae. The treatment started

at 9 a. m. on April 15, and by 2 p. m. dead lampreys, most about four inches long, were beginning to appear downstream.

The river was chosen because of its proximity to the Bureau of Commercial Fisheries Hammond Bay laboratory, where work against the lamprey has been under way for several years. The river was stocked with 500 brook and rainbow trout prior to the test. The chemical later made many of these fish groggy, but apparently did not kill them. A similar test last fall on nearby Elliott's Creek showed the same results.

Officials from a Michigan chemical firm, the Fisheries Research Board of Canada, and the U. S. Fish and Wildlife Service's Bureau of Commercial Fisheries coordinated efforts in this project. The work was aimed at ironing out difficulties in analysis of water samples and in use of the chemical. It was not designed as a full-scale management procedure.

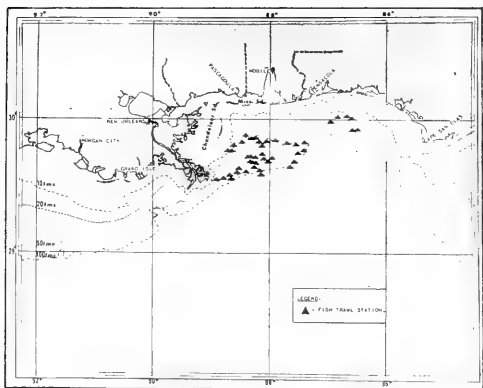
A full report of the work was not expected immediately, but it was obvious the chemical had harvested close to 100 percent of lampreys in the stream. Further work, both tests and management, is expected on Lake Superior streams later this year. Lake Superior still has a remnant lake trout population and officials are hopeful the chemical will help save the remaining trout.



Gulf Exploratory Fishery Program

EXPLORATORY FISHING FOR RED SNAPPER WITH ROLLER-RIGGED OTTER TRAWL (M/V Silver Bay Cruise 7): The hard bottom areas 15-60 fathoms in the northeast Gulf of Mexico extending from the Mississippi Delta to 86° 30' W. (south of Destin, Fla.) were fished with a roller-rigged otter trawl by the U. S. Bureau of

Commercial Fisheries chartered exploratory fishing vessel Silver Bay during a March 1958 cruise. The primary objective was to discover if red snappers could be found in commercial quantities on bottom too rough for otter trawls.



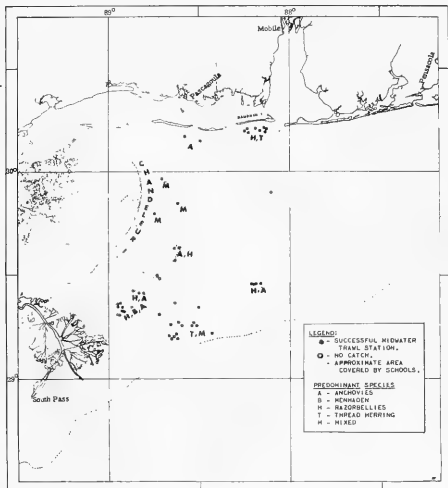
M/V SILVER BAY (CRUISE 7, MARCH 11-28, 1958).

Red snapper were taken in small quantities in 20 of the 44 tows made with the roller-rigged trawl. No areas were found which produced red snapper in commercial quantities. Several attempts at fishing on or adjacent to known red snapper "lumps" resulted in tear-ups, but no gear was lost. The trawl functioned without mishap on some rough bottom areas avoided by local commercial trawlers.

A series of tows on broken bottom south of Mobile Bay in 20-35 fathoms yielded catches of mixed species of up to 3,000 pounds per 90-minute tow, using a roller-rigged trawl constructed of 4½-inch braided nylon. The principal species caught were croaker (Migropogon), spot (Leiostomus), porgy (Stenotomus), and white sea trout (Cynoscion).

MIDWATER TRAWLING EXPLORATIONS BETWEEN MISSISSIPPI DELTA AND CAPE SAN BLAS (M/V Oregon Cruise 48): Samples of fish ranging from 10 to 1,369 pounds were obtained in 36 midwater tows by the U. S. Bureau of Commercial Fisheries exploratory fishing vessel Oregon during a cruise made between January 27 to March 14, 1958. Fifty-two exploratory midwater trawling tows were made between the Mississippi Delta and Cape San Blas during the cruise to count, sample, and identify midwater fish schools and to test midwater trawls of varying mesh sizes.

Trawl sets were made on depth recorder indications of midwater schools and the samples obtained indicated concentrations of many species of clupeoids. Eighteen of the schools sampled were predominantly razorbellies (*Harengula pensacolae*) and nine were 5 to 6 inch anchovies (*Anchoa hepsetus*). Other scattered schools contained mixtures of thread herring, chub mackerel, round herring, anchovies, scad, gizzard shad, and alewives. Menhaden (*Brevoortia patronus*) made up the bulk of the catch in two tows off Pass a Loutre. One tow (January 30) contained 1,290 pounds of menhaden in ripe spawning condition.



Two 40-foot square midwater trawls with mesh sizes tapering from 3" to 1 $\frac{1}{4}$ " and 2" to 1 $\frac{1}{4}$ " were used for midwater sampling. A single set on three dense school indications with an 88-foot nylon trawl resulted in the loss of all the netting.

Recorder indications of subsurface schools were numerous both preceding and following the cold wave during the middle of February. Schools were noticeably diminished during the cold wave.



King Crab

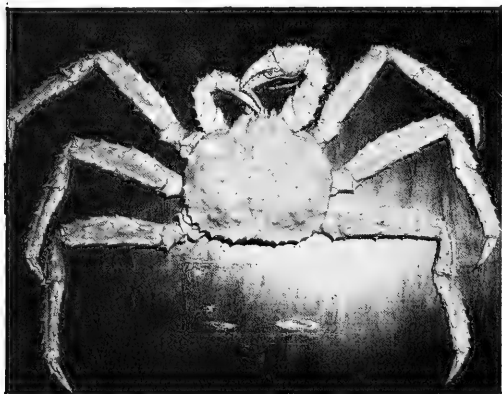
BUREAU FISHERY BIOLOGISTS STUDY LIFE HISTORY: Literally foot by foot the king crab utilizes its six walking legs to wend its way here and there in its favorite habitat in the Bering Sea and in other places in the North Pacific Ocean where the water is from 30 to 70 fathoms deep.

Records in the U. S. Bureau of Commercial Fisheries show that this crustacean has migrated along the ocean floor as much as 300 miles. Migrations of 50 to 100 miles are common. Recently the Bureau reported that one king crab was taken 122 miles from point of release, one year and ten days after tagging.

The king crab, a walker and not a swimmer, is one of Alaska's many contributions to the tables of many nations. In the eastern Bering Sea, which is the center of United States interest and activity, there are an estimated 20 million commercial-size king crabs. This estimate is based upon a July 1957 sampling project at 77 fishing stations covering an area of 31,000 square miles of ocean north of the Alaska peninsula. "Commercial size" is not less than 6 $\frac{3}{4}$ inches across the top of the

body. The king crab often measures as much as 5 feet from leg tip to leg tip; it weighs usually from 7-10 pounds with a record weight of 22.3 pounds.

While its tastiness has long been known to the United States consumer, it is only in recent years that United States fishermen have made systematic attempts to harvest the resource. Much of harvesting can be done in "off seasons" when fishing boats are not otherwise engaged.



KING CRAB

Japan has been harvesting the king crab for a long time. With United States fishermen now becoming active in the harvest, the advantage of joint conservation practices is becoming apparent. Hence, the United States section of the International North Pacific Fisheries Commission has asked the Bureau to make as thorough a study as possible of this resource. Through the Saltonstall-Kennedy Act of 1954 for the improvement of the domestic commercial fishing industry, \$31,000 has been made available for the current research program,

in addition to \$39,000 of regularly-appropriated funds.

If the resource is to be managed properly (that is if maximum sustained yield is to be realized) the researchers must accumulate a considerable amount of data on the life history of that shellfish--its spawning habits and areas, its natural enemies, conditions of optimum development, strong and weak spots in the life cycle, the rate of growth, its habitat, and numerous other things. The basis of such a study depends upon being able to identify individual members of the population to be studied.

One of the toughest problems which the research biologists working on the king crab have been asked to solve is the matter of tagging. Because the king crab periodically just walks out of his old shell a tag attached to the shell sooner or later is separated from the crab.

But the biologists finally found a spot under the shell--in an area which in humans might be called the sacroiliac--where a "spaghetti" or ribbon tag can be permanently attached. Last year 15,570 king crabs were tagged. Information on their recapture is secured from both Japanese and United States fishermen.

* * * * *

STUDIES TO BE CONTINUED BY ALASKA FISHERIES BIOLOGIST IN KODIAK-AFOGNAK AREA: King crab investigations will be the principal activity of a fishery biologist who recently joined the staff of the Alaska Department of Fish and Game, that agency's Director announced in April 17.

The biologist will continue king crab research, which was started in the Kodiak-Afognak area in 1954 by the Alaska Department of Fish and Game. The Department's former biologist made an important contribution to the study of king crabs--the development of a tag that would stay on the crab after its shell was shed during molting. Since then the tag has been widely used by other fishery agencies engaged in king crab research.

Working in close cooperation with fishermen and processors, the biologist will continue the Department's tagging program for additional data on king crab growth and migrations. These studies have been greatly facilitated by the installation of a large marine aquarium by the Department, which is now in operation at Kodiak. This will enable the biologist to conduct controlled experiments on growth and molting.

"The king crab fishery," the Department's Director says, "has expanded into a most important industry and gives promise of surpassing salmon in the Kodiak area in value to the Territory." Kodiak now calls the city "The King Crab Capital of the World" and plans to stage an annual king crab festival.



Maine Sardines

CANNED STOCKS, APRIL 1, 1958: Distributor's stocks of Maine sardines totaled 293,000 actual cases on April 1, 1958--2,000 cases or less than 1 percent lower than the 295,000 cases on hand April 1, 1957. Stocks held by distributors on January 1, 1958, amounted to 230,000 cases, and on November 1, 1957, totaled 298,000 cases, according to estimates made by the U. S. Bureau of the Census.

Canners' stocks on April 1, 1958, totaled 476,000 standard cases (100 $\frac{3}{4}$ -oz. cans), 11,000 cases above stocks held on the same date last year, and considerably less than the 1,111,000 cases reported on hand on January 1, 1958.

Shipments of canned Maine sardines from April 15, 1957, to April 1, 1958, amounted to 2,067,000 standard cases as compared to 1,877,000 cases for the same period the previous season.



Table 1 - Canned Maine Sardines--Wholesale Distributors' and Canners' Stocks April 1, 1958, with Comparisons

Type	Unit	1957/58 Season			1956/57 Season			
		4/1/58	1/1/58	11/1/57	7/1/57	6/1/57	4/1/57	1/1/57
Distributors	1,000 Actual Cases	293	230	298	212	230	295	347
Canners	1,000 Std. Cases $\frac{1}{1}$	476	1,111	1,337	895	416	465	879

$\frac{1}{1}$ 100 $\frac{3}{4}$ -oz. CANS EQUAL ONE STANDARD CASE.

* * * * *

OFFICIAL STATE GRADE STANDARDS FOR CANNED SARDINES ESTABLISHED: Maine's Commissioner of Agriculture on March 28, 1958, promulgated official State grades for canned sardines in oil and hailed the action as a "most vital forward step towards quality control, market development and the future success of this important industry." The promulgation becomes effective on April 15, which is the legal opening date of the 1958 packing season.

The action was taken, at the request of the industry, after three years of extensive research and actual experience on a voluntary basis with the Commissioner's organization participating in the development phases.

Under the program all lots of quarter-oil ($\frac{3}{4}$ oz.) sardines packed in the future will be graded, under the State's supervision, and given a rating commensurate with the degree of quality produced.

It further provides for the issuance of official State certificates of grade to any packer who requests this service and eliminates the introduction into trade channels of any sardines that do not conform to minimum standards.

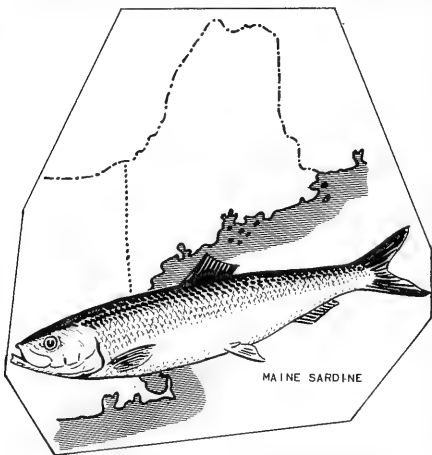
Each lot will be rated either fancy, extra-standard, standard, or substandard, according to the manner in which it survives the rigid grading examination.

The Commissioner said that research was being conducted for the inclusion of mustard and tomato-sauce packs, along with the oil pack, at a future date.

Maine sardine packers produce a large share of the world's sardines with an annual pack of approximately 2,225,000 cases (100 cans to the case).

The Chairman of a Maine sardine industry committee which has been active in development of the program,

described the promulgation as "the most commendable and progressive move ever made by any segment of the American seafood industry, on its own initiative...." He predicted that it would have far-reaching effects towards improvement of the per capita consumption ratio and marketing of Maine's sardine pack.



Administration of this activity comes under the Maine Department of Agriculture, as that Department is charged

by law, with the responsibility of policing and enforcing all State regulations dealing with grading, inspection, growing, and processing of foodstuffs. Much work along these lines is now being done on poultry, potatoes, blueberries, eggs, milk, and other products.

The grading operation will be performed by employees of the Department of Agriculture, under the direct supervision of the Assistant Chief of Inspection, at the industry's Bangor Laboratory.

Samples of each lot packed will be taken daily by State Inspectors, stationed at the individual plants, and shipped directly to the laboratory. The examinations and testing will then be speedily carried out so as to eliminate any unnecessary delay in getting the reports of the results back to the canners.

Grades will be based on a number of factors, including appearance, texture, flavor, odor, oil or sauce quality, moisture, and water content. The Department will take over a number of graders who have been training for this work for three years.

The laboratory was established and equipped with Maine Sardine Council funds at a cost of more than \$75,000 and was officially opened by the Assistant Secretary of the Interior Ross L. Leffler two years ago. Previously the development work was carried on at a laboratory on the University of Maine campus. In addition to the grading and quality control program, the laboratory houses other sardine research activities.

Activities that finally resulted in the official grading were launched in 1952 when the U. S. Bureau of Commercial Fisheries was engaged to conduct pilot studies.

Prior to promulgation the Commissioner presided at a public hearing, which was attended by most of the Maine's sardine canners, and an outline of the plan of action was received by the group without opposition.

* * * * *

PACKING SEASON OPENED ON APRIL 15, 1958: The 1958 Maine sardine packing season legally opened on April 15, 1958, but industry leaders predict that production will not begin until late May or early June.

The Maine Sardine Council's Executive Secretary said that the mid-April opening date has been nothing more than a legal definition for the past ten years. Not only have the old time early runs of fish failed to show up, but none of the plants are ready for operation so early.

He said that there was nothing to indicate whether there would be an abundance or scarcity of fish this season, but if the trend since 1951 prevailed, the latter situation might be the story.

Starting with 1951 when fish were very scarce, all season the industry had alternate high and low production years until 1956 and 1957 which were two good fish years in a row. Unless the trend is broken a shortage of sardines could crop up again.

It was expected that several less plants would be in operation in 1957. Two plants have been dismantled and there are reports of others not planning to operate.

The industry is anxious to know just what effect recently-promulgated official Maine State grade standards will have on the pack and the market picture.



Marketing

EDIBLE FISHERY PRODUCTS MARKETING PROSPECTS, SPRING-SUMMER 1958: United States civilian consumption of fishery products in the next few months is expected to be about the same as a year earlier. Average retail prices of these products this spring, judging from Bureau of Labor Statistics wholesale prices, may top the year-earlier high levels.

Commercial fishing operations are now on a seasonal upswing which will continue until early or mid-summer. Weather permitting, landings of food fish and shellfish may be heavier this spring than last since the level of prices may encourage commercial fishermen to make more trips, especially for groundfish.

Stocks of fishery products in cold storage in the continental United States last winter--particularly groundfish fillets and blocks--were rather low in volume and high in price. The seasonal

build-up in storage stocks which begins in the spring may be a little heavier this year than last.

Imports of fishery products during the next few months will be a little larger than a year earlier if supplies are available abroad. In the past year world supplies of groundfish fillets and blocks, important items in international trade in edible fishery products, have been relatively tight. Some reduction in exports from the spring 1957 total is likely since our supplies of canned fish are much smaller this year.

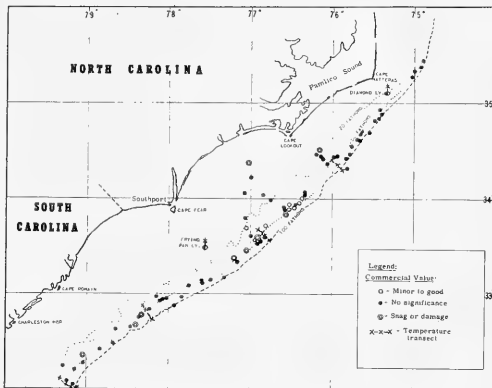
This analysis appeared in a report prepared by the Agricultural Marketing Service, U. S. Department of Agriculture, in cooperation with the Bureau of Commercial Fisheries, U. S. Department of the Interior, and published in the former agency's May 2, 1958, release of The National Food Situation (NFS-84).



North Atlantic Fisheries Exploration and Gear Research

CONTINENTAL SHELF OFF THE CAROLINAS SURVEYED FOR COMMERCIAL FISH (M/V Delaware Cruise 58-1): Concentrations of commercially marketable fish were not common in the offshore Continental Shelf areas off North and South Carolina surveyed from February 23 to March 17, 1958, by the U. S. Bureau of Commercial Fisheries research vessel Delaware. But several of the catches showed promise, and significant information on bottom conditions and commercial species not associated with the area was obtained. During the cruise 78 trawl stations and 4 oceanographic transects were completed.

Trawling explorations were made with a no. 41 manila otter trawl (79 foot headrope, 100 foot footrope, 4½-inch mesh body, 2½-inch cod-end) with roller or chain footrope. A 100-foot Gulf of Mexico flat shrimp trawl was used on several occasions to investigate areas in the deeper water--only rock shrimp were caught.



M/V DELAWARE CRUISE 58-1 (FEBRUARY 3-MARCH 17, 1958).

The most important catch, by present-day commercial standards was when one tow at 33°52' N. latitude and 76°29' W. longitude yielded approximately 700 pounds of two species of snapper (*Lutianus vivanus* and *Rhomboplites aurorubens*). Other areas gave indications that substantial quantities of industrial fish may be available (39°41' N. latitude and 77°03' W. longitude and 33°09' N. latitude and 77°35' W. longitude).

At 35°26' N. latitude and 74°54' W. longitude and 35°19' N. latitude and 74°59' W. longitude menhaden were trawled in considerable numbers (600 pounds) at a depth of 45 fathoms. A single common mackerel (*Scomber scombrus*) was taken ten miles SE. of Cape Lookout in 20 fathoms. Considerable scientific data on sharks was obtained during the cruise. One specimen of a deep-water shark (*Deania sp.*), reported previously only from the Eastern Atlantic, Pacific, and Indian Oceans, was taken, and the second known specimen of the deep-water shark *Etmopterus bullisi* was captured. Over 200 specimens of the sand bar shark (*Eulamia milberti*) were taken on one tow south of Cape Hatteras, indicating that this area may be the wintering area for this species.

Bottom traces were indicated in many areas with the echo-sounder, and from all indications anchovies may have been the species contributing to these traces.

As in previous exploratory operations in this area, the bottom was found to be trawlable, with gear damage on only 10 stations; a severe snag at 33°27' N. latitude and 77°04' W. longitude resulted in loss of port trawl door and the No. 41 net with roller gear.

Four oceanographic transects (see charts) were made to investigate the occurrence of warm bottom water along the edge of the Continental Shelf, south of Cape Hatteras. This condition was checked with reversing bottom thermometers and bathythermograph casts. As indicated by data collected by the Woods Hole Oceanographic Institution, the bottom water was considerably warmer in a depth of 75 fathoms than it was either inshore or offshore. A more tropical fauna was found to be present in this area, as several species of butterfly fish and southern forms of rays were taken.



North Atlantic Fisheries Investigations

HADDOCK ECOLOGY STUDIES CONTINUED (M/V Silver Mink): Observations and collection of data for the haddock ecology study were conducted by the Bureau of Commercial Fisheries chartered vessel Silver Mink on April 11, 1958, in an area NNE. of Cape Cod Light, Mass. Two tows were made with an otter trawl having a 1½-inch mesh cod end liner at 55 to 65 fathoms. The area fished was approximately six square miles. One bathythermograph lowering was made during the trip.

The entire catch of 764 haddock were measured for length, and scale samples were collected from 153 fish. In a sample of 50 female and 50 male haddock, length and weight were collected; liver weight and state of development noted; drumming muscle length, weight, and color were recorded; and scale samples, fin rays, and stomach contents collected.

All species were identified and counted in one tow and important species were measured.

A sample of sea dabs was collected for age and growth studies and red (ling) and white hake for meristic studies.

Red hake predominated in the two tows, followed by sea dabs, haddock, and dogfish. An increased abundance of one- and two-year old haddock was noted. About all the haddock taken in the catches were spawned out, indicating that the peak of spawning had occurred about the end of March.

* * * * *

HADDOCK TAGGING AND HYDROGRAPHIC CRUISE COMPLETED (M/V Albatross III): Thirty-two otter-trawl tows were made on Georges Bank, Browns Bank, and Jeffreys Ledge by the U. S. Bureau of Commercial Fisheries research

vessel Albatross III, between March 26, and April 9, 1958. A total of 1,219 haddock were tagged with the "spaghetti"-type tag and 8 halibut were tagged with Petersen-disc tags, in both cases just below the dorsal fins.

As part of the Bureau's participation in the International Geophysical Year (IGY) program, Nansen bottle water samples were collected and bathythermograph casts were made at 18 stations in the IGY section.

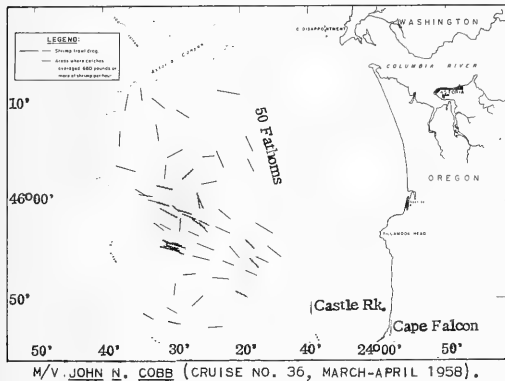
Two severe northeasters with hurricane-force winds at times reduced the time available to accomplish the objectives of the cruise.



THE BUREAU OF COMMERCIAL FISHERIES RESEARCH VESSEL ALBATROSS III.

North Pacific Fisheries Investigations

COMMERCIAL QUANTITIES OF PINK SHRIMP FOUND OFF NORTHERN OREGON (M/V John N. Cobb Cruise 36): Good commercial quantities of "cocktail size" pink shrimp were located off the northern Oregon coast by the U. S. Bureau of Commercial Fisheries' exploratory fishing vessel John N. Cobb during a four-week cruise which ended on April 11.



The best fishing areas were south of the mouth of the Columbia River off Tillamook Head where shrimp were taken at the rate of 2,800 pounds per hour with a 72-foot Gulf of Mexico semiballoon-type shrimp trawl and off Seaside where shrimp catches at the rate of 1,350 pounds per hour were taken with a 40-foot Gulf of Mexico flat-type shrimp trawl. These areas yielded catches which compare favorably with those made on the productive grounds off Grays Harbor, Wash., and off Copalis Head, Wash., when they were discovered by the John N. Cobb in 1956, and to the commercial fleet in 1957.

This was the first in a series of shrimp explorations scheduled for the Bureau's vessel for 1958 off the coasts of Washington and Oregon in cooperation with the State of Washington Department of Fisheries and the Fish Commission of Oregon.

The area explored during this trip extended from 10 to 28 miles offshore between the entrance of the Columbia River and Cape Falcon. Although tows were made at depths of 56 to 94 fathoms, the most productive grounds were found in 70 to 85 fathoms on green mud bottom.

Of the 63 tows (nearly all of 30-minute duration) completed during the trip, 43 were made with the 40-foot trawl and 15 with the 72-foot trawl. Both trawls were constructed with 1½-inch mesh cotton netting. Indications are that the 72-foot trawl is approximately twice as efficient as the 40-foot trawl.

The bottom fished was excellent with net damage limited to a single tow. Mud was present in the net on only one occasion, and even then it was only a small amount.

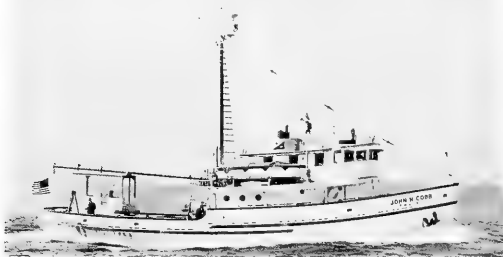
Samples of shrimp were frozen from each tow for biological analysis at the Fish Commission of Oregon's Research Laboratory at Astoria. Considerable fishing time was lost because of adverse weather conditions.

The second of the 1958 series of shrimp explorations off the coasts of Washington and Oregon was started on April 28 and due to end on May 23, 1958. The objectives of this cruise (No. 37) were to determine the distribution of shrimp offshore from Willapa Bay, Wash., to the Columbia River and from Cape Flattery at the entrance to the Straits of Juan de Fuca to Destruction Island off the northern part of Washington.

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MODIFIED ELECTRICAL DEPTH-TEMPERATURE TELEMETER TESTED AND TRUE COD TAGGED (M/V John N. Cobb Cruise 35): The modified electrical depth-temperature telemeter was tested for the first time in bottom trawling by the U. S.

Bureau of Commercial Fisheries exploratory fishing vessel John N. Cobb during a two-week cruise to the eastern part of the Strait of Juan de Fuca. The cruise ended on February 28, 1958. In addition to testing the telemeter, Washington Department of Fisheries biologists aboard were assisted in tagging true cod. More than 1,100 true cod and about 100 sablefish (black cod) were tagged during the cruise by the biologists with plastic "spaghetti"-type tags and experimental dart tags. Incisions in the belly cavity had to be made in most of the cod to release expanded gases result-



THE JOHN N. COBB, A VESSEL OPERATED BY THE SERVICE'S BUREAU OF COMMERCIAL FISHERIES.

ing from the changes in pressure from the sea bottom to the surface, in order for the fish to return to the bottom and not float on the surface after tagging.

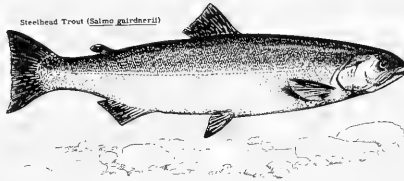
A total of 54 bottom tows were made with a standard 400-mesh Eastern-type otter trawl between Port Townsend and Port Angeles at depths of 10 to 60 fathoms. True cod were found to be most plentiful off Port Townsend, but small catches were made of Port Angeles and west of Protection Island.

The depth-temperature telemeter, a device which transmits continuous trawl depth and water temperature data to the pilothouse through an electrified trawl cable, proved to be sufficiently accurate when operating. However, on several occasions the electrical conductors broke under the strain of towing, necessitating repairs aboard the vessel. The tests proved that a stronger type of termination for the sending unit will have to be developed if this instrument is to become a dependable aid in bottom trawl fishing.

—O—O—

Oregon

COMMISSION OPPOSES MOVE TO DECLARE STEELHEAD TROUT A GAME FISH: The Oregon Fish Commission, at its April 1958 meeting in Portland, unanimously went on record as being officially opposed to declaring steelhead a game species in Oregon waters. The Commission members viewed with particular disfavor and alarm a movement currently under way to place the steelhead issue on the November 1958 ballot.



Speaking on behalf of the Commission, the Chairman declared that after careful consideration of the many complex factors associated with the steelhead question, the Commission decided it had no alternative but to oppose the game fish measure. He stated, "We fail to detect any semblance of conservation involved in making steelhead a game fish in Oregon. To the contrary, enactment of the proposal being advanced would result in either a tremendous wanton wastage of highly palatable fish or complete abolition of commercial fishing in the Columbia River." He further stated that he could not see how either of these drastic consequences could be construed as sound conservation.

Elaborating on the reference to wastage, the Chairman said that the manner in which gill-net fishing has been conducted in the Columbia River for more than 100 years makes it impossible to fish for salmon without catching varying numbers of steelhead. He also said that the major share of salmon and steelhead taken commercially in the Columbia River are dead or severely injured when the fisherman pulls his net. He continued, "Under provisions of the proposed initiative, a commercial fisherman would be heavily fined for catching even a single steelhead either intentionally or by accident. You can't educate a steelhead to stay out of a net, and we fear that large quantities of dead or dying steelhead that inevitably would be caught would be thrown overboard."

The Chairman further stated that Oregon law prohibits the wanton wastage of both food and game fishes, which precludes any disposal of steelhead caught incidentally during a legitimate salmon fishing operation in the Columbia River except through established commercial channels. The State of Washington recognizes this fact and permits the commercial fishery and disposition of steelhead in the Columbia River district and actually collects a fee on the quantity of fish landed.

Citing the Oregon commercial fisheries code, he said that the Commission is obliged to manage the food fishery resources of Oregon on the basis of conservation, substantiated by investigations. "Scientific findings of our staff of highly qualified biologists indicate that Columbia River steelhead runs are in good condition," he stated. "All available evidence indicates that with continued proper management, these runs can maintain a sizable harvest by both sport and commercial fishermen. For all practical purposes, making steelhead a game fish in Oregon involves only the Columbia River. An initiative measure adopted in 1956 reserves all Oregon streams south of the Columbia River, except Tillamook Bay, for exclusive use by sport anglers as far as salmon and steelhead are concerned. A limited commercial fishery is still permitted for chum salmon in Tillamook Bay."

In conclusion, the Chairman of the Commission declared, "Both sport and commercial interests have suffered materially over the years as a result of these continual fish controversies that all too often have been based more upon emotion

rather than fact. It is lamentable that the energy generated by these conflicts has not been directed towards assisting our capable fisheries scientists in solving the very real problems of maintaining and increasing salmon and steelhead production in our streams."



Pacific Oceanic Fishery Investigations

ENUMERATION AND SAMPLING OF TUNA SCHOOLS IN THE MARQUESAS ISLANDS AREA (M/V Charles H. Gilbert Cruise 38): Sampling Tuna Schools: Observations made by the U. S. Bureau of Commercial Fisheries research vessel Charles H. Gilbert indicate that April is a transition period between the seasons of abundance and scarcity for skipjack tuna in the Marquesas Islands area. In the course of an 85-day cruise that ended on May 2, 1958, the Charles H. Gilbert explored the waters around the Marquesas Islands, Tuamotus, and as far south as Tahiti (French Oceania), and reported that skipjack were plentiful in those waters. Skipjack in the Marquesas area were uniformly small in size, measuring around 5 pounds, while fish farther to the south in the Tuamotua and Tahiti area were generally large fish, 15 to 20 pounds, and comparable in size to the Hawaiian season fish.



M/V CHARLES H. GILBERT

Of the total of 183 schools of fish sighted on the cruise, 61 schools were identified as skipjack tuna, 4 as yellowfin tuna, and 11 as mixed yellowfin and skipjack. The balance were unidentified. More than 1,300 skipjack were tagged, with a new plastic dart tag developed by the local laboratory, and released. Recapture of these tagged fish will provide valuable information on the movements of fish in French Oceania.

The Marquesas Islands are located about 2,000 miles southeast of Hawaii and 2,800 miles from the United States mainland, thus placing them within an exploitable distance of United States commercial fishermen, particularly the long-range segment of the West Coast tuna clipper fleet.

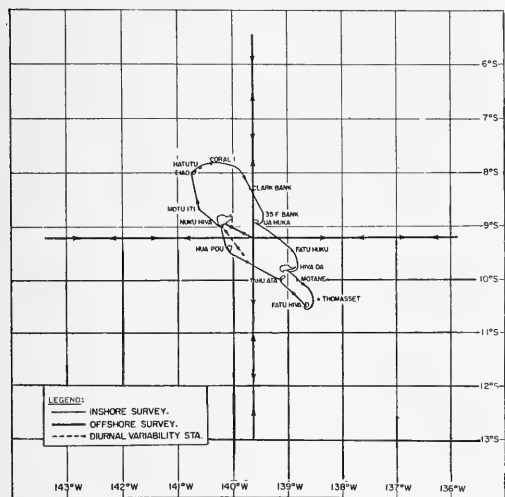
The vessel surveyed these virgin waters by visual scouting and live-bait fishing. The Marquesan sardine, a bait fish presently being introduced into Hawaiian waters by the U. S. Fish and Wildlife Service, was found to be an excellent bait for skipjack. Although rather large when compared to the local skipjack bait, the nehu, even the small skipjack of the Marquesas area were found to respond favorably to it. The vessel brought back 25 buckets of Marquesan sardines and released them off Ewa, making a total of about 55,000 fish of this species that have been released in Hawaiian waters. About one-half dozen sardines were taken by the sampan Bucaneer on May 1 in West Loch, Pearl Harbor, just prior to the most recent stocking. While these fish were probably survivors of earlier plants, they could have been progeny of spawnings.

Inshore Surveys: Two standardized inshore surveys, near the Marquesas Islands, were conducted during the cruise. The first survey, February 27 through March 8, revealed an abundance of skipjack schools in the area. Of the 90 schools

sighted, 24 were identified as being composed of skipjack. Others were 3 yellowfin, 6 mixed (skipjack and yellowfin), and 57 unidentified schools. Many of the schools were large and attended by huge bird flocks. The skipjack were almost without exception small (4-8 pounds), and yellowfin were generally between 15 and 20 pounds each in weight.

The second inshore survey, conducted between April 11 and 19, resulted in fewer sightings. Of 54 schools seen, 19 were skipjack, 4 were mixed (skipjack and yellowfin), and 31 were unidentified. Like the first survey, the fish were generally small.

While a fair portion (43 percent) of the schools worked during the first survey responded in some degree to chumming, the schools encountered during the second survey were extremely wild and "boat-shy"--only 25 percent of the schools responded in any way for fish to be taken.



TRACK CHART, CHARLES H. GILBERT CRUISE 38.

Table 1 - Results of Other Inshore Surveys in Marquesas Islands are Given for Comparison with Results of Cruise 38

Period of Survey	Schools Seen
Mar. 11-19, 1958	54
Feb. 27-Mar. 8, 1958	90
Feb. 23-31, 1957	97
Jan. 25-31, 1957	74
Jan. 18-25, 1957	76
Nov. 24-30, 1957	41
Oct. 14-20, 1957	37
Sept. 7-14, 1956	42

Table 2 - Results of Other Offshore Surveys in Marquesas Islands are Given for Comparison with Results of Cruise 38

Period of Survey	Schools Seen
Mar. 26-April 8, 1958	39
Jan. 27-Feb. 12, 1958	74
Oct. 24-Nov. 6, 1957	26

Offshore survey: The 12-day survey conducted between March 26 and April 8 resulted in total sightings of 39

schools (18 skipjack, 1 yellowfin, 1 mixed (skipjack and yellowfin), and 19 unidentified). This survey again revealed the absence of large skipjack in this area as without exception the fish seen or taken were around 5 pounds in size.

The Marquesan sardine (*Harengula vittata*) was generally scarce during the period of this cruise, particularly prior to mid-April. The previously reliable baiting grounds in Taiohae Bay, Nuku Hiva, yielded only a few scattered groups of sardines, while other bays in Nuku Hiva such as Taipi Vai and Anaho were notable for the absence of this bait fish. Surveys were made in all likely bays in Nuku Hiva and the general scarcity of bait was noted. Beginning around April 10 the sardines began to show up in fair quantities in Taiohae and Tai Oa Bays in Nuku Hiva.

Prior to April 10, a total of 40 sets were made in Nuku Hivan bays resulting in 218 buckets of sardine or 5.4 buckets per set. After April 10, 13 sets took 167 buckets or 13 buckets per set. Moreover, about 30 additional visual sweeps prior to April 10 showed no bait present in most of the bays surveyed. Indicative also of change in the bait situation after mid-April was the appearance of sardine at nights around the ship's light where formerly few or none had been attracted.

Of the other islands surveyed, only one bay in Tahu Ata Island (Hana Tetou) was found to have a fair quantity of sardines during this cruise. Unfortunately, the long haul from the baiting site to the vessel was probably the chief cause of the very high mortality experienced with bait taken in this locality.

The size frequency, sex, and gonad development were recorded from about 25 sardines at each baiting locality. An additional sample was preserved for laboratory examination.

A non-quantitative 10-minute plankton tow was made at each baiting locality employing a 45-cm. net.

Visual Surveys into the Tuamotus: Two days were spent fishing and scouting in the Tuamotus. Most noteworthy was the predominance of large (15- to 20-pound) skipjack in this area.

Diurnal Variability of Zooplankton: The diurnal variability station was occupied twice during the cruise. Each consisted of a 24-hour series of bathythermographs and 140-meter plankton tows taken at 2-hour intervals.

Deep-Swimming Tuna Resources in Equatorial Waters: A series of 7 long-line stations along 150° W. longitude between 5° N. and 1° S. latitude resulted in poor catches; the best day's catch was 8 yellowfin (3° N.). One big-eyed and 7 yellowfin tuna taken by long line were tagged and released.

Environmental Monitoring Survey in Waters Adjacent to Oahu: The Oahu monitoring survey, consisting of bathythermographs and collection of surface salinity samples at 12 localities, was conducted at the beginning of the cruise.

General Observations: Various oceanographic and productivity measurements were made during the cruise including 336 bathythermograph lowerings, 233 surface salinity samples, 204 phosphate samples, 14 Secchi disk and Forel observations, 71 0-140 m. oblique zooplankton and larval fish tows, and 12 surface plankton tows.

Blood samples for serological studies were obtained from big-eyed tuna (long-line caught) and skipjack.



Salmon

BIG FIELD TEST FOR ELECTRICAL GUIDING OF YOUNG FISH: A full-scale field experiment on the effectiveness of electrical apparatus in guiding young seabound salmon away from danger areas was begun in March 1958 and continues throughout the period of migration, the U. S. Bureau of Commercial Fisheries announced recently. The tests were started at Lake Taps on the White River, a tributary to Puget Sound, Wash.

The project is a result of the electrical guiding experimental program which the Bureau has been conducting for

about seven years. It is the Bureau's first large-scale test on the use of electrical equipment to divert young fish from danger areas.

Two field tests on streams approximating 100 feet in width have been successful, as have numerous laboratory and aquarium tests. In the current test a 1,000-foot electrical fence will be used. A "fence" consists of a line of electrodes which hang in the water at specified intervals and which carry pulsating direct electric current supplied by a source on the shore.

As the small fish approach the electrical field they are guided into a trap for enumeration. An additional trap will be used to catch any fish which may get through the electrical field. In this way the effectiveness of the device under actual operation can be ascertained.

The electrical guiding experiments have been conducted to get solutions for four general types of problems relating to fish migrations: (1) guiding adult fish around barriers which block upstream migration; (2) guiding young fish

safely around danger spots on their downstream migration; (3) separating wanted from unwanted fish; and (4) protecting young fish from predators.

The chief problem area for predation is in the lower Columbia River where hordes of squawfish are a final hazard for young salmon planted from hatcheries. Some progress has been made here but there is still much to be accomplished before this problem can be considered solved.

* * * * *

NIACIN DEFICIENCY INVOLVED IN SALMON SUNBURN: The case of the "sunburned salmon" which has plagued United States Fish and Wildlife Service fish culturists and biologists for a long while, has been partially solved, the Department of the Interior indicates. A niacin deficiency has been proved to be correlated with the sunburn, and research men are delving deeper to determine the character of this relationship.

Since circumstances--high dams and the destruction of salmon runs and spawning grounds--make successful hatchery operation a most important activity for the continuance of the Columbia River salmon fishery, biological attention is being given to sunburn and to kindred conditions associated with light.



Sunburn in salmon being reared in the Bureau's fish hatcheries in the Pacific Northwest is as noticeable on the fish as sunburn is on human beings. Distinct discoloration, a dermatitis causing sloughing off of the epidermis (which on a fish is under the scales), and swellings and lesions on the back are some of the evidences.

Salmon fry and small fingerlings also show evidence of the adverse effect of sun, or at least excess light. The death rate of young salmon being raised near sunny windows is much higher than in portions of the same brood raised farther back in the hatchery. The same thing applies to eggs. The hatch of salmon eggs kept in an area of sunlight is smaller than from eggs kept in darker portions of the room.

Experiments conducted by the Bureau's nutrition laboratory at Cook, Wash., indicate that diets deficient in the vitamin niacin are correlated with sunburn in salmon. Fish fed a niacin-deficient diet for 30 days have developed serious sunburn. Sunburned fish fed a complete diet for 60 days under the same light conditions have shown almost complete recovery. Further and more complete experimentation and analysis are planned for this spring.

Trout are also occasionally afflicted with "sunburn" in hatcheries, particularly in the states of the Southwest. Recognition of the cause will have far-reaching benefits in these areas, as well as in the salmon restoration program.

Fish in the wild, of course, are protected from sunburn by stream cover, deep pools, and a niacin-rich diet.



Shad

RECEIPTS AND TRENDS ON NEW YORK CITY'S FULTON FISH MARKET: Shad receipts on New York City's Fulton Fish Market for the past ten years ranged from a low of 1.4 million pounds in 1953 to a high of 2.9 million pounds in 1948 (see table 1). Shad receipts in 1957 dropped to 1.8 million pounds--22 percent below the 2.3 million pounds reported in 1956.

Most of the shad came from New York and New Jersey (Hudson River) during April and May and from Georgia, North Carolina, Virginia, and Maryland during January, February, and March.

Table 1 - Shad Receipts on New York City's Fulton Fish Market, 1948-1957

Year	Million Lbs.
1957	1.8
1956	2.3
1955	1.8
1954	1.7
1953	1.4
1952	2.1
1951	1.2
1950	1.7
1949	2.1
1948	2.9

Wholesale prices for shad reported in New York City's Fulton Fish Market for April 1955 and April 1957 are shown in tables 2 and 3.

Experienced observers in New York City's Fulton Market have noted a steadily diminishing demand for shad as a source of fish meat, but a firm and active market exists for the shad roe. As shad meat is richly-flavored and requires more than ordinary skill in cooking, it is understandable that the younger generations look for more easily-prepared fishery products.

Annually the drop in shad prices during the season corresponds very closely to the peak of the run of shad to the Hudson River and, as a rule, this is the time when the shad eating public begins to lose interest in this variety.

Table 2 - Daily Shad Prices Reported in New York City Market News Service "Fishery Products Reports," April 1955

April	North Carolina		Virginia		Maryland		New Jersey	
	Roes	Bucks	Roes	Bucks	Roes	Bucks	Roes	Bucks
1	53-55	12-12½	45	14	40-42	12½-14	50	15
4	57-58	15	42-45	12½-15	42-45	12½-15	T50	16-18
5	T55	-	43-45	12-15	43-45	12-15	T46-48	14-17
6	T55-58	12½-15	T45-48	T15-16	T45-48	T15-16	T45-48	15-17
7	T52-55	-	T45	11-12	T45	11-12	T40-45	-
8	T50	T11	35-40	7-8	35-40	7-8	T40-42	10-11
11	T45-48	T11-12	30-35	8-10	30-35	8-10	T35	11
12	-	-	25-30	8-9	25-30	8-9	T28-30	8-10
13	37-40	8-10	-	-	28	7-8	-	-
14	38	8-9	25-27	6-7	25-27	6-7	T28-30	7-9
15	35	-	20-22	5	20-22	5	T25-27	6
18	30	6	20-22	5-6	20-22	5-6	T23-24	6
19	-	-	20	-	20	-	T21-25	5-5½
20	27-30	4-5	20	4	20	4	T20	5
21	-	-	20	4	20	4	-	-
22	-	-	-	-	-	-	-	-
25	30-33	5	-	-	-	-	20-22	5
26	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-
28	-	-	-	-	-	-	-	-
29	-	-	-	-	-	-	25	5

NOTE: T = TRAP

There are several other factors that affect shad prices at New York. Although New York City is an excellent market for the shad roe, the market for shad meat is poor; therefore, when the supplies of buck shad are heavy there is no market at all in New York and the New York dealers will consign buck shad and "cut" roe shad to other cities at a loss. The profits from the shad roe will usually make up the losses and yield a profit.

With New York City loaded up with buck shad and cut roe shad and ready to sell at low prices, the prices paid for Maryland and Virginia bucks are forced downward. As a rule after the middle of April all East Coast shad markets become over-supplied with shad.

Also, as the roe shad from the Hudson River become more mature they are less valuable as a source of roe.

These adverse factors have been apparent for years, but they seem more pronounced in recent years due to a slowly-diminishing market for shad as a source of fish meat.

Table 3 - Daily Shad Prices Reported in New York City Market News Service "Fishery Products Reports," April 1957

April	North Carolina		Virginia		Maryland		New Jersey	
	Roos	Bucks	Roos	Buck	Roos	Bucks	Roos	Bucks
1	40-45	11-12	35	12	35-38	12	40	10
2	40-45	10-11	-	-	35	9-10	40	10-12
3	45-50	10	38-40	12	40	-	42	11
4	48-53	11-14	38-42	12	38	-	40-42	10-11
5	43-51	11-12	38-40	9-12	38-40	9-12	40	10
8	45-50	14	38-42	12-13	38-42	12-13	45-47	14-15
9	50-53	12-12½	35-40	10-11	35-40	10-11	45-47	12-13
10	45	12½	37-42	-	45	12½	-	-
11	50-55	12	42-45	-	45	14	48-52	15-16
12	45-53	12	40-42	12-12½	45	12½	48-50	13-14
15	50-55	-	45	-	40-43	12-14	-	-
16	53-55	-	40-45	10	42-45	10	45-47	10-11
17	50-55	-	40-43	10	42-43	10	43-45	10
18	-	-	40	8	40	8	40	8
19	50	-	40-42	-	40-42	-	38-42	6
22	30	5	25	5	25	5	36	5
23	30	-	20-22	3	20-22	3	20-22	3
24	25	4	15-18	2	15-18	2	15-18	2
25	-	-	-	-	-	-	14-16	1½
30	-	-	15-16	1-2	-	-	15-16	1-2

Another factor which has had an ever-increasing effect on shad prices at New York City is the contamination of Hudson River shad with oil and other waste products. At times perfectly fresh shad are so contaminated with oil that they are unsalable as a source of shad meat. The public has become increasingly conscious of this oily flavor in Hudson River shad.

Still another factor to be considered when judging the market and price for shad is the unusual difficulties encountered in preparing shad meat for the table. Modern consumers are extremely conscious of fish bones and shad have many very fine bones. The methods of boning shad are good, but costly in terms of labor. This practice of boning shad has been one factor that has helped to maintain the market for shad, but fish cutters who make good shad-boners are scarce. The seasonal nature of the fishery tends to keep skilled fish cutters out of the shad-boning business.



Shrimp

GOOD CATCHES TAKEN OFF TAMPA BAY, FLORIDA: Sizable catches of Gulf shrimp were taken from waters close to the mouth of Tampa Bay during the last half of April 1958, the U. S. Bureau of Commercial Fisheries fishery market specialist at Tampa reported on May 1.

The shrimp catches are the first taken from waters close inshore in this area since 1954. Catches weighing close to 3,000 pounds were taken by many of nearly 70 trawlers working the area. A trip usually consists of from 3-5 days, with all trawling done at night.

The current shrimp run began when several Fort Myers shrimpers trawled experimentally in the area west to north west of Egmont Key. Shrimping has been best from the entrance to Tampa Bay to off Blind Pass at St. Petersburg Beach, about 12 miles north. The best shrimp catches were taken 3-5 miles offshore at depths of 18-42 feet.

In the past shrimp boats operating out of Florida west coast ports have seldom found shrimp in commercial numbers in the Tampa Bay area. Past shrimp runs close by have usually faded within a short time or been abandoned in favor of better

fishing elsewhere. Best known west coast Florida shrimping grounds are in the Tortugas area, near Key West, and off Fort Myers Beach. Tampa is a major base for seagoing vessels which cross the Gulf to shrimp on the Campeche grounds off the Mexican coast. Shrimp is the number one dollar-value fishery in the United States and a multi-million dollar business in Florida.



United States Commercial Fisheries Decline in 1957

The U. S. Bureau of Commercial Fisheries' preliminary review of the United States commercial fisheries for 1957 shows a decline in the landings, a decline in the pack of fish used for human food, an increase in the canned pet food pack with fish as an ingredient, a decline in the number of fishing craft used, a decrease in the number of fishermen, and a slight increase in the number of shore installations handling the products. The per capita consumption remained steady at about 10.2 pounds.

LANDINGS: The United States landings for 1957 were 4.75 billion pounds as compared with 5.25 billion pounds in 1956. (The data on quantity represent fish in the round or as landed except for mollusks which are reported in pounds of edible meats instead of weight in the shell.) Declines were noted in both the food fish and industrial fish landings. Menhaden (the chief industrial fish) landings were down 20 percent, or 400 million pounds, and were responsible for the lower landings in this group. The 1957 catch of industrial fish was 2.2 billion pounds as compared with 2.6 billion pounds in the previous year. The food fish catch dropped from 2.7 billion pounds to 2.5 billion pounds.

Among the species taken in smaller quantities in 1957 were cod, haddock Pacific halibut, Atlantic ocean perch, salmon, tuna, oysters, and shrimp. The catch of herring, flounders, mackerel, pollock, scallops, and lobsters was up somewhat while the 40.6-million-pound Dungeness crab harvest and the whiting catch of 132.8 million pounds established new high records.

EMPLOYMENT AND VESSELS: The fishing boats were manned by 142,000 men, down 2,000 from 1956; in the shore establishments, estimated employment was 100,000. The estimated number of boats used in the commercial fisheries totaled 84,000.

EX-VESSEL PRICE AND VALUE: The average ex-vessel price for the 1957 landings was 7.39 cents a pound as compared with 7.03 cents a pound for the 1956 landings. But because of the decreased catch, the total value of the 1957 harvest was below that of 1956. The following figures show the estimated values of the 1957 catch at the various trade levels with 1956 values in parentheses: producer (fisherman)--\$351,000,000 (\$369,018,000); processor--\$592,000,000 (\$622,000,000); wholesaler--\$836,000,000 (\$879,000,000); retailer--\$1,091,000,000 (\$1,147,000,000).

LEADING PORTS: San Pedro, Calif., continued to be the Nation's No. 1 port in both landings and ex-vessel value of landings; the 354.4 million pounds of principally tuna, mackerel, and sardines brought \$25.4 million ex-vessel. Lewes, Del., was second in landings with 286.2 million pounds of menhaden, and Reedville, Va., was third with 256.8 million pounds of menhaden. Gloucester, Mass., was fourth in total landings, but second in landings of food fish with 248.9 million pounds. Other important ports included Beaufort-Morehead City, N. C.; Boston, Mass.; San Diego, Calif.; New Bedford, Mass.; Portland and Rockland, Maine; and Astoria, Ore.

LEADING SPECIES: Tuna led the food fishes in pounds landed with 295.6 million pounds. Salmon was next with 257.2 million pounds, followed by shrimp with

204.4 million pounds. The Maine herring catch was 153.6 million pounds, most of which was canned for human consumption. Haddock and ocean perch landings were almost identical, each being more than 133.0 million pounds. The whiting catch was 132.8 million pounds. The menhaden harvest was 1.7 billion pounds, accounting for 35 percent of the total catch.

The ex-vessel value of several of the food fish was higher in 1957 despite the fact that some of the catches were smaller than in the previous year. The shrimp harvest was down 20 million pounds, but the ex-vessel value was \$74 million, or \$3 million above 1956. The value of the salmon catch was \$39,300,000. The value of the tuna catch (down 33 million pounds) was \$38.4 million, or \$5 million below 1956. The value of menhaden taken in 1957 was \$22.1 million, or \$6 million below 1956.

CANNING: The quantity of fish canned for human food in 1957 was 644.7 million pounds as compared with 657.6 million pounds in 1956. There were 342.3 million pounds of pet food (with fish as an ingredient) and bait canned in 1957 as compared with 321.8 million pounds in 1956. The value of the 1957 pack of all canned fishery products was \$334.8 million; that of the 1956 pack was \$349.5 million. There was a \$15-million drop in food canned for human use and a slight rise in the value of fish canned for pets.

Tuna led the field in number of pounds canned with a record 232.5 million; salmon was next with 152.9 million; mackerel was third with 59.7 million; Maine sardines were next with 46.0 million pounds; and then clam chowder with 36.6 million pounds. There were 342.3 million pounds of pet food processed. The 1957 packs of tuna, Maine sardines, mackerel, and pet food were higher than those of 1956; the packs of salmon and clam chowder were lower.

UTILIZATION: Thirty percent of the commercial fisheries landings, or 1.4 billion pounds, went into the channels of trade as fresh or frozen fish; 24 percent was canned; and 2 percent was cured. A total of 2.1 billion pounds, or 44 percent of the landings, was used for byproducts (oil, meal, and solubles) and as pet or animal food and bait.

AREA DISTRIBUTION: Fifty-four percent of the 1957 production (2.6 billion pounds) was taken by Atlantic Coast fishermen. Fishermen from the Gulf States and the Pacific Coast each took 17 percent of the total; Alaskans caught 8 percent; and the fishermen operating in the Great Lakes and the Mississippi River system caught 4 percent. Most of the fishing was done in waters off the shores of the United States and Alaska but nearly 0.5 billion pounds, or about 10 percent of the catch was taken on the high seas off foreign shores. More than half of this catch off foreign shores was tuna.

STATISTICAL PUBLICATIONS: The 1957 review (Fisheries of the United States and Alaska, 1957--A Preliminary Review), Fishery Leaflet 393, differs from previous ones in that it contains more complete and current domestic data and is available to the public and to the industry some weeks earlier than usual. In addition to data on production, processing, prices, and supplies of the domestic catch, there is considerable information on the fishery imports and exports and on world fisheries. Related bulletins also available are Packaged Fish--1957, C.F.S. 1755, and Canned Fish and Byproducts--1957, C.F.S. 1756.



United States Fishing Fleet^{1/} Additions

FEBRUARY 1958: A total of 50 vessels of 5 net tons and over were issued first documents as fishing craft during February 1958--19 more than in February 1957. The Gulf area led all others with 19 vessels, followed by the Chesapeake area

Table 1 - U. S. Vessels Issued First Documents as Fishing Craft, by Areas, February 1958

Area	February		Jan.-Feb.		Total
	1958	1957	1958	1957	
	(Number)				
New England	1	2	2	3	19
Middle Atlantic	2	3	3	5	23
Chesapeake	10	9	17	17	104
South Atlantic	8	3	23	11	130
Gulf	19	9	35	10	166
Pacific	7	3	13	5	102
Great Lakes	2	-	2	-	8
Alaska	-	2	-	6	48
Puerto Rico	-	-	-	-	1
Virgin Islands	1	-	1	-	-
Total	50	31	96	57	601

NOTE: VESSELS HAVE BEEN ASSIGNED TO THE VARIOUS SECTIONS ON THE BASIS OF THEIR HOME PORTS.

Table 2 - U. S. Vessels Issued First Documents as Fishing Craft, by Tonnage, February 1958

Net Tons	Number
5 to 9	18
10 to 19	8
20 to 29	8
30 to 39	12
40 to 49	3
50 to 59	1
Total	50

with 10, the South Atlantic with 8, the Pacific with 7, the Middle Atlantic and the Great Lakes with 2 each, and the New England area and the Virgin Islands with 1 each.

1/ INCLUDES BOTH COMMERCIAL AND SPORT FISHING CRAFT.



U. S. Fish Stick Production

JANUARY-MARCH 1958: The United States production of fish sticks during the first quarter of 1958 amounted to 16.9 million pounds, an increase of 2.5 million pounds or 17 percent as compared with the first quarter of 1957.

Table 1 - U. S. Production of Fish Sticks, January-March 1958^{1/}

Month	Cooked	Raw	Total
	(1,000 Lbs.)		
January	5,008	470	5,478
February	5,496	437	5,933
March	5,142	384	5,526
Total 1st Quarter 1958	15,646	1,291	16,937
Total 1st Quarter 1957^{2/}	13,171	1,312	14,483
Total 1st Quarter 1956	14,700	1,900	16,600

1/ PRELIMINARY.

2/ REVISED.

The Atlantic Coast States led all areas with 14.1 million pounds or 83 percent of the total. The Interior and Gulf States were in second place with nearly 1.5 million pounds or 9 percent of the total, followed by the Pacific Coast States with 1.4 million pounds or 8 percent.

Table 2 - U. S. Production of Fish Sticks by Areas, January-March 1958-1957

Area	1958 ^{1/}		1957 ^{2/}	
	No. of Firms	1,000 Lbs.	No. of Firms	1,000 Lbs.
Atlantic Coast States	24	14,070	26	11,682
Interior and Gulf States	5	1,452	4	1,522
Pacific Coast States	11	1,415	11	1,279
Total	40	16,927	41	14,483

1/ PRELIMINARY.

2/ REVISED.

Cooked fish sticks (15.6 million pounds) accounted for 92 percent of the first quarter total, while the remaining 1.3 million pounds or 8 percent consisted of uncooked fish sticks.

Production was greatest during February with 5.9 million pounds. Close to 5.5 million pounds were packed during each of the other two months in the quarter, January and March.

NOTE: ALSO SEE COMMERCIAL FISHERIES REVIEW APRIL 1958, P. 38



U. S. Foreign Trade

EDIBLE FISHERY PRODUCTS, FEBRUARY 1958: Imports of edible fresh, frozen, and processed fish and shellfish into the United States during February 1958 were down about 7.9 percent in quantity and 6.2 percent in value as compared with January 1958. Compared with February 1957, the imports this February were higher by 13.2 percent in quantity and 15.8 percent in value. The imports in February

Table 1 - United States Foreign Trade in Edible Fishery Products, February 1958 with Comparisons

Item	Quantity			Value		
	Feb.	Year	Year	Feb.	Year	Year
	1958	1957	1957	1958	1957	1957
Imports:	(Millions of Lbs.)			(Millions of \$)		
Fish & shellfish:						
Fresh, frozen, & processed ^{1/}	62.3	55.0	837.0	18.3	15.8	248.4
Exports:						
Fish and shellfish:						
Processed only (excluding fresh & frozen) ^{1/}	2.8	8.3	69.7	0.8	1.7	16.8

^{1/} INCLUDES PASTES, SAUCES, CLAM CHOWDER AND JUICE, AND OTHER SPECIALTIES.

1958 were lower than in January 1958 for other fillets, frozen tuna, shrimp, canned salmon, and canned sardines. These decreases more than offset higher imports of canned tuna. Imports of edible fishery products in February this year were up from the same month in 1957 for groundfish fillets, shrimp, and canned sardines and tuna. These increases in February 1958 were partially offset by decreases in the imports of lobster and spiny lobster tails, frozen tuna, and canned bonito.

United States exports of processed fish and shellfish in February 1958 were higher by 8.3 percent in quantity and 33.3 percent in value as compared with January 1958. Compared with the same month in 1957, the exports in February 1958 were down by 66.8 percent in quantity and 52.9 percent in value. The sharp decreases in both quantity and value this February as compared the same month in 1957 were due, primarily, to a shortage of the usual exportable types of canned fish.

* * * * *

GROUND FISH FILLET IMPORTS, MARCH 1958: Imports of groundfish (including ocean perch) fillets and blocks totaled 10.2 million pounds in March 1958. Compared with the same month in 1957, this was an increase of 1.0 million pounds (11 percent). Increases of 1.1 million pounds of groundfish and ocean perch fillets from Denmark and 1.3 million pounds from Canada accounted for the over-all increase.

Canada continued to lead all other countries exporting groundfish and ocean perch fillets to the United States with 7.6 million pounds during March 1958.

Denmark was next with 1.5 million pounds. Imports from Iceland, the United Kingdom, the Netherlands, West Germany, Japan, Miquelon and St. Pierre, and the Union of South Africa accounted for the remaining 1.1 million pounds.

Imports of groundfish and ocean perch fillets and blocks into the United States during the first three months of 1958 totaled 31.9 million pounds, a decline of 3.4 million pounds (10 percent) as compared with the same period in 1954. Canada accounted for 72 percent of the January-March imports, followed by Iceland with 17 percent, and Denmark 7 percent. Norway, United Kingdom, the Netherlands, West Germany, Japan, and Miquelon and St. Pierre made up the remaining 4 percent.

NOTE: SEE CHART 7 IN THIS ISSUE.

* * * * *

IMPORTS OF CANNED TUNA IN BRINE UNDER QUOTA, JANUARY 1-MARCH 29, 1958: The quantity of tuna canned in brine which may be imported into the United States during the calendar year 1958 at the 12½-percent rate of duty has been established as 44,693,874 pounds. Any imports in excess of this established quota will be dutiable at 25 percent ad valorem.

Imports from January 1-March 29, 1958, amounted to 8,352,090 pounds, according to data compiled by the Bureau of Customs.

* * * * *

VALUE OF IMPORTS AND EXPORTS OF FISHERY PRODUCTS, 1957: The value of all United States fishery imports in 1957 increased almost 5 percent over 1956, continuing the steady climb begun in 1949. Fishery products imports were valued at \$294.5 million, according to preliminary data compiled by the U. S. Bureau of Commercial Fisheries from the Bureau of the Census records. Edible fishery imports were worth \$250.2 million, 7 percent more than the previous year; nonedible products were worth \$44.3 million, almost 8 percent less than in 1956 and the lowest since 1950.

Principal Products	Value (Million Dollars)		Percentage Change from 1956 %
	1957	1956	
Imports:			
Groundfish fillets	17.8	18.7	- 5
Groundfish blocks	9.6	7.3	+ 32
Other fish fillets	21.7	19.9	+ 9
Tuna, frozen	16.8	15.3	+ 10
Tuna, canned	16.8	15.0	+ 12
Bonito, canned	3.7	3.3	+ 12
Salmon, canned	9.5	11.7	- 19
Sardines, canned	9.3	7.1	+ 31
Swordfish, fresh or frozen	7.0	6.4	+ 9
Shrimp	35.5	33.0	+ 8
Lobster and spiny lobster (fresh or frozen)	36.8	34.3	+ 7
Crab meat, canned	6.3	5.3	+ 19
Fish meal	9.7	11.5	- 16
Exports:			
Sardines, canned	2.8	6.5	- 57
Salmon, canned	4.7	3.6	+ 31
Mackerel, canned	2.1	0.3	+ 600
Shrimp	3.9	3.9	0
Fish oil, inedible	11.0	13.0	- 15

Bureau of Commercial Fisheries from the Bureau of the Census records. Edible fishery imports were worth \$250.2 million, 7 percent more than the previous year; nonedible products were worth \$44.3 million, almost 8 percent less than in 1956 and the lowest since 1950.

The value of most of the major fishery products imports was higher in 1957 than in 1956. The import value was up for groundfish blocks, canned sardines, canned crabmeat, canned tuna, frozen tuna, swordfish, shrimp, and lobster. The import value was down for groundfish fillets, canned salmon, and fish meal.

Exports of fishery products decreased 9 percent in value in 1957 as compared with the previous year. The total value of fishery exports was \$35.9 million; edible products were worth \$20.5 million; and nonedible products \$15.4 million. The value of edible products were 10 percent less than in 1956, and nonedible products 7 percent less. Of the major fishery products exported in 1957, the value of canned sardines and fish oil decreased; the value of shrimp exports remained almost the same. Increased export values were recorded for canned mackerel and canned salmon.



Virginia

FISH KILLS MORE COMMON IN SPRING VIRGINIA BIOLOGISTS STATE: Dead or dying fish on Chesapeake Bay and ocean beaches are a common sight in the spring, the Director of the Virginia Fisheries Laboratory, stated in an April 24, 1958, news release. Prior to the last week in April the Laboratory received reports of dead anchovies in large numbers at Virginia Beach, and dead striped bass or rockfish in the Piankatank River.

Fish kills are not always caused by pollution or other human activities, the biologists report, for most deaths are caused by natural forces, disease, storms, and the like.

Every year, in spring, just as the water begins to warm, dead and dying anchovies are often seen along the beaches inside and outside Chesapeake Bay. In 1957 the kill was unusually large, and included young croaker, spot, menhaden, and other species. There are at least two possible causes of such kills, a disease that reaches its peak in April, or physical damage by winds and moving sand in shallow water.

Winter diseases are known to kill other animals in Chesapeake Bay. Each year in early spring an increase in oyster mortality usually is observed. The oyster biologist at the Laboratory has made careful observations of the phenomenon, and almost every spring received complaints from oystermen that their oysters are dying. Preliminary studies suggest that this is caused by a microscopic animal that enters oysters in winter and thrives in cold weather.

Recent observations at the Virginia Fisheries Laboratory also have shown that oyster drills or screwborers begin dying in April.

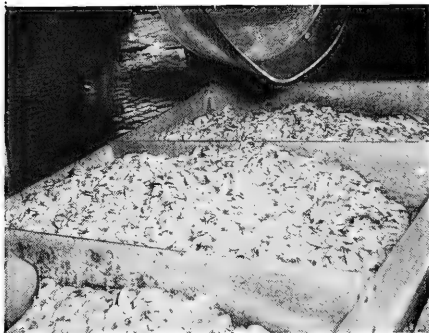
Striped bass often contract diseases that are associated with dietary deficiencies. These sometimes cause an eye condition similar to cataracts in humans. Lack of adequate food in winter probably deprives the fish of vitamins they require for good health, and by the end of winter some are so weak they succumb.

Anchovies and other fishes remain in deep water in the Bay or migrate south in winter. In spring, as the water warms, they move in close to the beaches, where more food is available. If a storm catches them in these shallow waters, they may be killed by suspended sand, which can remove their protective coating of slime and can damage their gills. Later, as the water becomes warmer, and more food has appeared farther offshore, they move out into areas where storm damage is less of a threat.

Determining cause of death in marine animals is difficult, because very little is known about fish diseases and symptoms. Biologists at the Laboratory urge fishermen and Chesapeake Bay tidewater residents to report all kills they observe, giving if possible the kinds and numbers of animals seen, the extent and location of the area affected, and any other pertinent details. Such information is useful to biologists in diagnosing causes of death



Wholesale Prices, April 1958



FRESH EAST COAST SHRIMP ON DISPLAY AT ONE OF THE STANDS IN THE NEW YORK CITY FULTON FISH MARKET.

The edible fish and shellfish (fresh, frozen, and canned) wholesale price index (122.4 of the 1947-49 average) declined 1.9 percent from the preceding month, but was higher by 2.5 percent as compared with April 1957. The decline is a seasonal one that usually occurs in the spring because landings of fish increase with good weather and improved fishing conditions.

Wholesale prices for the drawn, dressed, and whole finfish subgroup from March to April 1958 declined about 2.2 percent due to lower prices for the fresh-water varieties and fresh drawn haddock at Boston. A decrease in the wholesale prices of these products is normal for this period of the year because the Great Lakes production improves and haddock catches reach a peak level in April. Increases of 5 to 6 percent in frozen dressed halibut and salmon wholesale prices failed to offset the price declines for the remaining products in this subgroup. Wholesale prices for drawn, dressed, and whole finfish in April this year were 3.0 percent higher than in the same month of 1957 because higher wholesale prices for frozen dressed halibut and salmon offset lower prices for fresh haddock fillets and fresh-water fish.

During April 1958 the fresh processed fish and shellfish subgroup wholesale prices declined 1.8 percent from the preceding month due to lower fresh haddock fillet and

Table 1 - Wholesale Average Prices and Indexes for Edible Fish and Shellfish, April 1958 With Comparisons

Group, Subgroup, and Item Specification	Point of Pricing	Unit	Avg. Prices ^{1/} (\$)		Indexes (1947-49=100)			
			Apr. 1958	Mar. 1958	Apr. 1958	Mar. 1958	Feb. 1958	Apr. 1957
ALL FISH & SHELLFISH (Fresh, Frozen, & Canned)					122.4	2/124.8	126.9	119.4
Fresh & Frozen Fishery Products:					136.4	2/141.1	144.9	132.2
Drawn, Dressed, or Whole Finfish:					123.6	2/126.4	137.0	120.0
Haddock, lge., offshore, drawn, fresh	Boston	lb.	.08	.09	80.9	91.2	149.7	110.0
Halibut, West., 20/80 lbs., drsd., fresh or froz.	New York	lb.	.34	.32	104.7	99.0	97.5	92.3
Salmon, king, lge., & med., drsd., fresh or froz.	New York	lb.	.66	.63	149.2	2/142.4	141.0	134.8
Whitefish, L., Superior, drawn, fresh	Chicago	lb.	.74	.75	133.4	185.9	148.7	229.3
Whitefish, L., Erie pound or gill net, rnd., fresh	New York	lb.	.68	.80	136.5	161.8	128.4	227.5
Yellow pike, L., Michigan & Huron, rnd., fresh	New York	lb.	.31	.70	72.7	158.3	164.1	75.0
Processed, Fresh (Fish & Shellfish):					142.0	144.6	144.6	140.4
Fillets, haddock, sml., skins on, 20-lb. tins	Boston	lb.	.32	.35	107.2	119.1	165.0	120.8
Shrimp, lge. (26-30 count), headless, fresh	New York	lb.	.94	.96	148.5	151.7	150.1	143.8
Oysters, shucked, standards	Norfolk	gal.	5.63	5.63	139.2	139.2	133.0	142.3
Processed, Frozen (Fish & Shellfish):					132.4	140.9	141.1	130.9
Fillets: Flounder, skinless, 1-lb. pkg.	Boston	lb.	.40	.41	103.4	106.0	103.4	103.4
Haddock, sml., skins on, 1-lb. pkg.	Boston	lb.	.35	.40	109.9	125.6	125.6	92.6
Ocean perch, skins on, 1-lb. pkg.	Boston	lb.	.30	.30	113.8	113.8	113.8	114.8
Shrimp, lge. (26-30 count), 5-lb. pkg.	Chicago	lb.	.88	.94	135.3	144.3	145.8	145.8
Canned Fishery Products:					103.1	101.8	101.3	101.2
Salmon, pink, No. 1 tall (16 oz.), 48 cans/cs.	Seattle	cs.	23.00	23.00	120.0	120.0	120.0	120.0
Tuna, lt. meat, chunk, No. 1/2 tuna (6-1/2 oz.), 48 cans/cs.	Los Angeles	cs.	11.65	11.50	84.0	82.9	81.8	80.8
Sardines, Calif., tom. pack, No. 1 oval (15 oz.), 48 cans/cs.	Los Angeles	cs.	9.75	9.75	113.8	113.8	113.8	105.0
Sardines, Maine, keyless oil, No. 1/4 drawn (3 3/4 oz.), 100 cans/cs.	New York	cs.	7.50	6.99	79.8	74.3	74.3	81.9

^{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.

^{2/} Revised.

shrimp prices. Compared with April a year ago, the April 1958 index for this subgroup was down by 1.1 percent because lower prices this April for fresh haddock fillets (down 11.3 percent) and shucked oysters (down 2.2 percent) were only partially offset by a 3.3-percent increase in fresh shrimp wholesale prices at New York.

Frozen processed fish and shellfish prices were down by 6.0 percent in April 1958 as compared with the preceding month. Lower prices for frozen fillets of haddock (down 12.5 percent), ocean perch (down 2.5 percent), and shrimp (down 5.9 percent) accounted for the drop in the index between the two months. From April a year ago to April this year the frozen processed fish and shellfish subgroup index rose 1.1 percent due to higher wholesale prices for haddock (up 18.7 percent) and ocean perch (up 3.5 percent) fillets. These increases more than compen-

sated for a drop of 6.9 percent in the wholesale price for frozen 26-30 count shrimp at Chicago.

Canned fishery products prices in April this year as compared with the preceding month and the same month in 1957 continued to rise (up 1.3 percent). Prices of both canned tuna (up 1.3 percent) and Maine sardines (up 7.4 percent) were firmer this April as compared with the preceding month. Wholesale canned fish prices in April 1958 increased by 1.9 percent over the same month a year ago due to a 4.0 percent rise in canned tuna prices and an 8.4-percent increase in California sardine prices.

On the other hand, Maine sardine wholesale prices this April were still 2.6 percent below those that prevailed in April 1957.



To increase and maintain forever, for the people of the United States, a fishery resource capable of yielding the maximum annual product.

To strengthen and maintain a vigorous fishing industry by assuring full and fair access to its raw materials and full and fair access to the American market.

To do these things in partnership with the States and in full accordance with our international obligations.



International

FOOD AND AGRICULTURE ORGANIZATION

ATOMIC ENERGY AS POWER FOR FISHING VESSELS PREDICTED: A naval architect of the Food and Agriculture Organization (FAO) has predicted that fishing vessels powered by atomic energy will be in use "before many years have passed." He also said that the fishing boat of 1957 will possess many features which today are still in the idea stage.

The FAO Naval architect is secretary of the Second World Fishing Boat Congress, which is scheduled to be held in Rome in April 1959. He is arranging for the scientific papers on investigations and research which will be presented at the Congress. It is expected that naval architects, boatbuilders and designers, marine engineers, boat owners, skippers and fishermen, as well as government representatives from all the leading fishing countries will attend.

"Developments in fisheries are rapid these days," the Naval architect said. "When we had held our First International Fishing Boat Congress in 1953, we had a paper on gas turbines for fishing boats and several papers about factoryship design. Many participants thought we were too far ahead of practical possibilities, but today there are gas-turbine trawlers and dozens of huge factoryships operating, some in waters not before known to the fishing industry.

"Today, all kinds of interesting possibilities come to mind. There are advances in stern trawling, the use of stabilizers, and progress in automation. Why, it may not be many years before big factoryships can be sent to sea with a skeleton crew and have the main working crew join them by supersonic airplanes when needed.

"I venture to predict," he said, "that atomic-powered fishing vessels will be sailing the seas before many years have passed."

The 1953 Congress concentrated on design and construction. According to FAO, next year's Congress will take performance for its theme, and sessions will deal with fishing tactics, construction of vessels, sea behavior of boats, and productivity of vessels. The aim will be to gather from papers and discussions much practical design data; cost particulars and operational experience which will provide designers with information for building more efficient fishing boats.

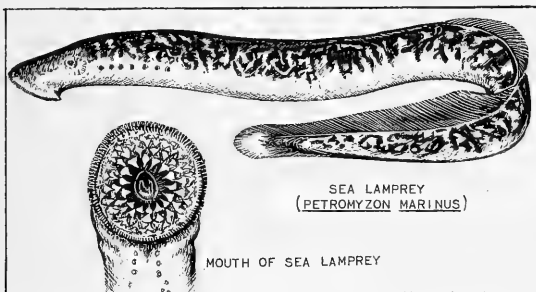
GREAT LAKES FISHERY COMMISSION

MEETING HELD IN WASHINGTON, D. C.: The Great Lakes Fishery Commission, established by treaty between the United States and Canada, met in Washington, D. C., April 9-10, 1958. The principal function of the Commission is the eradication of the sea lamprey predator which has so effectively destroyed most of the valuable food fishes of the upper Great Lakes.

Chairman of the Commission is L. P. Voigt, Conservation Director of the State of Wisconsin. Other United States members are Claude VerDuin, Mayor of Grand

Haven, Mich., and Donald L. McKernan, Director of the U. S. Bureau of Commercial Fisheries.

The Canadian Commissioners are: A. L. Pritchard, Director of the Conservation and Development Service of the Department of Fisheries, Ottawa; A. O. Blackhurst, Manager of the Ontario Council of Commercial Fisheries, Port Dover, Ontario; and W. J. K. Harkness, Chief of the Division of Fish and Wildlife of the Ontario Department of Lands and Forests, Toronto.



On hand to report progress and plans on behalf of the two Government agencies which are conducting the Commission's program were Dr. W. A. Kennedy of Canada and Dr.

J. W. Moffett of the United States Fish and Wildlife Service. They were accompanied by top members of their scientific staffs.

State conservation agencies were represented by Dr. Albert Hazzard of Pennsylvania, Dr. Mason Lawrence of New York, and Lee Roach of Ohio.

The principal method used to control the lamprey is the blocking of streams tributary to the Lakes. The lampreys are killed by electrical weirs on their upstream migration to spawning grounds. Another method has been the subject of experimentation, and very hopeful results are being obtained. This is the introduction into the streams of selective toxicants which kill the lampreys and their larvae but do not harm fish or leave a poisonous residue dangerous to human or animal life. Perfecting of this system will speed the work of lamprey control and bring nearer the time of rehabilitation of the lake trout and other commercial and sports fisheries.

INTERNATIONAL PACIFIC HALIBUT COMMISSION

CANADA APPROVES REVISED REGULATIONS: The Canadian Department of External Affairs has informed the U. S. Department of State that the Canadian Government in Order in Council No. P. C. 1958-446, March 29, 1958, has approved and enacted the revised Pacific Halibut Regulations drawn up by the International Pacific Halibut Commission in January 1958.

INTERNATIONAL WHALING COMMISSION

CONVENTION AMENDMENT RATIFIED BY FRANCE: The protocol amending the International Whaling Convention of 1946, done in Washington on November 19, 1956, has been ratified by France. Ratification was deposited on April 14, 1958, the U. S. State Department announced on May 5, 1958. The Protocol will not be in force until the required number of member countries complete ratification.

JAPAN-RUSSIA FISHERIES NEGOTIATIONS FOR 1958

JAPAN AND RUSSIA SIGN AGREEMENT ON SALMON QUOTA: The Japan-Soviet Fisheries Agreement for the 1958 North Pacific salmon season was signed on April 22, 1958, after more than three months of negotiations. The following are the salient features of the agreement: (1) the total salmon quota will be 110,000 metric tons; (2) Japan will be permitted to operate one fishing fleet in the Okhotsk

Sea with a total catch limit of 6,500 metric tons which will form part of the 110,000 quota; and (3) Japan and the U. S. S. R. have agreed to refrain from engaging in high-seas salmon fishing in the Okhotsk Sea beginning on January 1, 1959. The press has reported that the two countries have agreed to conduct a joint conservation survey in the Okhotsk Sea during 1958. Even if undertaken, the survey will not provide Japan with the right to fish for salmon in the Okhotsk Sea in the immediate future.

The press has been generally critical of the fact that Japan agreed to halt salmon fishing in the Okhotsk Sea stating in effect that Japan by this action gave up the principle of freedom of the seas. The Japanese Prime Minister vehemently denied this charge in Diet questioning on this subject. The view was expressed by the press that Japan should have accepted the 100,000-metric ton quota and left future fishing operations in the Okhotsk Sea to the results of the 1958 joint conservation survey. The Government of Japan, as reflected in statements made by the Agriculture-Forestry Ministry, considers the 1958 agreement to be considerably better than could have been anticipated at the outset of the negotiations, recalling that the initial Soviet proposal was to limit the Japanese salmon quota to 80,000 metric tons. The Government also considers the agreement favorable in view of the fact that it was not tied to the question of the Peace Treaty, although the safe fishing problem still remains unsolved. Japanese fishing industry representatives have indicated that they are reasonably satisfied with the new quota even though they, of course, would have liked to have obtained a quota closer to the 145,000 metric tons initially requested by Japan in the negotiations.

NORTHWEST ATLANTIC FISHERIES COMMISSION

ANNUAL MEETING FOR 1958 ANNOUNCED: The 1958 Annual Meeting of the International Commission for the Northwest Atlantic Fisheries was scheduled to convene at Dalhousie University, Halifax, Nova Scotia, Canada, in the week beginning June 9.

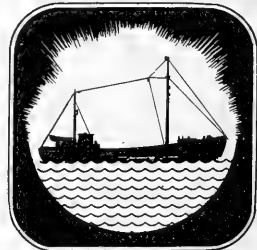
Commissioners, advisers, and experts from the 11 member countries will participate in the meeting. (Northwest Atlantic Fisheries Commission Newsletter No. 27, dated March 14, 1958.)

* * * * *

REGULATIONS OF THE TRAWL FISHERIES FOR COD AND HADDOCK EFFECTIVE: Following a circular note of November 15, 1957, from the Depository Government (United States), the International Commission for the Northwest Atlantic Fisheries (ICNAF) proposals of 1955 for regulation of the trawl fisheries for for cod and haddock in Subareas 3, 4, and 5 became effective as from January 1958.

The 1957 amendment to the regulations providing special rules for the use of cover for the protection of the cod end is being considered by the Governments concerned. The Governments of France and Norway have informed the Depository Government of their acceptance of the amendments.

In March-April 1957 a French expert visited Canada and the United States and participated in cruises with commercial fishing and research vessels for studying fishing methods, especially the means in use of protecting the trawl during hauling.



WHALING

ANTARCTIC WHALE-OIL OUTPUT DOWN SLIGHTLY BUT SPERM-OIL OUTPUT UP: Whale-oil production in the Antarctic during the 1957/58 pelagic whaling season declined slightly from a year earlier, according to preliminary data released by the International Whaling Commission, Sandefjord, Norway. Antarctic sperm-oil production, however, was one-fifth greater than the year before. The Antarctic season, ended at midnight March 16, 1958, and lasted 69 days, as did the season of a year ago.

Whale and Sperm Oil Production in Antarctic of Floating Factories, by Country, 1956/57 and 1957/58				
Country	Whale Oil		Sperm Oil	
	1957/58 ^{1/}	1956/57 ^{2/}	1957/58 ^{1/}	1956/57 ^{2/}
	(Short Tons)			
Norway	136,067	160,496	22,696	18,293
Japan	97,451	78,380	20,157	13,886
United Kingdom	53,857	57,065	6,780	5,335
Union of South Africa ^{3/}	-	15,411	-	750
Netherlands	19,382	16,359	2,362	1,223
Soviet Union	33,551	24,476	n.a.	1,226
Total	340,308	352,187	4/ 51,995	40,713

^{1/}PRELIMINARY.
^{2/}REVISED.

^{3/}PRODUCTION OF ABRAHAM LARSEN INCLUDED WITH JAPAN IN 1957/58.
^{4/}EXCLUDES SPERM-OIL PRODUCTION BY U.S.S.R.

The major Antarctic producer, Norway--with 9 floating factories--had a decline of almost one-sixth in whale-oil production, but output of sperm oil was one-fifth above that of 1956/57. Japan, operating 6 floating factories (in 1957/58 it acquired the former Abraham Larsen, which operated under the flag of the Union of South Africa in 1956/57), sharply increased both its whale-oil and sperm-oil production.

The United Kingdom, with 3 floating factories, had a slight decline in whale-oil output and an increase in sperm-oil output. Although the U. S. S. R. had only one floating factory in 1957/58, 6 catcher boats were added, to bring the total to 24 catchers--almost twice the number used by any other floating factory. Thus, the Soviet Union's whale-oil production was up sharply from last year. The Netherlands' single floating factory increased its whale-oil output 15 percent from last season, and its sperm-oil production was almost double that of 1956/57.



Aden

COMMERCIAL FISHERIES IN EASTERN ADEN PROTECTORATE STUDIED: A British fisheries officer was assigned to the Eastern Aden Protectorate in July 1956, for the purpose of developing the fisheries along the 450-mile coastline which extends from the Western Aden Protectorate to the Sultanate of Muscat and Oman. After operating for a year and a half on a very limited budget (the original four-year project had been allocated £28,000 (US\$78,873) from the British Colonial Development and Welfare Fund), in 1957 the Fisheries Officer received from the Ruler of the Qa'iti Sultanate, the most important state in the Eastern Aden Protectorate, a contribution of £18,000 (US\$50,704) for the project.

This sum of money enabled the Fisheries Officer to alter the ex-Scottish herring drifter with which he was provided, so as to make the boat more suitable for fishing in Aden waters. He has patterned the boat as much as possible along the lines of a purse seiner used in the United States. With this arrangement, and with some new nylon and kuralon nets from Japan (three floating gill nets of $\frac{1}{2}$ -inch mesh tied together), the Fisheries Officer recently made his first large catch--a haul of 5 tons of sardines (*Sardinella longiceps*). His technique was to set the gill net in a large semicircle around the school, and then run the boat across the mouth of the loop. Having caught almost the entire school, he let the net down for $\frac{1}{2}$

hour and was astonished to find that in this short time two smaller schools of sardines had entered the net as well. When the net was hauled aboard nearly every mesh was filled (figs. 1 and 2).

Though this was his first commercially-profitable catch, the Fisheries Officer made other catches



FIG. 1 - A LARGE HAUL OF SARDINES IN A GILL NET BEING HAULLED ABOARD THE VESSEL USED BY A BRITISH FISHERIES OFFICER IN EXPLORING THE FISHERIES OF THE EASTERN ADEN PROTECTORATE.

along the coast with various nets inherited from the Aden Colony Fisheries Department. His cotton kingfish net catches consisted primarily of small shark, which brings a very high price for drying in Aden. It was found that the trammel net brought up an assortment of sea life that considerably shortened the life of the net: sea-turtles, man-ta rays, crabs, crayfish, a mass of Murex shells, as well as small sharks, sole, rock cod, and other bottom feeders.

For commercial purposes, however, the Fisheries Officer intends to concentrate on surface netting, states an April 5, 1958 dispatch from the United States Consulate in Aden. There is little doubt in his mind that the surface fishing in southern Arabian waters is among the richest to be found anywhere in the world. In attempting to establish commercial fisheries which can be handed over to local management, the Fisheries Officer plans to exploit inshore surface fishing first, being confident that new grounds will not have to be sought for many years. This type of fishing is, moreover, more suitable to the type of native fishing craft being used along this coast.

A ready market exists for dried sardines in the hinterland of the Protectorate coast, both as a feed for livestock and as fertilizer for tobacco crops. The present system of preserving the fish, the simple and inexpensive method of letting them dry

in the sun and lacing them with salt, would be quite adequate for even the exportation of large fish, providing the fishermen could be persuaded to use clean salt and to gut their fish thoroughly. Training the fishermen in modern methods is, of course, at least one half of the Fisheries Officer's job. He finds that there are considerable obstacles to introducing new practices and equipment. In many localities the fishermen are the most conservative element in society and observe a ritual of arbitrary restrictions on their trade which have deep roots in religion and superstition. In some towns there are rules prohibiting the use of nets, or, variously, of different baits--live bait or dead bait, lures, or crabs. Sometimes night fishing is prohibited. These "rules of the sea" are legislated and enforced by the headmen of the fishing community in each town. Violators are tried by the headmen themselves in their own fisheries courts, and their rule is final.



FIG. 2 - A BOATLOAD OF SARDINES CAUGHT WITH GILL NETS.

Some areas have proved to be more conservative than others; it is often the smaller towns and villages, especially those that depend for their main livelihood on fishing, that have the greatest urge to improve their techniques and equipment. Qusa'ir, a small town near the Mahra Coast, is an example of the progressive and adventurous spirit that one occasionally finds. Each year the Qusa'iris send a fleet of shark fishing "sambuks" as far afield as Socotra, and they are the only ship builders along the coast--save the Adenis themselves--who build boats with bolted instead of sewn seams. Towns such as Qusa'ir are naturally only too happy to substitute nylon for cotton nets; in some cases cotton itself replaced cheap Indian jute fibres as recent as 20 years ago.

It is a fairly accurate generalization to say that while the bigger towns are conservative in temper, the smaller ones wish to go ahead. Unfortunately it is the first who have the money to change over, and the second who do not. The Fisheries Officer's successes in the smaller towns can never pay off until (and this is his plan) he has organized a viable industry in a large town where the big merchants will have an interest in the venture. Once established as a profitable enterprise, modern commercial fishing would probably expand as merchants go to other points along the coast to set up rival ventures. Only by the artificial system of extending substantial loans to individual indigent fishermen could modern gear be introduced initially in the small fishing towns.



Brazil

FROZEN TUNA MARKETED BY JAPANESE-SPONSORED FIRM: The Price and Supply Commission of the State of Pernambuco, Brazil, announced that 640 metric tons of fish were made available to Recife and other parts of Pernambuco during Holy Week (March 30-April 15), according to a dispatch from the U. S. consulate at Recife, dated April 7, 1958. A Japanese-sponsored Brazilian firm supplied 560 tons of frozen albacore tuna, which was sold at the standard retail price of Cr\$30 per kilo (about 14 U. S. cents per pound). The traditional native "jangada" fleet supplied 80 tons of fish to Recife at retail prices ranging from Cr\$70 per kilo (about 33 U. S. cents per pound) for dressed high-quality fish to Cr\$30 per kilo (about 14 U. S. cents per pound) for round inferior-quality fish.

The Brazilian-Japanese firm sells frozen tuna to wholesalers at Cr\$23 per kilo (about 11 U. S. cents per pound). The firm supplied tuna to other coastal cities of Brazil as follows: Rio de Janeiro, 60 tons; Salvador, 200 tons; Maceio, 50 tons; Natal, 50 tons; Joao Pessoa, 30 tons; and Fortaleza, 140 tons. It is reported that profits have been large enough to stimulate the interest of other private firms to establish modern fishing fleets of their own. It is believed that the "jangada" fishermen, which may be forced out of business as a result of their relatively small catches and the price competition, will be trained to work as crews of modern fishing vessels.

In all probability, Brazil's booming tuna industry should provide high food value protein to the low-income groups of the Northeast at reasonable prices. If expansion in the industry continues, Brazil may export tuna in quantity within a few years.

NOTE: BRAZILIAN CRUZEIROS CONVERTED AT RATE OF CR\$97.50 EQUAL US\$1.

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RETAIL PRICE FOR ALBACORE SET BY STATE COMMISSION: The Pernambuco State Supply and Price Commission has set the retail price of albacore tuna at Cr\$30 per kilo (about 14 U. S. cents a pound) after considerable discussion. Representatives on the Commission from local industrial unions and the army wanted the price set at Cr\$23 (about 11 U. S. cents a pound). It is estimated that the Japanese-sponsored fishing firm could make a profit at Cr\$23 per kilo if they were guaranteed a market for capacity production.

The native Brazilian fishermen are reported to charge Cr\$60-80 per kilo (28 to 37 U. S. cents a pound) for their catches. These fishermen would be hard hit in trying to compete with the Japanese-sponsored firm except for the fact that the consumer looks on albacore as a "poor man's" food. The Japanese firm at present has caught and marketed tuna only, but may later attempt to market whale meat. A small whaling firm at Joao Pessoa, Paraiba, has been purchased by the Japanese-sponsored firm, the United States Consulate at Pernambuco reports in March.

NOTE: CRUZEIROS CONVERTED AT RATE OF CR\$97.50 EQUAL US\$1.

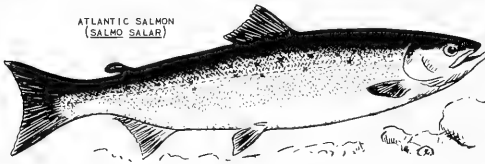


Canada

ATLANTIC SALMON MEETING: Specific recommendations for the improvement of Canada's Atlantic salmon stocks in the Maritime Provinces, Quebec, and Newfoundland were made at the annual meeting of the Federal-Provincial Co-ordinating Committee on Atlantic Salmon, held in Ottawa, February 11-12, 1958.

The suggestions made dealt with regulations as to netting, open seasons, control of poaching in certain areas, the stocking of streams from salmon hatcheries,

and mitigation of the damage done to salmon populations by the spraying of forests with DDT in efforts to wipe out the spruce budworm. In this connection, the Co-ordinating Committee reported that a search was being made for an insecticide other than DDT which would not harm fish.



Problems involved in efforts not only to halt the decline but to increase the Atlantic salmon populations were particularly complex because of the marked susceptibility of this species to even the slightest changes in its fresh-water environment, the Canadian Minister of Fisheries said. Frequently these changes were so subtle as not to be noticeable to the untrained eye but the effects were nevertheless drastic.

The Minister cited the case of several European countries which had at one time enjoyed large populations of salmon but had seen them become seriously depleted. Much of this depletion was attributable to the impact of spreading civilization on the inland waterways in which the salmon are hatched and nurtured in the years until they go to sea. (Canadian Trade News, February 1958.)

* * * * *

CONSUMPTION OF FISHERY PRODUCTS, 1955 AND 1956:

During 1956, the per capita consumption of fishery products in Canada amounted to 13.4 pounds (edible weight), a slight decrease as compared with 13.6 pounds in 1955, according to a recent statement of the Agriculture Division of Canada's Dominion Bureau of Statistics.

Canadian Annual Per Capita Consumption of Fishery Products, 1955-56		
Group	1956	1955
	.. (Lbs.) ..	
Fresh or frozen fish and shellfish	7.2	7.3
Cured, salted or pickled fish.	1.7	1.8
Canned fish and shellfish	4.5	4.5
Total	13.4	13.6

* * * * *

CONTAINERS OF SHELLFISH MEATS MUST BE LABELED WITH NET WEIGHT:

The Canadian Government on January 31, 1958, circulated a Directive to their personnel advising that henceforth all shucked shellfish must be labeled in terms of net weight. The part of the Directive from the Canadian Director of Inspection and Consumer Service states:

"7. Containers of shucked shellfish meats must be labeled in terms of net weight, as required by section 9 of the Fish Inspection Act. For example, a tin of shucked oysters must be marked _____ pounds net weight. However, the packer at his discretion may add the equivalent fluid measure designation properly identified as being either Imperial or U. S. measure."

The directive designates that the container must bear the name of the country of origin.

* * * * *

FUR-SEAL INVESTIGATION IN NORTH PACIFIC: The first Canadian group to begin research work on North Pacific fur seals left Nanaimo, British Columbia, on February 13 for a three-week cruise of waters offshore from Barkley Sound. This cruise initiated a program which calls for a Canadian catch quota of from 500 to 750 fur seals for scientific studies during 1958.

The quota was set by the new North Pacific Fur Seal Commission, which is made up of representatives of the United States, Canada, the U. S. S. R., and Japan, and which held its first annual meeting in Washington in January 1958.

The North Pacific Fur Seal Convention prohibits pelagic sealing and also provides for scientific investigation of the migratory movements of the seal herds, their wintering areas, and feeding habits.



FUR SEAL SWIMMING.

The commercial catch of fur seals is made each breeding season on the Pribilof Islands in the Bering Sea, and is strictly controlled. The Pribilofs are in United States territory. Smaller catches are made on the Commander and Robben Islands on the Asiatic side of the North Pacific.

The Canadian research group is made up of members of the staff of the Fisheries Research Board of Canada from the Board's Biological Station at Nanaimo. They will take their limited catch on the surface of the ocean, a form of sealing prohibited to any but authorized scientific investigators and Indians, Aleuts, Eskimos, and Ainos. The animals taken will be skinned and the contents of their stomachs examined. Pelts will be shipped to a fur-manufacturing firm for processing.

British Columbia fishermen, operating in coastal waters, have occasionally shot young fur seals under the impression that the animals were hair seals, thus risking heavy penalties. The method of distinguishing between the two species is by observing their manner of swimming. Hair seals swim only with the top of the head showing above water. Fur seals are in the habit of raising head and shoulders vertically out of the water and will frequently swim on their backs with flippers showing. (Canadian Trade News, February 1958.)

* * * * *

NEW TYPE HEADLINE ROPE DEVELOPED FOR MID-WATER TRAWLS: The headline ropes used in midwater trawl nets should be strong, light, relatively thin, and flexible. In these nets the headline completely encircles the mouth opening, whereas in bottom trawls the headline is referred to as the top rope to which the floats are attached. These ropes should be so constructed that they will not shrink or retain permanent twists after repeated immersion in water. To meet these requirements the Canadian Nanaimo Biological Station in British Columbia developed a headline which was constructed from preformed alternate-lay galvanized wire rope, sheathed with braided spun nylon rope.

In the first midwater trawls developed at the Biological Station the headlines were constructed from manila-clad wire rope (beiflex cable) to withstand the heavy strains imposed while towing. This type of headline rope was not extremely satisfactory because after immersion in the water only a few times, it twisted and pulled the netting in the wings and body out of shape. Most of the twisting was eliminated by use in the headline of shorter lengths of beiflex cable joined together by galvanized thimbles to a metal ring, at the points where the base of the wing corners were attached to the body. However, the alternate stretching and shrinking of the rope and the gradual weakening of the wire cores caused by the corrosive action of the salt water could not be overcome.

The new type of nylon-sheathed headline was constructed of 1-inch diameter 6x9 (12-6-1) galvanized preformed alternate right and left lay wire rope clad with a braided spun nylon sheath. Braided spun nylon was chosen for the sheathing to eliminate slippage of the knots in hanging the netting to the headline. The sheathing was marked with a continuous red line to assist in preventing twists and turns being placed in the rope when hanging the netting to the headline.

Although the cost of the new experimental headline was about three times that of the combination manila-clad wire rope, production on a commercial scale would undoubtedly reduce the price to an amount comparable with that for other ropes. This headline construction proved to be very satisfactory in the midwater trawl and ocean perch nets tested during experimental operations during the summer of 1957. The headlines remained flexible and no twists, kinks, or signs of shrinkage were observed in the ropes during the three months of experimental fishing. This rope was as easy to handle as other types of headline ropes. The rope could be spliced readily by paring the nylon sheathing away from the steel cable at the required place and afterwards covering the area again with a synthetic tape. The increase in the breaking strength and longer life of the new rope were important factors which would warrant its use in trawl nets.

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OCEAN PERCH DEEP-WATER EXPLORATIONS IN WEST ATLANTIC NORTH OF FLEMISH CAP: Exploratory fishing for ocean perch in the western Atlantic Ocean area north of Flemish Cap (a small fishing bank about 250-300 miles east of Newfoundland) by Canadian scientists of the Fisheries Research Board's Biological Station in St. John's, Newfoundland, was carried out by the station's M/V *Investigator II*. Depths between 100 and 396 fathoms were explored.

Ocean perch were absent in the trawl sets at 100 to 108 and 386 to 396 fathoms and scarce at 150 and 350 fathoms. They were most abundant at 250 fathoms where each of three sets produced a good catch. At depths of both 200 and 300 fathoms 1 set out of 3 gave good results.

In view of the small size of the net (a No. $\frac{3}{4}$ - 35 footer trawl with a 39-foot headrope and a 50-foot footrope), the short towing period of only a half hour per set, and the probable inefficiency of single-wire fishing, the catches at 250 fathoms were suitable for commercial exploitation.

As regards size, the proportion of small (less than 10 inches long) ocean perch present decreased from the

shallowest to the greatest depths. Below 150 fathoms, apart from a small decrease at 250 fathoms, ocean perch average sizes increased with increasing depth.

Neglecting the very small proportion of the fish less than 10 inches long, the catches were indicative of excellent suitability to the 200- to 300- fathom range where, considering the very small net used, there should be large ocean perch catches ranging upward to 10,000 pounds or more per hour's tow for the larger commercial dragners.

The bottom in the area north of Flemish Cap deepens gently and gradually and is smooth. There were no serious injuries to the net in 20 drags, although compared with the nets of large trawlers, the net of the *Investigator II* was a rather delicate one of cotton with a light manila cod end and with rubber rollers only six inches in diameter.

Trawlers fishing for ocean perch in this area must be prepared to drag as deeply as 200 to 250 fathoms and have winches operating at a fast enough speed to make deep-water fishing profitable. (Canadian Trade News, January 1956.)

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REFRIGERATED SEA WATER USE TESTED IN NORTH PACIFIC HALIBUT FISHERY: The use of refrigerated sea water to preserve halibut in the North Pacific Ocean fishery has been investigated by the Fisheries Research Board of Canada. Refrigerated sea water fish holding proved successful in the Board's earlier experiments on a salmon packer, and it was decided to apply a test to halibut fishing since the long holding time, required because of the length of a trip, dictated some improvement in holding methods. A halibut trip may consist of 12 days average fishing time plus 1 to 5 days returning to port, plus 1 to 5 days in port prior to unloading.

The vessel selected for the experiment was the *Silver Viking*, which was being built for private ownership, thus making possible the incorporation of the system into her original construction. Since this vessel was designed as a combination salmon seiner and halibut long-liner, it also made possible a study of the application of refrigerated sea-water holding to salmon seining. The vessel is a typical Pacific salmon seiner of wood construction, 78 feet long with a 22-foot beam. Six tanks were installed in her hold, three on either side of the shaft. The tanks were constructed of 3/16-inch steel plate and surfaces unsupported by the hold lining were stiffened by 2-1/2-inch angle irons toe-welded at two-foot centers. The inside surfaces were coated with an Epoxy resin coating to resist corrosion. Two inches of cork insulation were applied to the external surfaces.

Cooling coils, located in each tank, were made up of 250 feet of 3/4-inch O.D. steel tubing, the assembled coil being hot-dip galvanized. The coils were contained in closed compartments along the inboard tank sides. Circulation of the chilled sea water was provided through this compartment by a separate circulating pump for each tank. Refrigeration to these coils was supplied by two compressors (one for the three port tanks and one for the three starboard tanks).

To augment this refrigeration system there was a completely separate one comprising a shell and tube chiller, circulating pump, and refrigerant compressor. This system was used to speed up the initial cooling of any one tank but also served as a standby system in event of failure of the tank coil system.

All pumps and compressors were electrically driven. Power was supplied by two Diesel-driven alternating-current generators. These generators were of the 120- to 208-volt type which supplied either single phase 120-volt current for the small motors and ship lighting or 208-volt three-phase power for the larger motors.

The *Silver Viking* engaged in salmon seining in July and August of 1956. Round sockeye and chum salmon were brought to port in excellent condition after the week's fishing, and sockeye, after further sea-water storage to a total holding time of 14 days, was still judged to be excel-

lent. Some difficulty was encountered with the loss of scales and skin pigment of round coho and jack king salmon. The dressing of all fish of these species overcame this trouble whereas the dressing of sample individuals did not. These observations gave support to a theory that the damage was caused by a destructive enzyme disgorged with the stomach contents of these actively-feeding fish. Belief that this loss of scale and skin pigments was caused by the motion of fish in the tanks seems unlikely since this did not occur in loads composed entirely of nonfeeding fish or dressed fish.

The use of this equipment in salmon seining showed many advantages which may in the future be of value. First was the ship's ability to operate in areas remote from canneries or packers. Second was that no time was lost in the daily delivery of fish. Third was the much increased value of some types of fish when delivered by the fishing vessel itself directly to the port. This was emphasized by a week's catch of chum salmon which was delivered to the fresh fish market. The tank trunks on deck hindered the crew during salmon-seining operations while handling the net and brailing fish aboard. However, simple alterations were made which eliminated this difficulty.

The vessel engaged in halibut fishing in the December 1957 opening of halibut in Area 2. Some 36,000 pounds were caught and sold 8 to 15 days after catching. These fish were in fine marketable condition, and samples held in a tank at the Vancouver Technological Station to a total time of 29 days were still in good condition. Many advantages were demonstrated by this trip. Foremost was that halibut could be held beyond any period practical in fishing. Elimination of icing of fish increased the effectiveness of the crew, which would mean larger catches in periods of good fishing. The equipment in no way appeared to hinder the handling of gear or fish.

Of special interest to this project was the chiller which, as explained previously, was designed to assist in the initial cooling of the sea water and to a limited extent to act as an emergency system. However, since the first purpose was of great importance, the chiller was designed with a close tube spacing permitting high water velocity and hence a high heat transfer from the tubes. Thus a chiller of small outside dimensions which could be easily installed or dismantled for maintenance could be made. It was expected that this design would not permit attaining low temperatures, because of ice formation on the tubes. This, however, was not the case as it has been proven possible to cool water to 30° F. with the chiller.

The chiller had an outer shell of six-inch Kralastic pipe. The use of this material served three purposes: It reduced the weight of the chiller, eliminated corrosion of the shell, and provided sufficient elasticity to prevent rupture by freeze-up. The shell contained 240 feet of 5/8-inch O.D. copper refrigerant tubing arranged for dry refrigerant

expansion in six parallel circuits of four horizontal runs of tubing extending the length of the shell. Twenty semi-circular baffles direct the flow of sea water across the tubes. All refrigerant connections were on one end to permit easy removal of the shell for maintenance.

The success of this chiller altered the writers' opinions on design of refrigerated seawater equipment. With such small chillers being effective they can be relied on entirely for cooling without employing tank coils. This change would in turn affect other components of the system. For example, on such an installation as the Silver Viking the same flexibility and guarantee against failure could be

obtained with two compressors and two chillers as would otherwise be afforded by three compressors. Similarly, two compressors could be driven mechanically, whereas a third compressor warrants electrical generating and driving. The removal of coils from the tanks would simplify maintenance and permit the use of cheaper corrosion-resistant coatings. (Since the above report was made the Fisheries Research Board purchased the Silver Viking for its biological work out of its Nanaimo Station. Some modifications will be necessary to facilitate the sort of investigations which will be assigned to the vessel. These modifications are well under way. Canadian Trade News, January 1958.)

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RESEARCH ON THE USE OF METAL LOBSTER TRAPS: A new phase of research on the use of metal lobster traps may have far-reaching effects on the lobster fishery of Canada's Atlantic provinces. The new research was announced by the Canadian Fisheries Minister and was started early in March 1958.

The project, sponsored by Canada's Department of Fisheries through its Industrial Development Service, brings together in a concentrated 30-day program personnel of the Fisheries Research Board of Canada, the National Research Council, the Royal Canadian Navy, and the Department.

With the aid of professional divers, a diving chamber, underwater television, and movie cameras, the scientists, in conjunction with nontechnical members of the team, will invade the bottom-of-the-sea haunts of lobsters in the waters off Yarmouth, Nova Scotia.

The objective of the research, among other things, is to determine whether metal lobster traps are more economically practical than wooden traps in the catching of lobsters. Last year fishermen in the Maritimes, Quebec, and Newfoundland landed about 44 million pounds of lobsters which had a value to the fishermen of over US\$14 million.

This phase gives observers a ringside seat from which they can observe the behavior of lobsters in their native habitat. Findings will not be reached for some time but they are expected to go a long way toward solving the problem of trap losses by storms.

The HMCS Greenwood, of the Royal Canadian Navy, based at Halifax, will take part in the project. This vessel's diving chamber will be submerged on the lobster grounds and underwater movie and television cameras will record the actions of the lobsters. Other technical equipment will also be used to measure the effects of vibrations, currents, etc. In addition to the Naval vessel, three boats of the Department of Fisheries will participate in the operation. They are the Limada, Modiolus II, and Serpurla.

During the past four years metal traps have been tested on the various fishing grounds. The original project involved the use of steel traps fishing against wooden traps. The continuing experiment will include not only the old-type steel traps with three fishing heads and the door opening on the top, but also new steel traps with three fishing heads, the trap opening from the bottom, and catch locks on the ends; aluminum traps with three fishing heads with catch locks hooking under the bottom; nylon rope and twine; aluminum floats; high purity zinc anodes to help curb erosion of the steel traps; aluminum and fibreglass lobster buoys.

Experience gained in four years of testing under varied conditions in various parts of the Maritimes has proven that metal traps stand up better under gale and sea conditions than do traps made of wood. Metal traps also outlast wooden traps

by many years. Metal-producing firms are cooperating by supplying some of the traps necessary for the experiments.

Trap losses through storm have been one of the main problems lobster fishermen have had to face. Although the Department of Fisheries had sponsored trap insurance, only a portion of lobster fishermen have taken advantage of this protection. As a result, a severe storm can bring great economic hardship to noninsured fishermen. Coupled with information already tabulated showing the number of lobsters caught in both metal and wooden traps, the undersea observations should fill in the missing parts of the picture. (Canadian Trade News, February 1948.)

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SALT SUBSIDY FOR SALTED FISH PRODUCERS: It is the intention of the Canadian Government to continue in 1958 the policy of paying the Atlantic Coast producers of salted fish products a rebate of 50 percent of the cost of salt.

The Minister of Fisheries pointed out that fishermen producing these relatively low-priced products have been faced with controlled prices in many of the export markets and rising costs of production. The assistance has been paid for some years in the provinces of Newfoundland, Nova Scotia, New Brunswick, Prince Edward Island, and Quebec. The assistance does not apply to products sold in the United States. (Canadian Trade News, February 1958.)

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STUDIES ON HOLDING LOBSTERS IN ARTIFICIAL SEA WATER: Studies on how temperature and crowding affect the holding of lobsters in artificial sea water were conducted at the Fisheries Research Board of Canada's Biological Station at St. Andrews, New Brunswick.

The discovery that lobsters can live in artificial sea water has aided in the recent growth of inland markets for live lobsters. Suitable artificial sea water is easily prepared by dissolving five readily available salts in tap water. Many inland storage and display units that hold from 50 to 500 pounds of lobsters in artificial sea water are now in use and more are being built. Elaborate glass and stainless steel units with mechanical refrigeration, aeration, and filtration are manufactured. These are used primarily for display purposes.

If suitable water conditions are maintained in these units, the lobsters will remain active and form an attractive display for long periods. For practical reasons the volume of artificial sea water in inland holding units is limited and the lobsters are usually crowded. Under such conditions the waste products from the lobsters gradually accumulate and the water becomes murky and finally toxic. At this point the lobsters will weaken and die unless the water is replaced. The accumulation of toxic materials can be slowed down considerably and the appearance of the unit improved by filtering out the solid waste products as they are formed. However, even with efficient filtration the water eventually becomes toxic. If the water is not changed often enough unnecessary losses will occur. On the other hand too frequent changes mean a waste of time and money.

From general observations it was obvious that both the temperature of the water and the degree of crowding were important factors in determining how long the water would remain suitable. More precise information on the effects of these factors was obtained from the following experiments.

Fifty lobsters (total weight 50 pounds) were held in 50 (imperial) gallons of artificial sea water at each of four temperatures until all died. The water was not changed or filtered during the course of the experiment but was well aerated to provide an ample supply of dissolved oxygen. At 34° F. the lobsters lived an average of 26 days;

at 43° F., 19 days; at 57° F., 10 days; and at 68° F., 6 days. These results show clearly that the lower the temperature the longer the water will remain suitable.

Twenty lobsters (20 pounds total weight) were held in five different amounts of artificial sea water ranging from 10 to 80 gallons. This provided five degrees of crowding as follows; 1/4, 1/2, 1, 1-1/2, and 2 pounds per gallon. The water temperature was maintained at 40° F. and the lobsters were held in the same unfiltered but well-aerated water until all died. At 1/4 lb. per gal. the lobsters lived an average of 73 days; at 1/2 lb. per gal., 53 days; at 1 lb. per gal., 33 days; at 1-1/2 lbs. per gal., 22 days; and at 2 lbs. per gal., 16 days. It is clear that the water remains suitable longer when the lobsters are less densely crowded—over four times as long at 1/4 lb. per gal. as at 2 lbs. per gal.

At temperatures near the freezing point lobsters are sluggish and unattractive for display, and refrigeration costs are higher. There is also the danger of killing lobsters at very low temperatures, especially during the summer when they have been accustomed to warm water. Lobsters can be held at moderately high temperatures but the water must be changed frequently. The best compromise for most holding purposes appears to be a temperature of 40° to 45° F.

Lobsters can be held at various degrees of crowding but the more they are crowded the more often the water must be changed. In general the less the crowding the easier it is to provide adequate aeration and filtration and the longer the water remains suitable. In deciding the crowding that is best for his particular purpose an operator must consider the space required, the cost and appearance of his holding unit, and the inconvenience and loss of time involved in frequent water changes.

In inland holding one of the operator's primary concerns is knowing when to change the water to avoid unnecessary losses. Some lobsters are, of course, injured or weakened in shipment and will die shortly after they are placed in a holding unit. Such losses can to a large extent be avoided if each shipment is examined carefully and the weak lobsters are processed quickly. From the daily records of deaths in the experiments reported here and other similar experiments, it is possible to estimate how long the water will remain suitable at various degrees of crowding. If vigorous lobsters are held at 40° F. in unfiltered artificial

sea water, there should be no serious losses if the water is changed as follows: every 10 days when crowded to the extent of 2 lbs. per gal.; every 2 weeks at 1-1/2 lbs. per gal.; every 3 weeks at 1 lb. per gal.; every 5 weeks at 1/2 lb.

per gal.; and every 6 weeks at 1/4 lb. per gal. Lobsters that have become weak because of toxic waste products normally revive quickly when the water is changed. (Trade News, January 1958.)



Chile

NEW REGULATIONS FOR FOREIGN FISHING VESSELS PROPOSED: The Chilean Ministry of Agriculture has proposed a law regulating the granting of permits to foreign craft to fish in Chilean waters. The principal changes in existing regulations appear to be the following: (1) Permits are to be granted for a two-year period, whereas they were previously granted for one year. The decree states that renewal of this two-year permit may not be granted; (2) To qualify for issuance of such a permit, foreign craft must be not more than five years old, if of wood, and nor more than ten years old, if of other material. Furthermore, evidence that the vessel is of high-grade quality and construction must also be provided. This proposed law must be approved by the Ministries of Defense and Foreign Relations before being forwarded to the Comptroller General for final approval.



Colombia

LICENSE FEES FOR COMMERCIAL FISHING: Colombia Ministry of Agriculture Resolution 296 of March 10, 1958, establishes license fees and administrative procedures for obtaining licenses. The resolution was authorized by Article 16 (g) of the basic fishing regulation 0357, December 13, 1957, which gave the right to the Ministry of Agriculture to fix such fees and procedures.

The Resolution establishes these license fees:

- (1) Individual commercial fishing license: 2 pesos (44 U.S. cents).
- (2) Registration certificate for canoes, skiffs, or any small boats used in lake, river, or coastal fishing, that require two or more persons for operation: 15 pesos (US\$3.33)--valid for 1 year and issued to the owner.
- (3) Registration certificate for vessels, valid for 1 year, as follows (tonnages are gross, unless otherwise specified):
 - (a) Vessels weighing up to 2 tons: free
 - (b) Vessels weighing more than 2 tons but not more than 10 tons: 50 pesos (US\$11.12)
 - (c) Vessels weighing more than 10 tons do not have to purchase a registration certificate but must purchase a fishing permit.
- (4) Fishing permits for marine commercial fishing, valid for 1 year, as follows:

- (a) Vessels of more than 10 tons but not over 25 tons: 200 pesos (US\$44.46)
- (b) Vessels of more than 25 tons but not over 50 tons: 400 pesos (US\$88.92)
- (c) Vessels weighing more than 50 tons: 600 pesos (US\$133.38)
- (5) Registration certificate for foreign vessels, which are not connected in any way with Colombian firms or interests, and which are devoted to the fishery of marine mammals, tuna and tunalike fish, or live bait, in Colombian waters: US\$2.00--valid for 1 year.
- (6) Special permit for the fishery of marine mammals, tuna, and tunalike fish, or live bait, for vessels which are not connected in any way with Colombian firms or interests: US\$6 in the Pacific Ocean and US\$8 in the Caribbean Sea per net ton of registered weight of vessel. These special permits are valid for 100 days.

Licenses and permits may be obtained from the Ministry of Agriculture offices except that special permits for the fishery of marine mammals, tuna and tunalike fish, or live bait, will be issued only by the Director of the Division of Natural Resources or by the Chief of the Fish, Fish Culture, and Game Section.



Cuba

COOKED TUNA LOINS SHIPPED TO THE UNITED STATES: Shipments of cooked tuna loins to the United States have been made by the joint Cuban-Japanese fishing company according to news sources in Cuba. The tuna industry is new in Cuba and total exports to date have not exceeded 400 tons, including 250 tons of cooked tuna loins. Stocks on hand and available for export consist of 200 tons. The Japanese fishing vessel Sumiyoshi Maru (used as a training ship for Cuban fishermen and also as a fishing vessel) was the source of the tuna exported to the United States and Puerto Rico.

It was also reported that other Japanese firms are interested in making similar lease arrangements with Cuban firms as exist between the one joint Canadian-Japanese fishing company and the Sumiyoshi Maru. But the Cuban National Fisheries Institute has adopted a firm decision not to permit any further arrangements of this type. However, the Institute may permit the employment of foreign technicians and crews if the vessels fly the Cuban flag or are owned by Cubans.

The Sumiyoshi Maru departed from Habana on March 29, 1958, with another group of Cuban fishermen trainees and some Government scientific personnel. The vessel will conduct exploration activities and studies on the north coast of Pinar del Rio, the Yucatan Channel, south of the Isle of Pines, south of the Grand Caiman Islands, and south of Cienfuegos. This will be the first exploratory trip in purely Cuban waters during which a search will be made for new sources of bluefin, yellowfin, and albacore tuna, swordfish, sailfish, and other species. A well-known Cuban naturalist is aboard the vessel as the official delegate of the National Fisheries Institute. The scientific personnel will debark at Cienfuegos after which the Japanese vessel will continue its commercial fishing operations in the Atlantic and the Caribbean, returning to Habana about June 10 (United States Embassy in Habana, dispatch dated April 14, 1958).

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CLOSED SEASON FOR MOJARRAS AND SPONGES: The Cuban National Fisheries Institute imposed a closed season on the mojarra species of fish, including joturo, anguila, biajaca (tripletail), and dajao, effective April 1, 1958. The resolution putting into effect this closed season appeared in Official Gazette No. 53 of March 18, 1958, and will be in effect until cancelled by another resolution.

A closed season began on April 15, 1958, on the harvesting of sponges in the areas of the Western maritime zone, North of Caibarien, and South of Batabano, with the continuance of sponge fishing prohibited during the closed season off the coast North of Vuelta Abajo in the Province of Pinar del Rio. This closed season will also remain in effect until terminated by an appropriate resolution. The notice concerning this closed season appeared in the Official Gazette No. 65 of April 3, 1958. (U. S. Embassy in Habana dispatch, April 11, 1958.)



Denmark

METHOD OF COATING FROZEN FISH WITH HOT POLYETHYLENE: A method of packaging frozen fish which involves the manufacture of polyethylene as used (said to extend greatly the storage life of the product) has been patented in the United States. The patent was applied for by the chairman of the Danish Association of Producers of Flatfish, who is also president of a firm producing frozen and canned fish at Esbjerg, Denmark.

The new method works as follows: the frozen product passes on a conveyer belt from the freezer directly to a polyethylene extruder, which has a special exhauster that covers the product with a polyethylene film produced at the instant of wrapping. The product can continue on the same belt directly to the storage room.

Due to the great difference in temperature between the polyethylene film which is produced at a temperature of 180°C. (356°F.) and the frozen product which has a temperature of -30°C. (-22°F.), a difference of 210°C. (378°F.), the heat of the polyethylene has the effect of destroying a good deal of surface bacteria, without damaging the product, since this difference of temperature exists for only a brief part of a second. As the product is passed out

of the extruder, the air is evacuated from the polyethylene tube which is heat sealed at both ends.

Because of the characteristics of polyethylene the object appears as a glazed polyethylene inclusion. It is reported that this has the same effect as perfect glazing without any risk that this seal can become diminished by the influence of air or freezing. In addition, there are the advantages inherent in having the product polyethylene-enclosed.

This method of packaging can cut down the investment tied up in a variety of sizes of packaging, according to the inventor. Instead, a considerably-reduced stock of the raw material, polyethylene powder, may be kept, which has the advantage of being 100 percent usable regardless of any changes in product size.

It is reported by the inventor that this method is cheaper inasmuch as the polyethylene used is only the precise amount needed to cover the product, whereas in prefabricated polyethylene bags a certain amount of overhang is lost.

This method of packaging is also recommended by the inventor for extending storage life of frozen bread. (Quick Frozen Foods, March 1958.)

Ecuador

NEW FISHING LAWS PROPOSED: About the first of April the Ecuadoran Cabinet approved two new fishing laws which are expected to be approved by the President and promulgated.

The first of these new laws will open the Gulf of Guayaquil to foreign fishing vessels which have obtained the proper permits to operate in Ecuadoran waters. The principal benefit of this measure to foreign fishing vessels will be in the taking of bait for tuna fishing since the Gulf of Guayaquil abounds in bait which is very scarce in deeper waters.

The second of the proposed new bills is a complete general fishing law which the Ecuadoran Director of Fisheries states is modeled on the Peruvian law.

Ecuador hopes through these two measures to encourage the United States tuna fleet to return to Ecuadoran waters. Several years ago Ecuador had an income of around a half million dollars a year from the licenses and permits bought by United States tuna boats. This income has dwindled to almost nothing since the facilities granted by Ecuador have recently been extremely limited, particularly in the case of bait taking. Under the new laws it is probable that United States tuna boats will return in force to Ecuadoran waters and to the high seas off the coast of Ecuador and that Ecuador's income from fishing licenses will return to the level of several years ago (U. S. Embassy in Quito, dispatch dated April 3, 1958).

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SHRIMP FISHERY TRENDS: Late in March 1958 considerable attention was given by the Ecuadoran press to the status of the shrimp export industry, due to rumors that official approval would be given for the importation of foreign-built shrimp vessels. These rumors caused some criticism regarding the need to protect Ecuador's small shipbuilding industry. In addition, some fears were expressed as to the future of the shrimp resources off the coast if unregulated competition for the available supplies took place, an April 14, 1958, dispatch from the United States Embassy in Quito reports.



Honduras

FISHERIES TRENDS: The fisheries of Honduras are located principally in the vicinity of the offshore Bay Islands, in the Caribbean Sea. During 1957, construction of a freezing plant was started which will, when completed, provide facilities for a fleet of five vessels. The company operating the fishing vessels expects to supply the Honduras market, but the bulk of the shrimp catch will be exported to the United States, according to a March 1958 dispatch from the United States Embassy in Tegucigalpa.



Iceland

ELECTRIC TRAWL DEVELOPED FOR HERRING FISHERY: Two Icelandic brothers have sought a patent for an electric trawl which is specially adapted for use in the herring fisheries but also can be used for other fish, according to Fiskaren (April 9, 1958), a Norwegian fishery trade paper. Patents are being sought in Denmark, Germany, the United States, and many other countries. A patent has

been issued in Sweden and it is expected that the first electric trawl of this type will be built there.

The trawl is constructed in such a way that an electric current is sent through the towing cables from a generator in the stern of the vessel. This creates electric fields in the water around the trawl so that the fish are stunned and drawn into the trawl. The method is said to be very simple and does not require unusual or heavy expenses.

Icelandic fishery authorities have indicated an interest in the trawl and are following closely the further experiments.

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SELECTED FISHERY EXPORTS, 1957: Iceland's exports in 1957 include several fishery items of interest to the United States fisheries. There was a considerable increase in exports of herring oil, herring meal, and fish meal as compared with 1956. Exports of frozen fish and ocean perch meal were lower (Statistical Bulletin, January 1958, National Bank of Iceland).

Selected Icelandic Fishery Exports, 1956 and 1957				
Product	1957		1956	
	Qty.	Value 1/	Qty.	Value 1/
	Metric Tons	US\$1,000 (FOB)	Metric Tons	US\$1,000 (FOB)
Frozen fish.	57,089	19,938	57,480	20,243
Herring oil.	8,664	1,652	5,331	1,047
Herring meal.	8,090	1,262	1,876	292
Ocean perch meal.	4,940	728	5,914	866
Fish meal.	24,264	3,658	20,278	3,053

NOTE: VALUES CONVERTED AT RATE OF 16.26 KRONER EQUALS US\$1.



Japan

KING CRAB CANNERY VESSEL SAILS FOR BERING SEA: The 5,385-ton crab cannery vessel Tokai Maru sailed early in April 1958 for Bristol Bay, in the Bering Sea, to fish for and process king crabs. The first vessel of its type to leave Japan this year, it is expected to return with 684 tons of canned crab meat, according to a news release from Hakodate.

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SALMON FISHING FLEETS LEFT FOR NORTH PACIFIC ON MAY 5: The 1958 salmon fishing season in the North Pacific was initiated on May 5, 1958, when 16 mothership fleets departed for the fishing grounds. This is the same size fleet as the one that operated in 1957. Only one fleet with 28 catcher boats will operate in the Okhotsk Sea in accordance with the new Japanese-Soviet fisheries agreement, while the other 15 fleets will operate in the Aleutians area west of 175° W. longitude. Last year two fleets operated in the Okhotsk Sea.

The quota this year is 110,000 metric tons (last year 120,000 tons). The total number of catcher boats operating this year is about the same as last year. In 1957 a total of 461 catcher boats were attached to the 16 mothership vessels. The Japanese fleets generally start operating in the easternmost zone and work westward as the season progresses. It is the early season's fishing that yields the bulk of the Japanese red salmon catch, and as the fleets approach the waters off Kamchatka the Asian-spawned pink salmon predominate.

The Japanese Fisheries Agency has announced detailed plans for sending survey vessels to the fishing grounds. Eight survey vessels, headed by the 1,098-ton Toko Maru, are scheduled to study the salmon resources along the Kamchatka Peninsula. The press had announced that the studies would include the Okhotsk Sea, but official Japanese sources state that the final decision on this matter has not been reached.

Also on May 2 each fleet was assigned its catch quota. The total quota for mothership salmon fishing during 1958 was set at 91,667 tons (of which 6,000 tons was assigned to the Okhotsk fleet). Shore-based salmon fishing vessels based on Hokkaido have been given a quota of 18,333 tons.

Prices to be paid by mothership operators to catcher boat operators during the 1958 salmon season were established at a level 5-6 percent lower than for the previous year. By species the following prices were agreed upon: red salmon ¥300 kan (10 U. S. cents a pound); white salmon ¥125 per kan (4 U. S. cents a pound); pink salmon ¥75 per kan (2.5 U. S. cents a pound); and king salmon ¥205 per kan (6.9 U. S. cents a pound).

NOTE: CONVERSIONS MADE AS FOLLOWS: 1 KAN EQUALS 8.27 POUNDS; ¥360 EQUAL US\$1.

JAPANESE GOVERNMENT



Mexico

ENSENADA FISHERY TRENDS, FIRST QUARTER 1958: Spiny Lobster: The open season for spiny lobsters on Mexico's west coast closed on March 15, 1958, with a catch of about 1.8 million pounds. As a catch of 2.0 or more million pounds had been anticipated, the fishermen in this area considered it a poor season. The catch for the last month of the season fell far below normal due to heavy rains and ocean storms. Prior to the opening of the season, an Ensenada spiny lobster company had contracted to purchase the entire anticipated catch at 45.5 U. S. cents a pound provided the catch reached or exceeded 2.0 million pounds. As the catch fell below this amount, the price paid was only 44.5 U. S. cents a pound, which reduced the income to the lobster fishermen.

Canning: The severe storms also had an adverse effect on the Ensenada fish canneries. One firm reported curtailing operations by about 30 percent because of lack of fish. With improved fishing weather it was expected that operations would return to normal.

Abalone: Informal studies are under way to find ways and means of increasing the abalone catch. Fishermen in the area are trying to have the present January-February closed season extended in order to allow more time for spawning, an April 9, 1958, dispatch from the United States Consul at Tijuana reports.

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GULF OF MEXICO PORTS RESTRICT SERVICES TO FOREIGN FISHING VESSELS: A new order issued recently by the office of the Mexican Secretary of the Navy, states that all fishing boats of foreign nationality touching any Mexican Gulf of Mexico port can obtain provisions, including food and fuel, for 48 hours only. But the vessels cannot buy ice or equipment since it is believed that with the amount of provisions authorized the vessels can reach their home ports. Repairs to boats will be authorized directly by the Director General of the Merchant Marine, following investigation of the condition of the boats by the port captains and designated inspectors. (United States Consul, Tampico, Mexico, March 31, 1958.)



Norway

FAILURE OF WINTER HERRING FISHERY DUE TO COLD SURFACE WATER: According to a Norwegian fisheries consultant, ocean investigations indicate that the failure of the 1958 winter herring fishery was due to the incursion of cold surface water from the Baltic Sea. He stated that there was actually enough herring

off the Norwegian Coast to have enabled the fishermen to land twice as much as in a normal year, but the Baltic water drove the herring to greater depths than usual. When the herring were caught and brought to the surface they went wild and burst the nets.

The fisheries consultant maintains that there is no reason to be pessimistic about the future of the herring fishery. Only historical data are available for appraising the so-called herring cycles, he said, and assumptions that herring will disappear from the Norwegian coast are based on mere hypotheses. If this should occur ocean research would provide ample warning (News of Norway, April 17, 1958).

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FISHERIES TRENDS THROUGH MARCH 15, 1958: Cod: During the week ending March 15, 1958, in Finnmark, Lofoten, and in the districts south of Lofoten landings of spawning cod were higher. At Troms and Vesteralen the seasonal falling-off seems to have begun. Landings for the season through March 15 totaled 39,262 metric tons as compared with 36,950 tons at the same time last year. Of the landings 14,565 tons were sold for drying, 15,619 for curing, and 9,078 tons for fresh purposes. A quantity of 1,665 tons of cod liver oil was produced; 1,175 tons of roes were sold for curing, and 1,228 tons for fresh purposes and for canning.

Herring: The winter herring fishery improved in the Haugesund district where the net fishing was mostly satisfactory, and purse seiners had some catches at sea off Alesund during the week ending March 15. Shoals of winter herring have been found off the coast of Nordland county as far north as off Lofoten. Purse seiners have been in touch with these shoals. The total landings of winter herring as of March 15 were 319,947 metric tons of which 59,713 tons were sold for fresh purposes, 79,008 tons for curing, 7,171 tons for canning, 164,008 tons for reduction, and 10,047 tons for other purposes.

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HERRING FISHERMEN GRANTED SPECIAL FINANCIAL CREDIT: The Norwegian Government announced early in March 1958, that the Bank of Norway, through commercial banks, will furnish fishermen in economic difficulty with short-term working credit. The credit will be limited to kr.1,700-1,800 (US\$238-252) per fisherman. This aid has been made necessary by the very poor winter herring season this past year (the second during the past two years) and is limited to credit only for herring fishermen. This measure differs from the recent relief measures granted to the cod fishermen, which calls for a fund of kr.15,000,000 (US\$2.1 million) to support cod prices (United States Embassy in Oslo, dispatch March 14, 1958).

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HERRING OIL PRODUCTION DOWN SHARPLY IN 1958: Norwegian herring oil production from the 1958 winter and spring herring fishing season (ended April 2) was less than one-third that of 1957--about 17,000 short tons as compared with 55,000 tons in 1956.

If the herring catch this summer is average, herring oil output for 1958 should be around 28,000 tons, against 72,750 tons in 1957, and a record of 114,630 tons in 1956. This is the lowest herring oil yield since 1947, when only 22,000 tons were produced, and is slightly less than the 29,400 tons produced in 1949.



Panama

EXPANSION OF SHRIMP INDUSTRY SLOWS DOWN:

The rapid expansion of Panama's shrimp fishery which started in mid-1956 and swelled capital investment to an estimated US\$6.2 million by June 1957 appears to have come to a halt. To the extent possible, proposed expansion plans have been deferred until the future of the industry can be reappraised. Disappointing returns of new independent boat owners has caused new risk capital to withdraw from the industry. This "new" capital, which was the principal contributor in the expansion of the shrimp fleet, flowed from the Panamanian professional man, the businessman, and even the skilled carpenter with the anticipation of a quick fortune. Panamanian boat builders, who were unable to accept additional orders for new boats in July 1957, report numerous cancellations, and in some instances stop orders after the boat is under construction. Uncertainty exists with respect to existing orders, the United States Embassy in Panama states in a March 17, 1958, dispatch.

Panama's shrimp fleet numbered 203 trawlers as of January 22, 1958, an increase of 113 boats since June 1956 but a substantially greater increase in actual fishing power as most new boats are the 60-foot trawler. The rapid expansion in the fleet has placed a premium on experienced, reliable captains and trained fishing crews. Many of the boats have been placed under newly-licensed captains, (whose past experience was that of a seaman) and untrained crews. New boat owners have found the catch per trip disappointingly short of that anticipated in estimating earnings on their capital investment. Many boat owners suspect bootlegging of shrimp by the vessel at interior ports and "over the side." Experienced members of the shrimp industry are concerned that the sharply-reduced catches of the boats per trip may indicate that Panama's shrimp resources are being overfished.

There are seven shrimp packing companies presently operating in Panama. A new company has a small freezing plant located near the national abattoir in the suburbs of Panama City and is owned by the original organizers of a fish meal plant. Only three boats are working for the company, two of which are company-owned.

Forty-six trawlers were added to the shrimp fleet in the seven-month period, June 1957-January 1958. The fleet of one company has experienced the largest increase with a total of 18 trawlers. All the trawlers are independently owned. Three other companies have increased their fleets by eight each. The expansion pattern has been for the established shrimp companies to hold their investment in boats to normal replacement and expand their fishing fleet through contract with independent boats. Three-fourths of Panama's shrimp fleet is working for two companies. These two companies account for about 80 percent of the total production of frozen shrimp.

In 1957 Panama exported an estimated 8.2 million pounds 1/ of frozen shrimp as compared with 6.0 million pounds 2/ shipped in 1956. With allowance for an over-estimate in 1957 export figures, shipments for the year

1/ PRELIMINARY FIGURES BASED ON MONTHLY EXPORTS.

2/ REVISED ON BASIS OF DATA RECORDED FROM SHIPPING MANIFEST.

NOTE: IMPORTS OF SHRIMP BY THE UNITED STATES FROM PANAMA IN 1957 TOTALLED 8,378,000 POUNDS ACCORDING TO UNITED STATES DATA.

are believed to have exceeded previous records by over 2 million pounds. On the basis of available data, the export price averaged just under 75 cents a pound in both years. Total catch is not available, but allowing 800,000 pounds for consumption in the Panamanian and Canal Zone markets, 1957 production approximated 9 million pounds. The increase in production of between 2 and 2.5 million pounds was due almost entirely to the extraordinary catch of pink shrimp. Generally the pinks are taken in abundance for two to three weeks in the month of March. In 1957, the season started in November and by the end of January over 1 million pounds had been taken. The season reached its height in the last week of February but continued on through March. The total take is believed to have exceeded 3,000,000 pounds. The catch of large whites for the year held at about the same level as in 1956.

Trade reports that the catches of the boats have declined sharply. The average catch per trip is around 100 pounds per day. For a five- to seven-day trip the boat takes is now from 400 to 700 pounds as compared to 1,500 to 2,100 pounds a year ago. Many of the independent boats are extending their trips to as much as 23 days in a hope of increasing their catch. The loss in spoilage, however, offsets a large part of the gain after the tenth day out. Boat maintenance costs have increased sharply since the shortage developed in experienced fishing captains and crews. Trade recognizes that 1957 cannot be considered a normal year as radical changes in fishing patterns were noted all along the Pacific Coast. Trade also recalls that the catch per boat in 1952 and 1953 was about the same as the present take although Panama's shrimp fleet numbered less than 20 small trawlers.

The pink shrimp appeared in the Gulf within reach of the fleet February 29, 1958. Catches, however, were spotty and were located in rocky areas which were difficult to fish without ruining the net. The heavy run was expected within the next two weeks.

As of January 22, there were 12 boat-building yards in operation in Panama City with three additional boats under construction by independent contractors. There are 16 boats under construction in Panama City and 16 more boats reported under construction in Taboga, Guarare, Garachine (Darien), and Colon. Most of the new boats are the 60-foot trawler with a gross tonnage of 59.9 and a net of 38.7. Completion of these boats will swell Panama's shrimp fleet to 278 trawlers. Boat yards report an additional 35 trawlers on order. However a number of orders are not considered firm; construction is known to have been suspended on three boats. It is reported that 6 or 8 shrimp boats have moved to El Salvador and 2 or 3 to Colombia and Brazil. Several others are expected to go to Colombia. Allowing for normal replacement of overaged boats and transfer or sale of independently-owned boats, particularly those built and owned by capital interests outside the shrimp industry, the Panama shrimp fleet probably will level off at 250 to 275 trawlers.



Peru

ANCHOVY AND BONITO LANDINGS LOWER IN 1957/58 SEASON: Sharply curtailed supplies of anchovies and bonito have resulted in higher prices for fish meal and canned bonito produced in Peru. It is estimated that the bonito pack for the 1957/58 season will be about 600,000 cases, only one-third of the pack for 1956/57. A survey made by a leader in the industry showed that the canning and fish meal plants in the Chimbote area were operating at about 20-25 percent of capacity for this season of the year.

Catches of anchovies for the fish meal plants have been good in a cold-water area 150 miles south to 50 miles north of Callao, but because of the distance involved these catches cannot be transported to the Chimbote area without spoiling, the United States Embassy in Lima reports in a March 10 dispatch.

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REPORT OF JAPANESE FISHING OFF COAST UNCONFIRMED: None of the public or private news sources contacted in Peru were aware of Japanese fishing off the Peruvian coast. These sources stated that there is absolutely no arrangement between the Government of Peru and the Japanese concerning fishing off the Peruvian coast. No permits or licenses have been issued to Japanese vessels and none have been applied for. Whether or not applications have been made to Peruvian officials abroad is unknown, an April 15, 1958 dispatch from the United States Embassy in Lima reports.



Poland

OCEAN FISH CATCH: Poland's total ocean catch of fish in 1957 amounted to 125,000 metric tons--2½ times more than the catch in 1948, according to the April 4 issue of *Trybuna Ludu*. Plans for 1958 call for a 15-percent increase over 1957, with changes contemplated in the "exploitation system" of open sea fishing and in the catch assortment. The 1958 plan calls for a catch of 6,000 tons of herring.

With an eye on the rapidly growing Polish population (500,000 increase annually), a catch of 200,000 tons in 1960 and 500,000 tons in 1975 will be needed, states an April 8, 1958, dispatch from the United States Embassy in Warsaw.

The long-range plan obviously calls for rapid construction of a long-range, modern fishing fleet, equipped with the appropriate catching and processing equipment, and based on extensively developed shore and distribution facilities. To date the inadequacy of shore processing and refrigeration facilities has limited the total fish catch, and has been the cause of serious spoilage and waste.



Portugal

CANNED FISH EXPORTS, JANUARY 1958: During January 1958 Portugal's exports of canned fish amounted to 3,078 metric tons (195,510 cases), valued at US\$1.8 million, as compared with 2,315 tons, valued at US\$1.5 million, for the same period in 1957. Sardines in olive oil exported during January 1958 amounted to 2,238 tons, valued at US\$1.3 million.

In January 1958 the leading canned fish buyer was Germany with 604 tons (valued at US\$352,000), followed by Italy with 322 tons (valued at US\$178,000), the United States with 255 tons (valued at US\$207,000), Belgium-Luxembourg with 228 tons (valued at US\$122,000), and Great Britain with 224 tons (valued at US\$125,000). Exports to the United States consisted of 104 tons of sardines, and 151 tons of anchovies. (*Conservas de Peixe*, March 1958.)

Portuguese Canned Fish Exports, January 1958		
Product	1958	
	Metric Tons	US\$ 1,000
Sardines in olive oil	2,238	1,283
Sardinelike fish in olive oil	403	276
Sardine & sardinelike fish in brine	69	19
Tuna & tunalike in olive oil	76	61
Mackerel in olive oil	278	139
Other fish	14	11
Total	3,078	1,789

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CANNED FISH PACK, JANUARY-NOVEMBER 1957: The total pack of canned fish for January-November 1957 amounted to 53,493 metric tons as compared with 50,644 tons in the first 11 months of 1956. Canned sardines in oil (31,300 tons) accounted for 58.5 percent of the January-November 1957 total pack, higher by 8.3 percent than the pack of 28,902 tons for the same period in 1956.

The Portuguese pack of canned sardines in oil totaled 6,818 tons during November 1957. The pack of all canned fish in November 1957 amounted to 7,619 tons, the March 1958 Conservas de Peixe reports.

Product	Net Weight	Canners' Value
	Metric Tons	US\$ 1,000
In Olive Oil:		
Sardines	31,300	18,767
Sardinlike fish	11,049	5,418
Anchovy fillets	2,879	2,866
Tuna	1,496	1,092
Other species (incl. shellfish)	744	490
In Brine:		
Sardinlike fish	4,976	1,248
Other species	1,049	297
Total	53,493	30,178

NOTE: VALUES CONVERTED AT RATE OF 26.75 ESCUDOS EQUALS US\$1.

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CONSUMPTION OF FISHERY PRODUCTS INCREASES: At a launching ceremony held at Viana do Castelo a government delegate to the fishing industry stated that Portugal's consumption of fishery products had increased from about 68.3 pounds per capita in 1942 to about 114.5 pounds in 1957. He also stated that Portugal ranks third among European countries in per capita fish consumption. The increase has been made possible in part by gains in the number and the efficiency of the fishing fleet.

The 1958 catch, he stated, should be greater than in 1957, with four new cod fishing vessels, 7 new ocean-going trawlers, and 10 new coastal trawlers.

EDITORS NOTE: PROBABLY REFERS TO PRODUCT WEIGHT RATHER THAN EDIBLE WEIGHT, BUT THE REPORT DID NOT SPECIFY.



South-West Africa

FISHING INDUSTRY REVIEW: Fishing, an industry that has gained major importance only since the end of World War II, plays an important part in the economy of South-West Africa. Investment in the industry amounts to over £4 million (US\$11.2 million). Most of the fishery companies in South-West Africa are registered companies which originally stemmed from Union of South Africa companies. The most important products are sardines (pilchard) and spiny lobster.

Table 1 - South-West Africa's Production of Sardine and Spiny Lobster Products, 1950-57

Year	SARDINES (PILCHARDS)						SPINY LOBSTER					
	Canned		Meal		Oil		Canned		Frozen Tails		Meal	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	1,000	US\$	1,000	US\$	1,000	US\$	1,000	US\$	1,000	US\$	1,000	US\$
	Lbs.	1,000	Lbs.	1,000	Lbs.	1,000	Lbs.	1,000	Lbs.	1,000	Lbs.	1,000
1957	85,676	10,746	93,536	4,654	21,586	1,672	1,803	1,518	1,374	1,058	3,369	151
1956	65,520	8,218	99,310	4,970	26,190	2,030	1,995	1,674	776	596	2,778	104
1955	46,308	5,807	103,756	5,194	23,718	1,859	2,350	1,974	905	697	3,806	160
1954	34,080	4,276	108,204	5,415	37,384	2,618	2,542	2,136	635	490	4,540	171
1953	21,160	2,962	123,010	5,166	21,252	2,083	2,740	2,304	1,096	692	5,220	151
1952	5,225	792	74,646	3,136	16,204	1,588	2,893	2,430	1,937	1,221	4,646	148
1951	3,867	585	34,690	1,456	9,638	944	1,924	1,078	415	260	3,274	101
1950	-	-	6,808	286	-	-	1,688	899	448	280	2,784	67

NOTE: VALUES CONVERTED AT RATE OF £1 EQUALS US\$2.80.

The principal market for frozen spiny lobster is the United States and the product is shipped on United States vessels. There is also a well-established market for canned lobster, equally divided between the United States, United Kingdom, and Belgium.

Canned sardines are another important product of the fishing industry, but the United States is not considered a good market. The primary markets for this product are the United Kingdom, countries along the west coast of Africa, and Singapore. Only when the California sardine catch fails does trade with the United States become important. When this happens, as it has in recent years, various United States firms send representatives to South-West Africa to supervise the canning of sardines which are then sold under their labels.

The principal income from sardines is derived from fish meal and oil. Exports of these products are restricted by the Union of South Africa to 75 percent of production. The United States and Europe provide a ready market for exported meal. All of the oil production is consumed by the Union of South Africa. Production of meal and oil has been more profitable than canning--in 1957 only 17 percent of the sardines caught were canned and the remainder were processed into meal and oil.

There are at present 6 factories in Walvis Bay which process sardines and two companies which handle "white fish" (snook, kobbeljou, kingklip, steenbrass, skates, and others). In Luderitz there are 6 factories which process spiny lobster. The number of sardine and spiny lobster factories is limited by the South-West Africa government. There are no indications that the number of factories, for either spiny lobster or sardines, will be increased in the near future.

In efforts to establish a stable industry, the Government has established catch limits or quotas for spiny lobster and sardines. In addition, strict regulations controlling the finished products have been applied to insure high quality in a competitive foreign market. Except for catch limits, the fishing industry has not been regulated. The effect of the present regulations has been to force the industry to adopt efficient methods in order to profit from the legally limited catch. There is no quota on "white fish," reports a dispatch from the United States Embassy at Pretoria, dated April 3, 1958. But there is a catch quota on spiny lobsters. The present catch quota for sardines will remain at 250,000 tons per season until the extent of the fishing area has been determined by governmental research of currents, temperature, and other factors that affect the fish population. It is the Government's wish to insure a stable fishing industry.

In regard to future sardine catches, one important warning sign that has appeared recently is that too many immature fish are being caught. Considering the natural mortality, plus the decline due to the catch, there is a question of replacement of the breeding stock. It is the opinion of some fishery experts that the sardine fishing industry is in danger, although up to the present stocks of sardines have been stable.

* * * * *

SPINY LOBSTER FISHERY THREATENED BY OFFSHORE DIAMOND MINING:

The granting of another concession to a diamond dredging and mining company for a ten-year period for prospecting along an area extending from the high-water mark seaward for three miles, has raised fears as to the future of the spiny lobster fishery. The area granted to the diamond prospecting firm includes some of the best fishing grounds for spiny lobster and the packing firms at Luderitz depend on the catches from this area for raw material. If dredging and similar operations take place in this area, the grounds may be ruined and the spiny lobster industry, one of the oldest in the history of the territory, may be placed in a serious position.

Table 2 - Value of Principal Fishery Products
Exports from South-West Africa, 1955-57

Product	1957	1956	1955
	... (US\$1,000) ...		
Sardine, canned	6,339	6,376	1/
Spiny Lobster, canned . .	1,593	2,013	2,050
Fish Meal	4,141	5,438	4,889
Other Fish	2,397	409	4,379
1/INCLUDED IN OTHER FISH.			

A similar concession previously granted along the coast south of Luderitz menaces fishing grounds in that area. These spiny lobster fishing grounds have helped to build up and sustain the spiny lobster fishery for 40 years.

Over US\$2.8 million have been invested in the spiny lobster fishery at Luderitz and, in spite of the income that the Territory has received from this industry, especially during some of the most difficult years of financial stringency, it now seems that the fisheries will have to give way to diamonds (United States Consulate, Cape Town, March 28, 1958).



Spain

VIGO FISHERIES TRENDS, JANUARY-FEBRUARY 1958: Fish Exchange: Landings of fish at Vigo, Spain, during January 1958 amounted to only 7.0 million pounds. This was a drop of 3.7 million pounds from the preceding month, and about 0.7 million pounds from January 1957. The primary cause of this decrease was the bad weather which kept the fishing fleet in port during the latter part of January and early February.

Small hake was the leading species sold over the exchange (2.0 million pounds), followed by dollarfish (1.4 million pounds), and horse mackerel (0.9 million pounds).

The catch in January this year was valued at about US\$938,716 (at the official rate of exchange \$1.00 = 42 pesetas) or about US\$11,900 above January 1957. This higher value was due to the fact that the average price rose from 10.9 U. S. cents per pound to 13.6 U. S. cents a pound this January.

A closed season on sardine fishing or canning from February 15 to April 15 is in effect. Sardine landings in January 1958 were 13,550 pounds, a drop from the previous month's 371,000 pounds and 289,000 pounds in January of 1957.

In February, the catches sold over the Vigo Fish Exchange rose to 9.0 million pounds, almost 2.4 million pounds above the February 1957 sales of 6.6 million pounds. Dollarfish was the most prominent species landed with a total of 3.1 million pounds. Catches of this species usually reach their peak in February. Second highest landings were small hake (2.1 million pounds).

Total value of the landings in February this year was about US\$907,000 at the official rate of exchange.

Fish Canning and Processing: Cannery activity was practically nonexistent during the month of January. Canners normally devoted themselves to canning anchovies in brine. Only 7,000 pounds of fresh fish (mostly dollarfish) were bought from the exchange for canning. Another 9,800 pounds were bought for smoking and drying. In January 1957, 172,000 pounds and 550,000 pounds were bought for these two purposes.

During February 1958 cannery work picked up again with a total of 366,000 pounds of fresh fish bought from the ex-

change for canning. Fish bought for smoking and salting, dropped to 3,545 pounds. This compares with 88,200 pounds of fresh fish bought during the same month last year for canning and 618,000 pounds bought for other purposes.

Fishing Industry Taxes: On January 11, 1958, the city of Vigo lost the final round in its legal fight with the fishing industry when the Supreme Court ruled that the municipality could not extend its traditional tax of 2-1/2 percent to fish and shellfish not using the facilities of the fishing port, such as the Fish Exchange, packaging stalls, etc.

This followed a ruling made in the fall of 1957 by the Provincial Tribunal granting the fishing industry, on their payment of the provincial wealth tax (a depletion tax), an exemption to a maximum of 90 percent on taxes paid to the municipalities, with a 100-percent exemption in the case of cod, smoked fish, and salted fish. The ruling that cod was semi-processed when coming into port precluded the Port Works Authority, which administers the fishing port, from assessing their 2 percent surcharge on this type of fish. As a rule, the Port Works Authority would impose their 2 percent charge on all landings which they interpreted to be non-processed, regardless of whether use had been made of port facilities. These rulings, according to fishery members, are a little too late in one respect, for the cod industry has already been driven to other ports.

At stake, however, is the newly-developing tuna industry, and it is hoped that these rulings will serve as a basis to discourage the province and municipality from what fishermen consider overtaxation. At the moment, tuna landings are considered by the Port Works Authority as coming under their jurisdiction, i.e., non-processed, whereas fishermen consider that the tuna is landed preprocessed (frozen), and warn further that unless the port changes its mind the tuna fleet will move elsewhere.

Exports: The Spanish-French commercial agreement of December 4, 1957, will run to October 31, 1958. According to this commercial agreement Spain will export to France during this period over US\$1 million worth of dried and salted fish, anchovies, mussels, mollusks, and crustaceans. Almost half of the exportation will be dried and salted fish. In return, France will ship approximately US\$70,000 worth of cod to Spain, the United States Consulate at Vigo reported on March 7, 1958.



Sudan

NEW DIVING EQUIPMENT MAY INCREASE HARVEST OF SEA SHELLS IN RED SEA: A sea-shell fisheries expert of the Food and Agriculture Organization (FAO), Rome, Italy, left in April for the Sudan where he will introduce new, simple diving equipment for use in the Red Sea in diving for trochus, mother-of-pearl, and other sea shells used for making buttons. He will be a year on his assignment in the Sudan.

"Introducing improved diving techniques will be only one part of my duties," the expert explained in an interview before leaving Rome for Khartoum, Sudan. "I shall be helping the Sudanese Government to improve the Red Sea shell fisheries, survey the present and potential shell beds, and institute proper management of the fisheries."

The new diving equipment, which was invented by an Italian engineer, is hand-operated and simple in construction and use. Experimental dives by FAO's senior fishing gear expert led to the decision to test whether it might be suitable for the Red Sea shell divers, who do not even use goggles or swimfins.

"The equipment enables a diver to go down quite deep," said the expert, "but I expect generally to be working at about 30 to 50 ft."

"The meat of trochus are edible and when smoked are considered a delicacy in such countries as Japan, although sea-shell fisheries are founded on the value of the shells. Still, we can get a ton of meat from ten tons of trochus shells."



Surinam

SHRIMP FISHERY TRENDS: During the week of March 30, 1958, the news concerning the Surinam Government's decision to assist a United States-Surinam shrimp processing company by construction of an ice plant and wharf and payment of the expenses of operating the factory and trawler Coquette became public.

The Coquette, meanwhile, has been operating offshore with modest success. Despite the fact that this is one of the rougher periods of the year off the Surinam coast and the crew still new to the area, the vessel reportedly is averaging one trip a week. In March, the Coquette, in four short trips, brought in about 4,400 pounds of large shrimp and 3,300 pounds of marketable fish. In three successive nights of fishing on one trip the catch was 2,500 pounds of large shrimp. The shrimp were frozen for export and the fish sold on the local market.

Work on the ice plant and wharf has been delayed pending a change in the deed for the shrimp-processing plant property to allow the Government to retake title to those portions on which the new facilities will be built. This is now believed completed, so work should soon be started.

Early in April, a Japanese national residing in Canada, visited Surinam at the instigation of the manager of the shrimp-processing firm. The Japanese national is a managing director of a large Japanese fishing company, which reportedly has associated companies in Brazil, Cuba, Canada, and Chile. This company operates large vessels out of Pernambuco, Brazil, principally for fish. The shrimp company manager hoped to interest the Japanese in using the local facilities, but the latter did not appear enthusiastic, since his craft do not have to depend on ashore facilities to a very great extent, an April 9, 1958, dispatch from the United States Consul at Paramaribo reports.



U. S. S. R.

FISHING ACTIVITY IN NORTHWEST ATLANTIC INCREASES: Fishing activity in the Northwest At-

lantic Ocean by Russian vessels is obviously increasing. According to a broadcast in Norwegian

by Radio Moscow on January 5, 1958, large trawlers from Murmansk now fish as far west in the Atlantic as Greenland and Newfoundland waters. Further, it was broadcast that the U. S. S. R. Polar Institute in recent years has tried to find new fishing grounds in the West Atlantic; on the eastern part of the Grand Banks of Newfoundland new ocean perch fishing grounds were discovered, and named the "Sverdlvsk Banks." (*Fiskets Gang*, January 30, 1958.)

The broadcast gave the following review of the Soviet fisheries in the North Atlantic: The population in northern Russia has fished for many centuries. At the end of the 16th century there were about 30,000 fishermen and fishery workers in the North. At that time fishing occurred not only along the Murmansk Coast but also at Cape Kanin and along the coast to the mouth of the Petsjora. Russians also fished at Spitsbergen and Franz Josef Land. The first one who indicated the great possibilities for the development of the fisheries in the Barents Sea was the Russian scientist Nikolai Kipovitsj in the beginning of that century. The trawl fishery started and was particularly speeded in its development from the 30's when the Soviet Union obtained a large trawler fleet. Today about 1/4 of the Soviet Union's fish catch comes from the Barents Sea and the North Atlantic. The most important varieties are cod, haddock, pollock, ocean perch, and herring.

Murmansk is the largest fishing port--not only in the Soviet Union but in the whole world. The trawler fleet in Murmansk includes the most modern freezer-ship trawlers with stern trawling. These craft fish far out in the Atlantic Ocean and go clear to the coast of Greenland and to the Newfoundland Banks. A large number of fishing craft which fish for herring in the North Atlantic also have their base in Murmansk. In the harbor there are large cold-storage warehouses, canneries, and other operations which work for the fishing fleet.

In the offshore North Atlantic waters a large amount of scientific work is conducted with the aim of seeking fishery resources. It is the fishing industry's research institute--the Polar Institute--which conducts the research.

The exploration of fish comes directly under the fisheries administration. Along the Murmansk coast there are regular reconnaissance fleets for herring during the summer. All vessels which seek fish are equipped with special hydro-acoustic equipment.

In recent years Soviet researchers in close cooperation with the fishermen have discovered many new areas for trawl and gill-net fishing both in the Barent Sea and in the more distant waters. The north and northwesterly areas which have been fished in recent years are of great interest for trawl

operations. In the summer there are many cod in those areas and therefore these areas steadily are of greater importance for trawl fishing.

The study of the vertical distribution of cod and haddock in the Barents Sea with the aid of hydro-acoustic instruments and with the help of underwater equipment has shown that it is not wholly correct to place these varieties of fish in the category of bottom fish. It has been found that for the most part they remain in the middle water layers and trawling gives poor results when one is not aware of this.

In recent years the Polar Institute has conducted research to find a new area for trawling in the western part of the Atlantic Ocean. In the eastern half of the Newfoundland Banks new ocean perch grounds have been found--the Sverdlvsk Banks. The trawl fleet also tags many ocean perch on the Komptov Banks which recently were found west of Bear Island. The greatest part of the catch of cod, haddock and ocean perch is taken to Murmansk and frozen or cooked.

The Soviet Union conducts a large herring fishery both in and outside of the Barents Sea. Fat herring are fished with gill nets in the open sea and with purse seines along the coast. Even before World War II, Polar Institute had undertaken comprehensive research on the biology of the herring of Barents Sea. These experiments showed that the herring have their nearest spawning places in Lofoten. From there the young herring drift in the warm North Cape current to the Murmansk Coast. In the Barents Sea the young herring live until they become sexually mature after which they go back to the Norwegian Coast. Small herring from 1½ to 2 years of age are found almost everywhere in the southern part of Barents Sea but in the greatest amounts along the coast and in the fjords of Kolahalv Island. Herring that grow until they are 3 or 4 years old have developed into the fat herring which is very tasty and in great demand in the markets of the Soviet Union. Research on the biology of the herring has made it possible to determine the most rational fishery methods.

The Polar Institute and the exploratory fishing vessels in the North Atlantic conduct comprehensive observations of the distribution and migration of the herring by tagging. For many years the Polar Institute has tagged young fish, herring, and bottom fish in the Barents Sea. These experiments have made it possible to predict the fertility of the individual generations of fish and to set up predictions for the outlook many years ahead. Most of the Soviet fishery research workers believe that considerably more cod and herring can be fished in the North Atlantic than at present, but the conclusion is that the young fish be spared. This is true equally for both cod and herring.

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VESSELS USE FISH PUMP TO CATCH FISH ATTRACTED BY UNDERWATER LIGHT: Attracting fish by underwater light into dense shoals, then sucking them up by a fish pump has been successfully carried out by Russian fishermen in the Caspian Sea.

This development, which was started in 1951, is the subject of a paper by I. V. Nikonorov, of the Caspian Institute of Marine Fisheries submitted to the International Fishing Gear Congress at Hamburg last October.

In that year, 170 commercial fishing vessels were engaged in underwater light fishing, with a total catch of 17 million pounds. By 1956 the fleet had grown to 450 vessels and the total catch was 150 million pounds. Eleven ships equipped with pumps caught a total of 10 million pounds.

Before 1954 the fish "kilka" (including its anchovy form)--the most abundant fish of the Caspian Sea--were caught with a cone-shaped net.

The reason why "kilka" and many other fish are attracted by underwater light has not been established, and there is some controversy on the question. One view is that the attraction by light is a feeding reflex.

Daylight acts as a stimulus for an unconditional feeding reflex. In the dark an artificial light will produce the same effect stimulating a feeding reaction and inducing the fish to swim toward the source of light.

This is confirmed by a marked increase of the catch before dawn, when the feeding reaction becomes stronger and the approach of the fish to the source of light more intense.

"Kilka" will not approach a source of light placed above or beneath the level of optimum temperature, and all attempts to induce them were unsuccessful.

The electric lamps are enclosed in watertight fittings, and emit a flow in all directions. The size of the lamp is very small in relation to its range of action.

The stronger the source of light, and the wider the radius of attraction, the denser will be the concentration of "kilka" and the greater the catch.

There is some evidence that the density of "kilka" tends to decrease near a lamp with too great a brilliancy.

Fish enter the field of light some seconds after the underwater light is turned on. They approach close to the light, even brushing against the lamp. Commercial quantities are formed in 2-5 minutes.

"Kilka" approaching the critical zone try to get away. If the shoals are sparse some fish do escape, but when the concentrations are dense the foremost fish are prevented from swimming away by new arrivals who push them into the critical zone.

A nozzle with a sloping shear, which increases the area of the intake aperture, has been devised for the suction pump.

Over 30 ships are now fishing "kilka" with pumps in the Caspian Sea, and their fishing power is higher than that of ships fishing with cone nets.

It is claimed that pump-fishing gives greater labor efficiency, is labor saving, with higher production and lower operation costs. Great economics were made with the use of Diesel-electric motorships, fishing simultaneously with two pumps.

The author suggests further improvements, such as selecting the most suitable source of light to ensure dense concentrations within the active sphere of the sucking water current; and as an additional attraction, a path of light. He also advocates the use of small pumps of great capacity.

Further research may prove the value of pumps for fishing in other regions and for other pelagic fishes, such as sardines and saury, which react positively to underwater electric light.

Active controlling of fish movements by man is not impossible, and their behavior related to different physical phenomena may greatly alter technique and gear (The Fishing News, March 14, 1958).



United Kingdom

EXPANSION OF FOREIGN MARKETS FOR SCOTTISH FROZEN FISH URGED: In the British House of Commons, a member from Scotland said in March 1958 that there was in America, Canada, Africa, and Europe a great and growing demand for Scottish frozen fish.

He urged the Secretary for Scotland to take steps to empower the British White Fish Authority to finance a publicity campaign to increase "this potential source of wealth for Scotland."

The Secretary replied that the White Fish Authority's powers enabled them to promote the export of white fish and they were in close touch with the industry about the markets available overseas.

The member replied that, excellent though the work of the Authority was in many respects, their publicity campaigns in many foreign countries were not sufficiently extensive. Could the Minister do something to extend them? (Fish Trades Gazette, March 8, 1958.)

* * * * *

MARINE OIL IMPORTS: Imports of marine oils by the United Kingdom during 1957 increased 36.6 percent over 1956. Whale oil imports, the most important during both years, showed a marked increase of about 49 percent in 1957 as compared to 1956, the Foreign Agriculture Service of the U. S. Department of Agriculture reports in an April 21, 1958, dispatch from London.

Type	1957	1956
	(1,000 Lbs.)	
Cod-liver oil	2,899	598
Vitamin A oil	590	560
Sperm oil, unrefined	32,776	40,412
Whale oil	318,091	213,543
Others	7,762	9,908
Total	362,118	265,021

* * * * *

SILVER COD AWARD MADE FOR 1957: The British Trawlers' Federation "Silver Cod" was awarded on March 12, 1958, to the trawler Lord Beatty. The vessel landed 2,469 metric tons (about 5.4 million pounds), valued at £114,927 (US\$321,796) ex-vessel, in 302 days at sea. The captain of the vessel takes over the trophy from the captain of the Lancella which won the award in 1956 for landing 2,871 metric tons of fish.

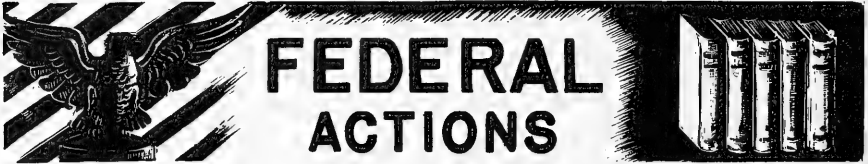
The Silver Cod trophy was first awarded in 1954 by the Federation as a means of encouraging the captains and crews to land more fish.

The trawler Lord Beatty did not start sailing until mid-February when other vessels had already landed two trips. The best trip of the vessel was on April 15 when landings of almost 392,000 pounds grossed £12,574 (US\$35,000).

The Hull trawler St. Britwin was second. In 326 days the vessel caught 2,379 tons (about 5.2 million pounds), valued at £131,397 (US\$367,912) ex-vessel.

The Diesel-electric Portia of Hull was third with 2,357 tons (a little less than 5.2 million pounds), valued at \$363,457 after 337 days at sea. (World Fishing, March 1958.)





Federal Trade Commission

ANOTHER CANNED SEAFOOD FIRM CHARGED WITH ILLEGAL BROKERAGE PAYMENTS:

Another Seattle, Wash., firm was charged on April 8, 1958, by the Federal Trade Commission with paying unlawful brokerage to some customers.

Alleging violation of Sec. 2(c) of the Robinson-Patman Amendment to the Clayton Act, a Commission complaint (No. 7089, Canned Seafood) alleges the company grants favored customers discounts or allowances in lieu of brokerage.

On direct sales not involving brokers, the complaint charges, favored buyers are granted a discount approximating the normal brokerage fee of 2½ percent. Also, certain customers are given reduced prices reflecting the brokerage generally paid, the complaint says.

In other transactions where sales are made through brokers, the complaint continues, the company gives favored customers reductions, offsetting them by cutting the broker's commission.

In addition to selling its own pack of canned salmon, tuna, and other seafood, the complaint says, the company distributes seafood packed by others as well as some jointly packed by itself and others.

The firm and its officials were granted 30 days in which to file answer to the complaint. A hearing was scheduled June 2 in Seattle, Wash., before a commission hearing examiner.

CANNED SEAFOOD PACKER-DISTRIBUTOR DENIES CHARGES OF ILLEGAL BROKERAGE PAYMENTS:

A Seattle, Wash., packer and distributor of seafood has denied Federal Trade

Commission charges of making illegal brokerage payments to some customers (Answer 7089).

In answer to the Commission's complaint of March 20, 1958, the firm and its officials deny granting favored customers discounts or allowances in lieu of brokerage in violation of Sec. 2(c) of the Robinson-Patman Amendment to the Clayton Act.

The complaint charged that on direct sales not involving brokers, favored buyers are granted a discount approximating the normal brokerage fee of 2½ percent. Also, it said, certain customers are given price reductions reflecting the brokerage generally paid.

In transactions handled through brokers, the company gives favored customers reductions, offsetting them by cutting the broker's commission, the complaint continued.

Categorically denying these charges, the parties ask that the complaint be dismissed.

OWNERSHIP OF FEW SHARES OF MEAT PACKER STOCK MAKES MEAT PRODUCTS MARKETER A "PACKER":

Purchasing a few shares of stock of a recognized meat packer makes a marketer of meat, dairy, and poultry products a "packer," and thus prevents the Federal Trade Commission from proceeding against it on charges of violating laws administered by the Commission, hearing examiner of that agency ruled (Initial Decision 6459, Food Products) on April 25.

The examiner held that a large Washington, D. C., supermarket chain is a packer within the definition given in the Packers and Stockyards Act because it recently purchased some stock of a large

meat and poultry packing company. Granting the super market chain's motion to dismiss a Commission complaint charging it with inducing illegal promotional allowances, he said the Secretary of Agriculture has exclusive jurisdiction over the chain's interstate commercial activities and the Commission has none.

This is not a final decision of the Commission and may be appealed, stayed, or docketed for review.

In a previous dismissal order, the examiner had ruled that the preparation of sausage and meat loaf makes the supermarket chain a packer under the statute. The Commission later reversed this decision, ruling that these meats are already meat products when received and supermarket chain's grinding and seasoning of them are customary merchandising operations which do not of themselves make the chain a packer.

Another reason given in the reversal opinion was that there was no showing that the chain owns or controls any interest in a packing establishment.

In the decision, the examiner said, "Respondent has now supplied that deficiency or taken that suggestion by purchasing, as of March 28, 1958, 100 shares of the common stock of a meat and poultry packing firm, and accordingly now claims coverage under clause (2)" (This provides that a marketer of these products is a packer if it "owns or controls, directly or indirectly, through stock ownership or control or otherwise. . . any interest" in a packer as defined elsewhere in the statute).

The examiner emphasized this clause "does not read or hint 'substantial interest' nor is any quantum or percentage of interest or ownership mentioned."

He then concluded: "The contention that this ruling opens the door for all actual or alleged violators of the Federal Trade Commission Act who happen to market meats, meat food, dairy, and poultry products or eggs, to escape corrective action by the simple and relatively inexpensive purchase of a few shares of stock in a 'meat packer' overlooks the

unambiguous statutory command. I cannot conscientiously twist or torture plain English to forestall that result. The remedy lies with those who wrote into law that plain English--the Congress of the United States."

The amended complaint of May 7, 1957, charged the supermarket chain with inducing special allowances from suppliers for promotion of an anniversary sale which it "knew or should have known" were not being offered to competitors.



Department of the Interior

BUREAU OF COMMERCIAL FISHERIES

ASSUMES RESPONSIBILITY FOR GRADING SERVICE TO FISHING INDUSTRY:

The U. S. Department of the Interior has assumed, under the authority of the Fish and Wildlife Act of 1956, the responsibility for furnishing inspection and grading services to the fishing industry. The U. S. Department of Agriculture will continue to furnish such services until July 1, 1958, at which time the transfer of functions will be effected.

Administrative authority has been delegated to the Bureau of Commercial Fisheries to supplement its standards development program. Bureau technologists anticipate no significant changes in inspection service personnel or procedures. The Federal shield and grade symbols, to all intents and purposes, will be identical with those now in use by processors. Contract renegotiation will consist of a simple change-order requiring only the signature of the processor for consummation.

The inspection and grading services for the fishing industry will be administered by experienced fisheries personnel.

Continuous inspection and grading services for fish sticks, fish blocks, and breaded shrimp will be made available to processors who request the services. Continuous inspection services also will be available for all fishery products even

though no grade standards have as yet been developed for such products. In addition, inspection services for specific lots of fishery products will be furnished and may be requested.



U. S. Tariff Commission

REPORT ON TUNA INVESTIGATION RELEASED:

The United States Tariff Commission made public on May 1, 1958, its report on an investigation of tuna made in response to a resolution of the Committee on Finance of the Senate adopted August 20, 1957. The investigation was made pursuant to section 332 of the Tariff Act of 1930, as amended, and was similar in scope to a previous investigation made by the Commission in response to a resolution of the Committee adopted June 26, 1952.

The Commission's report discusses the consumption of tuna fish in the United States in recent years; gives general information on the domestic tuna fishery and detailed information on the operations of the bait-boat, purse-seine, and albacore fishing fleets; discusses at some length the operations of the domestic tuna-canning industry; and gives information on a number of other subjects, including tariff rates, tuna imports, and the tuna fisheries of Japan and Peru.



Eighty-Fifth Congress

(Second Session)

Public bills and resolutions which may directly or indirectly affect the fisheries and allied industries are reported upon. Introduction, referral to committees, pertinent legislative actions, hearings, and other chamber actions by the House and Senate, as well as signature into law or other final disposition are covered.



FISHERMEN'S COOPERATIVE ASSOCIATIONS BANK: H. R. 12466 (Tollefson) introduced in the House on May 12, 1958, a bill to provide credit facilities for use of fishermen's cooperative associations through establishment of a Bank for Fishermen's Cooperative Associations, and for other purposes; to the Committee on Merchant Marine and Fisheries. The Act to be known as the "Bank for Fishermen's Cooperative Associations Act of 1958." The associations eligible to utilize the credit facilities are those defined in "An Act authorizing associations of producers of aquatic products," approved June 25, 1934 (15 U. S. C. 521, 522).

FISH AND WILDLIFE CONSERVATION PROGRAM: H. R. 12371 (Curtis of Missouri) introduced in the House on May 7, 1958, a bill to amend the Act of March 10, 1934, to provide for more effective integration of a fish and wildlife conservation program with Federal water-resource development, and for other purposes; to the Committee on Merchant Marine and Fisheries. This bill is similar in purpose to other House and Senate bills designed to protect fish and wildlife resources and provide for recreational benefits in plans for water-resource development projects. A related bill, H. R. 5497 (Cooley) was passed by the House on February 17, 1958, and referred to Senate Committee on Agriculture and Forestry on February 19, 1958. (See Commercial Fisheries Review, April 1958, p. 83 for additional information on H. R. 5497.)

HAWAII STATEHOOD: H. R. 12040 (Libonati) introduced in the House on April 21, 1958, a bill to provide for the admission of the State of Hawaii into the Union; to the Committee on Interior and Insular Affairs. Similar to seven or more other House bills and one Senate bill previously introduced in the First and Second Sessions of the 85th Congress.

INTERIOR DEPARTMENT APPROPRIATIONS: H. R. 10746 (Kirwin), a bill making appropriations for the Department of the Interior (including Fish and Wildlife Service) for the fiscal year ending June 30, 1959. Reported (S. Rept. No. 1479), with amendments on April 28, 1958, by the Senate Committee on Appropriations. H. R. 10746 was passed by the Senate on April 30 with all Committee amendments adopted en bloc. Additional amendments were made by the Senate before passage of the bill.

S. Rept. No. 1479, Interior Department and Related Agencies Appropriation Bill, 1959 (April 28, 1958, 85th Congress, 2nd Session, to accompany H. R. 10746), 42 pp., printed. The report by the Senate Committee on Appropriations as it concerns the Fish and Wildlife Service increased funds for fiscal year 1959 over the amounts provided by the House (see Commercial Fisheries Review, April 1958, pp. 83-84 for H. Rept. No. 1346) as follows:

BUREAU OF SPORT FISH AND WILDLIFE: Management and Investigations of Resources: The Senate Committee recommended the sum of \$11,616,000 (House recommended \$11,508,000). In addition both the Senate and House Committees added the sum of \$454,625 to be derived from the sale of Pribilof Islands fur-seal skins.

CONSTRUCTION: The sum of \$1,458,000 recommended by the House was increased to \$3,879,350

by the Senate Committee. This increase of \$2,421,350 included \$1,691,310 for fish-hatchery facilities, \$30,000 for engineering and surveys on fishery research facility for rice areas, and \$700,000 for wildlife-refuge facilities.

BUREAU OF COMMERCIAL FISHERIES: The sum appropriated for this Bureau was unchanged by the Senate Committee from the total of \$6,854,000 approved by the House. An additional \$454,625 derived from the sale of Pribilof Islands fur-seal skins was added and approved by both Committees.

SMALL BOAT REGULATIONS: S. 3658 (Magnuson) introduced in the Senate April 21, 1958, a bill to promote safety on the navigable waters of the United States, its Territories and possessions; to provide coordination and cooperation with the States in the interest of uniformity of boating laws; and for other purposes; to the Committee on Interstate and Foreign Commerce. This bill is similar in purpose to H. R. 8474 (Bonner) introduced in first session of the 85th. Congress. S. 3658 spells out the details of the proposed amendments to present laws and regulations in greater detail than H. R. 8474. The bill would institute a system of numbering undocumented vessels, establish fees and penalties, and a system for reporting collisions and injuries. Both bills would apply regulations to all motorboats or vessels on the navigable waters of the United States, its Territories and the District of Columbia, and every motorboat or vessel owned in a State and using the high seas.

SMALL BUSINESS ACT AMENDMENT TO AID FIRMS AFFECTED BY FOREIGN TRADE POLICY: S. 3664 (Javitts, Ives, Potter, and Saltonstall) introduced in the Senate on April 22, 1958, a bill to provide assistance to small business concerns to facilitate adjustment made necessary by the foreign trade policy of the United States, and for other purposes; to the Committee on Banking and Currency. This bill would provide that where a finding is made by the Tariff Commission of a substantial injury to an industry under the escape clause of the Trade Agreements Act and where a recommendation has been made to the President which the President fails to approve, thereupon a small business concern becomes eligible for loans from the Small Business Administration. Such loans would be based on the disaster loan provisions of the present law. Secondly, provides for small business to pool their productive capacities with the consent of the Federal Trade Commission and Attorney General without violating the antitrust laws. Thirdly, provides amendments to the Internal Revenue Code of 1954 providing for rapid amortization. Numerous other bills have been introduced in both sessions of the 85th. Congress to aid small business in one way or another, but this is the first bill that provides aid to firms injured by foreign trade policy.

SMALL BUSINESS EQUITY AND LONG-TERM LOAN CAPITAL: H. R. 12026 (Hill), H. R. 12027 (Riehlman), H. R. 12028 (Seely-Brown), H. R. 12029 (McCulloch), H. R. 12030 (Sheehan), H. R. 12031 (Moore) and H. R. 12032 (Patman), introduced in the House on April 21, 1958, bills to amend the Small Business Act of 1953 to provide a source of equity and long-term loan capital for small business concerns in the United States, and for other purposes; to the Committee on Banking and Cur-

Currency. Also S. 3651 (Johnson of Texas and 11 other Senators) introduced on April 21, 1958, S. 3719 (Wiley) introduced on April 28, 1958, and H. R. 12182 (Spence) introduced on April 28, 1958 and referred to the Committees on Banking and Currency and similar in purpose to H. R. 12026 (Hill) and other bills introduced on April 21, 1958. Hearings on bills to aid small business were held by the Senate Committees on Banking and Currency beginning April 24, 1958. Other bills to provide financing on equity capital for small business firms are H. R. 10980 (Multer) introduced February 25, 1958, and S. 720 (Sparkman and others) introduced January 3, 1957. (S. 3651 supersedes S. 720.)

SMALL BUSINESS TAX RELIEF: H. R. 12035 (Libonati) introduced in the House on April 21, 1958, a bill to amend the Internal Revenue Code of 1954 so as to establish an initial program of tax relief adjustment for small and independent business and for persons engaged in small and independent business; to the Committee on Ways and Means. Similar to 12 or more other House bills and one Senate bill previously introduced in First and Second Sessions of the 85th. Congress.

STARFISH ERADICATION EMERGENCY PROGRAM: H. R. 12092 (Wainwright) introduced in the House on April 22, 1958, a bill to provide that the Secretary of the Interior shall develop and carry out an emergency program for the eradication of starfish in Long Island Sound and adjacent waters to the Committee on Merchant Marine and Fisheries; also H. R. 12236 (Cretella) introduced on April 29, 1958; H. R. 12283 (Seely-Brown) introduced on April 30, 1958. Also S. 3753 (Bush) introduced May 6, 1958, referred to the Committee on Interior and Insular Affairs. All similar to H. R. 12092. The bills provide for the dredging of starfish on a large scale by means of many boats with special attention to protection of natural oyster beds and provides \$500,000 for this purpose. In addition, another \$500,000 is provided for the liming of public oyster grounds and the use of lime and other proven chemicals to destroy starfish on shellfish beds. The appropriated funds provide for a one year program with funds to be expended by the Gloucester, Mass., Regional Office of the U. S. Bureau of Commercial Fisheries.

STATE DEPARTMENT APPROPRIATIONS: H. R. 12438 (Rooney) introduced in the House on May 12, 1958, a bill making appropriations for Departments of State, Justice, the Judiciary, and related agencies for the fiscal year ending June 30, 1959, and for other purposes. H. Rept. No. 1708 to accompany H. R. 12438 was filed by the Committee on Appropriations on May 9 and referred to the Committee of the Whole House on the State of the Union on May 12.

H. Rept. No. 1708, Department of State and Justice, the Judiciary, and Related Agencies Appropriation Bill, Fiscal Year 1959 (May 9, 1958, 85th. Congress, 2d Session, to accompany H. R. 12438), 25 pp., printed. The report by the Committee recommends the following amounts to cover the United States share of the expenses of seven international fisheries commissions: International Pacific Halibut Commission, \$111,000; International Pacific Salmon Fisheries Commission, \$233,000; Inter-American Tropical Tuna Commission, \$363,000; International Commission for the Northwest Atlantic Fisheries, \$5,250; International Whal-

ing Commission, \$600; International North Pacific Fisheries Commission, \$17,650; Great Lakes Fishery Commission, \$900,000; and \$14,400 for expenses of United States Commissioners. The total amount recommended for fiscal year 1959 for international fisheries commissions was \$1,644,900.

Departments of State and Justice, the Judiciary, and Related Agencies Appropriations for 1959 (Hearings before the Subcommittee of the Committee on Appropriations, House of Representatives, 85th. Congress, 2nd Session, Department of State, January 20-February 11, 1958, 872 pp.), printed. Includes testimony offered by officials of the Departments of State and Interior in support of funds requested for the budget requirements of seven International Fisheries Commissions for fiscal year 1959.

TRADE AGREEMENTS ACT EXTENSION: Renewal of Trade Agreements Act (Hearings before the Committee on Ways and Means, House of Representatives, 85th. Congress, 2nd Session, Part 1, February 17-20, 21, and 24-28, March 3-7, 1958, 1,499 pp., printed; and Part 2, March 10-14, 17-21,

and 24-25, 1958, 2,935 pp.), printed. Reports in detail testimony presented to the Committee on Ways and Means for and against the renewal of the Trade Agreements Act as provided by H. R. 10368 (Mills). Part 2 contains, in addition to other testimony, detailed testimony, by various segments of the fishing industry both for and against the renewal of Trade Agreements Act.

UNEMPLOYMENT RELIEF IN DEPRESSED AREAS: H. R. 11,496 (Dellay) introduced in the House on March 19, 1958, a bill to establish an effective program to alleviate conditions of substantial and persistent unemployment and underemployment in certain economically depressed areas; to the Committee on Banking and Currency. Similar to two or more other bills introduced in the First Session of the 85th. Congress. Also H. R. 12048 (Libonati) introduced on April 21, 1958, S. 3583 (Douglas and 28 other Senators) introduced on April 23, 1958, and H. R. 12296 (Reuss) introduced on May 1, 1958. These bills are similar to H. R. 11496, and other bills introduced in the first session of the 85th. Congress.



NORTH ATLANTIC SEA SCALLOP GROUNDS

Many sea scallop grounds are known and fished. Port au Port Bay, Newfoundland; Northumberland Strait, Prince Edward Island; the Digby and Grand Manan areas of the Bay of Fundy; the bays of the Maine coast; Stallwagen Bank and Cape Cod Bay; the Hudson Canyon area; and the Virginia Capes, all support small local fleets of sea scallopers. The total catch from all these areas, however, is small when compared to the crop which the New Bedford boats harvest from Georges Bank. About 60 percent of the total sea-scallop catch is landed at New Bedford and almost all of it comes from Georges Bank. Sea scallops caught on Georges Bank are also landed at Gloucester, Mass.; Rockland, Me.; and Lunenburg, Nova Scotia.

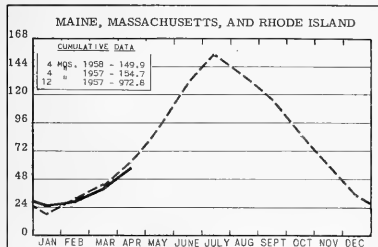
The greatest known sea scallop grounds are found between the 20- and the 50-fathom curves on Georges Bank. A dredge set almost anywhere in this area will bring up at least a few sea scallops. Within this general area, the Northern Edge, the Northeast Peak, the Southwest Part, and the South Channel grounds have been, for the past 10 years, the most consistent producers of sea-scallop crops. Many areas that are known to have concentrations of large sea scallops are not usually fished because the rough bottom damages the gear excessively.

--Fishery Leaflet 442, Sea Scallop Boats and Gear, August 1957.

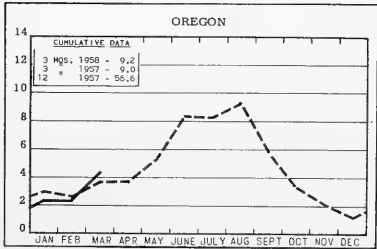
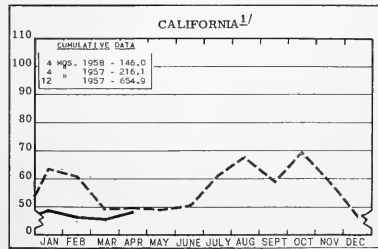
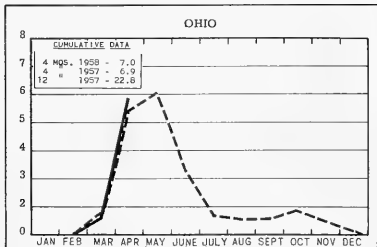
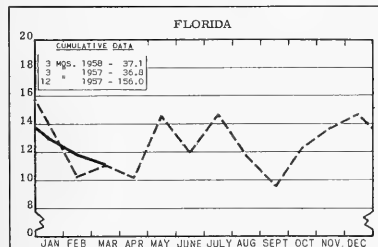
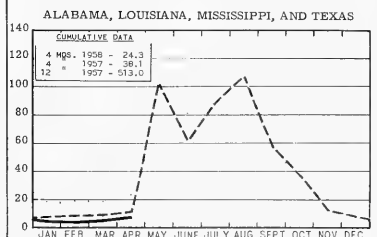
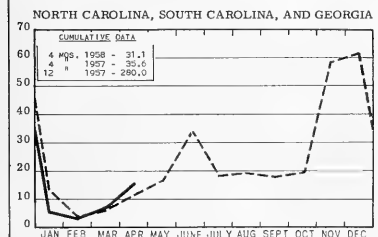
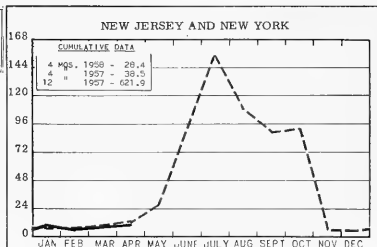
FISHERY INDICATORS

CHART I - FISHERY LANDINGS for SELECTED STATES

In Millions of Pounds



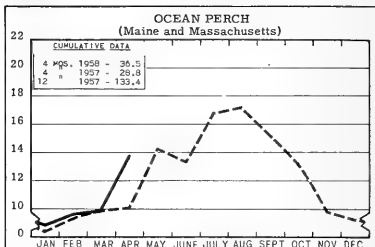
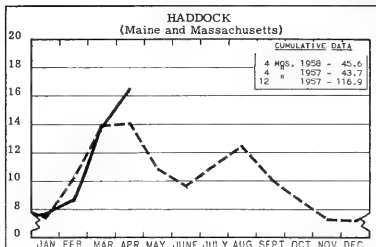
LEGEND:
 — 1958
 - - - 1957



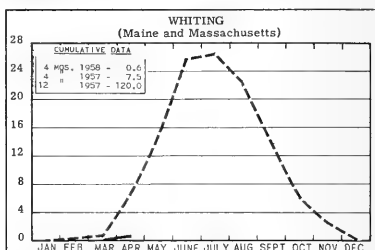
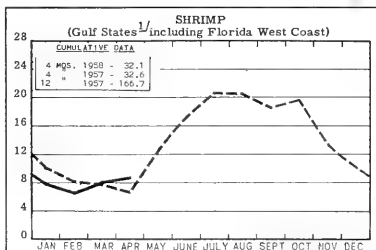
^{1/2}ONLY PARTIAL--INCLUDING PRODUCTION OF MAJOR FISHERIES AND MARKET FISH LANDINGS AT PRINCIPAL PORTS.

CHART 2 - LANDINGS for SELECTED FISHERIES

In Millions of Pounds

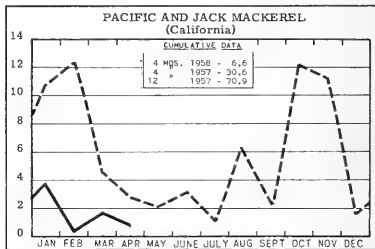
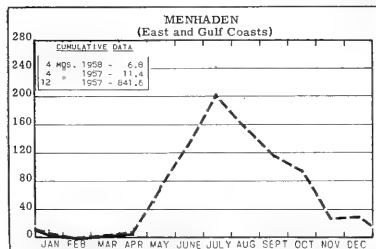


In Millions of Pounds



^{1/2} L.A. & A.L.A. DATA BASED ON LANDINGS AT PRINCIPAL PORTS AND ARE NOT COMPLETE.

In Thousands of Tons



In Thousands of Tons

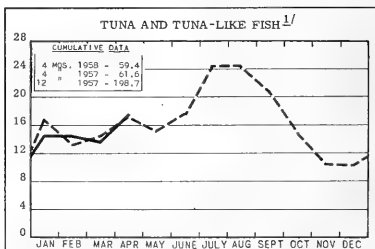
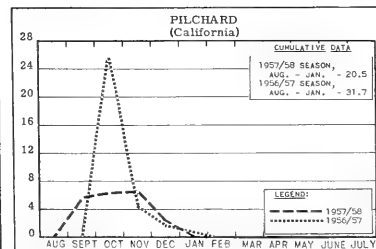
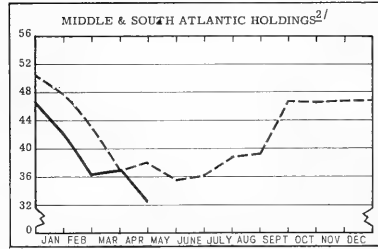
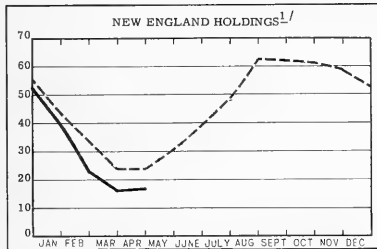
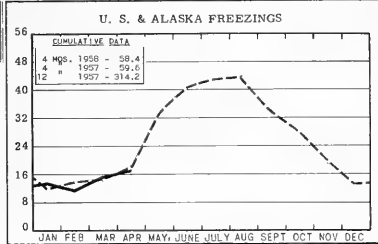
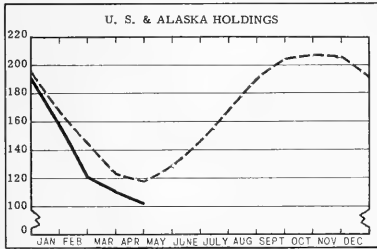


CHART 3 - COLD-STORAGE HOLDINGS and FREEZINGS of FISHERY PRODUCTS *

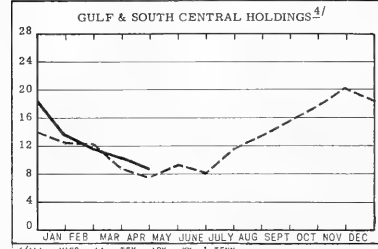
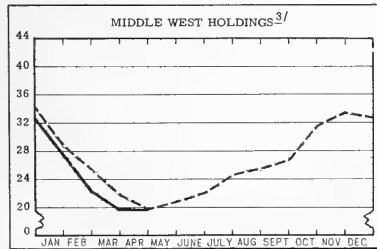
In Millions of Pounds

LEGEND:
 — 1958
 - - - 1957



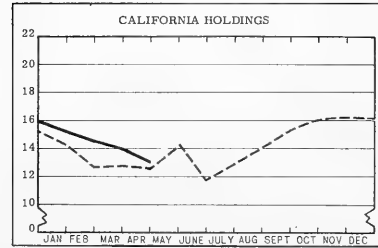
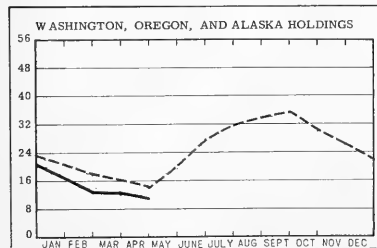
^{1/}MAINE, MASSACHUSETTS, RHODE ISLAND, AND CONNECTICUT.

^{2/}ALL EAST COAST STATES FROM N.Y. SOUTH.



^{3/}OHIO, IND., ILL., MICH., WIS., MINN., IOWA, MO., N. DAK., NEBR., & KANS.

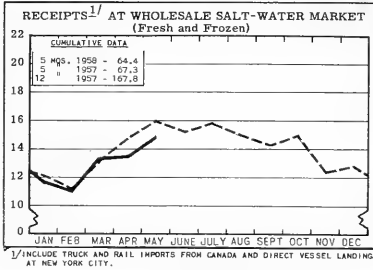
^{4/}ALA., MISS., LA., TEX., ARK., KY., & TENN.



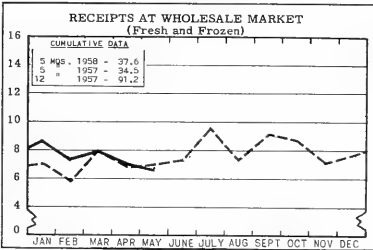
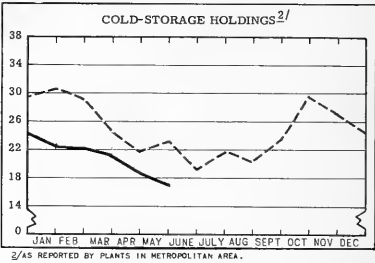
* Excludes salted, cured, and smoked products.

CHART 4 - RECEIPTS and COLD-STORAGE HOLDINGS of FISHERY PRODUCTS at PRINCIPAL DISTRIBUTION CENTERS

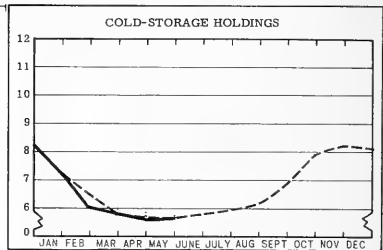
In Millions of Pounds



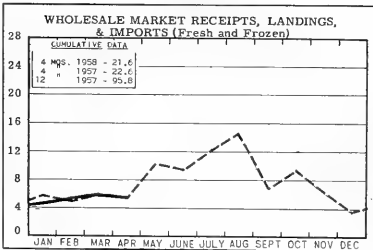
NEW YORK CITY



CHICAGO



SEATTLE



BOSTON

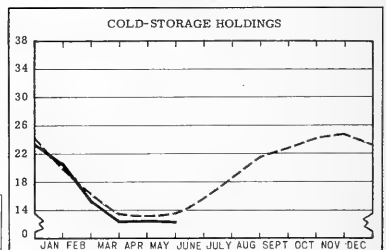


CHART 5 - FISH MEAL and OIL PRODUCTION - U.S and ALASKA

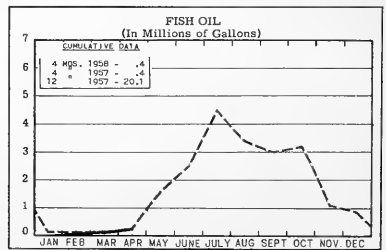
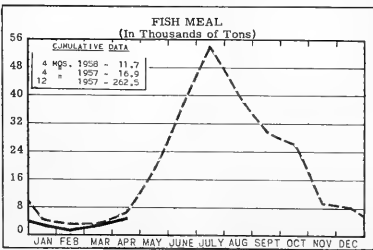
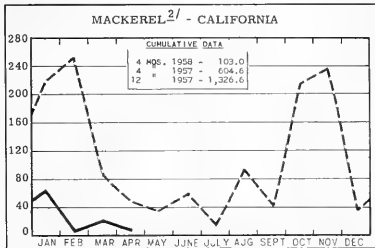
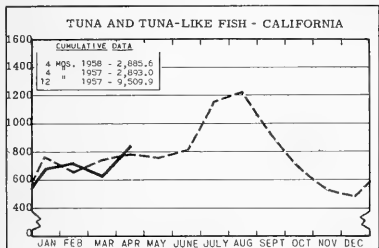
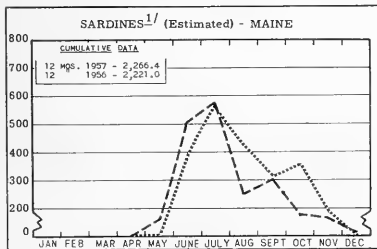
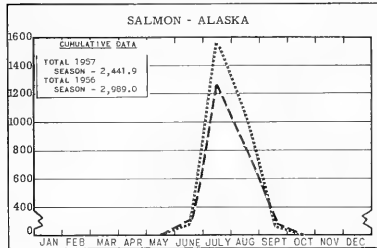
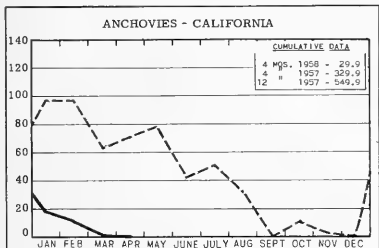


CHART 6 - CANNED PACKS of SELECTED FISHERY PRODUCTS

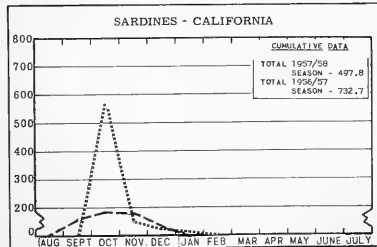
In Thousands of Standard Cases



2/INCLUDES PACIFIC MACKEREL AND JACK MACKEREL.



STANDARD CASES			
Variety	No. Cans	Designation	Net Wgt.
SARDINES.....	100	½ drawn	3¼ oz.
SHRIMP.....	48	--	5 oz.
TUNA.....	48	# ½ tuna	6 & 7 oz.
PILCHARDS..	48	# 1 oval	15 oz.
SALMON.....	48	1-lb. tall	16 oz.
ANCHOVIES..	48	½-lb.	8 oz.



Legend:
 — 1957/58
 1956/57

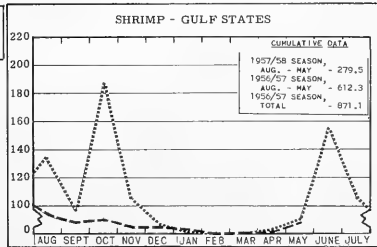
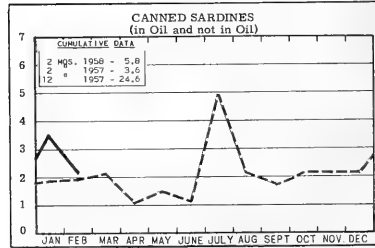
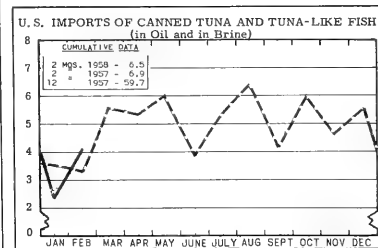
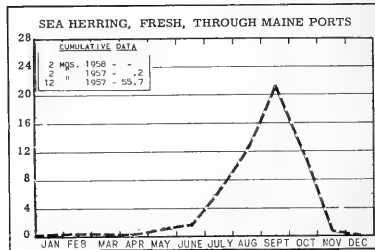
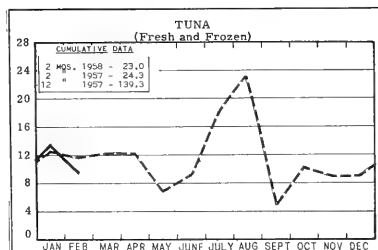
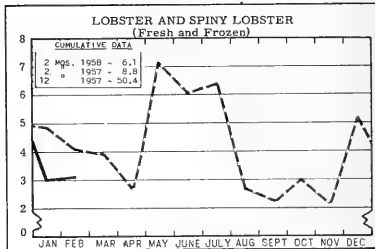
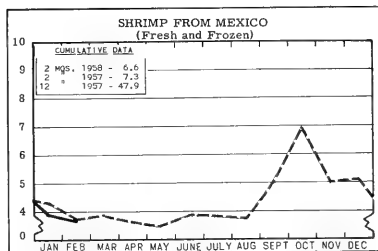
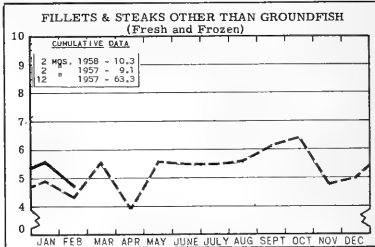
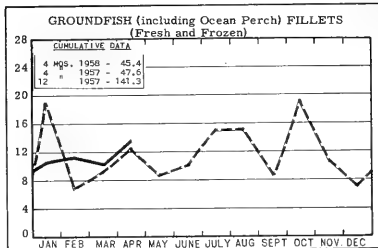


CHART 7 - U.S. FISHERY PRODUCTS IMPORTS

In Millions of Pounds

LEGEND:
 — 1958
 - - - 1957





RECENT FISHERY PUBLICATIONS

FISH AND WILDLIFE SERVICE PUBLICATIONS

THESE PROCESSED PUBLICATIONS ARE AVAILABLE FREE FROM THE DIVISION OF INFORMATION, U. S. FISH AND WILDLIFE SERVICE, WASHINGTON 25, D. C. TYPES OF PUBLICATIONS ARE DESIGNATED AS FOLLOWS:

- CFS - CURRENT FISHERY STATISTICS OF THE UNITED STATES AND ALASKA.
 SSR. - FISH, -SPECIAL SCIENTIFIC REPORTS--FISHERIES (LIMITED DISTRIBUTION).
 SEP. - SEPARATES (REPRINTS) FROM COMMERCIAL FISHERIES REVIEW.

- | Number | Title |
|------------|---|
| CFS - 1735 | Rhode Island Landings, 1957 Annual Summary, 7 pp. |
| CFS - 1742 | North Carolina Landings, 1957 Annual Summary, 5 pp. |
| CFS - 1746 | Gulf Fisheries, 1956 Annual Summary 7 pp. |
| CFS - 1747 | South Carolina Landings, January 1958, 2 pp. |
| CFS - 1748 | Fish Meal and Oil, January 1958, 2 pp. |
| CFS - 1749 | Georgia Landings, 1957 Annual Summary, 3 pp. |
| CFS - 1750 | North Carolina Landings, January 1958, 3 pp. |
| CFS - 1751 | California Landings, October 1957, 4 pp. |
| CFS - 1752 | Frozen Fish Report, February 1958, 8 pp. |
| CFS - 1753 | Georgia Landings, January 1958, 2 pp. |
| CFS - 1754 | Shrimp Landings, October 1957, 6 pp. |
| CFS - 1755 | Packaged Fish, 1957 Annual Summary 5 pp. |
| CFS - 1756 | Canned Fish and Byproducts, 1957 Annual Summary, 21 pp. |
| CFS - 1758 | New Jersey Landings, 1957 Annual Summary, 5 pp. |
| CFS - 1759 | New Jersey Landings, January 1958, 3 pp. |
| CFS - 1760 | Florida Landings, January 1958, 6 pp. |
| CFS - 1761 | California Landings, November 1957, 4 pp. |
| CFS - 1762 | Maine Landings, January 1958, 3 pp. |
| CFS - 1765 | New York Landings, January 1958, 4 pp. |
| CFS - 1768 | Shrimp Landings, November 1957, 6 pp. |
| CFS - 1769 | Rhode Island Landings, January 1958, 3 pp. |
| CFS - 1782 | Maine Landings, February 1958, 3 pp. |
| CFS - 1784 | Florida Landings, February 1958, 6 pp. |

SSR-Fish. No. 228 - Photographic Device for Accurately Measuring Fish, by Clifford W. Long and Raymond A. Arzylowicz, 17 pp., illus., November 1957. The photographic measuring device described in this paper was developed to aid the work of the International North Pacific

Fisheries Commission. A photographic measuring device using two cameras and strobe illumination has been developed to improve the accuracy of salmon body measurements in the field. The optical theory is given and the device is described in detail. The technique includes calculating longitudinal distances from photographs. The device is considered accurate within ± 0.05 centimeters when ideal subjects are measured.

Sep. No. 509 - New England's Industrial Fishery.

Sep. No. 510 - Twenty-Five Years of Research and Service by the Seattle Technological Laboratory.

THE FOLLOWING SERVICE PUBLICATIONS ARE AVAILABLE ONLY FROM THE SPECIFIC OFFICE MENTIONED.

Landings and Prices of Fishery Products, Boston Fish Pier, 1957 (Includes "Trends in the Fishing Industry at Boston"), by John J. O'Brien, 23 pp., processed, 1957. (Available free from the Market News Service, U. S. Fish and Wildlife Service, 10 Commonwealth Pier, Boston 10, Mass.) Fish marketing trends and conditions in Boston, highlights of fisheries in other New England ports, and highlights of selected foreign fisheries are discussed for 1957. Detailed data on landings and ex-vessel prices of fish and shellfish at the Boston Fish Pier during 1957 are presented. Statistics are given by months and species and by type of gear, together with comparative data for previous years.

California Fishery Products Monthly Summary, February 1958, 10 pp. (Market News Service, U. S. Fish and Wildlife Service, Post Office Bldg., San Pedro, Calif.) California cannery receipts of raw tuna and tunalike fish, herring, mackerel, anchovies, and squid; pack of canned tuna, herring, mackerel, anchovies, and squid; market fish receipts at San Pedro, Santa Monica, San Diego, and Eureka areas; California imports; canned fish and frozen shrimp prices; for the month indicated.

(Chicago) Monthly Summary of Chicago's Fresh and Frozen Fishery Products Receipts and Wholesale Market Prices, February 1958; March 1958; 12 pp. each. (Market News Service, U. S. Fish and Wildlife Service, 565 W. Washington St., Chicago 6, Ill.) Receipts at Chicago by species and by states and provinces; fresh-water fish, shrimp, and frozen fillet wholesale market prices; for the months indicated.

Gulf Monthly Landings, Production, and Shipments of Fishery Products, February 1958; March 1958; 5 pp. each. (Market News Service, U. S. Fish and Wildlife Service, 609-611 Federal Bldg.,

New Orleans 12, La.) Gulf States shrimp, oyster, finfish, and blue crab landings; crab meat production; LCL express shipments from New Orleans; and wholesale prices of fish and shellfish on the New Orleans French Market; for the months indicated.

Monthly Summary of Fishery Products in Selected Areas of Virginia, North Carolina, and Maryland, March 1958, 4 pp. (Market News Service, U. S. Fish and Wildlife Service, 18 So. King St., Hampton, Va.) Fishery landings and production for the Virginia areas of Hampton Roads, Lower Northern Neck, and Eastern Shore; the Maryland areas of Crisfield, Ocean City, and Cambridge; and the North Carolina areas of Atlantic, Beaufort, and Morehead City; together with cumulative and comparative data; for the month indicated.

New England Fisheries--Monthly Summary, February 1958; March 1958; 21 pp. each. (Market News Service, U. S. Fish and Wildlife Service, 10 Commonwealth Pier, Boston 10, Mass.) Reviews the principal New England fishery ports, presenting food fish landings by ports and species; industrial fish landings and ex-vessel prices; imports; cold storage stocks of fishery products in New England warehouses; fishery landings and ex-vessel prices for ports in Massachusetts (Boston, Gloucester, New Bedford, Provincetown, and Woods Hole), Maine (Portland and Rockland), Rhode Island (Point Judith), and Connecticut (Stonington); frozen fishery products prices to primary wholesalers at Boston, Gloucester, and New Bedford; and landings and ex-vessel prices for fares landed at the Boston Fish Pier and sold through the New England Fish Exchange; for the months indicated.

(New York) Monthly Summary - Receipts of Fishery Products at the New York City Wholesale Salt-Water Market, January 1958, 11 pp.; February 1958, 12 pp. (Market News Service, U. S. Fish and Wildlife Service, 155 John St., New York 38, N. Y.) Receipts in the salt-water section of the Fulton Fish Market by species and by states and provinces for the months indicated.

Seattle and Astoria Landings, Receipts, and Value of Fishery Products, 1957, by Charles M. Reedon, 45 pp., processed, 1958. (Available free from Market News Service, U. S. Fish and Wildlife Service, Pier 42, South, Seattle 4, Wash.) The Pacific Northwest fisheries trends and their effect upon Seattle fishery products receipts for 1957 are discussed in the first part of this report. This section covers total receipts of fishery products at Seattle; sources of supply of frozen and fresh fishery products; trends in Seattle receipts of salmon, halibut, tuna, otter-trawl and long-line fishery landings, shellfish, herring meal, and other miscellaneous fishery products and byproducts. The tables present fishery landings and wholesale receipts (including approximate values) at Seattle for 1957 by species, source of origin, and by months; monthly index of receipts of certain fishery products at Seattle; carload shipments of fishery products from Seattle by months; and names, classifications, and approximate standards for fresh and frozen fishery products sold on the Seattle market. The Astoria section includes a discussion

of fisheries trends and fishery products receipts at Astoria, Ore., for 1957. This section covers the Columbia River gill-net fishery; troll and otter-trawl fisheries; halibut, tuna, and shellfish fisheries; imports; Columbia River canned salmon and canned tuna packs; and landings and wholesale receipts of fishery products at Astoria during 1957.

THE FOLLOWING SERVICE PUBLICATIONS ARE FOR SALE AND ARE AVAILABLE ONLY FROM THE SUPERINTENDENT OF DOCUMENTS, WASHINGTON 25, D. C.

"Construction of a Two-Way Weir for the Enumeration of Salmon Migrants," by Donovan R. Craddock, article, The Progressive Fish-Culturist, vol. 20, no. 1, January 1958, pp. 33-37, illus., processed, single copy 25 cents.

"The Cortland, New York, Fishery Station: A Summary of Twenty-Five Years' Work," article, The Progressive Fish-Culturist, vol. 19, no. 4, October 1957, pp. 172-178, processed, single copy 25 cents.

Filtering Rates of the Hard Clam (VENUS MERCENARIA) Determined with Radioactive Phytoplankton, by Theodore R. Rice and Rebecca J. Smith, Fishery Bulletin 129 (From Fishery Bulletin of the Fish and Wildlife Service, vol. 58), 12 pp., illus., printed, 15 cents, 1958.

"An Improved Portable Tattooing Device," by Donald W. Chapman, article, The Progressive Fish-Culturist, vol. 19, no. 4, October 1957, pp. 182-184, processed, single copy 25 cents.

"Maintenance of Immature Sea Herring in Captivity," by Alva E. Farrin, Leslie W. Scattergood, and Carl J. Sindermann, article, The Progressive Fish-Culturist, vol. 19, no. 4, October 1957, pp. 188-189, processed, single copy 25 cents.

Propagation and Distribution of Food Fishes for the Calendar Years 1955-1956, Statistical Digest 42, 46 pp., printed, 20 cents, 1958.

"Use of Stake-Type Boat Anchors in Wing-Net Fishing," by Donald F. Hansen, article, The Progressive Fish-Culturist, vol. 19, no. 3, July 1957, pp. 142-143, illus., processed, single copy 25 cents. Material and construction of this device, consisting of vertical sleeves attached to each end of a boat through which metal stakes are driven into the bottom to anchor the boat, are discussed. Its primary advantage is to permit one man to lift and reset hoop nets.

MISCELLANEOUS PUBLICATIONS

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM. CORRESPONDENCE REGARDING PUBLICATIONS THAT FOLLOW SHOULD BE ADDRESSED TO THE RESPECTIVE ORGANIZATION OR PUBLISHER MENTIONED. DATA ON PRICES, IF READILY AVAILABLE, ARE SHOWN.

BELGIUM:
Rapport Annuel sur l'Evolution de la Flotte de Peche en 1957 (Annual Report on the Progress

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of the Fishing Fleet during 1957), 43 pp., processed in French. Ministère des Communications, Administration de la Marine, Brussels, Belgium. A statistical report on the status of Belgium's fleet of vessels used in high seas and coastal fishing.

BLOODWORMS:

Biology of the Bloodworm, GLYCERA DIBRANCHIATA Ehlers, and Its Relation to the Bloodworm Fishery of the Maritime Provinces, by W. L. Klawe and L. M. Dickie, Bulletin No. 115, 37 pp., printed, 50 Canadian cents. Fisheries Research Board of Canada, Ottawa, Canada, 1957. (For sale by Queen's Printer, Ottawa, Canada.)

CANADA:

Annual Report of the Department of Natural Resources of the Province of Saskatchewan for the Fiscal Year Ended March 31, 1957, 123 pp., illus., printed. Department of Natural Resources, Province of Saskatchewan, Regina, Saskatchewan, Canada, 1957. A compilation of reports of the branches of the Saskatchewan Department of Natural Resources, including a 19-page report of the Fisheries Branch. The fisheries report covers activities in management, research, fish culture, and administration for commercial and sport fisheries, and biological investigations. Also includes statistical tables on angling licenses; commercial fish production by lakes, 1956/57; commercial production by species, 1934/35 through 1956/57; sales details; commercial production and value by species, 1956/57; annual commercial production and value, 1946/47 through 1956/57; commercial and non-commercial production, 1939/40 through 1956/57; and lake stocking with rainbow and brook trout, grayling, and pickerel fingerlings.

Annual Report of the Fisheries Research Board of Canada, 1956-1957 (For the Fiscal Year Ending March 31, 1957), 195 pp., illus., printed. Fisheries Research Board of Canada, Ottawa, Canada, 1957. Reports on the activities of the biological and technological stations of the Fisheries Research Board of Canada--an organization in charge of advisory, consultative, and administrative functions of fishery research stations and investigations of practical and economic problems connected with the fisheries of Canada. Of particular interest is the report covering the activities of the London, Ontario, biological station which is charged with control investigations for the Great Lakes sea lamprey. The report also covers the work of the Arctic Unit at Montreal in assessing the fishery and marine mammal resources of the Arctic regions.

Department of Fisheries Twenty-Seventh Annual Report, 1956-1957, 99 pp., printed. Department of Fisheries, Ottawa, Canada, 1958. Reports on the work of the various services of the Canadian Department of Fisheries in conservation and development, inspection and consumption, economics, information and education, and industrial development. Also covers the activities of the Fishermen's Indemnity Plan, Fisheries Prices Support Board, Fisheries Research Board of

Canada, and various international commissions and special committees. A summary of progress in the fishing industry is included, followed by several tables of fisheries statistics and an appendix presenting the financial statements of the Department.

Fisheries Council of Canada, Thirteenth Annual Meeting, April 14-16, 1958, Halifax, 79 pp., illus., printed. Fisheries Council of Canada, 77 Metcalfe St., Ottawa 4, Canada. The 1958 annual review and program of the Fisheries Council of Canada. Contains, among other items, the following articles: "The Atlantic Fisheries," by G. J. Gillespie; "The 1957 Fisheries," by W. C. Mackenzie; "Highlights of the Sales Promotion Program," by Ben Dolan; "Marketing New Frozen Fish Products," by Ross Clouston; "Problems in the Lake Erie Fisheries," by Leonard Omstead; "Value of Metal Lobster Traps," "Fisheries Utilization--The Individual and the Community," by E. L. Harrison; "Federation of West Indies," and "The European Common Market and Canada's Fish Exports." Details of the annual meeting are also presented.

Fisheries Statistics of Canada, 1956 (New Brunswick), 59 pp., printed in French and English, 50 Canadian cents. Queen's Printer and Controller of Stationery, Ottawa, Canada, 1958. Consists of tables giving the value of the principal species of fish and shellfish in New Brunswick, 1949-56; quantity and value of landings by species and fisheries districts, 1955-56; quantity and value of manufactured fishery products by species and fisheries districts, 1955-56; capital equipment in the primary fisheries operations, by fisheries districts, 1955-56; and the number of persons engaged in the primary fisheries operations, by fisheries districts, 1955-56.

Journal of the Fisheries Research Board of Canada, vol. 15, no. 2, March 1958, pp. 115-274, illus., printed. Queen's Printer and Controller of Stationery, Ottawa, Canada. Contains the following articles: "Energy Considerations in the Bay of Fundy System," by H. J. McLellan; "Proteins in Fish Muscle. II. On the Extraction of Myosin from Cod Muscle with Potassium Iodide," by J. R. Dingle; "Physical Oceanographic Results of the 'Calanus' Expeditions in Ungava Bay, Frobisher Bay, Cumberland Sound, Hudson Strait, and Northern Hudson Bay, 1949-1955," by M. J. Dunbar; "Limnological Studies of Hemming Lake, Manitoba, and Two Adjacent Lakes," by G. H. Lawler and N. H. F. Watson; "Some Aspects of Growth and Reproduction of the Bearded Seal, *Erignathus barbatus* (Erxleben)," by I. A. McLaren; "Some Effects of Temporary Exposure to Low Dissolved Oxygen Levels on Pacific Salmon Eggs," by D. F. Alderdice, W. P. Wickett, and J. R. Brett; and "Rapid Learning of a Constant Course by Travelling Schools of Juvenile Pacific Salmon," by William S. Hoar.

Progress Reports of the Atlantic Coast Stations, no. 68, 27 pp., illus., printed in French and English. Queen's Printer and Controller of Stationery, Ottawa, Canada, January 1958. Contains the following articles: "The Effects of Boring

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Sponges on Oysters," by F. E. Warburton; "The Commercial Longline Experiment, St. Anthony, Newfoundland, 1955," by A. M. Fleming; "How Cod Spawn--Nielsen's Observations," by W. Templeman; "A Liver Preservation Procedure," by A. Guttman and F. A. Vandenhuevel; and "Preliminary Biology of Atlantic Salmon of the Little Codroy River, Newfoundland," by A. R. Murray.

COD:

The Bear Island Cod: Migrations and Movements, by G. C. Trout, 51 pp., illus., printed. Her Majesty's Stationery Office, York House, Kingsway, London W. C. 2, England, 1957. Reports on a study of the movements of the shoals of cod at Bear Island in the Barents Sea.

Estudio de los Lipidos de la Carne del Bacalao, GADUS CALLARIAS L. (Study of the Lipids of the Meat of Cod, *Gadus callarias L.*), by Maria Dolores Garcia Pineda, Works of the Spanish Institute of Oceanography, No. 23, 46 pp., illus., printed in Spanish. Instituto Espanol de Oceanografia, Madrid, Spain, 1957.

COLD STORAGE:

Holodil'noe Konservirovanie Rybnih Produktov (Cold Storage of Fish), by V. P. Zajcev, 340 pp., 121 figs., 47 tables, printed in Russian. Piscepromizdat, Moscow, USSR, 1956. Discusses the characteristics of fish as a foodstuff; effect of low temperatures on microorganisms and post-mortem changes in fish; physical properties of fish and characteristics of refrigerating media; chilling of fish (changes during chilling, duration of refrigeration, heat loads, industrial methods for the chilling of fish); freezing of fish (changes during freezing, freezing rate, heat loads, various freezing methods for fish). Also discusses the production of chilled and frozen fish fillets; storage of chilled and frozen fish, and the thawing of fish in air, ice, liquid media; and rate of thawing and heat requirements.

COMMISSIONS:

Annual Report 1956, International Pacific Salmon Fisheries Commission, 32 pp., illus., printed. International Pacific Salmon Fisheries Commission, New Westminster, Canada, 1957. A report of the Commission, an international agency appointed under a convention between Canada and the United States for the protection, preservation, and extension of the sockeye salmon fisheries in the Fraser River system. Discussed in this report are the various activities of the Commission during 1956; the regulations, the United States fishery, the Canadian fishery, Indian catch statistics, escapement, rehabilitation of barren areas, watershed protection, and general investigations.

CRAYFISH:

"Contractile Protein from Crayfish Tail Muscle," by K. Maruyama, article, The Biological Bulletin, vol. 114, no. 1, February 1958, pp. 95-105, illus., printed, single numbers \$2.50. The Biological Bulletin, Marine Biological Laboratory, Woods Hole, Mass.

ECHO SOUNDING:

Echo Sounding in East Anglia--It Works, Laboratory Leaflet 17, 9 pp., illus., processed. Ministry of Agriculture, Fisheries and Food, Fisheries Laboratory, Lowestoft, England. A number of questions and answers concerning an echo-sounding survey in East Anglia.

ELECTRICAL FISHING:

"Factors Controlling the Input of Electrical Energy into a Fish (*Cyprinus carpio L.*) in an Electrical Field," by Lester V. Whitney and Richard L. Pierce, article, Limnology and Oceanography, vol. 2, no. 2, April 1957, pp. 55-61, printed. Woods Hole Oceanographic Institution, Woods Hole, Mass.

FAR EAST:

"Marine Sciences in the Far East," by Anton Fr. Bruun, article, Current Affairs Bulletin, no. 20, November 1957, pp. 3-8, printed. Indo-Pacific Fisheries Council, Food and Agriculture Organization of the United Nations, Bangkok, Thailand.

FISH POPULATIONS:

The Dynamics of Exploited Fish Populations, by Raymond J. H. Beverton and Sidney J. Holt, illus., printed, \$22.68. British Information Services, 45 Rockefeller Plaza, New York 20, N. Y. The international regulation of fisheries in a region such as Europe, where there are more than a dozen sovereign states keenly interested, has made severe demands on fishery research because year after year negotiators require prediction of one effect or another of man's pressure on the fish population. To meet this demand the authors have written a handbook of all the methodology involved. With the aid of the cases stated and the worked examples given, an approximate solution can be found to any problem of fishery regulation in the world--provided the right data are available; or, if not, this work shows precisely what data are needed. In addition to making available adequate knowledge of population dynamics to all workers in the field of fisheries, many of the authors' methods will be applicable to other living populations, and their theoretical framework should form part of the syllabus of teaching in agriculture, in ecology, in geography, in sociology, and in nature preservation.

FISHWAYS:

"A New Approach to Fish Pass Design," by Drummond Sedgwick, article, The Atlantic Salmon Journal, no. 1, February 1957, pp. 33-36, printed. The Atlantic Salmon Association, Inc., 1559 McGregor St., Montreal 25, Canada.

FLORIDA:

Catches of Fish by Charter Boats on Florida's East Coast, by Robert W. Ellis, Special Service Bulletin No. 14, 13 pp., illus., processed. The Marine Laboratory, University of Miami, Coral Gables, Fla., December 1957. This report is concerned with data on the catches of different species of fish by anglers on charter boats operating on Florida's east coast. The present study was made to determine the major species

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of fish occurring in the catches of charter boats operating on Florida's east coast, the relative frequency of occurrence of these species, the total amount of fishing time, and the total catch of each major species in this fishery.

FOOD AND AGRICULTURE ORGANIZATION:

The Food and Agriculture Organization has published reports describing that Agency's activities under the Expanded Technical Assistance Program for developing the fisheries of many countries. These reports have not been published on a sales basis, but have been processed only for limited distribution to governments, libraries, and universities. Food and Agriculture Organization, Viale delle Terme di Caracalla, Rome, Italy.

Report to the Government of Brazil on Tuna Fisheries Development (Northeastern Coast of Brazil), based on the work of Robert E. K. D. Lee, FAO Report No. 739, 49 pp., illus., processed, 1957. Technical assistance in fisheries was provided the Government of Brazil to advise and assist the Government in carrying out experimental fishing operations and to advise on various types of fishing craft and gear that may be used most effectively within the country. This report describes general observations on the fisheries of the northeastern coast of Brazil, fishing boats used for demonstration, fishing methods, Japanese tuna fishing off the Brazilian coast, current progress on tuna fishing development, and conclusions and recommendations to the Government of Brazil.

Report on the South Pacific Fisheries Training Course, by H. V. Pel and P. Lusyne, FAO Report No. 753, 17 pp., processed, 1957. This report discusses the organization of a fisheries training course, work of the course, and results achieved. The purpose of this course was to train selected men from as many as possible of the South American territories in some basic knowledge of fisheries and related skills. These men were needed in practically all territories in the area for the development and protection of the fisheries.

FREEZING:

"Chilling and Freezing of Fish," by F. Bramsnaes, Revista del Frio, Special Issue, II, July 1957, pp. 49-54, printed in Spanish. Revista del Frio, Centro Experimental del Frio, Serrano 150, Madrid, Spain.

"Freezing and Cold Storage of Pacific King Crab Meat," by K. Amano, K. Yamada, M. Bitō, and I. Kaneko, article, Refrigeration, vol. 32, no. 358, August 1957, pp. 1-9, 1 fig., 26 tables, 19 references, illus., printed in Japanese. Nihon Reito Kyokai (Japanese Society of Refrigeration), No. 3, 1-Chome, Ginza Nishi, Chuo-ku, Tokyo, Japan.

FUR SEALS:

North Pacific Fur Seals (Interim Convention Between the United States of America, Canada, Japan, and the Union of Soviet Socialist Republics--Signed at Washington, February 9, 1957),

Treaties and Other International Acts Series 3948, 60 pp., printed in English, Japanese, and Russian, 20 cents. (For sale by the Superintendent of Documents, Washington 25, D. C.) Department of State, Washington, D. C. An interim convention on the conservation of North Pacific fur seals was signed at Washington on February 9, 1957, by the respective representatives of the Governments of the United States, Canada, Japan, and the Union of Soviet Socialist Republics, and entered into force October 14, 1957. The text of the convention is presented word for word in the English, Japanese, and Russian languages.

GEAR:

Analysis of the Action of Spherical Trawl Floats, by I. G. Smyslov, 7 pp., processed. (Reprinted from Proceedings of the All-Union Scientific Research Institute of Sea Fishery and Oceanography, vol. 30, 1955, pp. 31-35). Ministry of Agriculture, Fisheries and Food, Fisheries Laboratory, Lowestoft, England. The author describes in detail the action of spherical trawl nets, and states that "With spherical floats it is impossible to increase to any great extent the vertical opening of a trawl at the usual trawling speeds, or to maintain the existing vertical opening at increased speeds. Instead of spherical floats, therefore, it is necessary to use spacing devices in which the hydrodynamic forces of the contrary flow during trawling are utilized. These spacing devices may consist of hydrodynamic floats, sheets of foam plastic, wooden support boards, sheets in the form of an aeroplane's wing and many other hydrodynamic forms."

"Is 'Bang Up' Bang On?" article, World Fishing, vol. 7, no. 3, March 1958, pp. 39-40, illus., printed. John Trundell (Publishers) Ltd., Temple Chambers, Temple Ave., London E. C. 4, England. Discusses the difference between the German and Scottish method of handling large trawls. The merits and disadvantages of the "bang up" method, as it is known, are discussed.

Results of Hydrodynamic Tests on Trawl Floats, by A. I. Yakovlev, 22 pp., processed. (Reprinted from Proceedings of the All-Union Scientific Research Institute of Sea Fishery and Oceanography, vol. 30, 1955, pp. 36-56). Ministry of Agriculture, Fisheries and Food, Fisheries Laboratory, Lowestoft, England, 1957. Describes in detail the floats and various devices for fitting to the head ropes of trawls, hydrodynamic characteristics of floats, method of conducting hydrodynamic tests with trawl floats, results of hydrodynamic tests with experimental trawl floats, and conclusions.

GENERAL:

The Chemical Control of Aquatic Nuisances, by Kenneth M. Mackenthun, 84 pp., illus., printed. Committee on Water Pollution, Madison, Wis., January 1958. A report on the use of chemicals on lakes, ponds, and streams for the control of algae, weeds, and other aquatic nuisances. In the introduction, the author discusses the general methods of control, history of the control program, general

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procedure, and statutory procedure. Under sections on aquatic rooted vegetation, algae, and swimmers' itch, the author discusses the nature and development of the nuisance, chemical control equipment and application details, and effects of treatment.

Fisherman's Guide to the Fishes of the Eastern Gulf of Mexico and South Atlantic Coast, compiled by Russell W. Cumley, 64 pp., illus., printed. Professional Publication Producers, 1603 Oakdale St., Houston 4, Texas, 1957.

Fishes of the World, by Edouard Le Danois with the collaboration of Jacques Millot, Theodore Monod, and Paul Budker, 190 pp., illus., with 80 photogravure plates, 30 color photographs, and text illustrations, printed, \$12.50. The Countryman Press, Woodstock, Vt. A comprehensive encyclopedia of the world's fishes, including scientific data on the various species and habitats. The book is beautifully illustrated with excellent photographs, many of them in color. There are six chapters on some natural laws in the ocean; the northern, temperate, tropical, and southern regions; and the depths of the ocean.

Handbook of Selected Biological References on Water Pollution Control, Sewage Treatment, Water Treatment, by William Marcus Ingram, Public Health Service Publication No. 214 (revised 1957), 107 pp., illus., printed, 45 cents. (For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.) U. S. Public Health Service, Washington, D. C. A section on fish is included in the selected biological references applicable to water pollution control.

The World Beneath the Waves, by Gilbert Doukan, translated by A. and R. M. Case, 356 pp., printed, \$6. John De Graff, Inc., 31 East 10th St., New York 3, N. Y.

HALIBUT:

Pacific Halibut Fishery Regulations (Effective March 29, 1958), 13 pp., printed. International Pacific Halibut Commission, Fisheries Hall No. 2, University of Washington, Seattle 5, Wash., March 1958.

HERRING:

Extent of Herring Spawning in British Columbia in 1957, by D. Outram, Circular No. 46, 12 pp., illus., processed. Fisheries Research Board of Canada, Biological Station, Nanaimo, B. C., Canada.

On the Herring of the Southern North Sea (Contributions to Special Herring Meetings, 1956), Rapports et Procès-Verbaux des Reunions, vol. 143, Part I, 42 pp., illus., printed, Kr. 10 (US\$1.45). Conseil Permanent International pour l'Exploration de la Mer (International Council for Exploration of the Sea), Charlottenlund Slot, Denmark, October 1957.

INDIA:

Fish Farming, 26 pp., illus., printed. Government Fisheries Information Bureau, Madras-8, India, 1956.

A Fishing Calendar for the East Coast of Madras State, by P. I. Chacko and S. George, Contribution from the Marine Biological Station, West Hill, No. IV, 16 pp., printed. Superintendent, Government Press, Branch Press, Pudukkottai, India, 1956.

A Fishing Calendar for the West Coast of Madras State, by P. I. Chacko and S. George, Contribution from the Marine Biological Station, West Hill, Malabar Coast, No. III, 31 pp., printed. Superintendent, Government Press, Branch Press, Pudukkottai, India, 1956.

Madras Fish Facts, 1956, edited by P. I. Chacko, 12 pp., printed. Superintendent, Government Press, Madras, India, 1956.

JAPAN:

Annual Report of Catch Statistics on Fishery and Aquiculture, 1956, Agriculture, Forestry, and Fishery Statistics Bulletin 32-32, 378 pp., printed in Japanese and English. Association of Agriculture - Forestry Statistics, No. 4, 1-chome, Onden, Shibuya-ku, Tokyo, Japan, December 1957. Contains statistical information on the 1956 production from marine fisheries -- whaling, factoryship-type pelagic fishery on high seas, and domestic marine fisheries; culture in shallow seas; inland water fisheries and fish culture; and processing. Also presents market prices of fishery commodities and consumption of petroleum products for fisheries. Two glossaries containing the classification of type of fisheries and classification of fish species are also included.

Journal of the Faculty of Fisheries and Animal Husbandry, Hiroshima University, vol. 1, no. 3, pp. 303-397, December 1957, illus., printed. The Faculty of Fisheries and Animal Husbandry, Hiroshima University, Fukuyama, Japan. Contains, among others, the following papers: "Radioactivity in the River Water, Brackish Water, Sea Water, and the Laver at River Mouth, Derived from Radioactive Rain Water," by Isao Takesita and Shunpei Kakuda; and "On the Forming Season of Annual Rings (Opaque and Translucent Zones) in the Otoliths of Several Marine Teleosts," by Takaaki Irie.

Postwar Developments in Japan's Foreign Trade, 253 pp., processed. U. S. Tariff Commission, Washington 25, D. C., March 1958. An extensive report on Japan's foreign trade, containing five chapters on (1) factors shaping the foreign trade of Japan, (2) Japan's foreign trade policy, (3) Japan's foreign trade, (4) Japan's balance of payments, (5) trade between the United States and Japan, and (6) competition between United States and Japanese exports in third markets. Fishery products and byproducts are included in the tables on exports of selected miscellaneous products; and United States imports from Japan, by principal commodities.

Technical Report of Fishing Boat, No. 11, 55 pp., illus., printed in Japanese with brief English abstracts. Fishing Boat Laboratory, Production Division, Ministry of Agriculture and Forestry,

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Tokyo, Japan, January 1958. Contains the following reports, with very brief abstracts in English: "Propagation Characteristic of 1 Mc Ultrasonic Sound in Sea Water," by Tomiju Hashimoto, Yoshimitsu Kikuchi, Yoshinobu Maniwa, and Minoru Nishimura; "Study on Ultrasonic Reflection Loss on Fish-Body (On the Influence of the Air Bladder)," by Tomiju Hashimoto and Yoshinobu Maniwa; and "Study on the Ultrasonic Wave Form Reflected on the Sea Bottom, Fish Schools, and Seaweeds," by Yoshinobu Maniwa.

KENYA:

Lake Victoria Fisheries Service, Annual Report 1956/57, 22 pp., illus., printed. East Africa High Commission, Nairobi, Kenya, 1957. Reports on the general activities of the Lake Victoria Fisheries Service, including studies on motor fishing vessels, radio equipment, motor transport, fishing craft, experimental fishing, tilapia fish ponds, fish marking, illegal fishing, deep-water surveys, net trials and fish culture. Also presents summaries of annual catches in 1956 at recording stations in Uganda, Tanganyika, and Kenya.

NIGERIA:

Annual Report of the Federal Fisheries Service for the Year 1955-56, 11 pp., illus., printed. Federal Government Printer, Lagos, Federation of Nigeria, 1957. Contains a history of the growth of fisheries work in Nigeria, and a discussion of the federal research program which covers scientific research and technological investigations. Activity reports of the Sea Fisheries Section and the Fish Culture and Inland Fisheries Section are also included.

OCEANOGRAPHY:

"Oceanography and its Necessity for Fisheries Programme in the Indo-Pacific Region," by H. U. Sverdrup, article, Current Affairs Bulletin, no. 20, November 1957, pp. 1-2, printed. Indo-Pacific Fisheries Council, Food and Agriculture Organization of the United Nations, Bangkok, Thailand.

Travaux du Centre de Recherches et D'Etudes

Océanographiques (Works of the Center for Oceanographic Research and Studies), Fasc. I, Tome III, March 1958, 68 pp., illus., printed in French. Centre de Recherches et D'Etudes Océanographiques, 1 Quai Branly, Paris 7^e, France. Contains the following articles: "Résultats de Quelques Mesures de Courants Profonds" (Results of Some Measurements of Depth Currents), by V. Romanovsky; "Le Courantographie BBT-NEYRPC" (The BBT-NEYRPC Current-Graph), by J. Duroche and J. Serpaud; "Les Causes d'Erreurs dans la Mesure des Courants au Point Fixe" (The Cause of Errors in Measurements of Currents at a Fixed Point), by V. Romanovsky; and "Observations Océanographiques des Navires Stationnaires Meteorologiques" (Oceanographic Observations of Stationary Meteorological Vessels).

OYSTERS:

"Pond Culture of Oysters at Bears Bluff Promising," article, South Carolina Wildlife, vol. 5,

no. 1, Winter 1958, pp. 4-5, 18, illus., printed. South Carolina Wildlife Resources Department, 1015 Main St., Columbia, S. C. Describes briefly the life history of the oyster, the construction of ponds, and the early work in South Carolina on the culture of oysters. The pond culture of oysters was begun in 1944 but had been practically abandoned since 1950, due to lack of funds and personnel and a series of drought years. Since funds from a grant have become available, a one-acre pond has been partially cleaned of accumulated silt and a part of the floor shelled, hardened, and planted with seed oysters. Engineering work for the control of salinity is also under way, with pipe lines and a pump installed. The article states that "In addition to producing better quality oysters, the cultivation and growing of oysters in ponds provides valuable information, particularly in solving such problems as how to control oyster diseases and predation."

"Some Aspects of Behavior of Oysters at Different Temperatures," by V. L. Loosanoff, article, The Biological Bulletin, vol. 114, no. 1, February 1958, pp. 57-70, illus., printed, single numbers \$2.50. The Biological Bulletin, Marine Biological Laboratory, Woods Hole, Mass.

PLANKTON:

"Life History of a Dinoflagellate Bloom," by Robert A. Ragotzkie and Lawrence R. Pomeroy, article, Limnology and Oceanography, vol. 2, no. 2, April 1957, pp. 62-69, printed. Woods Hole Oceanographic Institution, Wood Hole, Mass.

PRESERVATION:

"How Antibiotic-Treated Fish Reacts Under Actual Storage Conditions," by Lionel Farber and Peter Lerke, article, Quick Frozen Foods, vol. XX, no. 8, March 1958, pp. 154-157, printed, single copy 50 cents. E. W. Williams Publications, Inc., 82 Wall St., New York 5, N. Y. This report presents the results of experiments on the keeping quality of antibiotic-treated fish under practical operating conditions existing in fish plants. Storage experiments in fish plants of filets of rockfish and of sole were carried out, comparing the effect of a 5-percent saline dip with a dip in 5-percent salt solution containing 5 or 10 p.p.m. of chlortetracycline (CTC). The CTC-dip treatment definitely prolonged the storage time of the filets. On being taken out of the water on shipboard, various whole flatfish were placed in plain ice and in ice containing 10 p.p.m. of CTC until they were landed ashore. Then they were stored at atmospheric temperature. The preliminary CTC-ice treatment aboard ship had a definite prolonging effect on the subsequent storage time compared to fish stored originally in plain ice. The possible influence on the storage times of such factors as storage temperature, initial bacterial loads, and history of the fish between the time of removal from the water and landing ashore were also briefly discussed.

"Storage Test of Sea Fish in Aureomycin Ice Under Tropical Climate," by J. Ducroz, article, Rev. d'Elevage et de Médecine Veterinaire, No. 2, 1957, pp. 147-150, 2 diagrams, illus., printed

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

in French. Revue d'Elevage et de Medecine Veterinaire des Pays Tropicaux, 23 Rue de L'Ecole de Medecine, Paris 6, France.

"Temperature Distribution in Fish Cooled in a Liquid Medium" (Raspređenjejeje Temporyyev Leje Ryby pri Ohlazdeniji Jeje v Zidkoj Srede), by G. Konokotin, article, Kholodil'naia Tekhnika, USSR, No. 1, January-March 1957, pp. 27-30, 4 figures, illus., printed in Russian. Kholodil'naia Tekhnika, c/o Four Continent Book Corp., 38 W. 58th St., New York 19, N. Y. Recommendations are made in this article to precool trawled fish in additionally salted sea water at temperatures not lower than -4°C . ($+26^{\circ}\text{F}$). The preliminary cooling leads to a 3-4 fold decrease in ice requirements, increasing the effective tonnage of the trawler. The storage life of the fish is increased by 3-4 days. Experimental data are presented on the temperature distribution in the fish body (large cod) on cooling in brine at various temperatures. Care should be taken to prevent freezing of the fish during cooling.

RADIATION:

The Effects of Atomic Radiation on Oceanography and Fisheries, by Roger Revelle, Publication No. 551, 137 pp., illus., printed, \$2. National Academy of Sciences, 2101 Constitution Ave., N. W., Washington, D. C. Summarizing present knowledge and areas of ignorance that must be taken into account in considering the biological effects of radiation.

Radioactivity in Reef Fishes of Belle Island, Eniwetok Atoll, April 1954-November 1955, by Arthur D. Welander, 43 pp., illus., processed, \$1.25. Applied Fisheries Laboratory, University of Washington, Seattle, Wash., May 17, 1957. (For sale by the Office of Technical Services, Commerce Department, Washington 25, D. C.).

REFRIGERATION:

Rybpromyslennye Refrizeratornye Suda (Refrigerated Fishing Boats), by V. P. Zajcev, A. E. Nitockin, and V. L. Survillo, 302 pp., 144 figs., 27 tables, printed in Russian. Gosudarstvennoe Sojuznoe Izdatel'stvo Sudostroitel'noj Promyslennosti, Leningrad, USSR, 1957. Covers the importance of refrigerated fishing boats, their characteristics and installation. Discusses the technical basis of refrigeration on board and transport of fish (various processes for the chilling and freezing of fish, production of chilled and frozen fish fillets, etc.); refrigeration machines, their installation and basis of operation; machines and plants on board ships for the chilling of fish; types of refrigerated boats used in the fishing industry and their general arrangement; heat transmission through the insulation of boats and testing of refrigerated boats; and some problems on the rational operation of refrigerated boats.

RIVER POLLUTION:

The Treatment of Trade-Waste Waters and the Prevention of River Pollution (Proceedings of a Course held in the Department of Civil Engineering, King's College, Newcastle upon Tyne, April 1-12, 1957), 326 pp., printed. Public

Health Engineering Section, University of Durham, King's College, in association with Contractors' Record Ltd., London, England, 1957.

SALMON:

"Effects of DDT Spraying on Young Salmon and Their Food," article, The Atlantic Salmon Journal, no. 4, December 1956, pp. 33-34, printed. The Atlantic Salmon Association, Inc., 1559 McGregor St., Montreal 25, Canada.

"The Potential Application of Antibiotics in the Salmon Canning Industry. II--Chemical and Bacteriological Evaluations," by J. A. Stern, H. L. Liebman, G. Kudo, J. Chapel, R. A. Olsen, L. L. Farber, and M. Grennan, article, Food Technology, vol. 12, no. 3, March 1958, pp. 132-137, illus., printed, single copies of periodical--domestic US\$1.50, foreign US\$1.75. (Published by the Institute of Food Technologists.) The Garrard Press, 510 North Hickory, Champaign, Ill. Describes an investigation conducted to determine the effects of antibiotics on the retardation of spoilage of sockeye salmon. Under the conditions of this investigation, oxytetracycline and chlortetracycline retarded the spoilage of sockeye salmon. The over-all storage life appeared to be extended by a factor approximating 1.5 over the cases where no antibiotics were used. Extension of storage time was dependent on temperature. At the high storage temperatures ($65 \pm 5^{\circ}\text{F}$), the absolute time of extension was relatively small, while at 32°F , the absolute time of extension was considerable. Chemical and organoleptic examinations substantiated the above conclusions. Results of the bacterial examination were inconclusive, probably due to the fact that the samples were stored at freezing temperatures prior to examination. Assays for residual antibiotic activity in the canned product were negative.

Recent British Columbia Spring and Coho Salmon Tagging Experiments and a Comparison with those Conducted from 1925 to 1930, by D. J. Milne, Bulletin No. 113, 56 pp., printed, 50 Canadian cents. Fisheries Research Board of Canada, Ottawa, Canada, 1957. (For sale by Queen's Printer, Ottawa, Canada.)

Salmon Research and Hydroelectric Power Development, by J. R. Brett, Bulletin No. 114, 26 pp., printed, 50 Canadian cents. Fisheries Research Board of Canada, Ottawa, Canada, 1957. (For sale by Queen's Printer, Ottawa, Canada.)

Salmon Spawning Report--British Columbia, 1957, 14 pp., processed. Department of Fisheries, Vancouver, B. C., Canada, March 17, 1958. A report covering the seeding of the salmon spawning areas of British Columbia for 1957. Developments or trends of the 1957 migration and spawning escapement of salmon, by species and areas, are discussed.

"Sweden Adopts Artificial Propagation," article, The Atlantic Salmon Journal, no. 1, February 1957, pp. 11-12, printed. The Atlantic Salmon Association, Inc., 1559 McGregor St., Montreal 25,

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Canada. In order to find answers to the many problems created by hydroelectric development of Sweden's rivers, the Migratory Fish Committee was formed which collaborated with the Swedish State Power Board and private companies in several studies. These studies revealed that salmon reared to 6 inches before stocking attained a weight of 4 pounds after 18 months in the sea, 12 pounds at the end of the third year, and 20 pounds after 4 years, and that only 2 of 80 tagged fish recaptured inshore had strayed from their "parent" stream. According to calculations, a return of at least 5 percent would be necessary to make artificial propagation a "paying proposition."

SEA MAMMALS:

Seals, Sea Lions, and Walrus (A Review of the Pinnipedia), by Victor B. Scheffer, 189 pp., illus., printed, \$5. Stanford University Press, Stanford, Calif., 1958. A systematic account of the pinnipeds. Drawing upon man's increased knowledge of life in the sea, especially in the polar regions, and on his greater understanding of the processes of animal evolution, the author has examined in a fresh light the pattern of distribution and variation displayed by the seals and their relatives. Taxonomic history, geographic range, and population estimates are given for each of the forty-seven kinds of pinnipeds, and an attempt has been made to estimate their world population. Pinniped adaptations in body form and function to life in the sea are explained, and the author traces the evolution of the order and its subdivisions from its precarnivore ancestors. A synoptic key enables the reader to identify each of the twenty genera on the basis of distinctive features of size and shape, pelage, skeleton, and behavior.

SEAWEED:

"Studies on the Physiology of a Laver, *Porphyra tenera* Kjellm. III. - Chemical Factors Influencing Upon the Photosynthesis," by Hideo Iwasaki and Chikayoshi Matsudaira, article, *The Tohoku Journal of Agricultural Research*, vol. VIII, no. 1, July 1957, pp. 47-54, illus., printed. Office, Faculty of Agriculture, Tohoku University, Sendai, Japan.

SHRIMP:

Observations on the Structural Development of the Genitalia and the Impregnation of the Pink Shrimp, *PENAEUS DUORARUM* Burkenroad, by Bonnie Eldred, Technical Series No. 23, 26 pp., illus., printed, Florida State Board of Conservation Marine Laboratory, St. Petersburg, Fla., January 1, 1958.

SPAIN:

Estadística de Pesca, Año 1956 (Fishery Statistics, Year 1956), 272 pp., printed in Spanish. Ministerio de Comercio, Direccion General de Pesca Maritima, Madrid, Spain. A purely statistical report presenting the weight and value of fish and shellfish by ports, regions, species, and months. Also contains tables on fishing gear, vessels, and canning factories.

III Reunion sobre Productividad y Pesquerias (Third Meeting on Production and Fisheries),

121 pp., processed in Spanish. Instituto de Investigaciones Pesqueras, Patronato "Juan de la Cierva" de Investigacion Tecnica, Barcelona, Spain. A collection of 31 articles presented at the third meeting on marine fishery and production held during September 10-14, 1957, in Spain, by the Institute of Fishery Investigation of the "Juan de la Cierva" Foundation for Technical Investigation. The various articles cover, among others, the following topics pertaining to Spanish fisheries: sardine (*Sardina pilchardus* Walb.) fishery; trawling problems in deep waters; limits and seasons for trawling in the Mediterranean Sea; and biological and statistical data on tuna (*Thunnus thynnus* L.).

TAGGING:

"Preliminary Experiments on the Use of Spaghetti Tags," by L. B. Tebo, Jr., article Proceedings of the Tenth Annual Conference, Southeastern Association of Game and Fish Commissioners, October 1957, pp. 77-80, printed. Southeastern Association of Game and Fish Commissioners, Columbia, S. C.

TARIFFS:

United States Customs Valuation Procedure, 54 pp., \$1. National Council of American Importers, Inc., 45 East 17th St., New York 3, N. Y. This booklet outlines the new United States Customs Simplification Act of 1956, which became effective on February 27, 1958. Part I consists of explanatory notes showing parts of the complete text of the new value section 402; part II gives the text of the two value sections in parallel columns to permit a comparison of the differences in phraseology; and part III contains the final list of articles that will continue to be appraised under the old valuation method, section 402a.

TERRITORIAL WATERS:

United Nations Conference on the Law of the Sea. United Nations, New York, N. Y. The following processed reports have been issued:

A/CONF.13/1. 110 pp., September 20, 1957. Memorandum concerning historic bays. Preparatory document no. 1. By the Secretariat of the UN.

A/CONF.13/2. 28 pp., including annex, September 30, 1957. Scientific considerations relating to the continental shelf. Preparatory document no. 2. Memorandum by the Secretariat of UNESCO.

A/CONF.13/3. 46 pp., October 4, 1957. The economic and scientific basis of the principle of abstention. Preparatory document no. 3. By Richard van Cleve, Director and Professor, School of Fisheries, University of Washington.

A/CONF.13/4. 30 pp., October 4, 1957. The law of the air and the articles concerning the law of sea adopted by the International Law Commission at its 8th session. Preparatory document no. 4. By E. Peplin, Director of the Institute of International Air Law, McGill University.

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- A/CONF.13/5. 98 pp., October 23, 1957. Comments by governments on the articles concerning the law of the sea prepared by the International Law Commission at its 8th session. Preparatory document no. 5.
- A/CONF.13/5/Add.1.-14 pp., November 7, 1957.
- A/CONF.13/6. 93 pp., maps. October 23, 1957. A brief geographical and hydrographical study of straits which constitute routes for international traffic. Preparatory document no. 6. By Commander R. H. Kennedy, O. B. E., R. N. (Retd.).
- A/CONF.13/8. 8 pp., October 29, 1957. Memorandum on pollution of the sea by oil. Preparatory document no. 8. Prepared by the Secretariat of the UN.
- A/CONF.13/9. 1 p., November 5, 1957. Provisional agenda. Prepared by the Secretariat of the UN.
- A/CONF.13/10. 19 pp., November 5, 1957. Provisional rules of procedure. Prepared by the Secretariat of the UN.
- A/CONF.13/11. 12 pp., November 5, 1957. Memorandum concerning the method of work and procedures of the Conference. By the Secretariat of the UN.
- A/CONF.13/12. 26 pp., including annex, November 6, 1957. Technical particulars concerning the methods of fishing conducted by means of equipment embedded in the floor of the sea. Preparatory document no. 9. By the Secretariat of FAO.
- A/CONF.13/13. 33 pp., November 6, 1957. Examination of living resources associated with the sea bed of the continental shelf with regard to the nature and degree of their physical and biological association with such sea bed. Preparatory document no. 10. By the Secretariat of FAO.
- A/CONF.13/14. 9 pp., November 12, 1957. Guide to instruments affecting the legal status of straits. Preparatory document no. 11. Prepared by the Secretariat of the UN.
- A/CONF.13/15. 100 pp., November 13, 1957. A brief geographical and hydrographical study of bays and estuaries, the coasts of which belong to different states. Preparatory document no. 12. Prepared by Commander R. H. Kennedy, O. B. E., R. N. (retd.).
- A/CONF.13/16. 41 pp., November 20, 1957. The economic importance of the sea fisheries in different countries. Preparatory document no. 13. By the Secretariat of FAO.
- A/CONF.13/17. 56 pp., Trilingual text (English, French and Spanish), November 21, 1957. Bibliographical guide to the law of the sea. Preparatory document no. 14. Prepared by the Secretariat of the UN.
- A/CONF.13/18. 38 pp., November 29, 1957. Certain legal aspects concerning the delimitation of the territorial waters of archipelagos. Preparatory document no. 15. By Jens Evensen, Advocate at the Supreme Court of Norway.
- A/CONF.13/19. 299 pp., December 3, 1957. Verbatim record of the debate in the 6th Committee of the General Assembly, at its 11th session, relating to agenda item 53(a). Volume 1.
- A/CONF.13/20. 12 pp., January 30, 1958. Report of the Secretary-General on the preparation of the conference.
- A/CONF.13/21. 182 pp., December 12, 1957. Reference guide to resolutions and records concerning the law of the sea adopted by worldwide or regional international conferences and meetings.
- A/CONF.13/22. 16 pp., December 17, 1957. Guide to decisions of international tribunals relating to the law of the sea. Preparatory document no. 17. By the Secretariat of the UN.
- A/CONF.13/22/Corr.1. 1 p., January 13, 1958. English only.
- A/CONF.13/23. 43 pp., December 17, 1957. List in chronological order of international agreements relating to fisheries and other questions affecting the utilization and conservation of the resources of the sea. Preparatory document no. 18. Prepared by the Secretariat of the UN. Trilingual text (English, French and Spanish).
- A/CONF.13/25. 35 pp., January 3, 1958. Recent developments in the technology of exploiting the mineral resources of the Continental Shelf.
- A/CONF.13/27. 244 pp., January 9, 1958. United Nations Legislative Series. Supplement to laws and regulations on the regime of the high seas, vols. I and II, and laws concerning the nationality of ships.
- A/CONF.13/28. 7 pp., January 13, 1958. Resolutions by and communication from the International Council of Scientific Unions concerning part II, section III of the articles concerning the law of the sea (continental shelf). Transmitted by UNESCO.
- A/CONF.13/29. 67 pp., January 14, 1958. Memorandum concerning the question of free access to the sea of land-locked countries.
- A/CONF.13/31. 9 pp., January 24, 1958. Comments on the articles concerning the law of the sea adopted by the International Law Commission at its eighth session.
- A/CONF.13/32. 25 pp., January 24, 1958. Text of the articles concerning the law of the sea adopted by the International Law Commission at its eighth session.

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A/CONF.13/33. 7 pp., February 4, 1958. Initial list of documents for the United Nations Conference on the Law of the Sea.

TEXAS:

A Checklist of Texas Fresh-Water Fishes, by Clark Hubbs, IF Series No. 3, II pp., printed. Division of Inland Fisheries, Texas Game and Fish Commission, Austin, Tex., 1957.

TILAPIA:

"Preliminary Studies on Tilapia Mossambica Peters Relative to Experimental Pond Culture," by H. D. Kelly, article, Proceedings of the Tenth Annual Conference, Southeastern Association of Game and Fish Commissioners October 1957, pp. 139-149, printed. Southeastern Association of Game and Fish Commissioners, Columbia, S. C.

TRADE LISTS:

The Office of Economic Affairs, Bureau of Foreign Commerce, U. S. Department of Commerce, Washington 25, D. C., has published the following mimeographed trade lists. Copies may be obtained by firms in the United States from that office or from Department of Commerce field offices at \$2 each.

Oils (Animal, Fish, and Vegetable)--Importers, Dealers, and Producers, Bolivia, 4 pp. (February 1958). Lists the name and address, size of firm, and type of product handled by each firm. Includes firms dealing in fish oils.

Oils (Animal, Fish, and Vegetable)--Importers, Dealers, Producers, Refiners, and Exporters--Lebanon, 8 pp. (February 1958). Lists the name and address, size of firm, and type of product handled by each firm. Includes firms dealing in fish and fish-liver oils. Statistics are given covering the different kinds of oils (including cod liver and other fish oils) imported into or exported from Lebanon during 1956. No fishoil is produced in Lebanon.

Canneries--Portugal, 14 pp. (February 1958).

Lists the names of canneries and addresses, size of firm and types of products handled, and registered annual capacity of firms. The report is divided into three parts, including Part I--Fish Canneries. The report states that the fish canning industry in Portugal is one of its major industries. The country's total exports of canned fish in 1956 amounted to 139.3 million pounds. Imports of canned food products totalled 9.4 million pounds of which fish products accounted for 44.6 thousand pounds.

Oils (Animal, Fish, and Vegetable)--Importers, Dealers, Producers, Refiners, and Exporters, Syria, 17 pp. (February 1958). Lists the name and address, size of firm, and type of product handled by each firm. Includes firms dealing in fish and fish-liver oils.

TRANSPORTATION:

"The Transport of Foodstuffs by Air in Warm Climates," article, Revue Pratique du Froid, May 1957, pp. 36-38, illus., printed in French. Revue Pratique du Froid, 254 Rue de Vaugirard,

Paris 15, France. Describes some achievements in air transport of perishable foodstuffs with regard to waterproof packaging to maintain the moisture content and the normal ground-level pressure. Insulated packaging and packaging with water ice and carbon dioxide ice are described.

TROPICAL FISHES:

Encyclopedia of Tropical Fishes (with Special Emphasis on Techniques of Breeding), by Herbert R. Axelrod and William Vorderwinkler, 732 pp., illus., printed, no price given. T. F. H. Publications, Inc., 57 Academy St., Jersey City, N. J. (Distributed to the Book Trade by Sterling Publishing Co., Inc., 121 East 24th St., New York, N. Y.)

TUNA:

"The Food of Tunas," by Donald deSylva, article, Bulletin of the International Oceanographic Foundation, vol. 2, no. 1, March 1956, pp. 37-48, printed. The Marine Laboratory, University of Miami, Coral Gables, Fla.

UNDERWATER PHOTOGRAPHY:

"A New Deep-Sea Underwater Camera," by A. S. Laughton, article, Deep Sea Research, vol. 4, no. 2, April 1957, pp. 120-125, printed. Deep Sea Research (Papers in Marine Biology and Oceanography) Pergamon Press, 122 East 57th St., New York 22, N. Y.

UNITED KINGDOM:

Herring Industry Accounts, 1956-1957, 7 pp., printed. Her Majesty's Stationery Office, London, England. Shows the sums received and paid out of the Herring Marketing Fund for the purpose of making loans in connection with export, or for undertaking operations involving the outlay of working capital (all of which was required for the Board's herring oil and meal schemes). No advances were required by the Board during the year in respect to schemes connected with export. Also shows an account of the Herring Industry Board's receipts and payments of grants for the purchase of vessels and engines, and a statement with respect to the application of money advanced to the Board out of the fisheries (Scotland) and herring industry vote.

Journal of the Marine Biological Association, vol. 37, no. 1, February 1958, pp. 1-266, illus., printed. Cambridge University Press, 32 East 57th St., New York 22, N. Y. Includes, among others, the following papers: "Sea Temperatures in Plymouth Sound," by L. H. N. Cooper; "A Single-Solution Method for the Determination of Soluble Phosphate in Sea Water," by J. Murphy and J. P. Riley; "Note on the Temperature Tolerances of Some Intertidal Animals in Relation to Environmental Temperatures and Geographical Distribution," by A. J. Southward; "The Modes of Action of Toxic Agents. III. Mercuric Chloride and n-Amylmercuric Chloride on Crustaceans," by E. D. S. Corner and F. H. Rigler; "Eudactylina rachelae n. sp., a Copepod Parasitic on the Electric Ray, Torpedo nobiliana Bonaparte," by J. Green; "The Chemistry of

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Ethylenediamine Tetra-Acetic Acid in Sea Water," by C. P. Spencer; "Nematodes Parasitic on Sea Weeds of the Genera *Ascophyllum* and *Fucus*," by John W. Coles; "The Distribution of Intertidal Organisms Along the Coasts of the English Channel," by D. J. Crisp and A. J. Southward; and "Studies on Marine Flagellates. IV. Morphology and Microanatomy of a New Species of *Chrysochromulina*," by Mary Parke, Irene Manton, and B. Clarke.

Living Silver: An Impression of the British Fishing Industry, by Burns Singer, 232 pp., illus., printed, 25s. (US\$3.50). Secker & Warburg, London, England. A well-written account of the British fishing industry, containing a detailed description of all the main fishing methods. The

business of fishing is described from the viewpoint of fishermen, and although it contains specialized technical knowledge it is so arranged and vividly displayed as to appeal to anybody with a normal layman's interest in marine matters.

WISCONSIN:

"Federal Fisheries Activities in Wisconsin," by Ancil D. Holloway, article, *Wisconsin Conservation Bulletin*, vol. 23, no. 3, March 1958, pp. 24-25, printed. Wisconsin Conservation Department, Madison 1, Wis. Describes the functions and activities of the Fish and Wildlife Service in Wisconsin. In addition to operating three hatcheries in Wisconsin, the Service is concerned with both sport and commercial fishing.



DO NOISES SCARE FISH AWAY?

The opinions of the experts vary on whether or not noises scare fish away. It appears that although fish in the immediate vicinity of the noises may be frightened and leave the area, those a short distance away are not affected. Surface-living fish are probably more apt to be frightened away than bottom-dwellers, but it is unlikely that they stay away permanently. In fact, fish have been observed returning to an area soon after explosions have been set off there. ("Sea Secrets," September 1957, The International Oceanographic Foundation, Coral Gables, Fla.)

Editorial Assistant--Ruth V. Keefe

Illustrator--Gustaf T. Sundstrom

Compositors--Jean Zalevsky, Alma Greene, Helen Joswick, and Vera Eggleston

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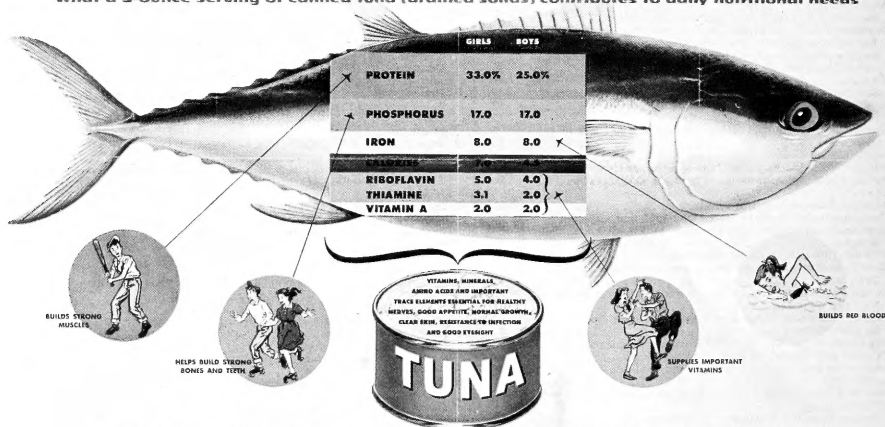
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NUTRITIONAL VALUE OF CANNED TUNA FOR TEEN-AGERS

What a 3-ounce serving of canned tuna [drained solids] contributes to daily nutritional needs



EVERY DAY THERE'S A DELICIOUS WAY TO SERVE TUNA

Prepared by the TUNA RESEARCH FOUNDATION, Terminal Island, California

TEMPTS TEEN-AGERS



An appetite-satisfying food, high in protein for building muscle and stimulating pep tempts teen-agers. They know that strength and sparkle are dependent on right eating.

PLEASES PARENTS



Parents are pleased to fit into family menus a food which has protein, minerals, vitamins, and trace elements needed by all the family. They call this nutrition economy.

SATISFIES GRANDPARENTS



Grandparents find satisfaction in a food which is easily eaten. And when such a food has high nutritive quality it serves to bolster their dwindling strength and appetite.

SAFEGUARDS CHILDREN



A food that gives energy calories, together with abundant nutrients for growth, safeguards children's health. Such a food served in many ways, encourages good food habits, too.

Solid Pack Tuna--7-ounce can--three large pieces of loins with smaller pieces to fill the can, Chunk-Style Tuna--6 3/4-ounce can--smaller pieces, ideal for salads, sandwiches, and soups. Soybean oil in which tuna is packed is excellent used as a base for sauces, salad dressings, and for sauteing.