

# TRENDS AND DEVELOPMENTS

## Fishing Vessel and Gear Developments

### EQUIPMENT NOTE NO. 8-- NEW HYDRAULICALLY-DRIVEN BLOCK SPEEDS HAULING CRAB-POT WARPS:

A Seattle, Wash., company has recently patented and introduced a new type of power block designed to improve handling of crab-pot gear and long lines. The equipment consists of a hydraulically-driven aluminum block weighing approximately 130 pounds and having a bronze V-sheave that can be preset to accommodate lines from  $\frac{5}{16}$  inch to  $\frac{5}{8}$  inch in diameter (fig. 1). This block is suspended from a short boom that can be raised or lowered hydraulically.

Besides handling the gear faster with less work, the block is said to eliminate line slip-

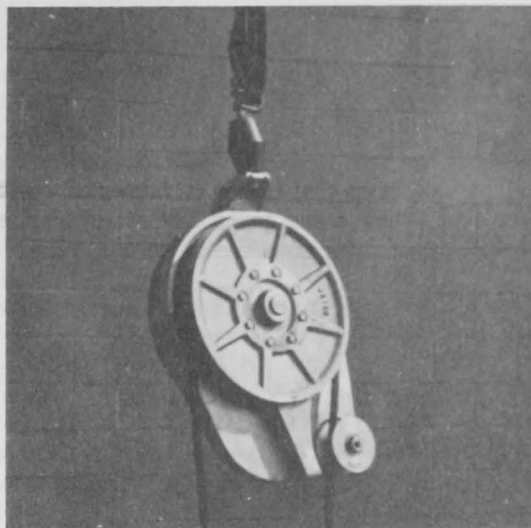


Fig. 1 - Hydraulic power block for hauling crab pots and long-line gear.

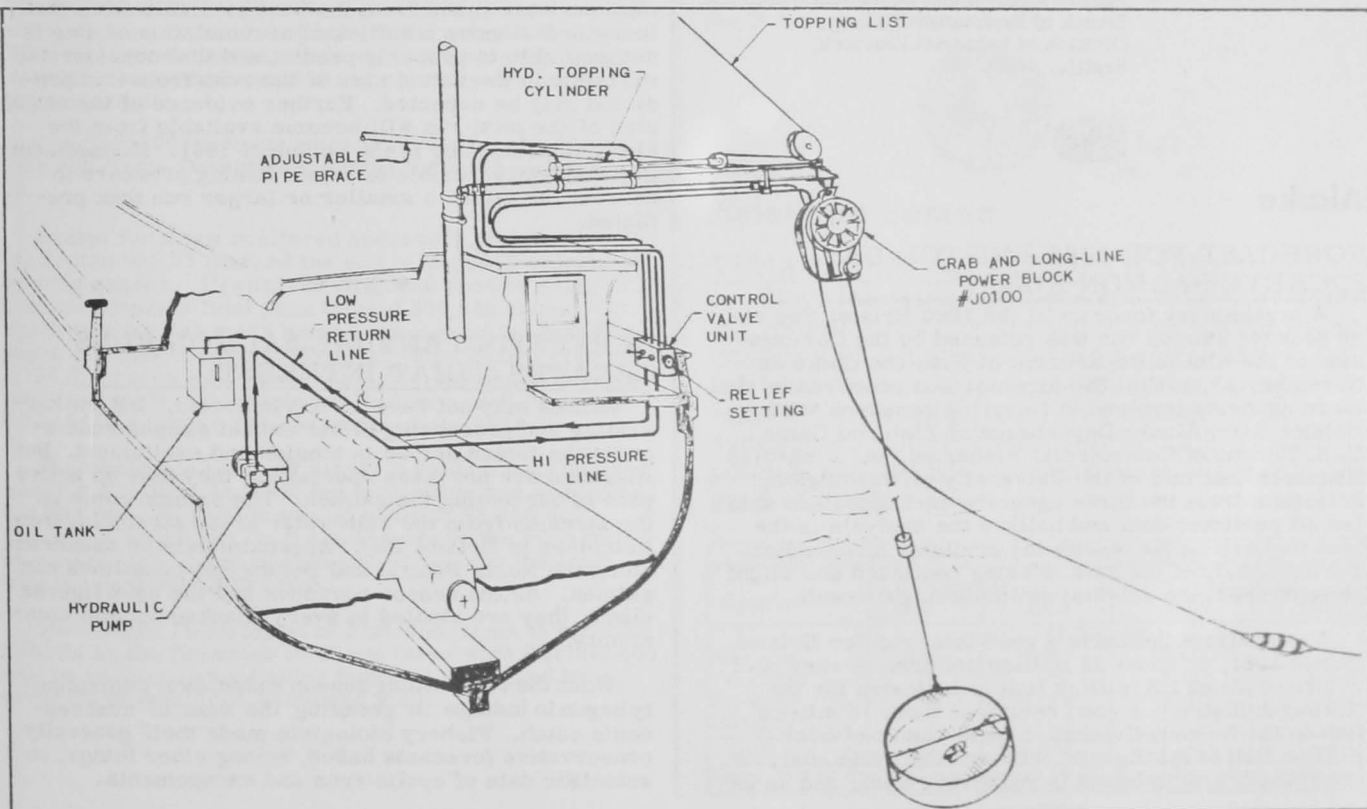


Fig. 2 - Schematic cutaway drawing showing hydraulic block boom and control arrangement on a crab boat.

page and, thus, does not wear or melt plastic pot warps. By means of special hydraulic controls, the maximum pulling power can be adjusted to a point where it will not exceed the parting strength of the line. This feature is important to the fisherman working in rough seas or with stuck gear.

When the gear is to be hauled, the boom is swung outboard (fig. 2) to clear the side of the hull and is lowered to allow the warp to be placed in the V-sheave at the time the buoy is picked up. The boom is then raised to a point where the pot will clear the bulwarks. The buoy and the hauling warp are played back in to the water. When the pot has been raised to its maximum height, it is pulled inboard, the sheave is simultaneously reversed, and then the boom is lowered. After removal of the warp from the sheave, the block is ready to receive the next pot warp.

Trials of the equipment by experienced commercial crab fishermen have shown that a loaded Dungeness crab pot with 35 fathoms of warp can be handled completely in 1 minute. Operations are continuous while the boat is under way. It is reported that strings of up to 50 pots have been hauled in 60 minutes.

--By Harold C. Johnson,  
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## Alaska

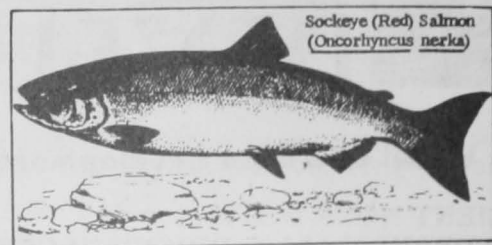
### FORECAST FOR 1961 BRISTOL BAY SOCKEYE SALMON RUN:

A preliminary forecast of the 1960 Bristol Bay red or sockeye salmon run was released by the Commission of the Alaska Department of Fish and Game on November 17, 1960. The forecast was prepared by the three agencies involved in fisheries research work in Bristol Bay--Alaska Department of Fish and Game, U. S. Bureau of Commercial Fisheries, and Fisheries Research Institute of the University of Washington. Scientists from the three agencies exchanged and studied all pertinent data and believe the analysis is the best that can be made with the available information. Further study of the data is being continued and slight changes from the original estimate might result.

The analysis indicates a good total run for Bristol Bay in 1961, or about 22 million salmon. A very poor return of about 1.3 million fish is indicated for the Nushagak district; a good return of about 15 million fish to the Naknek-Kvichak; a good return of over 2 million fish to the Egegik, although the cycle analysis upon which this is based is relatively weak; and an ex-

cellent run of over 3 million to the Ugashik, although in this instance, also, the margin of error is considerable. The estimate assumes no Japanese fishing on the returning mature salmon in 1961.

The forecast is based on previous cycles, the seaward migration of young salmon in 1958 and 1959, and the abundance of young salmon in 1960.



The high-seas sampling at sea by gill nets and seines which indicated the abundance of these fish in 1960 also gave clues as to the probable size of the fish in the 1961 run. Samples taken at sea showed a low abundance of one-year ocean fish (two-year ocean in 1961) suggesting a heavy ocean mortality on those young red salmon which went to sea in the spring of 1959. The catches indicate the majority of the fish returning to Bristol Bay in 1961 will be large fish with three years of ocean life.

The Commissioner stated that this joint effort in forecasting the 1961 Bristol Bay red run was done for the benefit of management and industry. The Alaska Board of Fish and Game may now plan its regulations around these figures and the fishermen and processors may prepare their fishing and canning capacity to properly utilize the 1961 runs.

The scientists also emphasized, although these predictions were made from the best available data, that in some instances a sufficient accumulation of data is not available to properly predict and that considerable variation in the actual size of the runs from that predicted may be expected. Further evidence of the actual size of the total run will become available from the high seas sampling in the spring of 1961. Management is sufficiently flexible to adjust fishing pressure to correct for either a smaller or larger run than predicted.

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### HARVESTING ANNUAL SALMON RUNS CREATES GREAT INTEREST:

Alaska may not have a "World Series," but the harvesting and processing of her annual salmon runs equals the famed series in tension and excitement. But Alaskans are not mere spectators; they take an active part in harvesting the salmon. The salmon come up the streams from the salt-water areas stretching from Ketchikan to Bristol Bay. Approximately 50 canneries along the North Pacific and Bering Sea coastlines can salmon. As the season advances and the pack figures climb, they are studied in every Alaskan coastal community.

When the 1959 fishing season ended, every community began to indulge in guessing the size of next season's catch. Fishery biologists made their generally conservative forecasts based, among other things, on scientific data of cyclic runs and escapements.

For 82 years since the first Alaska cannery was established in the native village of Klawok in 1878, this interest and concern in the annual salmon runs has grown. Fishing, like hunting and prospecting, is a gamble intensified by uncertainty and the sweet promise of success. Far more importantly, as the industry grew and the size of the runs dwindled, numerous communities found fishing almost their sole means of support. Places like Klawok, Craig, Hydaburg, Metlakatla, Petersburg, Hoonah, Pelican, Elfin Cove, Yakutat, Cordova, Chignik, Sand Point, Naknek, and Dillingham to mention a few were conscious that their very survival depended on a good season's fish catch.

After the comparatively simple oar-and-sail days their fathers knew when there was an abundance of fish, fishing for the individual fisherman has become a highly technical and mechanized business that requires expensive equipment and upkeep. This often involves being financed by a cannery or bank which results in a need for regular payments of principle and interest that can only be met by successful fishing seasons.

In 1960, the fishermen flocked to their respective fishing areas in May. As the season advanced and more areas opened, the coastal waters from Ketchikan to

Bristol Bay began to bristle with a formidable array of fishing gear. A total of 12,000 fishermen, manning approximately 5,000 fishing boats, using 336,000 yards of purse seines, 301,000 yards of anchor and shore set nets, 952,000 yards of gillnet, 32,000 troll hooks along with 11 fish traps and eight



fish wheels were ready or being readied to intercept by one method or another millions of the salmon that have, since time immemorial, made their annual pilgrimage from the sea to their natal streams, to spawn and in some cases die.

The first 1960 returns were recorded by the Alaska Fish and Game Department during the week ending May 29.

Except for a few scattered endeavors, the week ending September 25 marked the end of the 1960 salmon canning season. Preliminary figures showed Southeastern Alaska's final pack totaled 304,543 cases, which was far below the annual average of the last five years of 943,425 cases. However, the Central district's 1,200,310 cases and Western's 1,044,692 cases brought the grand total of Alaska's preliminary pack figures to 2,549,545 cases, or 771,256 cases above 1959.

The wholesale value of Alaska's salmon pack in 1956 was \$78,577,000. In 1959, the pack value had sagged to \$49,493,000. In 1960 it was up again to 78,500,000. For many, of course, in the areas where the runs failed to materialize, there would be hardship and the long wait for next season's catch.

The Alaska Department of Fish and Game is striving to build up the fisheries to where these wide fluctuations will be replaced by a fishing industry stabilized by a program of maximum sustained yield.

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### SIXTH SPECIES OF SALMON CAUGHT IN ALASKAN WATERS:

The identification of the sixth species of salmon being landed in Alaska, was announced by the Westward Regional Supervisor of Alaska's Commercial Fisheries Division. On August 15, 1960, while at a False Pass salmon cannery, he had occasion to examine a salmon that had been laid aside in the fish house. Neither the cannery superintendent or the Regional Supervisor could positively identify the fish. It was thought that it was a hybrid or possibly a species that occurs on the Siberian Coast (*Oncorhynchus masou* or the Masu salmon).

It was agreed that the salmon should be frozen and transported to the taxonomist at the University of Washington College of Fisheries, for possible identification. His identification was *Oncorhynchus masou* as the specimen fit all the classifications used to describe the species.

The specimen was a female with well-developed eggs and had spent two winters in the ocean. The physical characteristics of the salmon appeared to be a combination of several features of the other five species. One of the most obvious was the large number of small scales present as on the pink salmon. The head resembled a female chum salmon. There were a small number of fine black spots spread the length of the back from the head to the caudal peduncle, which was slender and rounded as a chum salmon. The tail structure and color resembled a red salmon and the meat color was pale pink. A dark green coloration above the lateral line was retained many hours after death.

The cannery superintendent said that this species has been landed at the False Pass cannery on several occasions in past years from the Alaska Peninsula area but not identified before. This particular specimen was believed to have been caught in Balboa Bay near the Shumagin Islands.



### American Samoa

#### TUNA LANDINGS, OCTOBER 1960:

Tuna landings by Japanese long-line fishing vessels for the United States-owned tuna cannery in American Samoa amounted to 1.7 million pounds in October 1960 as compared with 2.3 million pounds in October 1959. The January-October 1960 total of 22.3 million pounds was up 2.4 percent from the same period of 1959.

Species	October		Jan.-Oct.	
	1960	1959	1960	1959
	(1,000 Lbs.)			
Albacore . . .	1,620	2,075	19,070	17,359
Yellowfin . .	73	187	2,064	3,618
Big-eyed . . .	14	78	1,179	826
Skipjack . . .	-	3	10	7
Total . . .	1,707	2,343	22,323	21,810

Note: All of the tuna was landed by Japanese long-line vessels.



## Byproducts

### NEW TECHNICAL ADVISORY UNIT TO STIMULATE RESEARCH ON FISH MEAL AND OIL:

A new Technical Advisory Unit whose purpose is to stimulate research on fish meal and oils, and to correlate and make effective use of research findings for the benefit of industry, has been set up within the U. S. Bureau of Commercial Fisheries. Samuel R. Pottinger, Director of the Bureau's new Technological Laboratory in Gloucester, has been assigned to supervise the new program, with headquarters in Boston.

In describing the new program, the Director of the North and Middle Atlantic Region of the Bureau said, "With a view to finding new and more profitable markets for fish meal and oil, this new research team, composed of chemists and nutritionists, will endeavor to translate a great deal of research that is being carried on all over the country into a more usable tool for our meal and oil industry."

Pottinger, who has served with the Bureau for over 30 years, started with a team of five fishery technologists and built the East Boston, Mass., Laboratory, into an effective research organization, which in the spring of 1960 occupied the new Gloucester Laboratory, the best equipped laboratory of its kind in the United States.



## California

### BIG 1960 SALMON RUN TO SACRAMENTO RIVER:

An outstanding salmon run, which already has toppled one record, was in progress in November 1960 on the Sacramento River and tributaries, the California State Department of Fish and Game reported on November 25, 1960. The State's Nimbus Hatchery on the American River recorded 22,195 salmon in 1960, compared to 7,154 at the same time in 1959. With nearly two more months of run expected, the American River had a record run at the hatchery. Since the hatchery began operations in 1955, the top year was 1959 when 13,212 fish climbed its ladder. Egg take so far in 1960 was 14,296,700 as compared to 11,078,000 in 1959 on the same date in 1959. The record was set in 1959 when 38,949,200 eggs were taken.

The good run extended all the way up the Sacramento River. With the fish trap at Keswick Dam opened only one week, some 5,000 fish had been reported. Another 8,000 fish ascended Battle Creek near Anderson and moved into Coleman Fisheries Station, the Federal hatchery, where the Keswick-trapped fish were also being taken. Egg take at Coleman was near the 14,000,000 mark. In 1959 the total take for the season, which ended in January, was 53,000,000 eggs.

Coleman Station also reported a very good steelhead run in progress up the Sacramento River.

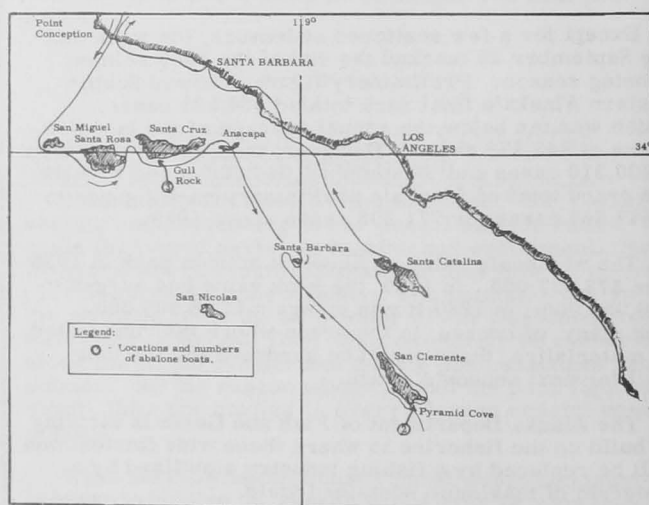
The Department of Fish and Game says the Yuba and Feather Rivers also supported good king salmon runs, both appearing to be as good or better than in 1959.

Runs up the lower streams--Tuolumne, Stanislaus, and Merced--were just beginning towards the end of November 1960.

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### INVESTIGATION OF ABALONE RESOURCES CONTINUED:

Airplane Spotting Flight 60-21 Abalone: The coastline from Santa Barbara to Pt. Arguello and the Islands of San Miguel, Santa Rosa, Santa Cruz, Anacapa, Santa Barbara, San Clemente, and Santa Catalina, was surveyed from the air on September 23, 1960, by the California Department of Fish and Game Twin Beechcraft to observe locations and numbers of commercial abalone boats.



Abalone resources investigation--airplane spotting flight 60-21, September 23, 1960.



Observations were limited along the coastline from Pt. Conception to Santa Barbara because of fog. The inshore sides of the Northern Channel Islands were obscured by fog, but visibility was excellent at Santa Barbara, Santa Catalina and San Clemente islands.

Three abalone boats were working in the Gull Rock area, Santa Cruz Island and two boats, one with diver on the bottom, were at Pyramid Cove, San Clemente Island.

The kelp beds around the islands were still relatively dense, but some sloughing off was evident.

Weather conditions had only recently improved, which may have accounted for the few boats in operation.

Note: Also see Commercial Fisheries Review, December 1960 p. 25.

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#### PELAGIC FISH POPULATION SURVEY CONTINUED:

Airplane Spotting Flight 60-19 - Pelagic Fish: The inshore area from the United States-Mexican Border north to Bolinas Bay was surveyed from the air (Sept. 12-15, 1960) by the California Department of Fish and Game Cessna "182" 9042T, to determine the distribution and abundance of pelagic fish schools.

South of Point Conception the weather was fair to good but it was poor in central California. Very few fish schools were found in any area.

In southern California, only four small sardine schools (three miles west of the town of San Clemente) and one group of about 15, small, deep anchovy schools (two miles off Paradise Cove) were seen. The water along the entire southern California coast was generally clean and the red tide of the past two months was not in evidence.

Observations in central California were hampered by a low overcast and fog but a small school-group of sardines was found one mile west of Gamboa Point. These schools were being harassed by hundreds of porpoises, sea lions, and birds, and it was not possible to estimate the magnitude of the group. About 50 thin anchovy schools were seen close to shore between the town of Santa Cruz and the Salinas River. Commercial spotters have reported that anchovy schools are abundant but very few sardine schools are present.

Airplane Spotting Flight 60-22 - Pelagic Fish: The survey from the air to determine the distribution and abundance of pelagic fish schools was continued (Oct. 10-13, 1960) by the Department's Cessna "182" 9042T, in inshore area from the United States-Mexico border north to the Russian River.

Weather and visibility conditions were generally good and complete coverage of the entire range of the survey was possible.

No significant number of fish schools has been found in the inshore area since July 1960 when a moderate concentration of anchovies was seen near Santa Barbara and Port Hueneme. October was no exception and only 135 schools were sighted. Most of these (109) were anchovy schools found in shallow water in Monterey Bay near Aptos Creek and off the town of Capitola.

A total of seven anchovy schools was seen in southern California--one off the mouth of the Tijuana River and six in the vicinity of the New Port Beach pier.

A school group of sardines was found off the town of Oceanside and 18 "breezing" schools were counted. This number is no measure of the magnitude of the group because the schools were quite wild and would appear and disappear frequently during a short period of time.

The water along the entire coast was uniformly clean and clear.

Note: Also see Commercial Fisheries Review, Dec. 1960 p. 27.



#### Cans--Shipments for Fishery Products, January-September 1960

Total shipments of metal cans during January-September 1960 amounted to 97,904 short tons of steel (based on the amount of steel consumed in the manufacture of cans) as compared with 93,065 tons in the same period of 1959. As of the end of September, the peak canning season for salmon had ended and that for Maine sardines was beginning to taper off. The pack of California sardines for one month s



fishing was very poor

and if this trend continues, the total shipments of tinsplate for fish cans in 1960 will be about the same or lower than the total shipments in 1959.

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

### IDENTIFICATION OF PACIFIC TUNA LARVAE:

As one phase of research on the biology of the Pacific tuna, the U. S. Bureau of Commercial Fisheries Honolulu Biological Laboratory has been working on the identification of tuna larvae. Such identifications are necessary, in part, for successful completion of studies concerned with the area, time, and success of spawning, and the distribution, abundance, and ecology of the larvae.

Skipjack, and yellowfin tuna and frigate mackerel larvae were identified from samples collected by Bureau research vessels during cruises to the central and eastern Pacific and preliminary studies of their distribution, abundance, and ecology were made. Lacking identification of the larvae, such studies were not possible for the big-eyed, albacore and bluefin tuna. Recently, using tuna larvae collected by the *Dana* (a Danish oceanographic expedition) during the 1928-30 cruise around the world, albacore, big-eyed, and bluefin larvae from the western Pacific have been tentatively identified.

The area surveyed by the *Dana* was divided into four geographical units, the Formosan waters, southern half of the South China, Sulu and Celebes Seas, the waters off New Guinea, and the eastern Indian Ocean (off northern end of Sumatra). From each of the areas, after removal of identifiable larvae such as yellowfin and skipjack tuna, the remainder could then be segregated into one or more "types." Comparison of those types with catch records of adults revealed a correspondence in the numbers of adult species reported from each area and the types of larvae. For example, in the Sulu and Celebes Seas, where only big-eyed are caught on long line, one larval type was found in abundance and was therefore designated as big-eyed. In the waters off Sumatra, both albacore and big-eyed are regularly taken by long line. Larvae

from those waters fell into two general types, one similar to that from the Sulu and Celebes Seas and designated as big-eyed; the other has been designated as albacore. In Formosan waters, where adult bluefin, as well as albacore and big-eyed, are caught, a similar line of reasoning resulted in the segregation of the larvae into the three types, the albacore, big-eyed and bluefin tuna.

Further confirmation comes from study of Central Pacific larvae collections. Adult bluefin tuna are rarely caught (one reported every 5 to 10 years) in that area and the type designated as bluefin larvae is absent from the collections.

Studies to confirm these identifications, using tuna larvae collected from Bureau vessels operating in the central and eastern Pacific, are presently under way. In addition, identifying characteristics such as meristic counts and distribution of chromatophors are being studied.



## Dams

### INTERIOR DEPARTMENT RECOMMENDS AGAINST IMMEDIATE POWER LICENSE ON MIDDLE SNAKE:

The Department of the Interior has advised the Federal Power Commission that it is unnecessary for a power development at either the Mountain Sheep or Nez Perce sites on the Middle Snake River in the Pacific Northwest to be undertaken at the present time and for some years to come.

In a letter signed by Acting Secretary Elmer F. Bennett, the Department pointed out that the proposed Columbia River treaty with Canada will permit other major hydro-power development on the Columbia River system and hence the proposed Middle Snake projects can be delayed pending further efforts to resolve the fishery problem.

The Department's letter calls attention to the White House statement of October 19 announcing President Eisenhower's approval of the proposals on Canadian storage which have been agreed to between the United States and Canadian negotiators. The White House statement said,

"Due to the location of this proposed storage, there will be no interference with

the cycle for salmon and other anadromous fish, which constitute such an important and recreational asset for the people of the Pacific Northwest."

"The large block of flood control storage and power that will be realized over the next decade as a result of this cooperative undertaking affords us a greater degree of selectivity in the planning and timing of potential domestic projects in order to take into fullest consideration conservation as well as purely economic needs. Sorely needed time will be gained which can be devoted to the research and study which must go into the solution of the problem, particularly pressing today in our northwest States, of harmonizing construction of large storage dams with fish and wildlife needs. In this way the agreement can make a maximum contribution to the fostering of conservation in its highest sense, the optimum harmonization of our multipurpose needs."

The Snake and Salmon rivers are of critical importance in maintaining the salmon fishery resources of the Columbia River system and a high dam at either Mountain Sheep or Nez Perce sites would drastically affect both upstream migration of the anadromous fish to spawn and the return of young fish to the sea.

The Department pointed out that as between the two proposed Snake River dams, the Nez Perce project, which would be located below the confluence of the Snake and Salmon rivers would have the greater impact on anadromous fish. However, the Department recommends that project construction at either site be deferred while full advantage is taken of the opportunity for storage and hydrodevelopment presented by the proposed treaty with Canada.



### Federal Aid Funds for Fish and Wildlife Restoration

Federal Aid funds totaling \$21,425,402 have been apportioned to the states for their fish and wildlife restoration programs for the year ending June 30, 1961, Secretary of the Interior Fred A. Seaton announced November 25, 1960. This includes the partial apportionment of \$12,800,000 made available to the states on July 1.

Of the total amount \$15,589,708 is for the restoration of game and \$5,835,694 is for the restoration of fish.

These funds are derived from Federal excise taxes collected from the manufacturers--an 11-percent tax on sporting guns and ammunition for the restoration of game (Pittman-Robertson Act, approved September 2, 1937) and a 10-percent tax on fishing rods, reels, creels and artificial lures, baits and flies (Dingell-Johnson Act, approved August 9, 1950). Both taxes apply on the manufacturer's price.



The programs are administered by the Bureau of Sport Fisheries and Wildlife, U. S. Fish and Wildlife Service.

Federal Aid money is matched by state money on the basis of not to exceed \$3 Federal Aid to \$1 state funds, although according to the provisions of the Acts the states carry out all projects with their own funds, and are reimbursed for up to 75 percent of project costs.

Note: Also see Commercial Fisheries Review, August 1960 p. 21.



### Federal Purchases of Fishery Products

DEPARTMENT OF DEFENSE PURCHASES, JANUARY-OCTOBER 1960:

Fresh and Frozen Fishery Products: For the use of the Armed Forces under the Department of Defense, 1.8 million pounds (value \$921,000) of fresh and frozen fishery products were purchased in October 1960 by the Military Subsistence Supply Agency. This was higher than the quantity purchased in September by 4.7 percent but was 9.2 percent under the amount purchased in October 1959. The value of the purchases in October

Table 1 - Fresh and Frozen Fishery Products Purchased by Military Subsistence Supply Agency, October 1960 with Comparisons

QUANTITY				VALUE			
October		Jan.-Oct.		October		Jan.-Oct.	
1960	1959	1960	1959	1960	1959	1960	1959
. . . . . (1,000 Lbs.)				. . . . . (\$1,000)			
1,766	1,945	19,488	19,433	921	1,062	10,109	10,039

1960 was lower by 0.8 percent as compared with September and 13.3 less than for October 1959.



During the first 10 months of 1960 purchases totaled 19.5 million pounds (valued at \$10.1 million)--an increase of 0.3 percent in quantity and 0.7 percent in value as compared with the same period in 1959.

Prices paid for fresh and frozen fishery products by the Department of Defense in October 1960 averaged 52.2 cents a pound, about 0.4 cents more than the 51.8 cents paid in September, but 2.4 cents less than the 54.6 cents paid during October 1959.

**Canned Fishery Products:** Salmon was the principal canned fishery product purchased for the use of the Armed Forces during October this year. In the first 10 months of 1960, purchases of canned tuna were up 20.7

Table 2 - Canned Fishery Products Purchased by Military Subsistence Supply Agency, October 1960 with Comparisons

Product	QUANTITY				VALUE			
	October		Jan. -Oct.		October		Jan. -Oct.	
	1960	1959	1960	1959	1960	1959	1960	1959
	. . . (1,000 Lbs.) . . .				. . . (\$1,000) . . .			
Tuna	771	100	3,141	2,602	349	44	1,393	1,203
Salmon	1,285	653	3,593	671	868	466	2,436	470
Sardine	25	51	124	1,025	10	21	51	165

percent and canned salmon were up 435.5 percent as compared with the same period in 1959. However, canned sardine purchases during January-October 1960 were down--87.9 percent as compared with the same months of 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.



**Florida**

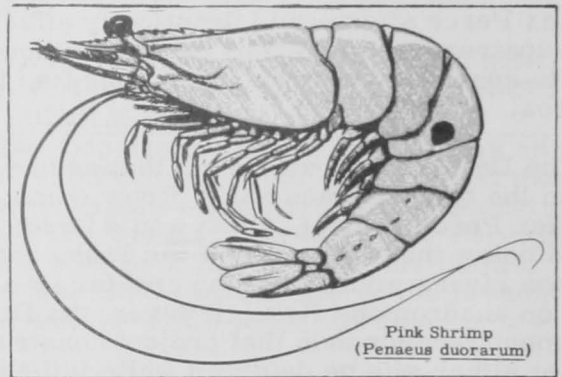
**FISHERIES RESEARCH THROUGH SEPTEMBER 1960:**

The Marine Laboratory of the University of Miami is carrying on research on fisheries with funds provided by various sources, including the Florida State Board of Conservation and the U. S. Fish and Wildlife Service. The research of interest to commercial fisheries contained in the Laboratory's September 1960 Salt Water Fisheries News-letter follows:

**Larval Shrimp:** Study of the early life stages of the pink shrimp, the species which supports the important Tortugas fishery near

Key West, Fla., is being carried on at the Laboratory with funds provided by the U. S. Fish and Wildlife Service. Investigation has been aimed at charting the spawning area and the spawning season of this species. Spawning of pink shrimp takes place in offshore waters from about 12 to 25 fathoms in depth. No very young larval stages have been taken in inshore waters of less than eight fathoms, although older postlarvae and young adults are present there. At depths of greater than 50 fathoms, no larvae have been found. There appears to be a strong westerly current in these deeper waters which might carry any larvae present into areas unsuitable for their further growth.

Some spawning of pink shrimp takes place all during the year. Only about two weeks are required for the shrimp to complete its larval life, but some of these very young shrimp are found each month of the year. The peak of spawning is from about June to September. The method by which the larvae move from the offshore spawning grounds over 90 miles to the shallow bays where they continue their growth are presently being studied.



**Spotted Sea Trout:** A tagged spotted sea trout released at Apalachicola, Fla., was recaptured at Grand Isle, La. Although this migration was well over 250 miles, the majority of west Florida tagged trout have been recaptured within 30 miles of the tagging area.

This tagging program was begun with the support of the Florida State Board of Conservation to determine migrations and growth rates. Tagged sea trout were released on the west coast of Florida, and about 10 percent have been returned. Two types of tags are being used. One consists of a small green "internal" or "body cavity" tag which is inserted in the body cavity of the fish. This tag is found when the fish is cleaned or gutted.



The second type of tag consists of a piece of yellow plastic tubing attached to a body cavity tag. The tubing protrudes externally from the fish's body to aid detection.

Winter growth was much slower than growth during warmer months. The average annual growth per fish was estimated at about three inches.

**Frozen Breaded Shrimp Quality:** The great demand for frozen breaded shrimp has led to an investigation of the bacteria present in the product. There are many temperature fluctuations that occur during the distribution cycle, therefore, tests are being carried out to determine the relation of time and temperature to the numbers of bacteria.

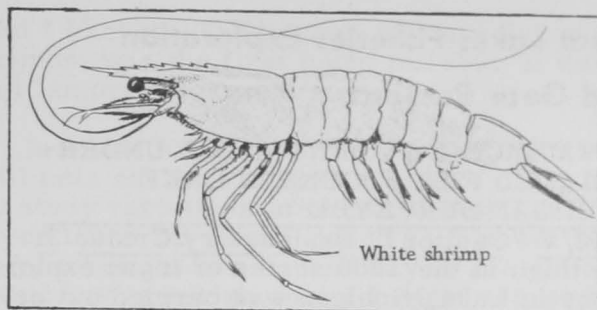
Preliminary results have shown a decrease in bacteria due to freezing immediately after processing, followed by a slight increase during a six-hour thaw at room temperature. This work is supported by the National Institute of Health.

**Nonutilized Species Incidental to Shrimp Fishing:** A large quantity of nonutilized fish is caught incidentally to the shrimp fishery. The fish that come up in the drag nets include many species, some of them edible, but since there is no market for them they are discarded.

A project has been started to develop a method of preserving these nonutilized or "trash" fish and finding uses for them. A method of holding the fish without refrigeration is under study. It consists of a hydrolysis or digestion of the fish by the naturally-occurring enzymes of the fish. These enzymes are related to gastric juices of the fish and will act on the meat.

One of the most likely applications for the "liquid fish" is in the fertilizer industry, for it can be fortified by the addition of chemicals and converted into a complete fertilizer with any desired formula. At least two large citrus growers in the central part of Florida are using a byproduct from the manufacture of fish meal, which does not contain all the ingredients of liquid fish. Both growers have reported good results from the applications of fish fertilizer.

The State Board of Conservation and the Small Business Administration are supporting the trash fish studies.



White shrimp

**Reaction of Shrimp to Light Studied:** Investigations on the reactions of pink shrimp, *Penaeus duorarum* and white shrimp, *P. setiferus*, to light rays of different types has been set in motion with the contract approval from a National Science Foundation grant. Since these two species of shrimp have opposite light activity rhythms, the study may provide a better description of their behavior. This may open up the possibility of using illuminated shrimp trawls in midwater for trawling over rough bottoms.

Note: Also see *Commercial Fisheries Review*, March 1959 p. 34; November 1960 p. 29.



## Food Spoilage

### GRANT MADE FOR STUDY OF NEW APPROACH TO CONTROL OF FOOD SPOILAGE:

Research has been initiated on a new approach to the control of food spoilage. The Refrigeration Research Foundation announced the latter part of 1960 this research has been undertaken under the direction of a member of the Foundation's Scientific Advisory Council. The member is also Chairman of the Food Technology Department at Oregon State College.

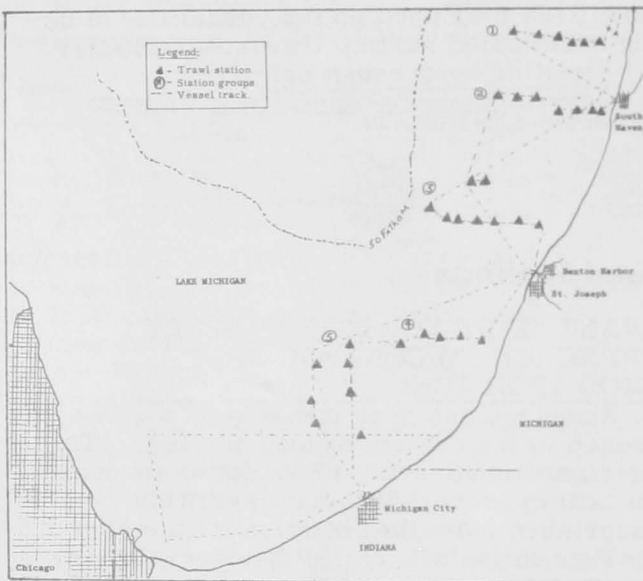
The grant with which the research is financed is from the U. S. Department of Health, Education, and Welfare. Basically the grant was made to study the food preservation properties of Vitamin K 5.

Vitamin K 5 is the only vitamin known to destroy spoilage agents in food. It is found in green leafy vegetables, cheese, liver, egg yolk, and tomatoes. Heat does not destroy the vitamin and it is possible that by adding it with freezing and canning methods, the refrigerator shelflife of foods may be extended as much as six weeks after exposure to air. (*Industrial Refrigeration*, October 1960).

## Great Lakes Fisheries Exploration and Gear Research

### COMMERCIAL POTENTIAL OF UNDER-UTILIZED FISH STOCKS IN LAKE MICHIGAN SURVEYED:

M/V "Capitol I" Exploratory Cruise 3: The third in the 1960 series of trawl explorations in Lake Michigan was carried out between South Haven, Mich., and Chicago, Ill., by the U. S. Bureau of Commercial Fisheries chartered vessel Capitol I, a former Gulf of Mexico shrimp trawler. The objectives of the seven-day cruise (ending October 1) were to determine the abundance and seasonal distribution of the various species of fish inhabiting the area and to learn the location of areas suitable for trawling.



The third 1960 exploratory cruise by Capitol I.

Some thirty-four 30-minute drags were completed in various depths between 10 and 42 fathoms using a standard, 50-foot (headrope), Gulf of Mexico balloon-type fish trawl. Catches ranged from 70 to 1,170 pounds of mixed chubs, bloater chubs, and alewives per drag. Best fishing results were obtained north of Michigan City, Ind., in Michigan waters, at depths of 15 to 35 fathoms. Seven drags in this area caught fish (96 percent L. hoyi) at an average rate of 793 pounds per hour. In four other localized areas this depth range produced fish at average rates of 345, 461, 497, and 498 pounds per hour. Considering the entire cruise area, the 20- and 30-fathom depth range was most productive with 18 drags catching an average of 639 pounds per hour.

Alewives were caught in amounts of 5 to 180 pounds and averaged 59 pounds in 13 drags scattered throughout the area in the 15- to 25-fathom depth zone. Smelt, whitefish, and herring were taken in amounts of 10 pounds or less per drag, and yellow perch were caught in amounts of 10 pounds or less per drag, and yellow perch were caught in amounts of 1 pound or less in 11 drags.

Extensive soundings of Indiana waters revealed unfavorable bottom conditions for trawling. Adverse weather conditions interfered with fishing operations during one day of the cruise.

Note: Also see Commercial Fisheries Review, November 1960 p. 30.



## Great Lakes Fishery Investigations

### LAKE ERIE FISH POPULATION SURVEY FOR 1960 SEASON COMPLETED:

M/V "Musky II" October 1960: The 1960 field operations of the U. S. Bureau of Commercial Fisheries research vessel Musky II on Lake Erie were terminated for the year at the end of October. Surface-water temperatures in western Lake Erie remained near 64° F. from October 1 to 17 but dropped to 52° F. by October 25. The growing season of most species in Lake Erie is 4 to 5 months when water temperatures are above 60° F.

Commercial catches generally were low in United States waters in October. Yellow pike contributed strongly to the catch in most areas. The average lengths of yearling yellow pike in the fishery in Ohio (7 ports) and Michigan (1 port) ranged from 14.3-14.6 inches. Average length in New York ports was only 12.9 inches.

Tagged yellow pike have been reported principally from western Lake Erie, but one was recovered from the St. Clair River north of Detroit and one from Dunkirk, N. Y.

Although goldfish (most are brownish colored) do not contribute greatly to total production in Lake Erie (157,000 pounds in 1958), they are abundant in some areas. Goldfish average 5 to 6 inches long at the end of the first year of life and about 9 inches at the end of the second year. Larger specimens are about 14 inches long and weigh a-

bout 2 pounds. Spawning checks on the scales of fish 2 years of age and older are almost identical to annuli. Determining the age of older fish is difficult.

The abundance and growth of young fish generally was much poorer in 1960 than in 1959. For example more young yellow pike and yellow perch were taken in some single trawl tows in 1959 than in all tows combined (approximately 400 tows) in 1960. It is little wonder that the sport and commercial catches of some species vary so greatly from season to season and year to year.

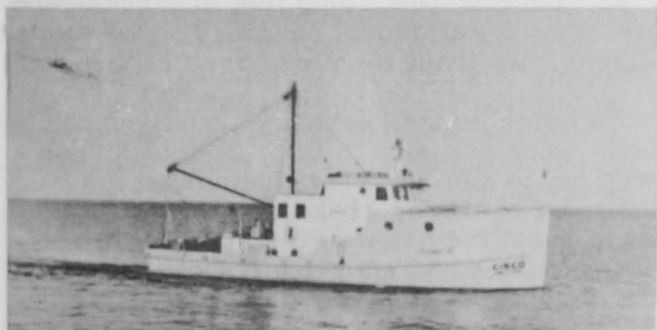
Samples of brown bullheads taken by the commercial fishery in October averaged 10.1 inches long and  $\frac{1}{2}$  pound in weight; channel catfish averaged 16.2 inches long and  $1\frac{1}{4}$  pounds in weight.

Note: Also see Commercial Fisheries Review, Dec. 1960 p. 33.

\* \* \* \* \*

#### LAKE MICHIGAN FISH POPULATION SURVEY CONTINUED:

M/V "Cisco" Cruise 9: The fish population survey in Lake Michigan was continued (October 11-25, 1960) by the U. S. Bureau of Commercial Fisheries research vessel Cisco.



Research vessel Cisco.

Gangs of nylon gill nets (50 feet each of  $1\frac{1}{4}$ - and  $1\frac{1}{2}$ -, 100 feet of 2-, 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 overnight at 25 and 50 fathoms off St. Joseph, Mich., and at 25 fathoms off Grand Haven. Chub catches were light and practically all Leucichthys hoyi in both 25-fathom sets, but moderately heavy, with more of other chub species, in the 50-fathom sets.

A gang of nylon gill nets was set for 13 nights at 88 fathoms in midlake west of Holland, Mich. The catch was extremely heavy: 3,516 L. hoyi, 61 L. kiyi, 32 L. zenithicus, 61 lake herring, 38 fourhorn sculpins,

and 1 burbot. The burbot, which weighed 2 pounds, was the first taken in 1960. It was not lamprey-scarred.

In order to study differences in catch from gill nets set for various lengths of time, and to study variations in identical sets, gill nets were lifted off Grand Haven as follows: first day, a 1-night set; second day, a 2-night set; third day, a 1-night and a 3-night set; sixth day, a 3-night and a 6-night set. The catches in all nets were practically all L. hoyi. The 1-night sets took 368 and 596 chubs, respectively; the 2-night set 581; the 3-night sets 892 and 723; and the 6-night set 1,256. The nets used during the second 3-night and the 6-night sets were loaded with current-transported weeds and trash. Gale winds blew almost constantly the day and night before the nets were lifted. It is doubtful that the nets fished properly during the last night. None of the mesh sizes in other sets appeared to be "loaded up" at the end of 3 days.

Gangs of linen gill nets were set for 5 nights at 25 fathoms (255 feet each  $2\frac{3}{8}$ -,  $2\frac{1}{2}$ -,  $2\frac{5}{8}$ -,  $2\frac{3}{4}$ -, and 3-inch mesh) and 50 fathoms (510 feet of each of the above mesh sizes). At both depths these nets took more L. hoyi and less individuals of other chub species than did identical nets set on about the same date in 1954.

The L. kiyi spawning season appeared to be near. Only one fully ripe individual was examined. No spent fish were seen.

A 52-foot commercial-type balloon trawl was fished at several depths off St. Joseph and Grand Haven. The chubs were practically all L. hoyi, especially in the shallow tows. Ordinarily the trawl caught little other than chubs, but at 20 fathoms off St. Joseph, 127 pounds of alewives were taken; and at 50 fathoms off Grand Haven the net brought up 49 pounds of fourhorn sculpins. The catch of sculpins was the smallest by far for this area in several cruises.

Hydrographic observations and collections were made at regular 25-fathom stations off Grand Haven and St. Joseph. Recorded surface-water temperatures ranged from  $47.5^{\circ}$  F. to  $62.2^{\circ}$  F. The epilimnion continued to thicken, but a distinct thermocline remained in the deeper water.

M/V "Cisco" Cruise 10: Bad weather reduced materially the work planned for

this cruise. Scheduled trawling, gill-netting, and hydrographic work on the west side of the lake (off Racine and Milwaukee, Wis.) were cancelled altogether; operations were confined to the Grand Haven, Mich., area.

A 52-foot balloon trawl of the type used by most Lake Michigan commercial fishermen was fished at 5-fathom-depth intervals from 10 to 50 fathoms. All tows were for 30 minutes. Most chub catches were rather small, but a large catch (954 pounds) was made at 20 fathoms. In addition, some spot-tail shiners were caught at 20 fathoms, a few emerald shiners were taken at 15 fathoms, and small numbers of slimy sculpins were caught in all tows deeper than 25 fathoms.

A gang of nylon gill nets (50 feet each of  $1\frac{1}{4}$ - and  $1\frac{1}{2}$ -, 100 feet of 2-, 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) was set overnight at 50 fathoms. The catch was rather light: 322 L. hoyi, 1 Leucichthys alpenae, 5 L. zenithicus, 5 L. kiyi, 2 lake herring, and 3 alewives.

Gangs of linen gill nets were set for 5 nights at 25 fathoms (255 feet each of  $2\frac{3}{8}$ -,  $2\frac{1}{2}$ -,  $2\frac{3}{4}$ -, and 3-inch mesh) and at 50 fathoms (510 feet of each of the above mesh sizes). The nets were out during a south-westerly gale, and the gang at 25 fathoms became so fouled with weeds and other trash that the catch data from it could not be used. The 50-fathom gang, however, apparently fished well throughout the 5 nights. It caught more L. hoyi, but fewer other chubs than an identical gang set in the same place on about the same date in 1954.

By the end of the cruise, 3 species of chubs (L. kiyi, L. alpenae, L. zenithicus) and the lake herring were nearing spawning condition. A few L. kiyi and lake herring were ripe, and one female lake herring had spawned. Spawn from 1 pair of L. kiyi was collected. The fish from these eggs are to be reared in the Northville, Mich., hatchery for taxonomic studies.

Hydrographic collections and observations were made at the regular 25-fathom station off Grand Haven. Surface-water temperatures were about 52° F. at the beginning of the cruise and about 49° F. at the end. By the end of the cruise the water had become vertically homothermous out to a depth of about

30 fathoms, but fairly pronounced stratification remained in depths greater than this.

Note: Also see Commercial Fisheries Review, Dec. 1960 p. 34.

\* \* \* \* \*

#### ABUNDANCE OF SPAWNING LAKE TROUT IN WESTERN LAKE SUPERIOR STUDIED:

M/V "Siscowet" Cruise 8: This cruise was scheduled (October 19-25, 1960) for the U. S. Bureau of Commercial Fisheries research vessel Siscowet to assess the abundance of spawning lake trout in the Apostle Island region of Lake Superior. Large-mesh gill-nets (5- to 6-inch mesh stretched measure) were set on two known spawning reefs: Devil's Island Shoal, located one mile east of Devil's Island, and Sand Cut Reef, located between Madeline Island and Chequamegon Point. Two sets were made on Devil's Island Shoal and one set on Sand Cut Reef.

At Devil's Island Shoal approximately 14,000 feet of large-mesh nets were set at depths ranging from 2 to 8 fathoms. Six spawning trout were captured--all of them males 22.6 to 27.2 inches long. The trout were tagged and released.

At Sand Cut Reef 7,000 feet of large-mesh nets were set at depths ranging from 5- to 8-fathoms. No trout were captured in this set.

Two small-mesh nets ( $1\frac{1}{2}$ - and  $2\frac{1}{2}$ -inch mesh) were attached to each gang of large-mesh net to sample other species on the lake trout spawning grounds. At Devil's Island Shoal the catch in the small-mesh nets consisted of 72 longnose suckers, 41 lake herring, 40 menominee whitefish, and 5 lake northern chubs.

At Sand Cut Reef the small-mesh nets captured only 7 lake herring, 1 menominee whitefish, and 1 smelt. The large-mesh nets, however, took 7 yellow pike (average weight: 6.5 pounds) and 15 white suckers.

The Wisconsin Conservation Department attempted to take lake trout spawn at Gull Island Shoal, Oak Island Shoal, Cat Island Shoal, and Manitu Island Shoal. They fished 61,000 feet of large-mesh nets and captured 21 spawning trout. Only 4 of these were females. About 1 quart of eggs was taken.

Trawls were towed by the Siscowet just south of Stockton Island in an effort to cap-



ture young-of-the-year of various species. The ninespine sticklebacks and slimy mud-  
glers predominated in the catches. No young-  
of-the-year fish were taken.

Water temperatures were the same from the  
surface to the bottom on the spawning reefs.  
Temperatures varied from 47.9° F. on Devil's  
Island Shoal to 50.4° F. at Sand Cut Reef.

Note: Also see Commercial Fisheries Review, Dec. 1960 p 34.



## Groundfish

### STUDY COMPARES FISHING COSTS IN NEW ENGLAND AND CANADIAN INDUSTRIES:

The first draft of a study of costs of fish-  
ing in the New England and Canadian ground-  
fish industries, being conducted by the Bureau  
of Business Research, Boston College, under  
a contract from the U. S. Bureau of Commer-  
cial Fisheries, has been submitted by the Col-  
lege. The study was designed to further an-  
alyze causes for the decline of the New Eng-  
land groundfish industry, and to compare the  
performance of the New England industry with  
its chief competitor, the groundfish industry  
of the Canadian Atlantic Provinces. Emphasis  
has been given to costs and earnings in the  
industry. In addition to the cost analysis, the  
study covered basic principles and theoret-  
ical economic aspects of the operations of  
the domestic industry. Suggestions are  
given concerning a more rational economic  
approach to the operations of the domestic  
industry.

The report points out that the New Eng-  
land groundfish fleet is comprised of a  
dissimilar group of vessels engaged in sep-  
arate and distinct fisheries. Some of the  
significant observations concerning the op-  
eration of this fleet bear on costs and rev-  
enues. Vessels are generally becoming  
old and are not being replaced. This, inci-  
dentally, is paralleled with an aging popu-  
lation of fishermen. Few young men are  
entering the fishery. The older vessels are  
more costly to operate. Trip expenses have  
been increasing substantially and are diffi-  
cult to adjust because of rigid, inflexible  
items of cost. Revenues, on the other hand,  
have been on a general down trend.

The Bureau of Commercial Fisheries ex-  
pects to publish the report for general dis-  
tribution early in the spring of 1961. The

study was financed by funds made available  
through the Saltonstall-Kennedy Act of 1954.



## Gulf Exploratory Fishery Program

### EXPLORATORY FISHING FOR INDUSTRIAL FISH CONTINUED:

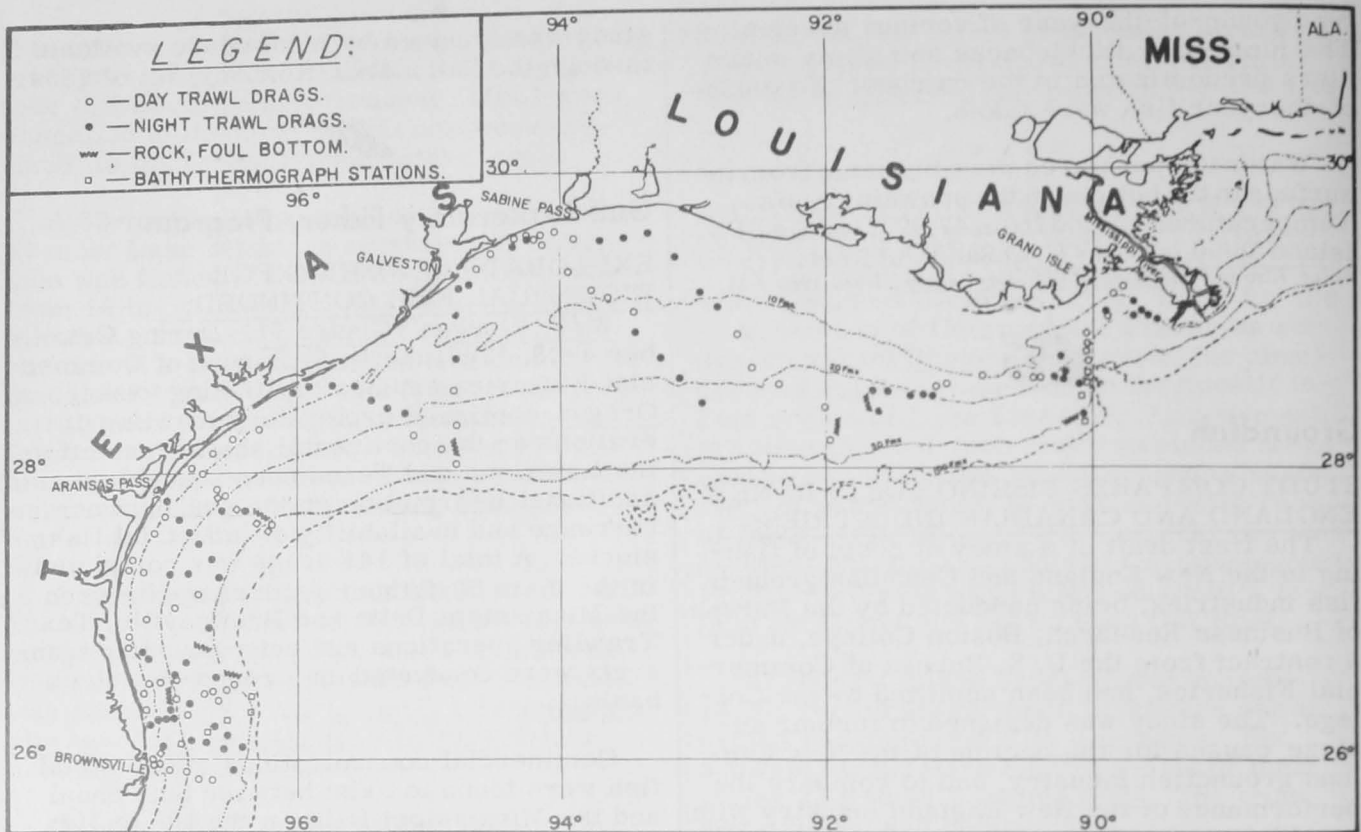
M/V "Oregon" Cruise 71: During Octo-  
ber 4-28, 1960, the U. S. Bureau of Commer-  
cial Fisheries exploratory fishing vessel  
Oregon continued exploratory trawling op-  
erations on the continental shelf areas off  
the Louisiana and Texas coasts to obtain  
additional information on the seasonal oc-  
currence and availability of industrial fish  
stocks. A total of 141 drags was completed  
in the 3- to 50-fathom depth range between  
the Mississippi Delta and Brownsville, Tex.  
Trawling operations and echo-sounding tran-  
sects were conducted on a round-the-clock  
basis.

Commercial concentrations of industrial  
fish were found to exist between Ship Shoal  
and the Mississippi Delta in the 10- to 20-  
fathom depth range and in 5- to 7-fathoms on  
the north side of Sabine Bank. Individual  
drags in those areas produced from 2,000  
to 6,000 pounds of fish per 1-hour drag with  
croakers (Micropogon sp.) predominating.  
Catches from west of Sabine Pass to Browns-  
ville, Tex., however, were generally poor.  
The best drag in this area produced only 800  
pounds of mixed fish. Bottom conditions  
were generally suitable for trawling with the  
exception of scattered areas of broken and  
foul bottom.

A pronounced decline was noted in the  
abundance of industrial fish between Sabine  
Pass and Aransas Pass during this cruise  
compared with the August 1960 cruise.

Approximately 1,000 pounds of the three  
species of Gulf of Mexico commercial shrimp  
(heads off) were taken. Brown shrimp (Penaeus  
aztecus) were the most abundant with best  
production between the 20- and 40-fathom  
curves.

Paper-shell scallops (Amusium sp.)  
measuring 2-3 inches in diameter were taken  
in moderate quantity (up to 1 bushel) in the  
30- to 50-fathom depth range off Grand Isle,  
La., and Brownsville, Tex.



M/V Oregon Cruise No. 71 (October 4-28, 1960)

Bathythermograph casts were made and surface water salinities obtained on the three oceanographic transects. On each transect observations were made from the 50-fathom curve shoreward at 10-fathom intervals.

Standard "Gulf of Mexico"- and "New England"-type industrial fish trawls, hung 71/85 feet and 60/80 feet, respectively, along the head and footrope, were used. Both types were constructed from 2-inch stretched mesh cotton webbing. Forty-foot 2-seam balloon trawls and 65-foot flat trawls were used in areas where doubt existed as to bottom conditions. Wooden chain doors (10x3 feet) and aluminum bracket doors (6x3 feet) were used to spread the trawls.

An electromagnetic underwater log system was tested and proved extremely accurate in registering the vessel's speed through the water. Preliminary trials with this device indicated a wide range in optimum dragging speeds for the different rigs used.

Note: Also see Commercial Fisheries Review, Dec. 1960 p. 36.



## Maine Sardines

### CANNED MAINE SARDINE STOCKS, NOVEMBER 1, 1960:

Distributors' stocks of Maine sardines totaled 277,000 actual cases on November 1, 1960--19,000 cases (6 percent) less than the 296,000 cases on hand November 1, 1959.

Canners' stocks on November 1, 1960, totaled 1,258,000 standard cases (100 $\frac{3}{4}$ -oz. cans), an increase of 257,000 cases (26 percent) as compared with November 1, 1959.



The 1960 pack (from the season which opened on April 15, 1960, and ended on December 1, 1960) was about 1,975,000 cases as compared with 1,750,000 cases in 1959.

At the beginning of the 1960 packing season on April 15, 1960, the carryover in the hands of canners from the 1959 pack was 335,000 cases. This carryover plus the 1960

Table 1 - Canned Maine Sardines--Wholesale Distributors' and Cannery Stocks, November 1, 1960, With Comparisons<sup>1/</sup>

Type	Unit	1960/61 Season		1959/60 Season				1958/59 Season			
		11/1/60	7/1/60	6/1/60	4/1/60	1/1/60	11/1/59	7/1/59	6/1/59	4/1/59	1/1/59
Distributors . . . . .	1,000 actual cases	277	172	197	252	235	296	176	197	254	268
Cannery . . . . .	1,000 std. cases <sup>2/</sup>	1,258	359	235	397	843	1,001	422	272	474	891

<sup>1/</sup>Table represents marketing season from November 1-October 31.

<sup>2/</sup>100 3<sup>3</sup>/<sub>4</sub>-oz. cans equal one standard case.

Correction: Heading of last 5 columns of Table 1 which appeared under this section on p. 24 of the September 1960 issue of this Review should have read "1958/59 Season" instead of "1957/58 Season." The columns headed "11/1/60" should have read "11/1/59."

pack of 1,948,000 cases as of November 1, 1960, made the available supply as of that date 2,283,000 cases--slightly more than the available supply of 2,121,000 cases on November 1, 1959. Shipments from November 1, 1959, to November 1, 1960, totaled 1,025,000 cases as compared to 1,120,000 cases for the previous period.

\* \* \* \* \*

**CANNING SEASON ENDS:**

The 1960 Maine sardine canning season officially closed on December 1, with a pack of approximately 1,975,000 cases. This is well above last year's production of 1,750,000 cases which was below normal due to a scarcity of fish.

The Maine Sardine Council's Executive Secretary said that 31 plants, located from Portland to Robbinston, were in operation for most of the season which got under way on June 1.



Several thousand persons were employed in canning the pack, which would have a market value of about \$18 million.

Fishing in the Portland area was very spotty which limited production there while the eastern Washington County section had the best catch of fish in a number of years, and conditions in the middle section

of the coast were about normal.

"Market conditions are good and the industry should have no trouble disposing of the pack," the Executive Secretary stated.



**Marketing**

**EDIBLE FISHERY PRODUCTS MARKETING PROSPECTS, WINTER 1960/61:**

United States civilian per capita consumption of food fishery products during the winter 1960/61 may be a little lower than a year earlier. Supplies of the canned items are expected to be about the same, but those of frozen products may be a little less plentiful. Retail prices of foods in this group probably will average moderately higher.

Total supplies of edible fish and shellfish through the winter may not be greater than a year earlier. For the fresh and frozen items, stocks were somewhat lower at the beginning of the fall of 1960 as compared with the same period in 1959, commercial landings will be at the seasonal low point of the year, and any increase in imports may not be large enough to close the gap in domestic supplies between this winter and last. Supplies of canned red salmon will be noticeably larger than a year earlier. About as much canned tuna will likely be available as in the past year. Canned Maine sardines will be a little more plentiful this marketing year.

Exports of edible fishery products in winter 1960/61 may total no larger than in the same period of 1959/60. However, there may be some increase for canned red salmon because of larger supplies this marketing season.

This analysis appeared in a report prepared by the Agricultural Marketing Service, U. S. Department of Agriculture, in cooperation with the Bureau of Commercial Fisheries, U. S. Department of the Interior, and published in the former agency's November 1960 release of The National Food Situation (NFS-94).



## North Atlantic Fisheries

### Exploration and Gear Research

#### BOOTHBAY HARBOR EXPLORATORY FISHING ACTIVITIES SHIFTED TO GLOUCESTER:

Exploratory fishing and gear research activities of the U. S. Bureau of Commercial Fisheries, formerly based at Boothbay Harbor, Me., have been combined with the Exploratory Fishing and Gear Research Base in Gloucester, Mass.

The move was made to eliminate duplication of administrative effort and to promote efficiency.

Among the accomplishments of the Boothbay Harbor exploratory fishing and gear research unit were the introduction of the power-block method of handling stop-seine gear and the development of the air-bubble curtain which has proven valuable as a unique method for harvesting schools of herring beyond the range of conventional stop-seines and weirs.

Experiments in electro-fishing for herring, which were started in the summer of 1960, will be resumed early in the 1961 fishing season.

\* \* \* \* \*

#### NEW EXPLORATORY FISHING AND GEAR RESEARCH CHIEF APPOINTED:

The Director of the North and Middle Atlantic Region of the U. S. Bureau of Commercial Fisheries has announced the appointment of Keith A. Smith as Director of the North Atlantic Fisheries Exploration and Gear Research Base at Gloucester, Mass., to succeed James L. Squire, Jr., who recently transferred to the U. S. Bureau of Sport Fisheries and Wildlife for a Southern California assignment.

Smith joined the Fish and Wildlife Service as soon as he received his B. S. degree in Fisheries from the University of Washington in 1952. His first assignment was with the Bureau's Seattle office where he conducted exploratory fishing in Alaskan and North Pacific waters for Alaskan shrimp, Pacific tuna, and bottom fish.

He transferred to Boothbay Harbor, Me., in 1955 where he has served as Chief of Maine

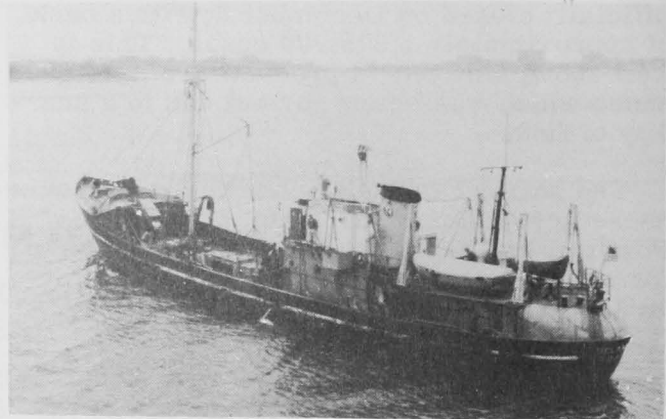
Herring Exploration and Gear Research. Notable among his unit's accomplishments in behalf of the Maine Sardine industry was the development of a novel method of harvesting herring by closing in on them with a barrier curtain of air bubbles.



### North Atlantic Fisheries Investigations

#### GULF OF MAINE SURVEYED FOR YOUNG HADDOCK AND OTHER SPECIES:

M/V "Delaware" Cruise 60-12: During a 20-day cruise the U. S. Bureau of Commercial Fisheries research vessel Delaware surveyed the Gulf of Maine for (1) the distribution and abundance of haddock spawned in the spring of 1960, and (2) the distribution and abundance of other species found in the Gulf of Maine.



U. S. Bureau of Commercial Fisheries research vessel Delaware.



### North Pacific

#### Exploratory Fishery Program

#### GOOD SHRIMP FISHING GROUNDS FOUND OFF CENTRAL OREGON:

M/V "John N. Cobb" Cruise 48: The U. S. Bureau of Commercial Fisheries exploratory fishing vessel John N. Cobb returned to Seattle, November 3, 1960, completing 6 weeks of exploratory shrimp fishing in cooperation with the Oregon Fish Commission. The survey was conducted off central Oregon, in the general region between the Coquille River and Stonewall Bank.



Systematic surveys of the bottom with a high-resolution, low-frequency echo-sounder resulted in the discovery of some fishable ground of soft bottom located within rocky regions avoided by commercial fishermen. Test drags made with a Gulf-of-Mexico shrimp trawl on the soft-bottom areas produced some catches of pink shrimp in commercial quantity. The best drag of the cruise, made off the Umpqua River in 90 fathoms of water, yielded 650 pounds of pink shrimp in one-half hour of fishing. A number of other one-half hour drags produced from 200 to 500 pounds of shrimp. The exploratory catches were generally higher than those concurrently made by commercial shrimp fishermen on previously known grounds in the same general region.

Maximum concentrations of shrimp were found at depths from 85 to 95 fathoms on green mud bottom, with good catches also in water as shallow as 72 fathoms. Test drags were made within the depth range from 50 to 110 fathoms.

The procedure used to survey the areas was as follows: (1) Sounding transects were made with a high-resolution, low-frequency echo-sounder. (2) On the grounds indicated by the echo-sounder as being free of snags and having a soft bottom, a series of drags from shallow to deep water were made until the center of abundance of the shrimp was located. This contour was then followed up and down the coast, when possible, until shrimp were no longer taken. Drags were then made again from shallow to deep water to insure that the center of abundance of the shrimp had not shifted. (3) Samples of shrimp from each drag were measured and sexed and the heads-on count per pound determined. Length frequencies of the more important species of fish caught were also obtained from each area explored.



### Oregon

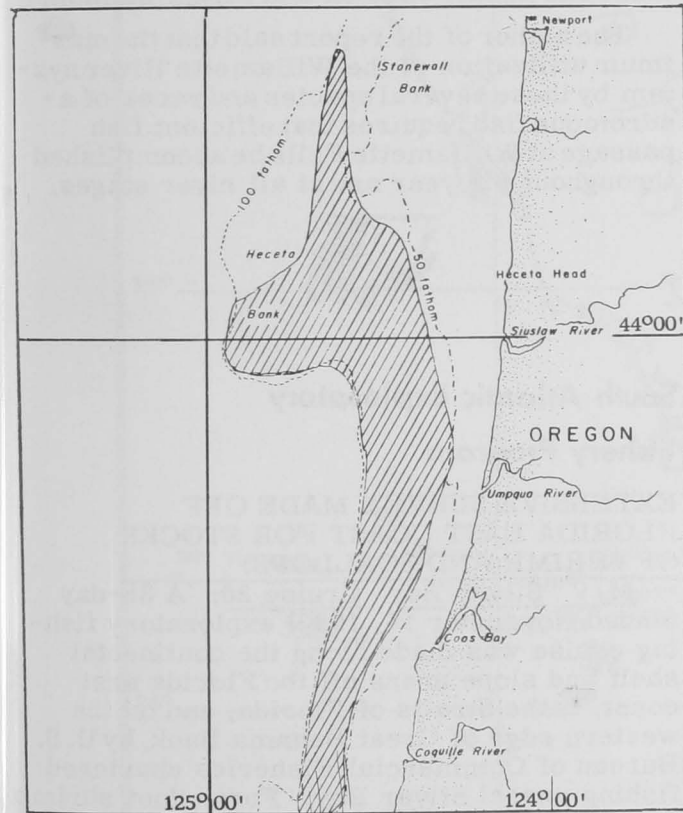
#### NEW FISH LADDERS RECOMMENDED AT WILLAMETTE FALLS:

Construction of two new ladders and other fish-protecting facilities at Willamette Falls near Oregon City, Oregon, has been recommended by the Oregon Fish Commission following an intensive and detailed two-year survey by technical engineering consultants.

"Determination of practical fish facilities as are now recommended for Willamette Falls, which will satisfy both engineering and biological requirements, is an important step toward eventual solution of this perennial fish passage problem," the Commission Chairman said in commenting on the report.

Early estimates indicate that the cost of the project would approximate \$3.4 million. Funds for the survey were provided by the U. S. Bureau of Commercial Fisheries. The findings have been forwarded to the Bureau for study. The problems of legal responsibility, the source of funding for construction, and obtaining the necessary quantities of water for the facilities remain to be decided.

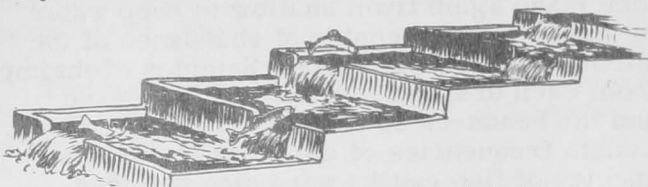
"Removal of these obstructions to fish passage," the State Fisheries Director said, "is one of the major factors in developing the fisheries potential which exists for salmonids in the Willamette River system and would be of particular advantage for establishing populations of fall chinook and silver salmon."



Area of shrimp explorations M/V John N. Cobb Cruise 48 (October-November 1960).

The size of the shrimp varied within the region, ranging from 70 to 140 heads-on count per pound. Samples of the catches showed that two- and three-year-old shrimp were dominant, with a few one- and four-year-olds also present.

Willamette Falls is on the main stem of the Willamette River, approximately 26 miles above its confluence with the Columbia River. The development of hydroelectric power combined with the regulation of flow by headwater reservoirs present difficult fish passage problems to anadromous fish. These are important factors in limiting the magnitude of the annual fish runs and the resultant loss in crops that could be harvested from them by both sport and commercial fishermen.



Fish ladders are a series of adjoining pools to help fish get past dams or falls.

First priority consideration of the fish facilities recommended will be a ladder having its entrance in the dead-ended large bay on the west side of the river immediately below the point where turbine water from two corporations is discharged and fish are attracted into the common tailrace or "cul-de-sac." At the present time the only route for the upstream passage of fish is an inadequate ladder located on the west side of the center of the U-shaped falls and dam about 500 feet upstream from the "cul-de-sac."

A second ladder at the main falls which would provide passage over a wide range of forebay and tailwater fluctuations is part of the plan. This would replace the existing ladder. It is possible that solution of the two aforementioned fish passage problem areas may alter the necessity for the relatively minor problems elsewhere in the project.

Both commercial and personal-use fishermen want the population of salmon and other anadromous fish increased in this major river as well as in its snow-fed tributaries which provide ideal areas for natural propagation of salmon and steelhead trout.

The most important existing fish population of the Willamette River is the spring chinook salmon run. The term "spring" comes from the fact that the adult fish in their upstream migration enter the river and pass Willamette Falls during the spring months, remain for the summer in the various tributaries, and spawn in the fall. It is

during the initial spring migration when these fish are subjected to a very intensive sport fishery in the several miles of river below Willamette Falls. In addition to being the most abundant and most heavily fished, the spring chinook are considered to be the best in quality of all the salmon.

Although spring chinook spawn in the Clackamas River, which joins the Willamette below the falls, the great bulk of the run must pass the falls to reach the spawning grounds in several tributaries that have their sources in the Cascade Mountains on the east side of the valley.

Also important among fish populations is the steelhead trout which pass Willamette Falls during late winter and early spring and support an important sport fishery, particularly in the tributaries.

With abatement of pollution and improvement in fish passage, the river above the falls appears to be capable of supporting important runs of fall chinook and silver salmon.

The author of the report said that the maximum utilization of the Willamette River system by these several species and races of anadromous fish requires that efficient fish passage at Willamette Falls be accomplished throughout the year and at all river stages.

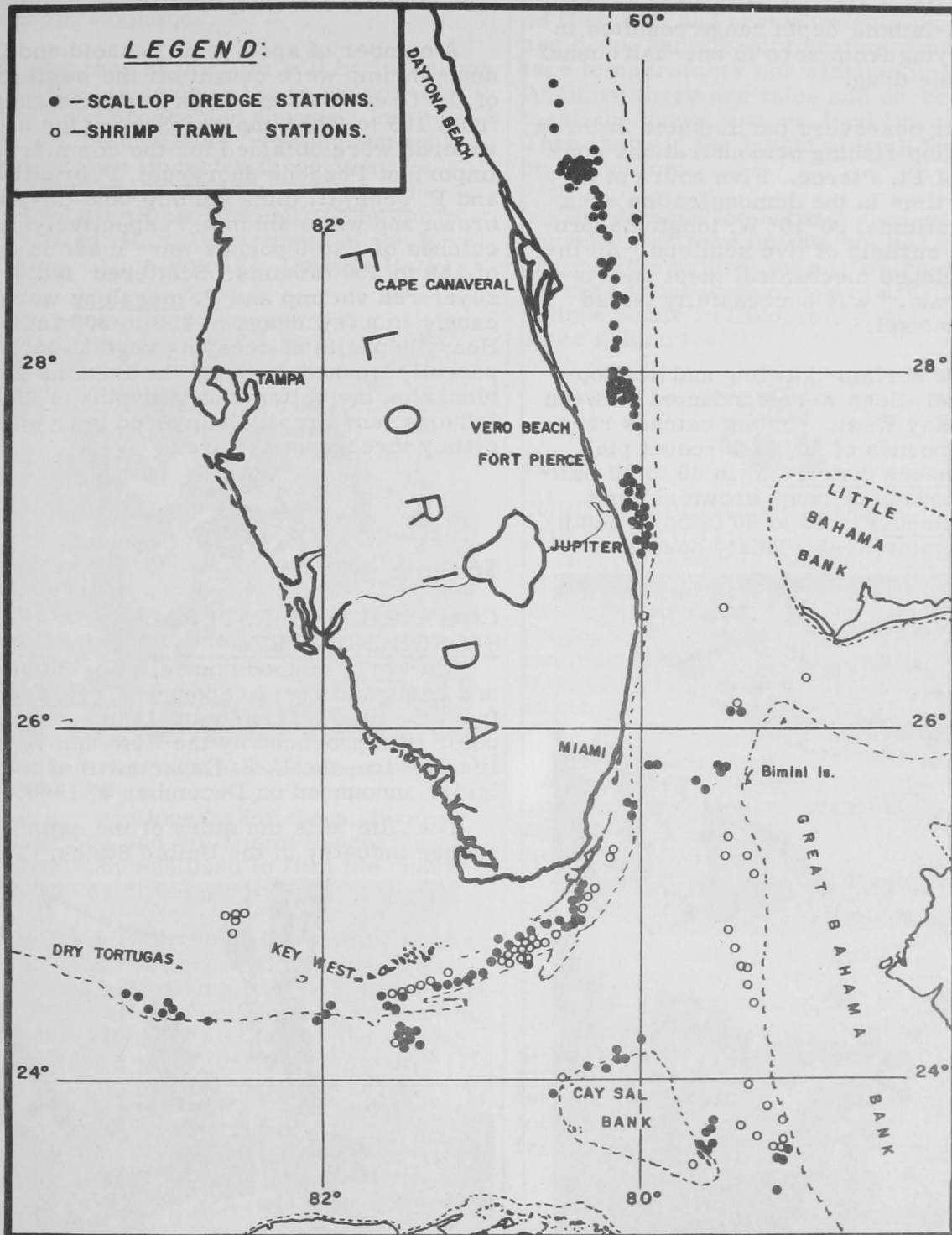


## South Atlantic Exploratory Fishery Program

### EXTENSIVE SURVEY MADE OFF FLORIDA EAST COAST FOR STOCKS OF SHRIMP AND SCALLOPS:

M/V "Silver Bay" Cruise 26: A 38-day (ended November 16, 1960) exploratory fishing cruise was made along the continental shelf and slope areas off the Florida east coast, in the Straits of Florida, and on the western edge of Great Bahama Bank, by U. S. Bureau of Commercial Fisheries chartered fishing vessel Silver Bay. Forty-foot shrimp trawls, eight-foot and ten-foot modified Georges Bank scallop dredges, and a six-foot tumbler dredge were utilized at 238 stations to assess the shrimp and scallop potential of the areas.

Catches of live scallops (*Pecten gibbus*) ranged up to 17 bushels per one-half hour



M/V Silver Bay Cruise 26 (October-11-November-15, 1960).

drag with a single dredge in the 13- to 49-fathom depth range between Daytona Beach and Bethel Shoal, Fla. Meat yields averaged  $6\frac{1}{2}$  pints per 75-pound bushel. Nineteen tows between Jupiter Inlet and Ft. Pierce, Fla., in the 14- to 40-fathom depth range resulted in catches varying from zero to one-half bushel per 30-minute drag.

Sixty-four observers participated in three days of scallop-fishing demonstrations conducted out of Ft. Pierce. Five hours of actual fishing time in the demonstration area ( $27^{\circ}53'$  N. latitude,  $80^{\circ}10'$  W. longitude) produced 101.5 bushels of live scallops. An industry-developed mechanical meat and viscera "separator" was successfully tested aboard the vessel.

Extensive shrimp-trawling and scallop-dredging operations were conducted between Miami and Key West. Shrimp catches ranged up to 11 pounds of 40- to 50-count pink shrimp (*Penaeus duorarum*) in 40 to 60 fathoms and 5 pounds of large brown shrimp (*Penaeus aztecus*) in 50 to 60 fathoms southwest of Alligator Reef. Thirty pounds of



Calico scallops dredged from new bed discovered off Florida's east coast. Shells are 2 to 2.5 inches in size, yielding 4 to 5 pints of meats per 80-pound bushel.

Caridean shrimp were taken along with 15 individual royal-red shrimp (*Hymenopenaeus robustus*) in 325 fathoms south southeast of American Shoal. No live calico scallops were taken during dredging operations in this area.

A number of species of Penaeid and Caridean shrimp were caught off the western edge of the Great Bahama Bank in depths ranging from 125 to 290 fathoms. Surprising depth records were obtained for the commercially-important *Penaeus duorarum*, *P. brasiliensis*, and *P. schmitti* (pink shrimp, and Caribbean brown and white shrimp, respectively), when catches of 1 to 8 pounds were made in depths of 150 to 200 fathoms. Scattered individual royal-red shrimp and *P. megalops* were caught in a few drags at 250 to 300 fathoms. Heavy deposits of decaying vegetation, apparently washed down off the Bahama Bank, blanketed the bottom out to depths of 250 fathoms, and greatly hampered gear efficiency throughout the area.



## Sponges

### COLOR FILM ON NATURAL SPONGE INDUSTRY:

Old world methods and old world culture add color and zest to Sponge--Treasure from the Sea, a 14-minute, 16-mm. sound-color film produced by the Fish and Wildlife Service, the U. S. Department of the Interior announced on December 8, 1960.

The film tells the story of the natural sponge industry in the United States. The



Fig. 1 - Sponge diver ready to submerge in Gulf of Mexico off the west coast of Florida. Mesh bag is used to store sponges while harvesting the sponges on the seabed.



center of this industry is Tarpon Springs on the west coast of Florida. Sponsor of the film is the Sponge and Chamois Institute, and the producer and distributor of the film is the Fish and Wildlife Service's Bureau of Commercial Fisheries.

The premiere of the film will be in Tarpon Springs, Fla., December 10, at the annual meeting of the Sponge and Chamois Institute. Prints will be available from the Bureau's cooperating film libraries throughout the country on a free loan basis and from the Visual Education Unit, Bureau of Commercial Fisheries, U. S. Department of the Interior, Post Office Box 128, College Park, Md.



Fig 2 - Sponges being hung for drying aboard a vessel operating out of Tarpon Springs.

There are two locales for the picture-- Tarpon Springs and the Miami Seaquarium. The Seaquarium was used to film the underwater sequence of the picture.

One of the high spots of the picture shows the two methods of harvesting sponges, hooking and "hard hat" diving; another, the sponge auction where silence and gesture replace the usual chant of the auctioneer and the shouts of the bidders; a third, the "Blessing of the Waters" on Epiphany Day with its ancient custom of diving for the Golden Cross. Old world music and old world dancing are included at appropriate places.

Sponge harvesting is a Greek art with centuries of tradition as a background. It was brought to this country more than a hundred years ago by Greek sponge fishermen and it has been maintained by their progeny throughout the decades.

Sponge harvesting has defied skin-diving techniques. Any harvesting which cannot be done by hooking from the surface must be done by men in the full diving suit with the hardshell headpiece, breathing hose and leaded feet, belt and breast weights. Some sponges are deep, and the surrounding waters--surface temperatures not withstanding--are cold. At times there are tides and currents which make the heavy suit and haul lines necessary. Then there is the length of time the diver is on the bottom.

The demand for natural sponges continues because man may imitate but has never duplicated the natural sponge which--besides having a multitude of uses in the home--is indispensable in lithography, ceramics, and other industries.



## Tuna

### CORE-SAMPLING TECHNIQUE FOR RAW TUNA:

A core-sampling technique has been worked out to obtain representative samples of tuna meat during the various processing stages. The researchers wanted to obtain samples of the fish without mutilating the entire fish and thus rendering it unfit for canning.

Core sampling provides a method of removing small portions of raw tuna meat from desired locations on the fish. The sample can be taken to avoid bone or dark meat, and to obtain meat that is representative of the light meat that will end up in the can.

Bureau technologists designed a series of experiments to determine whether or not a simple core sampler could be used to produce sufficiently homogeneous samples to give reliable results when they were analyzed for such components as moisture, protein, fat, ash, sodium, and potassium, or tested for freshness by means of total volatile base free fatty acid, and thiobarbituric acid tests.

The use of four  $\frac{3}{4}$ -inch cores from specific sections of each fish gave samples that were homogeneous with respect to protein and moisture content and probably reasonably homogeneous with respect to the other components and to the quality tests that are not associated with the oil of the tuna. The re-

searchers do not recommend the core-sampling method for use in preparing samples for rancidity tests such as the thiobarbituric acid method.

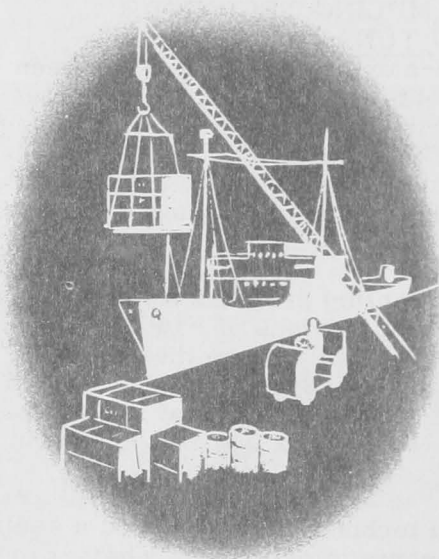


## United States Fishery Landings

### COMMERCIAL LANDINGS FOR 1960 EXPECTED TO EQUAL 5-YEAR AVERAGE:

The 1960 commercial fishery catch for the United States was expected to equal the five-year average, but will be about 200 million pounds below the 1959 mark of 5.1 billion pounds. The peak year was 1956 with 5.2 billion pounds.

The estimate of the 1960 catch was based upon data available for the first nine months of the year and an estimate of the fishing pattern and results for the remaining three months.



For the second consecutive year, the catch of fish used for industrial purposes--fish oil, meal, and animal feed--exceeded that taken for human food. This condition prevailed despite the fact that the industrial catch was expected to be 200 to 250 million pounds below that of 1959 and the catch for human consumption up 30 to 50 million pounds.

The total catch of fish for the first nine months was 3.6 billion pounds as compared with 3.7 billion pounds for the same period in 1959. The 1960 decline in the industrial

catch was reflected in the catches of menhaden herring in Alaska, and in miscellaneous industrial fish in New England. Increases in the harvest of food fish species were noted in Alaska salmon (203 million pounds compared with 147 million pounds). Maine sardines (131 million compared to 102 million), jack mackerel in California (50 million compared to 18 million), shrimp in the South Atlantic States and Gulf of Mexico (162 million compared to 151 million), and ocean perch (117 million compared to 110 million). Slight decreases occurred during the first nine months of 1960 in the catch of cod, halibut, tuna, whiting, and Washington State salmon.

\* \* \* \* \*

### JANUARY-SEPTEMBER 1960:

Landings of fish and shellfish in the United States during the first nine months of 1960 amounted to 3.6 billion pounds--about 4 percent less than during the comparable period of 1959.



Shrimp fishing trawler operating out of Florida ports.

The decline resulted from reduced landings of fish used for industrial purposes. The catch of those fish in Maine and Massachusetts was down 49 million pounds, menhaden production was down over 82 million pounds and Alaska herring 51 million pounds. The only major items of food fish showing sharp declines in catch were whiting, down 14 million pounds, and salmon in Washington, down 13 million pounds.

Large increases occurred in the 1960 catch of Alaska salmon which totaled 203 million pounds--56 million pounds more than in 1959. Also taken in greater volume during the first nine months of 1960 were jack mackerel (up 32 million pounds), Maine

Table 1 - United States Fishery Landings of Certain Species for Periods Shown, 1960 and 1959

Species	Period	1960 <sup>1/</sup>	1959	Total 1959
..... (1,000 lbs.) .....				
Anchovies, Calif.	9 mos.	2,700	2,192	7,174
<b>Cod:</b>				
Maine .....	9 mos.	2,600	2,412	2,694
Boston 2/ .....	9 "	12,000	14,708	17,709
Gloucester 2/ ..	9 "	2,400	2,443	3,233
<b>Total cod</b> .....		17,000	19,563	23,636
<b>Haddock:</b>				
Maine .....	9 mos.	2,900	2,771	3,405
Boston 2/ .....	9 "	62,100	60,771	72,378
Gloucester 2/ ..	9 "	10,000	10,780	12,103
<b>Total haddock</b> .....		75,000	74,322	87,886
<b>Halibut 3/:</b>				
Alaska .....	9 mos.	20,800	21,356	22,537
Wash. and Oreg.	9 "	16,100	17,095	17,908
<b>Total halibut</b> .....		36,900	38,451	40,445
<b>Herring:</b>				
Maine .....	9 mos.	131,300	101,871	117,150
Alaska (season over) .....	9 "	56,000	107,444	107,444
Industrial fish, Me. & Mass. 4/ .....	9 mos.	39,500	88,100	103,312
<b>Mackerel:</b>				
Jack .....	9 mos.	50,200	17,782	37,507
Pacific .....	9 "	19,500	17,490	37,602
Menhaden .....	9 "	1,768,700	1,851,113	2,202,732
<b>Ocean perch:</b>				
Maine .....	9 mos.	62,100	59,104	75,225
Boston .....	9 "	900	2,311	3,280
Gloucester .....	9 "	53,700	49,036	58,197
<b>Total ocean perch</b> .....		116,700	110,451	136,702
<b>Salmon:</b>				
Alaska .....	9 mos.	203,000	147,278	147,278
Washington ...	8 "	2/ 11,500	2/ 24,690	42,308
Oregon .....	8 "	2/ 4,700	2/ 4,318	5,329
Sardines, Pacific	to Nov. 9	47,600	53,300	74,367
Scallops, sea (meats), New Bedford ..	9 mos.	14,600	14,283	18,814
<b>Shrimp (heads-on):</b>				
South Atlantic & Gulf States ...	9 mos.	162,200	151,085	219,509
Wash. ....	8 "	1,600	2,501	3,046
Oreg. ....	8 "	600	2,414	2,734
Squid, Calif. ....	9 "	600	15,672	19,653
Tuna, Calif. ....	to Nov. 5	250,700	254,694	254,738
<b>Whiting:</b>				
Maine .....	9 mos.	11,100	23,174	23,339
Boston .....	9 "	400	588	687
Gloucester .....	9 "	51,700	53,591	61,797
<b>Total whiting</b> .....		63,200	77,353	85,823
<b>Total all above items</b> . . .		3,073,800	3,176,367	3,775,237
Others not listed . . . . .		520,700	561,410	1,324,763
<b>Grand total</b> .....		3,594,500	3,737,777	5,100,000
1/ Preliminary.		3/ Dressed weight.		
2/ Landed weight.		4/ Excludes menhaden.		

Table 2 - United States Fishery Landings by States for Periods Shown, 1960 and 1959

Area	Period	1960 <sup>1/</sup>	1959	Total 1959
..... (1,000 lbs.) .....				
Maine .....	9 mos.	243,900	222,328	265,958
<b>Massachusetts 2/:</b>				
Boston .....	9 mos.	90,400	90,845	113,257
Gloucester ...	9 "	184,200	196,301	228,723
New Bedford .	9 "	80,500	89,714	107,961
Provincetown .	9 "	20,700	21,621	27,700
<b>Total Mass.</b> .....		375,800	398,481	477,641
Rhode Island 3/.	9 mos.	31,300	85,089	101,548
New York 3/...	9 "	30,900	29,282	39,387
New Jersey 3/.	9 "	50,800	43,765	63,404
Maryland 3/...	9 "	48,500	48,583	60,847
North Carolina 3/	9 "	42,300	45,517	62,724
South Carolina 3/	9 "	14,100	12,342	19,452
Georgia .....	9 "	18,200	14,834	21,594
Florida 3/....	9 "	103,100	99,421	148,723
Alabama .....	8 "	7,600	9,831	14,022
Mississippi 3/.	7 "	11,200	11,760	78,865
Louisiana 3/...	4 "	20,600	21,670	103,018
Texas 3/.....	8 "	32,300	40,731	92,913
Ohio (season: Mar.-Dec.) .	9 "	15,500	16,752	18,586
<b>Alaska:</b>				
Halibut 4/ ...	9 mos.	20,800	21,356	22,537
Herring (season over) .....	9 "	56,000	107,444	107,444
Salmon .....	9 "	203,000	147,278	147,278
Washington ...	8 mos.	72,000	99,392	155,186
Oregon .....	8 "	32,700	36,021	51,718
<b>California:</b>				
Certain species 5/	9 mos.	371,300	361,130	431,089
Other .....	6 "	37,200	42,069	82,339
<b>Total Calif.</b> .....		408,500	403,199	513,428
Hawaii .....	6 mos.	4,700	7,031	16,570
Rhode Island, Middle Atlantic, Chesapeake, South Atlantic, and Gulf States (menhaden only)	9 mos.	1,750,700	1,815,670	2,166,126
<b>Total all above</b> .....		3,594,500	3,737,777	4,748,969
Others not listed . . . . .		6/	6/	351,031
<b>Grand total</b> .....		6/	6/	5,100,000
1/ Preliminary.				
2/ Landed weight.				
3/ Excludes menhaden.				
4/ Dressed weight.				
5/ Includes catch of anchovies, jack and Pacific mackerel, Pacific sardines, squid, and tuna. Data on tuna are for the season through November 5 and on Pacific sardines through November 9.				
6/ Data not available.				
NOTE: Data principally represent weight of fish and shellfish as landed except for mollusks which represent the weight of meats only.				



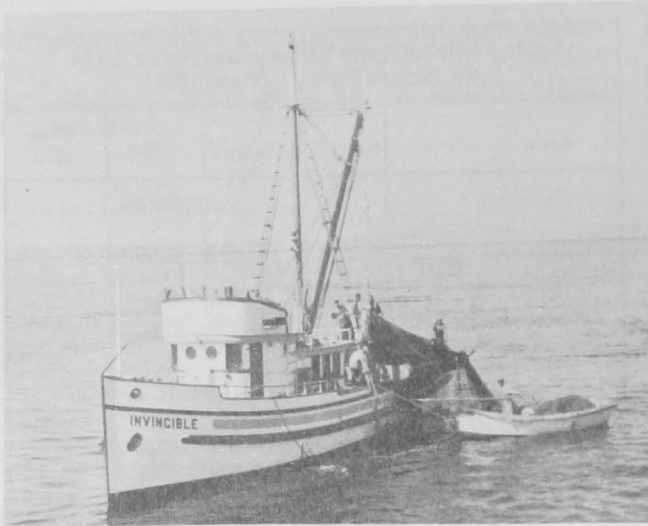


Fig. 2 - Salmon seiner hauling in first half of seine net off San Juan Island, Puget Sound.

herring ( up 29 million pounds), ocean perch (up 6 million pounds), and shrimp (up 11 million pounds) in the South Atlantic and Gulf States.



### United States Fishing Fleet<sup>1/</sup> Additions

#### SEPTEMBER 1960:

A total of 21 vessels of 5 net tons and over were issued first documents as fishing craft

Area	September		Jan. -Sept.		Total 1959
	1960	1959	1960	1959	
	(Number)				
New England . . . . .	1	2	26	13	15
Middle Atlantic . . . . .	-	4	12	10	12
Chesapeake . . . . .	8	9	56	69	106
South Atlantic . . . . .	1	2	41	69	76
Gulf . . . . .	7	15	67	117	135
Pacific . . . . .	1	7	100	84	97
Great Lakes . . . . .	-	1	12	6	6
Alaska . . . . .	3	1	21	31	32
Total . . . . .	21	41	335	399	479

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

during September 1960--a decrease of 20 vessels as compared with the same month in 1959. The Chesapeake area led with 8 vessels, followed by the Gulf with 7 vessels, and Alaska with 3. The New England, South Atlantic, and the Pacific areas accounted for 1 each.

During the first nine months of 1960, a total of 335 vessels were issued first documents as fishing craft.

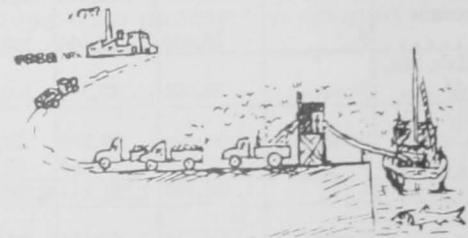
Net Tons	Number
5 to 9 . . . . .	12
10 to 19 . . . . .	7
20 to 29 . . . . .	1
30 to 39 . . . . .	1
Total . . . . .	21

ments as fishing craft--64 less than during the same period of 1959. Most of the decline occurred in the Gulf area with a drop of 50 vessels as compared with the 1959 nine-months period.



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

During the first nine months of 1960 the United States production of fish meal amount-



ed to 216,425 short tons, compared with 231,595 tons produced by the same firms during the 1959 nine-months period. A drop of over 5,000 tons occurred in the production of menhaden meal and nearly 4,000 tons in Alaska herring meal as compared with the first nine months of 1959.

Imports of fish meal totaled 97,333 tons in January-September 1960. These imports were nearly 23,000 tons less than in the same period of the previous year. Imports from Peru (over 51,000 tons) made up 52 percent of the total, while Canada followed with the next largest amount (28,000 tons). The remaining 18,000 tons were received from Chile, Union of South Africa, Angola, and other countries.

Similar declines occurred in the domestic production and imports of fish solubles. The January-September 1960 production of fish solubles amounted to 83,002 tons--59,813 tons less than in the same period of 1959. Imports of fish solubles amounted to 2,832 tons, compared with 21,213 tons in the same nine months of 1959.

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

Item	January-September		Total 1959
	1960	1959	
	.....(Tons).....		
<b>Fish Meal:</b>			
Domestic production:			
Menhaden . . . . .	181,855	186,891	223,893
Tuna and mackerel . . . . .	16,711	17,233	25,380
Herring, Alaska . . . . .	4,126	8,094	8,094
Other . . . . .	13,733	19,377	49,184
Total production . . . . .	1/216,425	1/231,595	306,551
<b>Imports:</b>			
Canada . . . . .	27,546	34,057	39,033
Peru . . . . .	51,093	46,225	49,923
Chile . . . . .	12,148	4,995	5,104
Angola . . . . .	360	20,738	20,738
Union of South Africa . . . . .	5,829	6,011	9,727
Other countries . . . . .	357	7,897	8,400
Total imports . . . . .	97,333	119,923	132,925
Available fish meal supply . . . . .	313,758	351,518	439,476
<b>Fish Solubles (wet weight):</b>			
Domestic production <sup>2/</sup> . . . . .	83,002	142,815	165,359
<b>Imports:</b>			
Canada . . . . .	809	1,305	1,660
Denmark . . . . .	1,858	16,109	18,723
Other countries . . . . .	165	3,799	6,247
Total imports . . . . .	2,832	21,213	26,630
Available fish solubles supply . . . . .	85,834	164,028	191,989

1/ Based on reports from firms which accounted for 92 percent of the 1959 production.  
2/ Includes production of homo-genized-condensed fish.



**U. S. Foreign Trade**

**EDIBLE FISHERY PRODUCTS, SEPTEMBER 1960:**

Imports of edible fresh, frozen, and processed fish and shellfish into the United States during September 1960 decreased by 9.2 percent in quantity and 5.8 percent in value as compared with August 1960. The decrease was due primarily to lower imports of canned salmon and frozen tuna other than albacore and, to a lesser degree, a decrease in the imports of fillets other than groundfish and fresh and frozen salmon. The decrease was partly offset by a 2.9-million-pound increase in the imports of groundfish fillets.

Compared with September 1959, the imports in September this year were down 6.9 percent in quantity, but up slightly (0.1 percent) in value. Imports were down for frozen tuna other than albacore (down 6.4 million pounds), and canned tuna in brine (down 1.9 million pounds). Compensating, in part, for the decreases was an increase of about 1.8 million pounds in the imports of frozen shrimp.

United States Imports and Exports of Edible Fishery Products, September 1960 with Comparisons

Item	QUANTITY			VALUE		
	September	Year	September	Year	Year	
	1960	1959	1960	1959	1959	
	(Millions of Lbs.)			(Millions of \$)		
<b>Imports:</b>						
Fish & shellfish:						
Fresh, frozen, & processed <sup>1/</sup>	88.9	95.5	1,070.5	25.9	25.7	309.6
<b>Exports:</b>						
Fish & shellfish:						
Processed only <sup>1/</sup> (excluding fresh & frozen)	6.3	7.7	68.0	3.4	3.8	22.8

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

United States exports of processed fish and shellfish in September 1960 were higher by 176.3 percent in quantity and 126.7 percent in value as compared with August 1960. Compared with September 1959, the exports in September 1960 were lower by 17.8 percent in quantity and 10.5 percent in value. The lower exports in September this year as compared with the same month in 1959 were due primarily to a drop in the exports of California sardines and canned salmon.

\*\*\*\*\*

**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-October 29, 1960, amounted to 41,295,078 pounds, according to data compiled by the Bureau of Customs. A total of 43,114,352 pounds had been imported from January 1-October 31, 1959.

\*\*\*\*\*

**IMPORTS AND EXPORTS OF SELECTED FISHERY PRODUCTS, JANUARY-SEPTEMBER 1960:**

During the first nine months of 1960, imports of canned tuna, canned sardines not in oil, fresh or frozen lobster, fresh or frozen shrimp, canned oysters, and fresh or frozen sea scallops were larger than during the same period of 1959. Imports of fresh or frozen groundfish, fillets and blocks, salmon, canned crab meat, fish meal, and fish solubles were lower. Fresh or frozen tuna, frozen swordfish, and canned sardines in oil were imported at about the same level as during the first nine months of 1959.

Exports of fish oils, canned mackerel, fresh or frozen salmon, and shrimp were larger than those of January-September 1959. Canned sardines, canned salmon, and canned squid were exported in lesser quantities.

**Imports: GROUND FISH AND OCEAN PERCH FILLETS AND BLOCKS:** The most significant trend in groundfish imports during the first nine months of 1960 was the larger share of total imports provided by frozen blocks. During this 1960 period, frozen blocks were 56 percent of all fresh or frozen groundfish imports compared with 39 percent in the same period of 1959. Despite the increased imports of blocks, groundfish imports were down 8 percent owing to a sharp decline in fillet imports, especially cod.

**TUNA, FRESH AND FROZEN:** During January-September 1960, frozen tuna was imported in the same quantity as during the same period of 1959. Imports of albacore, however, were 50 percent greater; yellowfin and other tuna were down 11 percent. Although other countries are supplying increased quantities of frozen tuna to the United States, Japan still accounted for the major share.

**TUNA, CANNED IN BRINE:** Imports during January-September 1960 were slightly higher than those of the like period of 1959. A decline in receipts of canned light-meat tuna was more than offset by an increase in canned white-meat tuna.

**SHRIMP, MOSTLY FROZEN:** Imports in the first nine months of 1960 were slightly higher than in 1959, a year of record imports. Receipts from Mexico and El Salvador were up more than three million pounds; receipts from Japan were 3,690,000 pounds less than those of the like period of 1959.

**LOBSTER AND SPINY LOBSTER, FRESH OR FROZEN:** Northern lobster imports during January-September 1960 were 7 percent above those for the same period of 1959; spiny lobster imports were up 16 percent. The major shippers were Canada, Australia, and the Union of South Africa.

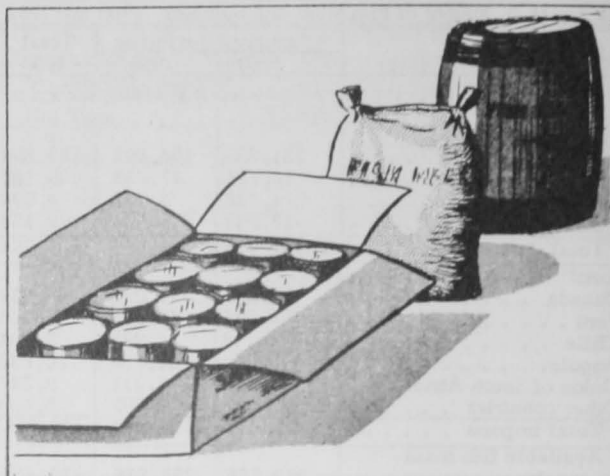
**SALMON, CANNED AND FRESH OR FROZEN:** Salmon imports were considerably below those of January-September 1959. Canned salmon imports, primarily from Japan, were 42 percent less; imports of fresh or frozen salmon, nearly all from Canada, were down 30 percent.

**CANNED SARDINES:** Norway and Portugal, as usual, supplied the major share of the imported canned sardines in oil; the Union of South Africa provided the major share of the canned sardines not in oil. Receipts of canned sardines not in oil were more than five times those imported during all of 1959 when these imports were comparatively low. California pack of canned sardines was light in 1959 and was expected to be lighter in 1960. When this occurs, imports of canned sardines not in oil increase.

**CANNED CRAB MEAT AND CANNED OYSTERS:** During the first nine months of 1960, imports of canned oysters were up 13 percent over those of the like period of 1959; imports of canned crab meat were down 50 percent. The declining imports of Japanese crab meat were due to more profitable markets elsewhere and added restrictions on Japanese crab fishing in the Sea of Okhotsk area.

**SEA SCALLOPS, FRESH OR FROZEN:** During January-September 1960, imports from Canada were more than double those of the same period of 1959. Canada accounted for 93 percent of the 1960 imports; Japan supplied nearly all the remainder.

**SWORDFISH, FRESH AND FROZEN:** Imports of frozen swordfish rose 3 percent; imports of fresh swordfish declined 44 percent from those of the first nine months of 1959. Japan accounted for the major share of the frozen swordfish and Canada for nearly all the fresh swordfish.



**FISH MEAL:** During January-September 1960, imports were down 19 percent from those of the like period of 1959. Peru accounted for more than half of the receipts. Canada was the second leading supplier. A large gain in imports was noted from Chile; a sharp decline from Angola.

**FISH SOLUBLES:** Imports were 87 percent below those of January-September 1959. This decline is attributed to low prices for fish solubles in the United States market.

**Exports: CANNED SARDINES, NOT IN OIL:** During January-September 1960, exports declined 47 percent from the comparable period of 1959. This decrease is the result of a drop of more than 50 percent in shipments to the Philippines. Notwithstanding the recent cutbacks, that country is still the primary export market for this product.

**SALMON, CANNED AND FRESH OR FROZEN:** Exports of fresh or frozen salmon were nearly three times those of the first nine months of 1959. The increase was due to larger landings of Alaskan salmon and liberalization of import controls by a number of foreign countries. Exports of canned salmon declined 26 percent, mainly due to a reduction in the amount of canned salmon taken by the Philippines. The relatively large exports of canned salmon to the Philippines in 1959 was a departure from the usual United States-Philippine trade in this product during recent years.

**SHRIMP, FRESH OR FROZEN AND CANNED:** During the first nine months of 1960, exports of fresh or frozen shrimp were up 40 percent; exports of canned shrimp showed a 27 percent increase. Canada took more than half the canned shrimp and nearly three-fourths of the fresh or frozen shrimp.

**CANNED SQUID:** During January-September 1960, exports were behind those of the same period in 1959. The decline is traceable to restrictions imposed by the Philippines which is the main foreign market for United States canned squid. After a record high level in the first quarter, canned squid exports to the Philippines decreased in the second quarter; none were reported in the third quarter.

**FISH OILS:** Exports were 4 percent above those of the first nine months of 1959. Exports to Sweden and Norway, in addition to the Netherlands and West Germany, contributed to the increase over the record year of 1959.





## Virginia

### FISHERIES LABORATORY RECEIVES GRANT TO STUDY CONCENTRATION OF RADIO-ACTIVE PARTICLES BY MARINE ANIMALS:

In order to study the role of filter-feeding marine organisms (oysters, clams, etc.) in removing radioactive wastes from water and depositing them as bottom sediments, a \$20,000 grant has been awarded by the Atomic Energy Commission to the Virginia Fisheries Laboratory. The Laboratory Director stated: "Studies of the concentration of radioactive particles by marine animals and plants are especially needed in Virginia waters, because of the proximity of significant nuclear activities to extensive sport and commercial fisheries, industrial and recreational areas. It should be specifically stated this particular problem is merely one of many pertaining to the over-all marine pollution situation and that this research project is but one of several which is being undertaken by the Laboratory's growing Pollution-Ecology Research Section."

There are several hundred different species of filter-feeding animals in Chesapeake Bay. These include oysters, clams, mussels, copepods, sea squirts, and worms. Of these, the oyster filters the largest volume of water per day per individual. A single market-size oyster will filter about 100 gallons of water through its gills during a 24-hour period... and there are more than 1.6 billion market-size oysters in Virginia waters at a given time. From this we can estimate that more than 165 billion gallons of marine waters are filtered by oysters each day. Oysters are able to remove from the water some particles as large as sand grains, and others as small as bacteria. The undigested material is deposited in the form of compacted pellets on the bottom.

One of the Laboratory's scientists will study the rates at which bio-deposition occurs at different salinities, temperatures, and available food levels. He will also investigate the types of material in the deposits as well as the stability of these deposits on the bottom. This part of the program will yield information on oyster physiology and on the amount of materials likely to be deposited on natural oyster beds.

Another scientist will determine how radioactive ions and particles become associated with natural particles in the water and

the rates at which the filter-feeding marine animals can deposit them on the bottom. He will also study the physical and chemical stability of these bio-depositions as related to radioactivity.

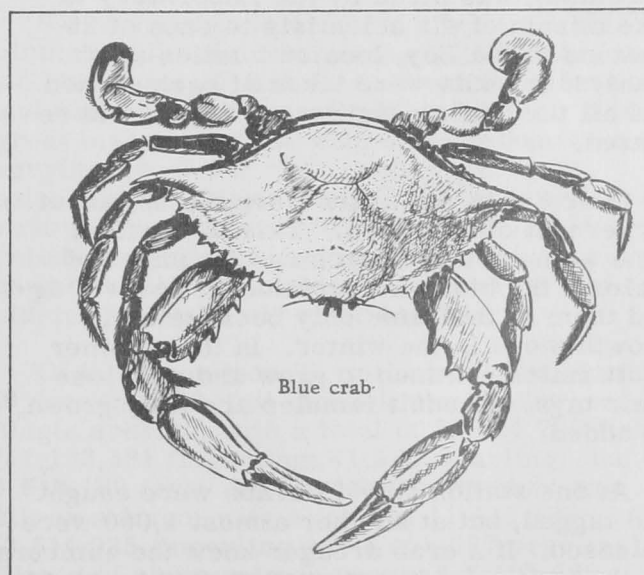
This combined study will help scientists predict what would happen if nuclear wastes should be dumped or if an accident to a reactor should cause an unanticipated release of radioactive materials into tidal waters. If such wastes remain in solution or suspended in the waters, then the normal physical phenomena of dilution and dispersal through tidal action would rapidly lower the concentration; but if they are deposited by living organisms they would remain in man's immediate environment for a longer period of time.

The initial phases of the project are scheduled for completion within one year but the Laboratory plans to continue to work until a better understanding of all aspects of bio-depositions as related to radioactivity are obtained.

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### LARGE NUMBER OF BLUE CRABS TAGGED IN CHESAPEAKE BAY:

Over 10,000 tagged blue crabs were released in lower Chesapeake Bay by scientists of Virginia's Marine Laboratory during a 7-day period late in November 1960. These crabs were distributed over a large area of the Bay where Virginia vessels began crab dredging December 1.



Blue crab

"This is probably a record number of tagged marine crustaceans--either lobster, crab, or shrimp--released in so short a time," the biologist in charge of the crab research at the Laboratory declared. The reward for the return of each of the numbered red plastic disks that were attached to the crabs is 25 cents.

The biologist, who has been engaged in crab research in Virginia for many years, named three reasons for the study, which was financed entirely out of Laboratory funds.

"One of the objectives is to estimate the total number of crabs in the lower Chesapeake available to dredges during the winter. In the second place, we want to learn what percent of that number will be removed by dredges in the next four months. There have been wild guesses in the past that anywhere from 1-75 percent are taken, and those who guess the highest percent want to blame dredges for a poor catch the following years."

The third objective is to learn something of the movements of crabs in lower Chesapeake Bay during the winter and spring. For example, whether the crabs along the western shore remain there or whether they move eastward or southward. He also said, "We will probably find out when crabs move from mud to sandy bottoms and what percentage of the stock does so." According to experienced watermen, this movement occurs after a hard freeze in late January or February.

A commercial crab dredging vessel, the Geraldine, was hired by the Laboratory to take a team of six scientists to each of 25 stations in the Bay, located 5 miles apart. Six dredge hauls were taken at each station and all the crabs caught were tagged and released.

Over 800 of the crabs were males, about 10 percent of the catch. "This is the first time we have tagged so large a number of males," the biologist explained, "and we tagged them at this time only because their growth stops in the winter. In the summer adult males continue to grow and may lose their tags, but adult females are fully grown," he added.

At one station only 17 crabs were caught and tagged, but at another almost 1,000 were released. If a crab dredger knew the numbers on the tags released at each station he could

tell from a tagged crab whether he was on top of a big stock or a little stock of crabs, but the Laboratory biologists are not letting that secret out until the season is over on April 1, 1961.

The Laboratory forecast over a year ago the arrival of the bumper crop of crabs which Virginia and Maryland crabbers have been catching since late July. According to its latest prediction the catch for the four-months season ending April 1, 1961, will rival that of the year 1955.

In anticipation of a large catch, the Virginia Commission of Fisheries has limited to 20 barrels the number of barrels of crabs that may be caught by a boat in one day, chiefly "for conservation measures and the betterment of the over-all economy of the crab industry."

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#### MARINE LABORATORY EXPANDS RESEARCH PROGRAM:

The Director of the Virginia Fisheries Laboratory, Gloucester Point, announced an expanded program of research which will lead to a better understanding of diseases of oysters and other marine animals. Problems of the production of food organisms vital to the well-being of the various important marine organisms are also under study.

"For many years much time and effort has been spent by scientists to control disease among farm crops and animals, and to increase production through improved diets," the Director pointed out. Only recently has the possibility of scientific control been applied to these same problems affecting the production of marine crops. Two researchers, who have recently joined the Laboratory staff, will contribute much to the understanding of these problems.

One of the researchers, a member of the Laboratory's Pollution-Ecology Research Section, is currently beginning a study of certain important marine animals. The quantitative and qualitative data which he obtains will be used as a check to detect possible changes in the marine environment which may be brought about by man, various pollutants, or engineering projects.

"All of these little known marine animals are part of important food chains supporting

our commercial fisheries," the researcher emphasized. "A change in the numbers and varieties of so-called 'useless' animals warn marine scientists that the natural environment is changing and these changes may have far-reaching effects on commercial species."

The other researcher is associated with the Microbiology-Pathology Research group in studying microorganisms in the marine waters of the State, and is giving special attention to disease-carrying organisms in oysters. Perhaps even more fundamental will be his investigation of microbes to determine their function in producing food at a low level in the food chain. Such food is consumed directly by oysters, clams, larval crabs, and fish.



## Washington

### KING SALMON EGGS DONATED FOR PLANTING IN JAPANESE RIVERS:

Chinook or king salmon from the State of Washington may be migrating to sea from Japanese streams in the Prefectures of Hokkaido and Iwate in the spring of 1961 as the result of a gift of 100,000 fall chinook salmon eggs from that State to the Japan Salmon Resource Conservation Association.

The chinook eggs, from the State's Green River Hatchery, were shipped by air on November 27, 1960. The eyed eggs were packaged in six cases, weighing around 175 to 200 pounds.

The gift was the result of a visit in 1960 of six members of the Japanese Salmon Resource Conservation Association. The group was impressed by Washington's salmon hatchery system and wanted to try a transplant of chinook salmon in Japanese streams.

The take of fall chinook salmon eggs in Washington hatcheries in 1960 will be between 40 and 50 million, so the gift to Japan will not deplete local stocks.

This is the second time Washington has sent chinook salmon eggs to Japan. In 1959, 100,000 spring chinook eggs from the State's Dungeness Hatchery were sent to Hokkaido in honor of the 80th anniversary of the Japanese salmon hatchery system. The Japanese reported that the spring chinook showed few

mortalities in shipment or in hatching out and migrated to sea as vigorous, healthy fingerlings.

Japanese use of the eggs is expected to add to knowledge the Washington Fisheries Department is continually seeking on the transplanting and rearing of salmon in other than home streams.

The chinook eggs shipped in November 1960 were split between the Chitose Hatchery in Hokkaido Prefecture and the Otsuchi Hatchery in Iwate Prefecture.

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### PLANTINGS OF YOUNG SALMON IN 1960 AT RECORD HIGH:

Many millions of vigorous young salmon have migrated to sea in 1960 from Washington streams or fish farm areas because of a record production achieved by State salmon hatcheries, the Director of the Washington State Department of Fisheries announced on October 31, 1960.

Salmon plants in October 1960 in fish farm areas brought releases in 1960 to an all-time record high of 77,831,621, a culmination of three years of intensive effort to increase salmon production through hatcheries and fish farms. Previous record, set in 1959, was 77,491,127 and in 1958 totaled 71,358,827. In addition, hatchery ponds at the end of October still contained about 13 million young salmon, chiefly silvers, which were to be planted early in 1961.

Salmon plants in 1960 have been made in virtually all salmon streams in the State, as well as in the 22 fish farm areas (both fresh- and salt-water) currently in operation. The great majority of the salmon were reared for varying lengths of time in the State's 22 salmon hatcheries. Long experience and investigations have proved that rearing before release results in larger, hardier fish which have a much better chance of survival than if planted immediately after hatching.

Of the more than 77 million salmon planted to date in 1960, fall chinook was the largest single species, with a total of 55,814,779 fish (51,133,381 fingerling; 41,268 yearling, and 4,640,130 fry). Second largest number was silver salmon, with a total of 11,113,492 (2,654,925 fingerling and 8,458,567 yearling). Plants of chum salmon reached 7,105,630



(6,069,566 fingerling and 1,036,064 fry). A total of 2,250,879 spring chinook were planted (1,935,646 fingerling and 315,233 yearling), and 832,086 pink salmon (823,896 fingerling and 8,190 fry).

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#### SPAWNING SALMON ESCAPEMENT GOOD DESPITE POOR CATCHES:

Despite a poor sport and commercial salmon fishing season in Washington State during 1960, severe curtailment of both sport and commercial fishing allowed comparatively good escapements of salmon to Washington streams, the Director of the Washington State Department of Fisheries stated on October 29, 1960.

Returns of chinook salmon to some hatchery streams in Puget Sound were of record size, with indications hatchery egg takes and natural seeding of streams would be comparable to those of last year, assuring future runs and holding hopes for increases.

Commercial fishermen were cooperative in shortening seasons and fishing time and sports fishermen contributed materially to escapements by voluntarily curtailing their fishing efforts.

The Deschutes River fishway count of chinook salmon hit an all-time record for returning adults, with 10,025 counted at the trap up to October 26, 1960, with the run still in progress. Since the Deschutes was first planted in 1946 more than 51,000 chinook have returned to the stream. In 1960, in addition, silver salmon were returning from fish planted in Capitol Lake in 1957.

The new run of chinook salmon that showed up at the Hoodspout Hatchery on Hood Canal (Finch Creek) reached an all-time high of around 2,700 fish. In addition, there were about 1,000 silver salmon in the hatchery's trapping area.

In northern Puget Sound the Samish Hatchery marked the second largest number of returning chinook and magnitude of egg take in its history. In the Snohomish district the outlook for silver salmon was good, with 1,200 silvers at the Skykomish Hatchery, ahead of both last year and the parent year (1957). Surprising too was the silver run trapped and transported around Sunset Falls. As of October 25, 1960, 3,841 silver

salmon had been trapped and hauled around the falls, as compared to a total of 1,561 for all of 1958 (first year of trapping).

An unexpected run of more than 5,000 sockeye salmon made their way through the Lake Union ship canal and spawned in the Cedar River in Maple Valley.

Chinook returns to the Issaquah Hatchery were down, but silvers showed strongly downstream from the station and crowded the holding pond, with a good possibility that the silver egg take there would be of record size.

Chinook salmon returns to the Green River Hatchery on Soos Creek were down in numbers of eggs taken, but not in numbers of fish. Here, as in some other Puget Sound streams, there was an unusually large percentage of three-year-old chinook males. This situation is usually considered an indication of a good run the following year.

From a statewide viewpoint, spawning escapements would probably be down, the Director said. As of the end of October 1960, chinook runs were virtually completed, as were silvers, with chum salmon returns, particularly in the coastal area, still incomplete.



### Wholesale Prices, November 1960

#### WHOLESALE PRICES, NOVEMBER 1960:

The November 1960 wholesale price index for edible fishery products (fresh, frozen, and canned) at 131.5 percent of the 1947-49 average was up 1.6 percent from the preceding month and up 8.9 percent from the same month of 1959. The increase from October to November 1960 was due primarily to higher wholesale prices for fresh and frozen fillets, fresh shrimp, and fresh-water yellow pike. From November 1959 to November 1960 all items in the fishery products wholesale price index were priced higher except for frozen halibut, fresh haddock fillets, and canned Maine sardines.



The index for the drawn, dressed, and whole finfish subgroup in November 1960 declined slightly (0.6 percent) from the preceding month. Lower prices for fresh drawn large haddock (down 6.3 percent), frozen halibut (down 2.2 percent), and fresh-water round whitefish at New York City (down 5.4 percent) were just about offset by higher prices for fresh-water yellow pike at New York City and drawn whitefish at Chicago. However, from November 1959 to November 1960, the subgroup's index rose 12.4 percent due to higher prices

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

Group, Subgroup, and Item Specification	Point of Pricing	Unit	Avg. Prices 1/ (\$)		Indexes (1947-49=100)						
			Nov. 1960	Oct. 1960	Nov. 1960	Oct. 1960	Sept. 1960	Nov. 1959			
			ALL FISH & SHELLFISH (Fresh, Frozen, & Canned) . . . . .								131.5
<b>Fresh &amp; Frozen Fishery Products:</b> . . . . .					146.9	143.7	143.7	133.4			
<b>Drawn, Dressed, or Whole Finfish:</b> . . . . .					165.4	166.4	169.8	147.2			
Haddock, lge., offshore, drawn, fresh . . . . .	Boston	lb.	.13	.14	132.6	141.5	120.4	129.2			
Halibut, West., 20/80 lbs., drsd., fresh or froz.	New York	lb.	.30	.31	92.3	94.4	95.4	95.9			
Salmon, king, lge. & med., drsd., fresh or froz.	New York	lb.	.90	.90	202.2	202.2	210.6	168.5			
Whitefish, L. Superior, drawn, fresh . . . . .	Chicago	lb.	.75	.74	185.9	183.5	183.5	179.7			
Whitefish, L. Erie pound or gill net, rnd., fresh	New York	lb.	.70	.74	141.6	149.7	202.3	126.4			
Yellow pike, L. Michigan & Huron, rnd., fresh .	New York	lb.	.70	.58	164.1	134.8	179.4	164.2			
<b>Processed, Fresh (Fish &amp; Shellfish):</b> . . . . .					141.7	135.3	137.0	134.0			
Filletts, haddock, sml., skins on, 20-lb. tins . .	Boston	lb.	.41	.31	139.5	103.8	108.9	153.1			
Shrimp, lge. (26-30 count), headless, fresh. . .	New York	lb.	.70	.65	109.8	102.7	114.1	102.7			
Oysters, shucked, standards . . . . .	Norfolk	gal.	7.50	7.50	185.6	185.6	173.2	173.2			
<b>Processed, Frozen (Fish &amp; Shellfish):</b> . . . . .					119.6	115.7	110.1	106.4			
Filletts: Flounder, skinless, 1-lb. pkg. . . . .	Boston	lb.	.40	.39	103.4	102.1	100.8	98.8			
Haddock, sml., skins on, 1-lb. pkg. . . . .	Boston	lb.	.34	.29	106.7	91.0	87.9	99.7			
Ocean perch, skins on, 1-lb. pkg. . . . .	Boston	lb.	.30	.28	118.8	112.8	108.7	108.8			
Shrimp, lge. (26-30 count), 5-lb. pkg. . . . .	Chicago	lb.	.74	.74	114.2	114.2	106.5	96.4			
<b>Canned Fishery Products:</b> . . . . .					110.1	109.6	106.5	103.4			
Salmon, pink, No. 1 tall (16 oz.), 48 cans/cs. . .	Seattle	cs.	27.50	27.00	143.5	140.9	133.0	127.8			
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.	7.65	7.75	89.8	91.0	89.8	88.1			
Sardines, Maine, keyless oil, 1/4 drawn (3-3/4 oz.), 100 cans/cs. . . . .	New York	cs.	8.50	8.75	90.5	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.

for whitefish at New York and Chicago, frozen troll king salmon (up 20 percent), and fresh drawn haddock at Boston (up 2.6 percent). But a drop of 3.8 percent in the frozen halibut prices at New York City partially offset the higher prices for the other subgroup items mentioned.

The November 1960 fresh processed fish and shellfish subgroup index rose 4.7 percent from October 1960. This rise was due to higher prices for fresh small haddock fillets at Boston (up 34.4 percent or about 10 cents a pound) and fresh shrimp at New York City (up 6.9 percent). Prices for fresh shucked oysters at Norfolk remained unchanged. From November a year ago to November 1960 the subgroup index rose 5.7 percent. Higher prices for fresh shrimp (up 6.9 percent) and fresh shucked oysters (up 7.2 percent) more than offset a drop of 8.9 percent for fresh haddock fillet prices.

The index for the frozen processed fish and shellfish subgroup increased 3.4 percent from mid-October to mid-November 1960. All the frozen fillet items were higher in November 1960 as compared with October 1960. Frozen haddock fillet prices rose sharply (17.3 percent or about 5 cents a pound) during that period. In November 1960, most East Coast frozen fillets were less plentiful and this contributed to

a stronger market. November 1960 frozen shrimp prices at Chicago were unchanged from October. From November 1959 to November 1960, the subgroup's index was up 12.4 percent due mainly to higher frozen shrimp prices (up 18.5 percent) at Chicago and smaller increases in the wholesale prices for frozen fillets.

The canned fish primary price index increased slightly (0.5 percent) from October to November 1960. A further increase of 50 cents a case for canned pink salmon (due to scarce supplies) was partially offset by a price drop of 1.3 percent for California sardines and 2.8 percent (25 cents a case) for Maine sardines. The November 1960 index for the subgroup was up about 6.5 percent from November 1959. Prices rose for canned pink salmon (up 12.3 percent), canned tuna (up 2.7 percent), and California sardines (up 1.9 percent), while prices for canned Maine sardines dropped 2.8 percent. As of the end of November 1960, it appeared likely that the canned California sardine pack would be extremely light, the pack of canned tuna was trending slightly upward from the good 1959 pack, the season-end pack of Maine sardines was up about 225,000 cases or 13.0 percent over the 1959 pack, and first-hand supplies of the light pack of canned pink salmon were about exhausted.



## Wisconsin

### COMMERCIAL OTTER-TRAWL FISHING IN LAKE MICHIGAN WATERS:

During 1959 five Wisconsin fishing vessels operated otter trawls in Lake Michigan on a commercial scale under a permit system. The vessels fished an average of 66 days each in depths ranging from 60 to 200 feet.

Landings by these vessels totaled 1.9 million pounds and consisted of 1,400,000 pounds of chubs, 200,000 pounds of smelt, and 100,000 pounds of alewives and herring. Approximately 1,500,000 pounds were sold for ani-

mal food and other industrial purposes with an estimated value of \$62,700 to the users. The remainder of the catch, 200,000 pounds, was made up of fish used for human consumption.

Experimental trawling was initiated under a permit system by the State of Wisconsin for the purpose of harvesting underutilized species of fish. The traditional fishing method employing gill nets was found to be uneconomical for the production of industrial fish. Experience in the marine areas has shown that low-priced fish can be economically produced by trawling.



### FISHERMEN'S 7-HOUR FIGHT TO LAND 5-TON WHALE-SHARK

This is a story of how 16 men and a giant fish fought for seven hours in the Arabian Sea. It is a story with a flavor of Hemingway's "The Old Man and the Sea" but with a full carcass, not a skeleton, to show at the end--a 32 ft. whale-shark weighing five tons.

The fight took place one sunny morning when an Icelandic master fisherman of the Food and Agriculture Organization (FAO) set out from Mangalore, India, in two boats with 13 trainees and his two assistants. It was just another training trip such as he had been making during the past five years to teach Indian fishermen to handle modern fishing boats, gear, and equipment, but at about 1 o'clock, when the boats were 8 miles north of Mangalore, the trip suddenly became an exciting adventure.

"We saw a big whale-shark swimming on the surface with its back fin sticking out of the sea," the Icelandic fisherman reported to FAO Headquarters at Rome, Italy, late in 1959. "As none of my companions had seen such a huge creature, we sailed towards it."

The only equipment onboard which could possibly be used in an attempt to capture the shark was a 2½-ft. long unbarbed iron hook to which was attached a 2-inch manila line. The fishermen decided to attack with this implement.

"We sailed alongside the shark for some time while I waited for a chance to jab the hook through the dorsal fin," he reported. "The chance came when the shark tried to swim under the boat and I got the hook through the center of the dorsal fin."

"And now," he continued, "started a fantastic sailing trip. Our two steel boats, one 32 feet and one 37 feet long, were secured together by a rope and both engines were stopped, yet the shark was able to tow both boats at a speed of 5 knots."

The shark, in a great fury, thrashed and plunged and dragged the boats about for 20 minutes; then the manila rope parted. The giant fish swam away with the hook and 15 fathoms of line.

"We were bitterly disappointed but, after a while, it came to the surface again and I was able to get a nylon line through the eye of the hook," the master fisherman said. "But the shark, finding itself under restraint again, reacted violently, churning up the water in a mad struggle before turning to the open sea, towing my boat with it."

"At about 4:30 p.m. the giant fish slowed down so we shortened the line from 20 to 3 fathoms and now had its tail by the bow of the boat. I cut a notch in the upper fin and looped eight nylon lines around it. We then tried to stop the shark from swimming by raising its tail against the bow but we quickly found that it was not as tired as we believed. No sooner did we tighten the lines than the fish made a tremendous leap, lashed about furiously and then plunged to the depths, trying to drag the boat under the sea. Fortunately, the shark hit bottom before the boat started taking in water forward."

The men were now able to wind 16 lines of nylon and a steel wire from the winch around the upper tail fin. By now most of the fight had gone from the monster so that, with the aid of the mechanically-driven winch, they were able to secure the tail against the bow and tow the shark towards Mangalore. As conditions were too dangerous that night to tow it up the river mouth to the town, one boat with four men was left at anchor to guard the fish.

"At five o'clock next morning we towed the shark in," the fisherman reported, "and I was told that of the 143,000 inhabitants of Mangalore at least 105,000 came down to the beach to see this monster of the deep."

The shark, which was the biggest fish ever seen or heard of in this part of India, was sold for 500 rupees (about US\$105).