TRENDS AND DEVELOPMENTS

Alaska

NEW DUNGENESS CRAB OPERATION IN SOUTHEASTERN ALASKA:

A new Dungeness crab operation began in November 1962 at the village of Metlakatla. A company has been formed to process and ship fresh Dungeness crab meat to Seattle by

Lively dungeness crabs in a live well aboard a crab fishing boat.

air freight. Several boats from the village salmon fleet have been equipped with crab pots, but landings in November were small because of bad weather and inexperienced fishermen. Current plans are to fish the bays and inlets in the Ketchikan-Prince of Wales Island area and to avoid the more exposed waters of Dixon Entrance and Hecate Strait.

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HERRING IN GOOD ABUNDANCE IN SOUTHEASTERN ALASKA:

Although the single herring reduction operator in Southeastern Alaska took 14,000 tons of herring in the 1962 season, which was about half of the 1961 catch, the catch per unit of effort measured in boat-ton days was 1,340 pounds, the second highest since 1929. The 1958 year-class formed 80 percent of the catch taken in 1962.

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GAINS SEEN IN 1962 CATCHES OF SEVERAL FISHERIES:

Alaskan fishermen have caught more salmon and halibut in 1962 than they did in 1961.

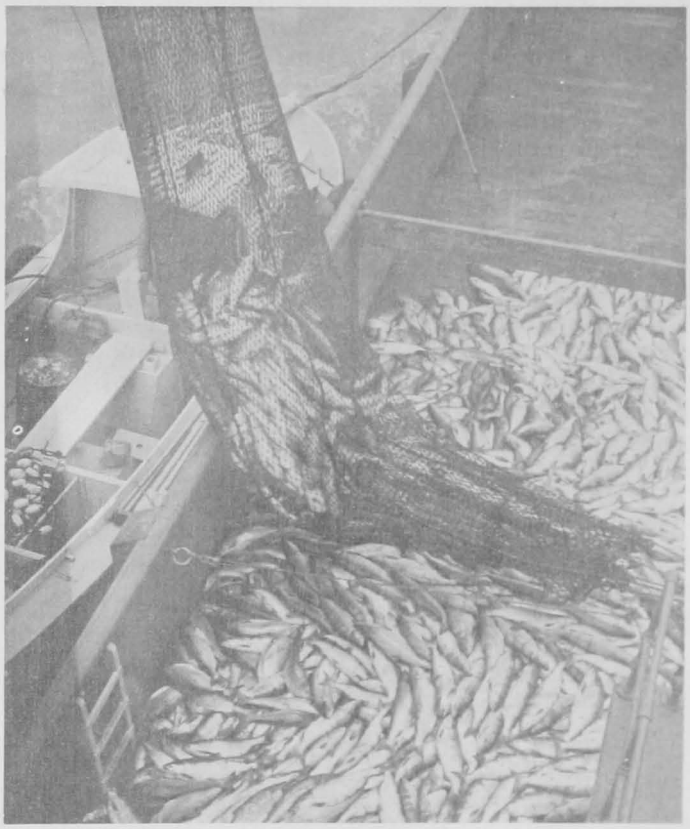

Fig. 1 - Brailing red salmon from gill net boat to buying scow in Bristol Bay.

It is apparent that record catches of king crab, shrimp, and probably Dungeness crab will have been taken when final data are available. On the basis of the reported pack of canned salmon, it has been estimated that the 1962 catch of salmon in Alaska totaled approximately 280 million pounds--15 million pounds more than in 1961. In 1962, the catch of halibut in Alaska totaled approximately 36 million

Fig. 2 - Shrimp being transported from landing dock to processing plant.

pounds (round weight), while in 1961 the catch was 33.4 million pounds. It is estimated that the catch of king crab in Alaska will top 50 million pounds; the record 1961 catch totaled 43.4 million pounds. The 1962 catch of Dungeness crab is expected to surpass the record catch of 5.5 million pounds taken in 1951. A catch of approximately 25 million pounds of shrimp in 1962 will exceed the record 1961 catch by about 9 million pounds.

Alaska Fisheries Investigations

The following is a report of the November-December 1962 activities and studies by the U. S. Bureau of Commercial Fisheries Biological Laboratory, Auke Bay, Alaska.

CONVERTED OCEANOGRAPHIC VESSEL:

The Murre II is the latest tool adopted by the Biological Research Laboratory, Auke Bay, in its expanding oceanographic program in Alaska. The vessel completed its initial cruise, and during November analysis of data collected was begun.

The Murre II is a self-propelled power barge 86 feet long with a 24-foot beam. She is powered by twin caterpillar Diesel engines and will do 8 knots. The vessel is equipped with living accommodations for 9 people and 2 laboratories, one approximately 10 by 15 feet and the other about 8 by 16 feet. There are about 720 square feet of usable forward deck space, with limited working space on the stern.

The objectives of the Laboratory's oceanographic program for the first 2 or 3 years will be to conduct reconnaissance surveys of certain areas of Southeastern Alaska known to be important nursery grounds and migration routes of commercially valuable fish and shellfish and to describe the dominant properties of those marine environments.

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PINK SALMON EGG MORTALITY IN LITTLE PORT WALTER:

A field party traveled to Little Port Walter aboard the vessel Heron in early November to continue observations on the abundance of

Enumerating pink salmon fry on their outmigration at Sashin Creek, Little Port Walter, in Southeastern Alaska.

dead 1961 brood-year pink salmon eggs in the Sashin Creek spawning beds at Little Port Walter. A sizable number of dead 1961 brood eggs equal to the number observed in mid-August was still present in late October, and plans are being made to sample again in the spring of 1963 to determine if 1961 brood-year eggs are present at that time. Large numbers of decomposing residual eggs in the spawning gravel could result in excess mortalities among the eggs of the next brood year.

Such a decrease in salmon productivity would argue for more accurate determination of optimum numbers of spawning fish and avoidance of overescapement as well as underescapement.

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KING CRAB TAGS RECOVERED IN SHUMAGIN ISLAND AREA:

Only about 15 tags were collected in the Shumagin Island area, partly due to the limited fishery there. In contrast to the Kodiak king crab fishermen, fishermen in the Shumagin Islands and Alaska Peninsula areas are primarily salmon fishermen. Therefore, those king crab stocks are not as extensively fished as they are in the Kodiak area.

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RECORD MIGRATION DISTANCES FOR SALMON REVEALED IN YUKON RIVER STUDIES:

Studies conducted by the Bureau in connection with the proposed Rampart Canyon project have resulted in the discovery of salmon migration unparalleled on the North American continent. In the Yukon River, the chinook or king salmon travel as far upstream as Nesutlin Lake in Yukon Territory, Canada, a distance of some 2,000 miles.

Chum or dog salmon have been observed at Teslin Lake in Yukon Territory, a distance of 1,735 miles from salt water. Only in the Amur River of Siberia are chums known to approach such far-distant movement to reach their spawning areas. Normally, chum salmon spawn relatively close to salt water. Because of the Yukon River chum's adaptation to this long distance migration journey, those chums are extremely fine fish, the meat being very deep orange in color and having a high content of oil to sustain the fish on the extended journey.

Cohos or silver salmon pass the proposed damsite beginning in late September, and apparently finish their ascent to the spawning areas under the ice during the winter months. Cohos tagged near the damsite in October have been recovered in December as far upstream as Old Crow, Yukon Territory, some 1,600 miles above the mouth of the Yukon. Reliable reports from Indians of Old Crow, located north of the Arctic Circle, indicate that cohos spawn in spring areas during February, an additional 200 miles further upriver than the recovery point of tagged fish.

In the 1962 agreement between the Department of the Army and the Department of the Interior it was agreed that the Department of the Interior shall initiate, in cooperation with the State of Alaska and interested Federal agencies, broad comprehensive studies of the effect of the Rampart project on all natural resources. This study shall be completed prior to any recommendations for authorization of the Rampart project. Preliminary discussions have been held with personnel of the Bureau of Reclamation District Office in Alaska, who have been assigned the responsibility of compiling and assembling this report for the Department.

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EXPERIMENTS TO INFLUENCE RED SALMON CHOICE OF HOME STREAMS:

Experiments are proceeding at the Bristol Bay-Brooks Lake Station whereby sockeye salmon are subjected to morpholine which is being continuously introduced into Hidden Creek during the egg and fry stages. It is anticipated that this same chemical may be used to influence their choice of home streams when they return to spawn as adults. This will be tested by discontinuing morpholine in Hidden Creek and introducing it instead into a neighboring tributary. In the low winter temperatures, freezing of morpholine in certain pipe connections at the metering site on Hidden Creek required modifications of the butane heating system; however, the project in December was operating smoothly. If adult salmon runs can be attracted to other than their ancestral streams in this manner, a valuable management and research technique will be available.

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OLSEN BAY PINK SALMON EGG LOSS HIGH FROM OVERSPAWNING:

The exceptionally high pink salmon spawning run into the research stream at Olsen Bay in 1962 resulted in a loss of eggs after the maximum numbers successfully deposited had been reached. In the early stages of the run where there was little or no competition for space and the females could defend their redds, there was a fairly close agreement between actual and potential egg deposition. When the accumulated number of eggs buried

in the spawning bed reached approximately 3,600 per square meter, additional spawners started to dislodge as much as two-thirds as many eggs as they successfully deposited. The maximum number of eggs which were successfully deposited was about 4,200 per square meter. After all spawning had been completed, the number of eggs per square meter was about 3,300. While the loss of 900 eggs per square meter is attributed largely to the excess spawning activities, some flooding did occur and accounted for some of the losses.

American Fisheries Advisory Committee

COMMITTEE ASKS EFFORT TO MEET WORLD FISHERIES COMPETITION:

Five steps which would help American commercial fishermen meet the competition of foreign fishing fleets were outlined by the American Fisheries Advisory Committee at its meeting in Kansas City, Mo., in December 1962, the Department of the Interior reported on December 19.

The 20-member Committee was established in 1955 under the Saltonstall-Kennedy Act and includes leading representatives of the commercial fishing industry from all parts of the Nation. It advises the Secretary of the Interior on fishery matters.

Steps outlined by the Committee were:

1. Increased scientific and economic research of fisheries.

2. More authority for international commissions in fish management and harvesting.

3. Modernization of United States fishing vessels and shore installations to equal those of competing nations, vessel loans, grants, and mortgage insurance where such programs apply.

4. Improvement of production and marketing techniques to build a better knowledge of fishery products and better markets.

5. Development of untapped resources which exist in tremendous quantities.

Among other problems which were discussed at the three-day meeting (December 3-5) were the effects of pesticides on fish life, grading and inspection of fishery products, development of new fishing gear, and the importance of mid-America to the fishing industry as a major market for fishery products.

Frank P. Briggs, Assistant Secretary of the Interior for Fish and Wildlife, opened the meeting by asking the committee to consider carefully the international implications involved in the conservation of the living resources of the sea.

Donald L. McKernan, Director of the U. S. Bureau of Commercial Fisheries, emphasized the political and economic impact which the European Economic Community, the Trade Expansion Act, and other major domestic and international developments are likely to have on this Nation's commercial fisheries consistent with yield.

Membership of the American Fisheries Advisory Committee includes Ammon G. Dunton, White Stone, Va.; J. Roy Duggan, Brunswick, Ga.; Thomas D. McGinness, Irvington, Va.; Roy Prewitt, Lonoke, Ark.; Ralph E. Carr, Kansas City, Mo; Harold F. Cary, Long Beach, Calif.; Chris Dahl, Petersburg, Alaska; George J. Davidson, Boston, Mass.; Louis Fischer, Cocoa, Fla.; Ray H. Full, Vermilion, Ohio; H. R. Humphreys, Jr., White Stone, Va.; Leon S. Kenney, St. Petersburg, Fla.; E. Robert Kinney, Gloucester, Mass.; John S. McGowan, Astoria, Oreg.; James McPhillips, Mobile, Ala.; John Mehos, Galveston, Tex.; Arthur H. Mendonca, San Francisco, Calif.; Einar Pedersen, Seattle, Wash.; and Daniel H. Smith, Port Washington, Wis.

The next meeting will be in Washington, D. C., May 27-29, 1963.

Califronia

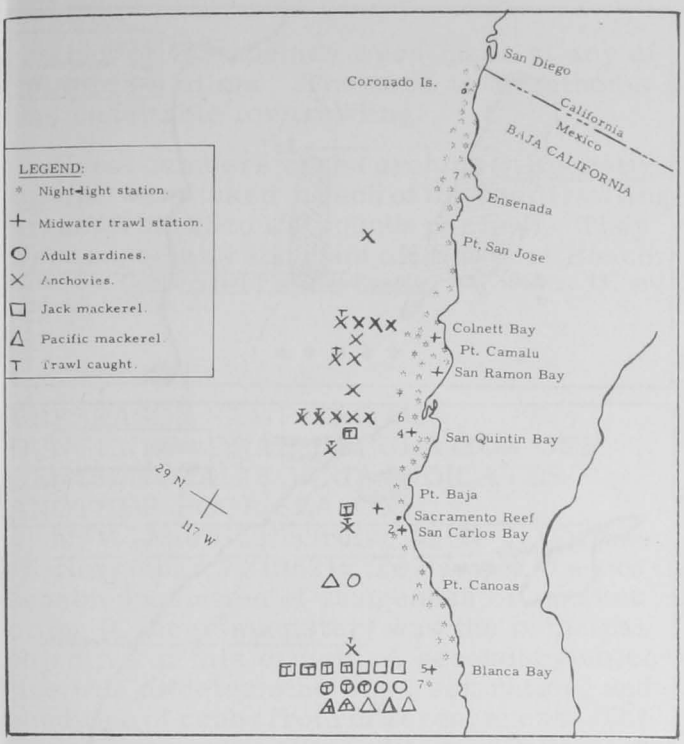
PELAGIC FISH POPULATION SURVEY CONTINUED:

M/V "Alaska" Cruise 62-A-6-Pelagic Fish (October 10-November 6, 1962): The coastal waters off the Pacific Coast of northern Baja California from Blanca Bay to the Coronado Islands were surveyed by the California Department of Fish and Game research vessel Alaska. The objectives were (1) to assess the strength of the 1962 sardine year-class and to determine the population density and distribution of adults; (2) to survey other pelagic

A Comparison of Trawl Catches with Light Station Catches from the Same Area

Area	Fishing Method	Station Number	Pacific Sardine	Northern Anchovy	Pacific Mackerel	Jack Mackerel	Pacific Round Herring	Jack Smelt	Pacific Pompano	California Barracuda	All Other Fish 1/	Squid
Blanca Bay	Trawl	I*	1			77						
		II*	2		9	4		6			2	1
		III		500			19		11		2	
		IV	255		4	2	2	1	150		32	
		V				1		16	36		11	7
	Light	1	500		1	88						
		2					5					
		3	17		23	4		400				
		4			1	5						
		5										
		6										
		7										
San Carlos	Trawl	VI*		4 tons						220		
		VII										
	Light	10										
Sacramento Reef	Trawl	VIII*				1					18	20
San Quintin Bay	Trawl	IX*										200
		X		500							5	
		XI		1,500		46			2		2	
		XII		3 tons								
	Light	27		5								1
		28										
		29										
		30										
		31										
		32		6,000								
		33		100								
San Ramon Bay	Trawl	XIII*		300							8	
	Light	40										
Colnett Bay	Trawl	XIV		200							1	
	Light	47		3								
		48										
		49		1								100

*Denotes daytime trawl; all others were made at night.
1/"All other fish" includes bat ray, California lizardfish, kelp pipefish, ocean whitefish, white croaker, queenfish, halfmoon, kelp perch, sharpnose seaperch, Pacific sanddab, California halibut, fantail sole, spotted turbot, hornyhead turbot, slim midshipman, and stargazer.



M/V Alaska Cruise 62-A-6-Pelagic Fish (October 19-November 6, 1962).

species for distribution, abundance, and age composition; (3) to continue testing a midwater trawl as a sampling device for pelagic species; and (4) to obtain live juvenile sardines for growth and scale studies.

The 1962 sardine year-class appeared to be very weak in the area. Fish-of-the-year were not observed or sampled at any of the 80 night-light stations occupied. Adult fish were absent except south of Pt. Canoas (see chart) where 3 samples were taken. Two of those were collected in Blanca Bay and were in the same size range (187-204 mm. or about 4.7-5.2 inches) as those found there on the previous cruise. The third sample was taken during daylight hours at Pt. Canoas. Several schools were seen there at sundown, but none was attracted to the night light.

No sardine schools were observed during 370 miles of night scouting. The sardine population in 1962 appears to be the lowest on record.

Northern anchovies were distributed over much of the survey area. They were present on 10 of 80 light stations and were taken in 7 of 14 midwater trawls. Twenty-seven schools were observed while scouting at night. Heavy local concentrations were present at San Carlos Bay, Pt. Camalu, Colnett Bay, and Pt. San Jose. Sizes ranged from pinheads (70-100 mm. or about 1.8-2.5 inches) to very large adults (130-144 mm. or about 2.5-3.3 inches). The pinhead size and an intermediate group (115-125 mm. or about 2.9-3.2 inches) comprised the bulk of the samples.

Jack and Pacific mackerel were unusually scarce. Four Pacific and 3 jack mackerel samples were collected at night-light stations in areas where sardines were also found.

Two additional samples of jack mackerel were caught by midwater trawling off Sacramento Reef and in San Quintin Bay. No school of either species was observed while night scouting.

Bonito were distributed over almost the entire survey area. They were most abundant in the area from Ensenada to the Coronado Islands where 39 schools were observed.

In order to compare night-light blanket net catches with midwater trawl catches, 2 daytime and 3 nighttime 45-minute surface tows were made at Blanca Bay, then 7 night-light stations were occupied at various points along the trawl tracks on the succeeding night. Pelagic species caught with the trawl included sardines, Pacific mackerel, jack mackerel, anchovies, and round herring. The night trawls produced better catches than the day trawls in number of species and quantities of fish.

The blanket net caught relatively larger catches of sardines and all pelagic fish investigation project species except anchovies. The trawl caught a great many more other species, especially bottom forms.

Trawling was conducted at various other locations along the cruise track, generally within 10 fathoms of the surface. Catches consisted almost entirely of anchovies and corresponded quite well with night-light station catches in the same vicinity. A notable exception was at San Carlos Bay, where the heaviest concentrations of anchovies were found. A 20-minute night trawl loaded the net so heavily the cod end burst, but night-light stations located directly over these fish failed to attract them. A surprising trawl catch of 220 adult barracuda was made in this same area during daytime. One deep tow (100 fms.) for hake over the edge of the continental shelf off Sacramento Reef failed to produce deep water species.

Thus far, the trawl appears to sample anchovies more consistantly than the blanket

net used with a night light. It was felt previously that cruises have grossly undersampled that species because they are frequently negatively phototactic.

Excellent weather prevailed during almost the entire cruise. Sea surface temperatures ranged from 66° F. at Pt. Canoas to 57° F. at Pt. Baja.

Airplane Spotting Flight 62-12-Pelagic Fish (November 15-16, 1962): The survey to determine the inshore distribution and abundance of inshore pelagic fish schools from the United States-Mexican Border to Santa Cruz, Calif., was continued by the Department's Cessna "182" 9042T.

On November 15, 1962, the area from Point Sal to Santa Cruz, Calif., was surveyed. Eighteen anchovy schools were sighted off Cayucos and 14 in San Simeon Bay. Four anchovy schools were counted in Monterey Bay: 2 off Santa Cruz and 2 about 2 miles off the Salinas River. Twelve unidentified schools were close to shore about 2 miles north of Monterey. Despite the scarcity of fish schools, birds were quite active and a few porpoises were present in the middle of the bay.

On November 16, 1962, the coastal area from the United States-Mexican Border to Pt. Conception was surveyed. The only fish seen were 10 unidentified schools off Pt. Loma.

There were small amounts of red tide in Monterey and Santa Monica Bays, and also off Long Beach and Oceanside. The brightest red tide was below Point Loma; in October 1962 the highest intensity was around the Long Beach and Port Hueneme areas. In September 1962 it was brightest in Monterey Bay.

Note: See Commercial Fisheries Review, December 1962 p. 22, November 1962 p. 18, October 1962 p. 11, August 1962 p. 15, July 1962 p. 12, May 1962 p. 14.

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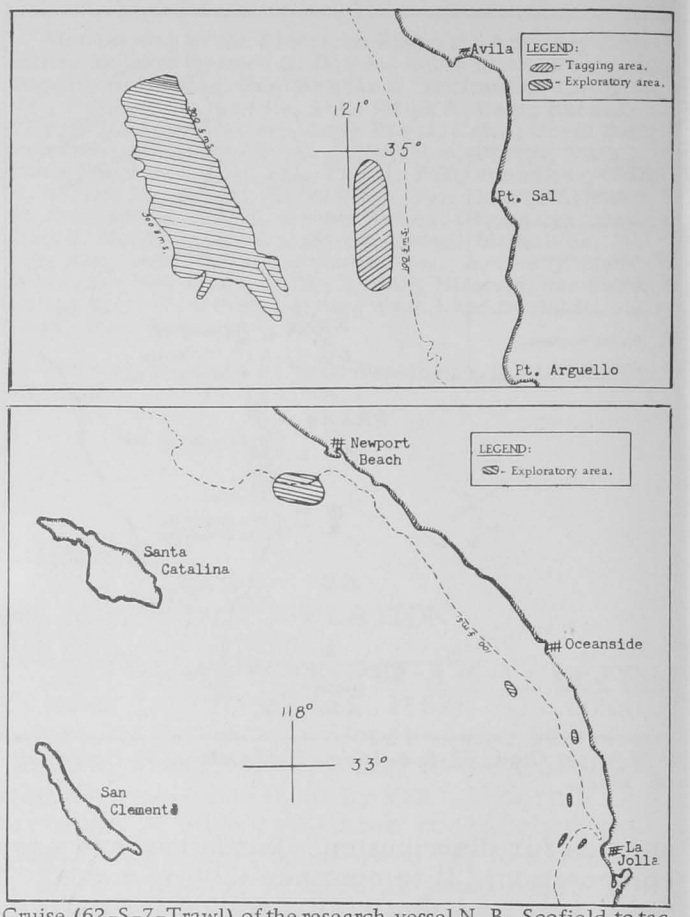
PETRALE SOLE TAGGING AND BOTTOMFISH SURVEY OFF SOUTHERN CALIFORNIA:

M/V "N. B. Scofield" Cruise 62-S-7-Trawl (October 9-November 9, 1962): The offshore waters between La Jolla and Newport Beach, Calif., were surveyed for concentrations of bottomfish, and petrale sole were tagged in deep-water offshore from Pt. Sal by the California Department of Fish and Game research vessel N. B. Scofield.



Cruise (62-S-7-Trawl) of the research vessel N. B. Scofield to tag petrale sole and survey offshore areas for bottomfish.

Between October 11 and November 4, 1962, 350 petrale sole (Eopsetta jordani) were tagged off Pt. Sal in 110 to 190 fathoms, mostly in 170 to 190 fathoms. The fish were tagged with vinyl spaghetti-type tags.

Two days were spent tracking the Pt. Sal area, and one, 1-hour tow was made at 300 fathoms, which yielded approximately 45 pounds of Dover sole (Microstomus pacificus), 50 pounds of sablefish (Anoplopoma fimbria), and small amounts of other species.

Twelve tows were made in Newport Beach area from 70 to 300 fathoms. The most predominant species were English sole (Parophys vetulus), Dover sole, rex sole (Glyptocephalus zachirus), sablefish, and greenspotted rockfish (Sebastodes chlorostictus).

Two tows were made in the Oceanside area: one at 50 and the other at 250 fathoms. Each tow was of 30 minutes duration. No significant poundage of fish was taken in either tow.

In the La Jolla area three tows were made at 50, 200, and 250 fathoms. No significant

catches of any species were made at any of the three stations. The area in 50 fathoms was unsuitable for trawling.

Great numbers of sea urchins (Allocentrotus sp.) were taken in each of the four trawling areas (from 25 to 150 pounds per tow). They were especially abundant off Newport Beach.
Note: See Commercial Fisheries Review, July 1962 p. 13, and March 1962 p. 21.

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PRESEASON SAMPLING OF DUNGENESS CRAB POPULATION OFF CENTRAL CALIFORNIA INDICATES ANOTHER POOR SEASON:

M/V "Nautilus" Cruise 62-N-2j (October 16-November 7, 1962): To sample the preseason population of Dungeness or market crabs (Cancer magister) was the principal objective of this cruise. A secondary objective was to determine size, sex ratios, and condition of crabs from different areas. The cruise was made by the California Department of Fish and Game research vessel Nautilus in the coastal waters off central California from Point Montara to the Russian River.

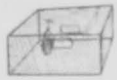

Dungeness Crab
(Cancer magister)

According to the survey, the California biologists believe the catch for the 1962/63 season will be between the 1961 season's catch of 687,000 pounds and the 1960 season's take of 2,300,000 pounds. Adjustment of those figures by percentages indicates total 1962/63 landings will fall between 728,000 and 1,600,000 pounds.

Sampling stations were selected randomly from the crabbing areas between Point Montara and the Russian River. Fifty 40-inch commercial-type crab traps, without escape ports, were fished in 10 to 40 fathoms of water. A string of 10 traps was baited with rockfish carcasses and squid and allowed to fish overnight at 71 stations, except at 6 stations strings were not pulled for 48 hours and one string fished 64 hours because of bad weather and vessel trouble.

In all, 5,508 crabs were taken in the traps, 2,844 legal-size males, 2,545 sublegal-size males, and 119 females. The average legal catch per trap of 4.1, was only slightly higher than the 3.2 legal-size crabs per trap taken in 1961 when San Francisco fishermen had their worst year on record for the area. The sublegal-size catch of 3.52 per trap was down from 1961 so the picture is not bright for the San Francisco crab fishermen.

The catches were scattered over the entire area in waters generally 10 to 30 fathoms deep. The best catch however, was in 34-37 fathoms off Point Reyes and averages 28 legal-size crabs per trap. Other deep-water sets were not as productive.
Note: See Commercial Fisheries Review, October 1962 p. 9.



Cans--Shipments for Fishery Products, January-October 1962

The amount of steel and aluminum consumed to make cans shipped to fish and shellfish canning plants during January-October 1962 was 7.5 percent above that used during the same period in 1961. Before 1962, the figures covered only tinplate cans, but beginning with January 1962 aluminum cans are included. It is believed that only a small amount of aluminum is being used in cans used for fishery products at present.

A total of 2,680,088 base boxes of steel (tinplate) and aluminum were used in the manufacture of cans shipped to fishery plants during the first ten months of 1962, whereas in the same period of 1961 (when only tinplate was reported 2,493,931 base boxes of steel were consumed.

The increase was due mainly to larger packs of Maine sardines, shrimp, salmon, and tuna during 1962.

Note: Statistics cover all commercial and captive plants known to be producing metal cans. A "base box" is an area 31,360 square inches equivalent to 112 sheets 14"x20" size. The 1962 data are derived by use of the factor 21.8 base boxes per short ton of steel.

Central Pacific Fisheries Investigations

FEEDING BEHAVIOR OF SKIPJACK TUNA STUDIED:

M/V "Charles H. Gilbert" Cruise 62 (November 26-December 18, 1962): The main purpose of this cruise by the Charles H. Gilbert, research vessel of the U. S. Bureau of Commercial Fisheries Biological Laboratory at Honolulu, was to capture and bring back live tuna for use in the Laboratory's research on the behavior, sensory powers, and learning ability of these commercially-valuable and often elusive fish. The cruise was conducted in the vicinity of the Island of Oahu and did not exceed a 65-mile radius from Honolulu.

The biologists succeeded in bringing back unusually good numbers of several tuna species, all of them extremely sensitive fish which literally die at the slightest touch. By using delicate handling technique developed by the Laboratory and by making many trips back and forth between Kewalo Basin and the fishing grounds, the vessel delivered alive to the shoreside behavior study tanks 13 aku (oceanic skipjack), 61 kawakawa (little tunny), 18 ahi (yellowfin tuna), and 13 frigate mackerel (Auxis thazard). These fish were immediately subjected to intensive tests and observations, because their survival in captivity is unpredictable and has never been of more than a few months' duration at best.

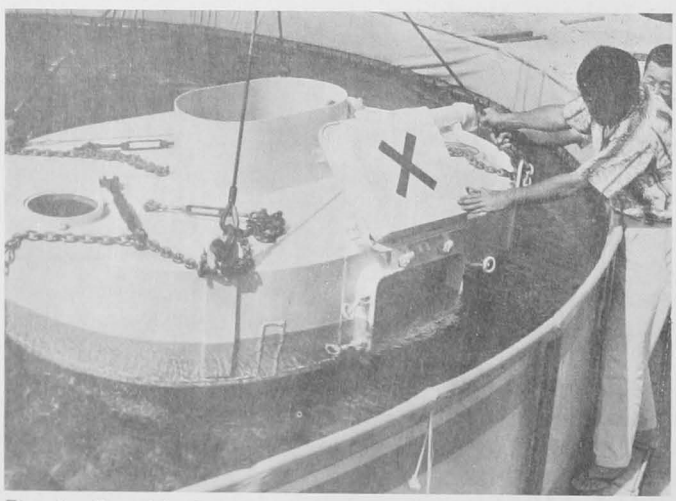


Fig. 1 - Portable skipjack tank in pool of U. S. Bureau of Commercial Fisheries Biological Laboratory, Honolulu.

While fishing for live tuna specimens was in progress the biologists aboard the vessel took the opportunity to study through underwater observation ports in the vessel's hull the feeding behavior of skipjack. The live bait used to bring the tuna in to the fishermen's hooks included both nehu (the common Hawaiian tuna bait fish) and tilapia (used with surface water sprays) from the State's bait-raising plant, so the scientists were able to observe the reactions of the skipjack to two different kinds of prey.

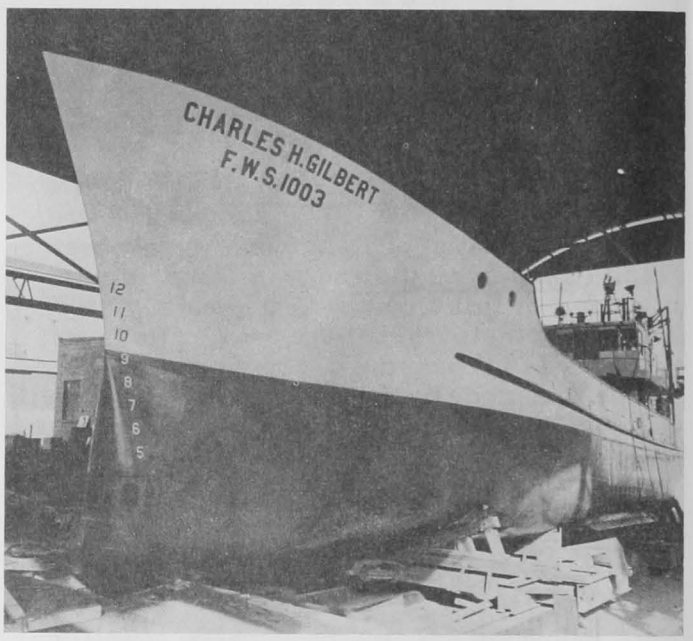


Fig. 2 - Underwater observation chamber in bow of research vessel Charles H. Gilbert.

The studies are designed to compare the feeding behavior of skipjack when (1) two different species (nehu and tilapia) are used as bait and (2) surface water sprays are used with tilapia as bait.

The behavior of skipjack as they fed alternately on nehu and tilapia was recorded on movie film on three occasions. The size range of the skipjack was different in each of the experiments: 22-40 cm. (8.7-15.7 inches), 50-62 cm. (19.7-24.4 inches), and 60-71 cm. (23.6-28.0 inches). Skipjack of the smallest size group were accompanied by yellowfin tuna and of frigate mackerel of similar sizes.

Many of the tuna caught on the cruise failed to survive to be placed in the Laboratory's tanks, and from 98 of the skipjack which did not, blood samples were taken for typing. The results will be used in the Laboratory's Pacific-wide investigation of the distribution and relationships of tuna subpopulations and particularly the problem of how many different populations of skipjack contribute to the Hawaiian commercial fishery.

The watch for bird flocks and fish schools resulted in 28 sightings of which 6 were skipjack; 1 mixed skipjack, yellowfin, and frigate mackerel; 2 little tunny; 1 mixed little tunny and frigate mackerel; 1 porpoise; and 17 unidentified.

A writer with the U. S. Naval Photographic Center in Washington, D. C., boarded the ship for one day on November 28 to collect material for a script on oceanographic research in the United States.

The first right gill arches of 56 skipjack, 13 little tunny, and 6 frigate mackerel were collected and frozen for the behavior program.

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SEASONAL AVAILABILITY OF HAWAIIAN SKIPJACK TUNA MAY BE PREDICTED FROM STUDIES OF OCEANOGRAPHIC CLIMATE:

Oceanographic research at the Honolulu Biological Laboratory of the U. S. Bureau of Commercial Fisheries has shown that the Hawaiian oceanographic climate is primarily determined by seasonal changes in surface water movement. During spring and summer California Current Extension water spreads northward into the Hawaiian Islands, displacing the higher salinity North Pacific Central water. This process is reversed in later summer and fall when the California Current Extension water retreats southward and higher salinity water returns to the islands. The timing and intensity of these water movements are reflected in the monthly changes of sea surface temperature and salinity which are regularly measured at Koko Head, Oahu.

It has always been suspected that seasonal changes in the trade wind system were the cause of the seasonal surface water movements, however, not until an investigation of the time-sequence temperatures and salinities from Koko Head was made, was it possible to associate changes in the trade wind system with those ocean processes. Recently a preliminary analysis was made of the monthly mean sea level pressure charts in terms of the location of the center of trade wind action and the strength of the trade wind system. This indicated that during the period of northward displacement of the California Current Extension water the center of wind action was located over the California Current Extension. During the period of southward displacement, the center was located over the North Pacific Equatorial system. Onset of northward and southward movement coincided with the change of location of the center of trade wind action.

It also became apparent that the strength of the system, an index combining the geostrophic (defective force due to rotation of the earth) wind speed with the size of the system, is a more important parameter than trade wind speed alone. Maximum strength of the trade wind system occurs during July and August and minimum strength during December and January, which is in phase with maximum and minimum surface water motion as reflected by the Koko Head temperature data. Maximum and minimum wind speeds, on the other hand, do not coincide with the maximum and minimum intensity of surface water movement.

If these relationships found in the average situation hold during a forthcoming investigation of individual years, then important progress will have been made in gaining understanding of the linkage mechanism between wind action and surface water motion in the Hawaiian region. It will also make possible prediction of season skipjack availability in Hawaiian waters directly from weather charts. This prediction is presently based on the time of initial heating at Koko Head.

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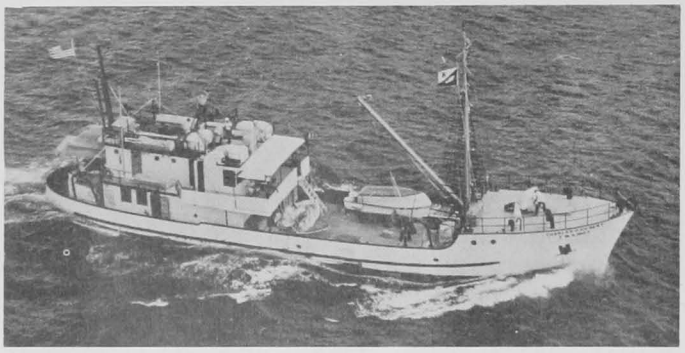
RESEARCH VESSEL SCOUTS FOR SKIPJACK TUNA EAST OF HAWAII:

A search for skipjack tuna (aku) in a new area and with new fishing methods was initiated on January 10, 1963, by the U. S. Bureau of Commercial Fisheries Honolulu-based research vessel Charles H. Gilbert. This cruise, to which the name Boundary I has been given, will take the ship to the vicinity of 150° W. long., about 450 miles east of the Hawaiian Islands, in an area which Bureau scientists consider likely to be the winter range of the skipjack tuna schools which



Research vessel Charles H. Gilbert of the U. S. Bureau of Commercial Fisheries.

support a productive summer fishery in Hawaiian waters.

The "boundary" for which the cruise is named is the division between two important water types of the central Pacific, the California Current Extension, and the North Pacific Central water. Studies carried out around the Hawaiian Islands during the summer fishing season have indicated that skipjack schools are numerous in the vicinity of this boundary. This cruise is aimed at discovering whether this is also true in winter, when the boundary lies to the east and south of the Islands. The scientists will find the location of the boundary by measuring the salt content of the ocean surface water and will then fish in the boundary and to the north and south of it to discover how it is related to the abundance of skipjack.

Fishing for skipjack tuna, both commercially and for scientific sampling, is generally done with pole-and-line and live-bait, and the research vessel will carry in her bait tanks a supply of the hardy tilapia for the purpose. However, because the area to be surveyed is so far from base and because of the duration of the cruise (almost 2 months), it will not be possible to rely entirely on live-bait fishing. Therefore, the vessel's crew will fish for skipjack with tuna long lines, similar to those used in Hawaiian waters for catching large tuna and marlins, but with hooks and bait more suited to the smaller skipjack. A small-scale long line of the type used for salmon fishing in the northwestern Pacific will also be tried out.

One of the main purposes of sampling skipjack tuna east of Hawaii, in addition to that of gaining information on the relation of the fish to water types, is to collect specimens of blood for typing. Examination of the blood types will reveal whether the skipjack tuna found along the boundary in winter are members of the population which supports the Hawaiian summer fishery or another population.

Many fishery scientists believe that the skipjack tuna offers the greatest production potential of all the tuna species. Although many thousands of tons of this small tuna are taken by the existing fisheries off Hawaii, Japan, and the Central and South American coasts, there is evidence that the yield could be greatly increased if more efficient ways of discovering and capturing the schools could be devised. Recent indications that yellowfin tuna production in the eastern Pacific is nearing its natural limits have heightened the United States fishing industry's interest in the skipjack tuna resource, an interest that is reflected in the present cruise of the Charles H. Gilbert.

Composition of Fishery Products

NEW METHOD FOR DETERMINING PHOSPHORUS IN FISHERY PRODUCTS:

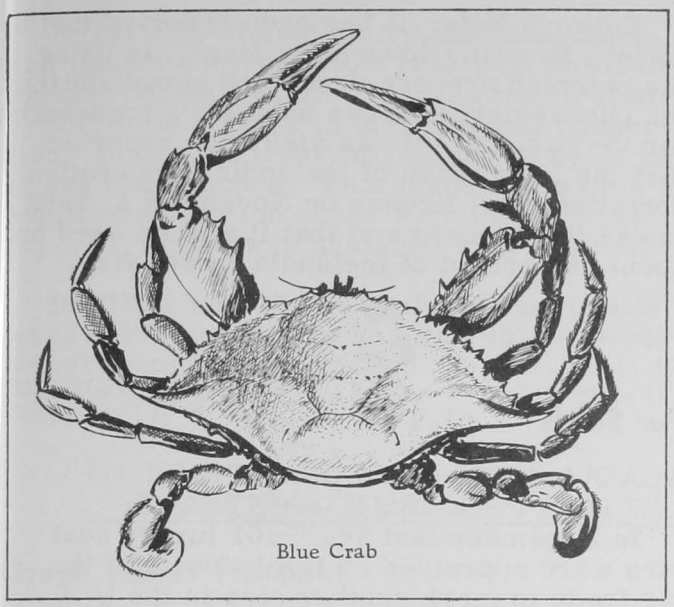
Evaluation of methods of phosphorous determination are under study by the U. S. Bureau of Commercial Fisheries Laboratory at Seattle, Wash., because of the existing need for a more rapid and accurate method for determination of phosphorous in fishery products. The studies and research have resulted in the discovery of a new method.

The new method involves burning a fishery product sample in an oxygen-filled flask containing dilute nitric acid, which absorbs the gases upon boiling. The phosphate is then determined colorimetrically. The total time required for phosphorus determination is now less than one-half hour. This is quite a substantial improvement over the old method which was time consuming (taking many hours), and even less accurate.

Crabs

LOW BLUE CRAB CATCH PREDICTED IN CHESAPEAKE BAY FOR 1962/63 WINTER:

Despite the fact that the first week's crab dredge catch was good early in December 1962, the quantity of blue crabs in the Chesapeake Bay during the 1962/63 winter was still considered to be small. Dredge boat catches until

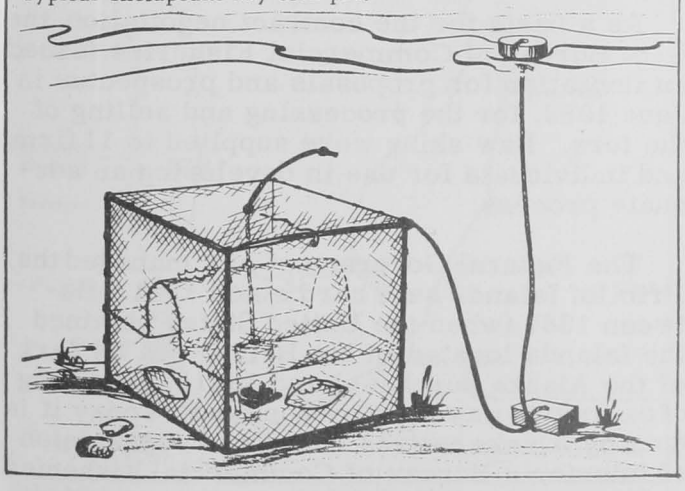


Blue Crab

the end of March should be much below average, according to biologists of the Virginia Institute of Marine Science, Gloucester Point, Va. An average catch, based on more than 30 years of records, would be about 11 barrels of crabs a day. While catches up to the boat limit of 30 barrels per day have been made by many dredgers since the opening of the dredge season December 1, catches were expected to decline rapidly to 10 or fewer barrels by the end of the month and then further decline in January.

An early indication that the supply would be small came from Tangier, where crab houses reported low catches of soft and peeler crabs this summer. Further indications came in the fall of 1962 with reports of low catches of hard crabs by crab pots throughout the lower Bay.

Typical Chesapeake Bay crab pot.



The picture appeared similar to that of the winter of 1959/60, when scientists also predicted below-average catches. December 1959 opened with large catches too, but catches dropped to about 10 barrels the middle of the month and then continued a slow decline over the next two months. Although the supply was supplemented with truck shipments from the Carolinas, some of the crab houses were operating only about three days a week.

"Relief from the short supply in the Bay may not be in sight in 1963," a marine scientist at the Virginia Institute of Marine Science reported. "The 1962 hatch of crabs appears to have been light, and our tenative prediction is that the stocks will remain low through 1963 and until August 1964. We have seen signs of a very late fall hatch, but the crabs were too small to be caught in our experimental trawl net surveys and we have been unable to estimate their number. Nothing further can be learned about the size of the crop until field surveys begin again in May 1963."

Delaware River Basin

COOPERATIVE FEDERAL-STATE STUDY YIELDS DATA ON FISHERIES RESOURCES:

A study of fisheries conditions in the Delaware River had been conducted cooperatively over the past four years by the U. S. Fish and Wildlife Service and the States of New Jersey, New York, and Pennsylvania. The study has produced a mass of valuable data which needs to be analyzed and evaluated in order to be useful for the protection and improvement of the fisheries resources of the Delaware River Basin. The Delaware River Basin Commission in a formal resolution urged that Federal funds be made available to the U. S. Fish and Wildlife Service for this purpose. (Delaware Basin Bulletin, November 1962.)

Frozen Fish

PATENT GRANTED FOR CHEMICAL SOLUTION THAT REDUCES DRIP:

A new treatment designed to reduce the thawing and cooking drip of frozen fish involves dipping the fish in certain chemical

solutions before the fish are frozen. The inventor of the new treatment claims that his method produces no undesirable side effects. He also claims that frozen fish treated according to his invention have a reduced tendency to turn yellow and are less susceptible to the development of rancidity. (Patent Number 3,036,923, granted May 29, 1962, to John H. Mahon, Scott Township, Allegheny County, Pa., assignor to Hagan Chemicals & Controls, Inc., Pittsburgh, Pa.)

In describing the important agents in the new chemical solutions covered by the patent, the inventor states, "The exact mechanism by which my invention produces its remarkable results is not known. I have found that the sodium and potassium molecularly dehydrated phosphates having a molar ratio of alkali metal oxide to P_2O_5 of about 1 to 1 to about 2 to 1 will significantly reduce thawing drip. . . .when I refer to the 'molecularly dehydrated phosphates,' I mean to include both crystal-line and glassy forms within the specified range of ratios of alkali metal oxide to P_2O_5.

The inventor tested certain solutions covered under the new patent on fresh fish fillets. The fillets were air-expressed from Boston, Mass., to Pittsburgh, Pa., under continual refrigeration. After dipping in the test solutions which were held at 40° F., the fish fillets were allowed to drain, thoroughly, weighed, sealed in polyethylene bags, and frozen at 0° F. The frozen fillets were then held from 7 to 85 days before thawing. The test solutions were evaluated by measuring thawing drip, phosphate pickup, dip uptake, and pH of the fillets. One of the most effective additives in the test solutions was sodium tripolyphosphate ($Na_5P_3O_{10}$) in a concentration of about 12.5 percent. When used in a 4-percent brine solution, that additive reduced thawing drip from fillets held frozen for 34 days to 0.3 percent; used alone the same additive reduced thawing drip from fillets held frozen for 35 days to 1.8 percent. ("Thawing drip" is the weight of fluid lost on thawing calculated as a percentage of the weight immediately before freezing; that is the weight after being dipped and drained.)

The results from various test solutions are described in detail in the patent. A copy of Patent No. 3,036,923 can be obtained for 25 cents from the Commissioner of Patents, Patent Office, U. S. Department of Commerce, Washington 25, D. C.

Editor's Note: It has been reported that a fishery firm in Gloucester, Mass., is using the patented process described above and that the Gloucester firm has obtained a trademark for the process. It has also been reported that the Federation of Icelandic Cooperative Societies got a license on November 8, 1962, to use the process and that it will be used on about 16 percent of Iceland's frozen fish.

Fur Seals

ALASKA SKINS APPRAISED PRIOR TO LETTING PROCESSING CONTRACT:

In December last year, 101 luxury seal furs were appraised by five experts of the fur trade to mark another step in the U. S. Department of the Interior's program to select a contractor to process Alaska's Pribilof Islands fur seal harvest. The industry experts who participated in the recent appraisal were from Chicago and New York City.

The 101 first were submitted by 4 of the 5 firms which have expressed an interest in securing a Government contract for processing the Pribilof Islands fur seal skins. The old contract with the Fouke Fur Company of Greenville, S. C., was terminated on December 31, 1962.

The next step in the selection of a contractor was to submit the luxury furs to the U. S. Bureau of Standards for physical and chemical tests. The ability of the firm to fulfill the contract also was to be considered before any award was made. Selection of the contractor or contractors was expected to be made after February 1963.

As a basis for the contract negotiation, the U. S. Bureau of Commercial Fisheries issued an invitation for proposals and prospectus in June 1962, for the processing and selling of the furs. Raw skins were supplied to 11 firms and individuals for use in developing an adequate process.

The Federal Government has managed the Pribilof Islands seal herd since 1911. Between 1867 (when the United States obtained the Islands located in the Bering Sea as part of the Alaska purchase) and 1911, harvesting of seal skins was done by contract. Today it is done by Alaska natives under the supervision of Interior's Bureau of Commercial Fisheries.

In 1911 the United States, Canada, Japan, and Russia entered into a treaty on the management of fur seals. This was the first step by the United States in international conservation. Under the treaty all killing of seals out at sea was stopped. This made it possible to begin conservation of the Pribilof fur seal herd. The task was assigned to the Bureau.

In 1962 about 78,000 of the fur seal pelts were harvested. Furs sold in 1962 were valued at more than $4 million.

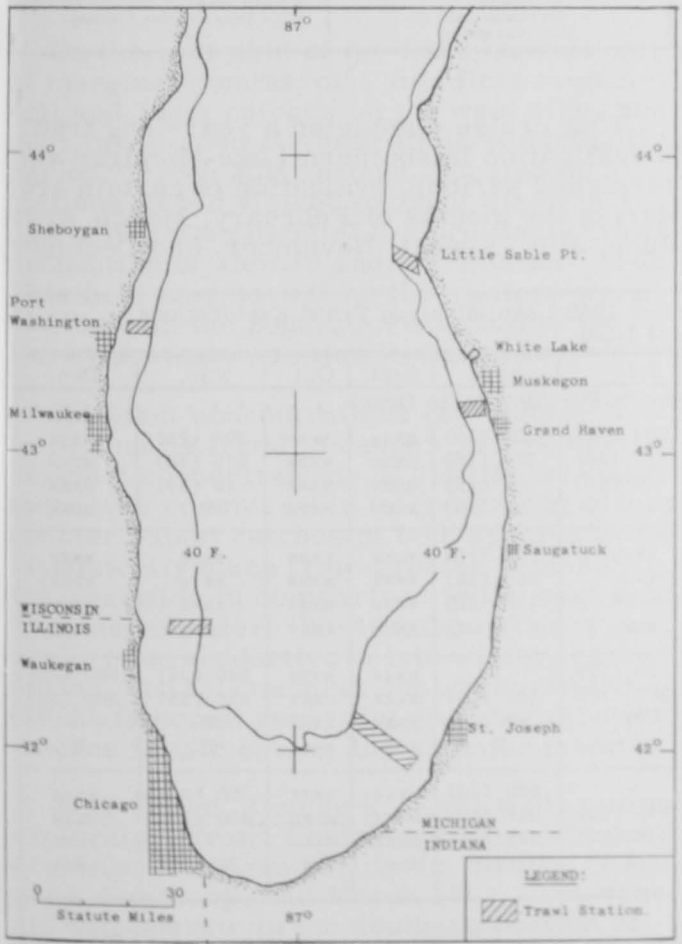
Note: See Commercial Fisheries Review, December 1962 p. 33, August 1962 p. 92, and January 1962 p. 65.

Great Lakes Fisheries

Exploration and Gear Research

TRAWL FISHING EXPLORATIONS OF SOUTHERN LAKE MICHIGAN COMPLETED FOR 1962:

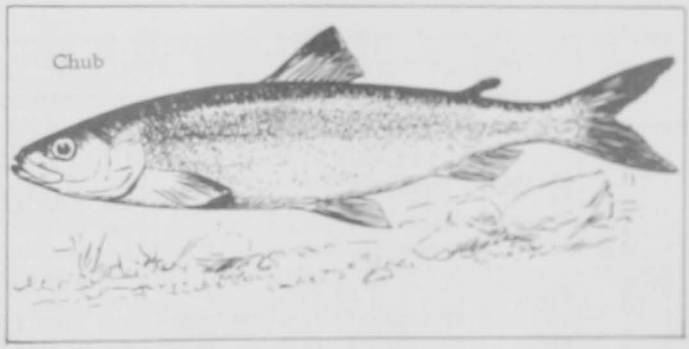
M/V "Kaho" Cruise 6 (November 13-21 and December 11-20, 1962): Trawl explorations along the east and west shores of southern Lake Michigan were completed for 1962 with fishing operations at preselected locations. Conducted by the exploratory fishing vessel Kaho of the U. S. Bureau of Commercial Fisheries, the objectives of the study were to obtain additional seasonal information concerning the depth and geographic distribution of various fish stocks and their availability to commercial-type bottom trawls.



Lake Michigan explorations M/V Kaho Cruise 6 (November 13-21 - December 11-20, 1962).

A total of 48 drags was made at three locations (Benton Harbor, Grand Haven, and Little Sable Point) on the eastern side, and two locations (Waukegan and Port Washington) on the western side of the Lake. All drags were of 30 minutes except one that was terminated when commercial gill-net sets were encountered. Bottom obstructions were met during 4 drags and severe net damage resulted during 3 of them. Standard 50-foot (headrope) Gulf of Mexico-type semiballoon trawls were used.

Fishing results were generally good on both sides of the Lake with the exception of the Port Washington station which was fished in December only (see tables 1 and 2). Best catches from the other stations ranged from 345 to as much as 1,850 pounds per drag in November, and from 905 to 1,150 pounds per drag in December. Most productive depths were 20 to 35 fathoms in November and 25 to 40 fathoms in December.



Alewife and "bloater" chubs dominated all significant catches except those taken during three drags at 15, 20, and 25 fathoms off Waukegan in November. These drags yielded 625, 180, and 270 pounds, respectively, of mostly commercial size yellow perch. Large chubs made up to seven percent of each catch of that species. Except for smelt which were taken in quantities up to 50 pounds per drag, all other species collectively amounted to less than five percent of each significant catch.

Although severe weather conditions prevailed over Lake Michigan during November and December, fishing conditions were good at least 50 percent of the time during each of the cruise periods. The start of the December phase was delayed 3 days due to a record-setting blizzard, and 2 days were lost due to equipment breakdown. Surface water temperatures ranged from 49° to 53° F. in November and from 34° to 43° F. in December.

Table 1 - Trawl Explorations, Lake Michigan (East Side) by M/V Kaho Cruise 6 (Phase I--November 14, 18, 19; Phase II--December 14, 1962)

Nearest Five-Fathom Depth Increment	Areas Fished on Eastern Side of Lake Michigan			
	Benton Harbor	Grand Haven		Little Sable Point
	Phase I	Phase I	Phase II	Phase I
	(Catch Rate--Pounds Per 30-Minute Drag)			
10	T[1]	(71-A) 203 (23-B) (3-0)	0	(94-A) 66 (3-B) (3-0)
15	(96-A)[2] 75 (2-B) (2-0)	(73-A) 219 (22-B) (5-0)	(94-A) 48 (2-B) (4-0)	(64-A) 104 (8-B) (28-0)[7]
20	(87-A) 345 (3-B) (10-0)[3]	(80-A) 250 (17-B) (3-0)	(94-A) 32 (1-B) (5-0)	(36-A) 760 (54-B) (10-0)[8]
25	(82-A) 325 (15-B) (3-0)	(69-A) 436 (27-B) (4-0)	(87-A) 1150 (13-B) (----)	(36-A) 480 (61-B) (3-0)
30	(73-A)[4] 44 (20-B) (7-0)	(57-A)[5] 210 (39-B) (4-0)	(71-A) 700 (29-B) (----)	(59-A) 620 (39-B) (2-0)
35	(67-A) 260 (31-B) (2-0)	(25-A) 474 (70-B) (5-0)	(83-A) 800 (17-B) (----)	(12-A)[6] 410 (85-B) (3-0)
40	(22-A) 310 (75-B) (3-0)	(33-A) 365 (66-B) (1-0)	----	(12-A) 370 (85-B) (3-0)
45	----	----	----	(10-A)[4] 52 (83-B) (7-0)

1/T = Trace (less than 5 pounds).
2/Percentage breakdown of catch by species:
Legend:
A = alewife
B = bloater chub
C = other species
3/Mostly salable size yellow perch.
4/Gear malfunctioned.
5/10-minute drag.
6/Net badly torn.
7/Mostly whitefish.
8/Mostly large "smoker-size" chubs.

Table 2 - Trawl Explorations, Lake Michigan (West Side) by M/V Kaho Cruise 6 (Phase I--November 15, Phase II--December 15, 16, 19)

Nearest Five-Fathom Depth Increment	Areas Fished on Western Side of Lake Michigan		
	Waukegan		Port Washington
	Phase I	Phase II	Phase II
	(Catch Rate--Pounds Per 35-Minute Drag)		
10	----	----	----
15	(10-A)[1] 790 (5-B) (85-0)[2]	(---A) 15 (30-B) (70-0)[4]	----
20	(35-A) 680 (23-B) (42-0)[2]	(---A) 69 (43-B) (57-0)[4]	(---A) 10 (37-B) (63-0)[4]
25	(28-A) 725 (31-B) (41-0)[2]	(10-A) 520 (77-B) (13-0)[4]	T[5]
30	(69-A)[3] 290 (22-B) (9-0)[2]	(2-A) 500 (96-B) (2-0)	(---A) 185 (97-B) (3-0)
35	(54-A) 1850 (43-B) (3-0)	(---A) 405 (99-B) (1-0)	(---A)[3] 41 (98-B) (2-0)
40	(17-A) 1100 (80-B) (3-0)	(33-A) 905 (66-B) (1-0)	(---A) 123 (98-B) (2-0)
45	(50-A) 270 (46-B) (2-0)	(44-A) 455 (55-B) (1-0)	----

1/Percentage breakdown of catch by species:
Legend:
A = alewife
B = bloater chub
C = other species
2/Mostly salable size yellow perch.
3/Net badly torn.
4/Mostly smelt.
5/T = Trace (less than 5 pounds).

This cruise completed a year-long trawl investigation in southern Lake Michigan which furnished periodic evaluation of certain areas during the months of February, March, April, June, July, August, November, and December

Table 3 - Summary of Best Catches, by Major Species, 1962 Lake Michigan Trawl Explorations, Michigan Side of Lake

Area:		Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
		(Catch Rate--Pounds Per 30-Minute Drag)										
Benton Harbor	Alewife	xxxx[1]	xxxx	T[2]	xxx	T	200 (15)	200 (15)	xxxx	xxxx	300 (20)	xxxx
	Bloats	xxxx	xxxx	170 (40)[3]	xxx	185 (25)	175 (25)	175 (15)	xxxx	xxxx	235 (40)	xxxx
	Perch	xxxx	xxxx	5 (10)	xxx	--	70 (10)	6 (10)	xxxx	xxxx	16 (20)	xxxx
	Smelt	xxxx	xxxx	T	xxx	--	T	7	xxxx	xxxx	T	xxxx
Saugatuck Holland	Alewife	--	10 (40)	T	xxx	80 (10)	xxxx	5 (10)	xxxx	xxxx	xxxx	xxxx
	Bloats	87 (35)	110 (35)	135 (25)	xxx	160 (15)	xxxx	260 (15)	xxxx	xxxx	xxxx	xxxx
	Perch	150 (20)	12 (25)	T	xxx	T	xxxx	135 (10)	xxxx	xxxx	xxxx	xxxx
	Smelt	T	T	T	xxx	T	xxxx	---	xxxx	xxxx	xxxx	xxxx
Grand Haven	Alewife	xxxx	xxxx	10 (40)	xxx	25 (10)	10 (15)	T	xxxx	xxxx	360 (30)	1000 (25)
	Bloats	xxxx	xxxx	184 (30)	xxx	110 (35)	300 (15)	505 (15)	xxxx	xxxx	330 (35)	200 (30)
	Perch	xxxx	xxxx	T	xxx	T	T	40 (10)	xxxx	xxxx	T	--
	Smelt	xxxx	xxxx	T	xxx	--	--	T	xxxx	xxxx	T	T
Little Sable Point	Alewife	xxxx	xxxx	10 (35)	xxx	80 (10)	--	520 (10)	xxxx	xxxx	365 (30)	xxxx
	Bloats	xxxx	xxxx	210 (30)	xxx	105 (20)	340 (10)	510 (15)	xxxx	xxxx	400 (20)	xxxx
	Perch	xxxx	xxxx	T	xxx	T	5 (10)	15 (10)	xxxx	xxxx	T	xxxx
	Smelt	xxxx	xxxx	T	xxx	T	T	T	xxxx	xxxx	30 (20)	xxxx

1/xxxx = No fishing effort.
2/T = Trace (less than 5 pounds).
3/Figures in parentheses indicate nearest 5-fathom depth increment from which catches were taken.

Table 4 - Summary of Best Catches, by Major Species, 1962 Lake Michigan Trawl Explorations, Wisconsin-Illinois Side of Lake

Area:		Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
		(Catch Rate--Pounds Per 30-Minute Drag)										
Waukegan	Alewife	xxxx[1]	xxxx	xxxx	xxx	130 (20)[2]	400 (15)	T[3]	xxx	xxx	1000 (35)	300 (40)
	Bloats	xxxx	xxxx	xxxx	xxx	400 (25)	580 (20)	285 (25)	xxx	xxx	880 (40)	600 (40)
	Perch	xxxx	xxxx	xxxx	xxx	5 (15)	145 (15)	--	xxx	xxx	625 (15)	T
	Smelt	xxxx	xxxx	xxxx	xxx	T	50 (15)	T	xxx	xxx	60 (20)	45 (25)
Milwaukee	Alewife	xxxx	xxxx	xxxx	xxx	65 (15)	30 (15)	--	xxx	xxx	xxxx	xxxx
	Bloats	xxxx	xxxx	xxxx	xxx	340 (25)	195 (35)	500 (35)	xxx	xxx	xxxx	xxxx
	Perch	xxxx	xxxx	xxxx	xxx	T	T	--	xxx	xxx	xxxx	xxxx
	Smelt	xxxx	xxxx	xxxx	xxx	--	15 (20)	--	xxx	xxx	xxxx	xxxx
Port Washington	Alewife	xxxx	xxxx	13 (25)	xxx	15 (20)	T	T	xxx	xxx	xxxx	T
	Bloats	xxxx	xxxx	435 (30)	xxx	285 (20)	320 (20)	1000 (20)	xxx	xxx	xxxx	180 (30)
	Perch	xxxx	xxxx	T	xxx	--	--	--	xxx	xxx	xxxx	--
	Smelt	xxxx	xxxx	450 (20)	xxx	T	T	T	xxx	xxx	xxxx	6 (20)
Two Rivers	Alewife	xxxx	xxxx	T	xxx	20 (25)	xxxx	60 (20)	xxx	xxx	xxxx	xxxx
	Bloats	xxxx	xxxx	365 (40)	xxx	85 (40)	xxxx	320 (20)	xxx	xxx	xxxx	xxxx
	Perch	xxxx	xxxx	--	xxx	T	xxxx	--	xxx	xxx	xxxx	xxxx
	Smelt	xxxx	xxxx	350 (30)	xxx	T	xxxx	5 (20)	xxx	xxx	xxxx	xxxx

1/ xxxx = No fishing effort.
2/ Figures in parentheses indicate nearest 5-fathom depth increment from which catches were taken.
3/ T = Trace (less than 5 pounds).

(see tables 3 and 4). Severe winter weather conditions curtailed operations through March.

On the east side of the Lake catches were of marginal commercial significance in April and June; catches on the west side, however, were good at some stations during that period. From July through December, all stations fished yielded catches which indicate a definite potential for profitable trawl production of alewife and/or "bloater" chubs. This held true each time the stations were visited with the possible exception of the Port Washington station in December.

Heaviest concentrations of "bloater" chubs were usually found in deeper waters than the heaviest concentrations of alewife, although there was considerable intermingling of these species. Best catches of both species were consistently taken from greater depths on the west side in comparison to the east side. The deeper waters (20-40 fathoms) were generally most productive in late winter, early spring, and fall months; shallower depths (10-25 fathoms) generally yielded the better catches in late spring and summer months.

M/V "Kaho" Cruise 8: Kaho will continue exploratory trawl fishing operations in southern Lake Michigan during the months of January, February, and March 1963. The vessel will operate in the southern portion of the Lake in a transect extending from Sauga-tuck, Mich., on the east shore, to Racine, Wis., on the west shore.

The primary objective of the cruise will be to extend seasonal knowledge concerning the depth distribution and abundance of various fish stocks and their availability to bottom trawls. The results will provide information for Lake conditions and depths not studied in previous explorations.

Echo-sounding equipment will be used to survey bottom features and record fish concentrations. A 50-foot (headrope) Gulf of Mexico-type otter trawl will be towed at depths ranging from 5 to 90 fathoms to assess the commercial fishing potential. A 65-foot (headrope) western-style bottom trawl will be used in commercial production efforts where conditions warrant. Hydrographic and meteorological data will be collected at all fishing localities.

The M/V Kaho (Cruise 7) was scheduled to participate in a cooperative investigation with the U. S. Public Health Service during January 1963.

Note: See Commercial Fisheries Review, October 1962 p. 15, June 1962 p. 16.

Great Lakes Fishery Investigations

SPAWNING OF WHITEFISH IN APOSTLE ISLANDS AREA OF LAKE SUPERIOR SURVEYED:

M/V "Siscowet" Cruise 9 (November 13-28, 1962): The annual assessment of spawning whitefish in the Apostle Islands area of western Lake Superior was made during cruise 9 of the U. S. Bureau of Commercial Fisheries research vessel Siscowet.

Large-mesh gill nets ($4\frac{1}{2}$- to $5\frac{1}{2}$-inch mesh) fished at depths of 3 to 6 fathoms on spawning grounds off Cat Island yielded 184 spawning whitefish (152 males, 32 females). The fish ranged in length from 16.1-23.8 inches; 169 were tagged and released. One whitefish which had been tagged on the same spawning grounds in 1961 was recovered. This is our first indication that whitefish may have a homing instinct. Water temperatures on the whitefish spawning grounds ranged from 40.3°-42.8° F.

Small-mesh gill nets ($1\frac{1}{2}$- and $2\frac{1}{2}$-inch mesh) fished with the large-mesh nets on whitefish spawning grounds caught longnose suckers, round whitefish, and lake herring. Stomachs were examined from fish of each species, but only the round whitefish contained fish eggs. Since round whitefish, lake herring, and lake whitefish were all in spawning condition, the fish eggs were not positively identified.

Nearly $1\frac{1}{2}$ quarts of fertilized eggs were collected from round whitefish for studies of embryonic and larval development. Attempts to collect eggs from pygmy whitefish were unsuccessful; only a few were caught, all of which were females.

Studies were continued on the abundance and distribution of juvenile lake trout in the Apostle Islands area. Trawl tows yielded 394 lake trout, of which only one was not fin clipped. Nearly all of the fish were returned to the water after removal of the anal fin. Lake trout which had been planted from shore in the Bayfield area in 1962 were most common in the catches; fish from the 1961 and 1960 Bayfield plants were also well represented.

Note: See Commercial Fisheries Review, February 1962 p. 24.

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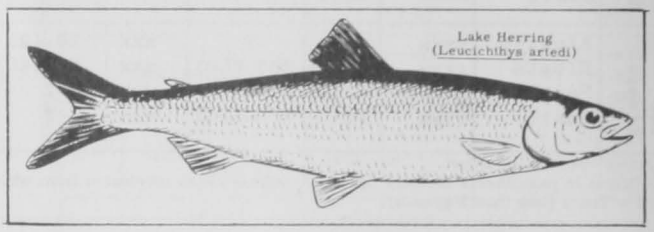
SPAWNING HABITS OF LAKE HERRING AND CHUBS SURVEYED IN APOSTLE ISLANDS AREA:

M/V "Siscowet" Cruise 10 (December 3-13, 1962): Spawning habits of lake herring and chubs were studied in the Apostle Islands region of Lake Superior by the U. S. Bureau of Commercial Fisheries research vessel Siscowet. Most lake herring had spawned by December 3, but chubs (Coregonus hoyi, C. zenithicus) had not spawned by December 13. In previous years, lake herring and chubs have spawned at about the same time in that region. Fertilized eggs were collected from lake herring for studies of embryonic and larval development.



Although young-of-the-year alewives were taken in nearly every trawl tow during the fall of 1961, none were taken in 1962. Only 3 alewives (adults) were captured during the entire 1962 season.

Trawl tows at 18-22 fathoms in Pike's Bay yielded 66 juvenile lake trout, of which only 1 was not fin-clipped.

Of 1,873 small (less than 17 inches long) lake trout captured by the Siscowet in the

Fin-Clipped Lake Trout Recaptured in 1962 by M/V Siscowet

Season, Year of Planting, Rearing Station, and Brood Stock	Recaptured During 1962	
	Total Recaptured	Number per 10,000 Fish Planted
Spring 1962:		
Bayfield-Marquette brood.	586	23
Pendills Creek-Marquette brood.	274	23
Fall 1962:		
Pendills Creek-Marquette brood.	70	6
Spring 1961:		
Bayfield-Marquete brood. .	315	29
Pendills Creek-Marquette brood.	280	26
Bayfield-Green Lake brood .	33	3
Fall 1960:		
Bayfield-Green Lake brood .	14	3
Spring 1960:		
Bayfield-Apostle Islands stock.	221	14
Spring 1959:		
Bayfield-Apostle Islands stock.	36	2

Apostle Islands region in 1962, 1,839 (98.2 percent) were fin-clipped. Most of the marked lake trout were returned alive to the water; more than 1,000 were re-marked by removal of the anal fin in an attempt to obtain information on population density, but only 3 of those were recaptured.

The table lists the number of fin-clipped lake trout recaptured from the various plantings and the number of fish caught per 10,000 lake trout planted. The data are based on a total of 184 15-minute trawl tows. Recaptures of less than 10 fish from a single planting are not listed.

Surface water temperature near the end of the cruise was 36.5° F. The cruise was terminated prematurely because of subzero temperatures and high winds.

Note: See Commercial Fisheries Review, January 1963, p. 31, December 1962 p. 37, November 1962 p. 24, October 1962 p. 17, September 1962 p. 26, August 1962 p. 21.

Gulf Exploratory Fishery Program

SEASONAL DISTRIBUTION OF ROYAL-RED SHRIMP AND HARD CLAMS SURVEYED IN GULF OF MEXICO:

M/V "Oregon" Cruise 83 (November 28-December 21, 1962): The objectives of this cruise by the U. S. Bureau of Commercial Fisheries exploratory fishing vessel Oregon were to continue seasonal assessment of the royal-red shrimp grounds off the Mississippi Delta and Dry Tortugas, to continue studies on the distribution of fauna of the upper Continental Slope between the 100 and 1,000 fathom contours, and to conduct a seasonal check on the shallow-water hard clam beds off western Florida.

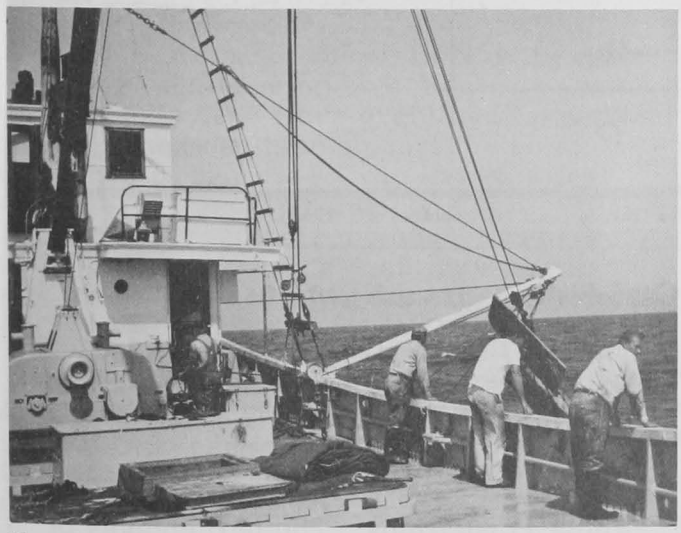


Fig. 1 - Setting the otter trawl on the exploratory fishing vessel Oregon.

Twenty-two trawling stations were completed off the Delta in depths of 100 to 480 fathoms. Concentrations of royal-red shrimp (Hymenopenaeus robustus) were light with best fishing centered between 205 and 225 fathoms. Seven three-hour tows with a 100-foot flat trawl produced only 919 pounds (heads-on) of red shrimp in this depth range. Heads-off count averaged 31-35 shrimp per pound.

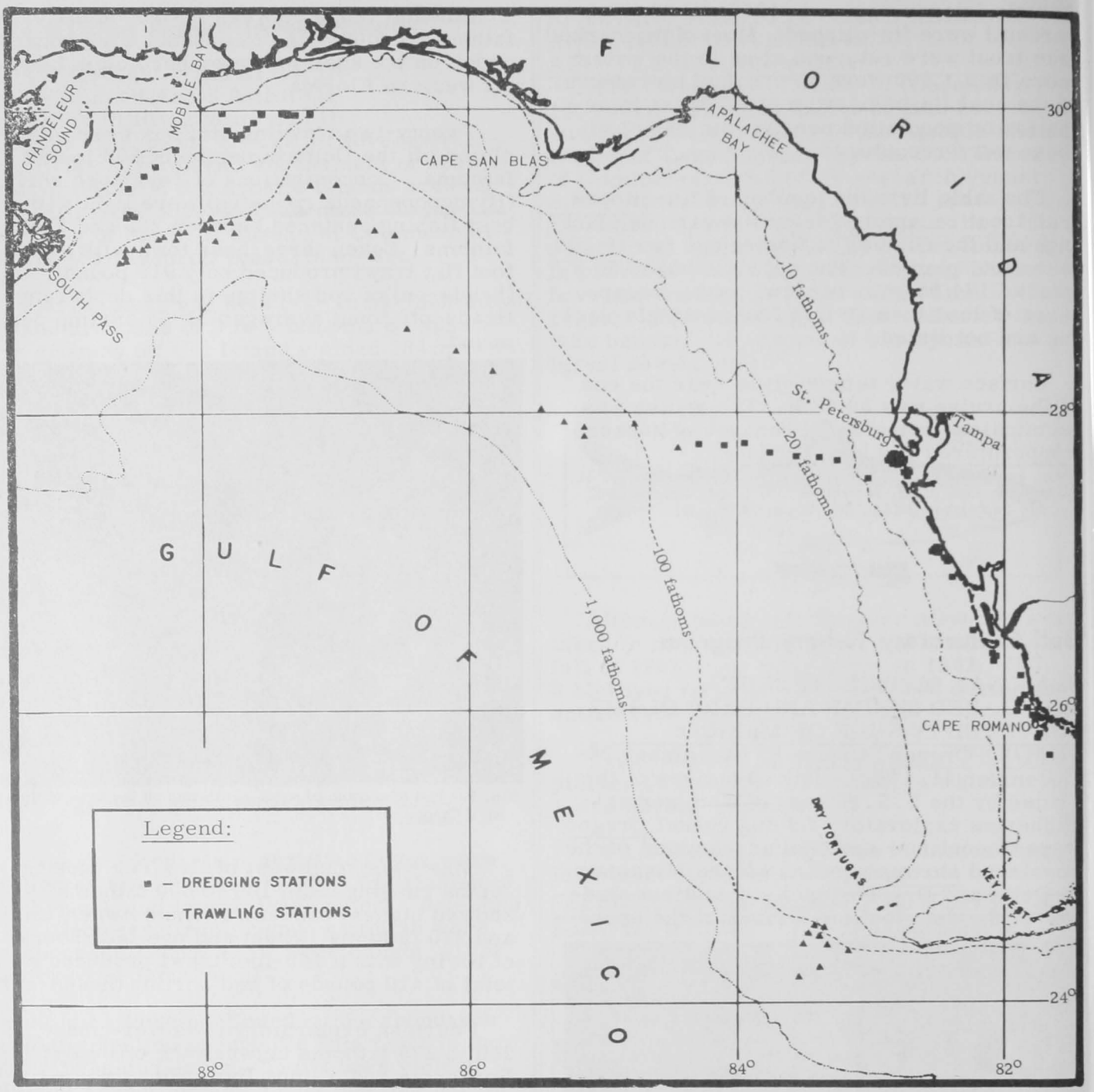
Fig. 2 - Part of a catch of royal-red shrimp on the deck of the M/V Oregon.

Nine tows southwest of Dry Tortugas in depths ranging from 100 to 500 fathoms showed highest concentrations between 190 and 210 fathoms. Eight and one-half hours of towing with a 100-foot trawl produced a total of 410 pounds of red shrimp (heads-on).

Fourteen exploratory tows were made in 200 to 275 fathoms between the offings of Pensacola and Tampa Bay. Red shrimp catches were poor, ranging from 0 to 105 pounds per two-hour tow.

Trawling transects beyond the 500-fathom contour were discontinued due to depth-recorder malfunction.

A total of 44 dredge hauls was made with a 22-tooth Fall River clam dredge along the southwest coast of Florida in depths of 3 to 5 fathoms. Towing time varied from 5 to 45 minutes depending upon bottom conditions. Best fishing was centered off St. Petersburg



Area covered by M/V Oregon during Cruise 83 (November 28-December 21, 1962).

where catches ranged from 20 to 185 hard clams (3-5 inches) per 30-minute tow. Northwest of Gasparilla Island in 4 to 5 fathoms a small area yielded as high as 154 clams in a 15-minute tow. Throughout the entire area worked, heavy beds of pen shells (Atrina rigida) hampered dredging efforts and sampling effectiveness was marginal.

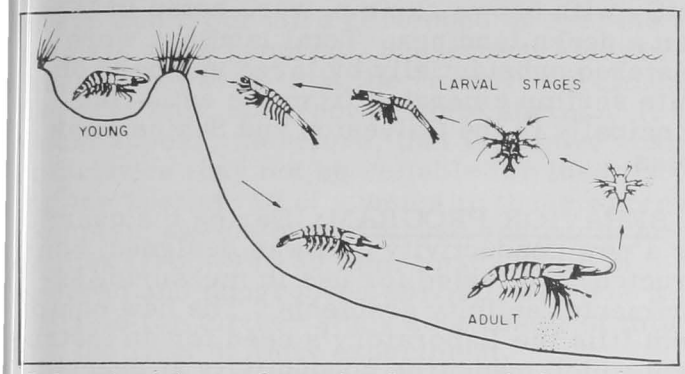
Note: See Commercial Fisheries Review, Jan. 1963 p. 31, November 1962 p. 25, October 1962 p. 19.

Gulf Fishery Investigations

Some of the highlights of studies conducted by the Galveston Biological Laboratory of the U. S. Bureau of Commercial Fisheries during October-December 1962:

SHRIMP FISHERY PROGRAM: Shrimp Spawning Populations: The percentages of

ripe and recently-spawned brown shrimp females taken off Galveston during June, July, and August 1962 agreed with comparable observations in 1961. In both years, females in spawning condition were more abundant at 25 than at 15 fathoms.



Life cycle of shrimp. Spawned in the ocean, the larvae (here greatly magnified) migrate to inshore nursery areas. As the shrimp grow, they return to sea where they support the most valuable of our commercial fisheries.

Preliminary examination of brown shrimp ovaries taken January through June 1962 from widely separated 25-fathom stations along the Texas and Louisiana coasts was completed. The results indicate that ovary conditions in the different samples were generally similar.

Six cruises during the quarter closed out sampling operations for 1962. They yielded biological material which included nearly 11,000 specimens of brown, pink, and white shrimp. All penaeid species appeared to be more abundant at the stations west of Galveston. The mean lengths of brown shrimp taken from the 25- and 35-fathom stations declined, suggesting that the smaller shrimp which were present in July and August in $7\frac{1}{2}$ fathoms had moved offshore.

Shrimp Larvae Studies: During the quarter, 180 plankton samples collected between May and July 1962 were examined for penaeid larvae. The results show that the relative abundance of penaeid larvae in statistical areas 14, 16, and 17 remained unchanged from that of the preceding 4 months. However, in all other areas there was an increase in abundance. The increase was most evident in the 0- to 20-fathom zone.

Protozoea, mysids, and postlarvae constituted the bulk of the catch, although a marked increase in the number of nauplii indicated that spawning activity had intensified since the January-April period.

Bait Shrimp Fishery: During the quarter, commercial bait shrimp production in the Galveston Bay area increased by 62 percent over that for the same period in 1961. However, catch per unit of effort for the same period rose by only 9 percent, indicating that demand rather than greater availability of juvenile shrimp was responsible for the increase.

Bait shrimp production in 1962 has surpassed that for any year during the four years the fishery has been given statistical coverage.

Commercial Bait Shrimp Production in Galveston Bay Area, Texas

Year	Catch	Effort	Catch/Effort
	Lbs.	Hrs.	Lbs./Hr.
1962 (Jan.-Nov.)	1,031,500	33,190	31.1
1961	731,200	25,305	28.9
1960	943,400	16,028	58.9
1959	516,800	1/ 9,550	1/ 45.1

1/ For period July-Dec. only.

Migrations, Brown and White Shrimp: As of mid-December, 150 (6 percent) stained and 88 (5 percent) tagged specimens had been recovered from the brown shrimp mark-recapture experiment initiated off Texas in April. Seven were recovered that had been at liberty for more than $6\frac{1}{2}$ months. Preliminary analysis of the data indicates that natural mortality exceeded fishing mortality during the period April-July.

Returns from the brown shrimp projects undertaken in July appear to be complete with 624 (26 percent) and 73 (2.5 percent) recovered from the Grand Isle, La., and Galveston, Tex., experiments, respectively. Over 98 percent of the shrimp recovered from the Louisiana study were taken less than 30 nautical miles from the area of release. The remaining 2 percent had moved less than 60 miles. Almost 90 percent of the shrimp returned from the Galveston experiment were recovered less than 30 nautical miles from the release area. Three of the shrimp from the study traveled more than 130 miles in a southwest direction. In these experiments, the shrimp were marked either with a primary mark and a fluorescent pigment, which can be identified under ultraviolet light, or a primary mark only. No significant difference in the number of returns of the two types of marks was noted.

Two mark-recapture experiments with white shrimp were started during September 1962. A total of 1,905 stained shrimp of a restricted size group was released west of Vermilion Bay, and 2,291 stained shrimp of two different size groups were released

between Cameron, La., and Sabine Pass, Tex. As of mid-December 197 (9 percent) of the marked shrimp had been recovered from the Cameron experiment, and 77 (4 percent) had been returned from the Vermilion Bay experiment. A general westerly movement with little or no movement offshore is indicated by the recapture data.

A short-term mortality experiment conducted in the sea-water laboratory indicated there is no significant difference in the survival rate between shrimp injected with sterile distilled water and those injected with an equivalent amount of fast green FCF as the primary mark, and the fluorescent pigment blaze orange as a secondary mark.

Several groups of shrimp were marked with different fluorescent pigments and primary marks to determine the longevity of the secondary marks, and to determine whether those marks can be differentiated from one another. It appears that 5 of the 6 fluorescent pigments tested can be differentiated, thereby increasing from 2 to 12 the number of proven staining agents which can be identified and used to mark shrimp.

Migrations of Pink Shrimp: Representatives of the 19,860 small pink shrimp stained and released at Indian Key, Fla., in August and September had been recaptured both on the Tortugas fishing grounds to the southwest and on the Sanibel grounds to the northwest. One marked shrimp was recovered in Boca Grande Channel near the northern end of the Sanibel fishing area approximately 73 nautical miles from the Indian Key release site.

Preliminary analysis of returns from the mortality experiment started off Sanibel Island in March 1962 was completed this quarter.

Between December 11 and 15, 2,350 pink shrimp, carefully sorted to uniform size, were stained and randomly released on the Tortugas grounds. Recoveries were coming in at a rapid rate, reflecting a high degree of activity by about 250 vessels fishing in the area. Comprehensive coverage of five landing ports in south Florida will assure a maximum number of recoveries and also furnish daily fishing effort data needed for analysis. An experiment designed to estimate the number of stained shrimp passing through the fishery unnoticed is also being conducted.

Commercial Catch Sampling: During the quarter, "northers" and fog hampered fishing operations along the Texas and Louisiana coasts. Catch per unit of effort, however, remained relatively high for both brown and white shrimp. Pink shrimp, taken only incidently with brown shrimp, were noted in less than a dozen landings. Total landings were bolstered substantially by large numbers of white shrimp emerging from the estuaries, principally in the Galveston and Sabine Pass areas.

BEHAVIOR PROGRAM: During the quarter a new conductivity cell was designed, constructed, and tested for use in measuring experimental salinity gradients. The new equipment fills the Laboratory's need for an instrument which measures conductivity at precise locations within a salinity gradient. Existing commercial conductivity cells are much less satisfactory in this regard due to their large size and relatively closed construction (which tends to prevent rapid equilibration of fluid within the cell with that outside it).

Using this equipment, an experiment was conducted to determine whether the previous salinity history of juvenile shrimp influences behavior in a continuous salinity gradient. Five shrimp held at 25 ‰ (parts per thousand) were introduced into a salinity gradient (4‰-88‰) together with five shrimp held at 90‰ (near the absolute limiting level for this animal). Observations made over a $1\frac{1}{2}$-hour period showed a marked degree of difference between the salinity ranges of the two groups of animals. These results indicate a definite short-term influence of salinity history on the salinity range subsequently selected. These findings suggest that the capacity for salinity conditioning we previously reported for postlarval shrimp is also possessed by the juvenile. They also serve to emphasize that the salinity preference range for young shrimp is not only broad, but flexible. These characteristics would seem to be of great importance to shrimp during the estuarine phase of the life cycle.

Twenty-five experiments were performed to find out if occasional variation in response to temperature gradients could be associated with stages of the molt cycle. No relationship has yet been observed.

A growth experiment, similar to those in which salinity effects have been tested, has demonstrated speciation problems. Postlarvae

obtained on September 27 and held in the laboratory for 2 weeks were subdivided by size into "large" and "small" groups. Examination of 34 "small" specimens, 12 mm. rostrum-telson length or less, indicated that, on the basis of relative distance from rostrum to eye and from third pereiopod to eye, the animals were grooved. Subsequent study indicated, however, that the "small" specimens were, in fact, nongrooved white shrimp. It would appear, therefore, that the above characteristics may not be reliable for identifying the postlarvae of species in these waters. Complete series of postlarvae and early juveniles (from 9 to 35 mm. total length) of grooved and nongrooved shrimp are now available for further study as a result of this and the first salinity experiment.

Present results indicate that brown shrimp contain more carotenoid pigments than white shrimp of equal size. Using a microhomogenizer, tests have been conducted with whole animals as small as 0.3 gram total weight (about 35 mm. total length).

Considerable time was spent during the quarter testing the "CHROMAC"--a device to speed the development of paper chromatograms for possible use in characterizing shrimp species biochemically. Various solvents, including water-saturated phenol, butanol, acetic acid, water, and propanol were tested in separations of standard amino acid solutions, and in extracts of shrimp muscle. It was found that standard paper chromatographic techniques, though slower, gave better and more reproducible chromatograms of the extracts than the CHROMAC.

Studies on rate of brine shrimp hatch were begun. It has been found that hatch is maximal after 18 hours at 30° C. (86° F.) and after 22 hours at 25° C. (77° F.) with hatch rate decreasing rapidly after these times. Oxygenation increases yields at both temperatures--dramatically so at 30° C. A technique for counting brine shrimp nauplii has been developed and tested for precision and accuracy. This information will be used to quantify the food requirements in future work on growth in immature estuarine animals.

ESTUARINE PROGRAM: Ecology of Western Gulf Estuaries: Analysis of previously collected field data continues. Three areas suitable for comparison in 1961 are (1) Offats Bayou--a small, highly saline body of water with average annual salinity of 18.7‰; (2) Clear Lake-- a small, protected, moderately low saline body with salinity averaging 4.7‰; and (3) Trinity Bay--a large, open bay with salinity averaging 4.0‰, very similar to Clear Lake.

Of the seven most common species caught by trawl in the Galveston Bay system, only one, the spot, was abundant in Offats Bayou. Five of the remaining species, the brown shrimp, white shrimp, croaker, sand sea trout, and blue crab, were much more numerous in Clear Lake than in Trinity Bay even though salinity was similar. Only the bay anchovy was equally abundant in the two low salinity areas. The apparent preference of those species for Clear Lake could very well be a result of sampling bias. Collection stations in Trinity Bay were further from the shore zone than in Clear Lake. Additional study is needed to resolve this problem. With the following reservations, periods of peak abundance for the seven species varied considerably from year to year but for a particular year occurred almost simultaneously in each of the three areas. Peaks were generally reached first in Offats Bayou, then in Clear Lake and Trinity Bay, the latter two areas being farthest removed from the Gulf. Neither the time at which peak abundance occurred nor the corresponding level of abundance seemed to be correlated with salinity. Additional study of the data is indicated.

Species abundance also fluctuated considerably from year to year, with amplitude generally highest for the two species of shrimp and lowest for the blue crab. During the period of study (1958-61), maximum seasonal concentrations of both white and brown shrimp occurred in 1960 followed by a sharp decline in 1961. A similar occurrence was not evident for the other species.

The field (sampling) program is being revised to permit a much more detailed comparison between specific subareas within the Galveston Bay estuarine system as a whole. Generally, the system has been divided so that data can be obtained from the near-shore area of the adjacent Gulf, tidal passes, Lower Galveston Bay, Upper Galveston Bay, the mouth of the San Jacinto River, Trinity Bay, and East Bay. A statistical balance between channel, open-water, and shoreline stations in each subarea and between subareas has been incorporated. In addition, tertiary bays or bayous adjacent to each subarea (except the near-shore Gulf area) are included. Sta-

tions are also to be established in the marsh areas adjoining each subarea.

Both hydrological and biological data will be collected. Arrangements have been made with the Corps of Engineers for an exchange of hydrological measurements. The Corps is presently initiating a large field program in the Galveston Bay system to obtain prototype data for a model study. The data resulting from our mutual efforts should provide the basis for obtaining very good definition of the estuary's hydrological parameters.

Effects of Engineering Projects: Under the present system of coordination with the Branch of River Basin Studies, 24 appraisals were made of engineering and mineral development projects potentially affecting fishery resources in Texas estuaries. The majority resulted from the more than 120 Corps of Engineers public notices received during the quarter. Marine fishery sections of 17 Bureau of Sport Fisheries and Wildlife draft reports on water development projects were received for concurrence of recommendations.

Most of the Corps of Engineers public notices dealt with applications for Department of the Army private permits for mineral development, pipeline construction, channel dredging or bulkheading, and filling. Frequently, these projects require modification to reduce damage to the estuarine habitat and dependent fishery resources. When this is the case, recommendations for corrective action are forwarded to the Branch of River Basin Studies, which in turn, requests the Corps of Engineers to require the applicant to modify the original plans. If oyster leases or reefs are involved, the Corps is requested to have the applicant secure approval of the Texas Game and Fish Commission.

INDUSTRIAL FISHERY PROGRAM: Sea Trouts: The average annual landings of sand sea trout (Cynoscion arenarius) and silver sea trout (C. nothus) from the north central Gulf of Mexico have been estimated at 3,382 tons or 8 percent of the total industrial fishery otter-trawl catches for the years 1959 through 1961.

The relative abundance of the two species of sea trout in inshore waters was determined from samples of trawler catches taken routinely from December 1961 to November 1962. The sand sea trout was approximately four times as abundant east of the Mississippi River Delta, and predominated in the samples each season. Samples from catches made west of the Mississippi River Delta showed that the silver sea trout was about $1\frac{1}{2}$ times as abundant as the other species, and was dominant in the samples from late winter through early fall. The average bottom depth at which fishing occurred varied between 4 and 12 fathoms in both areas.

Sand sea trout were more abundant at all contour depth intervals except the 20- to 29-fathom range. Maximum depth at which sand sea trout were caught with a bottom trawl was 60 fathoms. The maximum depth for silver sea trout was 40 fathoms.

Analysis of length-frequency data from catch samples of the M/V Oregon and the industrial trawler fleet shows that a larger size group (21.0-23.5 cm. or 8.3-9.3 inches) of silver sea trout predominated over bottom depths of 20-29 fathoms while a smaller size group (18.5-20.0 cm. or 7.3-7.9 inches) was dominant over grounds less than 10 fathoms. Data for the sand sea trout reveal a similar distributional pattern in fall with a smaller size group (19.5-22.0 cm. or 7.7-8.7 inches) present inshore (7-10 fm.) and a larger group (26.0-27.0 cm. or 10.2-10.6 inches) offshore (60 fm).

Menhaden: Large-scale menhaden (Brevoortia patronus) are present in Alabama, Mississippi, and Louisiana coastal waters throughout the year, but vary in abundance and size according to season and area. Examination of length-frequency data collected each month (November 1961 through November 1962) from samples of commercial bottom-trawl catches disclosed the presence of three principal size groups between Gulf Shores, Alabama, and Ship Shoal, Louisiana.

A principal modal group (9.0 cm. or 3.5 inches) appearing in winter samples from east of the Mississippi River Delta, progressively increased in size through the following fall (15.0 cm. or 5.9 inches). Large fish (modes 16.0 or 6.3 inches, and 18.5-19.5 cm. or 7.5-7.7 inches), which were present in the samples each month, were relatively more abundant in late fall and early winter. Approximately 48 percent of the fish from east of the Delta samples were between 15.5 and 20.5 cm. (or 6.1-8.1 inches) long.

Three discrete modal-length groups were present in samples from west of the Missis-

sippi River Delta. An intermediate group (15.5-16.5 cm. or 6.1-6.5 inches) was prominent in late winter, increased in size through spring and summer, predominated in late summer samples (mode 15.0 cm. or 5.9 inches) and then disappeared in the fall. Fish representing a larger modal group (17.5-19.5 cm. or 6.9-7.7 inches) were relatively more abundant in spring, early summer, and fall. Length-frequency data show that approximately 80 percent of the fish in samples from west of the Mississippi River Delta were between 15.5 and 20.5 cm. (or 6.1-8.1 inches) long.

CONTRACT RESEARCH: Life History of Late Postlarval and Juvenile Pink Shrimp in Everglades National Park Nursery Grounds: This new project, which began on October 1, 1962, seeks accurate quantitative data on young pink shrimp in an outlet of the nursery grounds. Information on relative abundance, sizes of shrimp, sex ratios of shrimp, and movements of shrimp in this canal in response to environmental conditions will be obtained.

To date, the sampling area has been defined and a special sampling net designed and installed in Buttonwood Canal (at Flamingo, Fla.). Initial trials indicate that with some modification of the cod end, the special net can be used to obtain samples on both ebb and flood tides and can be raised and lowered quickly so as not to interfere with boat traffic. Removal of snags by underwater searching and modification of the canal banks to prevent escapement of shrimp around the ends of the net have been accomplished.

The first night sample, taken on December 10, resulted in 90 pink shrimp being caught in 50 minutes. The small numbers were consistent with results for the same season from previous years. In addition, the size distribution of those shrimp was similar to that of shrimp taken in the same general area with dip nets during Decembers of previous years.

After the net was installed, underwater observations showed that at peak current velocities the lead line rose about 18 inches from the bottom of the canal. Additional weights placed on the bottom line of the net did not remedy the difficulty. It was therefore decided to modify the width of the cod end opening to reduce the drag caused by the net and thereby permit the lead line to remain on the bottom of the canal at all current velocities. if the modified net works as expected, regular sampling will be started the first week of January.

Research Contracts: New contracts were awarded to the Gulf Coast Research Laboratory, Ocean Springs, Miss., to undertake research on the occurrence and abundance of postlarval shrimp in the Mississippi Sound area ($30,000), and to the University of Miami to determine the seasonal distribution and density of postlarval and juvenile pink shrimp in Florida Bay-Everglades area ($42,000).

* * * * *

PINK SHRIMP STAINED AND RELEASED FOR MORTALITY STUDIES:

M/V "Silver Bay" Cruise 44 (December 4-17, 1962): To capture, stain, and release live pink shrimp (Penaeus duorarum) caught off the Tortugas Islands (off southwest tip of Florida) was the objective of this cruise by the U. S. Bureau of Commercial Fisheries exploratory fishing vessel Silver Bay.

Despite unusually rough seas, close to 2,300 live pink shrimp were stained and released in excellent condition on the Tortugas fishing grounds between December 11-15, 1962.

Note: See Commercial Fisheries Review, December 1962 p. 40, August 1962 p. 26, and June 1962 p. 20.

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SHRIMP DISTRIBUTION STUDIES IN GULF OF MEXICO:

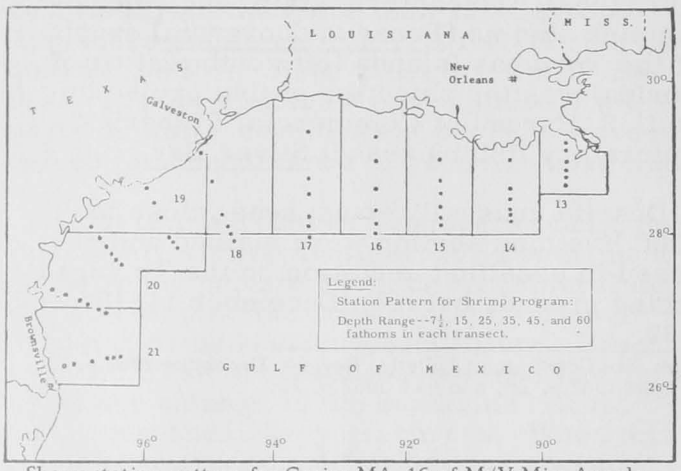
M/V "Miss Angela" Cruise MA-15 (November 29-December 5, 1962): Fair catches of 12-15, 15-20, 21-25 count brown shrimp were caught off the Louisiana coast (except off Cameron) in the 20-40 fathom range by the chartered commercial fishing vessel Miss Angela. The vessel, operated by the Galveston Biological Laboratory of the U. S. Bureau of Commercial Fisheries, is engaged in a continuing study of the distribution of shrimp in the Gulf of Mexico. In addition, catches of brown shrimp and some white shrimp (mostly 21-25 and 26-30 count) were made in the 0-20 fathom depth range.

Five statistical areas (13, 14, 15, 16, and 17) were covered in depths ranging from 0-60 fathoms. One three-hour tow in each of the three ranges (20 fathoms, 20-40 fathoms, and 40-60 fathoms) was made.

The best single catch per three-hour tow was 33 pounds of 15-20 count brown shrimp taken in 20-40 fathoms in statistical area 15. The same area yielded 18 pounds of 26-30 count white shrimp in the 0-20 fathoms depth range. Area 14 yielded 25 pounds of 12-15 count brown shrimp in the 20-40 fathoms depth range, and area 16 yielded 24 pounds of 26-30 count white shrimp in the 0-20 fathom depth range.

Catches were very light from all depth ranges in area 17 (off Cameron, La.).

M/V "Miss Angela" Cruise MA-16 (December 14-19, 1962): Shrimp distribution studies were continued off the Louisiana coast in statistical areas 13, 14, 15, 16, and 17 during this cruise by the chartered shrimp fishing vessel Miss Angela. One three-hour tow



Shows station pattern for Cruise MA-16 of M/V Miss Angela (December 14-19, 1962).

was made in depths of 0-20 fathoms, 20-40 fathoms, and 40-60 fathoms in each of the areas. Some good catches of 15-20 count and 21-25 count shrimp were made in the 20-40 fathom depth range.

The catch in the 0-20 fathom depth range in area 13 was 12 pounds of 31-40 count brown shrimp and a few 26-30 count white shrimp. The catch (all brown shrimp) in the 20-40 fathom depth range was only 4 pounds of 31-40 count and in 40-60 fathoms one pound of 15-20 count.

In statistical area 14, the 20-40 fathom depth range yielded 13 pounds of mixed brown shrimp, and one pound of mixed brown shrimp was taken in 40-60 fathoms. Yield from 0-20 fathoms was less than three pounds of brown, white and pink shrimp.

One tow in area 15 in the 20-40 fathom depth range yielded 12 pounds of 21-25 count brown shrimp and another tow in 40-60 fathoms yielded 10 pounds of 15-20 count brown shrimp. A few small brown shrimp and less than one pound of 26-30 count white shrimp were taken in 0-20 fathoms.

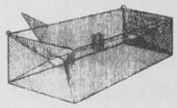
In area 16 no tow was made in the 0-20 fathoms due to fog. The catch of brown shrimp amounted to 16 pounds (15-20 count) in 20-40 fathoms and 11 pounds (12-15 count) in the 40-60 fathoms.

The best catch per tow was made in 20-40 fathoms in area 17--37 pounds of 15-20 count brown shrimp per three-hour tow were caught. The catch from the deeper water (40-60 fathoms) amounted to 6 pounds (12-15 count) of brown shrimp.

The shallow water tow yielded trace amounts of 15-20 count brown shrimp and 2 pounds of 15-20 count pink shrimp.

Notes: (1) Shrimp catches are heads-on weight; shrimp sizes are the number of heads-off shrimp per pound.

(2) See Commercial Fisheries Review, Jan. 1963 p. 32, Dec. 1962 p. 42, Nov. 1962 p. 26, Oct. 1962 p. 21, Sept. 1962 p. 29, Aug. 1962 p. 25.



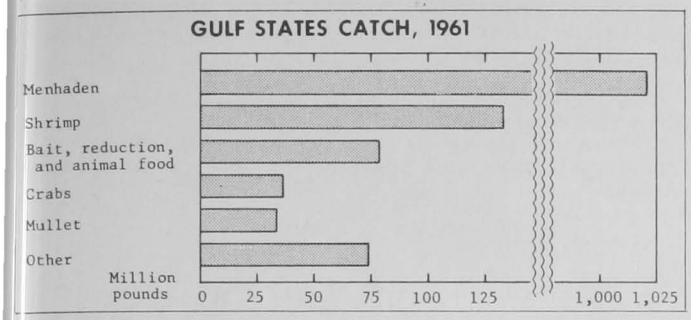
Gulf of Mexico

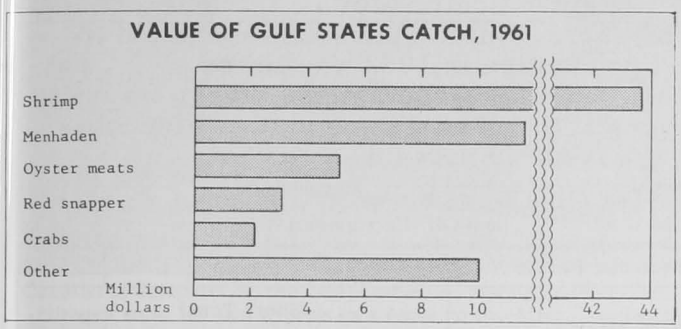
FISHERIES LANDINGS, 1961:

Fish and shellfish landings during 1961 in the Gulf States (West Coast of Florida, Alabama, Mississippi, Louisiana, and Texas) amounted to a record 1.4 billion pounds valued at $75.5 million ex-vessel. This was a

Fig. 1 - Shrimp otter trawlers docked at Aransas Pass, Tex.

gain of 111 million pounds, but a decline of $10 million as compared with 1960.





The increased quantity resulted from record menhaden landings amounting to more than 1 billion pounds--up 180 million pounds over the peak 1960 production. The catch of oysters (18.2 million pounds) and red snapper (11.9) exceeded the 1960 levels by 2.1 and 1.7 million pounds, respectively. Catfish and bullheads, hard blue crabs, and black and red drum were also taken in greater quantities in 1961.

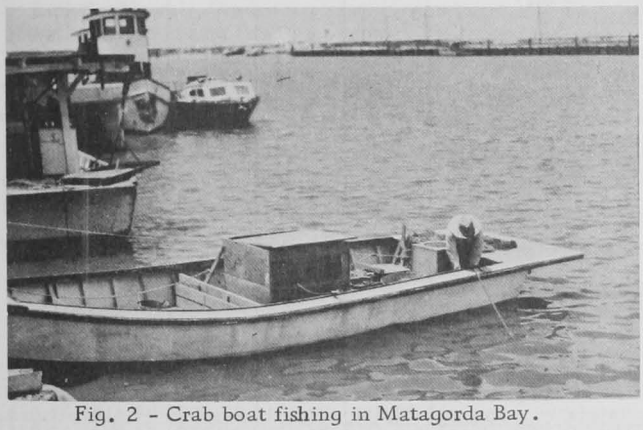


Fig. 2 - Crab boat fishing in Matagorda Bay.

The yield of shrimp (133.8 million pounds) fell 71.9 million pounds below the 1960 level and was the lowest since 1949. The decline in quantity of this high-priced species largely accounted for the marked reduction in value which occurred during 1961.

Three States (Louisiana, Mississippi, and Texas) accounted for 1.2 billion pounds or 90

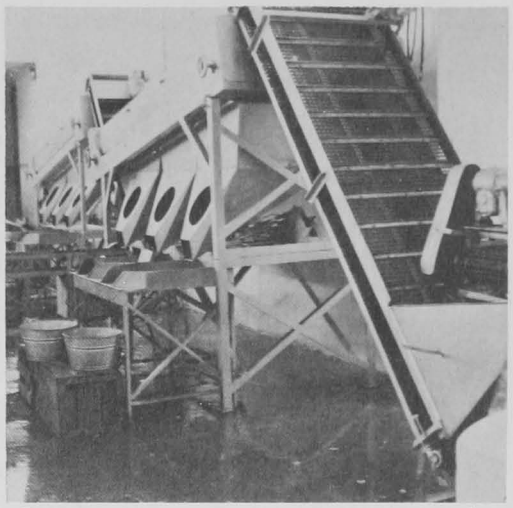


Fig. 3 - Shrimp sorter inside a processing plant in Brownsville, Tex.

percent of the volume; while Texas, Louisiana, and the West Coast of Florida accounted for $66 million or 87 percent of the value.

There were 22,249 fishermen engaged in the Gulf fishery in 1961. Commercial fishing craft operating in those States during 1961 consisted of 3,270 vessels of 5 net tons and over, 8,571 motor boats, and 640 other boats.

Industrial Fishery Products

OXIDATION OF FISH OILS SLOWED BY ADDITION OF PHOSPHOLIPIDS TO ANTIOXIDANT:

Studies on the phospholipids of tuna and menhaden oils at the University of California, in Berkeley, Calif., are being supported by the U. S. Bureau of Commercial Fisheries Technological Laboratory at Seattle, Wash., to determine their role in the oxidation (rancidity) of the oils in fishery products.

It has been found that phospholipids alone do not inhibit oxidation of those oils. However, when phospholipids are combined with a synthetic antioxidant, there is a very significant increase in the ability of the synthetic antioxidant to prevent oxidation. This significance is indicated by the following example. An antioxidant alone will protect menhaden triglycerides from oxidizing for a period of three days. However, the addition of three-percent phospholipid to the antioxidant will protect the triglycerides from oxidation for periods up to three months. This effect is attributable to presence of a nitrogenous

group in the radical phospholipid molecule.

Fish oils are composed of several different classes of chemical compounds including phospholipids. The amount of phospholipid in whole fish does not vary extensively, in that all fish contain between 0.5 and 0.7 percent phospholipids. Thus, most of the lipid content of a low-oil fish with a low-oil content will be phospholipid while in a fish high in oil a much lower percentage of its total oil will be phospholipid.

The work is under the supervision of the Bureau's Technological Laboratory, Seattle, Wash.

* * * * *

U.S. FISH MEAL AND SOLUBLES:

Production and Imports, January-November 1962: Based on domestic production and imports, the United States available supply of fish meal for the first 11 months of 1962 was 45,879 short tons (or 9.7 percent) greater than during the same period of 1961. Domestic production was 7,126 tons (or 2.6 percent) greater and imports were 38,753 tons (or 19.9 percent) greater than in the same 11 months of 1961. Peru continued to lead other countries with shipments of 173,099 tons during the first 11 months of 1962--40,778 tons above the imports in the same period of 1961.

The total United States supply of fish meal in calendar year 1961 of 529,100 tons exceeded the peak year 1959 when the quantity amounted to almost 440,000 tons.

The United States supply of fish solubles (including homogenized fish) during January-November 1962 was 14,151 tons more than during the same period in 1961. Domestic production increased 13.5 percent, but imports dropped 5.5 percent.

U. S. Supply of Fish Meal and Solubles, Jan.-Nov. 1961-62 and Total for 1961

Item	Jan.-Nov.		Total
	1/1962	1961	1961
	(Short Tons)		
Fish Meal and Scrap:			
Domestic production:			
Menhaden	243,531	238,144	247,551
Tuna and mackerel	19,411	19,190	21,243
Herring	3,533	5,268	5,268
Other	19,225	15,972	37,203
Total production	285,700	278,574	311,265
Imports:			
Canada	40,550	35,861	38,218
Peru	173,099	132,321	151,439
Chile	8,475	10,738	12,074
Angola	-	1,543	1,543
So. Africa Republic	9,984	12,626	13,026
Other Countries	1,222	1,488	1,545
Total imports	233,330	194,577	217,845
Available fish meal supply	519,030	473,151	529,110
Fish Solubles:			
Domestic production 2/	121,802	107,305	112,241
Imports:			
Canada	1,286	935	1,001
So. Africa Republic	1,717	1,097	1,351
Other Countries	2,918	4,235	4,387
Total imports	5,921	6,267	6,739
Available fish solubles supply	127,723	113,572	118,980

1/Preliminary.
2/50-percent solids. Includes production of homogenized condensed fish.

* * * * *

U. S. FISH MEAL, OIL, AND SOLUBLES: Major Indicators for U. S. Supply, December 1962:

United States fish meal and fish oil production in 1962 was lower by 0.1 percent and 2.6 percent, respectively, as compared with 1961. Fish solubles production increased 9.9 percent.

Major Indicators for U.S. Supply of Fish Meal, Solubles, and Oil, December 1962

Item and Period	1962	1961	1960	1959	1958
	(Short Tons)				
Fish Meal:					
Production 1/:					
December	2,900	12,750	9,185	14,381	14,636
November	11,023	10,058	8,725	10,791	9,749
Jan.-Oct.	274,954	265,497	242,486	250,218	189,230
Jan.-Dec. prelim. totals 2/	288,877	289,039	257,969	275,396	216,510
Jan.-Dec. final tots.	-	311,265	290,137	306,551	248,140
Imports:					
December	-	23,268	15,564	5,508	8,490
November	11,904	25,649	6,149	3,673	6,082
Jan.-Oct.	221,426	168,928	109,848	123,744	85,780
Jan.-Dec.	-	217,845	131,561	132,925	100,352
Fish Solubles:					
Production 3/:					
December	1,600	4,936	2,897	5,429	6,305
November	4,147	5,140	3,524	4,628	8,888
Jan.-Oct.	117,655	102,345	92,508	155,302	114,984
Jan.-Dec. totals	123,402	112,254	98,929	165,359	130,177
Imports:					
December	-	472	60	420	5,180
November	435	3,649	282	3,089	867
Jan.-Oct.	5,486	2,618	2,832	23,121	8,520
Jan.-Dec. totals	-	6,739	3,174	26,630	14,567
	(1,000 Gallons)				
Fish Body Oils:					
Production:					
December	47	1,488	1,038	1,865	1,839
November	1,027	1,360	1,202	1,147	1,028
Jan.-Oct.	31,524	30,522	24,385	21,352	18,555
Jan.-Dec. prelim. totals 4/	32,598	33,471	26,690	24,418	21,625
Jan.-Dec. final tots.	-	34,409	27,853	24,945	21,977
Exports:					
December	-	1,398	2,108	2,611	383
November	23	190	1,952	813	2,037
Jan.-Oct.	16,361	14,743	15,095	15,840	10,119
Jan.-Dec.	-	16,331	19,154	19,264	12,539

1/Does not include crab meat, shrimp, and misc. meals.
2/Preliminary data computed from monthly data. Fish meal production reported currently comprised 86 percent of the annual total for 1958, 90 percent for 1959, 89 percent for 1960, and 92 percent for 1961.
3/Includes homogenized fish.
4/Preliminary data computed from monthly data. Represents over 95 percent of the total production.
Note: Data for 1962 are preliminary.

* * * * *

Production, December 1962: Preliminary data on U. S. production of fish meal, oil, and solubles for December 1962 as collected by the U. S. Bureau of Commercial Fisheries and submitted to the International Association of Fish Meal Manufacturers are shown in the table.

Chemist is determining the temperature of press cake being discharged from the screw press in a Moss Point, Miss., industrial fishery products plant.

U. S. Production [1] of Fish Meal, Oil, and Solubles, December 1962 (Preliminary) with Comparisons

Area	Meal	Oil	Solubles	Homogenized [3]
	Short Tons	1,000 Gallons	Short Tons	Short Tons
December 1962:				
East & Gulf Coasts. .	886	13	199	132
West Coast [2]	1,993	34	1,232	-
Total.	2,879	47	1,431	132

1/ Does not include crab meal, shrimp meal, and liver oils.
2/ Includes Hawaii, American Samoa, and Puerto Rico.
3/ Includes condensed fish.

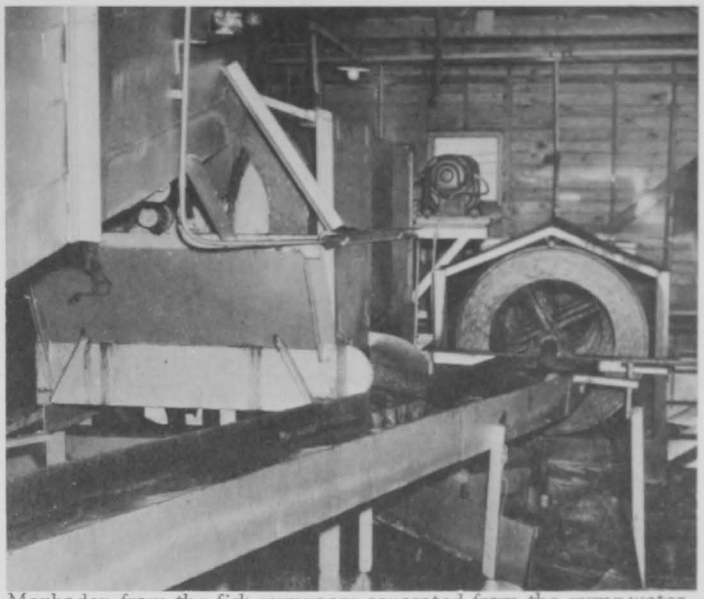
* * * * *

Production, January-November 1962: Preliminary data on U. S. production of fish meal, oil, and solubles for November 1962 as collected by the U. S. Bureau of Commercial Fisheries and submitted to the International Association of Fish Meal Manufacturers are shown in table 1.

Table 1 - U. S. Production [1] of Fish Meal, Oil, and Solubles, November 1962 (Preliminary) with Comparisons

Area	Meal	Oil	Solubles	Homogenized [3]
	Short Tons	1,000 Gallons	Short Tons	Short Tons
November 1962:				
East & Gulf Coasts	9,307	962	3,019	544
West Coast [2] . . .	2,449	61	1,411	-
Total.	11,756	1,023	4,430	544

1/ Does not include crab meal, shrimp meal, and liver oils.
2/ Includes Hawaii, American Samoa, and Puerto Rico.
3/ Includes condensed fish.



Menhaden from the fish pumps are separated from the pump water in the rotary sieve of an industrial fishery products plant in Moss Point, Miss.

During November 1962, a total of 11,000 tons of fish meal and scrap and 1 million gallons of marine-animal oils were produced in the United States. Compared with November 1961, this was an increase of nearly 1,000 tons or 9 percent in meal and scrap production, but a drop of 341,000 gallons or 25 percent in oil (Table 2).

Menhaden meal amounted to 8,100 tons--accounting for 74 percent of the November 1962 meal total. Oil from menhaden (nearly 1 million gallons) comprised 93 percent of the November 1962 oil production.

There were 4,100 tons of fish solubles produced in November 1962--100 tons below the same month of the previous year. There were 54 tons of homogenized condensed fish produced in November 1962 as compared with 945 tons in the same month in 1961.

During the first 11 months of 1962, domestic meal and scrap production totaled 286,000 tons--7,400 tons above the same period of 1961. The marine-animal oil yield totaled 32.6 million gallons--a drop of 365,000 gallons as compared with the same period in 1961.

Table 2 - U. S. Production of Fish Meal, Oil, and Solubles, November 1962 with Comparisons

Product	November		Jan.-Nov.		Total
	1/ 1962	1961	1/1962	1961	1961
	(Short Tons)				
Fish Meal and Scrap:					
Herring	-	175	3,533	5,268	5,268
Menhaden 2/	8,120	6,799	243,531	238,144	247,551
Sardine, Pacific	13	697	743	1,868	2,518
Tuna and mackerel	2,241	1,999	19,411	19,190	21,243
Unclassified	649	401	18,759	14,104	14,757
Total	11,023	10,071	285,977	278,574	291,337
Shellfish, marine-animal meal and scrap	3/	3/	3/	3/	19,928
Grand total meal and scrap	3/	3/	3/	3/	311,265
Fish solubles	4,093	4,195	111,283	95,955	100,551
Homogenized condensed fish	54	945	10,519	11,350	11,690
	(Gallons)				
Oil, body:					
Herring	-	10,000	647,180	817,547	818,017
Menhaden 2/	953,792	1,223,646	30,539,647	30,002,628	31,355,570
Sardine, Pacific	950	20,923	23,589	61,323	86,167
Tuna and mackerel	57,566	89,010	577,179	675,870	762,509
Other (including whale)	14,211	23,998	763,796	1,359,520	1,386,542
Total oil	1,026,519	1,367,577	32,551,391	32,916,888	34,408,805

1/Preliminary data.
2/Includes a small quantity produced from thread herring.
3/Not available on a monthly basis.

Irradiation Preservation

JOINT IRRADIATION STUDIES ON CRAB MEAT AND OTHER FISH PRODUCTS UNDER WAY IN SEATTLE:

Joint irradiation studies on crab meat and other fishery products are being conducted by the Seattle Technological Laboratory of the U. S. Bureau of Commercial Fisheries and the University of Washington under a contract from the U. S. Atomic Energy Commission. The two-phase study program is being conducted in the University's School of Fisheries. The University study group is primarily interested in the bacteriological and biochemical facets of irradiation and the Bureau's Seattle Laboratory group is interested in the commercial feasibility of preservation of fishery products through pasteurization by irradiation.

Both groups make use of Research Irradiator M. K. II, which has 31,000 curies of cobalt from Oak Ridge, Tenn., in 120 small rods nine feet below a shield of de-ionized water.

Crab meat and other fishery products to be irradiated are placed in hermetically-sealed containers and lowered to the bottom of the tank. The length of gamma ray bombardment is carefully timed. Crab meat can be kept fresh after irradiation for up to 28 days and there is no danger from eating any of the irradiated foods. Both of the study groups have eaten irradiated crab meat which was old enough to be thrown out. The consensus of opinion was that "freshness" was preserved and the crab meat was delicious.

Note: See Commercial Fisheries Review, October 1962 p. 25; April 1962 p. 24.

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NEW CONTRACT INCLUDES STUDIES ON THE PRESERVATION OF COD, POLLOCK, AND OCEAN PERCH BY LOW-LEVEL IRRADIATION:

Under a new contract with the Atomic Energy Commission, the U. S Bureau of Commercial Fisheries Technological Laboratory at Gloucester, Mass., will attempt to find out if cod, pollock, and ocean perch fillets can be successfully irradiated (irradiation pasteurization) and also the maximum acceptable refrigerated shelf life.

Other plans are for new applied and basic investigations into flavor and odor of irradiated seafood. To develop an objective test for quality it is necessary in the more applied aspect of this study to correlate the results of gas chromatography on volatiles from irradiated and nonirradiated fish and sensory evaluations.

The fundamental part of this study will concentrate on methods for collecting and analyzing volatiles present in irradiated and nonirradiated fish. Investigations will also be conducted to determine if new compounds result because of irradiation, and if they do, attempts will be made to define them. The first irradiation, taste tests, and storage experiments on the cod, pollock, and ocean perch fillet series were scheduled for mid-December 1962.

Note: See Commercial Fisheries Review, January 1963 p. 37.

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ATOMIC ENERGY COMMISSION APPROVES EXPANSION OF STUDIES ON FISHERY PRODUCTS:

To determine suitable packaging material for radiation-pasteurized products and the effect of pre-irradiation quality level on post-irradiated storage life are the objectives of expanded radiation preservation studies for fishery products at the Gloucester, Mass., Technological Laboratory of the U. S. Bureau of Commercial Fisheries. Support for the studies has been provided by the U. S. Atomic Energy Commission.

The present program at the Laboratory includes quality studies of irradiated cod, pollock, and ocean perch. The studies are very important in that this entire program will substantially benefit the semicommercial-scale radiation studies that follow.

Funds have also been approved in the current Commission's budget to implement commerical-scale studies in 1965 as construction is completed on a $600,000 marine products irradiator capable of processing 1,000 pounds of fish a day. This irradiator will be located adjacent to the Bureau's Laboratory and will be operated by Bureau employees under a contract with the Commission.

The eventual aim of this research work is to develop the necessary information to stimulate commercial use of radiation pasteurization in extending the shelf life of fresh fish and to demonstrate the economic feasibility of this process to the fishing industry. It is anticipated that eventually housewives in inland cities will be able to purchase irradiated unfrozen marine fish species of high quality.

New England Fisheries

BOTTOMFISH AND SEA SCALLOP FISHERIES YIELD FORECAST FOR 1963:

The abundance of bottomfish (haddock, cod, whiting, ocean perch, and yellowtail flounder) on New England fishing banks will show little change during 1963, but the abundance of sea scallops will decline, the Director of the North and Middle Atlantic Region of the U. S. Bureau of Commercial Fisheries stated on December 27, 1962. This forecast is based on information provided by biologists of the Bureau's Woods Hole Biological Laboratory who monitor the landings of commercial fishermen and study the populations of fish and shellfish on offshore fishing banks by sampling with fishery research vessels.

Fig. 1 - Mending the otter trawl aboard one of larger Boston, Mass., vessels. This method of fishing is important for groundfish (cod, haddock, pollock, and hake) and flounders in all North Atlantic countries.

Haddock landings in New England in 1962 will approximate 115 million pounds, about the same as in 1961. The Georges Bank stocks of haddock which provide the bulk of the New England landings are expected to remain in good supply during the first half of 1963, but small haddock or scrod abundance will drop during the summer. The 1960 age group which

enters the fishery in 1963 as 2-year-old fish appears to be weak and the following age groups, those of 1961 and 1962, are also weak, according to research vessel surveys. Therefore, abundance is expected to decrease after 1963.

Landings of cod in 1962 will be about 34 million pounds, an increase of 3 million pounds over 1961; making 1962 one of the biggest cod years in recent history. The outlook for cod in 1963 is very good. There is an abundance of young fish on the banks which should guarantee good catches in the coming year.

Landings of whiting for food in 1962 will reach at least 70 million pounds, an increase of about 5 million pounds over 1961. No significant change in whiting abundance is anticipated for 1963.

Yellowtail flounder are very abundant on the banks at present. The landings in 1962 were expected to reach 50 million pounds, up about 16 million pounds over 1961 and one of the largest in history. Abundance will continue high in 1963 since the present populations of yellowtail are composed of good numbers of young fish which will increase in weight during the year and contribute heavily to the landings throughout 1963.

Landings of ocean perch or redfish in the United States in 1962 will total about 122 million pounds, the lowest annual catch since 1944. This is about one-half the average landings for the years 1948-51, the peak period in the United States fishery. About 25 percent of the 1962 landings came from the Gulf of Maine, the remainder was mostly from Nova Scotia's banks and the Grand Banks, with practically nothing from the Gulf of St. Lawrence. The recent decline in ocean perch landings is due chiefly to a decrease in fishing effort. The abundance of that fish is holding fairly steady. Thus, landings in 1963 will depend largely on the amount of fishing conducted for that species.

Sea scallops have been unusually abundant during the past few years, but the high abundance is dropping off. United States landings in 1962 will be about 22 million pounds of scallop meats, down about 2 million pounds from 1961. The recent high abundance of sea scallops on Georges Bank was due to a very large age group coming into the fishery in 1959. This age group is now passing out of the fishery and no new age groups of any

Fig. 2 - A scallop fishing vessel docked at New Bedford, Mass.

strength have appeared. Abundance of commercial sizes of sea scallops on Georges Bank is now appreciably lower than it was in 1961. Furthermore, survey cruises by Bureau research vessels failed to turn up any significant number of very young scallops that might enter and support the fishery in the next year or two. Unless new beds are found, there probably will be a definite decline in scallop landings in 1963 and later.

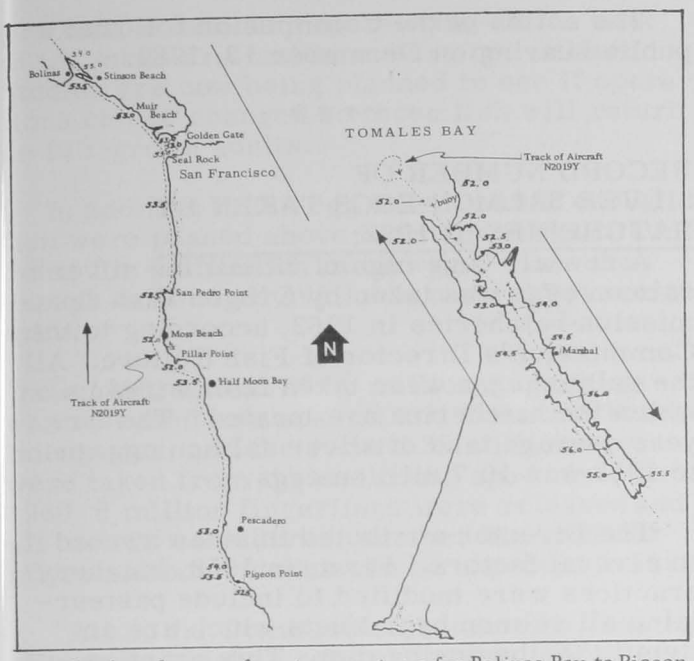
Oceanography

SEA SURFACE TEMPERATURES COLLECTED BY AIRBORNE INFRARED RADIOMETER:

The use of airborne infrared radiometry as a rapid method of obtaining sea surface temperatures was tried by the U. S. Bureau of Sport Fisheries and Wildlife Tiburon Marine Laboratory in California.

In November 1962 an infrared radiometer and supporting electronic equipment (power supply, recording instrument, intervalometer, voltmeter) were installed in a Cessna 172 aircraft. After installation, a series of preliminary tests were made with the airborne unit.

Initial experiments consisted of laboratory observations, calibration of the recording equipment, and flight checks to determine the accuracy of the infrared radiometer. A series of water surface observations was made at several



Aerial infrared sea surface temperatures for Bolinas Bay to Pigeon Point, November 13, 1962.

elevations with the airborne unit and compared with simultaneous observations taken at the water level. Accuracy of $<-0.5^{o}$ F. error was obtained for elevations to 1,500 feet from mean sea level (M. S. L.). Repeatability tests were made over Tomales Bay, where differences of surface temperature were available over a short geographical distance. A flight track from the upper Bay to over the ocean and return indicated repeatability of surface water measurements taken at selected points along the flight track.

During flight operations in the Tomales Bay area, off San Francisco, from Santa Barbara to San Diego, and in the Monterey Bay area, sea surface temperatures were recorded by visual readout and with the aid of a strip chart recorder. Visual readouts were made off selected geographical points, and the chart recorder (30 observations per minute) was operated during portions of the flights. The flight track was a half mile offshore and at elevations of 500 to 1,000 feet.

Of interest is the slightly warmer nearshore water from Santa Barbara to Ventura and from east of Long Beach to Dana Point. The cooling water discharges from the generator plants at Los Alamitos and near Huntington Beach are well defined by increases in surface temperature of up to 10^{o} F.

Immediate plans are to conduct, in cooperation with the California Department of Fish and Game, water surface temperature observations on the Sacramento River System in relation to the spawning of salmon. Also, plans are being formulated to study the effect of temperature changes in the marine environment on the distribution of schooling fish.

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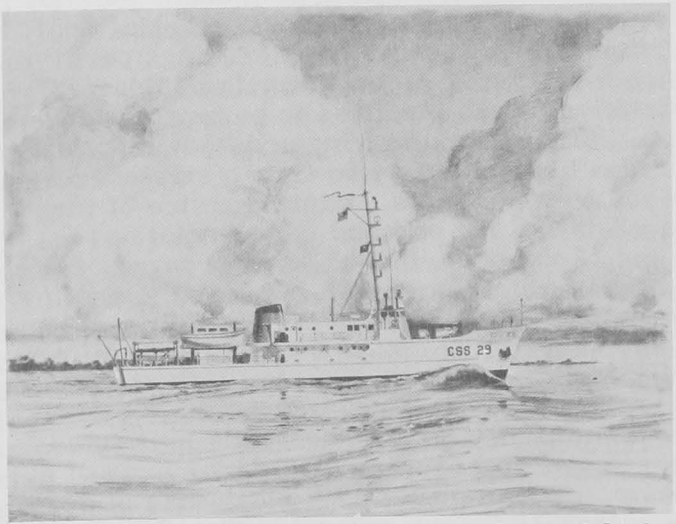
SECOND RESEARCH VESSEL LAUNCHED BY COAST AND GEODETIC SURVEY:

The new U. S. Coast and Geodetic Survey hydrographic and oceanographic research vessel Whiting was launched on November 20, 1962, at a Point Pleasant, W. Va., shipyard.

The Whiting is the second research vessel to be launched recently and is identical to the Peirce, which was launched on October 15, 1962. The two vessels were built under the same contract, totaling $3,733,040.

Known as a Class III, Coastal Survey Vessel, the Whiting measures 163 feet in length and carries a complement of 6 officers and 30 crewmen. She will be deployed primarily along the southeastern seaboard of the United States and in the Gulf of Mexico. The vessel, propelled by twin-screw 800 ship hp. Diesel engines with controllable pitch propellers, has a sustained cruising speed of 12.5 knots and a total displacement weight of 760 tons.

The Whiting has the latest electronic, navigational, and surveying equipment available. This includes Hi-Fix and Shoran navigational Systems, hydrographic winches, and an oceanographic laboratory--a facility which is unique for a vessel of this class. Two auxiliary



Artist's drawing of the Whiting, one of the new Coast and Geodetic Survey vessels.

power craft will be carried on board the Whiting to assist in inshore hydrographic work and supplemental surveys. Like her sistership, the Peirce, this vessel has a reinforced steel hull to cope with ice conditions.

The Whiting commemorates one of the most illustrious men employed in the long history of the Coast and Geodetic Survey who came to work for the Survey in 1838, at the age of 17. For nearly 60 years, until his death in 1897, he remained in the Federal service to become one of the leading scientists of the Nation, and an expert in his profession of topographic surveying. His professional excellence in topography was internationally respected during his lifetime.

The Whiting will replace the Cowie, built in 1927, and now in a poor state of repair. The Whiting will make Norfolk, Va., her home port.

Note: See Commercial Fisheries Review, November 1962 p. 36.

Oregon

REGULATIONS ON SHRIMP AND BOTTOM FISHING FOR 1963:

The decision of the Oregon Fish Commission to ease restrictions on the harvest of bottom fish and leave unchanged the regulations on shrimp fishing was announced on December 13, 1962.

The new regulations on bottom fish increase the tolerance limit on petrale sole landings from 3,000 to 6,000 pounds per trip during the winter period, January 1-March 31. The number of petrale sole landings per month will continue unrestricted. Gear restrictions were modified to permit a reduction in the minimum wing and body mesh size of trawl nets from $4\frac{1}{2}$ to 4-inch stretched mesh between knots. Minimum size of the mesh in the cod end and intermediate sections remains $4\frac{1}{2}$-inches as at present. Permissible minimum mesh size for the chafing gear that surrounds and protects the cod end was changed from 12 to 9 inches between hog rings.

Shrimp may be commercially harvested in Oregon waters at any time by means of a beam or shrimp trawl. A mesh size of not less than $1\frac{1}{4}$ inches nor more than 2 inches stretched measure between knots may be used.

The action of the Commission followed a public hearing on December 12, 1962.

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RECORD NUMBER OF SILVER SALMON EGGS TAKEN BY HATCHERIES IN 1962:

A new all-time high of 39 million silver salmon eggs was taken by Oregon Fish Commission hatcheries in 1962, according to the Commission's Director of Fish Culture. All the salmon eggs were taken from streams on which the hatcheries are located. The ten-year average take of silver salmon eggs prior to 1962 was 10.7 million eggs.

The Director attributed this new record to several factors. First, in 1958, hatchery practices were modified to include pasteurizing all salmon byproducts which are an item in the beginning diet. This practice virtually eliminated kidney disease, one big obstacle to rearing healthy salmon. It was found that the disease was being transmitted to the young fish in the ground-up salmon carcasses being fed prior to that time. (This is a disease which affects fish only, and not humans.)

Another factor was the introduction of the Oregon "pellet," a completely balanced diet which is the product of 12 years of cooperative research with scientists at Oregon State University. Beginning in 1958, this pellet has been fed on a full-scale production basis. Extensive studies also indicated that better returns could be obtained if fish were raised to the "fingerling", or yearling, stage rather than liberated as young fry. This practice was initiated and fish have since been raised to yearling size. After the needs of the hatcheries have been met, any additional eggs are hatched and set out as fry in stream areas without natural runs or, in other situations, areas where additional numbers of fish can be supported such as selected coastal lakes with outlets to the sea. These fish which are set out are raised at no cost to the State.

After hatchery procedures were changed in 1958, the resulting egg take in 1961 from the first returning fish was 32.3 million, the largest in 25 years. In addition, 26,000 jack salmon returned, which frequently is a rough indicator of the magnitude of the following year's run. In 1962, in addition to the 39 million eggs collected for the hatcheries, 55,000 jack returned. This has caused some

problem to hatchery operations, as the bulk of the jacks are males and are not utilized. Studies are now being planned to see if operations can be changed so those fish will return as full-grown adults.

In addition to the egg take, in 1962 enough fish were passed above hatchery racks to account for 4.6 million more eggs, more than enough to seed all available natural spawning area.

In 1959, a total of $6\frac{3}{4}$ million fingerlings was released into coastal and Columbia River tributaries, and the record 39 million eggs were taken from the surviving spawners. In 1960, 8 million fingerlings were released and all factors considered, another big year for silver salmon returns can be expected in 1963.

"All of the Commission hatcheries rearing silvers had higher returns than in the past several years," the Director stated, "and the largest single hatchery egg take was at Bonneville on the Columbia River with over 7 million." Nearly 7 million eggs were taken at Cascade Salmon Hatchery, a new installation starting operations in 1958 just upriver from Bonneville Dam. Two of the coastal hatcheries, Alsea and Klaskanine, topped the 6-million-egg total.

Pollution

MICHIGAN SELECTED AS THE SITE FOR NEW WATER POLLUTION FIELD LABORATORY:

The selection of the University of Michigan at Ann Arbor, Mich., as the location for a water pollution control field laboratory and research facility to serve the Midwest was announced on January 11, 1963, by the U. S. Department of Health, Education, and Welfare.

The laboratory--one of seven regional facilities authorized by Congress in 1961--will be designed and operated by the Department's Public Health Service.

The University is the fifth site to be selected. Previously announced sites for regional laboratories are Ada, Okla., to serve the Southwest; Corvallis, Ore., to serve the Pacific Northwest; Athens, Ga., to serve the Southeast; and College, Alaska. Yet to be selected are locations in the Northeast and Middle Atlantic states.

The University of Michigan Laboratory will serve the 14-State Great Lakes Region which has some of the most pressing water resources and pollution control problems in the country.

Many of the research projects to be carried out by the Laboratory will be cooperative endeavors making use of the resources of various schools and departments of the University of Michigan, such as the School of Public Health, the Medical School, the College of Engineering, the School of Natural Resources, and the Institute of Science and Technology.

The new facility will have about 50,000 square feet of floor space and will cost over $2.5 million. It will have a staff of approximately 150 scientists, researchers and engineers.

Note: See Commercial Fisheries Review, November 1962 p. 41.

Salmon

1963 FRASER RIVER CATCH FORECAST:

A 1963 catch of 2.0 to 2.6 million sockeye and 4 million pink salmon from the fishery for Fraser River salmon in North Pacific Convention waters was predicted by the International Pacific Salmon Fisheries Commission in December 1962. The Commission is responsible for maintaining Fraser River salmon and regulates commercial fishing in Convention waters so as to divide the catch equally between the United States and Canada. The sockeye salmon expected to return to the Fraser River in 1963 belong to the "subdominant" cycle of the Chilko Lake and Adams River systems. The Fraser River produces a run of pink salmon once every two years on the odd years.

Severe restrictions on fishing provided adequate escapement for the drastically reduced 1962 run of sockeye salmon to the Adams River (part of the Fraser River system). Spawners arrived on the Adams River in prime condition and at a good time for effective spawning, so the outlook for a bumper crop in 1966 is promising. The near failure of the 1962 run, which was based on parent stock from the great run of 1958, is considered proof that a correlation exists between the rate of flow of

the Fraser River at the time of the young salmon's seaward migration and the size of the homeward migration of mature sockeye. (Facts on Fish, Fisheries Association of B. C., December 1962.)

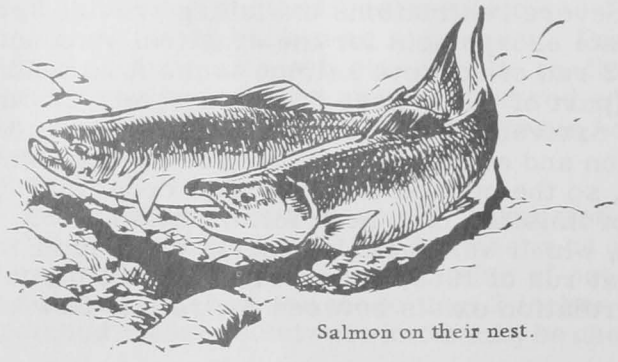
* * * * *

PACIFIC COAST STATES FORM INTERAGENCY COUNCIL TO SAVE DWINDLING STOCKS:

An interagency council to save the salmon resources of the Pacific Coast States was organized at the close of the Second Governors' Conference on Pacific Salmon on January 10, 1963.

High level fisheries officials of Washington, Oregon, Idaho, Alaska, and California will join Federal officials, University scientists, and industry leaders on the council to coordinate salmon research and take needed steps to preserve the Pacific salmon resources. The Director of the Oregon State Fisheries Department was named chairman. The Executive Director of the Pacific Marine Fisheries Commission was named secretary of the new council. The first meeting will be held at Portland, Oreg., in March of this year.

A prime responsibility of the new council will be to defend the rights of fisheries in the growing competition for water resources of the Western States. Other problems with which the council will be concerned are hydroelectric and industrial plants that bar the salmon from their spawning grounds.



Salmon on their nest.

A starting point for the new council will be an inventory of about 350 current salmon research projects compiled for the Conference by the Seattle Biological Laboratory of the U. S. Bureau of Commercial Fisheries. Plans call for the Pacific Marine Fisheries Commission to circulate research project plans in advance. The Commission will also distribute results from research projects before formal publication and will coordinate salmon catch statistics from all the West Coast States. A long list of research projects and other needs was submitted to the Conference at its closing session.

This January 1963 Governors' Conference on Salmon held in Seattle, Wash., was the second called in two years by a Pacific Coast State governor in efforts to solve the salmon crisis. The first one met in Juneau, Alaska, in 1960.

Shellfish

NEW YORK CITY PROPOSES REGISTRATION FEES FOR SHIPPERS AND PROCESSORS OF SHELLFISH:

The New York City Board of Health is considering a recommendation to charge annual registration fees of $25 to shippers of shellfish and crab meat and $15 to processors of shellfish for shipment into the City of New York. At present no fees are charged.

The proposed fees are designed to cover some of the inspection, laboratory, and administrative costs involved in servicing this registration.

Shrimp

UNITED STATES SHRIMP SUPPLY INDICATORS, DECEMBER 1962:

Item and Period	1962	1961	1960	1959
	....(1,000 Lbs., Heads-Off)....			
Total landings, So. Atl. and Gulf States:				
March	3,317	4,754	4,098	2,950
February	4,125	3,910	3,785	3,227
January	3,828	5,686	5,401	4,310
December	8,500	6,538	7,097	8,716
January-November	96,600	84,858	133,938	121,943
January-December	105,100	91,396	141,035	130,659

(Table continued on following page.)

Item and Period	1962	1961	1960	1959
	....(1,000 Lbs., Heads-Off)			
Quantity canned, Gulf States[1]:				
March	94	38	128	93
February	263	98	223	135
January	536	199	289	308
December	1,979	889	977	1,278
January-November	22,000	14,904	27,617	23,401
January-December	23,979	15,793	28,594	24,679
Frozen inventories (as of end of each mo.)[2]:				
March 31	16,607	31,345	23,232	24,893
February 28	19,012	37,612	29,063	27,555
January 31	21,328	37,842	34,332	30,858
December 31	28,372	19,755	40,913	37,866
November 30	27,500	20,668	37,264	37,334
October 31	21,315	17,811	31,209	33,057
September 30	12,843	13,361	24,492	26,119
August 31	12,754	12,728	20,171	23,780
Imports[3]:				
March	9,658	10,347	8,545	8,492
February	10,599	8,932	7,657	7,481
January	12,907	12,338	8,596	8,238
December	4/	15,442	12,411	10,611
November	17,964	14,852	13,516	10,269
January-October	107,622	95,974	87,491	85,675
January-December	4/	126,268	113,418	106,555
	(¢/lb., 26-30 Count, Heads-Off)			
Ex-vessel price, all species, Gulf Ports:				
March	80.9	56.0	56.3	67.6
February	78.9	53.5	51.8	69.6
January	76.3	52.5	49.4	70.9
December	5/83-93	75.2	54.2	48.4
November	5/78-93	73.5	54.0	46.2
Aug., Sept., & Oct.	5/88-100	68.3	52.4	45.8
May, June & July	83.1	54.5	58.1	54.0
Wholesale price for froz. domestic brown species (5-lb. pkg.) at Chicago, Ill.:				
March	94-95	69-71	65-68	81-83
February	93-95	69-71	65-67	82-87
January	91-94	69-71	64-66	86-88
December	101-109	91-92	68-70	64-66
November	105-110	89-92	69-73	60-65
Aug., Sept., & Oct.	10ł-118	76-91	64-73	59-64
May, June, & July	96-104	67-75	72-77	62-76

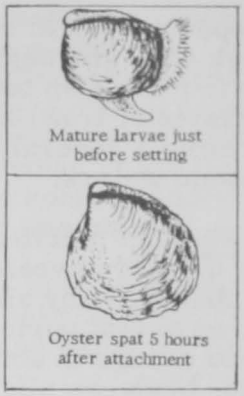
1/Pounds of headless shrimp determined by multiplying the number of standard cases by 33.
2/Raw headless only; excludes breaded, peeled and deveined, etc.
3/Includes fresh, frozen, canned, dried, and other shrimp products as reported by the Bureau of the Census.
4/Not available.
5/Range.
Note: Data for 1962 and 1961 are preliminary. December 1962 data estimated from information published daily by the New Orleans Fishery Market News Service. To convert shrimp to heads-on weight multiply by 1.68.

South Carolina

FISHERIES BIOLOGICAL RESEARCH PROGRESS, SEPTEMBER-DECEMBER 1962:

The following is a report on the progress of biological research by the Bears Bluff Laboratories, Wadmalaw Island, S. C., for September-December 1962:

Oyster Studies: The mapping and study of subtidal oyster beds was continued during the quarter. Under the present State law only oyster beds which are intertidal are subject to lease and conservation practices prescribed by law. The importance of the subtidal beds as disclosed by this mapping study indicates that some management program, and perhaps some legal conservation features, should be added to the existing laws.



The December cold wave which invaded the entire Southeast had little effect on the intertidal oysters. Even though the oysters were exposed during the time of low water to temperatures as low as 10° F. to 12° F., no noticeable kill of oysters resulted. Apparently the insulating ability of the shells was able to protect the oysters during the time of exposure between the tides.

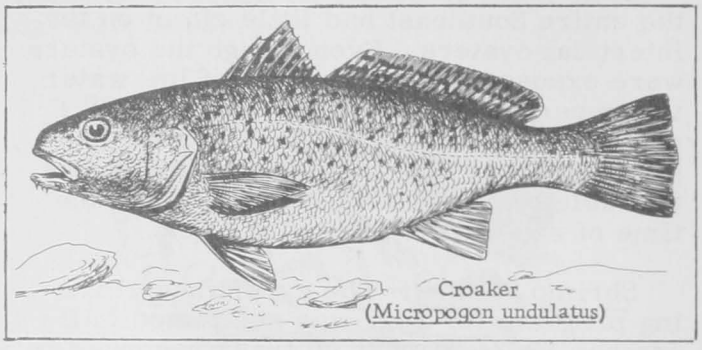
Shrimp Studies: The experimental trawling program for 1962 was completed in December 1962. Data from trawl records for the October-December quarter indicate little change in the abundance of white shrimp as compared with the same period in 1961. The catch per unit of effort for white shrimp during both those quarters was considerably less than the October-December period of 1960, however.

The commercial shrimp catch in South Carolina was several hundred thousand pounds less in October and November 1962 than in that period of 1961, and well below the average catch for those two months in 1959 and 1960. On the whole, however, the shrimp catch in 1962 has been considerably better than in 1961. Through November 1962, approximately 6.3 million pounds of shrimp (heads on) were landed. This is an increase of about $2\frac{1}{2}$ million pounds over the 1961 catch for the same period. The increased commercial catch in 1962 was due largely to the abundance of brown shrimp early in the season.

A cold spell in mid-December brought about a sudden drop in water temperatures throughout the inshore area. During that time water temperatures dropped as low as 41.5° F. No mortality was noted among the shrimp population, although the decreased temperatures apparently did cause a rather sudden migration of the remaining small shrimp in tidal creeks and rivers to the

deeper waters of sounds and offshore. One week after the beginning of the cold spell, shrimp and fish became very scarce in experimental trawl hauls in inside waters, indicating a general migration to the deeper outside waters.

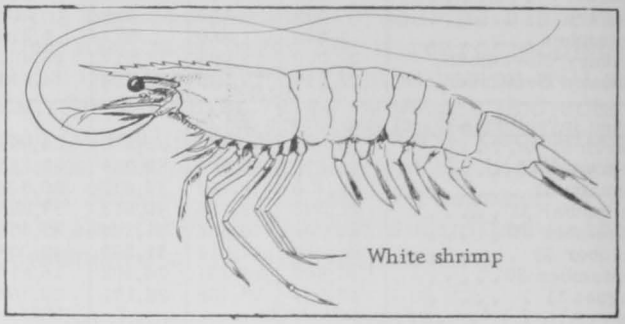
Finfish: Shrimp survey records during the quarter revealed that croaker increased in abundance by almost eight times as compared to that period of 1961. Spot showed little change in abundance for the two quarters, but were slightly more plentiful during October-December 1962.


Croaker
(Micropogon undulatus)

Apparently the only mortality caused by the December cold wave was to fish remaining in shallow waters. Several scattered reports of such kills were made. One report on December 14 indicated that several hundred large winter trout were killed by cold in a small shallow creek entering the Stone River. Another report on December 17 stated that several dead trout and other fish were found in a small canal off Harbor View Road on James Island. Many small 6- to 9-inch trout in shallow experimental ponds at Bears Bluff were killed by low-water temperatures on December 11 and 12. All of those kills, however, took place in very shallow water, and it seems unlikely that any mortality occurred in the deeper creeks and rivers.

Pond Cultivation: Three pond cultivation experiments were completed in October 1962. Results of those experiments were most encouraging and have added valuable information to the knowledge of shrimp culture.

One experiment involved the one-acre "Oyster Pond" which had been drained previously in late June. The floodgates and overflow of that pond were then screened with quarter-inch wire screening and the pond was allowed to fill on the flood tide with water from the nearby creek. This pond was then completely closed off to tidal influence and stocked by hand with juvenile shrimp. During the period of July 18 to August 24, 1962, over 8,000 white shrimp, averaging about three inches in length


White shrimp

were caught in nearby creeks by cast net and stocked in the pond. On August 8, 1962, the pond was treated with rotenone to remove predatory fish. Crab pots were used in the pond throughout the cultivation period to remove crabs. After stocking, the shrimp in the pond were fed on chopped crabs and fish, beginning at the rate of 5 pounds per week and increasing to a maximum of 40 pounds per week previous to harvesting. About 325 pounds of chopped food was placed in the pond during the experimental period.

When the pond was drained on October 18, 240 pounds of shrimp were harvested. The shrimp were about 65 count, heads off. Only a few pounds of crabs and fish were harvested, indicating that the predator control had been effective.

This experiment had been set up to determine the maximum production per acre of a shrimp pond under controlled conditions. Although a good yield of shrimp was obtained, it was felt that production could be improved by increasing greatly the amount of shrimp food. A similar experiment will be carried out in 1963 to determine the effects of increased feeding on shrimp production.

As a comparable experiment to the one above, the one-acre "Fish Pond" was drained also in late June and the same methods of predator control, feeding, etc., were used as for the "Oyster Pond." However, no screens were placed on the floodgates and the gates were allowed to remain open for tidal flow from June 26 to August 1, 1962. The pond was thus allowed to stock naturally with postlarval and juvenile shrimp, and no stocking was done by hand. On October 18, 1962, when the pond was drained, 146

pounds of 47 count (heads on) shrimp were harvested, along with only a very few pounds of fish and crabs.

In a third experiment, a small one-tenth acre pond was used. The pond had been drained, screened, and refilled early in the year and was then closed off completely and stocked with postlarval shrimp from plankton tows during the period of June 25 to August 8, 1962. The pond was treated with rotenone in August and was drained on October 29. About eight pounds of shrimp and almost no fish were harvested. Although the equivalent per-acre yield for the pond was only about 80 pounds, the experiment indicates that the method of stocking used may have possibilities.

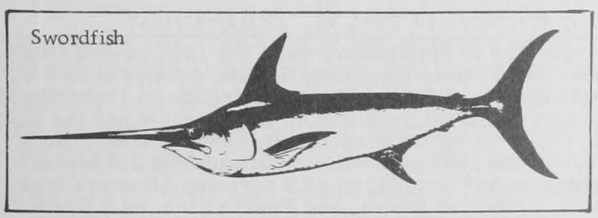
Construction of a $2\frac{1}{2}$-acre experimental pond at Bears Bluff was completed during the quarter. The pond was allowed to fill with tidal water in early November and is being stocked with small winter trout, channel bass, tarpon, and flounder.

Note: See Commercial Fisheries Review, November 1962 p. 45.

Swordfish

NEW LONG-LINE FISHERY OFF SOUTHERN NEW ENGLAND SHOWS PROMISE:

The possibility of using long-line gear for catching swordfish in New England offshore waters was indicated when catches of swordfish were made by the research vessel Crawford of the Woods Hole Oceanographic Institute in 1961. The vessel was on an exploratory cruise fishing for tuna with long


Swordfish

lines. The cruise was made in cooperation with the U. S. Bureau of Commercial Fisheries North Atlantic Fisheries Exploration and Gear Research Base at Gloucester, Mass.

Those catches and limited fishing by Canadian fishermen off Nova Scotia with converted halibut long-line gear led to the Bureau and the Institute undertaking another cooperative cruise using long lines for swordfish. The cruise, made in June 1962 with the Bureau exploratory vessel Rorqual, resulted in the capture of only one swordfish because of the numerous sharks in the fishing area. The sharks were hooked almost immediately after the gear was set.

Cooperative exploratory long-line fishing by the commercial vessel Cap'n Bill III, chartered by the Institute and using the Bureau's long-line gear. Four cruises were made in October and November 1962 in the waters south of Cape Cod, and approximately 26,000 pounds of swordfish were caught. Upon completion of the last experimental charter cruise, the vessel commenced fishing on a commercial basis and, as expected, catches increased considerably.

The Cap'n Bill III as of December 20, 1962, had landed five successful trips consisting primarily of swordfish, but also including a fair number of tuna. The fifth trip by that vessel, which was landed on December 20, last year, indicates the great potential of the new long-line fishery for swordfish. The trip consisting of 366 swordfish and 44 tuna were taken in only nine sets. One set of the long-line gear by the Cap'n Bill III caught 91 swordfish. This trip by the Cap'n Bill III undoubtedly sets a new record for the number of swordfish caught, but not necessarily in terms of weight. A second vessel, the Gulf Stream, entered the long-line fishery for swordfish late in 1962. This vessel by the end of 1962 had landed one partial trip and 4 complete trips of swordfish caught by long-line.

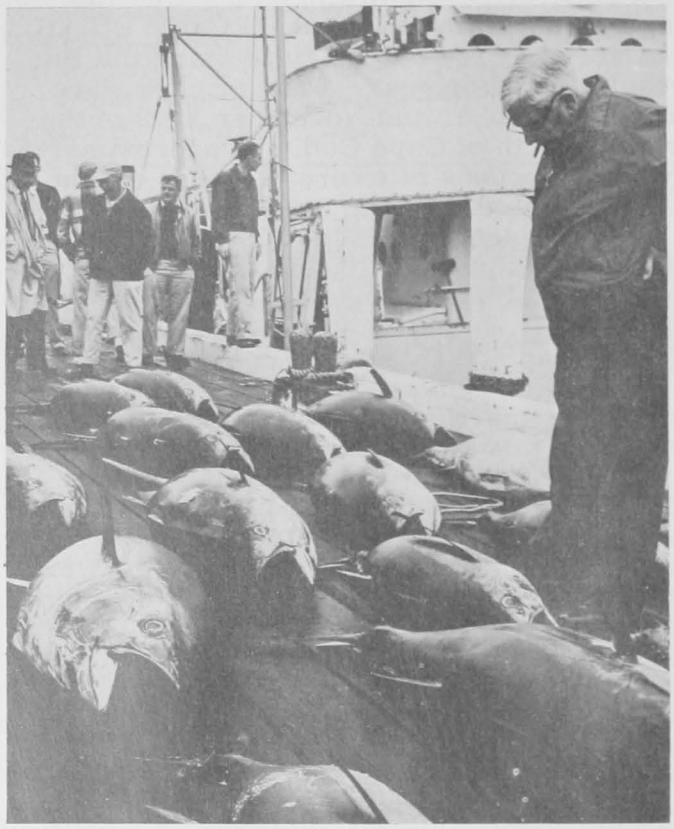
The successful trips made by these two vessels has stimulated interest on the part of other vessel owners. As of the end of 1962, five vessel owners were reported to be planning to enter the long-line for swordfish off New England.

Tuna

TAGGING PROGRAM:

The game fish tagging program by the Woods Hole Oceanographic Institution has been aimed at learning more about the migratory habits and growth patterns of bluefin tuna and other large fish. The Institu-

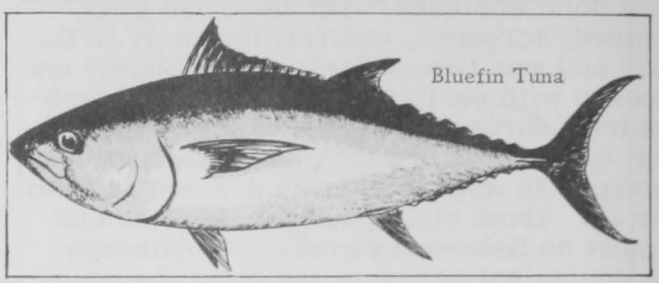
tion reported on November 9, 1962, that since the start of the program in 1954, scientists and cooperating sportsmen had tagged about 3,000 Atlantic sailfish, 1,300 bluefin tuna, 1,600 white marlin, 225 amberjack, 575 Pacific sailfish, 170 yellowfin tuna, 175 striped marlin, 40 blue marlin, and about 500 fish of various other species. So far, tags have been recovered from 14 Atlantic sailfish, 12 blue-



Senior Ichthyologist of the Woods Hole Oceanographic Institution examining a big-eyed tuna brought in along with several medium bluefin by the research vessel Crawford (seen in background).

fin tuna, 2 white marlin, 28 amberjack, and 1 yellowfin tuna, as well as 3 dolphin, 4 striped bass, 2 jack crevalle, 1 bar jack, 1 barracuda, 1 sea bass, and 1 fluke. Over 1,200 individuals have tagged one or more fish in the program.

The outstanding results of the program have been the returns showing five trans-atlantic migrations of giant bluefin tuna from off Cat Cay in the Bahamas to Norwegian waters. Two bluefin tuna crossed the Atlantic Ocean in 1961 in less than four months. Another made the journey in 1962 in the fantastic time of only 50 days. As only 77 tuna were marked in the Cat Cay area in the years 1960-1962, it seems certain that at least a large fraction of the giant bluefin passing the Bahamas in those years were migrating to Norwegian waters. This is in marked contrast to the widely held belief that bluefin tuna move from the Bahamas to northwestern Atlantic coastal waters. One



bluefin tuna, in addition to his transatlantic migration, had moved northward through 43 degrees of latitude, from just above the tropics to well inside the Arctic Circle.

The Atlantic bluefin tuna apparently has no home. Successful tagging programs in Norway and Spain have shown bluefin migrations from Norwegian waters to the southern Atlantic coast of Spain, and from there to the Mediterranean coast of France.

A large-scale tagging program is the quickest way to estimate the affect on tuna stocks of the increase in commercial tuna fishing off the Atlantic Coast, according to the scientist in charge of the game fish tagging program of the Institution. For this reason, he recommends intensifying the Institution's current tagging program and expanding the program to include tuna such as yellowfin, blackfin, big-eyed, and albacore, and also oceanic bonito or skipjack.

Note: See Commercial Fisheries Review, February 1962 p. 42.

* * * * *

U. S. CANNED PACK, 1961-1962:

According to preliminary data, the 1962 canned tuna pack in the United States (including Hawaii, American Samoa, and Puerto Rico) was 5.4 percent greater than in 1961--the albacore or white meat pack was up 14.7 percent and the light meat pack was up 2.4 percent. By canning areas, the increase in the 1962 pack was: California, up 2.6 percent; Washington and Oregon, up 15.9 percent; Atlantic Coast, Hawaii, American Samoa, and Puerto Rico, up 9.5 percent.

The discovery of tuna in commercial quantities in New England waters was an important development in 1962. Seven tuna purse-seiners fishing in the Northwest Atlantic between July and October caught about 3,660 short tons of tuna. The development created interest in building canning facilities on the East Coast. One tuna cannery was built in Maryland during the year.

On the West Coast, there was a striking decline in the important domestic yellowfin tuna catch. Yellowfin tuna landings in California amounted to only 63,490 tons in 1962,

U.S. Canned Tuna Pack, 1961-62

Area	1/ 1962			1961		
	White Meat (Albacore)	Light Meat	Total	White Meat (Albacore)	Light Meat	Total
	(Standard Cases)					
California	2,003,000	8,821,000	10,824,000	1,619,071	8,926,497	10,545,568
Wash. & Oregon	860,523	601,482	1,462,005	797,261	464,405	1,261,666
Atlantic Coast	238,454	539,623	778,077			
Hawaii, American Samoa, & Puerto Rico	1,360,000	2,200,000	3,560,000	2/ 1,475,099	2/ 2,485,371	2/ 3,960,470
Total	4,461,977	12,162,105	16,624,082	3,891,431	11,876,273	15,767,704

1/Preliminary.
2/Atlantic Coast, Hawaii, American Samoa, & Puerto Rico combined.

down 36.7 percent from landings of 100,189 tons in 1961. Throughout 1962, domestic yellowfin tuna landings lagged behind those in the previous year. In the last three months of 1962, fishermen reported that tuna were extremely scarce in the high-seas fishery off Central and South America. The decline in yellowfin landings was partly offset by increased domestic landings in 1962 of albacore (up 22.2 percent), bluefin (up 54.0 percent), and skipjack (up 25.7 percent). But the increase in the California tuna pack was achieved only because imports of frozen tuna were heavier and an increase in the pack of chunk-style tuna.

U. S. Fishing Vessels

FISHERIES LOAN FUND AND OTHER FINANCIAL AID FOR VESSELS, OCTOBER-DECEMBER 1962:

From the beginning of the program in 1956 through December 31, 1962, a total of 1,221 loan applications for $34,042,256 were received by the U. S. Bureau of Commercial Fisheries, the agency administering the Federal Fisheries Loan Fund. Of the total 645 applications ($15,122,649) have been approved, 422 ($10,994,959) have been declined or found ineligible, 136 ($5,818,677) have been withdrawn by applicants before being processed, and 18 ($480,634) are pending. Of the applications approved, 258 ($1,625,337) were approved for amounts less than applied for.

The following fishery loans were approved from October 1, 1962, through December 31, 1962:

North and Middle Atlantic Area: George DePutter, Sr., Brigantine, N. J., $10,000; Sigvald Osmundsen, Rio Grande, N. J., $6,000.

South Atlantic and Gulf Area: Eugene E. Lewis, Fernandina Beach, Fla., $90,000; Walter A. and David M. Tate, Aransas Pass, Tex., $23,000; Newell F. Allen, Freeport, Tex., $14,500; Emanuel Nagin, Freeport, Tex., $17,500.

Pacific Northwest Area: Theodore A. Whittaker, Ilwaco, Wash., $10,800; Elmer A. Johnson, Poulsbo, Wash., $7,500; Karl Kaldestad, Seattle, Wash., $15,000.

Alaska Area: Warder Nelson Stoaks, Elfin Cove, $4,000; John H. McVicker, Juneau, $2,000; Richard Z. LeMay, Ketchikan, $16,000; Carl J. Guggenbickler, Wrangell, $4,000.

Great Lakes Area: Chambers Bros., Holland, Mich., $15,000; Robert Peel, Saugatuck, Mich., $14,500.

Under the Fishing Vessel Mortgage Insurance Program during the fourth quarter of 1962, commitment to insure mortgage in the amount of $225,000 on a steel trawler was approved for Boston Fishing Boat Company, Boston, Mass. The total approved as of December 31, 1962, under this program (initiated on June 5, 1960) were 12 applications for $1,710,596, covering 24 vessels. Three applications for $198,000 were pending at the end of 1962.

In the Construction Differential Subsidy Program, 4 applications for $190,667 were pending as of December 31, 1962. Two subsidy payments were made during the fourth quarter of 1962, $35,750 to Thomas B. Larsen, New Bedford, Mass., and $151,299 to Boston Fishing Boat Company, Boston, Mass. Since

the beginning of the program on June 12, 1960, 5 applications for $507,646 have been approved for construction of trawlers to operate in the New England groundfish fishery. The amount approved for the subsidy is about one-third of the cost of each vessel.

* * * * *

NEW LARGE STEEL TRAWLER ADDED TO BOSTON FLEET:

The Boston, Mass., fishing fleet added its first large steel trawler in over 12 years, when the 124-foot Massachusetts was delivered to its owner on December 12, 1962. The owner of the new vessel is a corporation made up of 28 Boston area firms and individuals long associated with the ownership or servicing of fishing vessels.

The trawler was built by a Sturgeon Bay, Wis., shipbuilding firm at a cost of about $454,000. Construction of the new vessel was aided by the Vessel Subsidy Program of the U. S. Bureau of Commercial Fisheries with a grant of about $151,300. Additional financing amounting to $225,000 was provided by a large Boston insurance company, and that loan is insured by the Mortgage Insurance Program also administered by the Bureau.

The Massachusetts is being used in the fishery for groundfish (cod, haddock, hake, cusk, pollock, and ocean perch). It has a fish hold capacity of about 250,000 pounds and carries a crew of about 17. Customary fishing cruises last 7 to 9 days in the summer and as long as 12 days in the winter.

An identical vessel is under construction in the same Wisconsin shipyard for a Wisconsin firm which operates out of Boston. This vessel, also being partly financed by the Bureau's Fishing Vessel Subsidy Program, will be completed this spring. It will be another modern addition to the older groundfish fleet which, because of obsolescence, is suffering from the competition of newer vessels operating out of foreign countries.

Under the fishing vessel construction grant program up to one-third of the cost of construction of a fishing vessel can be financed by the Federal Government. This is to offset the lower construction costs on vessels built in foreign shipyards.

U. S. Foreign Trade

AIRBORNE IMPORTS OF FISHERY PRODUCTS, THIRD QUARTER 1962:

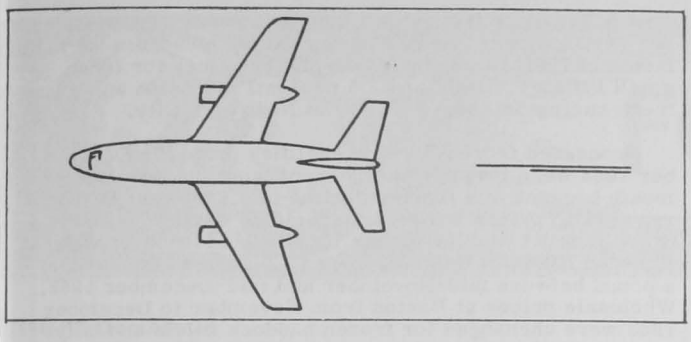
Airborne fishery imports into the United States leveled off in September 1962 after increasing in July and August due mainly to larger shipments of shrimp. Airborne imports of northern lobsters from Canada dropped to 54,961 pounds in July and then stopped completely. They were replaced by airborne shipments of spiny lobsters from Caribbean and Central American countries which amounted to 115,736 pounds in August and 54,349 pounds in September. Fish fillets from Mexico was the leading finfish product imported by air in the third quarter of 1962.

Raw headless shrimp made up the bulk of airborne shrimp imports--in July, shipments consisted of 617,228 pounds of fresh or frozen raw headless, 56,881 pounds of frozen peeled and deveined, and 95,261 pounds of unclassified shrimp; in August, shipments consisted of 886,496 pounds of fresh or frozen raw headless, 131,510 pounds of peeled and deveined, and 660 pounds of unclassified shrimp; and in September, shipments consisted of 507,023 pounds of fresh or frozen raw headless, 42,056 pounds of frozen peeled and deveined, and 1,500 pounds of unclassified shrimp. Over 80 percent of the airborne shrimp imports in July, August, and September entered through the U. S. Customs District of Florida. The remainder entered through the Customs Districts of New Orleans (La.), Laredo (Tex.), Los Angeles (Calif.), and New York City.

U. S. 1/ Airborne Imports of Fishery Products, January-September 1962

Product and Origin 2/	July		August		September		Jan.-Sept.	
	Qty. 3/	Value 4/	Qty. 3/	Value 4/	Qty. 3/	Value 4/	Qty. 3/	Value 4/
	Lbs.	US$	Lbs.	US$	Lbs.	US$	Lbs.	US$
Fish:								
Azores	-	-	-	-	25,654	5,672	25,654	5,672
Portugal	-	-	-	-	12,125	3,500	12,125	3,500
Canada	-	-	-	-	-	-	21,317	16,948
Mexico	93,411	12,831	109,582	22,252	138,299	22,246	691,542	121,467
France	124	200	-	-	-	-	279	663
Rumania	-	-	-	-	-	-	1,251	11,287
Panama	-	-	-	-	-	-	7,807	1,312
Norway	-	-	-	-	-	-	223	449
Denmark	99	261	-	-	-	-	99	261
Costa Rica	5,576	861	-	-	-	-	5,576	861
British Honduras	-	-	8,775	2,223	5,950	1,428	14,725	3,651
Total fish	99,210	14,153	118,357	24,475	182,028	32,846	780,598	166,071
Shrimp:								
Guatemala	14,125	6,575	62,167	29,638	30,580	15,528	230,175	115,303
El Salvador	77,027	44,272	70,722	39,946	56,957	31,131	467,112	292,757
Nicaragua	100,557	32,633	85,166	27,773	2,671	1,500	979,872	330,158
Costa Rica	37,734	17,137	75,996	31,104	65,274	25,697	327,691	138,828
Panama	170,545	105,262	278,165	144,937	295,804	181,591	1,423,170	776,268
Venezuela	369,382	214,188	446,450	251,752	502,360	295,132	2,482,428	1,343,422
Ecuador	-	-	-	-	-	-	12,210	3,440
Mexico	-	-	-	-	-	-	24,748	9,052
Netherlands Antilles	-	-	-	-	-	-	3,075	2,722
Total shrimp	769,370	420,067	1,018,666	525,150	953,646	550,579	5,950,481	3,011,950
Shellfish other than Shrimp:								
British Honduras	9,360	7,114	56,830	29,756	35,682	22,567	177,212	102,301
Honduras	-	-	52,800	32,960	-	-	113,003	80,666
Costa Rica	-	-	-	-	-	-	1,400	1,247
Panama	-	-	-	-	-	-	1,040	1,011
Jamaica	-	-	-	-	-	-	30,014	21,324
Netherlands Antilles	624	283	-	-	15,314	9,823	31,196	19,856
Venezuela	-	-	-	-	-	-	22,263	13,624
Mexico	2,268	1,072	18,699	12,346	3,353	3,120	53,919	33,573
Guatemala	-	-	1,100	710	-	-	8,470	4,590
Leeward and Windward Islands	1,232	548	2,333	1,034	-	-	22,911	8,660
Nicaragua	-	-	796	274	-	-	1,186	555
Japan	-	-	-	-	-	-	26	330
France	37	101	-	-	-	-	361	1,038
Colombia	285	1,264	56	220	-	-	1,763	5,110
Ecuador	700	448	-	-	-	-	1,640	1,152
Canada	54,961	20,740	-	-	-	-	223,442	90,880
El Salvador	-	-	336	237	-	-	831	479
Trinidad	-	-	-	-	-	-	2,338	971
Dominican Republic	6,621	4,830	572	550	14,886	14,844	22,079	20,224
Bahamas	-	-	1,882	837	-	-	1,882	837
Peru	-	-	92	204	-	-	92	204
Tot. shellfish (exc. shrimp)	76,088	36,400	135,496	79,128	69,235	50,354	717,068	408,632
Grand Total	944,668	470,620	1,272,519	628,753	1,204,909	633,779	7,448,147	3,586,653

1/Imports into Puerto Rico from foreign countries are considered to be United States imports and are included. But United States trade with Puerto Rico and with United States possessions and trade between United States possessions are not included.
2/When the country of origin is not known, the country of shipment is shown.
3/Gross weight of shipments, including the weight of containers, wrappings, crates, and moisture content.
4/F.o.b. point of shipment. Does not include U. S. import duties, air freight, or insurance.
Note: These data are included in the over-all import figures for total imports; i.e., these imports are not to be added to other import data published.
Source: United States Airborne General Imports of Merchandise, FT 380, July, August, and September 1962, U. S. Department of Commerce.



Shrimp accounted for 79.9 percent of the quantity and 84.0 percent of the value of airborne imports of fishery products in the first nine months of 1962. All of the U. S. airborne shrimp imports during the first nine months of 1962 originated in Central and South American countries. The leading suppliers of airborne shrimp imports in January-September were Venezuela with 42.4 percent, Panama with 23.9 percent, and Nicaragua with 16.5 percent.

The data as issued do not show the state of all products--fresh, frozen, or canned--but it is believed that the bulk of the airborne imports is fresh and frozen products.

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IMPORTS OF CANNED TUNA IN BRINE UNDER QUOTA:

United States imports of tuna canned in brine during January 1-December 1, 1962, amounted to 51,796,996 pounds (about 2,466,524 std. cases), according to data compiled by the Bureau of Customs. This was only slightly below the 52,024,510 pounds (about 2,477,358 std. cases) imported during January 1-December 2, 1961.

The quantity of tuna canned in brine which may be imported into the United States during the calendar year 1962 at the $12\frac{1}{2}$-percent rate of duty is limited to 59,059,014 pounds (about 2,812,334 std. cases of 48 7-oz. cans). Any imports in excess of the quota are dutiable at 25 percent ad valorem.

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EDIBLE FISHERY PRODUCTS, NOVEMBER 1962:

Imports of fresh, frozen, and processed edible fish and shellfish into the United States in November 1962 were up 0.8 percent in quantity but down 0.5 percent in value from those of the previous month. A large increase in imports of frozen tuna (increase mostly from Japan and Peru) was about offset by a sharp decline in imports of ocean perch fillets (decline mostly from Canada), canned sardines not in oil (decline mostly from South Africa), and canned oysters (mostly from Japan).

Compared with the same month in 1961, the imports in November 1962 were up 1.4 percent in quantity and 7.1 percent in value. There was a sizable increase in November 1962 in imports of fish blocks or slabs (increase mostly from Norway and Iceland), frozen tuna other than albacore (increase mostly from Japan and Peru), and frozen shrimp. But imports were down for frozen salmon (mostly from Canada), canned salmon (mostly from Japan and Canada), canned sardines in oil and not in oil, and frozen albacore tuna, canned tuna in brine other than albacore.

In the first 11 months of 1962, imports were up 15.3 percent in quantity and 26.1 percent in value as compared to the same period in 1961. The greater increase in value was because of the higher prices which prevailed in 1962 for most imported fishery products. Most fishery products were imported in greater quantity in 1962 and imports were up substantially for fish blocks or slabs, frozen tuna (increase mostly from Japan and Peru), canned sardines in oil, frozen shrimp, and sea scallops. Imports were down for the following products: haddock fillets, fresh and frozen salmon, canned salmon, canned albacore tuna in brine, canned bonito and yellowtail, and canned crab meat.

U. S. Imports and Exports of Edible Fishery Products, November 1962, with Comparisons

Item	Quantity				Value			
	Nov.		Jan.-Nov.		Nov.		Jan.-Nov.	
	1962	1961	1962	1961	1962	1961	1962	1961
	(Millions of Lbs.)				(Millions of $)			
Imports:								
Fish & Shellfish:								
Fresh, froz. & processed 1/	102.3	100.9	1,083.2	939.1	36.2	33.8	366.1	302.5
Exports:								
Fish & Shellfish:								
Processed only 1/ (excluding fresh & frozen)	3.5	3.9	30.8	23.9	2.0	1.9	13.9	12.1

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

Exports of processed fish and shellfish from the United States in November 1962 were down 2.8 percent in quantity from those in the previous month. But the value of the exports in both months was the same. In November, there was a modest decline in exports of canned salmon, canned sardines in oil and not in oil, and canned squid. The decline was about offset by an increase in exports of canned mackerel and the higher-priced canned shrimp.

Compared with the same month in 1961, the exports in November 1962 were down 10.3 percent in quantity, but up 5.3 percent in value. Exports of canned shrimp and canned squid increased in November, while exports of canned mackerel, canned salmon, and canned sardines not in oil declined.

Processed fish and shellfish exports for the first 11 months of 1962 were up 28.9 percent in quantity, but the value was up only 14.9 percent as compared with the same period of 1961. Exports of the lower priced canned squid (principally to Greece and the Philippines) showed the greatest increase in 1962. Exports were also up for canned mackerel, canned salmon, and canned sardines in oil. But there was a small decline in exports of canned shrimp (decline mostly in exports to Canada and the United Kingdom) and canned sardines not in oil (decline mostly in exports to the Philippines). Although not covered in the table, exports were up for frozen salmon, and were down for frozen shrimp (decline mostly in exports to Japan) and shucked oysters (principally to Canada).

Wholesale Prices

EDIBLE FISH AND SHELLFISH, DECEMBER 1962:

Wholesale prices for edible fish and shellfish (fresh, frozen, and canned) in December 1962 rose 2.2 percent from the preceding month due primarily to a sharp increase in prices for fresh drawn and filleted haddock at Boston following some extremely bad weather on the New England fishing grounds. As compared with December 1961, prices were up 4.5 percent because of generally higher prices for most of the fishery products included in the index.

The drawn, dressed, and whole finfish subgroup index in December 1962 was up sharply (increased 10.2 percent) from the previous month and up 15.7 percent from December 1961. Much higher prices in December 1962 for large drawn haddock (up 64.9 percent) at Boston plus a 2.3-percent increase for round fresh whitefish at Chicago more than offset a slight decline (1.9 percent) for dressed frozen halibut at New York City. Compared with December 1961, wholesale prices were up quite sharply for all items in the subgroup except those for Great Lakes fresh round yellow pike (down 14.9 percent).

A sharply higher price in December 1962 for fresh small haddock fillets at Boston (up 17 cents a pound or 40.2 percent) was responsible for the increase (3.6 percent) from November to December 1962 in the fresh processed fish and shellfish subgroup index. Fresh shrimp prices at New York City were up slightly (about one cent a pound) from the preceding month and fresh shucked oysters (standards) at Norfolk rose 1.6 percent. The December 1962 subgroup index was up 11.2 percent from the same month of 1961 because of much higher prices for fresh small haddock fillets (up 82.5 percent) at Boston and fresh shrimp (up 14.8 percent) at New York City.

Processed frozen fish and shellfish prices in December 1962 were lower by 3.6 percent from the previous month because of a further decline of 5.1 percent in frozen shrimp prices at Chicago (declined 4.0 percent between October and November 1962). In addition, frozen flounder fillets at Boston dropped 3.7 percent or one cent a pound between mid-November and mid-December 1962. Wholesale prices at Boston from November to December 1962 were unchanged for frozen haddock fillets and only fractionally lower for frozen ocean perch fillets. As compared with December 1961, the subgroup index for December 1962 was up 10.9 percent. Prices in December 1962 were higher by 12.6 percent for frozen shrimp, 8.1 percent for frozen ocean perch fillets, 10.7 percent for frozen haddock fillets, and 2.6 percent for frozen flounder fillets.

Canned fishery products prices in December 1962 were unchanged from the preceding month, but were 9.0 percent lower than in December 1961. Compared with December a year earlier, canned fish prices were lower for all the products in the subgroup index--canned Maine sardines down 24.4 percent, canned light meat tuna down 3.2 percent, canned pink salmon down 8.9 percent, and canned California sardines down 10.0 percent. Packs of canned fish items in this subgroup were all good in 1962, except for California sardines which yielded the lowest pack on record.

Table 1 - Wholesale Average Prices and Indexes for Edible Fish and Shellfish, December 1962 With Comparisons

Group, Subgroup, and Item Specification	Point of Pricing	Unit	Avg. Prices 1/ ($)		Indexes 2/ (1957-59=100)			
			Dec. 1962	Nov. 1962	Dec. 1962	Nov. 1962	Oct. 1962	Dec. 3/ 1961
ALL FISH & SHELLFISH (Fresh, Frozen, & Canned)					120.9	118.3	119.0	115.7
Fresh & Frozen Fishery Products:					127.6	123.7	124.3	113.3
Drawn, Dressed, or Whole Finfish:					133.1	120.8	120.7	115.0
Haddock, lge., offshore, drawn, fresh	Boston	lb.	.18	.11	143.8	87.2	82.2	109.3
Halibut, West., 20/80 lbs., drsd., fresh or froz.	New York	lb.	.43	.44	127.1	129.6	129.6	105.0
Salmon, king, lge. & med., drsd., fresh or froz.	New York	lb.	.97	.96	135.2	134.5	136.2	120.5
Whitefish, L. Superior, drawn, fresh	Chicago	lb.	.69	.68	103.0	100.7	108.2	94.0
Yellow pike, L. Michigan & Huron, rnd., fresh	New York	lb.	.54	.54	88.5	88.5	77.8	104.0
Processed, Fresh (Fish & Shellfish):					128.5	124.0	123.8	115.6
Fillets, haddock, sml., skins on, 20-lb. tins	Boston	lb.	.58	.41	139.6	99.6	92.3	76.5
Shrimp, lge. (26-30 count), headless, fresh	New York	lb.	1.05	1.04	123.1	121.9	122.5	107.2
Oysters, shucked, standards	Norfolk	gal.	7.88	7.75	132.8	130.7	130.7	132.8
Processed, Frozen (Fish & Shellfish):					116.4	120.7	122.7	105.0
Fillets: Flounder, skinless, 1-lb. pkg.	Boston	lb.	.40	.41	100.1	103.9	100.1	97.6
Haddock, sml., skins on, 1-lb. pkg.	Boston	lb.	.37	.37	107.0	107.0	105.5	96.7
Ocean perch, lge., skins on 1-lb. pkg.	Boston	lb.	.34	.34	117.5	118.3	110.4	108.7
Shrimp, lge. (26-30 count), brown, 5-lb. pkg.	Chicago	lb.	1.03	1.09	122.2	128.7	134.0	108.5
Canned Fishery Products:					109.4	109.4	110.2	120.2
Salmon, pink, No. 1 tall (16 oz.), 48 cans/cs.	Seattle	cs.	25.50	25.50	111.1	111.1	111.1	122.0
Tuna, lt. meat, chunk, No. 1/2 tuna (6-1/2 oz.), 48 cans/cs.	Los Angeles	cs.	11.75	11.75	104.4	104.4	104.4	107.9
Sardines, Calif., tom. pack, No. 1 oval (15 oz.), 24 cans/cs.	Los Angeles	cs.	4.50	4.50	101.6	101.6	118.5	112.9
Sardines, Maine, keyless oil, 1/4 drawn (3-3/4 oz.), 100 cans/cs.	New York	cs.	9.31	9.31	119.4	119.4	116.9	157.9

1/Represent average prices for one day (Monday or Tuesday) during the week in which the 15th of the month occurs. These prices are published as indicators of movement and not necessarily absolute level. Daily Market News Service "Fishery Products Reports" should be referred to for actual prices.

2/Beginning with January 1962 indexes, the reference base of 1947-49=100 was superseded by the new reference base of 1957-59=100.

3/Recomputed to be comparable to 1957-59=100 base indexes.

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