

TRENDS AND DEVELOPMENTS

American Samoa

TUNA LANDINGS, JULY 1960:

Tuna landings by Japanese long-line fishing vessels for the United States-owned tuna cannery in American Samoa amounted to 1.8 million pounds in July 1960 as compared with about 2.7 million pounds in July 1959. The January-July 1960 total of 15.4 million pounds was up 3.5 percent from the same period of 1959.

| American Samoa Tuna Landings, July 1960 | | | | |
|---|-------|-------|-----------|--------|
| Species | July | | Jan.-July | |
| | 1960 | 1959 | 1960 | 1959 |
| Albacore | 1,597 | 2,208 | 12,655 | 11,286 |
| Yellowfin | 172 | 388 | 1,601 | 2,902 |
| Big-eyed | 57 | 68 | 1,112 | 672 |
| Skipjack | - | - | - | 1/ |
| Total | 1,826 | 2,664 | 15,378 | 14,860 |

(1,000 Lbs.)
 1/Less than 500 pounds.
 Note: All of the tuna landed in July 1960 was by Japanese long-line vessels.



California

PHYSIOLOGICAL STUDY OF PACIFIC SALMON:

M/V "Nautilus" Cruise 60N6: The area off San Francisco (Muir Beach to Pedro Point) was surveyed from July 12-14, 1960, by the California Department of Fish and Game's research vessel Nautilus to obtain and keep alive, for physiological experiments, immature, ocean-caught chinook salmon. The fish were to be brought aboard without sustaining an obviously damaging injury and with minimum exertion on their part, to be held under conditions which would facilitate their return to a state of physical rest. Another objective was to examine chinook salmon in the 20-22 inch size range to determine their sex and stage of maturity.

In the course of three days' fishing, more than 100 chinook salmon were caught; 31 were successfully held in a large live-bait tank for varying lengths of time, up to 56 hours, and 22 others were examined for stage

of maturity and sex. Most of the latter had sustained serious injuries while being caught or landed. All other fish were released without being brought aboard or handled. This was accomplished by use of the so-called button-hook fish releaser.

Of the 22 fish examined, 17 were males (77 percent), and every fish was immature (would not spawn in 1960).

One marked salmon was captured. It had been one of about 250,000 fingerlings trucked to, and released in, lower San Francisco Bay early in 1959. When captured, it was 23 inches long, weighed 4.5 pounds and was in its second year of life.

During the last day, a team of scientists conducted physiological studies of fish which had been held for this purpose in the live-bait tank. The objective of the studies is to obtain knowledge about the cause of aging and death of an organism with particular reference to Pacific salmon.



Cans--Shipments for Fishery Products, January-June 1960

Total shipments of metal cans during January-June 1960 amounted to 60,560 short tons of steel (based on the amount of steel consumed in the manufacture of cans) as compared with 53,815 tons in the same period a year ago. The increase of about 12.5 percent in the total shipments of metal cans January-June this year as compared with the same period of 1959 was probable due to orders in anticipation of a sharp increase in the Alaska canned salmon pack.

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.



Central Pacific Fisheries Investigations

STUDIES INITIATED ON GENETIC DEFINITION OF TUNA STOCKS:

An intensive study of Pacific tuna species with reference to the hereditary composition of tuna stocks was started recently by the U. S. Bureau of Commercial Fisheries.

Geneticists in the recently-implemented program at the Bureau's Honolulu Biological Laboratory report a major advance in the study of skipjack tuna populations with the development of a battery of serological test fluids which will detect complex patterns of individual differences between the red blood cells of different skipjack. These antigenic differences analogous to those found in man (A-B-O, etc.) and other vertebrates are the products of the units of inheritance (genes).

Laboratory scientists report that a study of the frequency with which the various characters occur in tuna populations will lead to a genetic definition of tuna stocks. Such a definition may allow a more sophisticated study to be made of growth, recruitment, and mortality rates which may be unique for different racial or genetic stocks within the same species.

The antigenic characters themselves which are in a sense analogous to "natural" tags on the population level may also yield important information regarding the geographic distribution and migration of the tunas.

Preliminary studies have been carried out by the Honolulu Laboratory and visiting university scientists on a small scale since 1955 and more recently with the La Jolla, Calif., Biological Laboratory of the Bureau.



Federal Purchases of Fishery Products

DEPARTMENT OF DEFENSE PURCHASES, JANUARY-JUNE 1960:

Fresh and Frozen Fishery Products: For the use of the Armed Forces under the De-

| Quantity | | | | Value | | | |
|----------------------------------|-------|------------|--------|-------------------------------|-------|------------|-------|
| June | | Jan. -June | | June | | Jan. -June | |
| 1960 | 1959 | 1960 | 1959 | 1960 | 1959 | 1960 | 1959 |
| (1,000 Lbs.) | | | | (\$1,000) | | | |
| 2,718 | 2,212 | 11,740 | 11,346 | 1,195 | 1,170 | 5,986 | 5,987 |

partment of Defense, 2.8 million pounds (value \$1.2 million) of fresh and frozen fishery products were purchased in June 1960 by the Military Subsistence Supply Agency. This exceeded the quantity purchased in May by 27.7 percent, and was 22.9 percent greater than the amount purchased in June last year. The value of the purchases this June was 8.3 percent greater than the previous month and 2.1 percent more than for June 1959.

During the first six months of 1960 purchases totaled 11.7 million pounds (valued at almost \$6.0 million)--an increase of 3.5 percent in quantity and no change in value as compared with the same period in 1959.

Prices paid for fresh and frozen fishery products by the Department of Defense in June 1960 averaged 44.0 cents a pound, 7.8 cents less than the 51.8 cents paid in May and 8.9 cents less than the 52.9 cents paid during June 1960.

In June, the Agency also bought 2,000 pounds (valued at \$15,000) of dehydrated fish for experimental purposes.

Canned Fishery Products: Tuna was the principal canned fishery product purchased

| Product | Quantity | | | | Value | | | |
|------------------|------------------------------|------|------------|-------|---------------------------|------|------------|------|
| | June | | Jan. -June | | June | | Jan. -June | |
| | 1960 | 1959 | 1960 | 1959 | 1960 | 1959 | 1960 | 1959 |
| | . . . (1,000 Lbs.) | | | | . . . (\$1,000) | | | |
| Tuna | 166 | - | 1,449 | 1,832 | 75 | - | 656 | 868 |
| Salmon | 3 | 5 | 3 | 12 | 2 | 4 | 2 | 9 |
| Sardines | 22 | 160 | 84 | 669 | 9 | 28 | 35 | 100 |

for the use of the Armed Forces during June this year. In the first six months of 1960, purchases of canned tuna, salmon, and sardines were substantially lower than in the same period in 1959.

Note: Armed Forces installations generally make some local purchases not included in the data given; actual total purchases are higher than indicated because local purchases are not obtainable.



Fish Farming

DIRECTOR APPOINTED FOR NEW EXPERIMENTAL STATION:

Appointment of Dr. James H. Stevenson of Little Rock, Ark., to direct the new fish farming research program of the U. S. Bureau of Sport Fisheries and Wildlife, Department of

the Interior, was announced on August 3, 1960, by Bureau Director Daniel H. Jansen.

Stevenson will be in charge of the Bureau's research program into many of the problems of raising fish in conjunction with the growing of rice and other agriculture crops. Some of the problems to be worked out include effects of water quality and levels; control of aquatic vegetation; overpopulation; predation; intrusion of unwanted species of wild fish; disease and parasite infestations; proper stocking levels; nutritional requirements along with feeding materials and methods; spawning requirements and methods of controlling or inducing spawning; and brood stock selection.

The two tracts of land acquired by the Bureau for the fish farming experiments total 296 acres. One of the purchased tracts comprises 85 acres immediately adjacent to the University of Arkansas' Rice Branch Experiment Station near Stuttgart. The second tract, which is of a different soil type, is 211 acres adjoining the University's Southeast Branch Experiment Station at Kelso.

The Stuttgart property will have a modern laboratory; fish-holding facilities; a building for shop, garage and storage; a reservoir of about 30 acres; and experimental ponds ranging from one-tenth acre to one acre in surface area. The Kelso land has a high producing well and an adequate surface water supply. Levees have been constructed on three sides of 160 acres of the plot. Five, ten, and twenty-acre reservoirs are planned for the site.

Stevenson, who was formerly head of the Department of Zoology at Little Rock University and biologist for the Arkansas Game and Fish Commission, recently returned from a five-month assignment with the International Cooperation Administration to advise the government of Pakistan on development of its inland fisheries.

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CONTRACT LET FOR NEW EXPERIMENTAL STATION IN ARKANSAS:

A contract was executed on June 10, 1960, for first-phase construction for the new Fish Farming Experimental Station near Stuttgart, Arkansas. Specifications call for completion of the two headquarters buildings. One will contain offices and laboratories for biology, chemistry, and disease and parasite research; the other a combination building, will house a small shop, garage, storage, and fish-holding tanks.

Second-phase construction, for which bids will be solicited in the near future, will include a 30-acre reservoir, and three series of one-tenth, one-quarter, and one-acre experimental ponds, complete with water-supply system.



Great Lakes Fisheries Exploration and Gear Research

EXPLORATORY FISHING WITH OTTER TRAWL STARTED IN LAKE MICHIGAN:

M/V "Art Swaer II" Cruise 1: The U. S. Bureau of Commercial Fisheries inaugurated the Lake Michigan Exploratory Fishing and Gear Research Program with the cruise of a chartered Lake Michigan commercial gill-net tug that has recently been adapted to the newly-introduced otter-trawl method of fishing. On August 10, 1960, the chartered vessel, Art Swaer II, was scheduled to start a seven-day trawl fish exploratory cruise.

Exploratory fishing operations were carried out in eastern Lake Michigan at depths from 10 to 50 fathoms. The operational area was confined to waters between Ludington and South Haven.

The objectives of the cruise were to determine the distribution and abundance of the various species of fish that can be taken with otter trawls in that area at this time of year. Special effort was made to assess the potential yield of fish stocks that are presently only slightly exploited on a commercial basis. The characteristics of the lake bottom was analyzed and charted to show the location and extent of areas suitable for otter trawling.

Standard commercial Gulf of Mexico-type semiballoon fish trawls with 70-foot footropes were used. Electronic depth-recorders were employed to determine lake-bottom characteristics and the vertical distribution of fish.



Great Lakes Fishery Investigations

CHEMICAL CONTROL PROGRAM FOR SEA LAMPREY ON SCHEDULE:

Progress in the Great Lakes chemical-control program for sea lamprey makes it apparent that the goal of treating all known lamprey-spawning streams tributary to the United States shore of Lake Superior in

1960 will be reached. Two of the most difficult treatments were completed in July-1960--the Bad River-White River system in Wisconsin and the Ontonagon River in Michigan. Two smaller streams were also treated.

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EXPERIMENTAL TRAWLING REVEALS SPAWNING SUCCESS OF CERTAIN SPECIES:

Experimental trawling in Green Bay, Lake Michigan, and in Lake Erie has given some indication of the success of the 1960 spawning of certain Great Lakes species. As of August, no 1960 yellow pike had been taken in Green Bay even on grounds that yielded many young-of-the-year in 1959. Young yellow perch had been caught but in very small numbers. Juvenile smelt were extremely plentiful. Yellow pike of the 1960 year-class were taken at a number of localities in western Lake Erie, but in such small numbers as to indicate spawning success far below that of 1959. Reproduction seems to have been poor also in the spottail shiner and possibly the sheepshead. Young yellow perch had been caught in good numbers but were less plentiful than in 1959. Catches of the young-of-the-year white bass and smelt were very large.

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LAKE ERIE FISH POPULATION SURVEY:

M/V "George L." May-June 1960: Extensive trawling operations were conducted by the U. S. Bureau of Commercial Fisheries research vessel George L. and commercial fish catches were examined in May and June. United States commercial catches of yellow perch, sheepshead, carp, channel catfish, and white bass have been good. Yellow pike catches were about one-half of those last spring and catches of blue pike, cisco, and whitefish have been very light.

Yearling yellow pike (hatched in 1959) continue to appear in large numbers in commercial trap nets in the western basin. Great variations in catch from week to week in the same areas indicate that the yellow pike move about continuously in loosely-formed groups. The average length of yearling yellow pike taken in trap nets in late June was about 11½ inches. Several 13-inch yearling fish have been landed by commercial fishermen. At the present rate of growth (½ inch per month), most of those fish should exceed 13 inches by September 1.

Trawl catches continue to demonstrate the great abundance of yellow perch hatched in 1959. These fish now average about 5 inches long and should enter the commercial catch in late 1961. Trawl catches of large numbers of white bass hatched in both 1958 and 1959 indicate that a commercial production of this species should continue to be good in 1960 and 1961. The catch of 5- to 8-inch smelt in May and early June in western Lake Erie far exceeded catches during the same period in 1958-59.

Catches of fry and small fish by tow nets in May and by trawls in June revealed an exceptional hatch of smelt in the western basin this spring compared to last year. Yellow perch fry are appearing in goodly numbers but young yellow pike are relatively scarce compared to last year. Sheepshead eggs, which float on the wa-

ter's surface, have been taken earlier, in larger numbers, and over a wider area than last year. White bass, gizzard shad, and spottail shiner fry were also taken in late June.

Most yellow perch were in poor condition in May but since have fed heavily on animal plankton and now appear relatively plump. Yearling white bass (4-7 inches long) are feeding heavily on newly-hatched smelt and yellow perch. Yearling yellow pike have fed principally upon emerald and spottail shiners.

Trawling was to be continued during the summer to determine semi-monthly changes in relative abundance, growth, and food of important fish species.

M/V "George L." July 1960: Surface water temperatures were nearly constant at 75° F. in western Lake Erie during July. Average July air temperatures at Sandusky were coolest since 1947. Winds during the month were light. Low oxygen concentrations (lowest 0.5 p.p.m.) were observed in the Central and Western basins.

Commercial catches of most fish were light. Yearling yellow pike averaging 12 inches long were common in the trap-net catches in the Island Region. The largest yearling yellow pike observed was 13.7 inches long. Yearling yellow pike taken in Eastern waters (Cleveland to Dunkirk) range from about 9-11 inches long.

Ninety-two (2.3 percent) of the 4,000 yearling yellow pike tagged in April have been recovered. One fish was taken in Lake St. Clair--another taken from Lorain was the most easterly tag recovery reported.

Yearling yellow perch and white bass are very abundant in all waters of Western Lake Erie. Up to 9,000 yearling yellow perch averaging about six inches long have been observed in single trap-net catches.

Large numbers of white bass and smelt young-of-the-year were taken by trawl in July. Trawl catches of young-of-the-year yellow pike were much lower than in 1959 but appeared in somewhat greater numbers than in 1957 and 1958. The 1960 hatch averaged about 5 inches long by July 31--equal to the growth of the 1959 hatch a year ago.

The lowest total commercial catch of yellow pike on record in Lake Erie was previously reported to be 422,000 pounds in 1913, but the records for that year were incomplete. Ohio reported only the fall catches that year. Further examination of the records shows that total yellow pike commercial production in 1959 (about 1,500,000 pounds) was greater than in seven prior years (1918-21 and 1928-30). Lowest production was 744,416 pounds in 1919. Low production of yellow pike in Lake Erie, then, is not new.

Note: Also see Commercial Fisheries Review, July 1960 p. 28.

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LAKE MICHIGAN FISH POPULATION SURVEY CONTINUED:

M/V "Cisco" Cruise 4: The fish population survey in southern Lake Michigan was continued (June 28-July 12, 1960) by the U. S. Bureau of Commercial Fisheries research vessel Cisco.

Gangs of nylon gill nets (50 feet each of $1\frac{1}{4}$ - and $1\frac{1}{2}$ -inch mesh, and 300 feet each of 2-, $2\frac{3}{8}$ -, $2\frac{1}{2}$ -, $2\frac{3}{4}$ -, 3-, $3\frac{1}{2}$ -, and 4-inch mesh) were set overnight at 25 and 50 fathoms off Grand Haven, Mich., and at the same depths off Racine, Wis. Off Grand Haven the catch at 25 fathoms was light (314 *Leucichthys hoyi*, 2 *L. alpenae*, 1 *L. zenithicus*, 2 lake herring), but at 50 fathoms the catch was rather large (1,089 *L. hoyi*, 13 *L. reighardi*, 17 *L. alpenae*, 7 *L. zenithicus*, 9 lake herring). Off Racine the catches were very light (about 200 *L. hoyi* at each depth, 4 smelt at 25 fathoms, and 2 *L. reighardi*, 3 *L. alpenae*, 2 *L. kiyi*, and 7 lake herring at 50 fathoms).

Gangs of linen nets were set for 4 nights at 25 and 50 fathoms off Grand Haven (255 feet each of $2\frac{3}{8}$ -, $2\frac{1}{2}$ -, $2\frac{5}{8}$ -, $2\frac{3}{4}$ -, and 3-inch mesh at the former depth and twice that amount of each mesh size at the latter). The 25-fathom net took 151 *L. hoyi* and *L. alpenae*. An identical set at the same time of year in 1954 took 426 *L. hoyi*, 7 *L. alpenae*, 11 *L. reighardi*, and 1 *L. kiyi*. The set at 50 fathoms, with which no 1954 comparison is possible, caught 758 *L. hoyi*, 21 *L. zenithicus*, 12 *L. alpenae*, 8 *L. reighardi*, and 12 lake herring.

A 52-foot commercial-type balloon trawl was towed at 5-fathom intervals from 15 to 35 fathoms west-southwest of Grand Haven, at 30 and 40 fathoms north-east of Racine, at 25, 30, 35, 40, and 50 fathoms west of Milwaukee, and at 12, 15, and 20 fathoms near shore north of Milwaukee. All tows were for 30 minutes. The chub catches from 20 fathoms and deeper were mostly small, ranging from 60 to 250 pounds. At 15 fathoms off Grand Haven 367 pounds were caught, and at 12 and 15 fathoms north of Milwaukee, 446 and 524 pounds, respectively, were taken. The larger catches in the shallower water are accounted for by appreciably greater numbers of small (7 to 8 inches) fish than were present in the catches from deeper water. Apparently in depths greater than about 15 fathoms, a large portion of the small chubs were midwater, thus not vulnerable to the bottom trawl. The chub catches were more than 95 percent bloaters (*L. hoyi*) in all catches and were almost pure bloaters in the shallower tows. The commercial-trawl catches were practically devoid of species other than chubs, except in the 50-fathom tow off Milwaukee where 20 pounds of deep-water sculpins were caught, and in 12 and 15 fathoms north of Milwaukee, where 12 and 30 pounds, respectively, of smelt were taken.

An experimental 39-foot semi-balloon trawl with a small-mesh ($\frac{1}{2}$ -inch) cod end was towed in shallow water south of Grand Haven. At 15 fathoms, a 30-minute tow netted 285 pounds of chubs; at 10 fathoms a 10-minute tow produced small numbers of perch and about 15 pounds of very small chubs, more than half of which were less than 7 inches long. At 5 and 7 fathoms the catches were predominately yellow perch, smelt, and alewives, together with a few spottail shiners, trout-perch, and log-perch.

Complete hydrographic collections and observations were made at 25-fathom stations off Grand Haven and Racine, and at 70 fathoms in midlake between these ports. Pronounced thermal stratification existed in all areas visited, but in many cases the epilimnion was quite thin. At the end of the cruise surface temperatures were mostly 16° to 17° C. (average about 62° F.) on the west side of southern Lake Michigan and 19° to 20° C. (average about 67° F.) on the east side.

Sampling of the bottom fauna off Grand Haven was made with a Peterson dredge and a Smith-McIntyre

dredge at 5-fathom-depth intervals from 5 to 30 fathoms and at 3 and 50 fathoms. The Smith-McIntyre dredge was borrowed from the Bureau Laboratory at Woods Hole, Mass., to ascertain its suitability for use in the Great Lakes. This sampler undoubtedly operates more effectively in rough seas than does the Petersen dredge, but it is too heavy and bulky for practical use and storage aboard the *Cisco*.

M/V "Cisco" Cruise 5: The survey continued during July 19-August 2, 1960. Gangs of nylon gill nets (50 feet each of $1\frac{1}{4}$ - and $1\frac{1}{2}$ -inch, 200 feet of 2-inch, and 300 feet each of $2\frac{3}{8}$ -, $2\frac{1}{2}$ -, $2\frac{3}{4}$ -, 3-, $3\frac{1}{2}$ -, and 4-inch mesh) were set at 25 and 50 fathoms off Grand Haven, Mich., and off St. Joseph, Mich. Chub catches were heavier in the 25-fathom sets. Bloaters (*Leucichthys hoyi*) made up more than 95 percent of the catches, except in the 25-fathom set off St. Joseph, where about 75 percent of the chubs were bloaters. The remainder of the chubs in this latter set were rather difficult to identify, but were mostly *L. zenithicus*; there were also a few *L. alpenae* and *L. reighardi*, and a considerable number of lake herring. A few smelt and deep-water sculpins also were taken.

Linen gill nets of several mesh sizes from $2\frac{3}{8}$ - to 3-inch, set for 5 nights off Grand Haven, took about 15 to 50 percent more bloaters at 25 and 50 fathoms, respectively, than did identical gangs set in 1954 at the same time of year. For other species of chubs the following comparisons were obtained: at 25 fathoms, all were much more common in the 1954 set; at 50 fathoms, all non-bloater species except *L. kiyi* were somewhat more numerous in the 1960 set. *L. kiyi* was more common in 1954 (172 vs. 10 in 1960).

In order to study differences in gill-net catches with differences in lengths of time set, and also to determine variations in identical 1-night sets on successive nights, nylon gill nets were fished as follows: on the first day 4 gangs were set at 25 fathoms off Grand Haven; on the second day, 1 gang was lifted and reset; on the third day the 1-night set and a 2-night set were lifted, and 1 was reset; on the fourth day the 1-night set and a 3-night set were lifted, and 1 reset; on the fifth day the remaining gangs, a 1-night and a 4-night set, were lifted. Chub catches in the 1-night sets were 432, 429, 437, and 339, respectively. The 2-night set took 756 chubs; the 3-night set 1,000; and the 4-night set 1,140. The $1\frac{1}{2}$ - and 2-inch meshes (especially the latter) appeared to have lost fishing efficiency entirely after the third night, but the other larger meshes took appreciably more fish in the 4-night set than in the 3-night one.

A 52-foot commercial-type balloon trawl was towed at 5-fathom intervals from 15 to 35 fathoms northwest of St. Joseph and from 10 to 50 fathoms southwest of Grand Haven. All tows were for 30 minutes. Bloaters made up more than 95 percent of all chub catches. The chub catches off St. Joseph ranged from 110 pounds at 20 fathoms to 460 pounds at 35 fathoms. Other species taken in the trawls off St. Joseph were lake herring (27 pounds at 35 fathoms), smelt (about 5 pounds per tow at 15 and 25 fathoms), and a few perch, deep-water sculpins, and slimy sculpins. Chub catches off Grand Haven were generally light, ranging from 24 to 64 pounds at 50 and 45 fathoms, respectively, and from 296 to 256 pounds at 25 and 20 fathoms, respectively. Some 48 pounds of deep-water sculpins were taken at 50 fathoms, and 28 pounds at 45 fathoms; otherwise, there was little other than chubs in the catches.

A half-meter, large-mesh (No. 32 grit gauze) plankton net was towed for fish fry at various depths from the surface to 20 meters near shore south of Grand Haven. Very tiny fry were quite numerous at depths from 1 to 5 meters, but none were obtained in repeated tows at the surface and at depths greater than 5 meters.

Hydrographic observations and collections were made at regular 25-fathom stations off Grand Haven and St. Joseph. Phytoplankton was considerably less abundant than during previous cruises. Surface water was rather warm; temperatures were mostly between 19° and 21° C. (66.2° and 69.8° F.).

Note: Also see Commercial Fisheries Review, Sept. 1960 pp. 21-22.

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WESTERN LAKE SUPERIOR FISHERY SURVEY CONTINUED:

M/V "Siscowet" Cruise 3: To study the bathymetric and areal distribution of fish by systematically fishing standard gangs of experimental gill nets (1- to 5-inch mesh by $\frac{1}{2}$ -inch intervals) at various locations and depths in western Lake Superior was the objective of the second of three cruises scheduled by the U. S. Bureau of Commercial Fisheries research vessel Siscowet June 28-14, 1960.

The work was performed at four stations near Ontonagon, Mich., and at three stations in the Apostle Island region. The work also included fishing with trawls from the Siscowet and the outboard-powered skiff, and tests of an electrical boom-shocker for sampling fish in shallow areas adjacent to shore.

The "bloaters" (Leucichthys hoyi) taken in the 17-fathom set were very similar to those taken in Pike's Bay near Bayfield. This shallow-water variety has larger eyes (nearly as large as in L. kiyi), less pigment on the head, and is a heavier, more solid fish than the deep-water variety. The "bloaters" taken in the Ontonagon area also appeared to be late-winter or spring spawners. Large numbers of "bloaters" in the Apostle Island area have been observed spawning with the lake herring in the late fall.

Comparisons were made of the catch from a 1- and 2-night set at the station located at 52 fathoms and from 2 successive 1-night sets at the stations located at 25 and 72 fathoms. In each test the nets were set in exactly the same location and depth. Changing weather conditions, however, during the period may have had some effect on the results of the experiment. Only three varieties of chubs are used for the comparison that follows because of the very small numbers of other species taken.

The 2-night catch at 52 fathoms took over twice as many fish as the 1-night set. The second of two 1-night sets at 25 fathoms took 14 percent more fish than the preceding night and the second 1-night set at 72 fathoms took 26 percent more fish than the preceding night.

A 30-foot semiballoon trawl (1-inch-mesh body and a $\frac{1}{2}$ -inch-mesh cod end) fished just west of Outer Island at 9 to 25 fathoms took one 2-inch whitefish but no lake trout. The catch consisted mainly of slimy muddlers, trout-perch, and ninespine sticklebacks.

Through the cooperation of the Wisconsin Conservation Department, an electrical boom-shocker was operated at the mouth of the Bad River and in the shallow waters adjacent to Stockton Island in an attempt to locate young-of-the-year of several species. Although the shocker took no young-of-the-year, it did turn up a considerable variety of fish.

River species mainly were taken at the mouth of the Bad River--smallmouth bass, northern pike, yellow pike (yearlings), black crappie, and spot-tail shiners. No fish were taken in the lake proper off the mouth of the Bad River.

Shocking operations at Stockton Island were conducted after dark in water 3 to 8 feet deep over rock and sand bottoms. Over the rock bottom the shocker took trout-perch, 6- to 8-inch round whitefish, 6- to 10-inch burbot, and 1- to 8-inch longnose suckers. Over the sand bottom the shocker uncovered thousands of small (3 to 6 inches) smelt and 3 large brown trout, apparently in shallow water feeding on the smelt. Other species taken over the sand bottom were ninespine sticklebacks, lake northern chub, and trout-perch.

Shocking operations off Stockton Island the following morning (during daylight hours) took very few fish (slimy muddlers, ninespine sticklebacks, and burbot). No smelt were caught during the daylight fishing.

Trawl tows with the outboard skiff at 15 and 20 feet yielded only a very few ninespine stickleback and slimy muddlers.

Surface water temperatures varied from 39.6° F. northwest of Ontonagon to 59.8° F. south of Stockton Island. Bottom temperatures remained about 40° F. in all areas.

M/V "Siscowet" Cruise 4: Midsummer environmental conditions were studied July 18-25, 1960, at three index stations located southeast of Stockton Island, northeast of Bear Island, and east of Pike's Bay. These studies included fishing with standard gill-net gangs and a 30-foot semiballoon trawl. Limnological data and materials were collected including: records on water temperatures, water samples for chemical analyses, plankton and bottom samples, and Secchi-disc readings.

Secchi-disc readings were comparatively low at each station, undoubtedly due to a heavy plankton concentration in the upper layers of the water. Dissolved oxygen was found to be lowest at the surface at all stations (about 10.4 p.p.m.). The oxygen content of samples taken at or near the bottom was about 12.7 p.p.m.

In addition to the sets made at each index station, standard gangs were fished north of Devil's Island at 37 and 58 fathoms, and east of Gull Island at 15, 25, 45, and 55 fathoms.

The lake herring caught east of Gull Island at 15 fathoms averaged $\frac{3}{4}$ -pound each. One herring measured 17.9 inches and weighed 1.8 pounds. The Leucichthys zenithicus caught east of Gull Island were found to be in all stages of sexual development. Several ripe or nearly ripe specimens were observed as well as recently spent and early recovered individuals.

Trawl tows were made at each index station but catches were small in all cases. The principal species taken in the trawl were slimy muddlers, nine-spine sticklebacks, smelt, and *L. hoyi*. A 1/2-meter plankton net (32 grit cloth) was towed at the surface, 18 feet and 30 feet below the surface in 35 fathoms northeast of Bear Island. Only 1 unidentified fish larva was captured, in the tow 18 feet below the surface.

Surface water temperatures have warmed considerably since the previous cruise, ranging from 56.9° north of Devil's Island to 70.4° F. at Pike's Bay. Bottom temperatures, however, still remained at about 40° F.

Note: Also see Commercial Fisheries Review, Aug. 1960 pp. 25-26.



Gulf Exploratory Fishery Program

TRAWL FISHING GEAR STUDIED WITH UNDERWATER CAMERA:

M/V "George M. Bowers" Cruise 28 (July 14-29): Motion picture studies of shrimp trawls while being towed were continued by the U. S. Bureau of Commercial Fisheries research



The Service's exploratory fishing vessel George M. Bowers during the first week of a cruise made in the Gulf of Mexico off Panama City, Fla. Motion picture film of the operation of a model experimental fish trawl was made in that area.

Due to heavy algae concentrations on the bottom, only 800 feet of underwater motion pictures were taken of a 40-foot shrimp trawl and 10-foot try net. The algae concentrations

in the trawl resulted in reducing the spread of the doors and on one occasion of tearing the net

After reports were received of ideal conditions for photographing shrimp in the Florida Keys, the vessel proceeded to that area; however, no suitable area with shrimp and favorable clean water conditions was found.

Note: Also see Commercial Fisheries Review August 1960 p. 26.



Market News Service

ADDITION OF EASTERN PACIFIC FISHING INFORMATION TO CALIFORNIA "MONTHLY SUMMARY":

The California Fishery Market News Monthly Summary, published by the U. S. Bureau of Commercial Fisheries is now issued in two parts:

Part I - "Fishery Products Production and Market Data" will continue to provide information on receipts of major California Fisheries at leading ports, packs of major canned products and byproducts, and wholesale prices. This part is issued by the

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UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF COMMERCIAL FISHERIES

CALIFORNIA FISHERY MARKET NEWS MONTHLY SUMMARY
JULY 1960
Part I - Fishery Products, Production and Market Data*

California receipts of the major fisheries (including tuna, sardines, mackerel, anchovies, and mackerel fish) at leading ports; packs of major canned products; manufacture of by-products; and wholesale prices for frozen and canned products; with comparative data.

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Bureau of Commercial Fisheries
Market News Service
Post Office Building
San Pedro, California

* Part II - "Fishing Information", containing sea-surface temperature charts, etc., is published and released from the Bureau of Commercial Fisheries, Biological Laboratory, P. O. Box 6121 Pt. Loma Station, San Diego 4, California.

Bureau's Fishery Market News Service at San Pedro. (Requests for this part should be made to the Market News Service, U. S. Bureau of Commercial Fisheries, Post Office Building, San Pedro, Calif.)

Part II - "Fishing Information" (the first issue of which was issued in July 1960) includes monthly sea-surface temperature charts for the eastern Pacific, and fishing and research information of interest to the tuna fishing industry and marine scientists. Part II is released by the Bureau's San Diego Biological Laboratory. (Requests for this part should be made to U. S. Bureau of Commercial Fisheries, Biological Laboratory, P. O. Box 6121, Pt. Loma Station, San Diego 6, Calif.)

| UNITED STATES DEPARTMENT OF THE INTERIOR | |
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| BUREAU OF COMMERCIAL FISHERIES | |
| CALIFORNIA FISHERY MARKET NEWS MONTHLY SUMMARY | |
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The Bureau established the San Diego Biological Laboratory in 1959 as its center for scientific studies concerned with tuna of the eastern Pacific. Its prime purpose is to provide for the specific application of oceanographic and biological findings to the problems of the West Coast tuna fishing industry. The laboratory is concerned alike with tropical tunas, albacore, and bluefin. This pub-

lication will be the principal medium used to disseminate information to the industry.

The monthly publication will routinely include sea-surface temperature charts. It will not always contain research and fishing information. Such will be included when there is something of significance to report.

The temperature charts cover that area of the Pacific from the Aleutians in the north to Peru and Chile in the south and offshore to 180° W. longitude. They show for each month the average sea-surface temperature and the deviations from the 30-year average and from the previous year. Between May and November, single-page supplements are issued twice monthly to show, for the immediate region off the West Coast (25° to 52° N. and offshore to 135° W.), the average sea-surface temperature for the first and last 15 days of the month. Research and fishing information indicates that the distribution of tunas and many other commercial species is directly affected by sea-surface temperatures. The charts are being prepared promptly and are expected to be most useful to fishermen in their operations. They will also benefit research scientists and meteorologists studying the oceanic environment of the eastern Pacific.

The one-page supplements will be of interest primarily to fishermen operating along the United States west coast, particularly albacore fishermen, and research agencies concerned with the coastal environment.



Maryland

BIOLOGICAL LABORATORY RECEIVES GRANT FOR RESEARCH ON EARLY LIFE HISTORY OF FISH:

Maryland's Chesapeake Biological Laboratory has received a National Science Foundation grant of \$34,700 for work on the early life stages of fish in the Chesapeake Bay and Middle Atlantic Ocean areas.

The Director of the Maryland Department of Research and Education reported on August 17 that the grant had been made for a project directed by the senior fisheries scientist at the Laboratory.

The project, to run three years, is divided into two phases. The first consists of field and laboratory work in identifying and illus-

trating the eggs, larvae, and young of various species of fishes, many of which cannot now be completely identified. The work will make it possible to locate the spawning areas of Chesapeake Bay fishes, assess their spawning survival, and determine what natural factors affect the different stages of development. When identification is definitely established, the results will be published for the benefit of other workers.

"The period shortly after eggs hatch is greatly affected by such natural conditions as temperature, salinity, and food supply. Extremes of these factors may decide whether a hatch will provide a good harvest or a poor one several years later when the fishes reach keeper size," the scientist pointed out. "Yet, we know very little about this period."

As a second phase, an atlas of drawings of fish eggs and young of those species found in the region will be compiled from published and original sources. This will be printed in a book to serve as a research tool for the identification purposes, to show where gaps of knowledge are found, and to stimulate further work in this important field. This information, unfortunately, is now scattered in many different locations and is unavailable to most individual workers.

The project proposal, which won the approval of the Foundation, noted that "Russia probably has the largest, most intensive program dealing with basic and applied studies on all phases of the biology and ecology of early fish development. Japan, India, and Italy are also much further ahead of the United States in such valuable and much-needed research." All of these countries regard their fisheries of prime importance to their economy.

The Maryland Laboratory project will go far toward plugging holes in the knowledge of younger forms, at least in this part of the nation.

The scientist and his assistants were the first to rear striped bass successfully in 1955 from the egg to the young fish, a report of which was published in 1958.

In the new activity, the scientist will be assisted by a scientific illustrator and a full-time biologist under terms of the grant. In addition, the Laboratory will provide considerable aid with other personnel and equipment.



North Atlantic Fisheries Exploration and Gear Research

ANNUAL OVERHAUL OF FISHERIES RESEARCH VESSEL "DELAWARE" HELD UP BY FREAK ACCIDENT:

The U. S. Bureau of Commercial Fisheries research vessel Delaware is stranded half way up a marine railway in New London, Conn., where she was being dry-docked for annual overhaul and for the installation of a new underwater searching device on her hull. The 147-foot vessel was stuck by the derailment of the cradle that hauls large vessels out of the water. Her predicament is challenging marine engineers and salvage experts.

The Delaware's overhaul schedule called for the installation of a new device for locating and tracking schools of fish and to spot the presence of underwater obstacles such as sandbars, shoals, sunken wrecks, etc.



Oceanography

CHARTS OF EASTERN PACIFIC OCEAN FLOOR:

Detailed maps of the ocean floor from southern California to northern Chile and several hundred miles seaward are being compiled for the benefit of the tuna fleet by the U. S. Bureau of Commercial Fisheries Biological Laboratory, San Diego, and the University of California's Institute of Marine Resources.

The maps are based upon millions of echosoundings made in the region by research vessels, mostly during the past 10 years. Much of the data have not been generally available. The topographic charts will be useful in locating tuna and also for navigation.

Frequently tuna are found in greater abundance around seamounts and deeper protuberances rising above the sea floor than in the surrounding waters. The accidental discovery of Shimada bank, off the west coast of Mexico (16° 52' N., 117° 31' W.), and the ensuing large catches of yellowfin tuna was largely responsible for the initiation of the project to analyze and plot the large amount of sounding data collected during the past decade by research vessels of Scripps Institution of Oceanography and other agencies.

A series of 24 charts covering the area from 35° N. latitude (just north of Pt. Arguello) to 24° S., and 600 to 700 miles offshore will be issued. Two charts (Nos. 1 and 3) have been distributed and the remainder will be issued on the average of once each month until completion of the series. The charts issued cover an area from the coast offshore to 12° W. longitude between 23° and 35° N. latitude. It will be determined whether there are sufficient new sounding data to warrant preparation of charts between Pt. Arguello and the Columbia River.

* * * * *

SURVEY OF PACIFIC OCEAN AREA OFF SAN FRANCISCO UNDER WAY:

The familiar parachute--which has for so many years used air currents to lower objects safely through the atmosphere--will take to the water to aid oceanographers in observing ocean currents in a new project announced by the Coast and Geodetic Survey, U. S. Department of Commerce, on July 31, 1960.

In mid-August the Coast and Geodetic Survey ship Pioneer was scheduled to explore an 8,000 square-mile section of ocean northwest of San Francisco. The project blends hydrographic and oceanographic activities into one operation.

Deep-sea soundings will be recorded while a study is made of bottom sediments, sea water temperatures, salinities, magnetic disturbances, and meandering coastal currents.

The parachutes--which are being used by the Survey on a large scale for the first time and have been used by other oceanographic scientists before--will be submerged in several areas about 50 miles offshore. Suspended at depths of approximately 16 and 1,000 feet, the big 'chutes are secured by line to surface floats and allowed to drift with

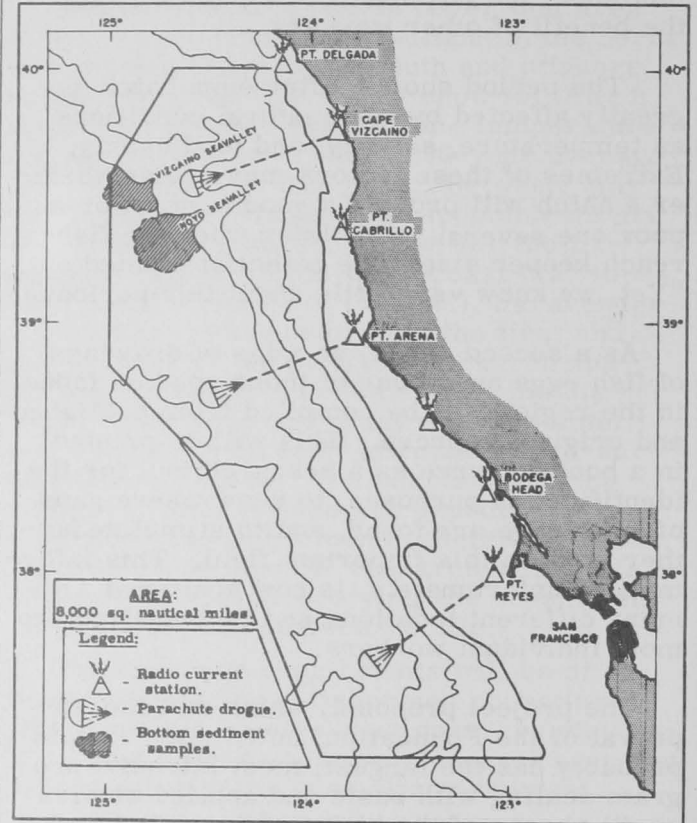


Fig. 1 - Area of oceanographic survey, season 1960 by the U. S. Coast and Geodetic Survey ship Pioneer.

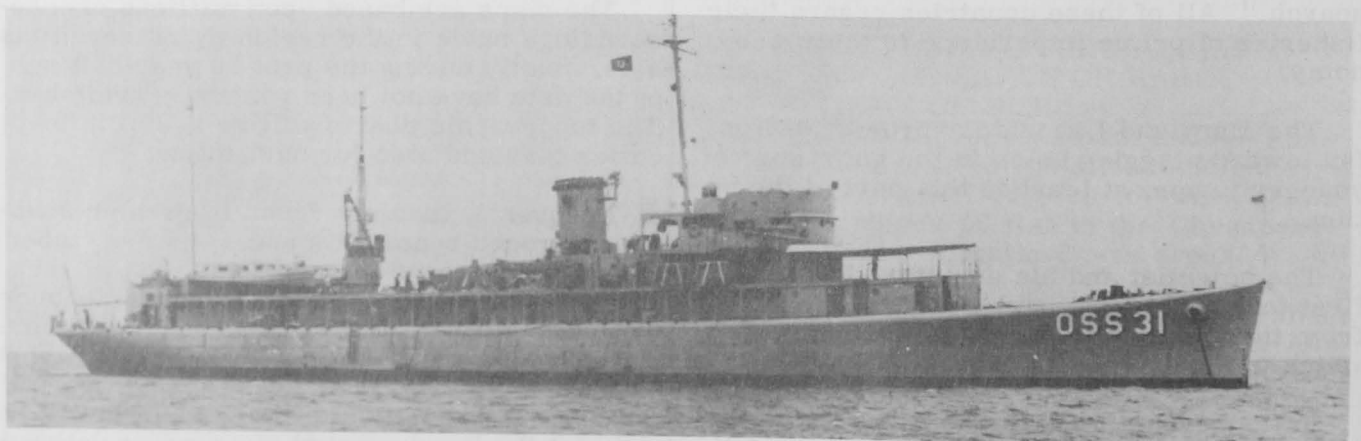


Fig. 2 - The U. S. Coast and Geodetic Survey ship Pioneer.

the current. Careful tracking of the floats for a period of 48 hours will provide significant data on direction and speed of deep submarine currents.

In addition, radio current meters also will be suspended 15 feet below the surface from bright yellow buoys anchored near Pt. Reyes, Bodega Head (Calif.), Salt Point, Point Arena, Point Cabrillo, Cape Vizcaino, and Point Delgada. Information will be transmitted from the buoys to a ship recorder by radio signals.

One of the problems the Marine scientists want to solve is the varying characteristics of the coastal currents. There is a current flowing southward and parallel to the Pacific Coast with a velocity which averages about $\frac{1}{4}$ nautical mile per hour. Prevailing winds, upwelling, and other physical forces can greatly alter this flow in many areas. The Pioneer will concentrate on probing in an area between Point Reyes and Point Delgada and within 60 miles of shore.

The ship will make detailed investigations near the mouths of the Vizcaino and Noyo sea-valleys. Located about 50 miles offshore and in 7,800 feet of water, these sea-valleys are great submarine "channels" carrying vast quantities of sediment out to sea. Sediment samples will be brought to the surface and analyzed. They may give indication as to what processes are taking place along the ocean floor.

The 311-foot Pioneer is one of the largest ships in the Coast and Geodetic Survey fleet. This reassignment follows 5 years of special oceanic surveys for the U. S. Navy. Upon arrival at San Francisco on July 26, 1960, the ship terminated a 5,000-mile trackline across the Pacific Ocean from Kwajalein Atoll in the Marshall Islands to Point Buchon in California. The resulting profile of the peaks and deeps of the ocean bottom took the ship by way of Wake Island, Midway, and Oahu. Thirteen Coast and Geodetic Survey officers are assigned to the big ship.

The ocean survey near San Francisco may provide science with important new knowledge of our marginal seas. Coastal currents affect the fishing industry of California and have an influence on the weather and climate in the area.



Oysters

MORTALITIES IN CHESAPEAKE AND DELAWARE BAYS:

Disastrous mortalities have virtually wiped out the oyster industry in Delaware Bay and some nearby waters since 1957. Serious losses, although not as destructive, have also damaged the industry in the Chincoteague Bay area. Most recently, very heavy death rates are threatening large areas of Chesapeake Bay. In a paper presented at the Fifty-Second Joint Annual Convention of the Oyster Growers and Dealers Association of North America, Inc., with the National Shellfisheries Association and the Oyster Institute of North America, Baltimore, Md., July 31-August 3, 1960, the President of the National Shellfisheries Association summarized the status of oyster mortalities. The paper presented what is now known about the oyster mortalities:

- (1) A parasite of oysters, called "MSX," is present in many sick, dying, and dead oysters, and is now considered to be a major cause of deaths in Delaware and perhaps in lower Chesapeake Bay and Chincoteague Bay.
- (2) "MSX" apparently is not a fungus.
- (3) The complete life cycle is not yet known.
- (4) Even in the areas of heaviest kill, a small percentage has survived. These will be of special importance for the future.
- (5) The presence of "MSX" and other microparasites can be detected only by careful laboratory methods.
- (6) Deaths can occur within one or two months after oysters are exposed, and can spread rapidly. We do not know the method of transmission from oyster to oyster.
- (7) Deaths have been greater in high salinity areas than in low salinities, but no sharp dividing line is known. We do not know the effects of moving infected oysters into fresher waters.
- (8) The heaviest losses have involved "MSX" and other factors, for example Dermocystidium, at the same time. One parasite or unfavorable condition may make oysters more susceptible to another. The sequence is complex.
- (9) In Delaware Bay, spring-planted seed has high death rates in late summer. Summer and fall seed shows heavy loss the following spring. Some loss occurs throughout the year.
- (10) Oysters imported into Delaware Bay from many sources have all shown susceptibility. Best survival there has been by local seed from parents which lived through one or more years of exposure.
- (11) In Chincoteague Bay and the seaside area, losses have been low among oysters held for a few months, but have increased in all oysters held for a second year. Total losses have not been as heavy as in Delaware Bay.
- (12) Dermocystidium, drill loss, low oxygen, and other causes of death in various areas are still a major part of the picture and must not be overlooked.
- (13) Seaside oysters contain a micro-organism which may be a stage of "MSX" or a different parasite.

The paper then summarized future prospects as follows:

Scientists are extremely reluctant to make predictions and general statements when evidence is incomplete. This is wise and proper. At the same time, state management agencies and members of the industry are entitled to know the present thinking of biologists. They urgently need the

strongest possible basis for important decisions which cannot be deferred. If these users are willing to recognize clearly that ideas must change as new facts emerge, the research biologists are willing to try to estimate some of the future developments in the mortality problems.

- (1) Only natural control offers promise. It is probably impossible to control microparasites by chemicals or other artificial means.
- (2) Thorough basic study is essential for understanding of the parasite or parasites and methods of combating it.
- (3) Parasites will spread by natural means and by accidental transportation, and they will reach most of the areas where conditions permit them to survive. They may not yet have reached full spread.
- (4) If the Chesapeake follows the Delaware patterns, (a) the mortality will continue to spread to new areas. The rate of spread might be rapid. (b) High salinity areas will probably have heaviest losses. Note, however, that the seaside area has shown a distinctly different pattern.
- (5) Dense oyster populations are more likely to have serious mortalities than are scattered ones.
- (6) Transplants into areas of high mortality are probably futile and may be destructive to oysters already present.
- (7) Transplanting from infected areas is likely to speed up spread of the parasite.
- (8) Possibilities of spread north and south are not predictable.
- (9) Some constructive measures are possible. These include: (a) control of import and export of shells, seed, and oysters; (b) perhaps use of low salinity waters to protect stocks; (c) planting and harvesting at the most advantageous time; (d) protection of brood stock in unaffected areas from excessive depletion; and (e) maximum development of stocks in affected areas. Research and practical experience may reveal other techniques.
- (10) Selection and development of resistant stocks is probably the only way to achieve recovery in areas of high mortality. This can be greatly assisted by careful management based on sound research. It is, however, slow and expensive.

* * * * *

MSX OYSTER KILLER IDENTIFIED AS ANIMAL PARASITE:

MSX, the suspected killer of oysters which has decimated beds in Delaware Bay and some areas in Virginia, and which poses a threat to Maryland, is now tentatively identified as an animal parasite, the Maryland Chesapeake Biological Laboratory at Solomons announced on August 24, 1960. MSX previously had not been placed definitely in either the plant or animal kingdom. This statement was made after examination of hundreds of slides from infected oysters by two parasitologists. Their work at the Laboratory is part of Maryland's contribution in an all-out cooperative effort to learn as much as possible about the parasite.

One of the parasitologists has found that MSX cannot be identified as one of the plant-like pathogens and does not have the characteristics of any known plant-like organism. By elimination, this places the organism as an animal parasite, and the matter of identification a problem for animal parasitologists.

The term MSX is scientific shorthand for "Multinucleate Sphere X." When the name was coined some time ago at Rutgers University, all that was known about the suspected oyster killer was that it was spherical, had several nuclei, and could be seen only through a microscope. Little else was known about its identity--hence the "X" factor. About 5,000 of the tiny spheres lined up in a row would extend about one inch. However, one further thing is certain: MSX is not harmful to humans--only to oysters.

A staff member who recently joined the Chesapeake Biological Laboratory is especially interested in the Sporozoa, a group of minute animal parasites to which it is now thought MSX may belong. He cautioned that much more must be learned about the identity of the organism, and that little is known about how MSX operates as the suspected killer of oysters. Certain information is on hand, however, to show how similar animal parasites cause harm to their hosts.

Teams of scientists at Rutgers University, the Virginia Fisheries Laboratory, the U. S. Bureau of Commercial Fisheries in Annapolis, and the University of Delaware have for some time been making a vigorous attack on the problems relating to MSX.

The Chesapeake Biological Laboratory has instituted a similar research program, conducted in cooperation with the other institutions. This combined approach is the largest ever mounted against a threat to coastal shellfish.

The Laboratory's shellfish program is attacking a number of other phases of the MSX problem. Fourteen outposts have been established in the Maryland Chesapeake area and in the Chincoteague area where oyster bars and test trays provide oysters which are examined under microscopes. These will give warning in case MSX advances northward from Virginia.

The assembled scientific talent, though concentrating on MSX, is taking advantage of the opportunity to study more fully other oyster predators such as mud worms, oyster drills, crabs, *Dermocystidium* (a fungus which functions similarly though not so devastatingly as MSX), and the so-called SSO (Seaside Organism) found in Virginia. SSO may, it is felt, be simply one stage in the life cycle of MSX.

Steps in combating a harmful organism about which little is known were described by the Laboratory Director as follows:

"First, the killer must be identified. Its life cycle must be learned--its appearance in various stages of development, how it is transmitted from one oyster to another, how it spends the winter. Perhaps we can interrupt the life cycle at some point--or perhaps not.

"Failure to interrupt the life cycle would leave us dependent upon the locating and encouraging of the few survivors, the mortality-resistant oysters. In any kind of living organism there are nearly always certain individuals which, like the flies that resist DDT and the human bacteria that resist penicillin, can form the nucleus of a new population.

"While our research in Maryland will be of value elsewhere, we are still hopeful that it won't be needed here. We are fortunate in that MSX appears to prefer saltier waters; however, it may adapt to the upper Chesapeake Bay's fresher water in time. We are therefore bound to learn all we can as soon as we can. We must maintain constant watch."

* * * * *

MARYLAND OBSERVATIONS, 1960 SEASON:

Maryland oyster setting this season has been later than usual and has been sparse, according to the July 27, 1960, Special Oyster Bulletin of the Maryland Chesapeake Biological Laboratory. Salinity during late

spring and early summer averaged about 20 percent less than normal. Temperatures were much lower than normal in early spring but were near the normal during early summer. Temperature and salinity of the water in the Holland Straits area for the first three weeks in July averaged about 79° F. and 12.7 o/oo, respectively.

The continued high oyster mortalities in Delaware Bay and in certain portions of the lower Chesapeake are of major concern.

At the tray stations and during a spring survey, oysters appeared to be normal in the Maryland portions of the Chesapeake except for some losses at Cinder Hill where a number of known adverse causes affected survival. The organism termed "MSX," that is associated with Delaware Bay mortalities, has not yet been found in Maryland Chesapeake Bay oysters although it has been found on the seaside. However, preparation and examination of material for detection of this parasite are very time-consuming and a large backlog of collections remains that has not yet been checked.

The Virginia Department of Tidewater Fisheries, the Maryland Department of Research and Education, and the U. S. Bureau of Commercial Fisheries cooperate in making counts of commercial oyster set in the fall and succeeding months in the Chesapeake Bay area.

Maryland oyster setting has remained light at most stations where observations are made, according to the August 19, 1960, Special Oyster Bulletin.

Water temperatures probably reached their peak (79° to 86.5° F. during the first three weeks in August) and salinities remained lower than normal.

The combination of high temperature and copious rainfall caused a strong stratification of the water with oxygen-poor (stagnant) water conditions in deep water reaching up nearer to the surface than normal.

Steady winds crossways of the Bay can cause the pool of stagnant water to tilt over towards either side of the Bay. When it overlies oyster beds for a sufficiently long period it may cause anaerobic conditions to develop at the bottom, accompanied by the generation of hydrogen sulphide, a gas smelling like rotten eggs. This gas is poisonous

and adds further to bad environmental conditions that may kill oysters, crabs confined in pots, and bottom-feeding fish. Heavy blooms of certain minute organisms sometimes cause patches of discolored water or "red tides" that add to the unfavorable conditions. No reports of damage have been made this season and it is probable that better mixing soon will restore oxygen levels to normal.

Heavy mats of a foreign species of seaweed, a water milfoil, are causing an increasing problem to oyster growers in certain tributaries of the Potomac. This problem is expected to increase with spread of the pest.

Oysters held on trays have shown no unusual mortality thus far except in Holland Straits, where oyster losses have continued higher than at other stations. Preparation and examination of material to determine the presence of "MSX," the parasite associated with the Delaware Bay mortalities, are in progress and are being rapidly stepped up as new equipment has been put into use.

The fungus parasite, Dermocystidium, has shown a rather high incidence on Cinder Hill during the past few weeks and undoubtedly is causing some of the oyster mortality observed there.

* * * * *

VIRGINIA'S YIELD PER ACRE ALMOST TREBLE THAT FOR MARYLAND:

At the August meeting of shellfish scientists and oyster growers in Baltimore, Md., a speaker from Crisfield, Md., stated that the Japanese are harvesting 80,000 pounds of oysters per water acre as compared to 50 pounds per acre in Maryland.

In contrast to the very low yield per acre in Maryland, the Information Officer for the Virginia Fisheries Laboratory points out that production on leased and planted oyster bottoms in Virginia is usually much higher than the estimates for Maryland. According to statistics compiled by the U. S. Bureau of Commercial Fisheries, the average production in Virginia for oyster planters is about 163 pounds per acre. This does not take into account the many acres of oyster grounds leased, but not cultivated. If the actual amount of uncultivated grounds were known, Virginia oyster production would probably be shown much higher.

Approximately 128,216 acres of oyster grounds are rented to oyster farmers in Virginia. Although these oyster-growing bottoms are admittedly inferior to the public rocks and might be compared to submarginal farm land, they produce nearly five times as many oysters as are harvested from the 200,000 acres of public grounds.

Research conducted by the Virginia Fisheries Laboratory has benefited planters in helping them make the best use of the ground they rent. The Laboratory has prepared for distribution a booklet, Let's Be Oyster Farmers, to make information available to oyster farmers throughout Virginia.

* * * * *

LONG ISLAND SOUND OBSERVATIONS ON SPAWNING AND SETTING:

As of August 10, 1960: Since the latter part of July, the bottom water temperature has increased several degrees in Long Island Sound and now ranges between 70.5° F. and 73.0° F. Examination of U. S. Bureau of Commercial Fisheries plankton samples, each retaining material screened from 200 gallons of water, again showed that oyster larvae are extremely uncommon. No mature oyster larvae were found in the Milford and New Haven areas from August 1 through August 8. In the Bridgeport area, one mature oyster larva was found on August 4, and three larvae were observed on August 8. The latter sample also included a large number of larvae of the wood-boring bivalve, Teredo, a condition indicating that the water mass probably came from the Housatonic River.

The absence, or near absence, of bivalve larvae, in general, and especially oyster larvae, is correlated with the plankton blooms that have been apparent in our water this summer, according to the biologists. As mentioned before, these blooms are responsible for large patches of "red water" that are caused by microscopic organisms, most of which belong to three groups, namely, Prorocentrum, Gymnodinium, and Gyrodinium.

Oyster setting continues to be extremely light. Between August 4 and August 8 it occurred only at four stations at the rate of 2 to 3 spat per 20 shells.

Starfish setting continues. However, it has shown a very sharp decrease since July 24. At present it is light and irregular, and

has occurred during the last four days at only approximately half of the Bureau's stations. (Bulletin No. 4, August 10, 1960, U. S. Bureau of Commercial Fisheries Biological Laboratory, Milford, Conn.)

As of August 23, 1960: The bottom water temperature of the oyster-producing section of Long Island Sound remained quite steady during the two weeks preceding August 23, 1960, and, as of that date, it ranged between 71.0° F. and 74.0° F. During the same period the water conditions gradually improved because fewer dinoflagellates that are responsible for "red water" were present. On August 22, no conspicuous patches of "red water" were observed within the entire New Haven-Bridgeport area, where the U. S. Bureau of Commercial Fisheries stations are located.

Parallel with the improvement in the water conditions, the numbers of bivalve larvae, including those of oysters, began to increase. Plankton samples collected about August 15 showed oyster larvae present in all three areas, i.e., New Haven, Milford, and Bridgeport. Although found at all stations, they were present in small numbers and were of different sizes, thus indicating that this was not a large, single brood that would give a heavy setting of short duration but a mixture of many broods that will result in a continuous but light setting.

Bivalve larvae continued to be present in fair numbers on August 22. They were most numerous at one station located at a 30-foot depth in the Bridgeport area, where a total of 23 mature oyster larvae were found in a 200-gallon sample. This is rather a substantial number of old larvae, probably indicating that a considerable increase in the intensity of setting may be expected at least in the Bridgeport area.

Oyster setting continued at most of the stations but remained light, although during the week preceding August 23 its intensity somewhat increased, especially at one station in the New Haven area and one station located in comparatively shallow water on the Bridgeport natural bed. Upon examination of the collectors brought in on August 22 the most promising aspect was that the majority of the recently-set oysters were only a day old or younger. This circumstance also indicated that an increase in intensity of oyster setting should be expected.

Contrary to the increase observed for oyster setting, setting of starfish showed a decline. For example, between August 18 and August 22, the last collecting period, only a single starfish spat was found per 40 shells at two stations, while the collectors from other stations were entirely free of young starfish. (Bulletin No. 5, August 23, 1960, U. S. Bureau of Commercial Fisheries Biological Laboratory, Milford, Conn.)

* * * * *

UNDERWATER HARROW MAY AID STARFISH CONTROL ON OYSTER BEDS:

In connection with the development of the underwater harrow by the Milford Biological Laboratory of the U. S. Bureau of Commercial Fisheries as a mechanical method of



Fig. 1 - A type of underwater harrow used as a mechanical method of control of oyster enemies.

control of oyster enemies, experiments are in progress to determine what happens to starfish covered by mud. Three types of substratum were used: mud, shells and mud, and sand. In mud, starfish buried in one inch could not emerge and died in 3 to 4 days at a temperature of about 10° to 12° C. (50°-53.6° F.), and in 2 or 3 days at a somewhat higher temperature. When starfish were covered with mud so that only one or two of their rays protruded in the open, only approximately 20 percent could emerge. The others died.

More or less similar results were observed using shells and mud and sand. In general, however, starfish die faster in mud.



Portion-Control Fishery Products

USE IN INSTITUTIONAL AND PUBLIC EATING PLACES:

Use of portion-controlled fish products by institutional and public eating places is definitely increasing. This was one of the findings of a survey conducted in ten selected cities by Crossley, S-D Surveys, Inc., for the U. S. Bureau of Commercial Fisheries to determine how much frozen fish, shellfish, and portions were purchased and served in restaurants and institutions.

In each of the ten cities surveyed, more than 10 percent of establishments using portions reported greater purchases of portions compared to the previous year. More than half of the purchasers in Springfield, Mass., said they were buying more. In Denver 47 percent of the users reported buying more.

"Convenience and ease of preparation" of portions was the most often cited advantage over other types of frozen processed fish. User establishments ranked "convenience" first in six of the 10 cities and second in the other four. "Uniformity and size" of portion held first place in three cities--Atlanta, Cleveland, and New York City; "fast and time-saving features" were most often cited by Los Angeles eating places.

Cost of using portions, as compared to other frozen processed fish, was considered less expensive or about the same by a wide majority of establishments in all cities except Springfield. About 51 percent of the Springfield users said they were more expensive compared with the 22 percent reporting them to be less expensive. In four cities--Chicago, Cleveland, Houston and Omaha--90 percent of the establishments using portions considered them no more expensive than other forms of frozen processed fish.

Omaha ranked first among the ten cities in terms of percentage of all establishments buying frozen processed seafood. Atlanta was second and New York City was last. Omaha and Atlanta also ranked at the top by percentage of establishments purchasing portion-controlled fish products, with 27 percent of users in each city buying portions.

Frying was the leading method of preparing all types of frozen processed fish prod-

ucts in the ten survey cities. It was also the leading method for preparing portions in all of the cities except Springfield, where baking was more popular.

In all cities, a majority of establishments using portions cooked them while frozen. This ranged from highs of 59 percent in Chicago to 92 percent in Omaha. Breaded portions were the most popular portion items.



Uncooked-breaded portions were the leading type of portion-controlled fish product in 8 of the 10 cities in terms of the percentage of establishments using them. The two exceptions were New York City and Springfield, where portions were most frequently bought cooked-breaded.

Uncooked-plain portions ranked high in Chicago and Cleveland and the quantity purchased was greater than that of any other type. Quality of portions was generally considered satisfactory by nearly all establishments in all cities.

There were a variety of disadvantages to using portions cited by users in each city, although a majority specified no disadvantage.

The size of portions in a package was considered satisfactory by almost all establishments in the 10 cities.

The majority of the portion users said they specified the kind of fish when ordering portions. A very small percentage of the portion users suggested new portion items, not available, which they would like to have.



North Atlantic Fishery Investigations

UNDERWATER TELEVISION AIDS BIOLOGISTS IN FISH BEHAVIOR STUDIES:

Biologists at the U. S. Bureau of Commercial Fisheries' Woods Hole Biological Laboratory now are able to extend their studies with the help of underwater television

to include observations of fish as they are caught in otter trawls. The specially-designed television camera is suspended within the cod end of the trawl and the image transmit-



ted over a coaxial cable to a receiver on board the vessel. Continuous observations or motion-picture recordings of the fish in the submerged net can be made by biologists in the comparative comfort of a shipboard laboratory.

A major problem in large mesh or savings-gear studies has been the behavior of fish in the trawl. The questions raised by the biologists are (1) do the small haddock or other commercially valuable species actually try to escape through the meshes; or (2) do non-commercial varieties clog the meshes, thus blocking the escape of immature food fish. Underwater television will now help to supply answers to these and other questions.

Careful analysis of motion picture recordings of the television screen has uncovered some interesting facets of species differences in behavior. For example, haddock seem to explore the confined area within the cod end, crossing from one side of the trawl to the other. In contrast, sand lance, an important marine forage species, seem in a hurry to escape through the meshes and usually do so in very rapid fashion.

Many future underwater television studies are planned by the Laboratory. One such study will examine the relationship between the swimming ability of fishes and the speed of the trawl moving over the ocean floor.



South Atlantic

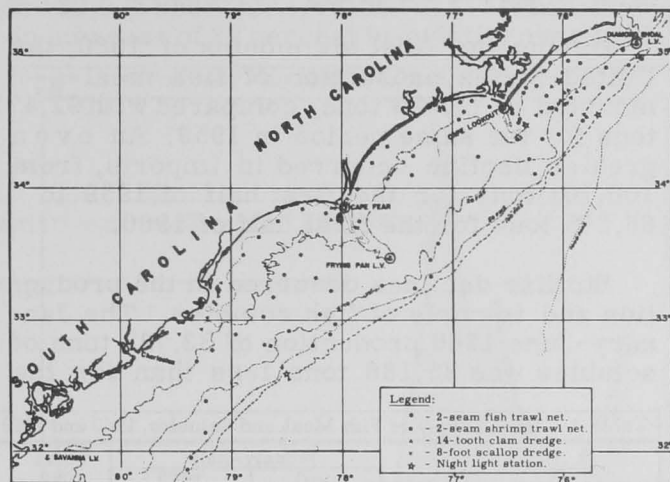
Exploratory Fishery Program

SAVANNAH RIVER-CAPE HATTERAS
OFFSHORE AREAS SURVEYED FOR
FISH AND SHELLFISH RESOURCES:

M/V "Silver Bay" (Cruise 25): The offshore area (5-100 fathoms) from the Savannah Riv-

er, Ga., to Cape Hatteras, N. C., was surveyed for stocks of clams, scallops, shrimp, and fish by the U. S. Bureau of Commercial Fisheries chartered exploratory fishing vessel Silver Bay, July 13-30, 1960.

In 29 drags with a 14-tooth Fall River clam dredge, scattered individual live clams (Venus mercenaria) and dead shells were taken in the vicinity of Bogue Inlet and Cape Fear. No live shells were taken in the vicinity of Cape Romain.



M/V Silver Bay Cruise 25 (July 13-30, 1960).

A total of 18 drags with an 8-foot modified Georges Bank scallop dredge, with a 1½-inch mesh liner (to determine the seasonal availability of calico scallops in known areas), east of Core Banks, produced catches up to 19 bushels per half-hour drag. The best catches were made in the 20- to 21-fathom depth range. The scallops were large (about 2.4 inches average), but the yield per bushel was only 2½ pints as compared with about 5 pints in September.

Inside the 10-fathom curve, 27 drags produced only scattered individual brown shrimp, Penaeus aztecus, and pink shrimp, Penaeus duorarum, except for one 40-pound catch of 26 to 30-count per pound headless brown shrimp in a one-hour drag.

Surface trolling at intervals between trawling stations resulted in the capture of king mackerel (Scomberomorus cavalla), dolphin, (Coryphaena hippurus), and white skipjack (Katsuwonus pelamis).



Telephone and Telegraph Cables

CHARTS SHOW CABLES IN NORTHWEST ATLANTIC:

Charts showing the exact routes of telephone and telegraph cables in the Northwest Atlantic Ocean area are now being made available for the first time to fishermen.

The cable companies hope the release of the detailed charts will help to prevent trawling damage to the cables--the mainstay of telephone and telegraph communications between North America and Europe.



Tuna

COMPOSITION STUDIES:

Research on the composition of tuna has been under way in the Seattle Technological Laboratory of the U. S. Bureau of Commercial Fisheries for more than a year. It has been determined that compared to some other salt-water species of fish, the tuna and tuna-like fish are low in moisture and sodium, and high in protein. Oil content is variable, ranging from 1-15 percent. The study involves the collection of two series of 10 fish each, taken each season over a period of three years. Samples are prepared from the light and dark meat of nape, center, and tail steak sections taken from each fish.

The investigation of albacore tuna is in its second year, skipjack tuna in the first year. Exploratory composition work has also been done on both bluefin and yellowfin tuna.

* * * * *

TROLLING PROGRAM AIDS PACIFIC COAST ALBACORE FLEET:

The cooperative program arranged by the U. S. Bureau of Commercial Fisheries and the U. S. Navy at the five picket stations along the West Coast, whereby trolling gear was fished almost daily from the vessels occupying those stations, proved effective in helping to locate the first incoming albacore tuna schools this season and in relaying the information to the United States albacore fleet. When catches were heavy or large schools were sighted, the Bureau was notified

by a radio message through Fleet Weather Facility, San Diego.

In addition to the Navy trolling program, the Bureau's research vessel Black Douglas of the La Jolla Biological Laboratory and research vessels of the Scripps Institution of Oceanography undertook a similar trolling program while on marine life research cruises. Invaluable information was obtained regarding the early season distribution of albacore this year.

Albacore fishermen's groups were alerted continually concerning catch and distribution information received as a result of the trolling program.



United States Fishing Fleet^{1/} Additions

During June 1960, 68 vessels of 5 net tons and over were issued first documents as fishing craft--a decline of 19 vessels as compared with the same month of last year. The

Table 1 - U. S. Vessels Issued First Documents As Fishing Craft By Areas, June 1960

| Area | June | | Jan. - June | | Total |
|----------------------|----------|------|-------------|------|-------|
| | 1960 | 1959 | 1960 | 1959 | |
| | (Number) | | | | |
| New England . . . | 6 | 1 | 12 | 8 | 15 |
| Middle Atlantic . . | 1 | 2 | 9 | 5 | 12 |
| Chesapeake | 15 | 11 | 38 | 45 | 106 |
| South Atlantic . . . | 7 | 13 | 27 | 44 | 76 |
| Gulf | 16 | 25 | 43 | 76 | 135 |
| Pacific | 20 | 20 | 71 | 59 | 97 |
| Great Lakes | 3 | 2 | 7 | 5 | 6 |
| Alaska | - | 13 | 14 | 20 | 32 |
| Total | 68 | 87 | 221 | 262 | 479 |

Note: Vessels assigned to the various areas on the basis of their home ports.

Pacific led with 20 vessels, followed by the Gulf with 16, and the Chesapeake with 15. The South Atlantic, New England, Great Lakes, and the Middle Atlantic areas represented the remaining 17 vessels.

During the first six months of 1960, a total of 221 vessels were issued first documents as fishing craft--41 less than were reported dur-

Table 2 - U. S. Vessels Issued First Documents as Fishing Craft By Tonnage, June 1960

| Net Tons | Number |
|----------------------|--------|
| 5 to 9 | 42 |
| 10 to 19 | 13 |
| 20 to 29 | 6 |
| 30 to 39 | 1 |
| 40 to 49 | 2 |
| 100 to 109 | 1 |
| 130 to 139 | 1 |
| 230 to 239 | 1 |
| 270 to 279 | 1 |
| Total | 68 |

ing the same period of 1959. Most of the decline occurred in the Gulf area where 33 fewer vessels were documented in the first six months of 1960 as compared with the same period of 1959.

^{1/}Includes both commercial and sport fishing craft.



U. S. Fish Meal and Solubles Production and Imports, January-June 1960

During the first six months of 1960, the United States production of fish meal amounted to 74,024 tons, compared with 92,471 tons for the same period in 1959. An even greater decline occurred in imports, from 100,701 tons for the first half of 1959 to 66,375 tons for the first half of 1960.

Similar declines occurred in the production and imports of fish solubles. The January-June 1960 production of 33,722 tons of solubles was 25,166 tons less than for the

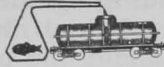
Table 1 - U. S. Supply of Fish Meal and Solubles, 1960 and 1959

| Item | January-June | | Total |
|---|-----------------|-----------------|----------------|
| | 1960 | 1959 | |
| | (Tons) | | |
| Fish Meal: | | | |
| Domestic production: | | | |
| Menhaden | 54,370 | 69,945 | 223,893 |
| Tuna & mackerel | 11,520 | 10,528 | 25,380 |
| Other | 8,134 | 11,998 | 57,278 |
| Total production | 1/74,024 | 1/92,471 | 306,551 |
| Imports: | | | |
| Canada | 21,930 | 30,099 | 39,033 |
| Peru | 32,889 | 36,884 | 49,923 |
| Chile | 7,393 | 4,995 | 5,104 |
| Angola | - | 20,738 | 20,738 |
| Union of So. Africa | 3,905 | 2,422 | 9,727 |
| Other countries | 258 | 5,563 | 8,400 |
| Total imports | 66,375 | 100,701 | 132,925 |
| Available fish meal supply | 140,399 | 193,172 | 439,476 |
| Fish Solubles (wet weight): | | | |
| Domestic production^{2/} | 33,722 | 58,888 | 165,359 |
| Imports: | | | |
| Canada | 615 | 966 | 1,660 |
| Denmark | 1,858 | 8,547 | 18,723 |
| Other countries | 45 | 312 | 6,247 |
| Total imports | 2,518 | 9,825 | 26,630 |
| Available fish solubles supply | 36,240 | 68,713 | 191,989 |

^{1/}Based on reports from firms which accounted for 92 percent of the 1959 production.

^{2/}Includes production of homogenized-condensed fish.

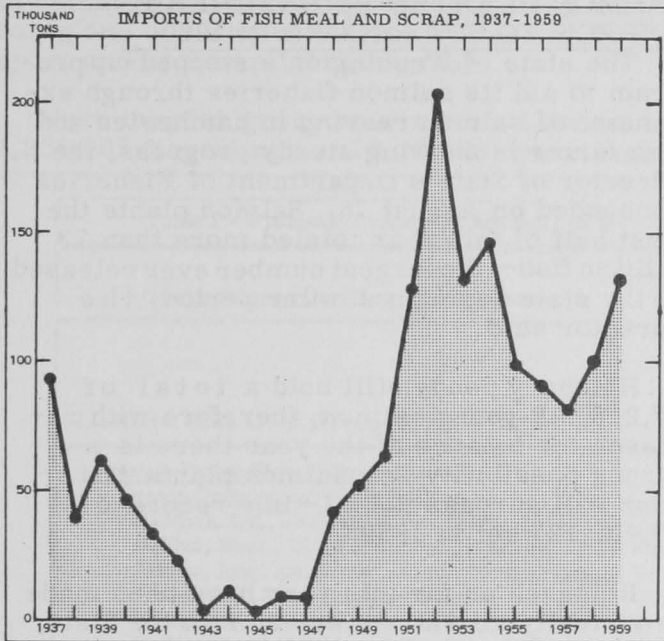
same period the previous year. Imports of solubles the first half of 1960 amounted to 2,518 tons, compared with 9,825 tons for the first half of 1959.



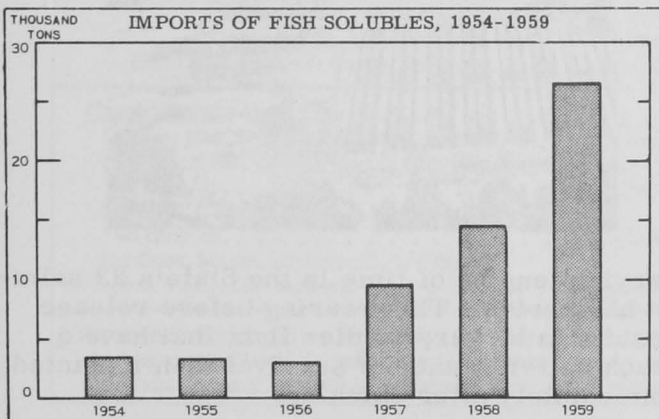
U. S. Foreign Trade

IMPORTS OF FISH MEAL AND SCRAP, 1959:

Total imports of fish meal and scrap entering into the United States during 1959 amounted to 132,925 short tons, valued at \$15.9 million-- an increase of 32 percent in quantity over 1958.



Fish meal and scrap imported into the United States from Peru during 1959 led in volume with 49,923 tons. Canada was second with 39,033 tons, followed by Angola with 20,738 tons. Those countries provided 83 percent of total United States imports.



The year 1952 was a record year both in volume and value when 203,539 tons of fish meal and scrap, valued at \$24.3 million, were imported into the United States. In that year Norway led all other countries in meal and scrap shipped to the United States with a total of 50,181 tons. Canada was second with 40,152 tons, followed by the Union of South Africa with 37,523 tons.

United States imports of fish solubles in 1959 amounted to 26,630 tons, valued at \$2.2 million. Compared with 1958 this was an increase of 12,063 tons and \$900,800.

EDIBLE FISHERY PRODUCTS, JUNE 1960:

Imports of edible fresh, frozen, and processed fish and shellfish into the United States during June 1960 increased by 5.6 percent in quantity and 5.0 percent in value as compared with May 1960. The increase was due primarily to higher imports of groundfish fillets (up 1.3 million pounds) and fresh and frozen lobster (up 1.4 million pounds), and to a lesser degree, an increase in the imports of canned tuna in brine, frozen tuna other than albacore, and fresh and frozen salmon. The increase was partly offset by a 1.6-million-pound decrease in the imports of frozen albacore tuna, and frozen shrimp (down 1.0 million pounds).

Compared with June 1959, the imports in June this year were up by 7.8 percent in quantity and unchanged in value due to higher imports of frozen albacore and other tuna (up 4.0 million pounds), groundfish fillets (up 1.5 million pounds), and fresh and frozen lobster (up 1.1 million pounds). Compensating, in part, for the increases was a drop of about 0.9 million pounds in the imports of fresh and frozen salmon and canned salmon (down 0.6 million pounds).

| Item | QUANTITY | | | VALUE | | |
|---|--------------------|------|---------|------------------|------|-------|
| | June | | Year | June | | Year |
| | 1960 | 1959 | 1959 | 1960 | 1959 | 1959 |
| | (Millions of Lbs.) | | | (Millions of \$) | | |
| Imports: | | | | | | |
| Fish & shellfish: | | | | | | |
| Fresh, frozen, & processed ^{1/} | 86.3 | 80.1 | 1,070.5 | 27.2 | 27.2 | 309.6 |
| Exports: | | | | | | |
| Fish and shellfish: | | | | | | |
| Processed only ^{1/} (excluding fresh & frozen) | 1.5 | 4.5 | 68.0 | 0.8 | 1.3 | 22.8 |

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

United States exports of processed fish and shellfish in June 1960 were lower by 16.3 percent in quantity and 33.3 percent in value as compared with May 1960. Compared with the same month in 1959, the exports this June were down by 66.3 percent in quantity and 38.5 percent in value. The drop in exports in June this year as compared with the same month in 1959 was due to sharply lower exports of California sardines and squid and miscellaneous fresh and frozen fish to Canada.

* * * * *

IMPORTS OF CANNED TUNA IN BRINE UNDER QUOTA:

The quantity of tuna canned in brine which may be imported into the United States during the calendar year 1960 at the 12½-percent rate of duty is 53,448,330 pounds. Any imports in excess of the quota will be dutiable at 25 percent ad valorem.

Imports from January 1-July 30, 1960, amounted to 26,754,852 pounds, according to data compiled by the Bureau of Customs. From January-August 1, 1959, a total of 26,535,173 pounds had been imported.

* * * * *

EXPORT EXPANSION PROGRAM AIDED BY EXPORT-IMPORT BANK:

In implementation of the National export Expansion Program, officials of the Export-Import Bank of Washington have provided a description of progress in the operation of medium-term export financing. An innovation in this field was devised by the Bank to give assistance to the United States exporter through flexibility in Bank procedure. Here, the Bank will place sole reliance upon the credit judgment of the participating commercial bank if the commercial bank will finance as much as 10 percent of the invoice value of the sale without recourse on the exporter. The innovation acts as a time saver, since the exporter may deal only with his commercial bank. To date, 43 of these transactions have been approved by the Bank for export sales invoice values of \$5.4 million.

Another point described was the new Export-Import Bank short-term political risk program. In this, the Bank covers short-term transactions which are not in excess of 180 days against non-commercial risks such as inconvertibility of funds, war and civil commotion, cancellation of import license, im-

position of foreign laws, and the expropriation of goods. Services of United States commercial banks and commercial export credit insurance companies have been enlisted by the Bank to act as issuing agents for the guarantees. To date 68 political risk guarantees have been issued under the program for an export volume of \$38 million, and 142 issuing agents have been authorized.



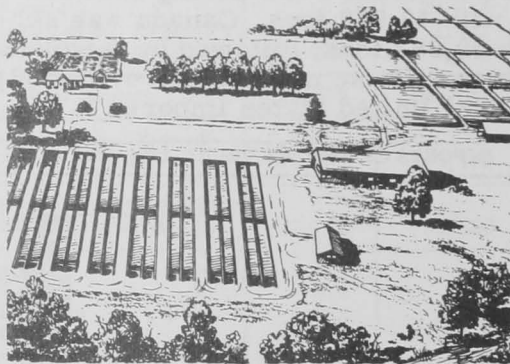
Washington

SALMON PLANTED BY HATCHERIES EXPECT TO SET RECORD IN 1960:

The state of Washington's stepped-up program to aid its salmon fisheries through expansion of salmon rearing in hatcheries and fish farms is showing steady progress, the Director of State's Department of Fisheries announced on August 15. Salmon plants the first half of this year totaled more than 73 million fish--the largest number ever released in the state during a similar period, the Director said.

Hatchery ponds still hold a total of 17,216,112 young salmon, therefore with releases the balance of the year there is a strong possibility that salmon plants this year will surpass the all-time record of 77,491,127 set in 1959.

Releases so far this year have been made in virtually all salmon streams in the State, as well as in a number of fish farms. The great majority of the fish had been reared for



varying lengths of time in the State's 22 salmon hatcheries. This rearing before release results in larger, hardier fish, that have a much better chance of survival than if planted immediately after catching.

Most of the fish-farm plants have been of fingerling-sized salmon, the Director said, reared about 90 days in hatchery ponds. Many of the fish-farm plants have shown phenomenal growth in the predator-free, naturally-enriched areas, resulting in seaward-bound migrants much larger than "wild" salmon migrating to sea.

Of the 73,607,804 young salmon planted so far in 1960, fall chinook was the largest single species, with 50,080,933 fingerlings, 24,768 yearlings, and 4,640,130 fry of that species released. Past experience has shown that plants of fall chinook bring the greatest returns, both in numbers of fish and in poundage, along with being one of the most desired species by both sport and commercial fishermen.

Next largest group was silver salmon, 1,936,907 fingerlings and 8,383,881 yearlings

planted. More than 7 million chum salmon were released--1,036,064 fry and 6,069,566 fingerlings. Pink salmon plants totaled 832,086--8,190 fry and 832,896 fingerlings. Spring chinook plants totaled 603,469--466,500 fingerlings and 136,969 yearlings.

Poundage total for the first six months of this year reached 384,202 pounds, compared to a total of 446,963 pounds of salmon planted during the entire year of 1959.



Wholesale Prices, August 1960

The mid-August 1960 wholesale price index for edible fishery products (fresh, frozen, and canned) at 124.4 percent of the 1947-49 average was down 4.2 percent from the preceding month, but was higher by 3.8 percent as compared with the same month in 1959. The decrease from July to Au-

Table 1 - Wholesale Average Prices and Indexes for Edible Fish and Shellfish, August 1960 With Comparisons

| Group, Subgroup, and Item Specification | Point of Pricing | Unit | Avg. Prices 1/ (\$) | | Indexes (1947-49=100) | | | | | | |
|---|------------------|------|--|-----------|-----------------------|-----------|-----------|-----------|--|--|-------|
| | | | Aug. 1960 | July 1960 | Aug. 1960 | July 1960 | June 1960 | Aug. 1959 | | | |
| | | | ALL FISH & SHELLFISH (Fresh, Frozen, & Canned) | | | | | | | | 124.4 |
| <u>Fresh & Frozen Fishery Products:</u> | | | | | 138.5 | 147.7 | 142.0 | 132.8 | | | |
| <u>Drawn, Dressed, or Whole Finfish:</u> | | | | | 158.1 | 165.1 | 149.7 | 152.2 | | | |
| Haddock, lge., offshore, drawn, fresh | Boston | lb. | .09 | .14 | 88.9 | 136.8 | 88.3 | 109.1 | | | |
| Halibut, West., 20/80 lbs., drsd., fresh or froz. | New York | lb. | .36 | .34 | 109.9 | 106.2 | 103.7 | 107.8 | | | |
| Salmon, king, lge. & med., drsd., fresh or froz. | New York | lb. | .90 | .88 | 202.2 | 198.0 | 189.3 | 179.7 | | | |
| Whitefish, L. Superior, drawn, fresh | Chicago | lb. | .64 | .63 | 158.7 | 156.2 | 141.3 | 158.6 | | | |
| Whitefish, L. Erie pound or gill net, rnd., fresh. | New York | lb. | .74 | .68 | 149.7 | 136.6 | 166.9 | 161.8 | | | |
| Yellow pike, L. Michigan & Huron, rnd., fresh . | New York | lb. | .73 | .68 | 170.0 | 158.3 | 155.9 | 193.5 | | | |
| <u>Processed, Fresh (Fish & Shellfish):</u> | | | | | 131.6 | 146.0 | 144.8 | 121.5 | | | |
| Fillets, haddock, sml., skins on, 20-lb. tins . . | Boston | lb. | .27 | .46 | 90.2 | 154.8 | 125.9 | 125.9 | | | |
| Shrimp, lge. (26-30 count), headless, fresh. . . | New York | lb. | .68 | .79 | 106.6 | 124.8 | 128.8 | 101.1 | | | |
| Oysters, shucked, standards | Norfolk | gal. | 7.00 | 7.00 | 173.2 | 173.2 | 170.1 | 148.5 | | | |
| <u>Processed, Frozen (Fish & Shellfish):</u> | | | | | 112.6 | 117.8 | 118.4 | 112.3 | | | |
| Fillets: Flounder, skinless, 1-lb. pkg. | Boston | lb. | .39 | .39 | 102.1 | 100.8 | 102.1 | 98.2 | | | |
| Haddock, sml., skins on, 1-lb. pkg. | Boston | lb. | .27 | .27 | 84.8 | 84.8 | 78.5 | 102.0 | | | |
| Ocean perch, skins on, 1-lb. pkg. | Boston | lb. | .27 | .27 | 108.7 | 106.7 | 110.8 | 108.8 | | | |
| Shrimp, lge. (26-30 count), 5-lb. pkg. | Chicago | lb. | .72 | .79 | 111.5 | 121.5 | 123.8 | 106.5 | | | |
| <u>Canned Fishery Products:</u> | | | | | 104.8 | 104.8 | 104.8 | 102.0 | | | |
| Salmon, pink, No. 1 tall (16 oz.), 48 cans/cs. . . . | Seattle | cs. | 24.50 | 24.50 | 127.8 | 127.8 | 127.8 | 123.9 | | | |
| Tuna, lt. meat, chunk, No. 1/2 tuna (6-1/2 oz.), 48 cans/cs. | Los Angeles | cs. | 11.10 | 11.10 | 80.0 | 80.0 | 80.0 | 77.9 | | | |
| Sardines, Calif., tom. pack, No. 1 oval (15 oz.), 48 cans/cs. | Los Angeles | cs. | 8.00 | 8.00 | 93.9 | 93.9 | 93.9 | 88.1 | | | |
| Sardines, Maine, keyless oil, 1/4 drawn (3-3/4 oz.), 100 cans/cs. | New York | cs. | 8.75 | 8.75 | 93.1 | 93.1 | 93.1 | 93.1 | | | |

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.

gust this year was due primarily to sharply lower ex-vessel prices for haddock at Boston and lower fresh and frozen shrimp prices. Prices this August were higher than a year earlier because of higher prices for fresh and frozen halibut, fresh salmon, shucked oysters, fresh and frozen shrimp, and canned fish.



Boxed fish ready for loading and shipping at Fulton Fish Market, New York City. Open box in front is ready to be filled with ice before lid is nailed on.

The wholesale price index for the drawn, dressed, and whole finfish subgroup this August declined 4.2 percent as compared with the preceding month--the sharply lower (down 35.0 percent) mid-August 1960 large haddock prices at Boston were responsible for the drop. All other subgroup items were priced higher. However, the August 1960 subgroup price index was up about 3.9 percent as compared with

the same month in 1959, due to higher fresh salmon prices (up 12.5 percent) and a 1.9-percent increase in fresh halibut prices. Substantially lower prices for fresh large drawn haddock (down 18.5 percent) and fresh-water round whitefish (down 7.5 percent) and yellow pike (down 12.1 percent) at New York City failed to offset the increases.

The fresh processed fish and shellfish subgroup wholesale price index this August declined 9.9 percent from the preceding month. Due to good supplies of small haddock at Boston, the index for fresh small haddock fillets dropped 41.7 percent. This plus a seasonal decline (14.6 percent) in fresh shrimp prices at New York City were responsible for the decline from July to August in this subgroup. From August 1959 to August this year, the subgroup index rose 8.3 percent due to higher (16.6 percent) shucked oyster prices and higher (5.4 percent) fresh shrimp prices. These increases more than offset the sharply lower (down 28.4 percent) prices for fresh small haddock fillets at Boston in mid-August this year.

The wholesale price index for the frozen processed fish and shellfish subgroup dropped 4.4 percent this August from the preceding month. Lower frozen shrimp prices (down 8.2 percent) at Chicago more than offset increases of about 1/2 cent a pound for flounder and ocean perch fillets. Frozen haddock fillet prices were unchanged. From August a year ago to this August, the subgroup price index was almost unchanged (up 0.3 percent). Lower prices for frozen small haddock fillets (down 16.9 percent) were just about balanced out by an increase of 4.7 percent in frozen shrimp prices and a 3.4-percent increase for frozen flounder fillets.

The canned fish subgroup price index in August 1960 remained unchanged from the preceding month and has shown little change over the past 12 months. Prices for all canned fish items (except for Maine sardines) were higher this August as compared with August a year ago. At the end of August 1960, the pack of Maine sardines was trending slightly higher than at the same time in 1959, but the prospects for a fair pack of pink salmon remained very poor. The packing season for California sardines, which opened on August 1 in Central California, started off poorly but picked up some by the end of the month. The major packing season for that species began on September 1 when the Southern California fishing season opened. Raw material for the tuna canning industry remained plentiful with the market, both in the United States and worldwide, somewhat oversupplied.



NOISES MADE BY SHRIMP

Some species of shrimp, notably the snapping shrimp, make very loud noises. These are sufficiently common to cause considerable difficulty to people operating underwater instruments. The commercial shrimp of the species *Penaeus* caught in Gulf of Mexico waters do not appear to make any sounds other than very faint rustling caused by their movements. Attempts have been made to discover some distinctive sounds made by these animals to assist their capture, but without success. The U. S. Bureau of Commercial Fisheries is engaged in further research in this field.