TRENDS AND DEVELOPMENTS

Alaska

FOREIGN FISHING ACTIVITY OFF ALASKA, DECEMBER 1964:

U.S.S.R.: The Soviet trawling fleet fishing in the vicinity of Yakutat Bay continued operations through December. It was the first time the Soviets have maintained a fishing fleet in the Gulf of Alaska during the winter. Weather conditions were severe, but they appeared to be fishing for Pacific ocean perch, with little or no catch of incidental species. About 15 vessels were reported in the area during December.

It was reported the Soviets had resumed an extensive herring fishery in the Bering Sea northwest of the Pribilof Islands. In past years this "winter" fishery has involved a fleet of more than 200 Soviet vessels.

Japan: The Japanese shrimp factoryship Chichibu Maru accompanied by 10 trawlers terminated fishing and returned to Japan during the month, according to Japanese sources. That fleet operated in the shrimp fishery mostly in the eastern Bering Sea throughout 1964.

Two large new stern trawlers, the Taiyo Maru No. 82 and the Akebono Maru No. 72, were reported in the eastern Bering Sea during December, with another new stern trawler (Aso Maru) fishing in the vicinity of Adak in the western Aleutian Islands.

* * * * *

1964 ALASKA KING CRAB CATCH AT RECORD HIGH:

Total landings of king crab in Alaska during 1964 were estimated by the Alaska Department of Fish and Game to be more than 35 million pounds as compared with the previous record of 78.7 million pounds in 1963.

Seismic sea waves and land subsidence resulting from the March 27 earthquake crippled crab processing facilities at Kodiak and caused a decrease in the king crab catch in that area. Kodiak fishermen, however, shifted much of their efforts westward to the Alaska Peninsula-Aleutians-Bering Sea areas following the disaster and helped attain a record king crab catch of about 31.1 million pounds--up from 13.7 million pounds in 1963.

The Kodiak area yielded 15 million pounds of king crab from July 1 to December 10, 1964,

Kodiak king crab haul showing large average size.

about 2 million pounds less than the same period in 1963. The Cook Inlet area also showed a decrease from 8.3 million pounds in 1963 to an estimated 7 million pounds in 1964.

* * * * *

FISHERY LANDINGS, 1963:

Fish and shellfish landings in 1963 in the State of Alaska totaled 392.2 million pounds valued at $45.7 million ex-vessel. Compared with 1962, this was a decline of 37 million pounds (9 percent) and $11.5 million (20 percent) largely because of reduced landings of salmon and halibut.

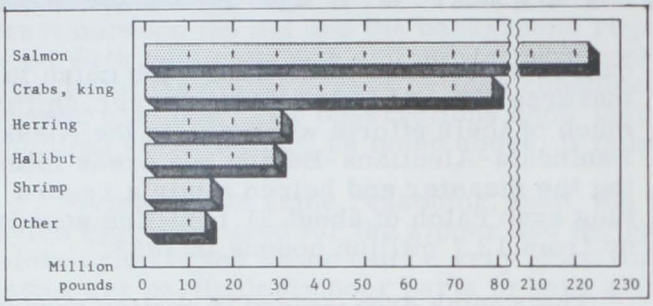


Fig. 1 - Alaska catch, 1963.

Landings of Alaska salmon in 1963 amounted to 223 million pounds--55 million pounds less than in 1962, and 504 million pounds below the record 727 million pounds in 1963. Halibut landings of 30 million pounds declined 7 million pounds (19 percent) as compared with 1962. The 1963 landings of herring (31 million pounds) and shrimp (15 million pounds) declined 2.7 and 1.8 million pounds, respectively.

The decline in 1963 was partially offset by record landings of king and Dungeness crab. King crab landings totaled nearly 79 million pounds--26 million pounds more than in 1962. Dungeness crab landings in 1963 totaled 12 million pounds--an increase of 3 million pounds (34 percent).

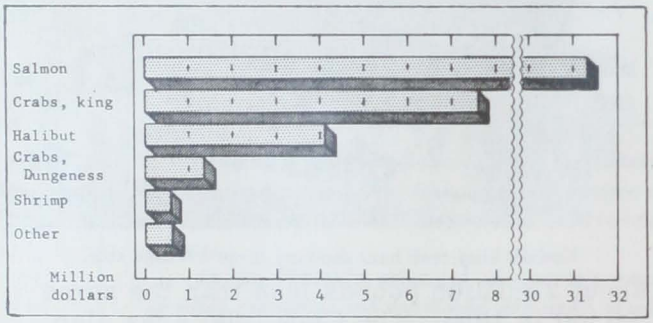


Fig. 2 - Value of Alaska catch, 1963.

Landings were taken by 17,014 fishermen--1,218 more than in 1962. Commercial fishing craft operating in 1963 consisted of 2,286 vessels of 5 net tons and over, and 7,970 motor boats.

In 1963, manufactured fishery products totaled 210 million pounds valued at $109 million--a decline of 38 million pounds and $23 million as compared with 1962.

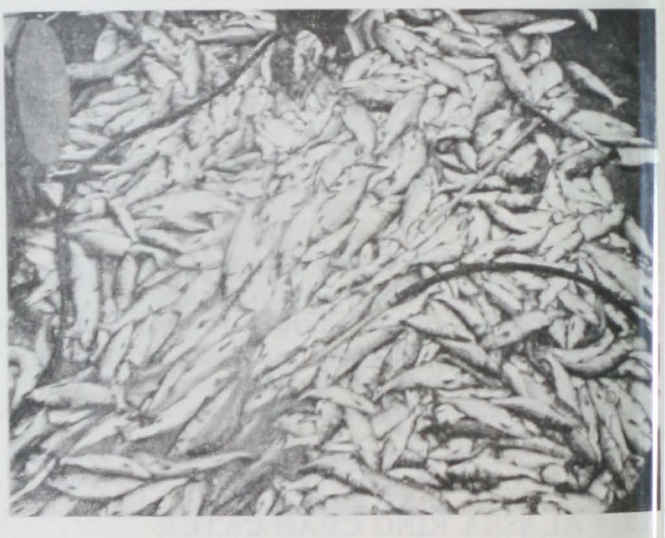
The Alaska canned pack of fish and shellfish in 1963 was 3.0 million cases valued at $76.3 million--775,000 cases and $25.7 million less than 1962. The decline resulted chiefly from a drop in the pack of canned salmon.

* * * * *

FISHERIES HIGHLIGHTS, 1963:

The total Alaska fisheries catch in 1963 was down 9 percent in quantity and 20 percent in value from the previous year due mainly to a drop in the catch of salmon and halibut. The Alaska king crab catch increased sharply in 1963.

Salmon continued to be the major item in Alaska fisheries, accounting for 57 percent of the quantity and 68 percent of the value of the total catch in 1963. Pink salmon accounted for over half of the Alaska salmon catch in 1963. The area breakdown of the total 1963 Alaska salmon catch was 102.4 million pounds in southern Alaska, 93.3 million pounds in central Alaska, and 27.4 million pounds in western Alaska.



Unloading red salmon at a cannery in Bristol Bay.

In 1963, the Alaska halibut fishery was centered in southeastern Alaska while the developing king crab fishery was centered in central and western Alaska.

The 1963 Alaska catch was taken by 17,014 fishermen operating 2,286 fishing vessels (craft of 5 net tons and over) and 7,970 other boats.

Alaska Fisheries Catch, 1962-1963

Species	1963		1962	
	Quantity	Value	Quantity	Value
Fish	Pounds	Dollars	Pounds	Dollars
Halibut[1]	29,886,400	4,160,990	36,791,800	7,466,520
Herring	31,216,200	468,240	33,876,400	379,320
Rockfishes[2]	90,500	6,340	166,200	8,370
Sablefish	1,359,500	125,540	1,508,600	171,920
Salmon: 3/				
Chinook or King	9,160,600	3,126,640	8,738,600	2,698,860
Chum or Keta	35,748,400	3,046,550	57,652,500	4,832,170
Pink	125,117,400	14,472,380	143,278,700	20,296,300
Red or Sockeye	35,455,600	7,643,860	52,946,400	11,130,170
Silver or Coho	17,581,200	3,008,820	15,231,500	3,161,960
Total Salmon	223,063,200	31,298,250	277,847,700	42,119,460
Trout:				
Dolly Varden	4,800	960	4,500	780
Lake	2,200	440	-	-
Steelhead	19,700	3,940	10,000	1,890
Whitefish	600	130	-	-
Total Fish	285,643,100	36,064,830	350,205,200	50,148,260
Shellfish, etc.				
Clam Meats, Razor	410,300	51,950	239,900	78,670
Crabs:				
Dungeness	12,084,100	1,357,540	8,989,500	1,001,450
King	78,740,300	7,607,360	52,782,200	5,278,210
Shrimp	15,126,900	605,080	16,943,100	731,370
Kelp (with herring eggs)	199,100	15,920	46,200	2,310
Other	-	-	11,700	1,380
Total Shellfish, etc.	106,560,700	9,637,850	79,012,600	7,093,390
Grand Total	392,203,800	45,702,680	429,217,800	57,241,650

1/Includes the value of halibut livers and viscera amounting to $6,500 in 1963 and $2,940 in 1962.
2/Includes lingcod.
3/The round weights used in catch tables were obtained by multiplying number of fish by their average weight.
Note: The above data include catches of halibut, sablefish, lingcod, and rockfish landed by vessels of U. S. Registry in British Columbia ports. Round weights of fish taken by halibut vessels were obtained by multiplying reported weights, representing poundage of fish eviscerated and with heads-off, by the following factors: halibut 1.33, sablefish and rockfish 1.43.

In 1963 there were 7,907 persons engaged in wholesaling and manufacturing fishery products in Alaska. Fishery establishments in Alaska included 100 canning plants, 59 fish curing plants, and 66 plants handling fresh and frozen fishery products. Alaska's processed fishery products had a wholesale value of $109 million in 1963.

Alaska's main canned fishery products in 1963 were 2.7 million standard cases of canned salmon valued at $67.4 million; 271,549 standard cases of crab meat (king and dungeness) valued at $7.6 million; and 61,949 standard cases of shrimp valued at $1 million.

Alaska's processed frozen fishery products included principally about 27 million pounds of dressed halibut valued at about $8 million; 13 million pounds of dressed salmon valued at about $6 million; 16 million pounds of king and Dungeness crab products (whole crab, crab sections, and crab meat) valued at about $12 million, and 3 million pounds of shrimp valued at about $3 million.

The 2 million pounds of mild-cured salmon produced in Alaska in 1963 was valued at $2 million.

Alaskan output of industrial fishery products in 1963 amounted to 2,229 short tons of herring meal valued at $285,100 and 4.4 million pounds of herring oil valued at $222,400. (C. F. S. No. 3691, Alaska Fisheries--1963, U. S. Bureau of Commercial Fisheries.)

Alaska Fishery Investigations

PINK SALMON FAIL TO SELECT BEST SPAWNING SITES:

Analysis of field data on the 1963 brood-year pink salmon runs in Sashin Creek shows that the spawning fish did not concentrate in areas offering highly favorable environmental conditions for survival of eggs and alevins. In 1963, emphasis was placed on relations between distribution of spawners and survival of their spawn. Spawning density in areas which demonstrated the highest survival of eggs and alevins and produced the most fry per square meter of spawning ground was no greater than in areas which showed relatively low survival, and was even less in one instance. The instantaneous mortality rate of the entire 1963

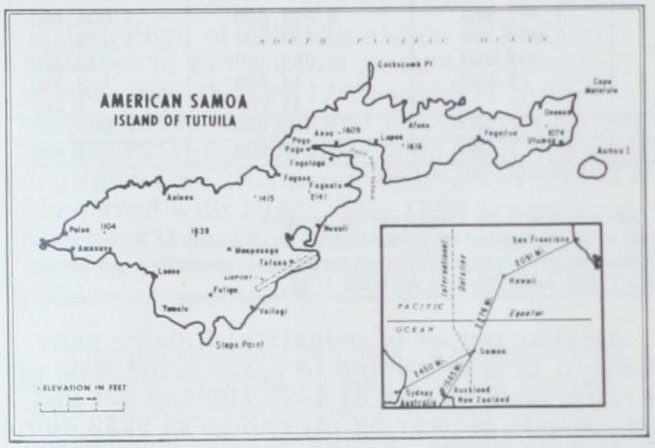
brood-year population was estimated to be about 40 times greater during the period of spawning than during the period of fry emergence and migration.

Analysis of remaining field data on 1963 brood-year pink salmon in Sashin Creek was near completion and will be followed by reports giving results of the field studies.

American Samoa

MORE TUNA VESSELS FISHING OUT OF AMERICAN SAMOA:

According to informed Japanese industry sources, the number of tuna fishing vessels



operating out of American Samoa has shown a sharp increase. As of December 31, 1964, a total of 68 vessels (40 Japanese, 17 South Korean, and 11 Formosan) were fishing for the two United States packing firms located on that Island, as compared to 54 vessels in mid-November 1964. (Suisan Keizai Shimbun, January 10, 1965.)

California

REGULATIONS ON NET WEIGHT LABELING ADOPTED:

The California Department of Agriculture, Bureau of Weights and Measures, adopted new "Net Quantity Declarations on Packaged Commodities" regulations, which became official as of December 18, 1964. The ruling became effective on labels redesigned and labels prepared from plates made after January 1, 1965, and on all labels after January 1966. California will require at least $\frac{1}{16}$-inch letters and numbers on all small labels up to 25 square inches.

A requirement of the regulations is that "a secondary statement of contents, other than the required statement, is not prohibited, but shall not be placed or designed to be more conspicuous than the required statement."

* * * * *

PELAGIC FISH POPULATION SURVEY CONTINUED:

M/V "Alaska" Cruise 64-A-6-Pelagic Fish (August 27-September 16, 1964): The objectives of this cruise by the California Department of Fish and Game research vessel Alaska in the coastal waters of central Baja California from Cedros Island to San Martin Island were to: (1) survey the fish and invertebrates of the inshore pelagic environment; (2) determine the amount of recruitment from the 1964 Pacific sardine (Sardinops caeruleus) spawning and to measure the population density of older fish; (3) determine the distribution and abundance of northern anchovies (Engraulis mordax), Pacific mackerel (Scomber diego), and jack mackerel (Trachurus symmetricus); (4) collect live anchovies for racial studies by the U. S. Bureau of Commercial Fisheries Biological Laboratory, La Jolla, Calif.; and (5) take bottom sediment cores for a study of the historical abundance of sardines and anchovies by the Scripps Institution of Oceanography.

A midwater trawl, a blanket net, and visual scouting were used to conduct the survey with all work carried out at night. A total of 41 midwater-trawl and 25 night light-blanket net stations were occupied, and 296 miles were scouted visually. Anchovies were taken on 30 stations, jack mackerel on 17, sardines on 10, and Pacific mackerel on 3. Midwater-trawl stations accounted for all but 2 anchovy, 2 sardine, and one jack mackerel catch. Other common species taken by the trawl in order of occurrence were: midshipmen (Porichthys myriaster and P. notatus), California tonguefish (Symphurus atricauda), Pacific pompano (Palometa simillima), and lizardfish (Synodus sp.).

Poor visual scouting conditions resulted in the sighting of only 16 anchovy, 2 sardine, and 7 unidentified schools. Echo-sounder

operations detected anchovies scattered continuously near the surface over a large proportion of the survey area. The invertebrate catch consisted chiefly of squid which were taken on 29 trawl stations. Salps, pelagic red crabs (Pleuroncodes planipes), ctenophores, and pyrosomes were caught less frequently.

NORTHERN ANCHOVIES: Anchovies dominated the survey both in number of occurrences and in numbers caught. They were distributed over almost the entire survey area except a small portion of Sebastian Vizcaino Bay where sardines were abundant. Anchovies were numerous around Cedros Island and became increasingly abundant from Lagoon Head towards the northern limit of the survey area. They were caught in 28 of 41 trawl tows and in 2 of 25 blanket-net stations. All schools observed or detected by echo-sounder were in a thin layer but covered areas up to 5 miles across. No dense compact schools were observed or fished.

Midwater-trawl catches were mostly light, with only one-half of them containing more than 100 fish. But 10 catches exceeded 1,000 fish and 3 exceeded 30,000, with the largest catch consisting of 100,000 fish weighing 800 pounds. Juveniles ranging from 85-100 millimeters (3.3 to 3.9 inches) accounted for over 80 percent of the total catch.

Anchovy distribution and size composition closely resembled that of the survey made in 1963. Negative phototactic behavior was quite evident on night light-blanket net stations. From this and past experience, it appears that type of behavior is the anchovy's normal reaction to light in the open sea.

PACIFIC SARDINES: Sardines were scarce, and were found mainly in 2 small areas at the southern end of the region surveyed. The 1964 year-class predominated at Cedros Island, where small pure schools of 108- to 126-millimeter (4.3 to 5.0-inch) sardines were present. Several smaller fish were taken mixed with large quantities of anchovies in the same vicinity. The blanket net and midwater trawl each accounted for 2 sardine samples. Adult fish were caught in a small area in the south end of Sebastian Vizcaino Bay. Six mdiwater-trawl catches were made in that area.

During the 1963 survey, sardines were much more abundant and distributed over the entire survey area. The 1964 year-class appears to be weak in central Baja California; this may be due to a southward shift of the sardine population. The eastern shore of Vizcaino Bay, which in former years produced the best survey catches, was almost entirely devoid of fish. Unseasonably cool water temperatures, averaging nearly 8° F. below normal, may have caused the sardines to move southward.

JACK MACKEREL: Small juvenile jack mackerel were caught at scattered locations throughout the survey area. Catches were small, ranging from 1 to 120 fish. The trawl took 16 samples and the blanket net 1. All but one sample was composed of fish-of-the-year. No schools were sighted during night scouting.

PACIFIC MACKEREL: Pacific mackerel were very scarce. Only 3 catches of several fish each were made and no schools were observed during night scouting. Several small schools were observed on daytime anchorages at Blanca and Playa Maria Bays.

MISCELLANEOUS: Live anchovies taken at Cedros Island were delivered to the biological laboratory of the U. S. Bureau of Commercial Fisheries at La Jolla for racial studies. Bottom sediment cores were obtained in deep water for a study of the historical abundance of anchovies and sardines by Scripps Institution of Oceanography.

Sea surface temperatures were abnormally cool for the time of year. They ranged from 20.8° C. (69.4° F.) at Cedros Island to 15.5° C. (59.9° F.) at San Quentin Bay. Temperatures at the same time in 1963 averaged 4.1° C. (7.6° F.) warmer. Weather conditions were ideal only at Cedros Island and north of Punta Baja. Steady and moderate winds over the greater part of Sebastian Vizcaino Bay reduced blanket-net station effectiveness but did not seriously hamper trawl operations.

A rare ribbonfish (Desmodema polystichta) was caught in the midwater-trawl in the north end of Sebastian Vizcaino Bay.

M/V "Alaska" Cruise 64-A-7-Pelagic Fish (September 25-October 13, 1964): The coastal waters of northern Baja California from Punta Baja to the United States-Mexican Border were surveyed during this cruise by the research vessel Alaska. Objectives were to: (1) survey the pelagic environment and meas-

ure the density, age, size composition, and recruitment of inshore populations of sardines, anchovies, Pacific mackerel, and jack mackerel; and (2) to collect live anchovies for blood-genetic racial studies by biological laboratory of the U. S. Bureau of Commercial Fisheries at La Jolla.

The midwater trawl and blanket net were used to sample the pelagic environment. Visual night scouting between stations was conducted to measure the density of fish schools in the immediate cruise area. A total of 32 trawl and 40 light stations were occupied, and 139 miles of ocean were scouted for fish schools. Light and trawl stations were made in the same general areas.

NORTHERN ANCHOVY (Engraulis mordax): As on previous cruises, the anchovy was the most abundant fish species taken. Anchovies were found throughout the cruise area and were caught in 29 of the 32 midwater trawl tows. Night-light stations were not as productive; anchovies were caught at only 3 of the 40 stations. A total of 19 anchovy schools was counted in the 139 miles of ocean scouted between stations. Scouting conditions were generally poor, both because of low bioluminescence in the water and because of dense fog which made scouting impossible on several nights.

There were no detectable size differences among fish caught within the survey area. The size range was 69 to 144 millimeters (2.7 to 5.7 inches), with most in the 90- to 130-millimeter (3.5- to 5.1-inch) range. The smallest fish were caught 1 mile from shore in Bahia Todos Santos, and the largest 10 miles off Punta Santo Tomas. Anchovies were caught throughout the 14° C. to 20° C. (57.2° to 68.0° F.) temperature range encountered on the cruise.

JACK MACKEREL (Trachurus symmetricus): Jack mackerel were the second most abundant fish caught during the survey. They were not taken at any light stations, but were caught in 16 of the 32 midwater trawl tows. Most catches were small with less than 15 fish per tow, although 2,400 were caught in one tow near Punta Descanso. Only 7 mackerel schools were seen during night scouting.

PACIFIC SARDINE AND PACIFIC MACKEREL (Sardinops caeruleus and Scomber diego): A total of 23 sardines were caught at 4 trawl stations between Ensenada and Punta Baja. The size ranged from 181 to 230 millimeters (7.1 to 9.1 inches). No sardine schools were seen between stations. Pacific mackerel were caught at two stations, one trawl, and one light.

Photometer measurements of water clarity taken during the cruise varied between 40 and 100. There was no apparent correlation between catches and photometer readings on this cruise. All trawls were made at night, and presumably, water clarity did not have too great an influence on catch-per-tow.

Airplane Spotting Flight 64-15-Pelagic Fish (October 28-29, 1964): To determine the inshore distribution and abundance of pelagic fish schools, the inshore area from Point Piedras Blancas to the United States-Mexican Border was surveyed from the air by the California Department of Fish and Game Cessna "182" N9042T.

On October 28 the area from Los Angeles Harbor to Point Piedras Blancas was scouted but weather conditions were not the best for aerial scouting. Rain storms were encountered at Piedras Blancas and a high cloud cover over most of the survey area severely restricted water visibility.

A total of 9 northern anchovy (Engraulis mordax) schools were found in Avila harbor. California bonito (Sarda chiliensis) were sighted near Goleta and Point Vicente. Seals and birds were feeding on 7 unidentified fish schools off Pismo Beach.

Red tide was light in intensity near Santa Barbara but quite heavy in the Ventura area. A very heavy oil slick (from natural seepage) covered the waters surface at Coal oil Point. It was the largest and heaviest oil slick seen in that area in two years.

The area from Point Dume to the United States-Mexican Border was scouted on the second day. Weather conditions were fair in the morning and excellent in the afternoon. Small groups of anchovies were seen at Encinitas and Point Vicente. Red tide was heavy in the southern portion of Santa Monica Bay and moderate in a strip just offshore from Seal Beach to La Jolla.

Note: See Commercial Fisheries Review, December 1964 p. 28.

* * * * *

SHRIMP RESOURCES IN NORTHERN COASTAL WATERS SURVEYED:

M/V "N. B. Scofield" Cruise 64-S-5-Shrimp (September 2-16, 1964): The objectives of this cruise in the coastal waters from Zuma Beach, Calif., to Cape Ferrelo, Oreg., by the research vessel N. B. Scofield of the California Department of Fish and Game were to:

1. Make underwater observations of the Gulf of Mexico shrimp trawl in operation and make needed adjustments in doors and net to insure maximum fishing efficiency.

2. Locate concentrations of pink shrimp (Pandalus jordani) for determining population estimates and natural mortality rates.

3. Determine size, sex, and weight of shrimp.

4. Save all cephalopods, rare fish, and invertebrates for the State Fisheries Laboratory, Terminal Island, Calif.

5. Identify and record incidentally-caught fish and invertebrates.

6. Collect stomachs from hake (Merluccius productus) and other species of incidentally-caught fish for juvenile shrimp abundance index study.

One day of the cruise was spent off Zuma Beach, where 2 tows were made in 8 fathoms. SCUBA divers of the California Department of Fish and Game made dives on both tows to observe the net in operation. The doors were functioning satisfactorily, but it was felt that the footrope was fishing too far from the bottom. Chain was added which brought it to within 4-6 inches of the bottom. The chain was later removed after talks with commercial fishermen who reported that they fish their nets about 12 inches off the bottom. At the time those chains were removed, a tickler chain was added to the gear to run about 5 feet in front of the center of the footrope. Moving pictures were taken of the net and the reactions of the fish to the net. The width of the net when fishing was estimated to be 25 feet and the height 6 feet.

A total of 56 tows was made in the combined survey areas as follows: Zuma Beach, tows; Fort Bragg (B-1), 5 tows; Redding Rock-Klamath River, 42 tows; Oregon border, tows. The gear used was a 41-foot headrope Gulf otter trawl with $1\frac{1}{2}$-inch stretched

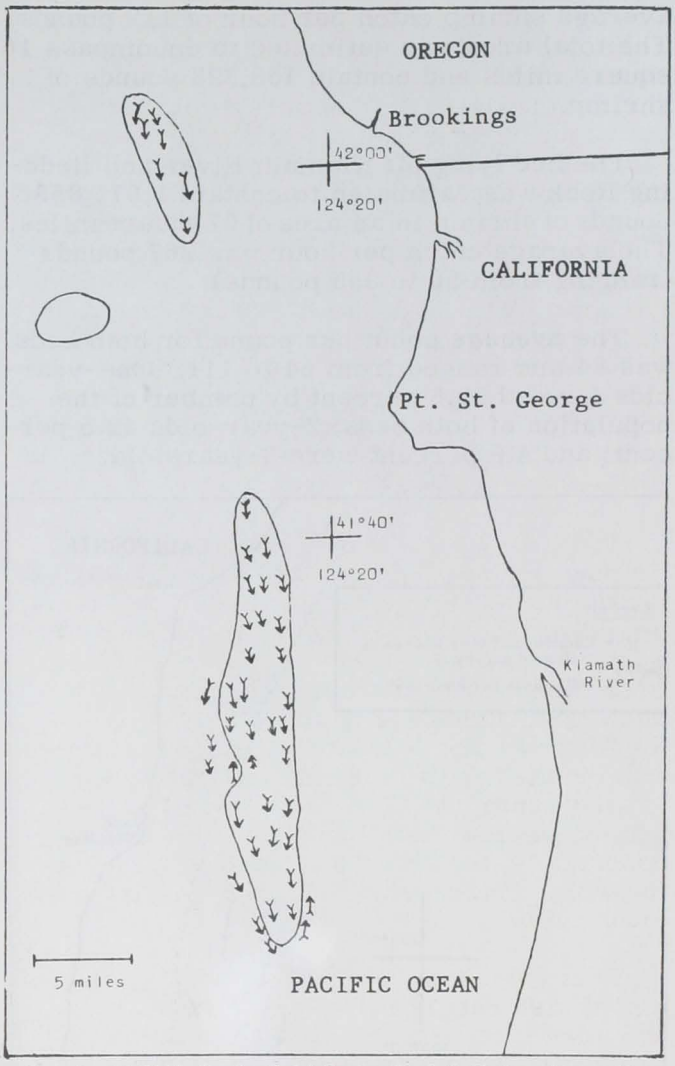


Fig. 1 - M/V N. B. Scofield Cruise 64-S-5-Shrimp (Area A).

mesh in the cod end. Of the tows made in the shrimp beds, 48 were of 20-minute duration and 6 lasted 30 minutes. On 15 of the tows, a $\frac{1}{2}$-inch stretched mesh liner was used to catch juvenile shrimp and determine escapement of adult shrimp. The tows were made in depths ranging from 8 to 165 fathoms.

An average of 229 pounds of juvenile shrimp an hour was caught in the liner (average heads-on count of 734 to the pound). The average escapement of adults into the liner amounted to 10.8 percent and ranged from 1.0 percent to 44.4 percent. Adults in the liner averaged 110 per pound. About 70 percent of the adults in the liner were 1-year-olds; 29.2 percent were 2-year-olds; and 0.8 percent were 3-year-olds.

AREA A: The 7 tows made on the bed lying on the Oregon-California border yielded an

average shrimp catch per hour of 112 pounds. The total area was estimated to encompass 16 square miles and contain 159,393 pounds of shrimp.

The bed lying off Klamath River and Redding Rock was estimated to contain 1,671,856 pounds of shrimp in an area of 67 square miles. The average catch per hour was 267 pounds (ranging from 50 to 855 pounds).

The average count per pound for both beds was 84 and ranged from 64 to 111. One-year-olds formed 52.6 percent by number of the population of both beds; 2-year-olds 42.5 percent; and 4.9 percent were 3-years old.

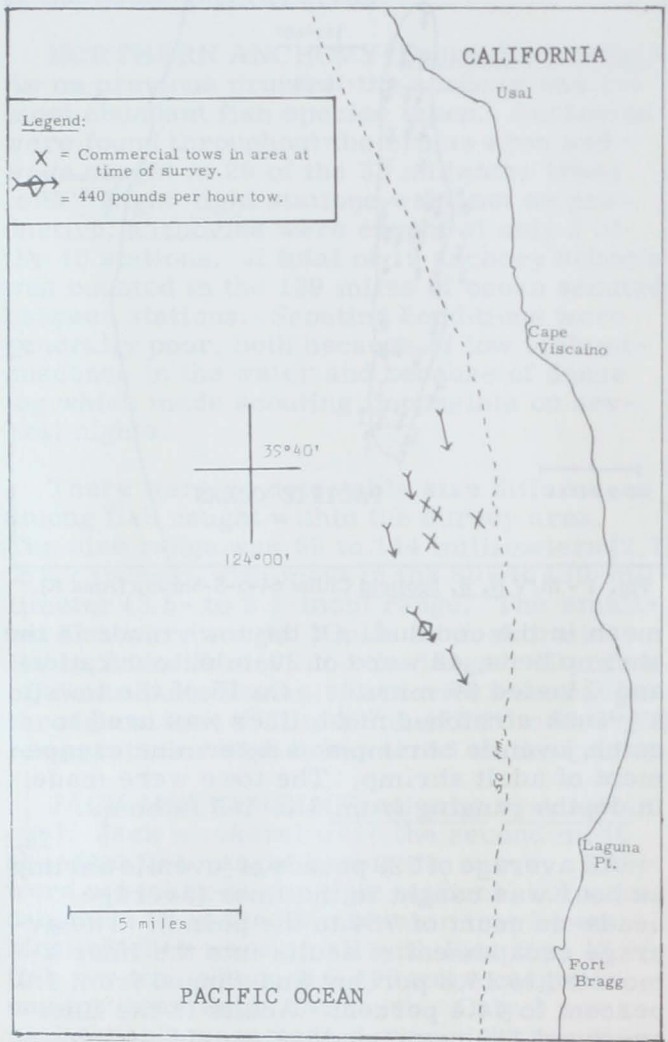


Fig. 2 - M/V N. B. Scofield Cruise 64-S-5-Shrimp (Area B-1).

Head roe was observed in 90.7 percent of the females and 40.3 percent of the transitionals. Incidental fish catches at times were quite heavy. Slender sole (Lyopsetta exilis) appeared in all of the tows. Dover sole (Microstomus pacificus) were in 90 percent of the tows, and greenstripe rockfish (Sebastodes elongatus), longnose skate (Raja rhina), eel pout (Aprodon cortezianua and Lycodopsis pacifica), slim sculpin (Radulinus asprellus), and hake appeared in over 60 percent of the tows. In all, 46 species of fish were identified in the tows.

A total of 28 dogfish (Squalus acanthias) were tagged in cooperation with the American Institute of Biological Sciences shark tagging program.

AREA B-1: Five tows were made on the area B-1 bed. The average catch per hour was 139 pounds with the best tow of 428 pounds an hour located 8.5 miles SSW. of Cape Vizcaino. The count per pound ranged between 77 and 87 with an average of 80.4. One-year-olds formed 44.8 percent by number of the samples taken, 2-year-olds 52.0 percent, and 3.2 percent were 3-year-olds.

Several rare and unusual fish species were saved for special study. A collection was also made of representative invertebrates found in association with shrimp.

Note: See Commercial Fisheries Review, October 1964 p. 18.

* * * * *

ABUNDANCE AND CONDITION OF DUNGENESS CRAB SURVEYED PRIOR TO OPEN SEASON:

M/V "N. B. Scofield" Cruise 64-S-6 (September 29-October 25, 1964): To determine preseason abundance and condition of legal and sublegal Dungeness crab (Cancer magister) in the San Francisco area for prediction of the 1964/65 season, the coastal waters off San Francisco from the Russian River to Point Montara were surveyed by the California Department of Fish and Game research vessel N. B. Scofield.

Sampling stations during this cruise were selected randomly from the crab areas between Point Montara and the Russian River. Commercial crab traps were baited with squid and rockfish and allowed to fish overnight at each of the 70 stations visited.

A total of 3,593 crab was taken at 70 stations in 694 traps. The catch consisted of 1,929 legal males, 1,422 sublegal males, and 242 females. The average legal catch per trap of 2.78 crabs is the lowest of any preseason cruise. In 1963, 4.3 legal size per

trap were taken and 4.1 in 1962. The sublegal catch of 2.05 was also below the previous year's figure.

The best crab catch was in outer Bodega Bay in 10 fathoms of water. Fair catches were also made in Drakes Bay and off Double Point in 10 and 20 fathoms, respectively. According to the survey, it is believed the crab catch for the 1964/65 season will be 50,000 pounds, with estimates ranging from 00,000 to 900,000 pounds.

About 36 percent of the legal crab taken were soft--much higher than in the past 3 years when around 5 percent were soft.
Note: See Commercial Fisheries Review, January 1964 p. 8.

* * * * *

ABALONE OBSERVATIONS AND GROWTH STUDIES:

M/V "Mollusk" Cruise 64-M-2-Abalone (September 3-17, 1964): The objectives of this cruise by the California Department of Fish and Game research vessel Mollusk in the coastal area from Pt. Estero to Cambria were to: (1) sample abalone in depths and areas selected at random for: numbers, sizes, gonad development, and sex ratios, and (2) observe relative abundance of invertebrates, vertebrates, and algae found in association with abalone.

During the cruise, 40 diving stations were occupied from Pt. Estero to Cambria, in an area about 7 miles long by $\frac{1}{2}$ to $\frac{3}{4}$ miles wide. An average dive lasted 30 minutes in water from 10 to over 75 feet deep. The area covered on each dive ranged from 100 to 1,210 square yards.

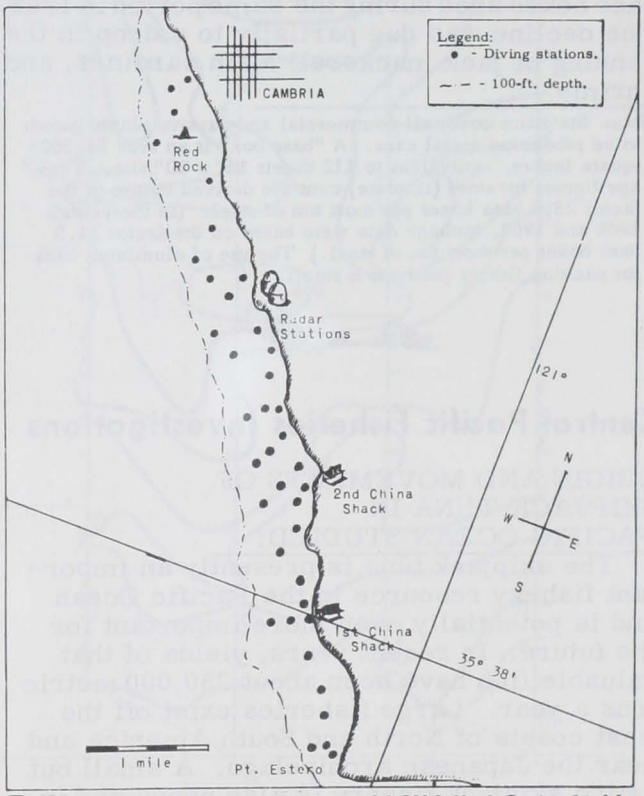
The survey showed there are large numbers of abalone within the area in varying concentration. Abalone density depends more upon ecological characteristics within an area than upon depth. At some stations numerous abalone of all sizes were found at 26-30 feet. At other stations of the same depth, few abalone of any size were observed.

Generally, "legal size" abalone ($7\frac{3}{4}$ inches and larger) were scarce in shallow (0-25 feet deep) waters. The 20- to 25-foot depth has been worked extensively by the commercial divers who, for the most part, have been unable to dive in deeper waters due to the practically impenetrable massive stands of bull kelp (Nereocystis) over most of the area.

The greatest numbers of abalone of all sizes were found at depths of 26 to 60 feet. Most of the sublegal size abalone (6 to $7\frac{3}{4}$ inches) appeared to be growing rapidly.

Many small abalone and several over 6 inches in length were recovered from the undersides of partially buried rocks; a number of small ones (1 inch) were recovered from beneath sea urchins. At depths greater than 70 feet no red abalone were found. Abalone sampled during the survey showed evidence of recent shell growth (some as much as an inch) and gonad development. Tests indicated that sperm and ova were active, but it was not possible to estimate when natural spawning would occur.

The area surveyed on this cruise is extremely rich in plant and animal life, both in



Shows diving stations occupied during M/V Mollusk Cruise 64-M-2-Abalone.

vairety and numbers. A number of different species or sponges, tunicates, and coral were observed as well as large numbers of chitons, sea urchin, and starfish. Numerous fish were present throughout the area. Schools of blue rockfish (Sebastodes mystinus) in two predominant size ranges were noted on almost every dive. The smaller sizes (1 to 3

inches long) inhabited the surface waters while those 6 to 12 inches long were in deeper waters. Lingcod, cabezon, sea trout, and china and vermilion rockfish were also present.

Note: See Commercial Fisheries Review, November 1964 p. 23.

Cans--Shipments for Fishery Products January-November 1964

A total of 2,592,305 base boxes of steel and aluminum was consumed to make cans shipped to fish and shellfish canning plants in January-November 1964, a decrease of 4.6 percent from the 2,719,239 base boxes used during the same period in 1963. The decline was due partially to a drop in the canning of jack mackerel, Main sardines, and shrimp.

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" x 20" size. Tonage figures for steel (tinplate) cans are derived by use of the factor 23.5 base boxes per short ton of steel. (In the years 1962 and 1963, tonnage data were based on the factor 21.8 base boxes per short ton of steel.) The use of aluminum cans for packing fishery products is small.

Central Pacific Fisheries Investigations

ORIGIN AND MOVEMENTS OF SKIPJACK TUNA IN PACIFIC OCEAN STUDIED:

The skipjack tuna is presently an important fishery resource in the Pacific Ocean and is potentially even more important for the future. In recent years, yields of that valuable fish have been about 250,000 metric tons a year. Large fisheries exist off the west coasts of North and South America and near the Japanese archipelago. A small but active skipjack fishery is also conducted in the Hawaiian Islands. The unexploited potential of the skipjack as a resource is demonstrated by the vast unfished areas of the Pacific Ocean where skipjack tuna occur. Large amounts of skipjack exist in those areas. For example, 35,000 metric tons of skipjack were taken in 1937 in the U. S. Trust Territories of the western Pacific Ocean. That area has been virtually unfished for skipjack for nearly 30 years, but a skipjack fishery has recently been reestablished there.

Plastic pool in which skipjack tuna are held for study at the U.S. Bureau of Commercial Fisheries Biological Laboratory, Honolulu, Hawaii. Tank is 23 feet in diameter and has a water depth of 3 feet.

Despite the importance of the skipjack tuna, very little is understood about its biology and population dynamics. In order to learn more concerning skipjack tuna, scientists at the U. S. Bureau of Commercial Fisheries Biological Laboratory, Honolulu, Hawaii, have been studying the origin and movements of the harvested groups of skipjack in the Pacific Ocean. A wide variety of data collected both at the Bureau's Honolulu Laboratory and at other research facilities has been examined. Some of these data involve larval distributions, subpopulation studies, gonad indexes, size distributions, tag recoveries and catch predictions. All of these data have been put together to formulate a model or set of hypotheses which could account for the origin and movement of the harvested skipjack in the Pacific Ocean.

The primary consideration of this model are the skipjack harvested in the eastern Pacific and Hawaiian fisheries. The fish harvested off the coast of Japan are not considered in the model, but they appear to originate from spawnings in the Ryukyu-Izu-Bonon Island chains, or perhaps from spawnings in the islands to the south of those chains.

In the eastern Pacific, it appears that skipjack spawning is negligible, so that skipjack harvested in that part of the ocean must come from somewhere else; the model postulates that those fish come from the central equa-

rial Pacific. Studies of skipjack biology primarily larval distributions and subpopulations) in the central Pacific have shown it unlikely that skipjack in the central Pacific comprise a single homogeneous population unit.

The model suggests that of the various population units or subpopulations of the central Pacific, skipjack from spawnings in the central equatorial Pacific contribute the majority of fish harvested in both the eastern Pacific and Hawaiian fishery. Another interesting feature brought out by the study was a possible measure of skipjack year-class strength for the Hawaiian fishery.

The next step in determining the origin and movements of skipjack tuna in the central and eastern Pacific is to test features of this model. Some of those tests are under way.

* * * * *

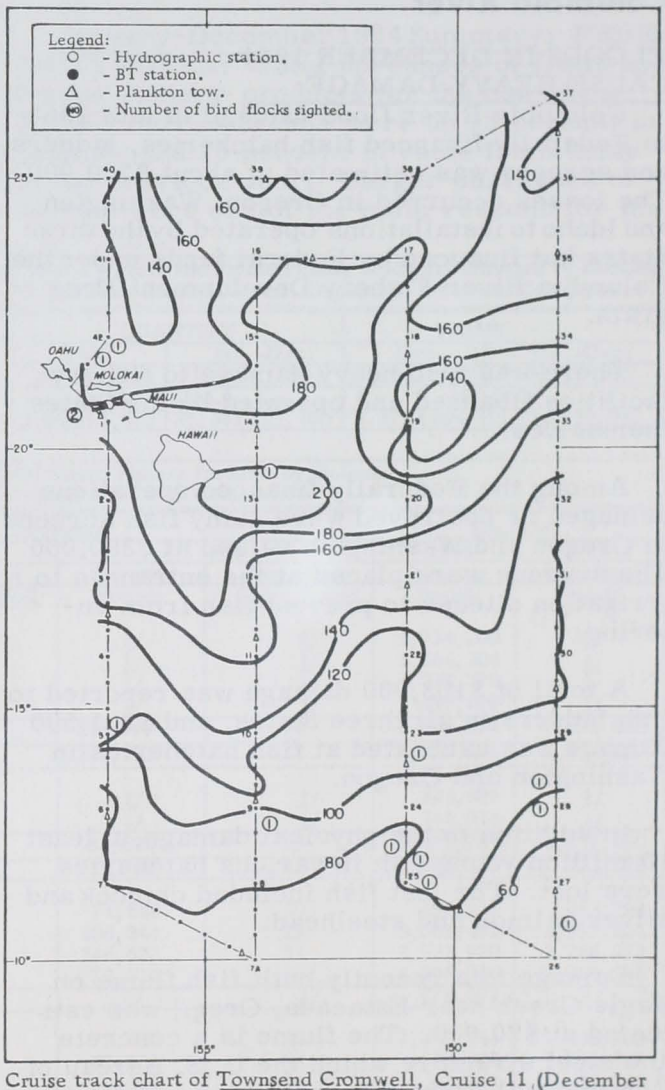
TRADE WIND ZONE OCEANOGRAPHIC STUDIES CONTINUED:

M/V "Townsend Cromwell" Cruise 11 (December 1-20, 1964): This was the tenth in a series of oceanographic cruises by the research vessel Townsend Cromwell to collect data on rates of change in the distribution of properties in the trade wind zone of the central North Pacific Ocean. The research vessel is operated by the Biological Laboratory of the U. S. Bureau of Commercial Fisheries, Honolulu, Hawaii, which on this cruise collected data in an area of the central North Pacific bounded by latitudes 10° N., 27° N. and longitudes 148° W., 158° W.

A total of 43 oceanographic stations was occupied on this cruise. At each station, temperatures and samples for salinity analysis were obtained at 20 depths to 1,500 meters (4,921 feet). Deep casts to 4,000 meters (13,123 feet) were taken at stations 21, 25, and 38.

The surface circulation and temperature distribution in the cruise area during December 1964 showed significant changes from the previous months. The westward flow of water south of 20° N. had broadened and was less intense. Over the entire cruise area the flow appeared to be more random than before. To the north of 20° N. a new set of eddies replaced the previous system in what appeared to have been an eastward shift of the pattern of the 20° C. isotherm depth. The thermocline in the south was less sharp than it appeared in October while the mixed layer for the entire region was somewhat deeper than before. After the sharp drop in surface temperature noted in November, the cooling seemed nearly to have ceased, with the surface temperatures for December almost the same as for the previous month. The temperature pattern was similar to that for November with a very slight temperature drop in the south.

A total of 14 feeding bird flocks were sighted during the cruise as compared to the 23 sighted during the November cruise.



Cruise track chart of Townsend Cromwell, Cruise 11 (December 1-20, 1964), showing depth contours of the 20° C. isotherm in meters.

Bathythermograms (BT) were obtained at 30-mile intervals along the cruise track.

Other operations during the cruise included: (1) obtaining surface bucket temper-

atures and water samples for salinity analysis at each (BT) observation; (2) making dissolved oxygen determinations for each water sample at stations 7A to 16, 26 to 37, and at station 39; (3) releasing 20 plastic-enclosed drift cards at 30-mile intervals along the entire cruise track up to station 38; (4) taking a 30-minute surface plankton tow daily using a 1-meter net; and other observations.

Note: See Commercial Fisheries Review, February 1965 p. 17.

Columbia River

FLOODS IN DECEMBER 1964 CAUSE HEAVY DAMAGE:

Columbia River flood damage in late 1964 to Federally-financed fish hatcheries, ladders, and screens was estimated at about $700,000. The losses occurred in Oregon, Washington, and Idaho to installations operated by the three States but financed by Federal funds under the Columbia River Fishery Development Program.

There was also heavy damage to fishery facilities financed and operated by the States themselves.

Among the Federally-financed operations damaged or destroyed were many fish screens in Oregon and Washington valued at $390,000. The screens were placed at the entrances to irrigation ditches to prevent fish from entering.

A total of $103,000 damage was reported to fish ladders in all three States, and $201,500 damage was estimated at fish hatcheries in Washington and Oregon.

In addition to the physical damage, at least 10 million young fish in various hatcheries were lost. The lost fish included chinook and silver salmon and steelhead.

Damage to a recently-built fish flume on Eagle Creek near Estacada, Oreg., was estimated at $20,000. The flume is a concrete and steel structure which the U. S. Bureau of Commercial Fisheries installed in order to test various kinds of fish guiding and collecting devices. Another flume on Grand Ronde River was damaged to the extent of $5,000.

Federal Aid for Sport Fish and Wildlife Restoration

FUNDS APPORTIONED TO STATES, FISCAL YEAR 1965:

A final distribution of $9,560,000 in Federal Aid funds for fish and wildlife restoration during fiscal year 1965 has been made to the 50 States, Guam, the Virgin Islands, and Puerto Rico, the U. S. Department of the Interior announced on January 19, 1965. Those funds come from excise taxes collected on fishing and hunting equipment. They are in addition to the preliminary apportionment of $14,200,000 made earlier and bring to $23,760,000 the total for fiscal year 1965.

Apportionment for Federal Aid in Fish and Wildlife Restoration, Fiscal Year 1965

State	Fish Projects	Wildlife Restoration
	$	$
Alabama	118,049.94	314,665.08
Alaska	349,750.00	835,250.00
Arizona	136,519.49	375,741.55
Arkansas	126,889.01	285,181.51
California	349,750.00	779,786.10
Colorado	169,568.74	428,469.57
Connecticut	69,950.00	83,525.00
Delaware	69,950.00	83,525.00
Florida	148,603.71	257,424.97
Georgia	151,236.83	299,065.99
Hawaii	69,950.00	83,525.00
Idaho	121,711.90	330,815.01
Illinois	181,517.11	415,203.17
Indiana	168,991.16	423,876.95
Iowa	120,940.95	312,599.59
Kansas	119,532.44	335,286.88
Kentucky	94,486.92	236,117.63
Louisiana	83,912.77	274,597.59
Maine	71,096.31	186,486.31
Maryland	69,950.00	114,497.45
Massachusetts	69,950.00	86,310.98
Michigan	252,080.92	629,956.12
Minnesota	328,064.67	460,422.94
Mississippi	103,850.30	265,344.57
Missouri	182,222.19	372,926.60
Montana	167,892.71	508,494.67
Nebraska	105,004.13	314,347.75
Nevada	104,487.95	321,508.53
New Hampshire	69,950.00	83,525.00
New Jersey	69,950.00	98,793.82
New Mexico	127,605.43	382,454.85
New York	184,034.14	529,973.09
North Carolina	104,860.06	353,591.34
North Dakota	69,950.00	231,015.31
Ohio	193,689.61	463,389.86
Oklahoma	150,030.91	303,191.17
Oregon	172,376.46	429,669.30
Pennsylvania	149,724.80	659,727.18
Rhode Island	69,950.00	83,525.00
South Carolina	83,301.00	186,078.01
South Dakota	92,671.00	320,538.80
Tennessee	159,073.69	348,504.30
Texas	349,750.00	835,250.00
Utah	109,496.77	335,980.27
Vermont	69,950.00	90,532.75
Virginia	96,392.21	301,110.70
Washington	134,298.55	347,809.57
West Virginia	69,950.00	177,383.25
Wisconsin	255,123.88	401,162.35
Wyoming	106,961.34	326,841.57
Guam	10,000.00	10,000.00
Puerto Rico	10,000.00	10,000.00
Virgin Islands	10,000.00	10,000.00
Totals	7,025,000.00	16,735,000.00

Of the total amount, $16,735,000 is for wildlife restoration and $7,025,000, which is a record high, is for fish projects.

The Interior Secretary said money apportioned to the States will be used for fish and

ildlife restoration projects involving the urchase of land, improvement or areas of nd or water for fish and wildlife, and to con- uct research for restoring and perpetuating ose resources.

Under the Federal Aid program, the States itiate the projects and, if they meet the re- uirements established by the Department of e Interior, the funds allocated are used to imburse the States up to 75 percent of the st of completed projects.

The amount allocated for fiscal year 1965 nder the Federal Aid in fish and wildlife storation programs is nearly $1 million ore than the $22,828,175.62 apportioned in s cal year 1964.

te: See Commercial Fisheries Review, August 1964 p. 20; pril 1964 p. 14.

ederal Purchases of Fishery Products

EPARTMENT OF DEFENSE PURCHASES, ANUARY-DECEMBER 1964:

December 1964: FRESH AND FROZEN: urchases of fresh and frozen fishery products in December 1964 for the use of the Armed orces were up 4 percent in quantity but down percent in value from the previous month. he decline in value was due mainly to lower urchases of peeled and deveined shrimp.

Compared with the same month in the previous year, purchases in December 1964 were up 22 percent in quantity and 49 percent in value. Average prices were much higher for shrimp and scallops in December 1964. Prices were also up for halibut steaks, salmon steaks, and swordfish steaks.

FREEZE-DRIED: Purchases for the Armed Forces in December 1964 included 4,022 pounds of freeze-dried groundfish (cod or haddoc) valued at $4.99 a pound.

January-December 1964 Summary: FRESH AND FROZEN: Total purchases of fresh and frozen fishery products for the use of the Armed Forces in 1964 were up 13 percent in quantity and 16 percent in value from those in the previous year. Larger purchases of shrimp were one of the main reasons for the increase in 1964. Shrimp purchases remained at a high level throughout 1964 in spite of a sharp price increase in late 1964. By the end of 1964, shrimp prices were considerably above those in late 1963.

Table 2 - Fresh and Frozen Fishery Products Purchased by Defense Subsistence Supply Centers, December 1964 with Comparisons

QUANTITY				VALUE			
Dec.		Jan.-Dec.		Dec.		Jan.-Dec.	
1964	1963	1964	1963	1964	1963	1964	1963
(1,000 Lbs.)				($1,000)			
2,041	1,678	26,341	23,400	1,328	894	15,040	13,017

Table 1 - Purchases of Principal Fresh and Frozen Fishery Products by Defense Subsistence Supply Centers, December 1964 with Comparisons

Product	December				Jan.-Dec.	
	1964		1963		1964	1963
	Quantity Pounds	Avg. Cost Cents/Pound	Quantity Pounds	Avg. Cost Cents/Pound	Quantity Pounds	Quantity Pounds
hrimp:						
raw headless	33,650	98	1/	1/	1,234,200	1/
peeled and deveined	104,980	134	1/	1/	1,664,304	1/
breaded	385,000	87	1/	1/	4,245,770	1/
molded and breaded	49,000	64	1/	1/	496,620	1/
Total shrimp	572,630	94	518,997	74	7,640,894	7,095,062
callops	189,936	77	227,775	57	2,777,486	2,611,957
ysters:						
Eastern	72,926	108	1/	1/	843,807	1/
Pacific	22,836	77	1/	1/	341,914	1/
Total oysters	95,762	101	83,520	99	1,185,721	1,217,450
ams	44,200	29	18,786	43	280,183	273,528
illets:						
Cod	20,300	32	71,638	30	496,916	683,794
Flounder	204,000	31	206,244	29	3,062,452	2,957,221
Ocean perch	203,000	30	246,622	31	3,522,970	3,786,973
Haddock	131,752	37	73,610	40	1,898,066	2,086,546
Haddock portions	202,750	46	2/	2/	774,072	2/
teaks:						
Halibut	71,867	49	75,680	38	1,278,144	1,408,900
Salmon	11,270	68	67,226	64	260,825	244,302
Swordfish	2,090	70	3,050	56	17,261	34,258

Breakdown not available
Not available.

Scallop purchases in 1964 were maintained at a level slightly above the previous year even though scallop prices throughout 1964 were higher than in 1963.

Oyster purchases in 1964 were down slightly from the previous year, although prices for eastern oysters during most of 1964 were below those in the previous year.

Average prices for finfish purchases in 1964 generally showed less fluctuation than those for shellfish. However, the average price for halibut steaks and salmon steaks in late 1964 was up considerably from the same period in 1963.

The average price per pound for the fresh and frozen purchases in 1964 was 57.1 cents compared with 55.6 cents in 1963 and 61.6 cents in 1962.

CANNED: Total purchases of the 3 principal canned fishery products (tuna, salmon, and sardines) in 1964 were up 24 percent in quantity and 23 percent in value from those in 1963 due mainly to larger purchases of canned tuna. Purchases of canned salmon were also up, but purchases of canned sardines were down.

Table 3 - Canned Fishery Products Purchased by Defense Subsistence Supply Centers, December 1964 with Comparisons

Product	QUANTITY				VALUE			
	Dec.		Jan.-Dec.		Dec.		Jan.-Dec.	
	1964	1963	1964	1963	1964	1963	1964	1963
	. . . (1,000 Lbs.) . . .				. . . . ($1,000)			
Tuna	645	364	5,714	4,367	269	154	2,513	1,990
Salmon	1	1	2,751	2,211	1	1	1,632	1,329
Sardine	11	31	312	489	7	13	181	193

Prices for canned tuna were steady throughout 1964. Prices for canned pink salmon declined in the last quarter of 1964 following an exceptionally heavy pack of that species. On the other hand, prices for canned sardines moved higher in late 1964 after a rather disappointing canning season in Maine.

FREEZE-DRIED: Purchases of fishery products for the Armed Forces in 1964 included small lots of freeze-dried shrimp (priced at about $10 a pound) and freeze-dried cod and haddock (priced at about $5 a pound).

Notes: (1) Armed Forces installations generally make some local purchases not included in the data given; actual total purchases are higher than shown because data on local purchases are not obtainable.

(2) See Commercial Fisheries Review, Feb. 1965 p. 21.

* * * * *

NEW PURCHASING CONTRACT PROVISIONS ANNOUNCED BY DEFENSE DEPARTMENT

Revised contract provisions covering bids, offers, and quotations on purchases by the U. S. Defense Department have been announced by Headquarters, Defense Subsistence Supply Center, 226 West Jackson Boulevard, Chicago, Illinois 60606. The revised provisions apply to pertinent solicitations issued on and after January 4, 1965. Copies of the revised contract provisions may be obtained from Regional Offices of the Defense Subsistence Supply Center.

* * * * *

FEDERAL SPECIFICATION PROPOSED FOR FRESH AND FROZEN SHUCKED RAW CLAMS:

A "Proposed Federal Specification for Clams, Raw, Shucked: Fresh (Chilled) and Frozen," has been drafted by the U. S. Bureau of Commercial Fisheries. The specification was developed by the Bureau's Technological Laboratory, Gloucester, Mass., and was based on currently available technical information. The proposed specification has not yet been approved for promulgation and is subject to modification.

Copies of the draft of a "Proposed Federal Specification for Clams, Raw, Shucked: Fresh (Chilled) and Frozen" were distributed to the United States clam industry with the request that comments be submitted by February 1, 1965, to the Technological Laboratory, U. S. Bureau of Commercial Fisheries, Emerson Ave., Gloucester, Mass. Comments received after that date would be considered for inclusion in the next revision or amendment of the specification.

The Bureau was particularly interested in industry comments on the sizes as given in the specification for Class 1 Hard and Class 2 Soft Clams. Since the Military is the largest Government buyer of the items listed, the new specification will include their needs.

Federal specifications are designed to meet the requirements of Federal agencies for purchases of food products. By definition, a specification is an accurate description of the technical requirements for a material, product, or service including the procedure by which it will be determined that the requirements have been met.

ish Preservation

ESEARCH GRANT TO
NIVERSITY OF WASHINGTON:

The National Science Foundation will contribute $37,050 in matching funds to help the niversity of Washington expand fish preseration research facilities, Senator Warren . Magnuson reported November 25, 1964.

The money will be used to remodel the food cience area of the Fisheries Center at the niversity. Fish preservation research at e University involves irradiation and freeze-rying. (Seattle Post Intelligencer, Novemer 26, 1964.)

lorida

ISHERIES, 1963:

Summary: Commercial landings of fish nd shellfish at Florida ports during 1963 amounted to 186.2 million pounds valued at 27.7 million ex-vessel as compared with 962 landings of 186.9 million pounds valued t $30.9 million. In 1963, about 61.5 million ounds were landed on Florida's east coast nd 124.7 million pounds were landed on the est coast. From a volume standpoint, the eading species landed in Florida during 1963 ere shrimp 39.4 million pounds (heads-on), lack mullet (lisa) 35.9 million pounds, menaden 25.7 million pounds, and blue crab 21.7 illion pounds. Sixty-six percent of Florida's otal catch in 1963 consisted of those 4 species. uring 1963, a total of 14 species of finfish nd 4 of shellfish were landed in Florida in antities greater than 1 million pounds.

Shrimp: In Florida, shrimp continued to e the most valuable fisheries item. Florida

Florida Shrimp Catch (Heads-on) by Fishing Areas, 1962-1963

Area	1963	1962
	(Million Pounds)	
East Coast	4.5	5.2
Tortugas	16.7	14.0
Campeche	12.6	14.9
Upper West Coast	4.1	3.0
Other Areas	1.5	0.2
Total	39.4	37.3

hrimp landings in 1963 had an ex-vessel valee of $14.0 million compared with $17.1 milion in the previous year. The total value of he Florida shrimp catch declined in 1963 ven though shrimp landings were greater.

Florida shrimp landings (heads-on) in 1963 consisted of 32.9 million pounds pink shrimp, 4.7 million pounds white shrimp, 1.8 million pounds brown shrimp, and a small quantity of sea bob. The major shrimp-producing areas for the Florida shrimp fleet continued to be the Tortugas grounds off the southwest coast of Florida and the offshore Campeche grounds off the Mexican Gulf Coast.

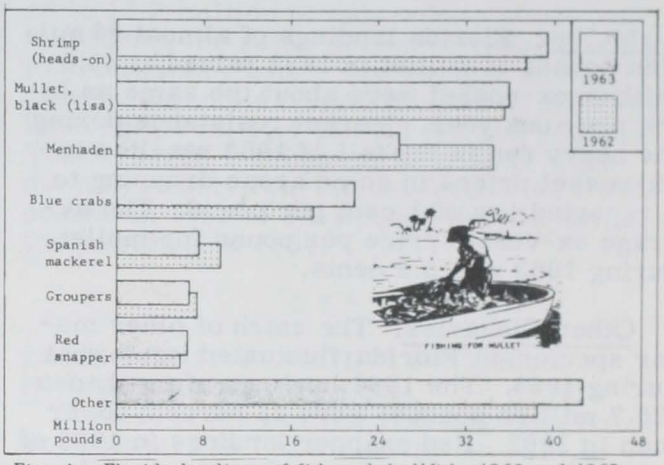


Fig. 1 - Florida landings of fish and shellfish, 1963 and 1962.

Oysters: Florida produced 4.4 million pounds of oyster meats in 1963--a decrease of 13 percent from the previous year's record catch. During the spring months of 1963 landings from public oyster reefs were on a comparable basis with the previous year. However, during the fall season there was a scarcity of marketable oysters.

Blue Crab: The Florida blue crab catch in 1963 totaled 21.7 million pounds with an ex-vessel value of $1.1 million, a gain of 19 percent in quantity and 23 percent in value over the previous year. In 1963, cooked crab-meat production in Florida amounted to 3.4 million pounds with a wholesale value of almost $4 million. Demand for Florida crab meat was good most of the year. Florida crab-meat producers in some instances received crab from other States during the low winter production period.

Spiny Lobster: The Florida catch of spiny lobsters in 1963 was 3.6 million pounds valued at $1.4 million ex-vessel, an increase of 15 percent in quantity and 18 percent in value from the previous year. Demand remained strong all year despite heavy imports of spiny lobsters at Florida ports.

Spanish Mackerel: Florida landings of Spanish mackerel in 1963 amounted to 7.5

million pounds compared with 9.4 million pounds in the previous year. The catch in 1963 was valued at about $700,000 to fishermen. It was not until December 1963 that Spanish mackerel schooled up on the Florida Bay side of the Keys and became available in quantity. During the previous year, most of the catch was made in the Hawks Channel area south of the Keys.

Mullet: Florida landings of almost 36 million pounds of mullet in 1963 valued at $1.9 million ex-vessel were about the same as in the previous year. Market resistance during the heavy run in the fall of 1963 resulted in ex-vessel prices in some areas dropping to a reported low of 1 cent per pound. The average ex-vessel price per pound for mullet during 1963 was 5.2 cents.

Other Fisheries: The catch of other major species in Florida fluctuated somewhat during 1963. The 1963 landings of menhaden (25.7 million pounds) were 25 percent lower than in 1962. Red snapper landings in 1963 of 6.4 million pounds were up 6 percent while grouper landings of 6.8 million pounds in 1963 were down 6 percent. The 1963 catch of 2.3 million pounds of bluefish, 1.3 million pounds of king whiting, 800,000 pounds of pompano, and 3.4 million pounds of spotted sea trout was about equal to the landings of those species in 1962. King mackerel landings (5 million pounds) were up 22 percent. Landings of spot amounted to 1.5 million pounds, a gain of 48 percent over the previous year. Other species of fish and shellfish also showed some up-and-down fluctuations. There were substantial landings of fresh-water catfish, although exact data on that species were not available. Approximately 46 species of edible finfish and 13 species of edible shellfish were landed in significant quantities during 1963 by Florida's commercial fishermen.

Processed Fishery Products: The processed fishery products produced in Florida during 1963 had a wholesale value of $43.8 million. The leading item was frozen packaged shrimp (headless, peeled and deveined, breaded, etc.). Fish fillets and steaks, frozen spiny lobsters, crab meat, and shucked oysters were also processed in substantial quantities.

Imports: During 1963, imports of fishery products through Florida ports became increasingly important. In the last 9 months of 1963, over 15 million pounds of fishery items entered through the Port of Miami. Shrimp in various forms amounted to almost 13 million pounds of that total. Points of origin were in countries in Europe, South America, and as far away as Japan. At least half of the Florida shrimp imports probably consisted of airborne imports. (C.F.S. No. 3602, Florida Landings, 1963, U. S. Bureau of Commercial Fisheries.)

Fig. 2 - Fishing vessel unloading shrimp at a Florida fishing port.

* * * * *

EXPLORATORY FISHING AND FISHERY INVESTIGATIONS BY RESEARCH VESSEL "HERNAN CORTEZ:"

A variety of fishery studies are being made off the Florida coast by the research vessel Hernan Cortez operated by the Salt Water Fisheries Division, Florida State Board of Conservation. Exploratory fishing is one of the major projects of the Hernan Cortez. Midwater trawl tests are scheduled for early 1965. The vessel is seeking food fish stocks that can be caught cheaply, but in large quantities.

Other work of the Hernan Cortez includes (1) making a study of the seaweed resource of Florida's broad Continental Shelf, (2) sampling water for phytoplankton and chemical studies related to "red tide," and (3) collecting zootoplankton in connection with studies of the early stages of food fish and shellfish. (Florida State Board of Conservation, December 1964.)

Fluke

FERTILIZED EGGS INCUBATED AT SANDY HOOK MARINE LABORATORY:

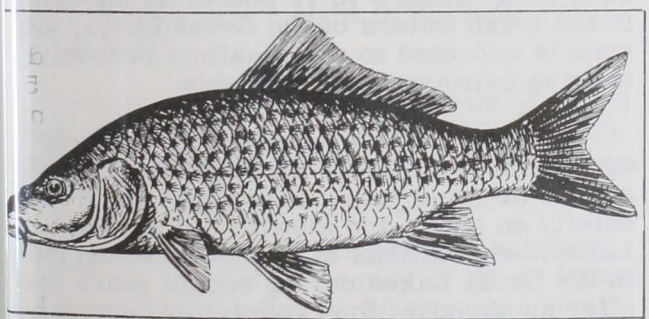
Fertilized fluke eggs are being incubated at the Sandy Hook Marine Laboratory of the U. S. Bureau of Sport Fisheries and Wildlife as a result of a successful cruise by the Bureau's new research vessel Dolphin. In early November 1964, biologists from New York, New Jersey, and Virginia joined Bureau scientists aboard the Dolphin to sample offshore areas between Barnegat Bay and Delaware for fluke spawning areas. This is part of a cooperative program between the U. S. Fish and Wildlife Service and the Middle Atlantic States to delineate the offshore spawning areas and to determine oceanographic factors affecting the movement and survival of young fluke.

Great Lakes

COMMERCIAL FISHERY LANDINGS LOWER IN FIRST HALF OF 1964:

United States Great Lakes commercial fishery landings of 26.7 million pounds for four states (Michigan, Ohio, Pennsylvania, Wisconsin) in the first half of 1964 were down slightly as compared with 26.9 million pounds landed in the same period of 1963. Commercial fishery landings for those four states during all of 1963 were 52.9 million pounds, accounting for about 95 percent of the total United States Great Lakes commercial landings.

Landings for Michigan (9.3 million pounds) and Wisconsin (8.5 million pounds) during the first six months of 1964 were up from the previous year because of marked increases in catches of alewife and yellow perch from Lake Michigan.



Carp range from 2 to 12 pounds and are sold as fresh whole fish; some as fillets, live, smoked; and also used in "gefilte" fish.

Landings of principal species for the period were: alewife 4.9 million pounds from Lake Michigan; sheepshead 3.7 million pounds from Lake Erie; herring 2.2 million pounds from Lake Superior; carp 0.6 million pounds from Lake Huron.

Canada's Great Lakes commercial fishery landings in the first half of 1964 amounted to 13.9 million pounds--down about one-third from the same period in 1963, according to preliminary data. The decline was primarily due to a 41-percent drop in Lake Erie landings (from 17.4 to 10.3 million pounds). Yellow perch landings in Lake Erie were down by nearly two-thirds, from 9.4 million pounds in 1963 to 3.2 million pounds during the first half of 1964.

* * * * *

LAKE TROUT PLANTING PROGRAM IN LAKE SUPERIOR, 1964:

A total of 2.6 million yearling lake trout were planted in Lake Superior in 1964 by participating United States and Canadian agencies. In 1963, plantings of young lake trout in Lake Superior were 2.3 million fish, of which some 2 million were yearling and the remainder fingerling lake trout.

Restoration efforts of lake trout in Lake Superior appeared to be showing good results based on studies made. The trend of improved survival among larger and older fish continued toward the end of 1964, and the incidence of lamprey-wounded lake trout remained at a very low level. As the year came to a close, there were encouraging signs that natural lake trout reproduction may be on the rebound. (Michigan Department of Conservation Bulletin, December 24, 1964.)

Note: See Commercial Fisheries Review, April 1964 p. 17.

* * * * *

RESTOCKING WORK WITH LAKE TROUT AND SALMON:

Lake Trout: Plans for building up lake trout stocks in the upper Great Lakes are gaining momentum. In the fall of 1964 more than 15 million trout eggs were collected from brood stock at hatcheries of the Michigan State Department of Conservation. Collections in other state, Federal, and Canadian hatcheries will supply another 3 million lake trout eggs. From that total of over 18 million eggs, an estimated $5\frac{1}{2}$ to 6 million yearling trout will survive hatching and rearing for release in Great Lakes waters in

1966, according to the Assistant Director of the Great Lakes Fishery Commission.

Plans call for most of the yearling trout bound for the Great Lakes in 1966 to go into Lake Superior where more than 10 million trout have been planted since 1958.

There is a strong possibility that some hatchery trout will be liberated in Lake Michigan, provided that sea lamprey populations are well enough under control to insure good trout survival.

Intensive efforts to restock Lake Huron are not expected to begin until 1967 at the earliest.

From Lake Superior, the first battlefront in the fight to bring back lake trout populations, studies continue to show signs of success, according to the Assistant Director of the Great Lakes Fishery Commission.

"Trends of improved survival among larger and older fish, which started in 1962, are still holding true," he said. "By the same token, the incidence of lamprey-wounded trout remains at a very low level, reflecting a wholesale reduction of the eel-like predators by chemical treatment in the Lake's tributaries."

In regard to small and medium trout, he said there were good indications that releases of hatchery-reared trout during the last few years had largely offset shortages caused by a lack of natural spawning since 1959.

With more mature fish showing up in sample catches and spawning fairly widespread in Lake Superior, natural reproduction may now be on the rebound. In the Apostles Island area of Wisconsin waters, the number of spawning lake trout in 1964 was 10 times greater than in 1963. (Michigan Department of Conservation, December 17, 1964.)

Salmon: Midwestern fishermen may soon be challenged by the fighting coho (silver) salmon from the Pacific. A bold plan is underway to bring this famous game fish from the Pacific fiords to the Great Lakes. The Oregon Fish Commission in January 1965 provided the State of Michigan with 500,000 fertilized coho salmon eggs. They were flown in from Oregon and will be reared at state-operated hatcheries in Oden and Harrietta as introductory planting stock in the upper Great Lakes. Michigan may get another 500,000 fertilized coho eggs from other West Coast hatcheries. Fish from those eggs will be hatched and reared to the size of 6 inches before their release in the upper Great Lakes, which is scheduled for late fall or spring 1966.

The Michigan State Department of Conservation plans to release coho salmon in the Great Lakes for 3 years. The aim is to establish runs of adult fish in waters where they can be captured for spawn-taking purposes. Hopefully, too, some natural reproduction will occur.

As with any attempt to introduce a new species, success of the coho program is not a sure-fire thing, but fisheries men are optimistic about its chances. A Michigan fisheries official said, "From what we've learned about the coho, we think this program is going to click. At any rate, it's worth shooting for."

The coho plantings are tied in with the broad effort to rebuild sport fishery stocks of the Great Lakes to the level that existed before 1945. Boosting hopes for the sport fishery are the success of lamprey control and lake trout restoration work in Lake Superior, and the promising prospects for similar results in Lake Michigan and Lake Huron.

The timing of coho spawning runs should supplement migrations of trout to provide a longer fishing season.

The coho dies after spawning once, usually in its third year. In western streams, coho range from 6 to 12 pounds at maturity. In the fresh waters of the Great Lakes, the coho is expected to run smaller, probably ranging between 3 and 6 pounds.

The coho feeds on plankton at an early age and then shifts its diet to fish during its second or third year. It is expected to feed chiefly on smelt and alewife in the Great Lakes. Populations of alewife have exploded in the Great Lakes during recent years and offer an abundant food supply for coho salmon. (Michigan Department of Conservation, December 19, 1964.)

Gulf Fishery Investigations

SHRIMP DISTRIBUTION STUDIES:

M/V "Gus III" Cruise GUS-24 (December 8-19, 1964): The best catches of brown shrimp were made in area 20 during this cruise by the chartered research vessel Gus III. The cruise was another in a series of cruises of a continuing shrimp distribution study in the Gulf of Mexico conducted by the U. S. Bureau of Commercial Fisheries Biological Laboratory, Galveston, Tex.

Although bad weather hampered trawling operations in the survey area, a total of 28 tows with a 45-foot Gulf of Mexico flat trawl was made. In addition, 63 plankton tows, 41 bathythermograph, and 167 water (Nansen bottle) samples were taken. Drift bottles cast at 27 stations during the cruise totaled 162.

All of the 8 statistical areas worked during this cruise yielded fair to moderate quantities of brown shrimp of various sizes. The largest catch from area 20 yielded 45 pounds of 31-40 count shrimp from the 10- to 20-fathom depth and 33 pounds of 15-20 count shrimp from over 20 fathoms. That area also yielded a few pounds of large white shrimp and a scattering of pink.

Area 19 yielded 33 pounds of 31-40 count brown shrimp from the 10-20 fathom depth. No shrimp were caught in the other two depth ranges of the area.

A fair quantity of 15-20 count white shrimp (27 pounds) was taken in the 10-20 fathom depth range of area 13. The up to 10-fathom depth yielded 17 pounds of smaller white shrimp, and 9 pounds of brown 26-30 count brown shrimp was caught in the over 20-fathom depth.

Area 17 yielded some 50 pounds of 26-30 count brown and white shrimp about equally divided from the up to 10- and over 20-fathom depths.

Brown shrimp catches predominated in area 18--a total of 33 pounds of 15-20 count and smaller from the 10-20 and over 20-fathom depths. A few pounds of pink also were taken from that area.

Note: (1) Shrimp catches are heads-on weight; shrimp sizes are the number of heads-off shrimp per pound.
(2) See Commercial Fisheries Review, February 1965 p. 25.

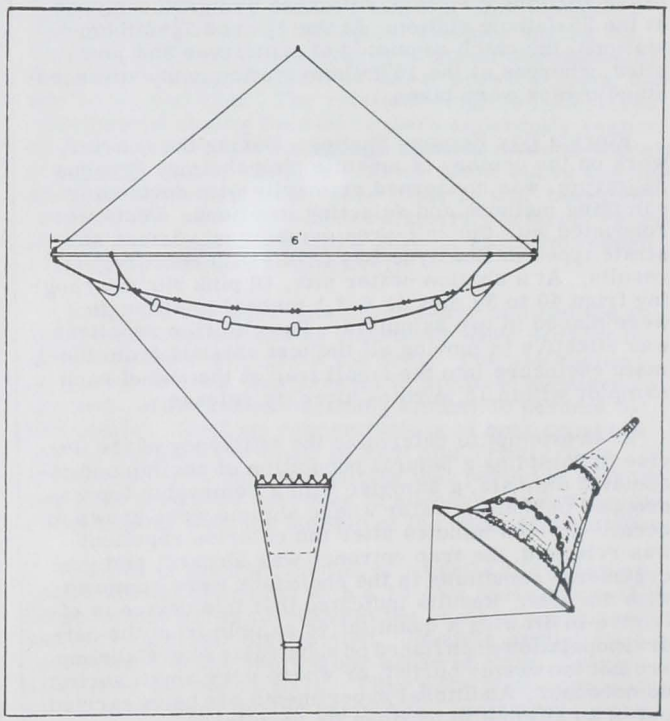
* * * * *

Some of the highlights of studies conducted by the U. S. Bureau of Commercial Fisheries Biological Laboratory, Galveston, Tex., during October-December 1964:

SHRIMP BIOLOGY PROGRAM: Shrimp Larvae Studies: Larvae of the pink shrimp, Penaeus duorarum, were reared to postlarvae and those of the rock shrimp, Sicyonia dorsalis, to first protozoeae.

Work to ascertain the effects of various environmental conditions on larval development of the brown shrimp, P. aztecus, continued. In two experiments to determine the effects of salinity, the larvae did not live beyond the first protozoeal stage. One temperature experiment was also completed. Larvae reared at 18° C. (64.4° F.) and 32° C. (89.6° F.) died at the molt to first protozoeae. Development, however, was successfully completed at intermediate temperatures, the first postlarval stage being reached in 15 days at 24° C. (75.2° F.), in 12 days at 27° C. (80.6° F.), and in 11 days at 30° C. (86° F.).

Examination of 82 plankton samples collected in July and August 1963 revealed planktonic-stage penaeids to be considerably more numerous in the western (Galveston-Brownsville) than in the eastern portion (Galveston-Mississippi River) of the sampling area. Seasonal abundance, however, showed an overall increase in all areas.



A net designed to catch postlarvae shrimp in shallow areas along the shore. One man wading can easily handle the net.

Similarly, planktonic stages of Penaeus spp. were 6 to 7 times more abundant in the western sector than in the eastern, with a general increase in seasonal abundance in all areas. Although planktonic-stage Penaeus spp. occurred at all stations, greatest concentrations were found at those located inside 25 fathoms. Analy-

sis of monthly catches by planktonic stage revealed that advanced stages (Mysis and postlarval) predominated in the east, whereas earlier stages (nauplial and protozoeal) prevailed in the west. This observation, in addition to the greater abundance noted in the west, indicates that spawning was considerably more intensive in Gulf waters west of Galveston.

In our continuing investigation of the possibility that postlarval Penaeus spp. concentrate on the bottom prior to their movement into nursery areas, a modified Clarke-Bumpus sampler was mounted on a sled so that its net fished approximately 5-6 inches above the bottom. The performance of this gear has been good and results obtained with it appear promising. In November 1964, its sampling efficiency was compared with that of the Gulf-V plankton net.

Although Penaeus spp. postlarvae were neither taken at upper levels of the water column with the Gulf-V sampler nor on the bottom with the Clarke-Bumpus net, large numbers of Trachypeneus spp. and Sicyonia spp. larvae, postlarvae, and juveniles were caputred in both regions.

Young shrimp were caught in the water column with the Gulf-V net at only the 15- and 25-fathom stations, their relative abundance increasing with depth and temperature. These shrimp consisted entirely of protozoeal- and mysis-stage larvae. In contrast, the numbers of shrimp taken just off the bottom with the Clarke-Bumpus net increased from the $4\frac{1}{2}$-fathom station out to the 15-fathom station, with none being encountered at the 25-fathom station. At the $4\frac{1}{2}$- and $7\frac{1}{2}$-fathom stations, the catch consisted of postlarvae and juveniles, whereas at the 15-fathom station many advanced-stage myses were taken.

Florida Bay Ecology Studies: During the quarter, work on the ecology of juvenile pink shrimp, Penaeus duorarum, was concerned primarily with developing sampling methods and selecting locations. Tests were conducted with the unit-area sampler on various substrate types in Biscayne Bay (Fla.) with encouraging results. At a shallow-water site, 40 pink shrimp ranging from 40 to 80 mm. (1.6-3.1 inches) total length were placed in two samplers. The chlorine repellent was effective in moving all the test animals from the main enclosure into the small trap at the end of each sampler within 15 minutes after its release.

In an attempt to determine the efficiency of the device in sampling a natural population of shrimp and associated animals, a sampler with a removable top was dropped in shallow water where shrimp were known to occur. Fifteen minutes after the chlorine repellent was released, the trap entrance was blocked, and the organisms remaining in the enclosure were removed with dip nets. Results indicated that this device is effective in drawing a quantitative sample from the natural population when fished on substrates where shrimp are not too deeply buried, or where very small shrimp do not occur. Additional experiments are being carried out in an attempt to broaden its usefulness.

If possible, indices of Penaeus postlarval abundance will be developed from material collected in the area now being surveyed. Postlarval penaeids, though not abundant there during the month of December, were occasionally taken with the small beam trawl whose bag was fitted with an extra-fine-mesh cover.

Abundance and Distribution of Larvae of Pink Shrimp: A single cruise, representing the final stage of field work on this project, was undertaken during the quarter. Forty-two stations, distributed in a grid pattern over the Tortugas Shelf, Florida Bay, the Florida Straits, and Hawk Channel, were occupied. The object of the cruise was to obtain a semi-synoptic picture of larval distribution patterns over a wide area of the Tortugas Shelf. At the same time, 240 seabed drifters were released, but returns (only 7 to date) have been poor. Since the majority of release sites were situated to the northeast of the principal trawling grounds, the lack of returns may, however, have significance in indicating the direction in which water currents do not generally move. (Conducted by University of Miami under contract.)

Juvenile Phase of the Life History of the Pink Shrimp: Samples of juvenile pink shrimp migrating out of Whitewater Bay via Buttonwood Canal, Flamingo, Fla. (Everglades National Park Nursery Grounds) have been collected monthly from January 1963 through December 1964. Although shrimp were taken in every month, their numbers varied greatly. In 1963, three peaks of abundance were observed, one each in January, April, and September. The latter two were the greatest and about equal in amplitude.

In 1964, however, only two peaks occurred, one in March and another in June, both of which were larger than those of 1963. The June peak was the largest and nearly three times greater than any of the peaks in 1963. It appears that peaks of juvenile abundance can occur in spring, summer, and early fall. The periods of lowest abundance occurred in late fall and winter, and in the spring. Shrimp associated with peaks in abundance were somewhat smaller than the overall average, which was about 14 mm. in terms of carapace length. In June 1964, when greatest numbers were recorded, the average carapace length was 10 mm. or 0.39 inch. (Conducted by University of Miami under contract.)

SHRIMP DYNAMICS PROGRAM: Surveys of Postlarval Abundance and Fisheries for Bait (Juvenile) Shrimp: Sampling for postlarval shrimp continued during the quarter at four locations along the Texas coast. As is normally the case at that time of year, the number of postlarvae in sample catches dropped sharply at all locations. One unusually large catch for the season was made at Gilchrist (Tex.) on December 2, however, when 110 postlarval brown shrimp were collected.

In October-November 1964, commercial bait shrimp production in the Galveston Bay area dropped 24 percent from that recorded for the same period in 1963. During that period the harvest of bait-size brown shrimp decreased 75 percent. Juvenile pink shrimp were unusually abundant in Galveston Bay during 1964. Landings of that species for bait (mostly during mid-year) totaled 10,900 pounds, surpassing the combined catch of small pink shrimp over the previous 5 years. Due probably to uncommonly mild weather, bait shrimp (practically all white shrimp) remained plentiful well into December.

Commercial Catch Sampling: Catch-sampling activities in Texas and Louisiana declined during the quarter due to a seasonal decrease in shrimp abundance and consequent lull in fishing operations. Interview information indicated that heaviest concentrations of brown shrimp were present in 15 to 20 fathoms south of Freeport (Tex.), and of white shrimp in 2 to 5 fath-

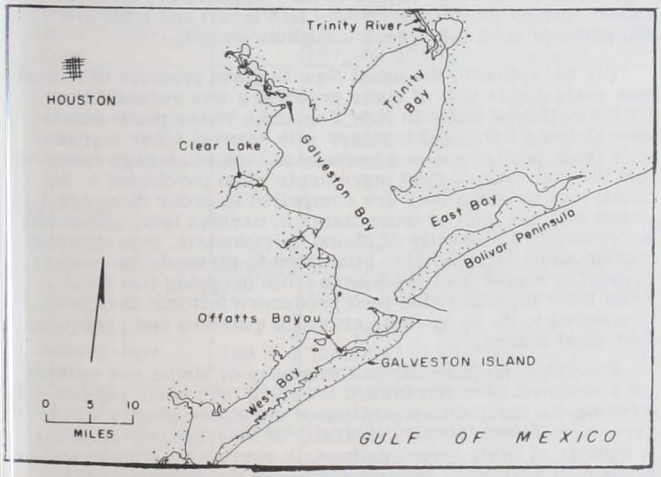
oms between Freeport and Morgan City (La.). Few small shrimp of either species were discarded at sea.

The shrimp fleet at Key West (Fla.) increased in size from 87 vessels in early October to over 200 by the end of December. Although fishing operations were hampered by rough seas during the quarter, production exceeded that for the same portion of 1963. The installation of machine-grading devices by several shrimp processors in the Key West area is thought to have influenced the culling practices of Tortugas shrimp fishermen. Only half as many small shrimp were discarded at sea in the last quarter of 1964 as during the same period in 1963 (4.4 percent of the total weight caught in 1964 against 8.8 percent in 1963).

Comparison of Bait Shrimp Catches from Galveston Bay for the Final Quarters of 1964 and 1963

Month	Year	Catch	Catch/ Effort	Distribution by Species		
				Brown	Pink	White
		Lbs.	Lbs./Hr.	. . .(Percentage). . .		
October	1964	101,200	31.7	7	0	93
	1963	178,900	42.5	20	0	80
November	1964	59,300	28.1	3	0	96
	1963	32,200	22.4	5	0	95
December	1964	. . . . Data not yet processed				
	1963	3,600	13.3	0	0	100

Migrations, Growth, and Mortality of Brown and White Shrimp: Returns from the brown shrimp mark-recapture experiment initiated in June off Freeport (Tex.) appear to be complete with 166 tagged individuals (8 percent of the number released) recovered. Ten of those shrimp had been at liberty more than 80 days and had traveled an average distance of less than 15 miles from their release sites, as compared to 13 miles for shrimp recovered within 80 days of release. During the season and in the area involved, it appears that adult brown shrimp do not move great distances.



In mid-August, 3,384 stained shrimp were released in 13 to 17 fathoms off Freeport. To date, 263 (8 percent) have been returned. The distribution of those recoveries indicates little offshore movement in August and September. Only 4 shrimp were recovered beyond 20 fathoms, although considerable fishing effort was expended at greater depths. Coastwise movement also was minimal and the majority of recaptured shrimp were taken within the release area. Mortality estimates for the marked population are being computed.

Population Studies: The influence of mesh size on the fishing characteristics of shrimp nets was investigated by attaching echo-sounding transducers to the otter boards of the experimental trawls. Earlier measurements of change in the spread of the otter boards resulting from differences in net-mesh size were partially confirmed. The transducers are presently being modified to allow measurement over a range of vessel speeds. It is anticipated that future experiments will provide an explanation for the occurrence of more large shrimp in the catch of nets constructed with large meshes than in nets with small meshes.

Catch data from recent cruises permit general inferences to be drawn concerning the reliability of trawls as sampling gear for adult shrimp. On several occasions, three trawls of similar construction have been towed simultaneously by our research vessel. Differences in the number of shrimp caught by the three nets have been slight when fishing was done in offshore waters. The small variance associated with these catches is believed to indicate that each of the trawls caught a constant and representative portion of the population present. Similar trials conducted in shallow bay waters produced comparable results when shrimp population densities were relatively low. At high population densities, however, differences in the catch of the three nets were often as great as 50 percent, presumably as a result of the nonuniform distribution of shrimp on the fishing grounds.

ESTUARINE PROGRAM: Ecology of Western Gulf Estuaries: The bay anchovy was the most numerous species taken in trawl biological samples during the quarter, followed in descending order of abundance by the white shrimp, Atlantic croaker, brown shrimp, sand sea trout, and spot. The relatively high temperatures experienced during December were apparently responsible for the exceptionally high catches made in the middle of that month. Sample catches of the above species were up 20 percent over those made in mid-December of 1963. The increase was due primarily to larger catches of Atlantic croaker and white shrimp which increased 170 and 48 percent, respectively.

Young-of-the-year Atlantic croaker entered the estuary in November and by December were present in large numbers throughout the area. The bay anchovy, on the other hand, was present in greatest numbers in October, with catches declining almost 80 percent by December. Heaviest concentrations of both croakers and anchovies were found in East and Trinity Bays. It is interesting to note that during that period in both 1963 and 1964 a marked decrease in anchovy numbers coincided closely with the buildup of the croaker population.

A study of the distribution of juvenile and subadult brown shrimp (sampled with a 10-foot shrimp trawl) is being conducted to supplement the study of postlarval and early juvenile distribution. Juvenile shrimp tend to concentrate in the shore-zone areas of East, Trinity, and Upper Galveston Bays. They were first observed in the lower bays during early April (postlarvae were first observed there in late March), but were not captured in the upper bays until 2 weeks later. This time lag corresponds closely with the time required for postlarvae to arrive in the upper bays after their appearance in the lower bays, and suggests that the postlarvae grow very little prior to their arrival in the peripheral nursery areas of the bays.

Interestingly enough, the subadults, when moving toward the Gulf, did not use the Houston Ship Channel as did the immigrating postlarvae, but instead moved along the shore and in the open waters. When they reached

the tidal pass, however, they entered the Channel and followed it in their return to the Gulf.

INDUSTRIAL BOTTOMFISH FISHERY PROGRAM: Life Histories of Central Gulf Bottomfish: Growth measurements for Atlantic croaker representing the 1958-63 year-classes were derived from a fairly large volume of weight frequency data. The data indicate that growth is rapid during the first 3 years of life, the percentage increase in weight during the second year being more than twice the increase exhibited in the third.

Analysis of size-frequency data from commercially caught croaker revealed that individuals are first recruited to the fishable stock (in the Gulf near Mobile Bay) during June when approximately 9 months old and at an average size of 11 cm. (10 g.). By September, yearling fish about 12 months old and sexually immature average 13 cm. (20 g.). Collections by personnel of the Alabama Marine Resources Laboratory revealed that yearlings of comparable size (12 cm. and 15 g.) are present during October in Mobile Bay. They apparently remain in the bay throughout the winter and spring, being eventually recruited to the fishery the following summer. At this time they are about 21 months old and average 14 cm. in length (30 g. in weight). Yearling fish, recruited to the stock during the previous year and also contributing to the summer fishery are somewhat larger 15.5 cm. and 35 g.).

These observations indicate that part of a year-class may not contribute to the offshore fishery until almost a year after its members attain commercial size. Rapid growth during this interval in the estuary and nearby Gulf results in more than a threefold increase in the average weight per recruit to the fishery. In the remainder of the year-class, recruitment and exploitation are coincident and occur when the average fish is almost 2 years old.

Commercial Catch Sampling: A method to determine optimum bottomfish grounds in the north-central Gulf employs seasonal indices of mean annual bottomfish abundance (catch per hour) for the 5-year period 1959-63, and associated coefficients of variation. The area with the highest average abundance and the lowest coefficient of variation represents the ground where, over the years, average fishing success has consistently been greatest.

Area	Average Annual Abundance 1959-63	Coefficient of Variation
	Tons per Hour	Percentage
Nearshore (Apr.-Sept.):		
East of Delta	0.71	19
West of Delta	0.61	31
Offshore (Dec.-May):		
East of Delta	0.46	26
West of Delta	0.45	21

By this means of assessment, the nearshore area east of the Mississippi River Delta proved to be the most productive bottomfish ground. Although fish abundance on the nearshore ground west of the Delta was relatively high (0.61 ton per hour), its annual variation was the greatest of all four areas. The offshore grounds (Dec. to May) contained smaller concentrations of bottomfish than the nearshore grounds (Apr.-Sept.). Year-to-year variation in the magnitude of offshore stocks was intermediate between comparable measures for nearshore grounds east and west of the Delta.

Note: See Commercial Fisheries Review, November 1964 p. 43.

Industrial Fishery Products

LEVEL OF FISH MEAL UTILIZATION IN NEW ENGLAND POULTRY RATIONS:

Mixed feed producers and experiment stations in a number of New England States (Maine, Massachusetts, and New Hampshire) as well as some fish reduction plants in Maine were visited in early December 1964 by a nutritionist of the U.S. Bureau of Commercial Fisheries Technical Advisory Unit, Boston, Mass.

Observations of the nutritionist during those visits and his conclusions follow:

With one notable exception, the levels of fish meal utilization in New England poultry rations are relatively high. The levels presently recommended by the New England College Conference Board 1/ are 10, 5, 5, 5, and 3.75 percent, respectively, for turkey starter (first 9 weeks), broiler starter, broiler finisher, turkey breeder, and chicken breeder rations; these are the same as the 1963-1964 Board recommendations.

The recommended level of 3.75 percent fish meal in the chicken breeder rations is greater than the amount recommended by some other authorities. For example, Morrison 2/ recommends that 2.5 percent fish meal be included in chicken breeder rations together with an equal amount of meat and bone scrap. Cornell University nutritionists 3/ recommend a minimal level of animal proteins (fish meal, fish solubles, meat scraps) of 0 to 5 percent in chicken breeder rations.

The fairly liberal New England fish meal allowance is based upon evidence that fish meal in hens' rations results in increased rate of growth of chicks. The fish-meal levels recommended by the New England College Conference Board, despite their liberality, are frequently exceeded by mixed feed producers in the region. For example, one large New England firm visited by the Bureau nutritionist incorporates fish meal in broiler starter rations at a level of 7 percent.

The State of Maine, ranking about eighth largest among the broiler-producing states, represents a fairly large market for fish meal. In addition, a considerable amount of fish meal is used by the New England pork production industry. Most of the hogs raised in New England are first fed mixed rations (that often contain fish meal) and later are fed garbage until they reach slaughter weight.

The exception to the usual New England practice of liberal fish meal use is that of some producers who recently have built small feed mills in New England. Those producers have deleted fish meal together with several other ingredients from poultry rations because of lack of storage space and the high cost of feed ingredients when purchased in the small lots in which they are compelled to order them compared with the cost of those items in carload lots. Although, according to University of Maine nutritionists, experiment station authorities earlier attempted to dissuade the newly organized mixed feed producers from dropping fish meal from their formulas, the feed producers felt that they were compelled to do so by their cramped quarters and prevailing fish meal prices.

Extension workers at the University of Maine are working on a program directed toward lowering feed costs and improving the competitive position of the Maine poultry industry. A professor at the University of Massachusetts, among a number of basic investigations, is carrying out studies of endocrine influences in production. At the University of Massachusetts another professor is conducting research that reasonably may be expected to lead to some increase in the use of fish meal in swine feeding. At the University of New Hampshire, a faculty member and his co-workers are determining the niacin (B-vitamin) requirements of the hen. The control ration used in the experiments contained approximately 24 milligrams of niacin per pound of feed. Part of this niacin was provided by the 3.75 percent fish meal of the ration. (Fish meal contains 17 to 42 milligrams of niacin per pound of meal.) Niacin deficiencies lead to reductions in feed consumption and egg production of hens and reduced hatchability of eggs. Also at the University of New Hampshire, workers have determined that a daylight period of 12 hours is suffi-

cient for maximum broiler growth, a finding that may be expected to contribute to greater economy in production and, eventually, to a greater broiler industry in New England and hence to increased fish meal utilization in the region.

At all of the experiment stations visited by the nutritionist, the possibilities for productive research offered by condensed fish solubles and other industrial fish products were discussed. Because very little research has been done on fish solubles, with the exception of determinations of its unidentified growth factor (UGF) value, that product offers many research possibilities.

1/ 1965 Chicken and Turkey Rations. Cooperative Extension Service University of Maine (at Orono) and the U.S. Department of Agriculture cooperating.
2/ Morrison, Frank B. Feeds and Feeding, 1959. The Morrison Publn. Co., Clinton, Iowa.
3/ New York State College of Agriculture Extension Stencil #205 Revised Oct. 1, 1960. Ithaca, N.Y.

* * * * *

U. S. FISH MEAL, OIL, AND SOLUBLES:

November 1964: United States production of fish meal in November 1964 was lower by 33.0 percent as compared with November 1963. Production of fish oil was down by 32.8 percent and production of fish solubles decreased 41.6 percent.

Major Indicators for U.S. Supply of Fish Meal, Solubles, and Oil, November 1964

Item and Period	1/1964	1963	1962	1961	1960
			(Short Tons)		
Fish Meal:					
Production:					
November	8,922	13,316	10,175	10,071	10,805
January-Nov. 2/	202,589	228,704	291,893	278,574	261,165
Year 3/	-	255,907	312,259	311,265	290,137
Imports:					
November	25,745	17,369	11,904	25,649	6,149
January-Nov.	401,320	346,592	233,330	194,577	115,997
Year	-	376,321	252,307	217,845	131,561
Fish Solubles:					
Production: 4/					
November	2,851	4,886	4,819	5,140	3,524
January-Nov. 2/	80,339	103,876	122,811	107,318	96,032
Year	-	107,402	124,649	112,254	98,929
Imports:					
November	176	171	435	3,649	282
January-Nov.	4,228	3,952	5,921	6,267	3,114
Year	-	7,112	6,308	6,739	3,174
			(1,000 Lbs.)		
Fish Oils:					
Production:					
November	6,778	10,089	8,254	10,257	12,070
January-Nov. 2/	164,863	179,433	249,385	246,927	201,406
Year	-	185,827	250,075	258,118	209,143
Exports:					
November	90	146	171	1,425	14,640
January-Nov.	140,349	229,080	122,878	112,002	127,852
Year	-	262,342	123,050	122,486	143,659

1/ Preliminary.
2/ Data for 1964 based on reports which accounted for the following percentage of production in 1963: Fish meal, 95 percent; solubles and homogenized fish, 99 percent; and fish oils, 99 percent.
3/ Small amounts (10,000 to 25,000 pounds) of shellfish and marine animal meal and scrap not reports monthly are included in annual totals.
4/ Includes homogenized fish prior to 1964--none produced in 1964.

* * * * *

Production by Areas, December 1964: Preliminary data on U. S. production of fish meal, oil, and solubles for December 1964 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.

U.S. Production 1/ of Fish Meal, Oil, and Solubles by Areas, December 1964 (Preliminary) with Comparisons

Area	Meal	Oil	Solubles
	Short Tons	1,000 Pounds	Short Tons
December 1964:			
East & Gulf Coasts . . .	5,092	5,428	1,722
West Coast 2/	1,503	330	1,009
Total	6,595	5,758	2,731
Jan.-Dec. 1964 Total	209,184	170,621	83,307
Jan.-Dec. 1963 Total	229,646	184,009	89,000

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

* * * * *

Production, October 1964: During October 1964, a total of 5.3 million pounds of marine animal oils and 9,230 tons of fish meal was produced in the United States. Compared with October 1963 this was a decrease of 9.7 million pounds of marine animal oils and 9,039 tons of fish meal and scrap. Fish solubles production amounted to 4,824 tons--a decrease of 2,547 tons as compared with October 1963.

Menhaden oil production amounted to 3.8 million pounds--a decrease of 9.4 million pounds. Menhaden fish meal and scrap production in October 1964 amounted to 4,442 tons--a decrease of 7,756 tons as compared with the same month of 1963.

U.S. Production of Fish Meal, Oil, and Solubles, October 1964 1/ with Comparisons

Product	Oct. 1/1964	Oct. 1963	Jan.-Oct. 1/1964	Jan.-Oct. 1963	Total 1963
			(Short Tons)		
Fish Meal and Scrap:					
Herring	662	862	9,987	7,492	7,537
Menhaden 2/	4,442	12,198	141,647	166,725	184,205
Tuna and mackerel	2,720	4,011	22,611	20,069	26,957
Unclassified	1,406	1,198	19,584	21,102	22,415
Total	9,230	18,269	193,829	215,388	241,114
Shellfish, marine-animal meal and scrap	3/	3/	3/	3/	14,793
Grand total meal and scrap	3/	3/	3/	3/	255,907
Fish solubles:					
Menhaden	2,636	4,787	60,777	69,284	74,831
Other	2,188	2,584	16,711	22,482	25,347
Total	4,824	7,371	77,488	91,766	100,178
Homogenized condensed fish	-	-	-	7,224	7,224
			(1,000 Pounds)		
Oil, body:					
Herring	249	263	9,986	5,136	5,709
Menhaden 2/	3,819	13,198	137,443	153,098	167,635
Tuna and mackerel	851	951	4,912	4,773	5,903
Other (including whale)	349	567	5,744	6,337	6,580
Total oil	5,268	14,979	158,085	169,344	185,827

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

* * * * *

U. S. FISH MEAL AND SOLUBLES:

Production and Imports, January-October 1964: Based on domestic production and imports, the United States available

supply of fish meal for January-October 1964 amounted to 569,404 short tons--18,103 tons (or 3.3 percent) more than during January-October 1963. Domestic production was 21,559 tons (or 10.0 percent) less, but imports were 39,662 tons (or 11.8 percent) higher than in January-October 1963. Peru continued to lead other countries with shipments of 300,820 tons.

The United States supply of fish solubles during January-October 1964 amounted to 81,540 tons--a decrease of 20.4 percent as compared with the same period in 1963. Domestic production dropped 21.7 percent but imports of fish solubles increased 17.7 percent.

U. S. Supply of Fish Meal and Solubles, January-October 1964 with Comparisons

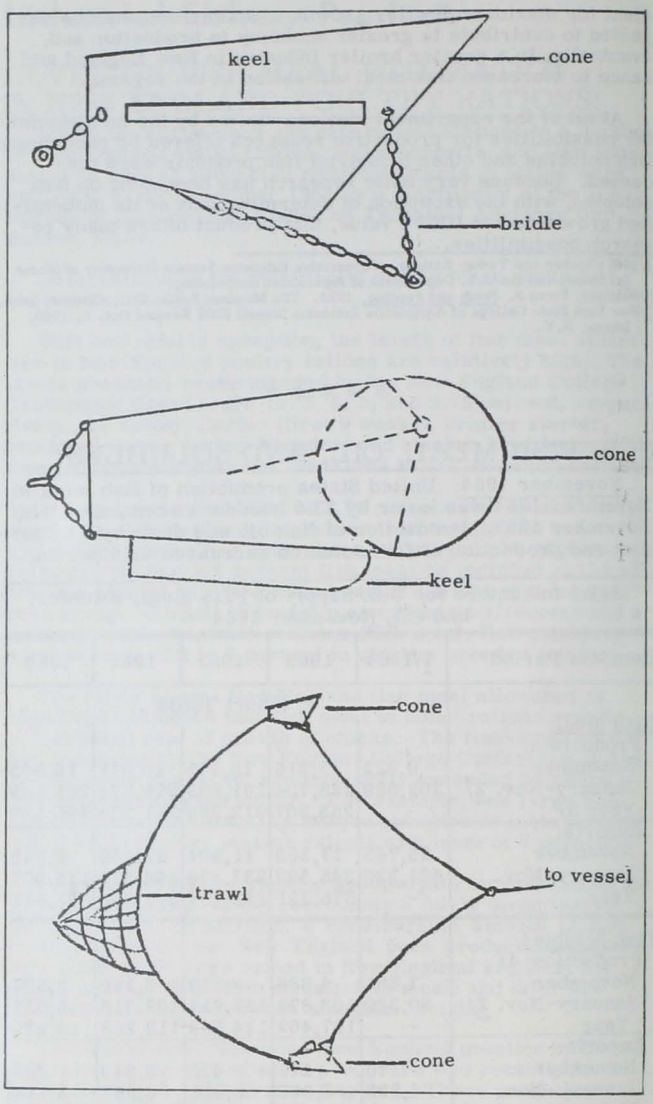
Item	Jan.-Oct. 1/1964	Jan.-Oct. 1963	Total 1963
	. . . (Short Tons). . .		
Fish Meal and Scrap:			
Domestic production:			
Menhaden	141,647	166,725	184,205
Tuna and mackerel	22,611	20,069	26,957
Herring	9,987	7,492	7,537
Other	19,584	21,102	22,415
Total production	193,829	215,388	241,114
Imports:			
Canada	46,754	43,735	50,925
Peru	300,820	257,087	291,544
Chile	11,302	23,197	24,249
Norway	-	1,819	1,819
So. Africa Republic	13,487	8,275	12,296
Other countries	3,212	1,800	2,274
Total imports	375,575	335,913	383,107
Available fish meal supply	569,404	551,301	624,221
Fish Solubles:			
Domestic production 2/	77,488	3/98,990	3/107,402
Imports:			
Canada	1,315	1,753	2,034
Iceland	-	55	160
So. Africa Republic	935	191	411
Other countries	1,802	1,443	4,168
Total imports.	4,052	3,442	6,773
Available fish solubles supply	81,540	102,432	114,175

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

Inventions

TRAWLING CONE THAT CAN SUBSTITUTE FOR OTTER BOARDS INVENTED IN DENMARK:

A device to hold open a floating trawl has been invented in Denmark where two-vessel trawling is practiced. The new invention will hold open a floating trawl when towed by only one vessel, according to the inventor. The new invention is an open-ended, cone-shaped device which supplants the usual otter boards on each side of the trawl.



The forward end of the cone is cut at a backward angle while the rear end is square. The cone has a keel underneath with a rounded front edge to prevent the cone from digging into the bottom when the trawl is fished near the bottom. A vertical bridle attaches the rear end of the cone to a cable leading to the trawl. Front bridles are attached to the forward end of the cones and then to cables which lead to a single cable to the towing vessel. The depth of the trawl is adjusted by letting out or hauling in the single cable.

In operation, the water passing through the cones keeps them separated and the trawl open. The stream of water directed back through the cones toward the trawl is expected to increase the catch when passing through a school of fish. Patent and model protection have been sought in Denmark for the device.

The inventor of the device is Hartman Fynbo, Holstvej 8, Skagen, Denmark. Since he is a tinsmith, his first models have been constructed of metal. However, his patent application states the cones may be made of collapsible material such as canvas or plastic cloth. There have been no reports of the device being used commercially. The inventor has said that a special trawl should be used with the cones, and that such a trawl is being constructed.

The Danish patent application for the device is number 3221 and was made July 6, 1963. Protection for the model of the device was sought June 21, 1963, and given registration number 39,490 by Direktoratet for Patent-og Varemaerkevaesenet, Nyropsgade 45, Copenhagen V, Denmark. (Regional Fisheries Attache for Europe, United States Embassy, Copenhagen, December 22, 1964.)

New Jersey

FISHERIES, 1963:

Summary: Landings of commercial fish and shellfish in New Jersey during 1963 were 255.2 million pounds with a value of $10.2 million ex-vessel--a decrease of 191.7 million pounds (43 percent) and $1.6 million (13 percent) from 1962. Menhaden was down 196.7 million pounds, and scup or porgy was down 2.1 million pounds. Appreciable increases occurred for surf clams, which were up 7.7 million pounds, and bluefin tuna up 2.8 million pounds.

Menhaden made up 70 percent, surf clams 15 percent, scup 5 percent, and 4 species combined (fluke, whiting, bluefin tuna, and sea bass) 5 percent of the 1963 New Jersey catch.

Following are some of the highlights of the New Jersey fisheries during 1963:

New Jersey Fishery Landings, 1962-1963

Species	1963		1962	
	Quantity	Value	Quantity	Value
Fish:	Pounds	Dollars	Pounds	Dollars
Bluefish	822,219	97,132	1,091,600	118,871
Butterfish	1,385,964	125,349	2,112,700	161,452
Cod	1,238,987	161,464	1,483,900	174,750
Fluke	4,444,861	1,046,138	4,749,200	973,107
Menhaden	178,816,346	2,184,960	375,526,600	3,901,547
Scup or porgy	12,730,355	1,066,987	14,878,900	994,411
Sea bass	2,811,754	333,619	2,621,400	341,943
Striped bass	743,251	104,767	493,800	91,304
Swordfish	192,796	89,510	26,200	15,838
Tuna, bluefin	2,827,635	155,462	5,400	747
Whiting	3,408,407	142,860	3,912,500	156,781
Other fish	2,595,058	275,488	3,180,400	234,437
Total fish	212,017,633	5,694,226	410,082,600	7,165,188
Shellfish, etc:				
Crabs:				
Blue:				
Hard	828,500	99,503	1,505,000	139,692
Soft	33,150	6,630	155,500	31,088
Rock	22,767	712	22,000	892
Horseshoe	201,200	1,007	340,000	1,938
Lobsters	750,303	336,753	870,900	368,645
Clams:				
Hard	1,555,420	642,878	1,339,700	536,335
Soft	15,252	6,355	17,400	7,210
Surf	37,548,411	2,580,151	29,830,200	1,917,518
Conchs	524,053	112,242	166,200	22,680
Oysters 1/	485,365	518,183	1,553,400	1,422,234
Scallops:				
Bay	273,886	112,170	364,700	129,438
Sea	173,412	83,110	97,300	37,124
Shrimp	2/	2/	7,300	7,300
Squid	795,703	41,674	544,100	32,450
Terrapin, Diamond-back	2/	2/	3,200	1,120
Turtles	2/	2/	29,700	3,508
Total Shellfish, etc.	43,207,422	4,541,368	36,846,600	4,659,172
Grand Total	255,225,055	10,235,594	446,929,200	11,824,360

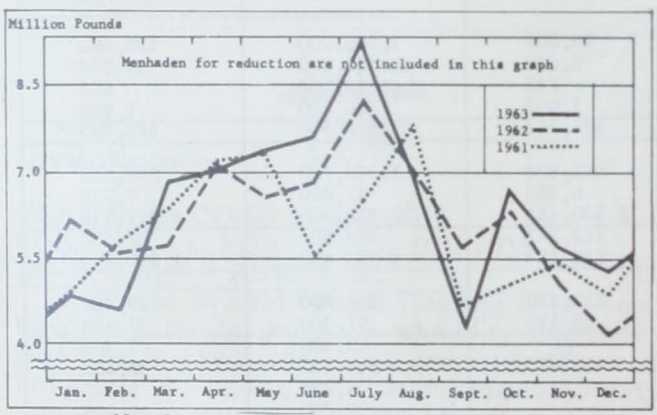
1/Does not include production taken from waters of Delaware.
2/Not available.
Note: Data for 1962 are revised. Univalve and bivalve mollusks are reported in pounds of meats. All other species are shown in round weight.

Tuna: For the first time in New Jersey's history tuna was landed in commercial quantities at the ports of Jersey City and Cape May. The tuna landings were made in 1963 by purse seiners from Massachusetts and California.

Striped Bass: Setting a record in 1963, striped bass landings totaled 743,000 pounds. Otter-trawl gear was credited with most of the catch during November and December, the period of peak production. New Jersey fishermen first took significant quantities of striped bass in otter trawls during 1961. Since that time striped bass catches by otter-trawl gear have increased each year.

Sea Bass: The catch of sea bass by pot operators in 1963 increased over 1962. The best catches occurred during the months of May and June. The catch in those 2 months accounted for more than 50 percent of the total production for the season which ended in the fall. The price for "pot" sea bass held up well during the peak months because the fish were of unusually good quality and size. Otter-trawl operators were also pleased with their catch of sea bass during the months of February, March, and December.

Swordfish: Seven vessels from New Jersey entered the long-line fishery for swordfish in 1963. Their first swordfish catches were landed during April 1963 at Hampton, Va., because that port was close to the fishing grounds. Starting in May 1963, the vessels landed all their swordfish at New Jersey ports. The majority of those vessels stopped long-lining in July and returned to otter-trawl fishing due to the drop in swordfish prices.



New Jersey landings by months, 1961-63.

Surf Clams: The record surf-clam catch in 1963 exceeded the 1962 catch by almost 8 million pounds of surf clam meats. The best catch for a 1-month period was the 4 million pounds taken in October 1963. Six vessels were added to the surf clam fleet in 1963. Early in the year surf-clam grounds previously unexploited were located off the Jersey coast. The acceptance of clam products by consumers has led to a steady increase in the surf-clam catch during the last 10 years.

Conch: Landings of conch are becoming more prominent. Various canners and bait establishments have reported an increased demand for conch meat. Inshore-boat operators have turned to the conch fishery during periods when other species have been scarce.

Squid: The New Jersey squid catch is taken mainly by offshore draggers during early spring and late fall along with more valuable catches of other species. No vessel specifically fishes for squid, yet the 1963 squid landings in New Jersey were the largest in 14 years. There is no explanation that can be given for the increase, except fishermen caught more squid while fishing for fluke.

Hard Clams: Production of hard clams in New Jersey during 1963 was up 21,683 bushels from the previous year. In general, there was a good demand for hard clams all year. (C. F. S. No. 3484, New Jersey Landings, 1963, U. S. Bureau of Commercial Fisheries.)

New York

FROZEN FOOD REGULATIONS POSTPONED:

Proposed regulations by the State of New York on the manufacture, storage, and distribution of frozen foods have been postponed by that State's Commissioner of Agriculture and Markets. The reason for the postponement, after public hearings were held, was that the Commissioner was not satisfied that the regulations should be put into effect at this time. Further investigation and conferences among State officials and affected industries are planned.

North American Fisheries Conference

FUTURE OF FISHERIES TO BE DISCUSSED AT FIRST CONFERENCE:

"The Future of North American Fisheries Resources" will be the subject of the first general session of the North American Fisheries Conference, to be held in Washington, D. C., April 30-May 5, 1965, at the Mayflower Hotel.

Robert J. Gruber, president of the National Fisheries Institute (NFI)--the host association--will preside at the Monday morning (May 3) meeting of the Conference. It will mark the first time in history that Canadian, Mexican, and United States fishery associations have ever held a joint convention. E. A. Ruthford, who is first vice-president of NFI, is chairman of the panel of speakers. Included among the speakers are Dr. W. M. Chapman, president of the Van Camp Foundation, San Diego, whose subject is "North American Fishery Potential"; Dr. John L. Kask, director of the Inter-American Tropical Tuna Commission, La Jolla, Calif., who will ask "whether or not the North American resource is being properly managed and developed"; and Dr. Peter A. Larkin, director of the Biological Station, Fisheries Research Board of Canada, Nanaimo, B. C., who will provide the answers.

All speakers are internationally known and have had the broad education and experience which make them experts in their fields. Dr. Chapman, who has been director of the School of Fisheries, University of Washington, Seattle, and first special assistant to the Under Secretary of State for Fish and Wildlife, is a member of many advisory committees and is chairman of the Panel on Law of the Sea, Committee on Oceanography, National Academy of Sciences.

Dr. Kask is the former chairman of the Fisheries Research Board of Canada and before that was assistant director of the U. S. Fish and Wildlife Service. He has also been a member of the International Commission for the Northwest Atlantic Fisheries, the International Halibut Commission, and assistant director of the International Sockeye Salmon Commission.

Dr. Larkin is a former professor of the Department of Zoology and director of the Institute of Fisheries, University of British Columbia.

Delegates to the North American Fisheries Conference will be members of the Fisheries Council of Canada; the Camara Nacional de la Industria Pesquera, Mexico; and the National Fisheries Institute of the United States. The joint meeting will commemorate the 20th anniversaries of the Canadian and United States trade associations and the 14th anniversary of the Camara. Heading the delegations will be Donovan F. Miller, president of the Canadian organization, Elias Selem Curi, president of the Camara, and R. J. Gruber of NFI.

Technology Sessions planned by the National Fisheries Institute Quality Committee and the Smoked and Cured Fish Committee will be held on the opening day of the convention. Experts in five fields will participate at the Technology Session. Special speakers at the Smoked and Cured Fish Session will include the chief of the Bacteriological Branch, Division of Microbiology, U. S. Food and Drug Administration. The sessions will be open to all Conference participants.

Note: See Commercial Fisheries Review, December 1964 p. 70.

North Atlantic

FOREIGN FISHING ACTIVITIES OFF COAST, JANUARY 1965:

In order to observe foreign fishing activities in the North Atlantic, the staff of the Fisheries Resource Management Office, U. S. Bureau of Commercial Fisheries, Gloucester, Mass., has been conducting weekly reconnaissance flights cooperatively with the U. S. Coast Guard.

Foreign fishing vessel activity during January 1965 increased slightly over the previous month. A total of 26 Soviet vessels were sighted during the month and identified as 17 fish-factory stern trawlers, 4 refrigerated fish transports, 2 fuel and water carriers, 1 tug, and 2 side trawlers. During the previous months in December 1964 there were 20 vessels and in January a year earlier there were 19 vessels of similar types operating in the area covered.

Fishing operations of the vessels observed were generally confined south and southeast of the Nantucket Lightship along the Continental Shelf between Veatch and Hydrographer Canyons. But several of the transport

ships and support vessels were seen south and east of Nantucket Island.

It was noted that very large quantities of fish overflowed the open deck storage areas of each vessel. Trawls were bulging with fish catches estimated at 30,000 to 40,000 pounds. Visual examination and photographs confirmed that both whiting and red hake (also called mud hake) were being caught, with red hake appearing to be the predominant species.

The vessels' dehydration plants in full operation seemed to indicate that fish in excess of their processing facilities were being reduced to fish meal. How much red hake is being used for that purpose is not known.

The large quantities of fish seen in January were more than has been observed since the Soviet's intensive herring operation on Georges Bank in September 1964. By the end of the month about 6 Soviet vessels were reported operating along the mid-Atlantic coast areas.

North Atlantic Fisheries Investigations

FALL DISTRIBUTION AND ABUNDANCE OF GROUNDFISH SPECIES STUDIED:

M/V "Albatross IV" Cruise 64-13 (October 22-November 25, 1964): To determine the fall distribution and relative abundance of groundfish species from the Bay of Fundy southward to Hudson Canyon was the purpose of this survey by the U. S. Bureau of Commercial Fisheries research vessel Albatross IV.

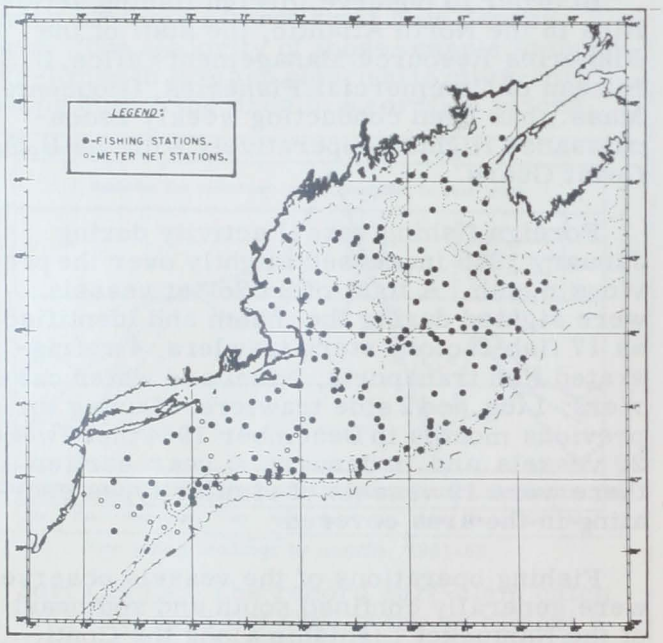


Fig. 1 - Shows fishing stations worked during Albatross IV Cruise 64-13 (October 22-November 25, 1964).

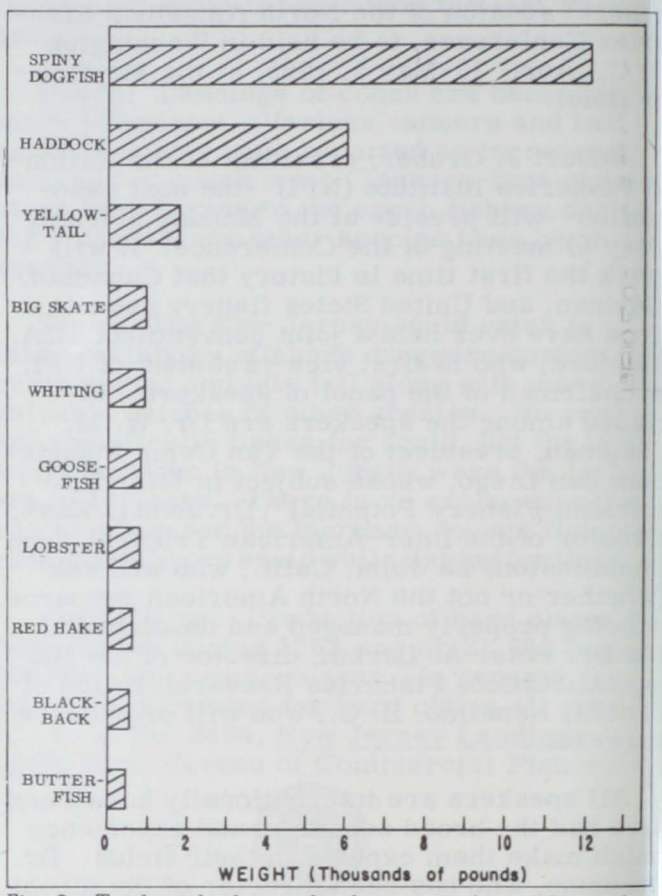


Fig. 2 - Total catch of most abundant species by weight caught during Albatross IV Cruise 64-13 (October 22-November 25, 1964).

A total of 185 groundfish stations was occupied on this cruise. All fish were identified and measured and the total weight by species was obtained from each tow. Stomach contents from a variety of groundfish species caught throughout the area were examined and recorded. Scale samples were taken from haddock and yellowtail flounders; otoliths were extracted from whiting (silver hake), squirrel hake, and white hake; blood samples were collected from selected groundfish species. Invertebrates taken in each tow were preserved. A sample of the bottom type was collected at each station. Selected groundfish species were preserved for special reference collections at the University of Maryland and Auburn University. Bathythermograph (BT) casts were made at all stations and every 10 miles between stations.

In the southern New England area, three plankton transects were made to obtain fluke eggs for the fluke program; conducted by marine biologists of the State of New Jersey.

Haddock 23 to 36 centimeters (13 to 14.2 inches) long (the 1963-year class) were caught in good quantities on Georges Bank and in the South Channel off Nantucket from depths of 30 to 50 fathoms. But the catches of the 1964-year class of haddock were low. A forecast of the influence of the 1964 year-class on future commercial landings was to be made after all the data were analyzed. Generally, catches of whiting (silver hake) were low as compared with previous years. Several good catches of ocean perch (redfish) were made in the deep waters of the Gulf of Maine. Spiny dogfish were taken in general throughout the survey area. In one tow off southern New England, over 6,000 pounds of spiny dogfish were caught in the net.

The total weight of all species caught on this survey amounted to 54,000 pounds. Spiny dogfish and haddock were at the top of the 10 most abundant species (by weight) caught during the survey.

Note: See Commercial Fisheries Review, November 1964 p. 44.

Oceanography

CONFERENCE AND EXHIBIT TO BE HELD IN WASHINGTON, D. C.:

The National Conference/Exposition on Ocean Science and Ocean Engineering will be held on June 14-17, 1965, in Washington, D.C. The meeting is cosponsored by the American Society of Limnology and Oceanography and the Marine Technology Society.

The Conference will be the first national meeting on the relation of ocean science and engineering. It will explore the role of marine technology and science in man's coming need to use intelligently the resources of the sea.

The Conference will hear a discussion of marine mineral resources. There will also be symposiums on the "Results of International Indian Ocean Expeditions"; "Navy Requirements in Oceanography"; and "Perspectives in Ocean Engineering."

A wide field of technical subjects will be discussed during the 3-day Conference. Some of the subjects are underwater research vehicles, oceanographic data-gathering techniques, instrumentation calibration and standardization, desalination, and fish farming. Other topics to be examined include water pollution control, nuclear power and the ocean, and undersea transport and storage.

A highlight of the Conference will be an exhibit of oceanographic equipment, services, vessels, and accessories. It will be the first time many of the products have been on public display, and the exhibit will be the largest oceanographic exposition ever presented.

* * * * *

"SOUND PICTURES" OF FISH SCHOOLS MAY BE POSSIBLE WITH IMPROVED ECHO-SOUNDER:

Work is under way to develop an echo-sounder accurate enough to tell an albacore from a skipjack tuna. The project is under the direction of the La Jolla (Calif.) Tuna Resources Laboratory of the U. S. Bureau of Commercial Fisheries.

A 60-foot vessel on loan from the Navy is being outfitted with special echo-sounding equipment developed by a California firm. The vessel is expected to begin testing the equipment in the spring of 1965. It will operate in the coastal waters of California.

The special sonar equipment developed for the test will employ continuous frequency-modulated sound transmission in contrast with the conventional-type sonar which sends out periodic sound waves and then stops until the echoes return from a object. A complex sound analyzer is being built to sort out the continuous sound returns and classify them. The sound returns will be displayed continuously on a cathode ray tube. The new equipment is designed to enable fishermen to tell a school of yellowfin tuna from a school of bonito, or a school of anchovy from a mass of mackerel.

For practical use, it will be necessary to extend the range of the new echo-sounder far enough to give it an advantage over visual spotting from the masthead of a vessel. The new sonar could be especially valuable for night fishing. Visual spotting is possible only on dark nights when a school of tuna, anchovy, or other fish can be seen from the

white froth or phosphorescence created by the beat of their tails in the sea.

* * * * *

NEW METHOD OF EXTRACTING RADIOACTIVE SILICON FROM SEA WATER:

A new technique for measuring naturally occurring radioactive silicon in the oceans' water should help oceanographers who are trying to chart the circulatory and mixing patterns of the seas' depths, an assistant research professor of oceanography at the University of Rhode Island announced November 21, 1964. He reported that he had successfully developed and tested a method whereby he is able to remove some 2 ounces of silicon from more than 40 tons of sea water taken from various selected depths.

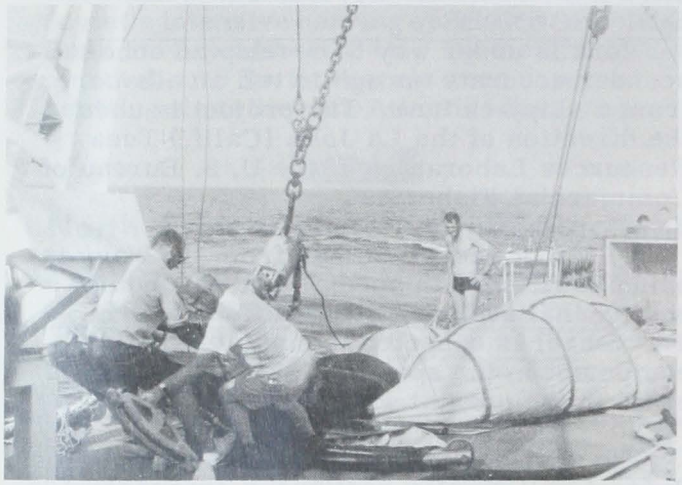


Fig. 1 - Shows water sampling bag hauled aboard research vessel Trident.

About 10 out of every billion. billion atoms in this sample is radioactive Silicon-32, an isotope of the element which is formed by cosmic rays bombarding the upper atmosphere. (Isotopes are chemically similar forms of the same element which vary in weight.) Since the rate at which Silicon-32 decays is known within broad limits, the scientist's measurements give an indication of the "age" and the movements of the ocean waters. Expansion of such knowledge is vital to scientists who are concerned about the dispersal of radioactive wastes in the oceans, the scientist explained. In addition, the U. S. Navy, which is supporting his work through the Office of Naval Research, is interested in his findings.

While Carbon-14 is admittedly the best radioactive tracer for sea water, its rate of decay or half-life, he believes, is too long (half a given quantity decays in 5,700 years) in terms of the process being studied. Although it never has been accurately measured, Silicon-32 has a half-life somewhere near 300 years. This is more in line with the estimates that it takes a particle of sea water about a thousand years to complete its cycle into the depths and back again.

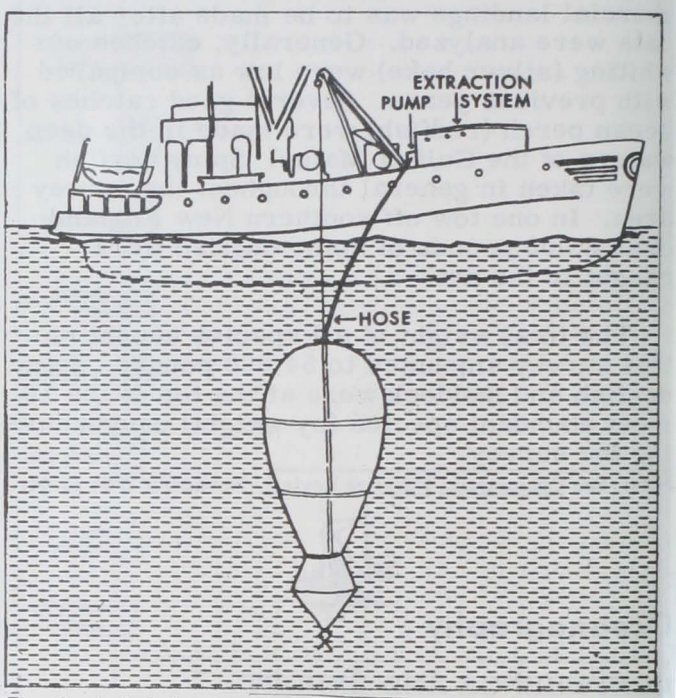


Fig. 2 - Artist's drawing shows how water sampling bag is operated.

The key item used by the scientist in his process is what is considered to be the world's largest bag water sampler, capable of collecting 10,000 gallons of water at one time. The rubberized-nylon bag is lowered empty into the water using a large shipboard winch and A-frame. At a pre-set depth a hydrostatic device opens the nine-foot mouth of the bag. As it starts to come up, water gushes through a 15-foot neck or funnel into the bag itself which is nearly 28-feet long.

When filled, the bag turns over to disengage the funnel and is hoisted to within 50 feet of the ocean's surface. Here a suction hose and pump run the collected water through an extraction system where the silicon--in the form of dissolved silica--is captured or scavenged out, using a specially treated ion-exchange resin. Silica is a common constituent of beach sand.

After treatment aboard the vessel with hydrochloric acid and distilled water, the resin yields some 150 gallons of solution which is stored aboard the University of Rhode Island research vessel Trident until returned to the University's laboratory facilities at Narragansett Bay. The radioactivity of the minute quantities of material eventually obtained is measured in a Geiger counter. (Actually Silicon-32 decays to form Phosphorous-32, a radioactive "daughter" which can be handled easily chemically and counted.)

Originally, Silicon-32 is formed on the borders of space when high-energy cosmic rays--nature's own atom smashers--strike the nucleus of Argon, creating atomic fragments some of which are Silicon-32. Argon is an inactive gas which forms a little less than one per cent of the earth's atmosphere. The atmosphere's Silicon-32 is washed to the sea's surface by rainfall and then begins the mixing process. (Press release, University of Rhode Island, Kingston, November 22, 1964.)

Salmon

RETURNS TO LOWER COLUMBIA RIVER HATCHERIES IN 1964 REPORTED EXCELLENT:

Returns of fall chinook and silver salmon in 1964 to U. S. Bureau of Sport Fisheries and Wildlife and State operated hatcheries located on the lower Columbia River and its tributaries were considered the best in years. The fall chinook egg-take at the Spring Creek National Fish Hatchery in Washington alone totaled more than 45 million. Other hatcheries operated by the state and Federal governments reported excellent takes of chinook and silver salmon eggs and holding ponds crowded with additional, unstripped silvers. Many adult fish were released above hatchery facilities or carried to other streams for natural spawning.

* * * * *

SALMON SANDWICH BIG HIT AT NEW YORK WORLD'S FAIR:

A salmon sandwich was the most popular of 16 sandwiches sold at the World's Fair booth of a soft drink firm, according to the Association of Pacific Fisheries.

Sea Lamprey

GREAT LAKES FISHERY COMMISSION COMMENDED FOR RESULTS OF ERADICATION PROGRAM:

The Great Lakes Fishery Commission was commended on January 4, 1965, by Secretary of the Interior Stewart L. Udall for the progress made by Canada and the United States toward controlling the predations of sea lampreys on commercial and sport fish species in the Great Lakes.

Secretary Udall noted that the Commission (made up of three members from each country) has reported that sea lampreys in Lake Superior have been reduced 80 percent following treatment of tributary streams by selective chemicals which kill the young lamprey. Progress has been so encouraging that the Commission now has recommended that its research agencies study the desirability of permitting a limited commercial lake trout fishery in Lake Superior in the near future. Secretary Udall also endorsed the Commission's action in directing its scientists to continue seeking more effective, but less expensive chemicals which will kill only the young lampreys and then dissipate rapidly in the water without contributing to water pollution.

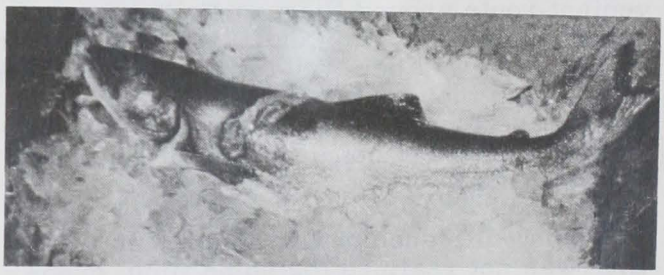


Fig. 1 - Lake trout in a bed of ice with a sea lamprey wound.

Efforts to control the sea lamprey by selective chemicals have centered around Lake Superior since Canada and the United States began the joint chemical control program in 1958. At that time some lake trout remained in Lake Superior, but commercial catches in Lakes Huron and Michigan were only a fraction of 1 percent of what they were during 1930-39 when about 5 million pounds were taken from each of the two lakes. Lamprey control treatments were extended recently to Lake Michigan, where the initial series will be completed by summer 1966.

Secretary Udall said, "The apparent success of the program in Lake Superior is most

encouraging. I congratulate the Commission members on their dedication to programs to restore the Great Lakes to their rightful place as a source of revenue to commercial fishermen and a haven for sportsmen of both countries."

Fig. 2 - Feeder mechanism that maintains critical level of selective toxicants in Great Lakes streams infested with sea lampreys. The chemicals introduced in the streams selectively kill the young lamprey.

The sea lamprey reached Lake Erie from Lake Ontario when the Welland Canal--a convenient route around Niagara Falls--was deepened between 1913 and 1918. Before then, the lamprey was believed to have been in Lake Ontario for thousands of years, but unable to enter Lake Erie because of the falls and unfavorable passage conditions before the canal was deepened.

The significance of sea lamprey in Lake Erie was not realized for some time, probably because their population was small and there was no noticeable effect on fishing. But when they reached Lake Huron, where conditions were more favorable, they increased rapidly and the threat to deep-water fish became apparent. Lake trout, rainbow trout, whitefish, suckers, and many other species were caught with round wounds, about three quarters of an inch across, made by the numerous sharp teeth of the lamprey which attaches itself on its victim and feeds on its blood. Lake trout bore the brunt of the lamprey attacks and catches of trout went down first in Huron, then in Michigan, and finally in Lake Superior as the parasite multiplied in each of those lakes.

Before the invasion of the sea lamprey, lake trout were the mainstay of a flourishing and stable fishing industry with landings ranging from 14 to 17 million pounds a year in the upper Great Lakes. Fluctuation of populations made commercial fishing for other species profitable in some years, but lake trout was the backbone of the industry. When lake trout nearly disappeared, both sports fishermen and commercial fishermen lost a resource which had been receiving greater attention each year. In times past, thousands of outdoorsmen had spent millions of dollars annually on fishing and related hobbies in the lakes.

A realization that a united approach to the fisheries problem was desirable and necessary led to the establishment of the Great Lakes Fishery Commission by Canada and the United States in 1956. Since then, the Great Lakes States (New York, Pennsylvania, Ohio, Michigan, Indiana, Illinois, Wisconsin and Minnesota), the Province of Ontario, and the Governments of the United States and Canada combined efforts to control sea lampreys. The first step was a study of the life history of the sea lamprey in the Great Lakes, its spawning habits, migrations and growth, to discover at what stage in its development it could be most easily controlled. Sea lamprey migrate up streams in the spring and early summer and spawn in holes they make in a bottom of coarse gravel or sand. After spawning, the adults die. The eggs hatch in about 12 days, but several years pass before they leave a nonparasitic stage of life burrowed in sand and silt to migrate to the lakes and attack fish.

During the 12 to 20 months that adult sea lamprey spend in the lakes before re-entering the streams to spawn, they grow from about 7 inches to 17 inches. Laboratory observations have shown that a single lamprey may destroy 30 to 40 pounds of fish during the parasitic stage.

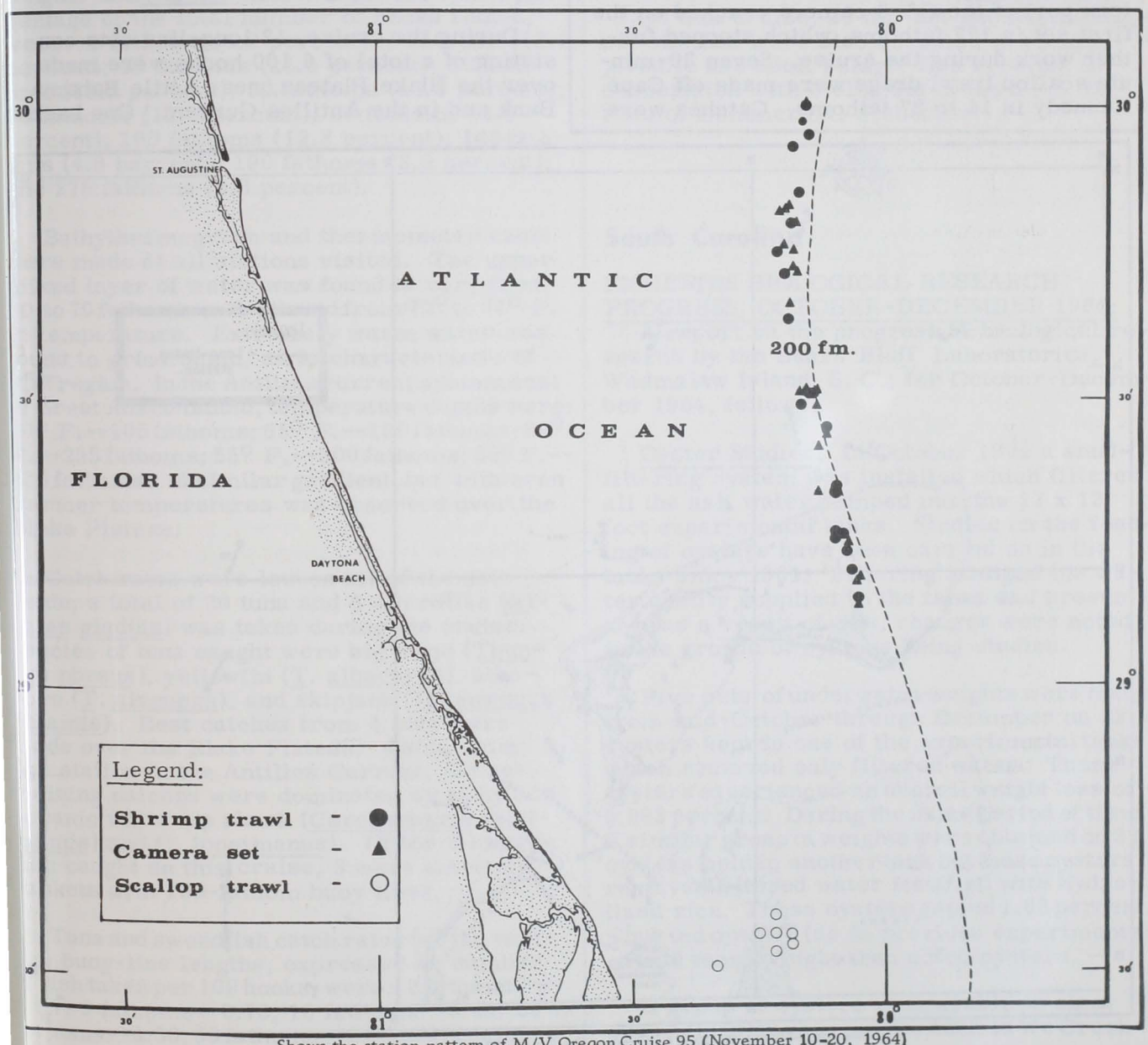
Note: See Commercial Fisheries Review, February 1964 p. 62.

South Atlantic Fisheries Exploration and Gear Research

USE OF CAMERA STUDIED TO FISH FOR ROYAL-RED SHRIMP AND CALICO SCALLOP:

M/V "Oregon" Cruise 95 (November 10-20, 1964): To obtain photographic observations of the fishing efficiency of 40-foot shrimp trawls working at 200-fathom depths and to obtain additional information on gear performance were the main objectives of this cruise by the U. S. Bureau of Commercial Fisheries exploratory fishing vessel Oregon. The area of operations was on the royal-red shrimp (Hymenopenaeus robustus) grounds off the Florida east coast extending from St. Augustine southward to below Daytona Beach.

A total of 43 trawl hauls was completed in depths of 177 to 225 fathoms, and a 40-foot flat trawl rigged with 6-foot chain doors was used for all drags. Slight modifications were required to position the motion picture camera over the headrope. Twenty-three drags were made without the camera gear to locate shrimp concentrations and check out bottom conditions; 20 drags were completed with the motion picture camera mounted on the headrope. A total of 3,200 feet of 16-millimeter motion picture film was exposed in the underwater



Shows the station pattern of M/V Oregon Cruise 95 (November 10-20, 1964)

camera--2,400 feet of black and white, and 800 feet of color film.

Catches with and without the camera attached to the trawl yielded royal-red shrimp of mixed sizes of from 1 pound to 75 pounds an hour. There was no indication that the camera equipment impaired the fishing efficiency of the trawls.

A secondary objective of the cruise was to continue bottom reconnaissance studies using a CA-8 35 millimeter still camera in cooperation with the National Geographic Society, and to sample a segment of the calico scallop (Pecten gibbus) bed off Cape Kennedy. The lens port of the CA-8 camera cracked on the first set in 177 fathoms, which stopped further work during the cruise. Seven 30-minute scallop trawl drags were made off Cape Kennedy in 14 to 27 fathoms. Catches were small, with the largest catch yielding about 250 scallops ranging in size from 50 to 55 millimeters (2.0 to 2.2 inches).

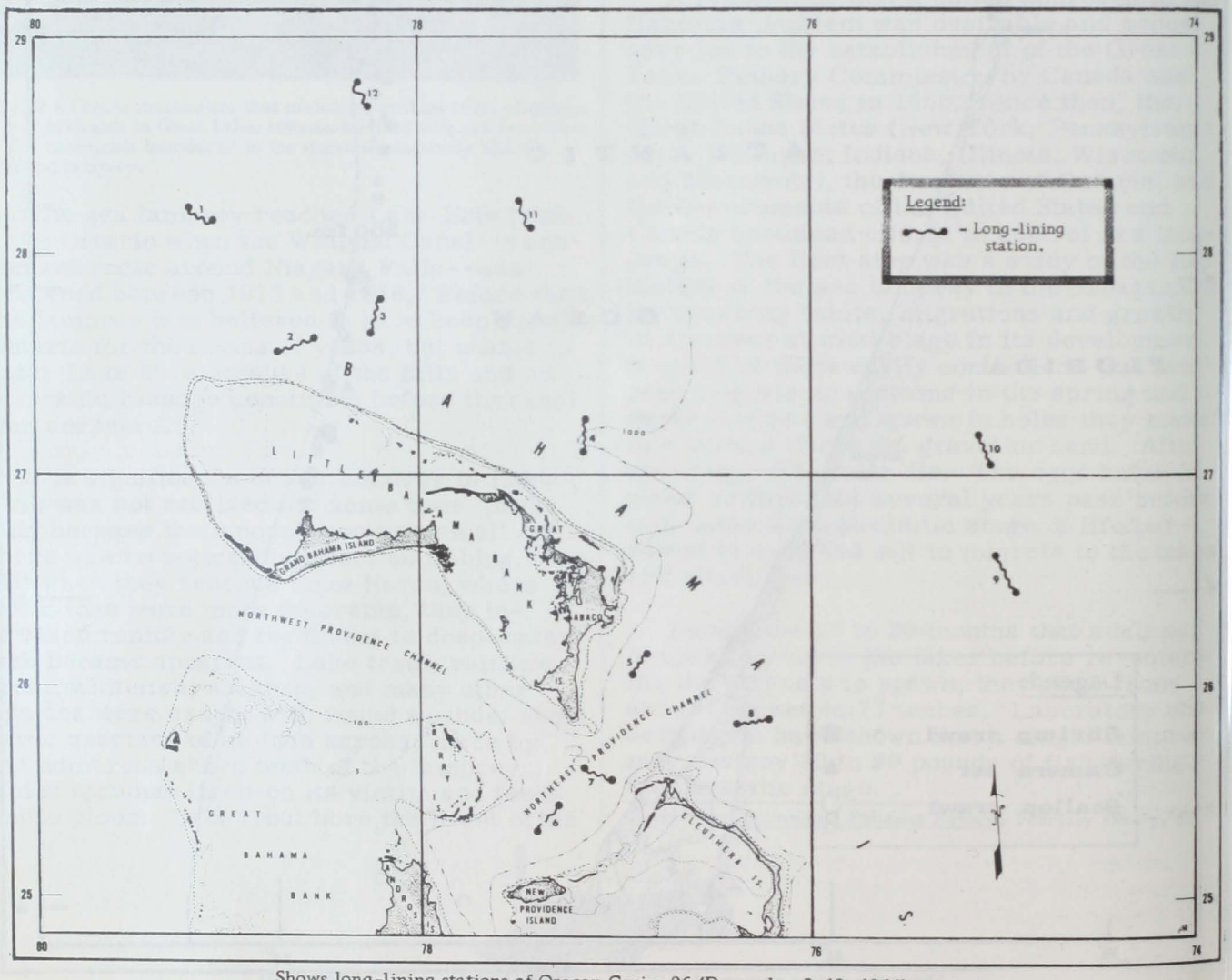
Note: See Commercial Fisheries Review, May 1964 p. 32.

* * * * *

SEASONAL AVAILABILITY OF SWORDFISH AND TUNA INVESTIGATED:

M/V "Oregon" Cruise 96 (December 2-19, 1964): To conduct preliminary investigations on the seasonal availability of swordfish and tuna in the vicinity of Little Bahama Bank was the main objective of this 18-day cruise by the U. S. Bureau of Commercial Fisheries exploratory fishing vessel Oregon.

During the cruise, 12 long-line sets consisting of a total of 6,100 hooks were made over the Blake Plateau, near Little Bahama Bank and in the Antilles Current. One basket



Shows long-lining stations of Oregon Cruise 96 (December 2-19, 1964).

of gear consisted of a 138-fathom mainline with 10 gangions of two 4-fathom sections. Buoy-line lengths varied from 2 to 275 fathoms long. Squid and scad (Decapterus) were used for bait. The gear was usually set early in the evening and retrieved at mid-morning the next day.

Techniques were evolved for experimental deep-drop long-line fishing during the cruise. The gear was successfully fished with buoy-line lengths varying from 100 to 275 fathoms. But severe gangion twisting problems were encountered when hauling back baskets with drops greater than 100 fathoms. Buoy-line lengths and fishing effort, expressed as a percentage of the total number of hooks fished, were: 2 fathoms (4.9 percent); 5 fathoms (13.1 percent); 10 fathoms (14.8 percent); 20 fathoms (14.8 percent); 30 fathoms (14.8 percent); 50 fathoms (11.5 percent); 60 fathoms (2.4 percent); 100 fathoms (12.3 percent); 140 fathoms (4.8 percent); 190 fathoms (3.3 percent); and 275 fathoms (3.3 percent).

Bathythermograph and thermometer casts were made at all stations visited. The upper mixed layer of water was found to vary from 30 to 70 fathoms in depth and from 72° to 77° F. in temperature. Extremely warm water was found to great depth, as is characteristic of that region. In the Antilles current system east of Great Abaco Island, temperature depths were: 70° F.--105 fathoms; 65° F.--190 fathoms; 60° F.--255 fathoms; 55° F.--300 fathoms; 50° F.--335 fathoms. A similar gradient, but with even warmer temperatures was observed over the Blake Plateau.

Catch rates were low on all of the sets made; a total of 20 tuna and 6 swordfish (Xiphias gladius) was taken during the cruise. Species of tuna caught were big-eyed (Thunnus obesus), yellowfin (T. albacares), albacore (T. alagunga), and skipjack (Katsuwonus pelamis). Best catches from 4 sets were made over the Blake Plateau. Aside from one station in the Antilles Current, the remaining catches were dominated by silky and oceanic white-tip shark (Carcharhinus falciformis) and C. longimanus). Of the 6 swordfish caught on this cruise, 3 were taken on baskets with 100-fathom buoy lines.

Tuna and swordfish catch rates for the various buoy-line lengths, expressed as number of fish taken per 100 hooks, were: 2 fathoms--1.07; 5 fathoms--0.73; 10 fathoms--0.44; 20 fathoms--0.33; 30 fathoms--0.33; 50 fathoms--0.13; 60 fathoms--0.00; 100 fathoms--0.80; 140 fathoms--0.33; 190 fathoms--0.00; and 275 fathoms--0.00. Although the number of fish caught and amount of fishing time during the cruise was low, indications were that highest catch rates were made on baskets with 100, 5- and 2-fathom buoy lines, respectively. The 100-fathom baskets also yielded the greatest poundage of fish per unit of effort: 85 pounds per 100 hooks as compared to 42 pounds per 100 hooks for the 140 fathom baskets, and 40 pounds per 100 hooks for the 5-fathom baskets. Catch rates for the remaining baskets were less than 25 pounds per 100 hooks.

On this cruise, 20 dip-net and nekton ring-net stations were also occupied to collect juvenile and adult pelagic fish species, in cooperation with biologists of the U. S. Bureau of Commercial Fisheries.

South Carolina

FISHERIES BIOLOGICAL RESEARCH PROGRESS, OCTOBER-DECEMBER 1964:

A report on the progress of biological research by the Bears Bluff Laboratories, Wadmalaw Island, S. C., for October-December 1964, follows:

Oyster Studies: In October 1964 a sand-filtering system was installed which filtered all the salt water pumped into the 12 x 12 foot experimental tanks. Studies on the feeding of oysters have been carried on in the tanks since 1963. Filtering changed the water quality supplied to the tanks and presumably as a result of this, changes were noted in the growth of oysters being studied.

Five sets of underwater weights were made from mid-October through December on 32 oysters kept in one of the experimental tanks which received only filtered water. Those oysters experienced an overall weight loss of 0.993 percent. During the same period of time a similar group of weights were obtained on 33 oysters held in another tank but those oysters received filtered water fortified with hydrolized rice. These oysters gained 1.03 percent. Thus fed oysters (as in previous experiments) gained more weight than unfed oysters.

A group of oysters comparable in size were held in trays under the dock in We Creek

(the main source of salt water for ponds and tanks at Bears Bluff). Four sets of underwater weights were available for those oysters. They showed that the oysters in that environment gained 1.06 percent in total weight. Thus oysters in unfiltered water gained considerably more than those held in filtered water and in fact gained a fraction of a percent more than oysters held in filtered water fortified with carbohydrate food.

Studies have commenced to retest the results.

Shrimp Studies: Experimental otter trawling and plankton sampling throughout coastal waters continued on schedule during October-December 1964. Earlier in the year, experimental plankton tows indicated a scarcity of postlarval white shrimp in inshore waters, and it was predicted that the 1964 commercial catch of white shrimp would be below normal. Generally the predictions have proven correct, and although the commercial catch for white shrimp was greater in 1964 than in 1963, the harvest was far from normal.

Postlarval white shrimp continued to enter coastal waters until mid-October, but did not reach any great peak of abundance during the recruitment period. A moderate increase in the numbers of those postlarvae as well as postlarvae of the spotted shrimp was, however, noted in mid-September through early October. This was rather unusual for that time of year. Those postlarvae entered too late to be of significance commercially. By December they had reached a length of only $2\frac{1}{2}$-$4\frac{1}{2}$ inches, but experimental trawling indicated that those small shrimp were fairly plentiful in inshore waters during December.

According to experimental tows, white shrimp were slightly more plentiful in coastal waters during October-December of 1964 as compared with that period of 1963. Brown shrimp, usually not abundant during that time of year, were caught in greater numbers that quarter than in that of 1963, and unusual numbers of juvenile brown shrimp were noted in most rivers and sounds during November.

Although it is too far in advance for predictions as to the commercial shrimp catch for 1965, the abundance of juvenile shrimp during November and December is somewhat encouraging. If the winter is mild and the small shrimp now present in coastal waters survive until spring to spawn, the commercial crop of shrimp for 1965 should be better.

Data obtained from experimental otter trawling during the quarter indicated that croaker were slightly less plentiful in 1964 than during the same period in 1963. Spot also declined somewhat in abundance as compared with the last quarter of 1963.

Pond Cultivation: Several experiments in pond cultivation were concluded during October and November. Two one-acre ponds, two one-quarter-acre ponds, and several smaller ponds were drained and harvested. Best results were had in the smaller experiments, chiefly because supplies of postlarval and juvenile shrimp for pond stocking were scarce in nearby waters and inadequate numbers were obtained for large-scale projects. Heavy rainfall (30 inches in July) resulted in below normal growth and above normal mortality in the experimental shrimp.

In one experiment in a $\frac{1}{10}$-acre pond, 868 small (3-4 inch) shrimp were stocked between June and September. That pond was treated with rotenone in July and traps were used to remove crabs. The shrimp in that pond were fed a total of 138 pounds of chopped crab and fish during the growing period, an equivalent of over 1,300 pounds per acre. Over 27 pounds of shrimp were harvested from that small pond when it was drained on October 16, 1964, the equivalent of almost 300 pounds per acre.

In another experiment using a 12 x 12 foot concrete tank, the bottom of which was covered with pond mud, 2.5 pounds of shrimp were harvested on October 12 when the tank was drained. This is the equivalent of about 800 pounds per acre. The tank had been stocked with postlarval shrimp beginning in March and continuing through August. Shrimp in the tank were fed an equivalent of over 3,000 pounds per acre of chopped trash fish and crabs.

The one-acre "Oyster Pond" was stocked with about 850 juvenile brown shrimp during May-August and only 43 pounds 4 ounces of shrimp were harvested when the pond was drained on October 14. Mortality in that pond was high and the shrimp were much smaller than normal for that time of year. The shrimp in that pond had been fed several hundred pounds of chopped fish and crabs. Low sa-

linity due to excessive rainfall apparently greatly impeded their growth.

The other one-acre pond at Bears Bluff also yielded a low harvest of shrimp when it was drained on October 19, 1964. This pond had been allowed to stock naturally by the tidal flow of water into it from the nearby creek during March and April and again in July and August. Only about 23 pounds of shrimp were harvested, reflecting the scarcity of shrimp in nearby waters. Those shrimp also were much smaller in size than usual, again chiefly because of low salinities during the culture period.

The two one-quarter acre ponds, which were harvested on November 5 and 6, had been stocked in March 1964 with fish chiefly juvenile winter trout, channel bass, spot, croaker, and flounder. Forage shrimp and fish were also stocked in those ponds, and food in the form of chopped crabs and fish was introduced at regular intervals during the experiment. Survival and growth rates were good in both ponds. Over 60 percent of the fish stocked were harvested and many had increased in length by as much as six inches. Those experiments indicate the feasibility of using salt-water ponds for food and game fish.

Fish Kill: One small fish-kill occurred in the Ashley River beginning on November 18. Fresh water catfish, striped bass, croaker, spot, and menhaden were found dead and dying. Dead fish were observed over a three-day period along the river from Magnolia Gardens to the Municipal Yacht Basin. A survey crew from Bears Bluff collected water samples and dead fish on November 19. Those samples were turned over to the South Carolina Water Pollution Control Authority, for determination as to the cause of the kill.

exas

ISHERIES, 1963:

Summary: Landings of fish and shellfish at Texas ports during 1963 totaled 166.3 million pounds valued at $30.1 million ex-vessel value--a decrease of 3 percent in quantity and less that 1 percent in value from 1962. The leading species landed in Texas during 1963 were menhaden 83.7 pounds, shrimp (heads-on) 70.2 million pounds, blue crab 3.0 million pounds, oysters 2.6 million pounds, and red snapper 2.2 million pounds. Those 5 species accounted for 97 percent of Texas fishery landings in 1963.

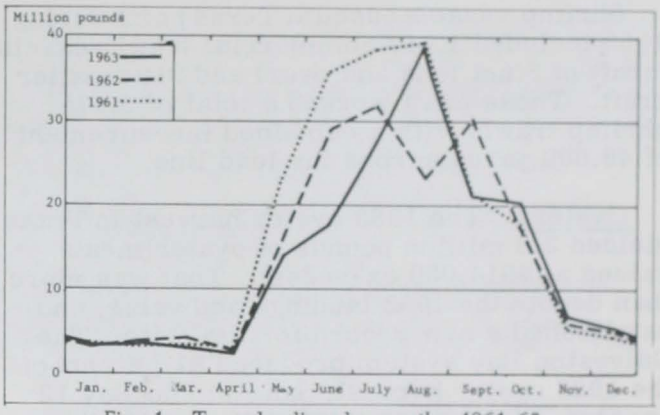


Fig. 1 - Texas landings by months, 1961-63.

Shrimp: Domestic landings of headless shrimp at Texas ports in 1963 were 44.1 million pounds (70.2 million pounds, heads-on) with an ex-vessel value of $26.6 million. That was well above the 35.2 million pounds of heads-off shrimp landed in 1962, but below the $27.1 million received for the 1962 catch. Texas ports accounted for 34 percent of the quantity and 42 percent of the ex-vessel value of all domestic shrimp landings in the Gulf States during 1963.


Fig. 2 - Shrimp conveyor unloader at Aransas Pass, Tex.

Shrimp vessels based at Texas ports during 1963 included 1,419 commercial trawl vessels (craft of 5 net tons and over) and 919 smaller craft. Those craft worked a total of 3,475 shrimp trawls with a combined measurement of 48,000 yards across the lead line.

Oysters: The 1963 oyster harvest in Texas yielded 2.6 million pounds of oyster meats valued at $914,000 ex-vessel. That was more than double the 1962 landings and value, and established a new record for the State. The Galveston Bay system produced 81 percent of the 1963 oyster harvest, San Antonio Bay 12 percent, Lavaca Bay 4 percent, and 5 other bays accounted for the remainder. A total of 241 oyster-dredge craft and several tong crews shared in the record commercial oyster harvest. In addition, sport fishermen took substantial quantities of oysters for home use. In 1963, most of the oyster meats were very good in quality. The yield of oyster meats per Texas bushel (92-96 pounds) of shell stock was down slightly from 1962 in both the spring and fall harvest because catches were not culled as carefully as in previous years.

Fig. 3 - Oyster dredge at the dock, Fulton, Tex.

Blue Crab: Texas landings of blue crab in 1963 were 3 million pounds with an ex-vessel value of $200,000, a decline from the 4.5 million pounds valued at $290,000 landed during 1962. Four crab-processing plants operated in Texas during 1963 and were supplied by 70 craft fishing a total of 9,668 crab pots.

Edible Finfish: Landings of edible finfish in Texas during 1963 amounted to 6.6 million pounds valued at $1.3 million ex-vessel. Red snapper landings of 2.2 million pounds valued at $590,000 accounted for 33 percent of the quantity and 45 percent of the ex-vessel value of the 1963 edible finfish landings in Texas. The red snapper landings were at the highest level since 1908 when 2.3 million pounds were landed. The red snapper catch contained many small fish in 1963. The catch of red snapper taken on many fishing trips consisted mostly of fish weighing less than 3 pounds. A total of 119 full- and part-time craft worked in the 1963 red snapper fishery. Four new vessels joined the snapper fleet in 1963.

Landings of almost all other edible finfish species of major commercial importance remained at the 1962 level. Spotted sea trout

Texas Fisheries Landings, 1962-1963

Species	1963		1962	
	Quantity	Value	Quantity	Value
Fish:	Pounds	Dollars	Pounds	Dollars
Menhaden	83,735,900	1,034,170	103,874,000	1,137,394
Snapper, red	2,168,700	590,440	1,742,300	444,308
Sea trout, spotted	1,190,200	301,601	989,100	248,583
Drum:				
Black	1,362,700	106,935	1,373,200	105,125
Red (redfish)	685,600	165,878	699,400	171,063
Other fish	1,332,200	158,702	1,570,800	146,905
Total Fish	90,475,300	2,357,726	110,248,800	2,253,378
Shellfish:				
Crabs, blue	2,982,200	199,968	4,478,400	290,032
Oysters	2,617,900	913,835	1,210,900	473,117
Shrimp (Heads-on): 1/				
Brown and Pink	55,811,100	21,752,846	44,250,700	22,156,446
White	13,719,500	4,805,748	10,813,600	4,893,721
Other	700,800	32,899	1,078,300	98,823
Squid	37,400	3,884	27,700	2,770
Total Shellfish	75,868,900	27,709,180	61,859,600	27,914,909
Grand Total	166,344,200	30,066,906	172,108,400	30,168,287

1/Does not include bait shrimp sold to sport fishermen. Over 1 million pounds of bait shrimp valued at $1.3 million was produced in the Galveston Bay area. Bay systems from Matagorda to Port Isabel also yielded substantial quantities of bait shrimp.

Note: Oysters are reported in pounds of meats (8.75 pounds per gallon). All other species are shown in round weight. The weight of heads-on shrimp was determined by multiplying heads-off weight by the following factors: brown, 1.61; pink 1.60; white 1.54; royal red, 1.80; and sea bobs, 1.53.

andings increased slightly, while the catch of edfish and black drum was practically unhanged.

General: About 40 new vessels (craft of 5 et tons and over) entered the Texas shrimp ishery in 1963, while about 10 vessels were ost at sea.

Two new types of winches were developed the Aransas Pass area in 1963. One is a mplete hydraulic system using three indeendent drums. It is practically free of wearg parts, easy to operate, and has good safey features. The second type winch is a modied gear-driven rig capable of holding enough able to work waters in excess of 300 fathoms nd was designed primarily for use by vessels ishing for royal-red shrimp.

Suction hoses for unloading industrial fish re being tried at Texas ports. The apparatus hows considerable promise, but the elaborate ick-up hose (some 10 inches in diameter) is eavy and somewhat difficult to handle.

There were no major changes in Texas port acilities in 1963. However, improvements for he Port Lavaca-Palacios area (comparatively inor ports prior to 1962) were made in 1963. ew channels and a jetty system breaching the idth of Matagorda Bay and extending just oer 1 mile into the Gulf were partially comleted. The expected completion date of the ntire project will be late 1965. When comleted, the project is expected to increase he landings of shrimp at Palacios and Port avaca as both ports are adjacent to the Pass avallo fishing grounds, one of the most proictive areas in the northern Gulf of Mexico. . F. S. No. 3627, Texas Landings, 1963, . S. Bureau of Commercial Fisheries.)

. S. Fishing Vessels

ISHERIES LOAN FUND AND THER FINANCIAL AID FOR VESSELS, CTOBER 1-DECEMBER 31, 1964:

From the beginning of the program in 1956 through Decemer 31, 1964, a total of 1,582 applications for $41,665,972 were eceived by the U.S. Bureau of Commercial Fisheries, the gency administering the Federal Fisheries Loan Fund. Of he total, 828 applications ($18,656,590) had been approved, 20 ($12,566,272) had been declined or found ineligible, 195 $7,701,992) had been withdrawn by the applicants before being rocessed, and 39 ($725,270) were pending. Of the applications pproved, 309 were approved for amounts less than applied or--the total reduction was $2,015,848.

The following loans were approved from October 1, 1964, through December 31, 1964:

New England Area: George W. Durfee, Boothbay Harbor, Me., $6,000; and Estrela Corporation, Gloucester, Mass., $91,370.

California: Alfred P. Faraldo, Fort Bragg, $8,283.

South Atlantic and Gulf Area: Jesse W. Callaway, Gulf Shores, Ala., $7,666; and Edward F. Winchester, Brownsville, Tex., $16,000.

Pacific Northwest Area: Peter S. Berg, Freeland, Wash., $6,000; Peder L. Bredal & Leon Pedersen, Seattle, Wash., $30,000; H. W. Myers, Seattle, Wash., $7,359; North Pacific Enterprises, Inc., Seattle Wash., $80,000; and Kristen H. Vedo, Seattle, Wash., $32,115.

Alaska: Karl E. C. Bradlee, Cordova, $3,200; Maurice D. Ingman, Ketchikan, $4,000; Sherman A. Vincent, Ketchikan, $12,000; Arthur C. Nelson, Kodiak, $48,000; Alfred Torsen, Ouzinkie, $15,000; Richard I. Eliason, Sitka, $5,000; and Thomas W. Maloney, Auke Bay, $3,500.

Under the Fishing Vessel Mortgage Insurance Program (also administered by the Bureau) during the fourth quarter of 1964, 3 applications for $131,662 were received. Since the program began (July 5, 1960), 64 applications were received for $6,269,913. Of the total, 52 applications were approved for $3,368,741 and 8 applications for $2,272,654 were pending as of December 31, 1964. Since the mortgage program began, applications received and approved by area are:

New England Area: Received 12 ($1,314,500), approved 8 ($775,365).

California: Received 2 ($1,262,000), approved 1 ($557,000).

South Atlantic and Gulf Area: Received 39 ($1,777,389), approved 35 ($1,455,305).

Pacific Northwest Area: Received 8 ($1,861,250), approved 5 ($526,296).

Alaska: Received 3 ($54,774), approved 3 ($54,774).

U.S. Foreign Trade

IMPORTS OF CANNED TUNA IN BRINE UNDER QUOTA:

United States imports of tuna canned in brine during January 1-December 31, 1964, amounted to 52,930,989 pounds (about 2,520,523 standard cases), according to preliminary data compiled by the U. S. Bureau of Customs. That was 3,482,649 pounds (about 165,841 standard cases) less than the 56,413,638 pounds (about 2,686,364 standard cases) imported during January 1-December 31, 1963.

Imports of canned tuna in brine in 1964 were substantially below the quota for the year. The quantity of tuna canned in brine which could have been imported into the United States during the calendar year 1964 at the $12\frac{1}{2}$ percent rate of duty was 60,911,870 pounds (or about 2,900,565 standard cases of 48 7-oz. cans). Any imports in excess of that quota would have been dutiable at 25 percent ad valorem.

* * * * *

AIRBORNE IMPORTS OF FISHERY PRODUCTS, JANUARY-OCTOBER 1964:

Airborne fishery imports into the United States in October 1964 consisted mainly of shrimp from Venezuela and Panama. Shipments were about the same as in the previous month.

Airborne shrimp imports in October 1964 totaled 735,300 pounds, the bulk of which was fresh and frozen raw headless shrimp. About 98 percent of the airborne shrimp imports in October 1964 entered through the Customs District of Florida. The remainder entered through the Customs Districts of New York (N.Y.), Galveston (Tex.), New Orleans (La.), Los Angeles (Calif.), and Puerto Rico.

Spiny lobsters from British Honduras and Jamaica were the main shellfish item other than shrimp imported by air in October 1964.

Total airborne fishery imports in January-October 1964 were down 7.8 percent in quantity and 6.4 percent in value from those in the same period of 1963. The decline was due to smaller shipments of shrimp and spiny lobsters from Central and South American countries.

U. S. 1/Airborne Imports of Fishery Products, January-October 1964 with Comparative Data

Product and Origin 2/	1964				1963	
	October		Jan.-Oct.		Jan.-Oct.	
	Qty. 3/	Value 4/	Qty. 3/	Value 4/	Qty. 3/	Value 4/
	1,000 Lbs.	US$ 1,000	1,000 Lbs.	US$ 1,000	1,000 Lbs.	US$ 1,000
Fish:						
Mexico	6.8	0.7	320.5	64.7	245.2	66.4
Canada	-	-	14.8	4.8	-	-
Other countries	2.9	2.4	30.8	37.7	100.9	114.4
Total fish	9.7	3.1	366.1	107.2	346.1	180.8
Shrimp:						
Guatemala	-	-	-	-	141.6	74.0
El Salvador	-	-	159.1	96.8	258.0	172.7
Honduras	-	-	10.3	3.8	99.8	52.3
Nicaragua	8.2	4.7	87.8	50.3	477.2	159.1
Costa Rica	14.1	5.6	310.2	166.8	582.5	278.9
Panama	137.3	87.3	950.1	586.4	1,442.5	776.2
Venezuela	574.7	302.5	5,245.9	2,504.9	4,161.9	1,956.1
Ecuador	-	-	-	-	111.6	39.4
France	-	-	-	-	2.6	0.9
British Guiana	-	-	10.5	5.2	-	-
Mexico	-	-	2.1	1.4	13.2	6.9
Other countries	1.0	1.7	13.1	6.9	-	-
Total shrimp	735.3	401.8	6,789.1	3,422,5	7,290.9	3,516.5
Shellfish other than shrimp:						
Canada	-	-	312.9	173.4	213.3	109.2
Mexico	-	-	14.4	9.9	97.6	57.6
British Honduras	46.4	38.4	253.7	203.9	309.9	253.7
Honduras	7.4	3.9	80.3	82.6	17.0	7.0
Nicaragua	-	-	50.5	40.0	164.5	100.0
Costa Rica	0.5	0.5	19.1	14.7	73.8	60.1
Jamaica	10.4	13.6	63.3	63.2	65.7	49.5
Other countries	4.0	1.4	58.5	25.8	102.7	90.9
Total	68.7	57.8	852.7	613.5	1,044.5	728.0
Grand total	813.7	462.7	8,007.9	4,143.2	8,681.5	4,425.3

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 overall 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, October 1964, U.S. Bureau of the Census.

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 consists of fresh and frozen products.

* * * * *

PROCESSED EDIBLE FISHERY PRODUCTS, NOVEMBER 1964:

United States imports of processed edible fishery products in November 1964 were down 10 percent in quantity and 1 percent in value from those in the previous month due mainly to lower imports of frozen groundfish fillets and blocks from Canada. The decline was partly offset by higher imports of sea catfish fillets, halibut fillets, canned albacore tuna, canned sardines in oil, and canned crab meat.

Compared with the same month in 1963, imports in November 1964 were down 4 percent in quantity, but up 12 percent in value.

In November 1964, imports were down for cod fillets, ocean perch fillets, canned tuna other than albacore, and canned oysters. But imports in November 1964 were up for flounder fillets, swordfish fillets, sea catfish fillets, yellow pike fillets, canned albacore tuna, canned sardines in oil and not in oil, and canned crab meat.

In January-November 1964, imports were up 1 percent in quantity and 6 percent in value from those in January-November 1963. During January-November 1964, there were larger imports of groundfish blocks (increase mainly from Canada and Iceland), flounder fillets, yellow pike fillets, and sea catfish fillets. Imports were also up for canned albacore tuna and canned sardines not in oil. But there was a decline in imports of most other canned fish import items (tuna other than albacore, crab meat, oysters, salmon, and sardines in oil).

U.S. Imports and Exports of Processed Edible Fishery Products, November 1964 with Comparisons

Item	Quantity				Value			
	Nov.		Jan.-Nov.		Nov.		Jan.-Nov.	
	1964	1963	1964	1963	1964	1963	1964	1963
Fish & Shellfish:	. .(Millions of Lbs.). .				. . (Millions of $) . .			
Imports 1/	49.8	51.8	497.7	493.4	16.6	14.8	151.8	143.7
Exports 2/	6.7	3.7	45.0	30.2	3.3	1.8	23.6	14.5

1/Includes only those fishery products classified by the U.S. Bureau of Census as "Manufactured foodstuffs." Included are canned, smoked, and salted fishery products. The only fresh and frozen fishery products included are those involving substantial processing, i.e., fish blocks and slabs, fish fillets, and crab meat. Does not include fresh and frozen shrimp, lobsters, scallops, oysters, and whole fish (or fish processed only by removal of heads, viscera, or fins, but not otherwise processed).
2/Excludes fresh and frozen.

Exports of processed edible fish and shellfish from the United States in November 1964 were up 46 percent in quantity and 6 percent in value from the previous month due mainly to heavy shipments of canned salmon and canned squid. In November 1964, shipments of canned salmon totaled 3.6 million pounds (about half of which went to the United Kingdom); shipments of canned squid totaled 1.1 million pounds (most of which went to Greece).

Compared with the same month of 1963, the exports in November 1964 were up 81 percent in quantity and 83 percent in value. The increase was due mainly to larger shipments of canned salmon.

Processed fish and shellfish exports in the first 11 months of 1964 were up 49 percent in quantity and 63 percent in value from those in the same period of 1963. In January-November 1964 there were much larger shipments of canned mackerel and canned salmon. Exports of canned shrimp and canned sardines in oil were also higher, but exports of canned sardines not in oil and canned squid were down.

Note: See Commercial Fisheries Review, Feb. 1965 p. 44.

Vessels

CERTAIN DRY CHEMICAL FIRE EXTINGUISHERS REQUIRE PRESSURE GAUGES:

The U. S. Coast Guard has ruled that all fire extinguishers of the dry-chemical, stored-pressure type manufactured after June 1, 1965, must be equipped with pressure gauges if the extinguishers are to be carried on board motorboats or other vessels as required equipment.

That ruling does not affect extinguishers now carried on board and not fitted with pressure gauges as long as the extinguishers are maintained in good and serviceable condition.

Dry-chemical extinguishers have a smothering action that is effective on burning liquids such as gasoline, oil, and grease. Dry-chemical extinguishers are also effective for fighting live electrical fires in motors, switches, and navigating and fish-finding equipment.

Vessel owners are urged to maintain their fire protection on board and have their fire extinguishers refilled and retagged at least once a year.

Virginia

MARINE SCIENCE SUMMER TRAINING PROGRAM FOR HIGH SCHOOL STUDENTS:

The National Science Foundation has granted $8,245 to the Virginia Institute of Marine Science to conduct a marine science training program in Norfolk, Va., during the summer of 1965. The program is for high school students.

The Virginia Institute has presented advanced science courses in Norfolk to outstanding students for three summers. The purpose of the program is to challenge exceptional secondary school students to higher achievement, and to make it possible for Norfolk schools to use their marine environment as an aid in developing a strong science curriculum.

Fifteen students will be admitted to the program, 10 of whom will be selected from the private and public schools of Norfolk. Five students may be selected from other schools in the continental United States. Students accepted into the program must have studied biology and completed the 10th grade.

Three science teachers will also be selected for the program so they will become familiar with marine ecology. Participating teachers will form a nucleus around which improved science courses will be built. (Virginia Institute of Marine Science, Gloucester Point, January 8, 1965.)

Washington

UNEMPLOYMENT INSURANCE COSTS IN THE FISHING INDUSTRY:

An analysis of unemployment insurance in Washington State shows that fishing industry benefits have exceeded tax income. From 1939 through 1963, benefits to the fishing industry were more than 3 times greater than tax income. To have matched unemployment insurance taxes with benefits to the fishing industry in Washington State, the tax rate in the fishing industry would have had to be about 8.5 percent of taxable wages rather than the statutory 2.7 percent.

In terms of high relative benefit costs, however, the fishing industry in Washington State was surpassed in 1964 by the heavy construction industry and by the "miscellaneous manufacturing" group. (Washington State Employment Security Department.)

* * * * *

ROCK SLIDE INTERFERES WITH SALMON MIGRATION ON COWLITZ RIVER:

On December 14, 1964, a rock slide blocked fish ladders at Mayfield Dam on the Cowlitz River in Washington State. With the fish ladders knocked out, migrating silver salmon and steelhead trout were temporarily unable to reach upstream spawning grounds. Emergency action opened two minor fishway entrances at Mayfield Dam by December 31, 1964. It was hoped that some salmon and steelhead were getting past the dam through those entrances.

Salmon and steelhead migrants arriving in the Mayfield Dam area after the slide occurred were collected below the dam and trucked around the project to continue their journey upstream.

The number of salmon and steelhead which were delayed by the slide and lost their spawning potential is not known. An additional 3,000 to 5,000 coho salmon and upwards of 10,000 steelhead are expected to reach Mayfield Dam during the first part of 1965.

Permanent correction of the fish facilities at Mayfield Dam cannot be started until water conditions permit a more thorough evaluation of the damage. The work may have to be delayed until early summer 1965.

The director of the Washington State Department of Fisheries said the situation is similar to that at Mayfield in the spring of 1962 when a slide trapped more than 1,500 steelhead between the powerhouse and the arch dam. The magnitude of the recent slide and subsequent blockage of the fishway, however, is much greater than that experienced in 1962.

The slide in December 1964 at Mayfield destroyed portions of both the upstream and downstream flume systems, which are a part of the permanent fish collection and transportation system. Rock deposited below the spillway from the slide was carried over the fish barrier dam by the high spillway flows. That dumped a large quantity of rock in the river below the barrier dam in front of the powerhouse. The rock material made the adult-collection and fish-ladder facilities completely inoperable. In addition, turbulence created in front of the adult fish entrances stopped all upstream migration of salmon and steelhead. (Washington State Department of Fisheries, January 7, 1965.)

Wholesale Prices

EDIBLE FISH AND SHELLFISH, JANUARY 1965:

Prices for fresh and frozen fishery products rose 2.4 percent from December to January. The January 1965 wholesale price index for edible fish and shellfish (fresh, frozen, canned) at 112.1 percent of the 1957-59 average was 2.1 percent higher than in the same month of 1964.

An increase in the drawn, dressed, or whole finfish subgroup index of 9.5 percent from December to January resulted from (1) a sharp increase in prices at Boston for ex-vessel large haddock (up 34 percent); (2) substantially higher

Wholesale Average Prices and Indexes for Edible Fish and Shellfish, January 1965 with Comparisons

Group, Subgroup, and Item Specification	Point of Pricing	Unit	Avg. Prices 1/ ($)		Indexes (1957-59=100)			
			Jan. 1965	Dec. 1964	Jan. 1965	Dec. 1964	Nov. 1964	Jan. 1964
ALL FISH & SHELLFISH (Fresh, Frozen, & Canned)					112.1	109.5	108.9	109.8
Fresh & Frozen Fishery Products:					118.3	113.8	113.0	113.0
Drawn, Dressed, or Whole Finfish:					121.8	111.2	111.7	116.5
Haddock, lge., offshore, drawn, fresh	Boston	lb.	.17	.13	133.3	99.5	107.8	141.0
Halibut, West., 20/80 lbs., drsd., fresh or froz.	New York	lb.	.40	.40	118.3	118.3	112.4	96.1
Salmon, king, lge. & med., drsd., fresh or froz.	New York	lb.	.85	.83	119.1	115.6	115.6	118.4
Whitefish, L. Superior, drawn, fresh	Chicago	lb.	.61	.51	90.3	76.1	74.6	69.4
Yellow pike, L. Michigan & Huron, rnd., fresh	New York	lb.	.75	.70	122.8	114.6	106.4	80.3
Processed, Fresh (Fish & Shellfish):					116.0	111.9	111.1	115.4
Fillets, haddock, sml., skins on, 20-lb. tins	Boston	lb.	.56	.45	134.8	109.3	106.9	142.0
Shrimp, lge. (26-30 count), headless, fresh	New York	lb.	.94	.90	109.6	105.5	102.5	100.8
Oysters, shucked, standards	Norfolk	gal.	7.13	7.13	120.1	120.1	122.2	128.6
Processed, Frozen (Fish & Shellfish):					111.8	112.8	110.8	102.8
Fillets: Flounder, skinless, 1-lb. pkg.	Boston	lb.	.37	.37	92.5	92.5	88.7	98.9
Haddock, sml., skins on, 1-lb. pkg.	Boston	lb.	.40	.40	115.8	115.8	112.9	114.3
Ocean perch, lge., skins on 1-lb. pkg.	Boston	lb.	.31	.30	106.9	105.2	103.4	117.5
Shrimp, lge. (26-30 count), brown, 5-lb. pkg.	Chicago	lb.	.95	.96	112.1	113.8	112.7	95.5
Canned Fishery Products:					101.8	102.2	102.2	104.7
Salmon, pink, No. 1 tall (16 oz.), 48 cans/cs.	Seattle	cs.	21.00	21.25	91.5	92.6	92.6	102.4
Tuna, lt. meat, chunk, No. 1/2 tuna (6-1/2 oz.), 48 cans/cs.	Los Angeles	cs.	11.56	11.56	102.6	102.6	102.6	103.3
Mackerel, jack, Calif., No.1 tall (15 oz.), 48 cans/cs.	Los Angeles	cs.	6.25	6.25	105.9	105.9	105.9	97.5
Sardines, Maine, keyless oil, 1/4 drawn (3-3/4 oz.), 100 cans/cs.	New York	cs.	10.00	10.00	128.3	128.3	128.3	114.9

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.

rices for Great Lakes fresh-water fish--Lake Superior esh whitefish prices at Chicago were up 18.7 percent and ound fresh yellow pike prices at New York City increased .2 percent; and (3) a 3-percent rise in frozen dressed king almon prices. Prices for frozen dressed western halibut ere steady during January and remained unchanged from the revious month. As compared with the same month a year arlier, prices this January were higher for all products in e subgroup (except fresh ex-vessel haddock--down 5.5 per- nt) and the index was higher by 4.5 percent. January 1965 rices for frozen halibut were 23.1 percent higher than in anuary a year earlier because of low stocks in cold-storage, nd prices for Great Lakes fish were sharply higher due to ery light market supplies.

Higher January 1965 prices for most processed fresh fish and shellfish products were responsible for a 3.7-percent increase from the previous month in that subgroup index. Fresh small haddock fillets at Boston were much higher-priced (up 23.3 percent) this January than in December 1964, but they were 5.1 percent lower than the very high prices of January 1964. A gradually stronger market at New York City for fresh South Atlantic shrimp (wholesale price up 4 cents a pound) this January caused prices to rise 8.7 percent above January a year earlier. The January 1965 subgroup index was up only slightly from the same month in 1964 because considerably higher shrimp prices were offset by price decreases for other items in the subgroup.

From December 1964 to January 1965, prices for frozen ocean perch fillets at Boston rose slightly (up 1.6 percent) while at Chicago frozen shrimp prices declined in about the same proportion. Those opposite trends resulted in an 0.9-percent drop from the previous month in the January 1965 processed frozen fish and shellfish subgroup index. January prices for other items in the subgroup were unchanged from the preceding month. The January 1965 subgroup index at 11.8 percent of the 1957-59 average was 8.8 percent higher than in Januars 1964 principally because of considerably higher shrimp prices and a small increase in prices for frozen haddock fillets.

Slightly lower prices for canned pink salmon (down 1.2 percent) in January 1965 brought the subgroup index for canned fishery products down 0.4 percent from the previous month. Prices for all other canned fishery products in the subgroup--tuna, jack mackerel, Maine sardines--remained unchanged from November 1964 through January 1965. Canners' stocks of pink salmon (16-oz. No. 1 tall) on hand January 1, 1965, were about 1.4 million cases as compared with nearly 1.6 million cases on hand December 1, 1964. As compared with January 1964, the subgroup index this January was 2.8 percent lower--prices this January for canned salmon and tuna were lower, but those for Maine sardines and California jack mackerel were much higher than in the same month a year earlier because stocks were light.

OUR DROWNED ATLANTIC COAST SHORELINE

At one time, not too long ago, the shoreline was well out to sea, and one present offshore fishing bank, Georges Bank, was an island. These events generally have been acknowledged by scientists for some time now, but recently biologists from the U. S. Bureau of Commercial Fisheries Biological Laboratory, Woods Hole, Mass., and the Woods Hole Oceanographic Institution have added significantly to our knowledge of older shorelines. They delineated two ancient oyster reefs at depths of 19 and 30 fathoms (115 and 180 feet), extending from Cape Cod to Cape Hatteras, respectively, dating approximately 8,000 and 11,000 years ago. More recently the Oceanographic Institution biologist has announced the discovery of peat from Georges Bank, containing the remains of salt marsh grasses and spruce. This is the first solid evidence that Georges Bank was a forested island during the glacial period.