

TRENDS AND DEVELOPMENTS

Alaska

NEW REGULATION PERMITS COMMERCIAL ABALONE FISHING:

A regulation authorizing commercial abalone fishing in Southeastern Alaska was signed on February 3, 1961, by the Commissioner of the Alaska Department of Fish and Game.

Under provisions of the regulation, prospective abalone fishermen must obtain a permit from the Commissioner of the Department of Fish and Game. The regulation also establishes a legal minimum size of three inches in greatest diameter of the shell.

The regulation was promulgated in order to legalize abalone fishing this winter in response to a mounting interest in harvesting it commercially.

The Alaska Board of Fish and Game will review the abalone situation during its regular spring meeting, and at that time, will consider permanent regulations.

The Alaska or pinto abalone is found in Pacific coast waters from California to Cross Sound. It is rare in California and more abundant in Alaska, but the extent and size of the population has not been determined.

The Alaska abalone is separate and distinct from the well-known commercial abalones of California. The abalones found in Alaskan waters are much smaller and attain a maximum size of only six inches in greatest diameter.

Virtually nothing is known about the life history of this shellfish, but Department biologists will be working with specimens obtained from the commercial fishery and with the fishery itself to determine the information necessary for proper management.

It is known that red abalones, the most important commercial species in Cali-

fornia, are slow-growing animals which require as long as 13 years to attain the legal taking size.

Alaska biologists have recommended a legal minimum size of three inches in order to assure an adequate brood stock.



RED ABALONE SHELL
Haliotis rufescens

"As our knowledge of this animal increases, it may be necessary to change the minimum three-inch size requirement," the Commissioner stated. "In any event, it is our intention to manage the abalone fishery in accordance with sustained-yield principles. If a commercial fishery proves to be biologically and economically feasible, Alaskans may soon be able to enjoy this delicacy at their tables," he added.



Byproducts

U. S. PRODUCTION OF FISH MEAL, OIL, AND SOLUBLES, 1959-60:

The United States production of fish meal in 1960 amounted to 257,969 short tons, a decline of 8.6 percent as compared with the

U. S. Production of Fish Meal, Oil, and Solubles, 1959-60			
Product	Unit	1960 ^{1/}	1959 ^{2/}
	 (Quantity)	
Meal and Scrap:			
Herring:			
Alaska	Tons	4,126	8,094
Maine	"	2,447	3,519
Menhaden	"	214,387	223,893
Sardine, Pacific . .	"	3,639	2,927
Tuna and mackerel .	"	21,633	25,380
Unclassified	"	11,737	18,431
Total	"	257,969	282,244
Fish solubles	"	90,054	136,662
Homogenized- condensed fish . . .	"	9,551	28,697

(Table continued on next page)

U. S. Production of Fish Meal, Oil, and Solubles, 1959-60 (Contd.)			
Product	Unit	1960 ^{1/}	1959 ^{2/}
	 (Quantity)	
Oil, Body:			
Herring:			
Alaska	Gallons	1,031,760	1,778,248
Maine	"	163,526	180,900
Menhaden	"	23,675,111	20,628,278
Sardine, Pacific	"	161,636	187,938
Tuna and mackerel	"	598,205	601,010
Other (including whale)	"	1,059,386	1,568,608
Total	"	26,689,624	24,944,982

^{1/} Preliminary. Data from firms which accounted for 92 percent of the production. The total production of fish meal in 1959 amounted to 306,551 tons.
^{2/} The 1959 production includes revisions.

282,244 tons produced in 1959. However, the production of fish body oils (including whale oil) of about 26.7 million gallons was up 7.0 percent from the 1959 production of about 24.9 million gallons. Production of both fish solubles and homogenized-condensed fish was down sharply--34.1 and 66.7 percent, respectively--from the amounts produced in 1959.

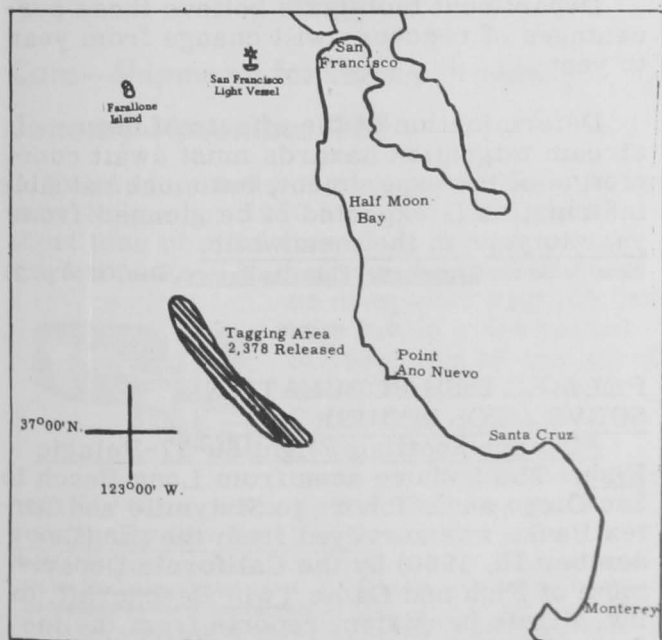
Note: Also see Commercial Fisheries Review, March 1960 p. 16.



California

PETRALE SOLE TAGGING STUDIES:

M/V "N. B. Scofield" Cruise 60-S-6-Trawl: The coastal waters between San Francisco and



M/V N. B. Scofield Cruise 60-S-6-Trawl (Nov. 15-Dec. 20, 1960).

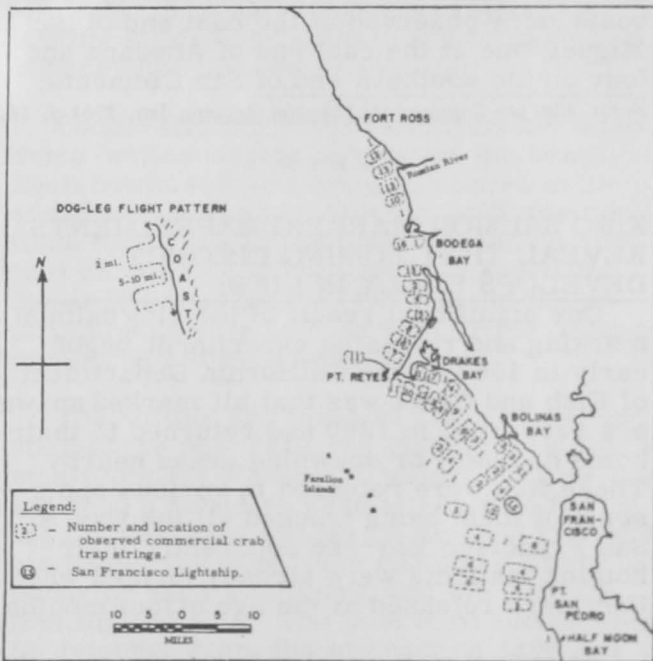
Santa Cruz were surveyed (November 15-December 20, 1960) by the California Department of Fish and Game research vessel N. B. Scofield to tag petrale sole (*Eopsetta jordani*) as part of a coastwide program of identification of sub populations, and to collect specimens for various investigations.

The cruise was carried out during a period of southerly storms which made trawling difficult. In spite of adverse weather, 2,378 petrale sole were tagged and released in depths of 164 to 225 fathoms offshore between Half Moon Bay and Año Nuevo Island. All fish were tagged with vinyl-spaghetti tubing.

Returns were being received from San Francisco commercial fishermen before termination of tagging operations. Valuable information on seasonal distribution will be gained from these and future returns.

CRAB FISHING AREA AND INTENSITY STUDIES CONTINUED:

Airplane Spotting Flight 60-25-Crab: The commercial crab-fishing areas from Half Moon Bay to Fort Ross were surveyed from the air in December 5, 1960, by the California Department of Fish and Game Cessna 182 to determine the early season fishing localities and the relative density of crab gear off central California.



Flight report Cessna 182, 60-25-Crab (December 5, 1960).

The 298 lines of crab gear counted were distributed as follows: 17 percent between Ft. Ross and Bodega Bay; 30 percent between Bodega Bay and Pt. Reyes; 39 percent between Pt. Reyes and the San Francisco Lightship; and 14 percent between the San Francisco Lightship and Half Moon Bay.

The amount of gear observed was 3.5 times as much as in the same area a year ago, after the season opened in the Eureka region (December 20-21, 1959). This high concentration was caused by Eureka-Crescent City crab fishermen fishing off Bodega Bay and San Francisco while waiting for the season to open in northern California.

Note: Also see Commercial Fisheries Review, August 1960, p. 15.

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INVESTIGATION OF ABALONE RESOURCES CONTINUED:

Airplane Spotting Flight 60-26-Abalone: The shoreline from Monterey to Morro Bay and all of the Channel Islands except San Nicolas was surveyed from the air on December 15, 1960, by the California Department of Fish and Game Twin Beechcraft to locate areas of winter commercial abalone diving.

No divers were observed along the shoreline from Monterey to Morro Bay where ground swells were high. Among the Channel Islands, the swells were much lower. Two boats were observed at the east end of San Miguel, one at the east end of Anacapa and four on the southern end of San Clemente.

Note: Also see Commercial Fisheries Review, Jan. 1961 p. 18.

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KING SALMON MARKING EXPERIMENTS REVEAL THAT HOMING INSTINCT DEVELOPS EARLY IN LIFE:

One significant result of the king salmon marking and releasing experiment begun early in 1959 by the California Department of Fish and Game was that all marked spawners recovered in 1960 had returned to their home hatchery or spawning areas nearby. These fish were released in various spots--some of them being trucked all the way to San Francisco Bay--so apparently their homing instincts were already formed when they were released at the age of four months.

Very few of the fish were large enough to be retained by commercial fishermen,

but sport anglers took numbers of them in the Pacific Ocean and the Sacramento River.



The young salmon were raised and marked at the U. S. Fish and Wildlife Service's Coleman Hatchery and released in four lots. One lot was placed in the river at Chico, another was trucked to Rio Vista and placed in the river there, still another lot was hauled to Rio Vista and transferred by live-bait boat to San Francisco Bay, and the fourth lot was trucked all the way to the bay. Similar marking and releasing was done in the spring of 1960 and the experiments will be continued in 1961.

Purpose of the experiment is to determine which part of the migration to the sea is the most hazardous for the young salmon.

Total percentage of recovery of the marked fish in 1960, both in the creel and on the spawning grounds, was greatest for the boated fish. Lowest recovery was of the fish released into the water at Rio Vista.

Department biologists believe these percentages of recovery will change from year to year.

Determination of the effects of downstream migration hazards must await completion of the experiment, but much valuable information is expected to be gleaned from year to year in the meanwhile.

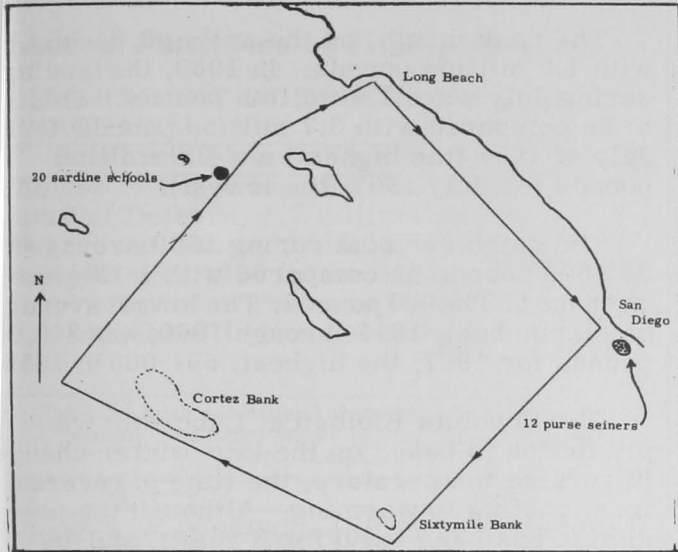
Note: Also see Commercial Fisheries Review, Dec. 1960 p. 25.

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PELAGIC FISH POPULATION SURVEY CONTINUED:

Airplane Spotting Flight 60-27-Pelagic Fish: The inshore area from Long Beach to San Diego and offshore to Sixtymile and Cortez Banks was surveyed from the air (December 16, 1960) by the California Department of Fish and Game Twin Beechcraft, to investigate persistent reports from the industry, fishermen and others of a large concentration of sardine schools outside the Channel Islands.

Weather conditions were fair throughout the flight and more than 300 miles of open ocean were scouted. No sardine schools were seen outside the Channel Islands, but 20 small to medium schools were seen 20 miles WSW. of the west end of Santa Catalina Island.



Airplane spotting flight 60-27 (Dec. 16, 1960).

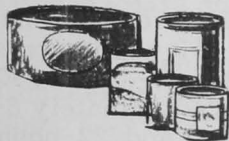
About two miles off Mission Bay (San Diego) 12 purse seiners were observed setting on a small concentration of mixed Pacific mackerel and sardines.

Note: Also see Commercial Fisheries Review, Feb. 1961 p. 14.



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

Total shipments of metal cans during January-November 1960 amounted to 115,090 short tons of steel (based on the amount of steel consumed in the manufacture of cans) as compared with 109,049 tons in the same period of 1959. As of the end of November, the pack of California sardines was down sharply from the same period of 1959. Except for tuna canning, fish canning was at a seasonally low level in November.



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

DRIFT BOTTLES USED TO STUDY PACIFIC OCEAN CURRENTS AROUND HAWAIIAN ISLANDS:

A study of the direction and speed of Pacific Ocean currents was initiated in January this year by the Honolulu Biological Laboratory of the U. S. Bureau of Commercial Fisheries. Plans call for the release of several thousand drift bottles each year. The drift bottles will be released by the Bureau's research vessel Charles H. Gilbert in groups of ten, four or more times each day while at sea.

The drift-bottle program is expected to provide information on the direction and the speed of ocean currents near the Islands. It is the first large-scale study of its kind to be attempted in mid-ocean. The results of the study will be a series of charts, showing the current patterns in the Hawaiian region at various times of the year. It is expected that such charts will be useful to the Honolulu Biological Laboratory scientists in the study of the distribution of fish eggs and larvae and the organisms which are the food of larger fish. At the same time, information on currents is expected to be of great value in search and rescue operations when ships and small boats are disabled near the islands and at the mercy of the currents. The charts should also be of use to industry in planning for waste disposal, to meteorologists in making weather forecasts, and to sport and commercial fishermen as well.

Cooperation is sought from anyone finding these bottles washed ashore on the beach. Each bottle will contain a numbered self-addressed post card, together with instructions for filling in the blank spaces on the post card with the information needed for the drift-bottle study. The back of the instruction card is printed with bright orange stripes to attract attention.

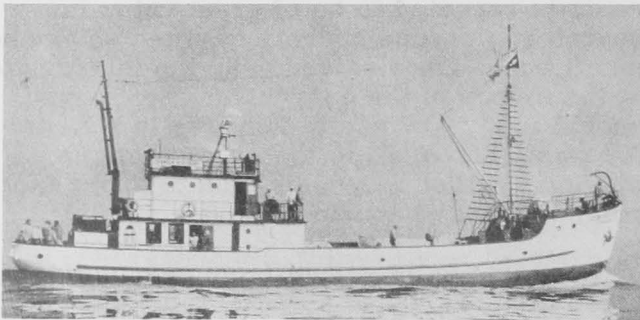
The bottles are made of clear glass, and contain the post card and instructions plus a small amount of sand as ballast. Anyone finding such a bottle or card is asked to fill in legibly the blank spaces on the post card with his name, the time, date and place where the bottle or card was found, and the finder's mailing address. The post card should then be detached from the instruction card and mailed. No postage is required when the cards are mailed within the United States.

In return, the finder will receive a chart showing the time and place where the bottle which he found was released. Everyone is requested to fill in and mail every card which he finds, since it is expected that only a very small percentage of the bottles which are released at sea will finally be washed ashore, and each card is thus of great value in the drift-bottle program.

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LOWER HAWAIIAN TUNA LANDINGS IN 1960 BEAR OUT PREDICTIONS OF BIOLOGISTS:

In addition to the results of research conducted from the U. S. Bureau of Commercial Fisheries research vessel Charles H. Gilbert, data concerning the commercial catch of skipjack tuna in Hawaiian waters are made available to Bureau biologists by the Hawaii State Department of Fish and Game, a tuna-canning company, and the commercial fishermen. Such data are used to monitor fluctuations in availability of the skipjack in Hawaiian waters and for various research studies, particularly those concerned with inter-relationships between the skipjack and the environment. In addition to providing the



The Service's research vessel Charles H. Gilbert.

catch data, personnel of the cannery and the sampan fishermen cooperate by making fish and facilities available to the biologists for studies such as those of size frequencies, stages of maturation, stomach contents, and blood types. The following is a summary of the 1960 skipjack catch statistics and of the size distribution, the latter from fish measured at the cannery.

The total 1960 landings of skipjack tuna by the Hawaiian commercial fishermen was 7.3 million pounds, of which, 5.1 million pounds were landed during May-September (the "season"), and 2.2 million during the remainder of the year.

The prediction for 1960 landings, made in March 1960 was for a poorer than average year. The average landings for the past eleven years was 10.0 million pounds. The lowest total during this period was for 1957, 6.1 million pounds; the highest for 1954, nearly 14.0 million pounds.

The peak month, on the average, is July, with 1.9 million pounds. In 1960, the landings during July were 1.4 million pounds. This is to be compared with 3.7 million pounds for July of 1954 (the highest) and 0.9 million pounds for July 1957 (the lowest).

The catch per boat during 1960 averaged 365,000 pounds as compared with a 13-year average of 385,000 pounds. The lowest average catch per boat, 1948 through 1960, was 245,000 pounds for 1957; the highest, 591,000 in 1959.

The Honolulu Biological Laboratory's prediction is based on the late-winter change in surface temperature, the time of reversal from cooling to warming. Although the prediction has been valid for 3 years, and by hind-casting for 8 additional years, it is empirical and does not consider the biology of the skipjack which, each spring, enter Hawaiian waters. These variations in catch may arise from variations in year-class size or from variations in the availability of the fish to the fishery.

Information leading to estimates of year-class size is obtained through the study of the distribution of skipjack landed at the Honolulu cannery. On the average, there are two modes in the size distribution of the "season" fish, one at 4.1 pounds (45 centimeters) and one at 18.0 pounds (70 centimeters). In the off-season the modes are less distinct, with a dominant mode frequently at 11 pounds (60 centimeters). During May, June and September 1960, the dominant mode was at 7.0 pounds (53 centimeters); 23.6 pounds (76 centimeters) in July, and two pronounced modes in August, 7 pounds (53 centimeters) and 26 pounds (78 centimeters). The 1960 off-season skipjack were predominately 6-8 pounds (50 to 55 centimeters) and 22-pound (74 centimeters) fish during January through April and 10-pound (59 centimeters) fish during October through December.

Information on local availability of skipjack is being sought through investigation of the relationship between oceanography and skipjack movements and through at-

tempts to locate the source of season fish. Both of these problems will be investigated on three cruises of the M/V Charles H. Gilbert in 1961.



Federal Purchases of Fishery Products

DEPARTMENT OF DEFENSE PURCHASES, 1960:

Fresh and Frozen Fishery Products: For the use of the Armed Forces under the Department of Defense, 1.7 million pounds of fresh and frozen fishery products were purchased in December 1960 by the Military Subsistence Supply Agency. This was lower than the quantity purchased in November by 1.0 percent

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

QUANTITY				VALUE			
December		Jan. -Dec.		December		Jan. -Dec.	
1960	1959	1960	1959	1960	1959	1960	1959
. . . . (1,000 Lbs.) (\$1,000)			
1,706	1,775	22,917	22,651	832	876	11,839	11,624

and under the amount purchased in December 1959 by 3.9 percent. The value of the purchases in December 1960 was lower by 7.3 percent as compared with November 1960 and 5.0 percent less than for December 1959.

During 1960 purchases totaled 22.9 million pounds (valued at \$11.8 million)--an increase of 1.2 percent in quantity and 1.8 percent in value as compared with 1959.

Prices paid for fresh and frozen fishery products by the Department of Defense in December 1960 averaged 48.8 cents a pound, about 3.1 cents less than the 51.9 cents paid in November 1960 and 0.6 cent less than the 49.4 cents paid during December 1959.

Canned Fishery Products: Canned fish purchases in December 1960 were light. As compared with the year 1959, total purchases of canned fish in 1960 were up 26.0 percent in quantity and 58.9 percent in value. In 1960 purchases of canned salmon were up 231.2 percent in quantity and 230.1 percent in value principally because the pack was larger. On the other hand purchases of canned tuna were down 2.4 percent in quantity, and 3.5 percent in value; canned

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

Product	QUANTITY				VALUE			
	December		Jan. -Dec.		December		Jan. -Dec.	
	1960	1959	1960	1959	1960	1959	1960	1959
Tuna	47	741	3,610	3,698	24	315	1,613	1,672
Salmon	-	-	3,593	1,085	-	-	2,436	737
Sardine	21	25	147	1,051	9	11	61	177

sardine purchases were down 86.0 percent in quantity and 65.5 percent in value.

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.



Fisheries Loan Fund

LOANS APPROVED

OCTOBER 1 TO DECEMBER 31, 1960:

From the beginning of the Fisheries Loan Fund program in 1956 through December 31, 1960, a total of 848 applications for \$25,866,250 have been received. Of these, 459 (\$11,107,203) have been approved, 288 (\$8,024,014) have been declined or found ineligible, 71 (\$4,650,485) have been withdrawn by applicants before being processed, and 30 (\$913,785) are pending. Of the applications approved, 169 were approved for amounts less than applied for. The total reduction was \$1,170,763.

The following loans were approved during October, November, and December of 1960:

New England Area: Silas Barrows, Narragansett, R. I., \$21,200; Samuel S. Cottle, Jr., Wakefield, R. I., \$25,450; Clarence J. Santos, Provincetown, Mass., \$5,000; and John C. Sisson, Wakefield, R. I., \$13,950.

South Atlantic and Gulf Area: Felix C. Birch, Fort Myers, Fla., \$21,426; Evan J. Callais, Sabine, Texas, \$18,000; Thomas R. Thornton, Marathon, Fla., \$3,750; and George H. Wenzel, Bon Secour, Ala., \$15,000.

California: Caribe Fishing Co., Inc., San Diego, \$125,000 and Nick Mosich, et al, San Diego, 125,000.

Pacific Northwest Area: Ivar Angell, et al, Bellingham, Wash., \$25,000; William Brun, Port Angeles, Wash., \$5,830; John W.

and Julia A. Clausen, North Bend, Oreg., \$5,000; William F. O'Meara, Chinook, Wash., \$1,300; and Western Ace Company, Inc., Tacoma, Wash., \$80,000.

Alaska: Eugene Browning, Homer, \$4,500; Santiago M. Cesar, Juneau, \$8,500; Lynn Crosby, Elfin Cove, \$3,200; Clare Hiner, Sel-dovia, \$7,900; Charles McLeod, Juneau, \$5,000; Clarence Moy, Pelican, \$15,000; Jerry Nielsen, Wrangell, \$4,000; Margarete von Scheele, Kodiak, \$6,500; and Fred Torsen, Ouzinkie, \$4,800.



Freeze-Drying

EXPERIMENTS PLANNED:

Exploratory experiments on the freeze-drying of various types of fish products will be conducted by the Gloucester, Mass., Technology Laboratory of the U. S. Bureau of Commercial Fisheries. The Army Quartermaster Laboratory in Chicago has offered its freeze-drying equipment for these studies.

Organoleptic evaluation and determination of nutritive changes of the freeze-dried products will be carried on in conjunction with the Gloucester Laboratory's studies on irradiated fishery products. Some work in freeze-drying has been done by the Army Laboratory, but those studies were aimed at determining only what food products can be successfully freeze-dried.



Great Lakes Fisheries

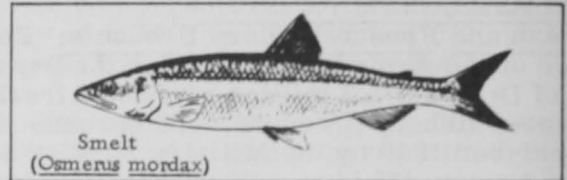
Exploration and Gear Research

SEASONAL DISTRIBUTION STUDIES OF COMMERCIAL FISH STOCKS IN LAKE ERIE CONTINUED:

M/V "Active" Cruises 13 and 14:

The U. S. Bureau of Commercial Fisheries exploratory fishing vessel Active conducted the fifth and sixth cruises in the 1960 series of otter-trawl explorations in United States waters of Lake Erie from Monroe, Mich., to Buffalo, N. Y. The two 16-day cruises--one in October and one in November--provided additional information on the seasonal abundance, distribution, and potential commercial production of smelt and other underutilized species by trawling.

During the October cruise, smelt were found to be concentrated at depths of 70 feet or more in certain parts of the eastern two-thirds of the lake. The two best catches, averaging 1,290 pounds per hour, were taken at a depth of 70-80 feet off Fairport, Ohio. Other catches averaging 650 or more pounds per hour were taken in 70-80 feet off Fairport and 90-100 feet off Erie, Pa., and Dunkirk, N. Y. Surface temperatures ranged from 64° to 71° F.



During the November cruise, smelt were found at shallower depths, but were caught in relatively insignificant amounts. Best fishing was obtained in 40-60 feet off Fairport, Ohio, where four drags caught smelt at rates of 210 to 330 and averaged 254 pounds per hour. Surface temperatures ranged from 43° to 52° F.

Catches of other species were insignificant during both cruises. With the exception of 31- and 33-pound catches of carp, 25- and 32-pound catches of minnows, and a 26-pound catch of yellow perch, all catches of other species amounted to 19 pounds or less per drag per species.

Note: Also see Commercial Fisheries Review, Dec. 1960 p. 32.



Great Lakes Fishery Investigations

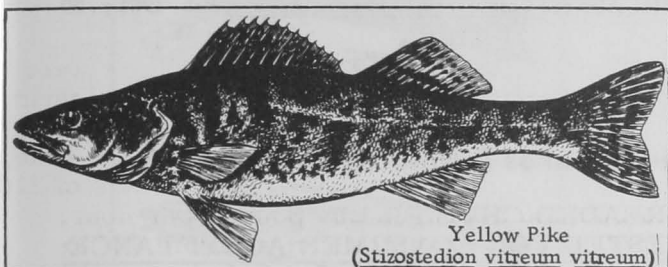
LAKE ERIE FISH POPULATION SURVEY SUMMARIZED:

The U. S. Bureau of Commercial Fisheries biological research on Lake Erie for 1960 is summarized to demonstrate the type of inquiry made and to show the progress made. During the year, 645 10-minute trawl tows were made (108 hours total) in the western basin and most of the several hundred thousand fish captured were sorted and counted. Scales, lengths, and weights were taken from about 1,400 fish. About 75,000 fish were measured, and 5 percent of these fish were preserved for future examination. A total of 104 10-minute tows with fry nets were made to catch newly-hatched fish. Gill nets were set on three separate occasions to catch fish not ordinarily taken by trawl or tow nets.

Samples of important species of fish in the commercial landings were taken in the spring and fall. Scale samples were obtained from 4,092 and lengths and weights were measured on an additional 6,276 fish

The limnological features of the waters of the western basin such as temperature, turbidity, pH, alkalinity, and oxygen content of the water were measured seasonally. Samples were taken of the plankton and bottom fauna for later study.

Yellow pike marketed from Lake Erie ports are sorted into size groups--each group usually commands a different price. Number 2's are less than 1½ pounds; Number 1's range



Yellow Pike
(*Stizostedion vitreum vitreum*)

from 1½ to 4 pounds; and jumbos are larger than 4 pounds. Sorting practices are somewhat arbitrary and may vary between ports and fishermen but differences usually are not great. Records of the abundance of the size groups of yellow pike landed (Number 1's, 2's, and jumbos) and their ages provide a broad basis for determining production trends for the present and immediate future. They also make possible easier determination of changes in the abundance of year-classes.

The dominance of the larger and older yellow pike (jumbos) in the Lake Erie fishery may indicate that production of individuals, temporarily at least, is on the decrease, and conversely, the dominance of smaller and younger fish (Number 2's) may indicate that such production is on the increase. The 1960 spring production, near a record low, was dominated by catches of Jumbo yellow pike. Production this fall--greatly improved over last fall--was dominated by Number 2's. In 1960, the Number 2's consisted almost entirely of one-year-old fish (hatches in 1959); Number 1's usually were two- and three-year-old fish; and jumbos four years old and older.

In April and May 1960, 4,000 yearling yellow pike caught in trap nets by commercial fishermen at ten different locations between

Bono and Vermilion, Ohio, were tagged. The tagged fish averaged 10½ inches long; 2½ inches short of the legal minimum length in Ohio. A four-inch, yellow neoprene dart-type tube tag was inserted into the back of each fish, angling forward until its barb was anchored between the rays of the spiny dorsal fin.

By the end of 1960, 333 tags--8.3 percent of the total--had been returned. About 65 percent were recovered from United States waters and 35 percent from Canadian waters.

The localities of tag recovery give some indication of the movements of these young yellow pike during their second year of life. The 74 tags returned in April and May came from the same area in which they were tagged. By the first of June, the tagged yellow pike showed a tendency to move northward. In June most of the tags were recovered around Pelee Island and the Bass Islands. Most recaptures were made in this area during the remainder of the year.

Only two tagged fish were caught east of Lorain, Ohio. One was taken off of Cleveland while the other had moved to Dunkirk, N. Y.; over 180 miles in 172 days. One tagged fish was caught in southern Lake Huron, while 3 more were caught in Lake St. Clair. Nine other tagged yellow pike were captured near the mouth of the Detroit River. Only 3 recoveries came from the Toledo-Monroe area along the western shore.

The majority of the tagged yellow pike was caught in October. The percentages of returns per month are as follows: April - 11, May - 11, June - 2, July - 7, August - 9, September - 19, October - 32, November - 8, and December - 1.

United States fishermen caught most of the tagged fish during the first half of the fishing season, but as the season progressed, Canadian fishermen caught tagged yellow pike with increasing success due to their northerly movement.

Since the lengths of tagged and untagged fish caught were about equal, the tags apparently did not interfere with the growth of the fish. Many of the tagged yellow pike had sores around the tag insertion. Biologists found that in most instances the wound was superficial and was not causing the fish any great harm.

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WESTERN LAKE SUPERIOR FISHERY SURVEY FOR 1960 COMPLETED:

M/V "Siscowet" Cruise 10: This cruise (November 30-December 20, 1960) brought to a close the season's activities in the western Lake Superior area with the U. S. Bureau of Commercial Fisheries research vessel Siscowet. Although vessel operation was seriously hampered by rough weather and icing, some important life-history data were collected for several species of fish in the Apostle Islands region.

The primary objectives were to follow the spawning activities of the various forms of chubs and to collect eggs from the ripe specimens. Short gangs of gill nets ($2\frac{1}{4}$ -inch mesh) were set in Pike's Bay, northwest of Madeline Island, south of Stockton Island, and southeast of Outer Island.

Most of the chubs were still green but enough ripe specimens were captured to obtain fertilized eggs from L. hoyi and L. kiyi. In addition, the crosses were made with female L. hoyi and male lake herring, and female lake herring and male L. hoyi. Through the cooperation of the Wisconsin Conservation Department the eggs will be incubated at the Bayfield Hatchery to the eyed stage when they will be transferred to the Northville, Mich., hatchery. At Northville they will be under constant observation and study in an attempt to discover characteristics which may aid in field identification of the various chubs.

The spawning activities of the round whitefish, pygmy whitefish, and lake herring were also studied during the cruise. On December 1 a gang of 3 gill nets ($2\frac{1}{2}$ -inch mesh) was lifted just off the south shore of Madeline Island in $3\frac{1}{2}$ fathoms. The catch consisted of 177 round whitefish (average weight about 1 pound), 38 lake herring, 12 longnose suckers, and 2 brown trout. About 90 percent of the round whitefish were spent or nearly spent. These fish had spawned on a gravel-rocky bottom at a water temperature of 40.0° F. Attempts to collect eggs off the bottom with a bottom sampler and a $\frac{1}{2}$ -meter larva net were unsuccessful. The rocky nature of the bottom undoubtedly prevented efficient operation of the devices.

The pygmy whitefish spawned during the last week of November. Specimens taken in the trawl on November 23 were still green. On December 2 all the pygmy whitefish taken in the trawl were spent. The fish were taken

at depths ranging from 20 to 30 fathoms over a bottom covered with decayed leaves and debris. There was no evidence that the pygmy whitefish migrated to shallow water to spawn. The water temperature during this period was about 40.0° F.

The lake herring were observed spawning on rocky reefs as early as November 21 (water temperature 42.0° F.) and ripe specimens were still observed at 85 fathoms on December 20 (water temperature 40.0° F.). The height of the spawning season occurred during the last week of November.

Surface water temperatures had cooled to about 36.0° F. by the end of the cruise.

Note: Also see Commercial Fisheries Review, Feb. 1961 p. 20.



Great Lakes Technological Research

BREADED CHUB FILLETS

TESTED FOR CONSUMER ACCEPTANCE:

Several hundred pounds of chub were filleted and breaded under the supervision of the Great Lakes Technological Laboratory Staff of the U. S. Bureau of Commercial Fisheries for consumer acceptance tests. The breaded chub fillets were test fed at two industrial cafeterias in Detroit and were found to be generally satisfactory.

Tests will be continued on the keeping qualities of chub fillets prepared in various forms and frozen. At suitable intervals, organoleptic tests will be carried out to determine the changes in the fillets during cold storage.



Groundfish

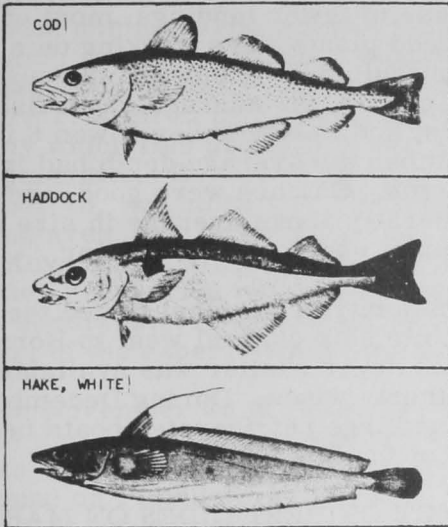
PRODUCTION COSTS STUDIED IN

NEW ENGLAND AND CANADIAN INDUSTRY:

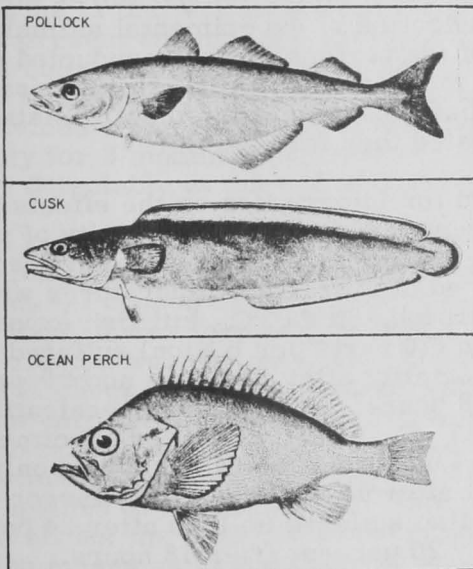
A study designed to identify and evaluate factors involved in the competitive position of the New England groundfish industry and its chief competitor, the Canadian groundfish industry, has been completed and is now being reviewed by Interior's Bureau of Commercial Fisheries.

The study was made by Boston College under a contract from the Bureau. The

study was motivated by the fact that in 1939 domestic producers supplied 91 percent of the United States market for groundfish fillets but in 1959 supplied only 33 percent of that market. Various biological and economic factors, including production costs, are considered as reasons for this change.



The report covers only the groundfish industry. Cod, haddock, hake, pollock, cusk and ocean perch were the specific species covered. Other segments of the New England fisheries--the Maine lobster and sardine, the scallop and the industrial fish industry producing fish meal, solubles, oil and other by-products--are not included.



Emphasis has been given to costs and earnings in fishing for groundfish. In addition

to the cost analysis, organizational structure of the respective industries, labor market conditions, the role of government, and other factors were considered. The study also reviews some of the economic principles involved in the catching operations of the domestic industry, including the principles involved in maximizing gross income from a fluctuating resource such as is involved in this industry.

Suggestions are given concerning a more rational approach to the fish catching operations of the domestic industry. In the report Boston College suggested diversifications in the catch objectives as a partial answer to the fishermen's problem. "It would lessen the danger of dependence on one species of fish," the report points out. "Whether and how this diversification could be accomplished will depend on a number of biological and economic factors," the authors say.

The New England groundfish industry has been beset with difficult problems. A substantial portion of these problems relate to the vessel operation stage. Partially because of the difficulties of this other group, the Fishery Loan Fund, operated by the Department, was established in 1956. Loans made to vessel operators in this industry have, to some extent, helped to ease their economic difficulties. In 1960 a fishing vessel construction differential subsidy was authorized by the Congress for a period of three years. This program is now being implemented. The Department is authorized to pay up to one-third of the cost of constructing a fishing vessel in the New England groundfish industry. Various kinds of research programs have also been initiated in attempts to improve fishing conditions and reduce costs of production. However, these programs are concerned with difficult problems, and solutions are not quickly and easily obtained.

Bureau economists are now reviewing and evaluating the report. The Bureau expects to publish the report during the spring of 1961. The study was financed by funds made available under the Saltonstall-Kennedy Act.

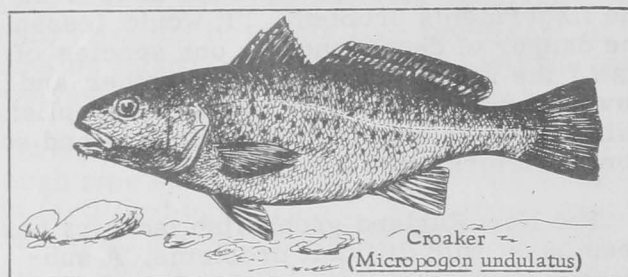


Gulf Fishery Investigations

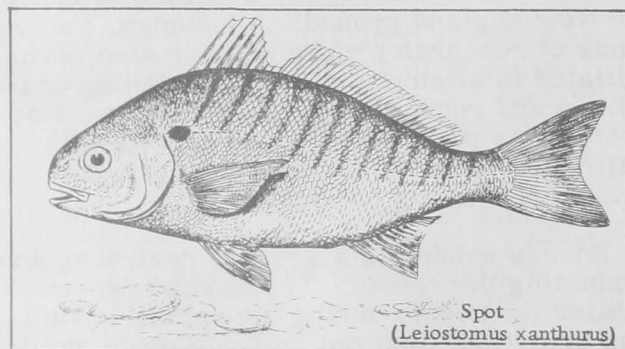
Following are some of the highlights of the studies conducted by the Galveston, Tex.,

Biological Laboratory of the U. S. Bureau of Commercial Fisheries during October-December 1960:

INDUSTRIAL FISHERY STUDIES: Work was expanded to include 10 of the dominant species to be sampled on a systematic schedule. Croaker, spot, and spotted trout comprised 62 percent of the total landings by weight for October. In November 1960 they were 71 percent of the total landings and approximately 78 percent in December. Changes of species composition between this period in 1959 and 1960 were almost negligible. Miscellaneous species, those consisting of less



than one percent each of the total weight, comprised 7 percent in October, 11 percent in November, and nearly 10 percent in December. Life-history studies showed croaker and spot spawning during the middle of the period and razorbelly spawning near the latter part of the period. Spot were spent by the last weeks of December, but a few croaker were still gravid. The average number of species in October was 15, 19 for November, and 15 for December.



No new species were noted during the period. New species have become increasingly rare during the past 6 months which indicates most of the species common to the bottom trawl fishery have been taken.

In October a total of 26 samples were taken from 787,789 pounds of fish landed; 27 samples in November from 945,350

pounds; and 25 samples were taken in December. Bad weather throughout the latter part of the period seriously curtailed fishing. Because of uncertain landings, no schedule of port sampling was possible. When weather conditions and landings stabilize, sampling will return to a regular schedule.

Because of fewer landings, most of the Gulf petfood plants were working on a reduced schedule during most of the quarter. During October, the average depth fished was 5 fathoms, and in November it was 6 fathoms. By December the average depth had increased to 8 fathoms. Catches were good, and fish were generally above average in size among the dominant species in particular.

The majority of the fleet fished the area from Mobile ship channel west to Horn Island gaining whatever shelter was available during high northerly winds. During December several of the large refrigerated boats began fishing west of the Mississippi Delta.

EFFECT OF PESTICIDES ON MARINE ORGANISMS: Routine bioassays of various chlorinated hydrocarbons were carried out during the quarter using spot (*Leiostomus xanthurus*); Atlantic croaker (*Micropogon undulatus*); sailfin molly (*Mollienisia latipinna*); gulf killifish (*Fundulus grandis*); sheepshead minnow (*Cyprinodont variegatus*); blue crab (*Callinectes sapidus*); and white shrimp (*Penaeus setiferus*). At this time of year the lower water temperatures afford little selection of experimental animals, and most of the bioassays were conducted on the sailfin molly and gulf killifish. The sailfin molly has been one of the most resistant species tested thus far.

Need for information on the effects of environmental factors on the toxicity of insecticides was clearly shown in experiments conducted at different temperatures with the gulf killifish. At 21° C., killifish exposed to dieldrin (70 parts per billion) suffered 30 percent mortality after 24 hours and 90 percent after 48 hours. At similar concentrations, but at 17° C., slightly smaller specimens suffered no loss after 24 hours and only 30 percent after 48 hours; slightly larger specimens also suffered no loss after 24 hours and only 20 percent after 48 hours.

Studies of the effects of sublethal levels of pesticides on the rate of hatching and the development and growth of young were initi-

ated. The preliminary work has consisted of developing suitable methods for handling experimental groups of brine shrimp eggs, pregnant live-bearers (sailfin molly), post-larval blue crabs, and post-larval shrimp.

SHRIMP FISHERY INVESTIGATIONS:

Pink Shrimp Migration, Growth, and Mortality: During November 1-4, 1960, 13,306 juvenile pink shrimp were marked with fast green stain and released near Bottle Key in northeast Florida Bay. On November 24-26, five were recovered in Florida Bay off Pigeon Key which lies about $2\frac{1}{2}$ miles ESE. of the release site. Between November 27 and December 15, two more were recovered in the same area, and two were recovered near Crane Keys, about 5 miles SW. of Bottle Key. The latter recoveries indicate a tendency toward southwesterly movement for at least a portion of the experimental population.

From November 28 to December 15, 39,913 juvenile pink shrimp were marked with trypan blue stain and released in lower Pine Island Sound on Florida's west coast. The purpose of this experiment is to determine the northern limit of coastal nursery areas inhabited by immature shrimp of the Tortugas population. No recoveries were reported to date.

Of the 11,000 small pink shrimp that were graded, marked, and released on August 9 in Biscayne Bay, none have been recovered to date. One possible explanation of the lack of recoveries is that the stain used (trypan red) did not present enough contrast to the shrimp's normal color to permit ready identification by bait fishermen or dealers. The stain in all individuals comprising a sample held in captivity for 3 months was, however, still readily detectable at the end of that period.

The Florida State Board of Conservation has recently reported a second species of Penaeidae, *Penaeus braziliensis*, from Biscayne Bay. It was formerly believed that *P. durorarum* was the only penaeid occurring there. A check of several bait shrimp samples not only corroborated the discovery, but also revealed the presence of still another form which resembles *P. aztecus*. Since all three species are practically indistinguishable at all but the most advanced stages, the question arises as to what degree such a complex will invalidate the results of research on pink shrimp per se in the southeast Florida area.

Marking Techniques: Inability to extract mixed stains from shrimp tissue in quantities sufficient to permit their identification by chromatographic and spectrophotometric methods continues to be a major drawback. Pyridine has proved to be a satisfactory extractant in cases where shrimp retained "greater-than-normal" amounts of stain. But, unfortunately, "loaded" recoveries are the exception rather than the rule.

The hypothesis that some of the stain may combine chemically with shrimp tissue, and that extraction attempts thus far have succeeded in removing only the uncombined stain, is now being tested. The approach is to first destroy the tissue protein with various proteolytic agents and then, employing the pyridine and other methods, extract the stain from the residue. Preliminary experiments were disappointing as both protein and stain were destroyed during proteolysis.

Collection and organization of various shrimp measurement data continued. Computation of factors relating length to weight, carapace length to total length, "tail" weight to total weight, etc., is under way for the Gulf's four commercial species. Certain of these factors will aid the industry in standardizing processor-fisherman buying and selling practices, while all will provide biologists with means for converting research data (including fishery statistics) to comparable units.

Larvae Studies: Enumeration of penaeid shrimp larvae sorted from 3,111 plankton samples was completed. All specimens were coded according to kind and stage of development. Fifty-seven "types" have been defined and figured. These are now being studied in an effort to consolidate them by developmental series on a genus or species basis. A series representing each kind of larvae encountered will be retained for specific identification at a later date. Although the identity of several forms (esp. *Penaeus* spp.) is fairly certain, that of most will have to await comparative material reared from known parents.

Attempts to rear and describe early penaeid larvae of known parentage continued unsuccessful. Although eggs were obtained from several species held in the laboratory, none ever reached the hatching stage.

Several techniques for controlling the growth of microzoan populations in rearing

media were designed and tested. The method showing most promise in preliminary tests consists of a recirculating system in which small rearing aquaria are fed sea water (1) treated with penicillin and streptomycin, (2) filtered through fine sand, and (3) passed under ultra-violet light. Growth of populations of troublesome micro-predators in media so treated appeared to be markedly reduced over that observed in untreated media.

At present, identification of penaeid post larvae is possible only for specimens in the most advanced stages. To provide a means for identifying common species at most post-larval stages, early (unidentifiable) post larvae taken periodically from local waters are being reared--one per container--to sizes at which present keys permit identification. Comparison of cast exo-skeletons recovered after every molt is yielding information which may find use in constructing keys for penaeids in all but the earliest post-larval stages.

Bait Shrimp Production: Commercial bait shrimp production for October-November 1960 in the Galveston Bay area increased 66 percent over that for the same period in 1959 (170,800 pounds for 3,090 hours in 1960 vs. 102,700 pounds for 1,910 hours in 1959). Production continues to decline rapidly, however, as is typically the case during the late fall and winter months. Practically all bait fishermen in Upper Galveston, Trinity, and East Bays curtailed operations for the season.

Catch composition by species was 94-98 percent white and 6-2 percent brown shrimp for the period October-November 1960, contrasted to 92-99 percent white and 8-1 percent brown shrimp for the same period in 1959.



Maine Sardines

CANNED STOCKS, JANUARY 1, 1961:

Distributors' stocks of Maine sardines totaled 233,000 actual cases on January 1, 1961--2,000 cases (1 percent) less than the

235,000 cases on hand January 1, 1960. Stocks held by distributors on November 1, 1960, amounted to 277,000 cases, and on April 1, 1960, totaled 252,000 cases, according to estimates made by the U. S. Bureau of the Census.

Canners' stocks on January 1, 1961, totaled 1,029,000 standard cases (100 3³/₄-oz. cans), an increase of 186,000 cases (26.0 percent) as compared with January 1, 1960. Stocks held by canners on November 1, 1960, amounted to 1,258,000 cases and on April 1, 1960, totaled 397,000 standard cases.

The 1960 pack (from the season which opened on April 15, 1960, and ended on December 1, 1960) was about 1,975,000 standard cases.

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 pack of 1,975,000 cases as of December 1, 1960 (the close of the season), made the available supply as of January 1, 1961, a total of 2,310,000 cases--more than the supply of 2,171,000 cases on January 1, 1960. Shipments have been slightly less than a year ago.

Stocks of canned Maine sardines in warehouses of multiunit organizations on January 1, 1961, totaled only 53,000 cases, only 1,000 cases more than on the same date in 1960, but substantially less than the 57,000 cases reported on January 1, 1959.

Note: Also see Commercial Fisheries Review, Jan. 1961 p. 28.



Markets for Fishery Products

In conducting a study of long-term economic prospects for the domestic fishing industry, which it will bring to completion soon, the U. S. Bureau of Commercial Fisheries has reviewed a mass of source materials concerned with general long-range economic forecasts. Two items recently reviewed effectively analyze the future economic setting in which industry, including the fishing in-

Table 1 - Canned Maine Sardines--Wholesale Distributors' and Canners' Stocks, January 1, 1961, With Comparisons ¹/₁

Type	Unit	1960/61 Season		1959/60 Season				
		1/1/60	11/1/60	7/1/60	6/1/60	4/1/60	1/1/60	11/1/59
Distributors	1,000 actual cases	233	277	172	197	252	235	296
Canners	1,000 std. cases ² / ₄	1,029	1,258	359	235	397	843	1,001

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

²/100 3³/₄-oz. cans equal one standard case.

dustry, must operate and find its future markets. One of the two items, a report on a recent symposium on world food and population growth conducted by the British Association for the Advancement of Science, has great significance for the fishing industry. The British Association gave prominence to the subject because of its view that in the absence of catastrophic events, world population will have doubled by the year 2000, while food production, left to itself, will soon be far below the necessary minimum for support of such a population. With only forty years to go to reach the year 2000, crash programs would appear essential. The consequence of a failure to rise to the challenge will be disaster for the advanced nations which cannot hope to hold their own against world pressures of overpopulation, famine, and diseases.

The second item is a book, authored by the staff of a domestic magazine under supervision of its chief economist, entitled Markets for the Sixties. It describes coming transformations in the American economy. Those in the fishing industry will find most interesting the detailed description of the consumer market of the sixties. It observes that there may come to pass an annual after-tax income of over \$7,500 for 45 percent of all United States families, and a college education will become nearly as routine as a high-school education is now. The consequence of the higher level of income and education is a more discerning population at the market place. There will be a demand for greater variety, better quality, the uncommon, and the striking in goods and services. Concerning the consumer of the sixties the study reports that "the most striking effect of the boom (of the last decade) has been to make the United States a remarkably young nation and this in itself is a sharp reversal of historical experience. High proportions of children have almost invariably marked societies rural or only semi-industrial in character; the advanced nations of the Western world have been generally characterized by declining birth and death rates, both of which tend to increase the average age of the population."

The latter publication, in particular, should prove helpful to those concerned with the fishing industry. By bringing into view the anticipated economic environment of the 1960's, it provides some basis for judging future marketing conditions for the industry. As an example, the anticipated higher family in-

comes, and demand for variety and quality of products, would indicate the advisability of the industry redoubling its efforts to bring out new high-quality convenience products which would find a ready market under these conditions.



Maryland

GEAR STUDIES PROVE THAT NYLON GILL NETS CATCH MORE SHAD:

Nylon anchor gill nets catch twice as many East Coast shad per yard as do linen anchor gill nets, according to a report published by the Maryland Department of Research and Education.

The biologist, who conducted the study in Maryland reports that buck or male shad caught in nylon gill nets are heavier than those caught in linen gill nets. This is due to the fact that nylon has a greater elasticity than linen. In addition, nylon has several advantages to the fisherman in that it is stronger than linen and is more resistant to rot, fouling organisms, and sunlight deterioration. Nylon has become so widely accepted due to its more favorable physical properties that it now takes a special order to obtain linen netting.

The experiments confirm the impressions of commercial fishermen who have felt that nylon nets were producing more favorable catches of shad.



North Atlantic Herring Research

DOGFISH USED FOR SEROLOGICAL STUDIES ON HERRING:

As part of herring population studies being conducted by scientists at the U. S. Bureau of Commercial Fisheries, Biological Laboratory at Boothbay Harbor, Me., antisera have been prepared by injecting herring blood cells into dogfish held in experimental tanks. Tests during December 1960 indicate that dogfish are capable of recognizing individual differences in herring that rabbit antisera failed to distinguish. On this basis, dogfish may prove to be very useful in serological work on herring.

NEW DIRECTOR APPOINTED FOR BOOTHBAY HARBOR BIOLOGICAL LABORATORY:

A new director of the U. S. Bureau of Commercial Fisheries Biological Laboratory in Boothbay Harbor, Me., has been appointed to succeed Leslie W. Scattergood, who has been transferred to the Bureau's Washington Office to the post of Associate Chief of the Branch of Reports. The Bureau has selected Bernard Skud, formerly Assistant Director of the Bureau's Galveston Biological Laboratory, to succeed Scattergood.

A native of Ironwood, Mich., Skud received a B. S. degree in Zoology in 1949 from the

University of Michigan and an M. S. degree in Zoology in 1950. Working out of the Bureau's Seattle Laboratory, Skud was associated with the Pink Salmon Research Program. For several years as Chief of the Alaska Herring Investigation, he studied herring fishery problems of the Pacific un-



Bernard E. Skud

til he was placed in charge in 1956 of the Passamaquoddy Bay Power Survey fishery studies where he became familiar with Maine's sardine industry.

In its planning for the future, the U. S. Bureau of Commercial Fisheries considers its Biological Laboratory at Boothbay Harbor to be ideally located to play an important part in not only future studies of species commercially important to Maine, but as part of the over-all National emphasis on various oceanographic programs relating to the fisheries.

The Laboratory's plans for the immediate future include herring research, especially studies of early life history, populations, movements, herring serology and diseases, and a new study of the productivity of Maine's coastal waters.

Shellfish research will continue as before with the soft-clam program, concentrating

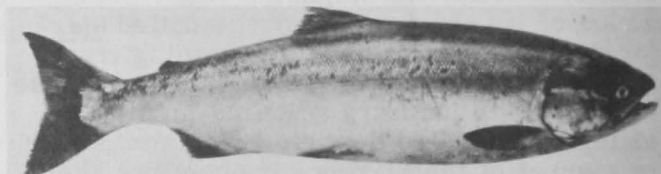
on the completion of culture and management studies, and initiation of studies on the effects of the environmental factors on clams. A new program to study diseases of shellfish was also initiated at the Laboratory this winter.



Oregon

EARLY RETURNS INDICATE ESTABLISHMENT OF SILVER SALMON RUN:

The appearance of silver salmon jacks or males on the Mary's River near Corvallis recently spurred hopes for the success of the Oregon's Fish Commission efforts to establish a run of silver salmon on that Willamette tributary as well as in other Oregon streams not now supporting a silver salmon run.



Silver Salmon (*Oncorhynchus kisutch*).

The jacks, male salmon maturing and returning from their ocean sojourn before most other fish of the same year's stock, were concentrated below a diversion dam on the Mary's River near Corvallis. Because of improper passage facilities at the structure, the fish were unable to move on upstream. A Game Commission biologist dip-netted 30 jacks from the pool below the dam and transferred them to waters above the obstruction. So far as known this is the first record of the appearance of mature silver salmon in the Mary's River.

The jacks almost certainly represent the first returns from the Fish Commission's May 1959 releases involving 80,000 fingerlings, according to the biologist in charge of the Willamette River studies for the Commission's Federally-financed Columbia River Fishery Development program. The young salmon were distributed to various locations in the Mary's River drainage, including sites on Nichols, Hawley, Rainbow, Hammer, and Cherry Creeks. The main body of mature fish from this release should return to the Mary's River system during the fall of 1961.



Plankton

COLLECTED BY SUBMARINE IN ARCTIC OCEAN:

For the first time a United States submarine has been used to collect samples of plankton under polar ice. The nuclear submarine Seadragon took the samples during its voyage from Portsmouth, N. H., to Pearl Harbor, Hawaii, by way of the Northwest Passage and the North Pole.

The collecting was done by an automatic sampler, somewhat resembling an automatic soft drink dispenser, that was devised and built for the voyage. A biologist of the Woods Hole (Mass.) Biological Laboratory of the U. S. Bureau of Commercial Fisheries was one of the four scientists who collaborated in working out the design of the sampler.



Tuna

NEW ENGLAND BLUEFIN LANDINGS, 1960:

During the New England June-November 1960 tuna-fishing season, almost 1.2 million pounds (valued at \$65,000) of bluefin tuna were landed. Although some catches were landed in June and November, close to 96 percent of the seasonal landings were made in the July-September period. Due, in part, to the lack of interest on the part of the canneries in supplies of New England-caught tuna, the average seasonal price was only about 5.5 cents a pound (about \$110 a short ton).

More than 50 percent of the June-November landings were made by the small Provincetown purse-seiner Silver Mink during the months of August and September. Most of the balance was taken by the Provincetown, Mass., traps with smaller quantities landed at Gloucester, Mass., and Maine ports.

Month	Quantity	Value	Average Price
	Lbs.	\$	¢/lb.
June	20,945	3,578	17.00
July	220,738	10,909	4.94
August	619,076	32,684	5.28
September 1/2	290,000	15,892	5.48
October 1/2	20,000	1,096	5.48
November 1/2	6,000	900	15.00
Total	1,176,759	65,059	5.53

1/Partly estimated.

The Silver Mink, a small tuna purse-seine vessel of Provincetown, Mass., completed its third consecutive season of bluefin tuna (Thunnus thynnus) fishing on September 11, 1960.

Table 2 - Landings of Bluefin Tuna by New England Purse-Seiner Silver Mink, 1960

Date of Landing	No. of Fish	Weight (lbs.)
August 15	40	5,240
16	23	3,360
20	417	63,670
23	242	34,970
26	700	102,230
27	699	102,730
29	665	102,190
September 2	470	70,680
3	154	22,330
6	915	130,240
7	35	3,545
11	260	35,450
Totals	4,620	676,635

Table 3 - Bluefin Tuna Purse-Seining by Silver Mink Off New England Coast, 1958-60

	1960	1959	1958
Pounds	676,600	1,514,800	359,000
Length of Season	4 weeks	7½ weeks	10 weeks
Number of Trips	9	21	1/
Number of Fish	4,620	11,577	1/
Average Weight of Fish	146.5 lbs.	130.8 lbs.	1/

1/Unavailable.

The short 4-week fishing season that began on August 15, 1960, for the vessel resulted in a catch of 676,600 pounds of bluefin tuna in nine trips made in or near Cape Cod Bay. This amount was 838,200 pounds, or 55.3 percent, less than the 1959 catch. However, the catch per unit of effort was the same in both years. The weak market for bluefin tuna on the East Coast was largely responsible for the shorter fishing season, and the full potential of this seasonal fishery could not be realized.

Note: Also see Commercial Fisheries Review, February 1959 p. 1 and May 1960 p. 27



United States Fishing Fleet ^{1/}Additions

DECEMBER 1960:

A total of 16 vessels of 5 net tons and over were issued first documents as fishing craft during December 1960--an increase of 2 vessels as compared with the same month of 1959. The Gulf area led with 5 vessels, followed by the Pacific area with 4 vessels.

Fishing craft issued first documents during 1960 totaled 408 vessels--a decrease of 1/Includes both commercial and sport fishing craft.

Table 1 - U. S. Vessels Issued First Documents as Fishing Craft By Tonnage, December 1960

Net Tons	Number
5 to 9	7
10 to 19	3
20 to 29	1
30 to 39	2
40 to 49	3
Total	16

71 vessels compared with 1959. Most of the decrease occurred in the Gulf area where only 85 vessels were issued first documents in 1960 compared

with 135 vessels in 1959.

Table 2 - U. S. Vessels Issued First Documents As Fishing Craft By Areas, December 1960

Area	December		Total			
	1960	1959	1960	1959	1958	1957
	(Number)					
New England	2	-	34	15	13	19
Middle Atlantic	-	-	13	12	13	23
Chesapeake	2	6	76	106	99	104
South Atlantic	1	2	45	76	135	130
Gulf	5	4	85	135	270	166
Pacific	4	2	114	97	112	102
Great Lakes	1	-	17	6	10	8
Alaska	1	-	24	32	31	48
Puerto Rico	-	-	-	-	-	1
Virgin Islands	-	-	-	-	1	-
Total	16	14	408	479	684	601

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

Table 3 - U. S. Vessels Issued First Documents As Fishing Craft, 1938 to 1960 Inclusive

Year	Number	Year	Number	Year	Number
1938	376	1946	1,085	1954	717
1939	357	1947	1,300	1955	418
1940	320	1948	1,184	1956	521
1941	354	1949	1,002	1957	601
1942	358	1950	812	1958	684
1943	358	1951	780	1959	479
1944	635	1952	675	1960	408
1945	741	1953	729		



U. S. Foreign Trade

EDIBLE FISHERY PRODUCTS, NOVEMBER 1960:

Imports of edible fresh, frozen and processed fish and shellfish into the United States during November 1960 decreased by 9.9 percent in quantity and 10.5 percent in value as compared with October 1960. The decrease was due primarily to lower imports of ground-fish fillets (down 1.8 million pounds), frozen albacore and other tuna (down 3.8 million pounds), and fresh and frozen salmon (down 2.8 million pounds), and to a lesser degree, a decrease in the imports of frozen shrimp. The decrease was partly offset by moderate increases in the imports of canned sardines in oil and canned tuna in brine.

Compared with November 1959, the imports in November 1960 were up by 1.0 percent in quantity but lower by 0.4 percent in value. Higher imports of frozen albacore and other tuna (up 5.0 million pounds) and frozen shrimp (up 3.2 million pounds) were partially offset by a drop of about 2.8 million pounds in the imports of canned tuna in brine and fresh and frozen salmon (down 3.6 million pounds).

Item	QUANTITY			VALUE		
	Nov.	Year	Year	Nov.	Year	Year
	1960	1959	1959	1960	1959	1959
	(Millions of Lbs.)			(Millions of \$)		
Imports:						
Fish & shellfish:						
Fresh, frozen, & processed ^{1/}	87.8	86.9	1,070.5	26.4	26.5	309.6
Exports:						
Fish & shellfish:						
Processed only ^{1/} (excluding fresh & frozen)	5.0	9.6	68.0	2.3	4.5	22.8

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

United States exports of processed fish and shellfish in November 1960 were lower by 19.4 percent in quantity and 17.9 percent in value as compared with October 1960. Compared with the same month in 1959, the exports in November 1960 were down 48.1 percent in quantity and 48.9 percent in value. The lower exports in November 1960 as compared with the same month in 1959 were due primarily to sharply lower exports of California canned sardines and canned salmon.

IMPORTS OF CANNED TUNA IN BRINE UNDER QUOTA:

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

Imports during 1960 amounted to 50,266,025 pounds, according to data compiled by the Bureau of Customs--3,182,305 pounds less than the quota established for that year. In 1959 the quota of 52,372,574 pounds was reached early in December and total imports for that year exceeded the quota by about 2,932,000 pounds.



U. S. Production of Fish Sticks and Portions, 1960

The United States production of fish portions in 1960 amounted to 48.3 million pounds valued at \$17.2 million and the production of fish sticks totaled 65.0 million pounds with a value of \$28.7 million. Compared with the previous year, fish portions were 11.1 million pounds (30 percent) greater in quantity and \$4.0 million (31 percent) greater in value. Fish sticks production was up 4.8 million pounds (8 percent) in quantity and \$68,000 in value.



During 1960, 8.3 million pounds of breaded cooked and 37.9 million pounds of breaded raw portions were processed--96 percent of the 1960 total. Unbreaded portions accounted for the remaining 2.1 million pounds or 4 percent.

Table 1 - U. S. Production of Fish Sticks by Months and Type, 1960^{1/}

Month	Cooked		Total
	(1,000 Lbs.)		
January	5,190	313	5,503
February	6,174	360	6,534
March	7,252	584	7,836
April	4,484	378	4,862
May	3,422	276	3,698
June	4,081	279	4,360
July	3,319	363	3,682
August	4,582	421	5,003
September	4,886	529	5,415
October	6,069	484	6,553
November	5,841	429	6,270
December	5,031	290	5,321
Total Quantity 1960	60,331	4,706	65,037
	(\$1,000)		
Total Value 1960	27,002	1,715	28,717
Total Value 1959	26,768	1,881	28,649

^{1/}Preliminary data.

The 1960 fish-stick production consisted of 60.3 million pounds of cooked fish sticks or 93 percent of the fish stick total. The remaining 4.7 million pounds or 7 percent was made up of raw fish sticks.

Table 2 - U. S. Production of Fish Sticks, 1956-1960

Month	1960 ^{1/}	1959	1958	1957	1956
(1,000 Lbs.)					
January	5,503	6,265	5,471	4,261	4,862
February	6,534	6,340	5,925	5,246	5,323
March	7,836	5,594	5,526	5,147	6,082
April	4,862	4,708	4,855	4,492	3,771
May	3,698	4,398	4,229	3,380	3,873
June	4,360	4,575	4,702	3,522	3,580
July	3,682	3,783	4,574	3,821	3,153
August	5,003	3,872	4,358	4,643	4,166
September	5,415	5,343	5,328	4,861	4,085
October	6,553	5,831	5,485	5,162	5,063
November	6,270	4,822	5,091	4,579	4,585
December	5,321	4,734	5,467	4,014	4,019
Total	65,037	60,265	61,011	53,128	52,562

^{1/}Preliminary data.

The Atlantic Coast States led all other areas in the production of both fish portions and fish sticks with 27.9 and 53.1 million pounds, respectively. The inland and Gulf

Table 3 - U. S. Production of Fish Sticks by Areas, 1959-1960^{1/}

Area	1960 ^{1/}		1959	
	No. of Firms	1,000 Lbs.	No. of Firms	1,000 Lbs.
Atlantic Coast States	23	53,154	25	50,448
Interior and Gulf States	8	6,161	5	5,412
Pacific Coast States	8	5,722	10	4,405
Total	39	65,037	40	60,265

^{1/}Preliminary data.

Table 4 - U. S. Production of Fish Portions, by Months, 1960^{1/}

Month	Breaded			Unbreaded	Total
	Cooked	Uncooked	Total		
(1,000 Lbs.)					
January	463	3,022	3,485	118	3,603
February	546	2,768	3,314	119	3,433
March	870	3,567	4,437	156	4,593
April	696	2,532	3,228	169	3,397
May	522	2,542	3,064	105	3,169
June	288	3,472	3,760	160	3,920
July	511	3,328	3,839	179	4,018
August	561	2,804	3,365	128	3,493
September	964	3,301	4,265	276	4,541
October	1,111	3,816	4,927	220	5,147
November	831	3,547	4,378	260	4,638
December	945	3,224	4,169	157	4,326
Total					
Quantity 1960	8,308	37,923	46,231	2,047	48,278
(\$1,000)					
Total:					
Value 1960	3,663	12,585	16,248	905	17,153
Value 1959	2,541	9,555	12,096	1,042	13,138

^{1/}Preliminary data.

Table 5 - U. S. Production of Fish Portions by Areas, 1959-1960

Area	1960 ^{1/}		1959 ^{2/}	
	No. of Firms	1,000 Lbs.	No. of Firms	1,000 Lbs.
Atlantic Coast States	23	27,925	25	19,793
Interior and Gulf States	11	19,184	10	16,676
Pacific Coast States	5	1,169	4	678
Total	39	48,278	39	37,147

^{1/}Preliminary data.

^{2/}Revised.

Table 6 - U. S. Production of Fish Portions
by Months, 1958-1960

Month	1960 ^{1/}	1959 ^{2/}	1958
	(1,000 Lbs.)		
January	3,603	2,692	1,973
February	3,433	3,025	1,254
March	4,593	3,225	1,471
April	3,397	2,634	2,268
May	3,169	2,684	1,478
June	3,920	3,247	1,504
July	4,018	2,227	2,161
August	3,493	2,796	1,516
September	4,541	3,558	1,566
October	5,147	4,314	2,560
November	4,638	3,483	1,979
December	4,326	3,262	2,060
Total	48,278	37,147	21,790

^{1/}Preliminary data.
^{2/}Revised.

States were next with 19.2 million pounds of fish portions and 6.2 million pounds of fish sticks. The Pacific Coast States made up the remaining 1.2 million pounds of fish portions and 5.7 million pounds of fish sticks.

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



Washington

EXPERIMENT WILL TRY TO CREATE A NEW RUN OF SOCKEYE SALMON TO THE NORTH FORK OF THE LEWIS RIVER:

Efforts to create a new run of sockeye salmon in the North Fork of the Lewis River will be inaugurated this spring, the Director of the Washington State Department of Fisheries announced on January 24, 1961. He stated that one million juvenile sockeye would be planted in Merwin Reservoir on the Lewis in southwestern Washington.



Sockeye Salmon (*Oncorhynchus nerka*).

The eggs utilized in this effort to initiate a new run of this fine food fish in the lower Columbia River tributary were transported from streams in the Lake Washington watershed near Seattle and from the Cultus Lake watershed in British Columbia.

Transported from their native areas to the Speelyai incubation station in the "eyed" stage, these eggs will complete their hatching at this site and will be released into the 3,000 acres of Merwin Reservoir where they will live and grow for one year prior to their migration to sea.

Studies by the Washington Fisheries Agency show that excellent growth can be obtained in that reservoir. Environmental conditions there are similar to those sockeye salmon require during their normal one year of lake residency in their natural habitat.

Also involved in the project is a cooperative effort by the State's Department of Fisheries, the Pacific Power and Light Company, and the Cowlitz County Public Utilities Department to test artificial devices that have been developed to liberate the seaward migrants from the reservoir.

If the transplanted salmon sockeye adapt to their new home and leave the reservoir for the sea at the normal time, the returning adults will be trapped at the Pacific Power and Light Merwin dam powerhouse in the fall of 1964. Their eggs would be incubated in the Speelyai hatchery and the cycle would be completed.

SALMON "FISH FARMING" EXPERIMENTS BEGIN TO PAY OFF:

The program of "fish farming" for salmon by Washington State's Department of Fisheries, initiated in 1957, is beginning to pay off, according to a January 24, 1961, news release by that Department. Returns to the "farms" at the end of 1960 proves that the new salmon-rearing system will work.

Returns at six selected spots, where returning adult salmon were counted, and in some instances trapped for egg-taking by Department crews, indicate that the initial phase of testing and experimenting is nearing an end. Coming years should show substantial contributions from the program to commercial and sports fisheries, along with enough returns for egg-taking for future seeding if necessary.

Checks for marked salmon catches in 1960 showed that a total of 243 silver salmon marked and reared in Lake Melbourne were caught in the commercial troll fishery at Neah Bay, Westport, and the Columbia River. In addition, 1,100 of the 1957 brood, reared in Lake Melbourne, returned to Eagle Creek, lake outlet, to spawn. Using usual catch-to-escapement ratios, fishery scientists estimate that the Melbourne fish farm contributed 2,860 silver salmon to the 1960 salmon fisheries of the Pacific Coast.

Salmon from the fish farms, in the Department's original over-all rearing program, were seen as additions to the harvest of salmon, designed for catching rather than for egg-taking. However, fish were taken at some of the counting stations when it became clear they would not be caught. More than 3 million eggs, chiefly silvers, were taken and will be hatched and reared in the Department's hatcheries.

The Fisheries Director states: "We have completed our first step. We still have things to learn about the proper care and protection of young salmon in the farms to boost the survival rate, but returns are considered remarkable by fisheries biologists in view of the poor fishing during the 1960 season."

Fish farming of pond fish is a centuries-old practice in some middle European countries and in the Orient. The method has never been used extensively, however, in the rearing of salmon.

Other returns to fish farms checked this fall and winter are as follows:

Erdman Lake, Mason County, 176 silver salmon were trapped, with a take of 219,000 eggs.

Cranberry Lake, Mason County, a total of 1,672 silver salmon were trapped, with egg take of 2,299,835.

Capitol Lake, Olympia, in addition to the 10,273 adult chinook salmon returning to the trap at Fishway No. 3 on the Deschutes River above the Lake, 711 silver salmon were counted at the trap, with many others proceeding upstream to spawn; 321 were trapped for the purpose of taking 156,000 eggs.

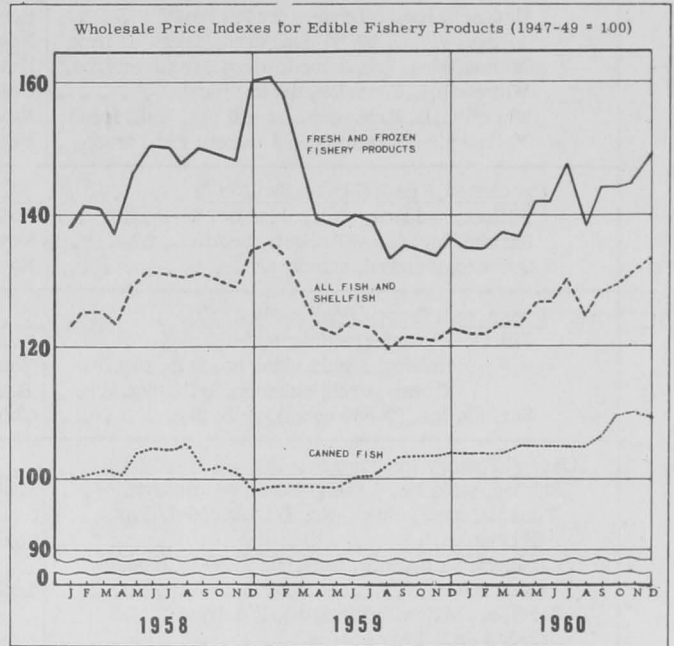
Titlow Ponds, Tacoma, 124 adult silver salmon were captured near and inside the salt-water lagoon, with 50,000 eggs taken. This is only a portion of the fish observed.

Pleasant Lake, Clallam County. Returns of silver salmon at this lake, used as a rearing area jointly with the Game Department, totaled 2,243, of which 1,677 were jacks; 870,000 eggs were taken from a portion of the 566 mature adults.



Wholesale Prices, January 1961

The January 1961 wholesale price index for edible fishery products (fresh, frozen, and canned) at 130.9 percent of the 1947-49 average was down 1.7 percent from the preceding month, but was up 7.4 percent from the same month of 1960. The decrease from December last year to January this year was due primarily to an increase in the haddock supply at Boston following some better weather on the fishing grounds. In January this year prices for most of the fishery products that make up the wholesale price index were higher than in the same month of 1960.



The drawn, dressed, and whole finfish subgroup index in January 1961 was down 6.3 percent as compared with the preceding month. Lower fresh drawn haddock prices (down 29.7 percent) at Boston and lesser declines for fresh-water whitefish more than offset higher prices for fresh yellow pike. From December 1960 to January this year there was no change in frozen dressed halibut and salmon prices. From January 1960 to this January the subgroup index rose 9.4 percent due to higher wholesale prices for dressed king salmon (up 17.6 percent) at New York City and fresh drawn whitefish (up 12.4 percent) at Chicago. The increases were partially offset by slightly lower prices for fresh drawn haddock and frozen dressed halibut, plus a more substantial decrease for fresh yellow pike.

From December 1960 to January this year the fresh processed fish and shellfish subgroup index was about unchanged (down 0.5 percent). A rather sharp drop (24.3 percent) in the fresh haddock fillet prices at Boston was about cancelled out by the increase in the fresh shrimp prices at New York City. Fresh shucked oyster prices have remained stable the past few months. However, the wholesale price index for the subgroup this January was up 7.5 percent from January a year ago. Higher wholesale prices for fresh shrimp (up 11.2 percent) and fresh shucked oysters (up 7.2 percent) were more than sufficient to balance out a drop of 10.3 percent in the fresh haddock fillet price.

Changes from December 1960 to January 1961 in wholesale prices for frozen processed fish and shellfish items were slight. Increases of about one cent a pound for frozen haddock fillets and frozen shrimp were responsible for the 0.9 percent rise in the subgroup price index from December 1960 to January 1961. As compared with January a year ago, the January 1961 subgroup price index rose by 7.5 percent. All the subgroup items were priced higher in January this year as compared with January a year ago.

Group, Subgroup, and Item Specification	Point of Pricing	Unit	Avg. Prices ^{1/}		Indexes (1947-49 = 100)			
			Jan. 1961	Dec. 1960	Jan. 1961	Dec. 1960	Nov. 1960	Jan. 1960
ALL FISH & SHELLFISH (Fresh, Frozen, & Canned)					130.9	133.2	131.5	121.9
<u>Fresh & Frozen Fishery Products:</u>					146.2	150.0	146.9	135.1
<u>Drawn, Dressed, or Whole Finfish:</u>					162.7	173.6	165.4	148.7
Haddock, lge., offshore, drawn, fresh	Boston	lb.	.12	.18	125.2	178.0	132.6	127.4
Halibut, West., 20/80 lbs., drsd., fresh or froz.	New York	lb.	.30	.30	92.8	92.8	92.3	93.8
Salmon, king, lge. & med., drsd., fresh or froz.	New York	lb.	.90	.90	202.2	202.2	202.2	171.9
Whitefish, L. Superior, drawn, fresh	Chicago	lb.	.73	.75	179.8	185.9	185.9	159.9
Whitefish, L. Erie pound or gill net, rnd., fresh	New York	lb.	.63	.75	126.4	151.7	141.6	161.9
Yellow pike, L. Michigan & Huron, rnd., fresh .	New York	lb.	.65	.50	152.4	117.3	164.1	166.5
<u>Processed, Fresh (Fish & Shellfish):</u>					146.0	146.8	141.7	135.8
Fillets, haddock, sml., skins on, 20-lb. tins . .	Boston	lb.	.39	.52	132.7	175.2	139.5	148.0
Shrimp, lge. (26-30 count), headless, fresh . . .	New York	lb.	.75	.73	118.5	114.5	109.8	106.6
Oysters, shucked, standards	Norfolk	gal.	7.50	7.50	185.6	185.6	185.6	173.2
<u>Processed, Frozen (Fish & Shellfish):</u>					116.0	115.0	119.6	107.9
Fillets: Flounder, skinless, 1-lb. pkg.	Boston	lb.	.39	.39	102.1	102.1	103.4	98.1
Haddock, sml., skins on, 1-lb. pkg.	Boston	lb.	.35	.34	109.9	106.7	106.7	97.3
Ocean perch, skins on, 1-lb. pkg.	Boston	lb.	.30	.30	118.8	118.8	118.8	108.8
Shrimp, lge. (26-30 count), 5-lb. pkg.	Chicago	lb.	.70	.69	107.2	106.5	114.2	100.3
<u>Canned Fishery Products:</u>					109.9	109.8	110.1	103.8
Salmon, pink, No. 1 tall (16 oz.), 48 cans/cs. . .	Seattle	cs.	27.50	27.50	143.5	143.5	143.5	127.8
Tuna, lt. meat, chunk, No. 1/2 tuna (6-1/2 oz.),								
48 cans/cs.	Los Angeles	cs.	11.00	11.00	79.3	79.3	80.0	77.9
Sardines, Calif., tom. pack, No. 1 oval (15 oz.),								
48 cans/cs.	Los Angeles	cs.	7.75	7.65	91.0	89.8	89.8	93.9
Sardines, Maine, keyless oil, 1/4 drawn								
(3-3/4 oz.), 100 cans/cs.	New York	cs.	8.50	8.50	90.5	90.5	90.5	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.								

Canned fish prices in January 1961 remained unchanged from the preceding month except for a 10-cent-per-case increase for California sardines. Supplies of this product are practically exhausted. But January 1961 canned fish prices were up 5.9 percent from the same month of 1961. Canned pink salmon prices rose 12.3 percent and canned tuna prices rose 1.8 percent. These increases were par-

tially offset by slightly lower prices for canned Maine and California sardines. Among the canned fish products, tuna was the only product being produced in volume in January this year. Although the demand was good, promotional efforts to further increase the sales of canned tuna continued through January.



PRINTERS' INK FROM FISH

Pakistani fish technologists have produced printers' ink of good quality by mixing Puntis fish oil with linseed oil. Puntis, *Barbus stigma* (Puntius), is a fish which is abundantly available at a low price. Shark-liver oil is also used in the manufacture of black printers' ink. (Australian Fisheries Newsletter, February 1959.)