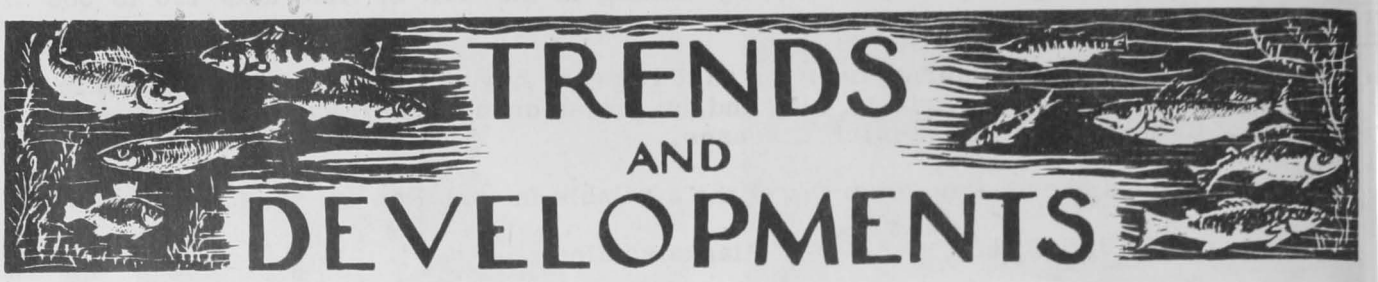

Alaska

FOREIGN FISHING OFF ALASKA, NOVEMBER-DECEMBER 1963:

The withdrawal of foreign fishing vessels from the waters off Alaska continued during November 1963 and by month's end less than 20 vessels remained of the more than 400 Soviet and Japanese craft operating in mid-summer 1963. A single shrimp-processing vessel and 14 accompanying trawlers constituted the entire Japanese fishing effort in that area in November. This fleet operated in the region north and west of the Pribilof Islands during most of the month. The Japanese planned to operate this shrimp fleet intermittently throughout the 1963/64 winter. Soviet fishing efforts were entirely withdrawn in November from the eastern Bering Sea and Gulf of Alaska. It was expected that the Soviet trawl fisheries will resume in the eastern Bering Sea when the ice pack advances into the trawling areas and can be used as shelter for the fishing vessels.

After an absence of Soviet fishing activities in November, the anticipated movement of Soviet winter trawling fleets into the eastern Bering Sea began in mid-December. Japanese activities remained at a low level. Soviet trawlers and associated support vessels began departing their Siberian ports in early December and by month's end about 60 vessels were concentrated in an area roughly 100 miles northwest of St. Paul Island. Those fleets were reportedly obtaining excellent trawl catches of herring and flatfish in the shallower waters adjacent to the 100-fathom curve. Soviet trawling efforts were expected to continue to increase during January 1964, expanding into areas south and east of the Pribilof Islands. The Japanese shrimp factoryship Chichibu Maru and her accompanying trawlers remained the sole Japanese fishing fleet near Alaska from November through December. This fleet has generally operated north and west of the Pribilof Islands but in December started to shift to waters along the 100-fathom curve south and east of the Pribilofs.

* * * * *

FISHERY VENTURES IN JUNEAU AREA:

A newly developed corporation started operations at a cannery site in Juneau during the latter part of 1963. Up to ten vessels may be used for producing "fresh" shellfish products. It was reported that initial emphasis is to be devoted to shrimp and crab processing with some consideration given to scallop resources investigated by the U. S. Bureau of Commercial Fisheries in the spring of 1963. The area of fishing operations being considered is from lower Chatham Straits to Yakutat.

* * * * *

KODIAK COLD-STORAGE PLANT PROCESSING DUNGENESS CRAB:

A cold-storage plant in Kodiak began processing Dungeness crab in October 1963 for shipment to various parts of the United States as fresh ocean crab. As of November, five vessels were engaged in this new industry. (Kodiak Mirror, November 8, 1963.)

* * * * *

WINTER FISHERY FOR BAIT HERRING BEGINS NEAR KETCHIKAN:

The first 1963/64 winter season delivery of bait herring to a fishery company in Ketchikan was made in December by the purse seiner Lady Alice. A good catch of 250 barrels was made in Tongass Narrows within a mile of the firm's dock which indicated the reappearance of herring in the local area after several years of relative scarcity. The winter bait fishery at Ketchikan normally accounts for 1.5 million to 2.0 million pounds of herring and provides a limited winter fishery for a few local seiners.

* * * * *

ECOND CONFERENCE ON TECHNOLOGY
F KING CRAB PROCESSING:

Plans for the Second Conference on the echnology of King Crab Processing were announced by the U. S. Bureau of Commercial isheries Technological Laboratory at Ketchian. It was anticipated the meeting will be eld in either Ketchikan or Anchorage during e first week in May 1964.

* * * * *

RAB TAG RECOVERIES
EDUCED BY HEAVY WINDS:

Only 30 tags from king crabs were rened by Alaska fishermen during December. was the lowest monthly return of tags since e current fishing season started. The highst return was over 200 tags sent to the U.S. ureau of Commercial Fisheries Auke Bay iological Laboratory in November. The harp drop largely reflected the effects of the evere storms in December that restricted e fishing fleet, although there is usually me decline over the holiday season.

* * * * *

UCCESS OF PINK SALMON EGG
EPOSITION VARIES IN SASHIN CREEK:

At the Little Port Walter Station, pink almon eggs successfully deposited in lower ashin Creek were only 37 percent of those vailable compared to 78-percent success in e upper reaches, although the numbers of male pink salmon per square yard of spawng gravel were about the same. The possiility is being studied that the difference in awning success was due to a difference in e composition of bottom materials resulting om stream gradient. Lower Sashin Creek s a gradient of 0.1 percent while the upper awning areas have a gradient of 0.7 percent.

* * * * *

AIL-BARGE SERVICES EXPANDING:

In April 1963, a barge service between rince Rupert, British Columbia, and Saxman ear Ketchikan), Alaska, opened all-rail traffic between Alaska and the lower 48 States. he terminal at Saxman has truck and ferry nnections to all cities in Southeastern Alas-. During 1963, about 60 mechanically-reigerated carloads of fish moved south over e Saxman-Prince Rupert facility to various nited States receiving stations. Destinations cluded Miami, Fla., Cincinnati, Ohio, Louisille, Ky., Pittsburgh, Pa., and Baltimore, Md.

Rail-barge connections to Alaska are being expanded. Other barge services now provide all-rail capability between Whittier (Anchorage area), Alaska, and the Puget Sound area of Washington State as well as between Whittier, Alaska, and Prince Rupert, B.C. In addition, similar service may be established between Puget Sound and Saxman and between Vancouver, B.C., and Whittier.

American Fisheries Advisory Committee

FISHERIES PROBLEMS DISCUSSED
AT ANNUAL MEETING:

A number of critical issues confronting the United States fishing industry at domestic and international levels were considered at the 17th annual meeting of the American Fisheries Advisory Committee held January 22-25, 1964, at Honolulu, Hawaii.

Special emphasis was placed on the fishery resources of Hawaii and the Central Pacific Ocean. During the four-day meeting, the Committee heard discussions of Central Pacific fisheries by officials of the State of Hawaii, Government of Guam, and the Government of American Samoa. In addition, key biological and oceanographic programs were described by staff members of the U.S. Bureau of Commercial Fisheries Biological Laboratory at Honolulu. It was stressed that this research will benefit all segments of the United States fishing industry in the Pacific and elsewhere. The Bureau's plans to aid the local fishing industry were strongly endorsed by the Committee. Other matters considered during the meeting included: (1) Atlantic tuna; (2) expansion of fishery trade; (3) fishing vessel construction legislation now pending before Congress; and (4) territorial fishing rights. The Committee also had an opportunity to tour the Bureau's research facilities at Kewalo Basin and the University of Hawaii campus, as well as tuna canning operations at a local cannery.

At the conclusion of Executive Sessions held on the last day of the meeting, the Committee urged that the United States increase its status as a high-seas world fishing nation by taking the following steps:

1. The tuna fisheries are becoming more international in nature and world tuna consumption is increasing. The United States must make every effort to increase its catch of tuna, and cooperation between government and industry is essential to achieve this goal. More modern, long-range vessels may be required to carry out a successful program of high-seas fishery expansion.

2. Steps should be taken to encourage young workers to seek employment in the fishing industry through training programs, and through modernization and mechanization of vessels and processing plants.

3. Passage of fishing vessel construction legislation is necessary for the modernization of United States fishing fleets, to provide a better environment for successfully competing with foreign nations.

4. The export of United States fishery products to all world markets is essential and can be accomplished through use of counterpart funds (foreign funds held abroad), and the Food for Peace Program.

5. The Bureau of Commercial Fisheries must actively continue its search for new products such as fish protein concentrate (fish flour) as a means of developing wider use for unused fishery resources. The expansion of the industry is greatly limited by the inability to properly utilize its catches.

6. The Bureau program to study effects of pesticides on fisheries resources should be continued to protect the public and the fishery resources of the nation.

Following adjournment of the meeting on Saturday, January 25, the Committee participated in commissioning ceremonies for the new oceanographic research vessel Townsend Cromwell, which will be operated by the Honolulu Biological Laboratory of the Bureau of Commercial Fisheries.

The American Fisheries Advisory Committee, which is composed of 20 fishing industry representatives from various parts of the United States, was organized under the Saltonstall-Kennedy Act of 1954. The Committee, which is responsible for advising the Secretary of the Interior on general fisheries matters, has held 16 previous meetings in other areas of the United States. The 17th meeting was the first to be held in Hawaii.

California

PELAGIC FISH POPULATION SURVEY CONTINUED:

M/V "Alaska" Cruise 63-A-7 (October 6-23, 1963) and Cruise 63-A-8 (November 4-22, 1963): The main objectives of these cruises by the California Department of Fish and Game research vessel Alaska were to: (1) measure the density, distribution, and age composition of inshore pelagic fish species; (2) measure the success of 1963 sardine spawning; and (3) collect juvenile sardines for growth studies by the U. S. Bureau of Commercial Fisheries Biological Laboratory at La Jolla, Calif.

Cruise 63-A-7 was carried out off the Mexican coastal waters of northern Baja California from Sacramento Reef to the International Border.

Cruise 63-A-8 was conducted off southern California from the International Border to Gaviota.

Sampling was accomplished chiefly by towing a large midwater trawl for 40 minutes at each station. The net was fished at night within 10 fathoms of the surface. Night-light, blanket-net stations were used as a secondary sampling technique. On the northern Baja California cruise, 26 trawl and 29 night-light stations were occupied; during the southern

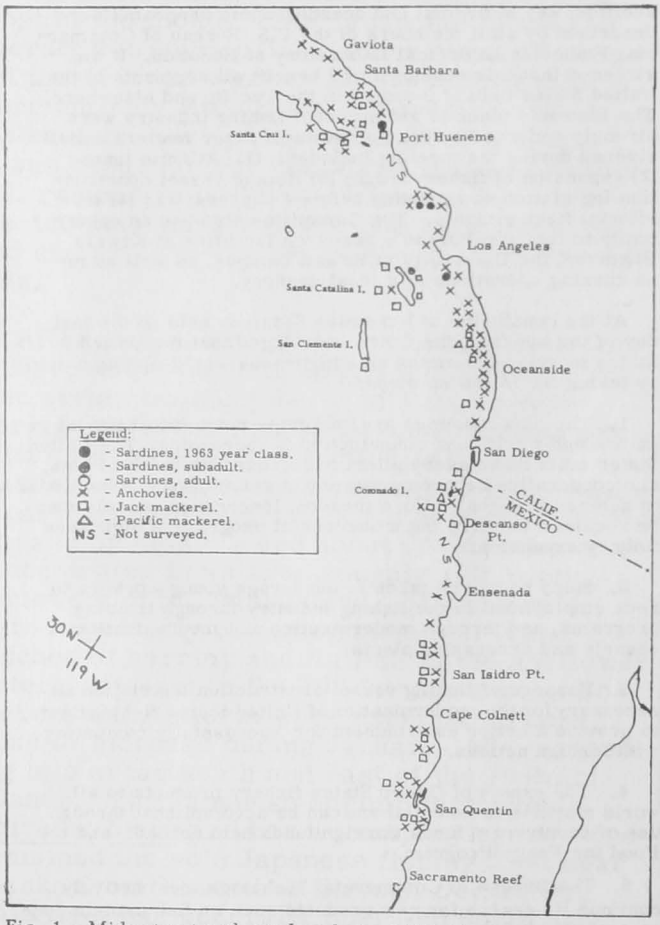

Fig. 1 - Midwater-trawl catches during M/V Alaska Cruise 63-A-7 (October 6-23, 1963) and Cruise 63-A-8-(November 4-22, 1963).

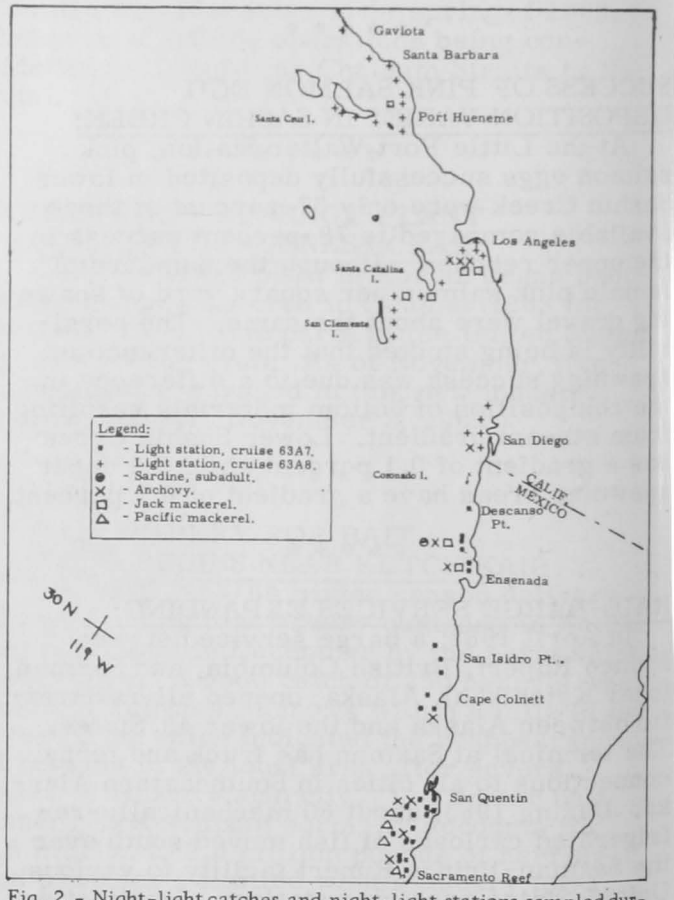

Fig. 2 - Night-light catches and night-light stations sampled during M/V Alaska Cruise 63-A-7 (October 6-23, 1963) and Cruise 63-A-8 (November 4-22, 1963).

California cruise, 50 trawl and 27 night-light stations were occupied.

Schools of fish sighted while en route between stations were identified and counted. Visual night scouting covered 142 miles off Mexico and 212 miles off California.

ANCHOVIES: Northern anchovies (Engraulis mordax) far exceeded all other species both in number caught and in number of samples taken. Midwater-trawling in northern Baja California caught anchovies at 88 percent of the stations, in amounts varying from 1 to 22,500 fish per tow. However, over three-fourths of those catches consisted of fewer than 4,000 fish, and a majority amounted to less than 500. Anchovies were taken along the entire route of the Mexican cruise, except in a small area south of Descanso Point, Baja California. Juveniles (75-90 millimeters) were predominant from Sacramento Reef to Cape Colnett, Baja California, while adults, averaging close to 130 millimeters were found from San Isidro Point to the International Border. No dense schools or concentrations were observed and only 13 small schools were sighted. Echo soundings made during trawl tows indicated a continuous scatter of fish.

Anchovies also dominated the night-light catches in northern Baja California, but catches were not as widespread or as numerous as with the trawl. (Anchovies were taken at 24 percent of the light stations.) The size of anchovies taken during night-light fishing was similar to those caught by trawling.

The size and frequency of anchovy catches off southern California were very similar to those off northern Baja California. Off southern California anchovy were caught in 84 percent of the total trawl tows, and in all but 1 inshore tow (within 10 miles of the coast). Catches ranged from 1 to 600,000 fish with most containing fewer than 500. Juveniles (75-90 millimeters) completely dominated the catch over most of the area. Pure catches of adults were made only in the Santa Cruz Island and Santa Barbara areas. As in northern Baja California, very few schools and no concentrations were observed in spite of excellent scouting conditions. During 212 miles of night scouting, only 8 small schools were seen. Extensive echo soundings failed to detect a single concentrated school, but indicated extensive areas of dispersed fish.

Night-light fishing off southern California yielded anchovies at only 4 of 27 stations, and negative results were obtained in areas that produced good trawl catches. The size and frequency of midwater-trawl catches and the absence of concentrated schools indicated an extensive, scattered anchovy distribution.

JACK MACKEREL: Jack mackerel (Trachurus symmetricus) ranked second in both trawl and night-light catches, with juveniles (45-200 millimeters) comprising almost the entire catch. Jack mackerel appeared in 54 percent of the trawl and 8 percent of the light station catches in northern Baja California. Trawl catches ranged from 7 to 2,050 fish, although only 3 tows caught over 100. The best catches off Mexico were made from Descanso Point to the Coronado Islands.

In southern California waters, jack mackerel were caught at 34 percent of the midwater-trawl stations and at 22 percent of the night-light stations. The best catches were made at San Clemente and Santa Catalina Islands, where up to 75 fish were taken per haul.

SARDINES: Sardines (Sardinops caeruleus) were scarce over the entire area surveyed. One sample was taken by night light and 1 by trawl in northern Baja California; 5 were taken by trawl in southern California. No schools were seen during night scouting. The 7 catches consisted of 3 samples of the 1963 year-class, 2 of subadults, and 2 of adults.

All of the 1963 year-class sardines were taken off southern California. They were mixed with large numbers of anchovies. The largest catch was 22 sardines in a tow containing 6,000 anchovies. Although the southern California sardine catches contained only a few fish-of-the-year, this was an improvement over the 1961 and 1962 surveys, which located no fish-of-the-year in that area. Unseasonal late summer spawning was indicated by the small fish sizes (47-70 millimeters) in 2 samples. Small sardines were not taken in sufficient numbers for the U. S. Bureau of Commercial Fisheries age and growth study.

PACIFIC MACKEREL: Pacific mackerel (Scomber diego) were not sampled in quantity although they apparently were present in both northern Baja California and southern California waters. Large schools were seen over a wide area from San Quentin to Cape Colnett, Baja California, during daylight hours, and the California commercial fleet caught 2,000 tons in southern California while the survey

was in progress. Midwater-trawl catches consisted of only 1 small sample of juvenile fish on each of the 2 cruises. Night-light stations yielded 4 samples in northern Baja California and none in southern California. It appears that both midwater-trawl and night-light fishing are ineffective in adequately sampling adult mackerel.

MISCELLANEOUS OBSERVATIONS: Off southern California, bonito (Sarda chiliensis) were the species most commonly sighted during night scouting. They were taken in 20 percent of the trawls, and 27 schools were sighted. Salps (Salpa tilesii-costata) were frequently taken on both cruises, and sometimes caused considerable clogging of the trawl while fishing off southern California. Squid (Loligo opalescens) and pyrosomes (Pyrosoma sp.) were occasionally taken in small quantities.

The trawl again proved its superiority in sampling anchovies. Anchovies were caught at 86 percent of the trawl stations but at only 20 percent of the night-light stations. The light failed to attract anchovies many times in areas where consistent trawl catches were made. Jack mackerel and sardines were taken by both types of gear, but the trawl appears to be the more efficient, especially when those species are scarce. Adult Pacific mackerel were sampled more efficiently by the night light (adults were not caught in the trawl in spite of good indications that they were present).

Weather conditions on both cruises were generally favorable. Several mechanical breakdowns on the northern Baja California cruise limited scheduled work. A newly-constructed device for recording trawl fishing depths was successfully tested on the southern California cruise.

Note: See Commercial Fisheries Review, December 1963 p. 17.

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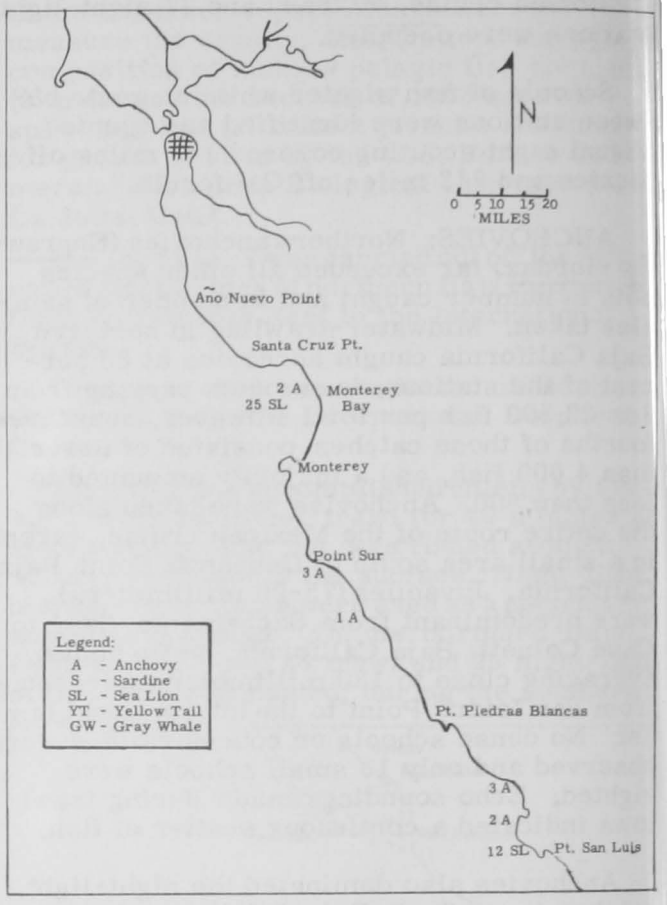
Airplane Spotting Flight 63-12-Pelagic Fish (December 16-17, 1963): The survey to determine the inshore distribution and abundance of pelagic fish schools was continued by the California Department of Fish and Game Cessna "182" 9042T during flights over the inshore area from Ano Nuevo Point to the United States-Mexican Border.

On December 16, light haze prevailed throughout the area covered from Ano Nuevo Point to Ventura, Calif. A total of 11 northern anchovy (Engraulis mordax) schools were noted at scattered localities north of Point Conception. The two largest schools were in Monterey Bay and were being preyed upon by sea birds. On the first day 37 sea lions were counted--25 in Monterey Bay and 12 off Point San Luis.



Pelagic fish survey flight 63-12.

The area from Ventura to the United States-Mexican Border was scouted on December 17. The waters from Sunset Beach to Dana Point were completely obscured by a dense, low fog bank. Light haze persisted in the remainder of the area. A total of 87 anchovy schools, 1 gray whale, 6 small Pacific sardine (Sardinops caeruleus) schools, and from 8 to 12 California yellowtail (Seriola dorsalis) were sighted. The largest concentration of anchovies was a group of 58 schools extending southward from San Clemente City for about 5 miles. Off Point La Jolla six "tightly-balled" schools of sardines were being "worked" by sea birds, sea lions, and yellowtail. Several party boats were fishing in that area.

Note: See Commercial Fisheries Review, February 1964 p. 12.

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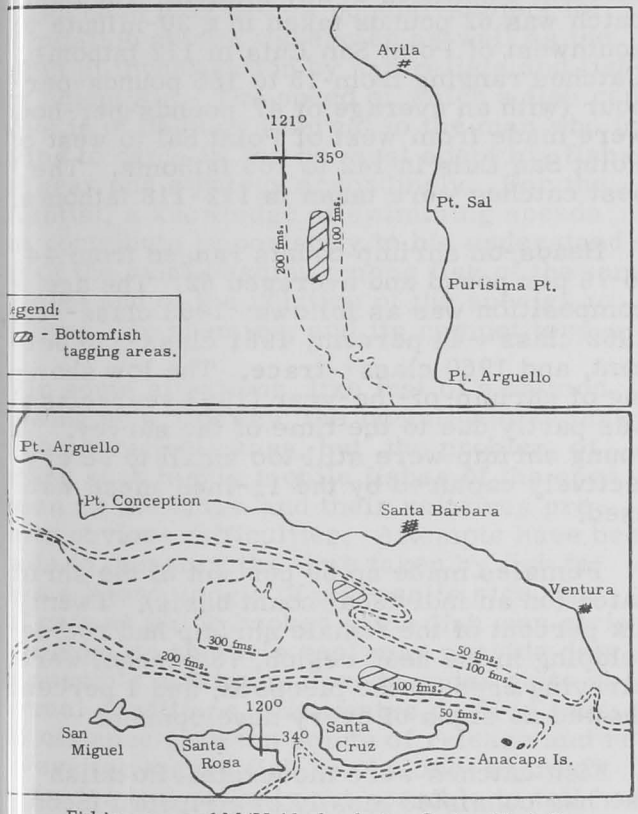
OTTOMFISH STUDY IN
OUTHERN COASTAL WATERS:
M/V "Alaska" Cruise 63-A-9 (December 3-
, 1963): The main objectives of this cruise
southern California coastal waters by the
lifornia Department of Fish and Game re-
arch vessel Alaska were to: (1) locate and
petrale sole (Eopsetta jordani) and Eng-
h sole (Parophrys vetulus) for growth and
gration studies; and (2) collect greenspot-
rockfish (Sebastodes chlorostictus) and
k rockfish (S. eos) for taxonomic studies.



Fishing areas of M/V Alaska during Cruise 63-A-9.

POINT SAL TO POINT ARGUELLO: Twen-
-nine tows were made in depths of 120 to 150
thoms in this area. From those tows, 184
trale sole and 2 English sole were tagged.

SANTA BARBARA CHANNEL: Two days
ere spent collecting greenspotted and pink
ckfish by hook-and-line and long-line gear
50 to 160 fathoms near Anacapa Island.

Nineteen otter-trawl tows were made in 50
260 fathoms. The tows produced 113 Eng-
sh sole and 4 petrale sole for tagging.

Cephalopods, shells, and unusual fish were
llected for special studies.

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DUNGENESS CRAB SURVEY IN
NORTHERN COASTAL WATERS:

M/V "N.B. Scofield" Cruise 63-S-8 (November 10-December 9, 1963): The objectives of this cruise by the California Department of Fish and Game research vessel N. B. Scofield in coastal waters between Point Arena, Calif., and Cape Ferrelo, Oreg., were to: (1) survey dungeness crab (Cancer magister) stocks off northern California to determine abundance, distribution, sex ratios, and condition; and (2) obtain information for crab life-history studies.

OPERATIONS: Ten commercial crab traps were fished overnight at 90 randomly selected stations in productive crab areas between Usal, Calif., and Cape Ferrelo, Oreg. Crab shoulder widths were recorded for the entire catch. Shell condition determinations were made for all males of legal size (7 inches or more in breadth).

Ocean shrimp (Pandalus jordani) were taken with a 41-foot head rope Gulf of Mexico otter trawl for abundance studies.

RESULTS: Of the 900 crab traps set, 5 were lost. The crab catch in the remaining 895 traps consisted of 2,142 legal-size males, 6,127 sublegal males, and 510 females. The average catch of legal and sublegal males were 2.4 and 6.8 per trap, respectively. The most productive area was between False Cape and Mad River where at 29 stations the average trap catch of legal males was 4.2 crabs. The best station catch occurred off Usal where 14.5 legal-size crabs per trap were taken.

Crabs of legal size were in good condition as only 77 (3.6 percent) were soft. The mean shoulder width of legal-size males was 166 millimeters.

The forecast for the 1963/64 northern California crab season, based on those results, is for a catch between 1.2 and 1.8 million pounds with 1.5 million as the most likely poundage. This is above the northern California crab catch in 1962/63, but far below the long-term average.

Mating activity, as evidenced by mating marks, was noted for those males at 114 millimeter shoulder width and larger. Those crabs had not undergone a recent molt. Three percent of the legal males and 11.5 percent of the sublegal males had mating marks.

Of the 510 females, 265 (52 percent) had eggs in early and intermediate stages of develop-

ment. Twenty-five live egg-bearing female crabs were retained for fertility and fecundity studies.

Note: See Commercial Fisheries Review, Oct. 1963 p. 16. and March 1963 p. 20.

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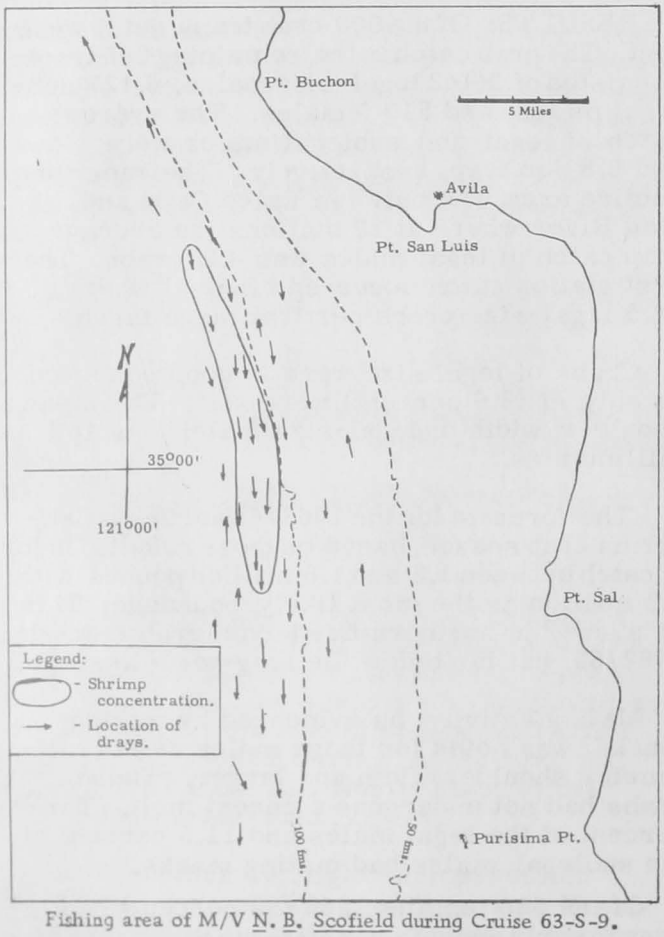
SHRIMP DISTRIBUTION SURVEY CONTINUED:

M/V "N. B. Scofield" Cruise 63-S-9 (December 12-20, 1963): The main objectives of this cruise by the California Department of Fish and Game research vessel N. B. Scofield off southern California were to:

(1) Locate concentrations of pink shrimp (Pandalus jordani), to determine population estimates and natural mortality rates;

(2) Determine size, sex, and weight of shrimp;

(3) Make bathythermograph and Nansen bottle casts to obtain bottom temperatures and water samples in both producing and non-producing shrimp areas;



Fishing area of M/V N. B. Scofield during Cruise 63-S-9.

(4) Count and weigh species of incidentally caught fish; and

(5) Save all cephalopods, rare fish, and invertebrates for the California State Fisheries Laboratory at Terminal Island.

Off southern California between Purissima Point and Point Buchon, forty 20-minute tows were made with a 41-foot head rope. Gulf of Mexico otter trawl ($1\frac{1}{4}$ inch mesh) in 60 to 159 fathoms. Shrimp were not caught in commercial quantities at any station. The best catch was 62 pounds taken in a 20-minute tow southwest of Point San Luis in 112 fathoms. Catches ranging from 15 to 186 pounds-per-hour (with an average of 47 pounds-per-hour) were made from west of Point Sal to west of Point San Luis in 142 to 105 fathoms. The best catches were taken in 112-118 fathoms.

Heads-on shrimp counts ranged from 44 to 76 per pound and averaged 62. The age composition was as follows: 1963 class--trace, 1962 class--44 percent, 1961 class--56 percent, and 1960 class--trace. The low showing of shrimp-of-the-year (1963 year-class) was partly due to the time of the survey. The young shrimp were still too small to be effectively captured by the $1\frac{1}{4}$-inch mesh net used.

Females made up 60 percent of the shrimp catch (on an individual count basis). Twenty-six percent of the female shrimp had roe developing in the head region, 73 percent were carrying eggs on the pleopock, and 1 percent showed no signs of ovary development.

Fish catches were moderate. Rockfish catches consisted mostly of stripetail (Sebastodes saxicola) and splitnose (Sebastodes diploproa). Flatfish catches were light. The most abundant species were rex sole (Glyptocephalus zachirus) and slender sole (Lyopsetta exilis). Other commonly caught fish were hake (Merluccius productus), sablefish (Anoplopoma fimbria), dogfish (Squalus acanthias), sea poachers (Agonidae), and eelpouts (Zoarcidae).

Bathythermograph casts were taken at 21 stations and bottom water samples for salinity determinations were obtained from 5 stations. Surface temperatures ranged from 13.7° to 14.9° C. (56.6° to 58.8° F.) and averaged 14.1° C. (57.4° F.). Bottom temperatures were obtained from depths ranging from 61 to 137 fathoms. Temperatures ranged

om 7.5° to 11.5° C. (45.5° to 52.7° F.) and eraged 8.7° C. (47.7° F.) at an average pth of 97 fathoms.

te: See Commercial Fisheries Review, December 1963 p. 21.

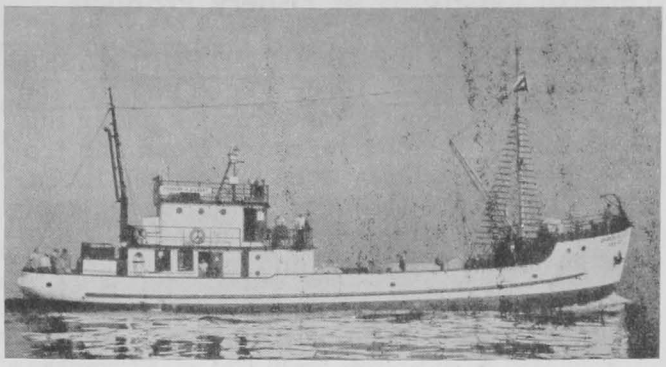
ntral Pacific Fisheries Investigations

EED AND SWIMMING
FORT OF TUNAS STUDIED:

The swimming speeds of various species fish have long been a popular subject for culation among fishermen as well as the ject of investigation by naturalists and fish- scientists. The speed at which a fish can ve is of obvious interest to the man who is ing to catch it, for he must adapt his fish- gear and strategy accordingly. For the ientist, a knowledge of swimming speeds n contribute importantly to his understand- of the relationships among fish of the same ecies and of the relation of the species to s prey, its enemies, and its competitors.

In some situations, like that of a salmon ssing up a fishway, the investigator's task comparatively easy, but the problem of ning such highly mobile fishes of the open ean as the tunas and their relatives pre- nts obvious difficulties. Attempts have been ade to measure the time taken by fish to ss a known length of a vessel's side, and e rate at which hooked game fish can strip e from an angler's reel may provide data possible maximum speeds under quite ab- rmal conditions. Estimates derived from e distance between points of release and re- very for tagged fish can be only approxi- te, for it is usually not possible to tell how ect a course the fish may have taken. The ures recorded in the scientific literature y widely for the same species, and for such pressively streamlined and obviously speedy hes as the tunas the estimates offered often pear unreasonably high.

Scientists of the U.S. Bureau of Commer- l Fisheries Biological Laboratory at Hon- lu have recently succeeded, through the use new observational techniques, in not only tting precise measurements of the swimming eeds of tuna but also relating to swimming fort. Motion pictures were taken (from the derwater viewing ports in the hull of the



The Service's research vessel Charles H. Gilbert.

Bureau's research vessel Charles H. Gilbert) of skipjack and yellowfin tuna attracted to the vessel by chumming with live bait. Projection of the pictures on the screen of a microfilm reader made it possible to plot the paths of individual tuna. The distances traveled by the fish were measured from the plots, and speeds were then calculated from the constant rate at which the camera exposes successive frames of film.

Skipjack tuna were recorded swimming at speeds from 4.5 miles per hour to a maximum of 13.1 miles per hour. Those fish averaged about 22 inches in length and would weigh about 9 pounds, which is a medium size for that species. Yellowfin tuna were photographed at speeds ranging from 4.2 miles per hour to 11.4 miles per hour. They were 20-inch or $5\frac{1}{2}$-pound fish which is considered small for that species as yellowfin tuna grow to a weight of 150 pounds or more.

The motion picture technique made it possible to count the tail beats of individual tuna and relate them to the resulting speed of forward movement. It was found that 3 tail beats per second in the skipjack moved the fish at 4.5 miles per hour, while 11 tail beats per second produced a speed of 9.3 miles per hour. Yellowfin appeared to propel themselves slightly more efficiently, getting 4.2 miles per hour from only 2 beats per second and a fast 11.4 miles per hour from 11 beats. When additional data on this relationship between propulsive movements and resulting speed have been accumulated for other sizes and species of tuna, it will be interesting to compare them in the light of what is known about the body form and behavior of the tunas.

Federal Purchases of Fishery Products

DEPARTMENT OF DEFENSE PURCHASES:

January-August 1963: Fresh and Frozen: For the use of the Armed Forces under the Department of Defense, more fresh and frozen fishery products were purchased in August 1963 by the Defense Subsistence Supply Centers than in the previous month. The increase was 1.8 percent in quantity and 18.8 percent in value.

Table 1 - Fresh and Frozen Fishery Products Purchased by Defense Subsistence Supply Centers, August 1963 with Comparisons

QUANTITY				VALUE			
August		Jan.-Aug.		August		Jan.-Aug.	
1963	1962	1963	1962	1963	1962	1963	1962
(1,000 Lbs.)				($1,000)			
1,989	2,078	15,820	16,112	1,182	1,592	8,950	9,673

Compared with the same month a year earlier, purchases in August 1963 were down 4.3 percent in quantity and 25.7 percent in value. Purchases in August 1963 included 780,922 pounds of shrimp, 281,093 pounds of ocean perch fillets, 236,285 pounds of scallops, 195,740 pounds of flounder fillets, 135,036 pounds of haddock fillets, 124,844 pounds of halibut, and 95,789 pounds of oysters, as well as substantial quantities of cod fillets and fish sticks.

Although not included in the data shown in table 1, a total of 32,900 pounds of freeze-dried fish squares valued at $164,130 were purchased in August 1963 for the use of the Armed Forces. It has been reported that the Defense Subsistence Supply Centers have been purchasing freeze-dried fish squares for about three years. The squares are prepared from cod and haddock portions and are distributed in number 10 cans.

Table 2 - Canned Fishery Products Purchased by Defense Subsistence Supply Centers, August 1963 with Comparisons

Product	QUANTITY				VALUE			
	August		Jan.-Aug.		August		Jan.-Aug.	
	1963	1962	1963	1962	1963	1962	1963	1962
	(1,000 Lbs.)				($1,000)			
Tuna	-	-	2,064	3,708	-	-	1,007	2,062
Salmon	-	-	18	1,016	-	-	12	638
Sardine	11	1	332	54	4	1/	135	27

1/Less than $500.

Canned: Purchases of canned fishery products for the use of the Armed Forces were light in August 1963.

* * * * *

January-September 1963: Fresh and Frozen: For the use of the Armed Forces, less fresh and frozen fishery products were purchased in September 1963 than in the previous month. The decline was 6.8 percent in quantity and 16.1 percent in value.

Table 1 - Fresh and Frozen Fishery Products Purchased by Defense Subsistence Supply Centers, September 1963 with Comparisons

QUANTITY				VALUE			
September		Jan.-Sept.		September		Jan.-Sept.	
1963	1962	1963	1962	1963	1962	1963	1962
(1,000 Lbs.)				($1,000)			
1,853	1,822	17,673	17,934	992	1,302	9,942	10,975

Compared with the same month a year earlier, purchases in September 1963 were up 1.7 percent in quantity but down 23.8 percent in value. Purchases in September 1963 included 553,250 pounds of fresh shrimp, 348,026 pounds of ocean perch fillets, 175,457 pounds of scallops, 171,052 pounds of halibut, 165,663 pounds of flounder fillets, 143,107 pounds of haddock fillets, and 125,945 pounds of oysters, as well as considerable quantities of sole fillets, cod fillets, fish sticks, clams, and headed and gutted whiting.

During the first 9 months of 1963, fresh and frozen purchases were down 1.4 percent in quantity and 9.4 percent in value from those in the same period of the previous year.

Table 2 - Canned Fishery Products Purchased by Defense Subsistence Supply Centers, September 1963 with Comparisons

Product	QUANTITY				VALUE			
	September		Jan.-Sept.		September		Jan.-Sept.	
	1963	1962	1963	1962	1963	1962	1963	1962
	(1,000 Lbs.)				($1,000)			
Tuna	647	-	2,711	3,708	290	-	1,297	2,062
Salmon	12	-	30	1,016	8	-	20	638
Sardine	43	11	375	65	15	4	150	31

Canned: Tuna was the principal canned fishery product purchased in September 1963 for the use of the Armed Forces. Purchases of the 3 principal canned fishery products (tuna, salmon, and sardines) in the first 9 months of 1963 were down 34.9 percent in quantity and 46.3 percent in value from those in the same period of the previous year. The decline was due to lower purchases of canned tuna and salmon.

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

(2) See Commercial Fisheries Review, January 1964 p. 9.

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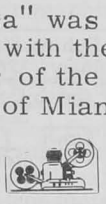
EW OCEANOGRAPHIC FILM SHOWS ORK OF MARINE SCIENTISTS:

A new oceanographic motion picture color im, "The Restless Sea," was shown over BC-TV on January 24, 1964. The hour-long im (the latest in the Bell System Science ries) describes the work of oceanographers searching out the complex relationships of ure in the sea.

The film combines photographed action h above and below the surface of the sea. filmed and animated sequences, it illus- tes the work of marine scientists in search- out the interwoven relationships of ani- ls and plants in the oceans. A number of interesting sequences include such sub- ts as hurricanes and mountainous waves; imal life from plankton to sharks to whales; dern scientific instruments that probe the ths to obtain a record of early life on rth; and the latest oceanographic research ssels consisting of both surface ships and dersea vehicles.

"The Restless Sea" was produced by Walt sney Productions with the technical assist- e of the Director of the Institute of Marine ience, University of Miami.



eat Lakes Fishery Investigations

ITEFISH SPAWNING SURVEY WESTERN LAKE SUPERIOR:

M/V "Siscowet" Cruise 10 (November 18- ember 17, 1963): The assessment of spawn- whitefish in western Lake Superior was primary objectives of this cruise by the S. Bureau of Commercial Fisheries research sel Siscowet. Large-mesh gill nets ($4\frac{1}{2}$-to nch mesh, stretched measure) fished on wning grounds off the north end of Cat Is- d yielded 214 whitefish (171 males and 43 ales) ranging from 17.2 to 32.0 inches long erage of 19.5 inches).

The total number of fish caught and the ch per unit-of-effort was the highest since essment studies began in 1958. Nearly all he fish were tagged and released. Seven itefish, recaptured by commercial fisher- n and by the Siscowet, had returned to wn on the same grounds where they were ged during the 1962 spawning run. Small-mesh gill nets fished on the whitefish spawning grounds caught predominately round whitefish and longnose suckers, and smaller numbers of lake herring. Water temperatures on the whitefish spawning grounds ranged from 45° to 47.5° F.

Other activities during this cruise included the collection of fertilized eggs from lake whitefish, round whitefish, and "bloater" chubs for studies of embryonic and larval development, and the collection of blood samples from eight species for electrophoretic and serological studies.

During the 1963 field season, the Siscowet caught 2,522 juvenile lake trout (1,511 in bottom trawls and 1,011 in experimental gill nets), of which 97 percent were fin-clipped. Most common in the trawl catches were lake trout planted at Bayfield, Wis., in the spring of 1962-63; gill nets caught predominately fish from the 1960-61 Bayfield plants. The survival of lake trout planted in 1960-62 appears to be better than for fish stocked in 1959 or 1963.

Gulf Fishery Investigations

Some of the highlights of studies conducted by the Galveston Biological Laboratory of the U. S. Bureau of Commercial Fisheries during October-December 1963:

SHRIMP FISHERY PROGRAM: Shrimp Larvae Studies: On three occasions, spawn were obtained from ripe female brown shrimp (Penaeus aztecus) held in the laboratory. In 1 instance, the developmental sequence of the resulting larvae was carried as far as the mysis stage, and in 2 others to the postlarval stage. Specimens of all stages were preserved for descriptive purposes. During the last experiment, the following variables or conditions were observed for their effect on rearing success:

(1) Media--eggs were spawned and hatched in bay water with a salinity of 28‰ (parts per thousand). The larvae were then isolated and held in vitamin-enriched (offshore) sea water with a salinity of 36‰ to 38‰ (parts per thousand). Water was changed daily.

(2) Antibiotics--a combination of penicillin and dihydrostreptomycin was added to the water in which the ripe females were held. The treatment depressed the level of undesirable organisms until after hatching took place.

(3) Temperature--eggs were spawned and hatched at 25° C. (77° F.). The resulting larvae were isolated and maintained at 30° C. (86° F.).

(4) Rearing Containers--eggs were spawned and hatched in fiberglass aquaria holding 80 liters of water.

For rearing, units of 30 specimens of Nauplius I were placed in 250-milliliter beakers containing approximately 100 milliliters of medium. When the larvae reached the second protozoeal stage their numbers were reduced to 10 per beaker.

(5) Feeding--during the initial feeding stage, i.e., Protozoea I, the larvae were fed diatoms (Skeletonema sp.). Newly hatched brine shrimp (Artemia sp.) nauplii were added when the second protozoeal stage was reached. The Skeletonema was eliminated from the diet at the first postlarval stage.

Excluding preserved specimens, the survival rate was 19 percent from the first nauplial through the first postlarval stage. With slight modifications in rearing procedure, an improvement in survival rate may be possible in the future. Approximately 60 brown shrimp postlarvae obtained from the rearing trials are being maintained in the laboratory. A single juvenile rock shrimp (Sicyonia brevirostris) reared from a spawn in the spring of 1963 was still surviving in late 1963.

Distribution and Abundance of Larvae: Examination of 47 plankton samples collected outside the $7\frac{1}{2}$-fathom contour line between Galveston and Brownsville, Tex., in December 1962 showed that penaeid larvae and postlarvae were distributed over the entire sampling area. In December 1962, plankton tonic stages were 3 to 16 times more abundant at the 25-, 35-, and 60-fathom stations than at the 15- and 45-fathom stations. None were encountered at the $7\frac{1}{2}$-fathom stations.

In November 1963, an effort was made to gain additional information on the vertical distribution of penaeid larvae and postlarvae. The findings differed markedly from those obtained during the summer of 1963 when the resulting data indicated that, although the greatest concentrations of all penaeid planktonic stages occurred at and below mid-depth (18 meters), all stages tended to move upwards during the hours of darkness. This was not the case in November when all stages were evenly distributed throughout the water column regardless of the time of day. Temperature profiles taken during the 1963 summer studies indicated a vertically stable water mass with a well-developed thermocline, whereas in November 1963, an isothermal, mixed water mass prevailed. It is believed that the (vertical) mixing process overcame the ability or need of the organisms to respond to light changes.

Florida Bay Ecology Studies: Pink shrimp (Penaeus duoarum) habitat in eastern Florida Bay was surveyed with respect to water depth, bottom type, and submerged vegetation. This provided new insight into the types of sampling gear that will be required. Four types of stationary shrimp traps were field-tested in Florida Bay as well as in parts of Biscayne Bay. The traps varied from a small rectangular plexiglas model to a 3-foot square metal trap with a 24-foot plastic lead. All types captured shrimp in shallow-water areas. The key to successful sampling apparently is the proper design and setting of the trap lead.

In addition to traps, a sampler which removes all shrimp (or a constant known percentage) from a defined area of bottom is being investigated. Capturing all the shrimp contained within a specified sample area is difficult. Some shrimp may remain buried even at night. Two approaches to the problem are being explored. One entails enclosing the area and pumping all shrimp within it out of the bottom mud or sand into a screened container at the surface. A second approach involves enclosing the area and, by means of a built-in trap, removing all the shrimp enclosed. This procedure may necessitate using a repellent or attractant to get all the shrimp out of the mud and into the trap. Such "drop traps" can be fished overnight. Some success has been obtained with both methods and further developmental studies of the sampling techniques are planned.

Surveys of Postlarval Abundance and Fisheries for Bait (Juvenile) Shrimp: Rearing experiments were started during the fourth quarter of 1963 to determine the accuracy of present techniques for identifying postlarval shrimp. The regular semiweekly samples of postlarvae were preserved and identified. In addition, live postlarvae, taken at the same time and place, were reared to identifiable size in glass aquaria supplied with sea-water from a recirculating system. Three such rearing experiments were completed. In each instance there was a discrepancy of less than 5 percent between the identification of the field-preserved postlarvae and those reared to the juvenile stage in the laboratory.

As usually happens late in the year, the number of postlarvae in sample catches declined rapidly during the fourth quarter of 1963.

The catch composition of juvenile shrimp from Galveston Bay indicated that brown shrimp juveniles left the bays earlier in 1962 than in 1963. Commercial bait shrimp production in the Galveston Bay area during November 1963 was down sharply from that in the same month in 1962, while fishing effort showed an increase in November 1963.

Shrimp Catch and Fishing Effort in Galveston Bay Bait Fishery, 1962-1963

Month	Year	Catch	Catch Composition		Fishing Effort	Average Catch Per Hour
			Shrimp			
			Brown	White		
		Lbs.	. . . (Percent) . . .		Hrs.	Lbs.
October	1963	178,900	20	80	5,210	34.3
	1962	160,200	10	90	3,450	46.4
November	1963	32,300	5	95	1,440	22.4
	1962	93,500	1	99	1,740	53.7
December	1963	1/	1/	1/	1/	1/
	1962	31,400	0	100	420	74.8

1/Not yet available.

Migrations, Growth, and Mortality of Brown and White Shrimp: Of the 4,801 stained and 1,208 tagged brown shrimp released on the bottom in 5 to 8 fathoms off the Mississippi coast in June 1963, a total of 421 (9 percent) stained shrimp and 63 (5 percent) tagged shrimp were recovered by the end of 1963. More than 91 percent of the recaptured shrimp had moved less than 30 miles. The greatest movement was about 85 miles from Horn Island to Southwest Pass, the most westerly of the several mouths of the Mississippi River. Appreciable offshore movement was not apparent, as only 9 percent of the returned shrimp were captured beyond the 11-fathom depth contour and less than 1 percent beyond 16 fathoms.

Analysis of the length-at-recapture data revealed a difference between the growth rates of males and females. The data showed that during the summer, the marked males increased in size from 115 millimeters or 59 count heads-off per pound to 131 mm. (38 count) and the marked females increased in size from 115 mm. (59 count) to 135 mm. (35 count) in 4 weeks.

In August 1963, a total of 3,016 brown shrimp were stained and released in the 10- to 12-fathom range off

ransas Pass, Tex. Of those, 58 have been returned. ost of the recoveries were made inside the 15-fathom ntour and within 30 miles of the release area. The ngest movement recorded was 65 miles in a southerly rection.

Returns from the white shrimp mark-recapture exriment undertaken in Galveston Bay in August 1963 pear to be complete with 411 (13 percent) of the 3,115 ned individuals having been recovered through Ocber 1963. There did not appear to be any seaward vement of the marked group. Most of the shrimp e recovered in the upper portion of the Bay where y were released, and none were recovered in the lf of Mexico. Those recoveries are providing the st current estimates of growth for this species. ngth-at-age data reveal that during the August-Septber 1963 period the experimental shrimp increased size from 99 mm. (98 count) to 134 mm. (39 count) 4 weeks.

Population Dynamics: One of the objectives of the rk is to increase, through more accurate knowledge fishing intensity, the reliability of mortality coefficents estimated from mark-recapture experiments. us, when the relative fishing power of vessels conituting a fleet is known, statistics of time spent fishg can be adjusted to standard units of fishing intensity ich, in turn, bear a constant (theoretical) relationip to resulting mortality coefficients. A considerable lume of data from the two areas has been collected d is being prepared for machine processing.

CONTRACT RESEARCH: Abundance and Distribun of Pink Shrimp Larvae on the Tortugas Shelf: ankton samples were collected with a 3-inch centrifal pump from Buttonwood Canal at Flamingo, Fla. addition, plankton were sampled at each of 10 stans during 3 research cruises on the Tortugas Shelf. his research is being conducted by the University of ami under contract.)

Analysis of postlarval data from Buttonwood Canal mples followed and a summary of results was pred. Generally speaking, peak influx (abundance) of stlarvae always occurred in association with flood es; smaller peaks were frequently observed during tides. That relationship held during all lunar stages, lough the greatest numbers of postlarvae were taken ring new-moon phases. The data also suggest that, ring the annual cycle in 1962-1963, there occurred peaks in the movement of postlarvae into the Whiter Bay estuarine complex via Buttonwood Canal. A all peak appeared in late January and early February 3, followed by a larger peak which extended over the iod July-October 1963. Some postlarvae enter the hitewater Bay nursery grounds during each month of e year, but there may be a seasonal variation in the e, or at least in the stage of development, at which ey do so. A stage (age) index based on the number of stral spines per individual postlarva was calculated r each series of samples. Index analysis indicated at the February postlarvae were the least advanced development and that the stage of development at try increased steadily from July through September.

Juvenile Phase of the Life History of the Pink Shrimp Everglades National Park (Fla.) Nursery Grounds: uring the period October 19-December 19, 1963, a tal of 14 nights of sampling yielded 96 collections with e channel net and 80 with the wing nets. A comparison simultaneous catches revealed that the ratio of the number of juvenile shrimp caught in the wing nets to that of individuals caught in the channel net varied considerably. Because of inconsistent results, the channel net remains the primary sampling device while possible sources of sampling variation (in the case of the wing nets) are being explored. (This research is being conducted by the University of Miami under contract.)

Abundance of Postlarval Shrimp in Mississippi Sound and Adjacent Waters: Sampling for the occurrence and abundance of postlarval shrimp continued at 18 stations in Mississippi Sound. In October 1963, postlarval pink shrimp were found to be more numerous than either white or brown shrimp postlarvae. Thereafter, each of the three species declined in abundance and were absent from collections made in mid-December. The decline of postlarvae appeared to precede extreme drops in water temperature. (This research is being conducted by Gulf Coast Research Laboratory under contract.)

Seasonal Distribution of Postlarval Shrimp in Vermilion Bay (La.): Regular sampling at 4 weekly and 4 biweekly stations in Vermilion Bay continued. The number of white shrimp postlarvae per collection gradually declined during October 1963 with the last one appearing in a sample taken on November 2. Brown shrimp postlarvae were not found at any station after October 26, 1963. No pink shrimp postlarvae were taken during the quarter. (Southwestern Louisiana University is conducting the research under contract.)

Seasonal Distribution Patterns of Adult and Larval Shrimp in Aransas Pass (Tex.) Inlet: The tide trap was operated at or near maximum flood and ebb tides approximately three times per week throughout the quarter. Although large numbers of marine organisms were captured, few penaeid shrimp were encountered. Immediately after the passage of cold fronts, trap catches of all organisms increased greatly during ebb tides. Apparently, concomitant low tides and low water temperatures cause a mass exodus of organisms from the shallow bays, through the Aransas Pass Inlet, into the deeper shelf waters of the Gulf of Mexico.

Separation, classification, and enumeration of organisms in plankton samples from the Aransas Pass study area were accelerated. Average numbers of brown and pink shrimp larvae were calculated for all stations, depths, and sampling times within each sampling period. In general, brown shrimp postlarvae were more abundant during the late spring months while pink shrimp postlarvae were most numerous during late summer. Very few white shrimp postlarvae were taken. No larval or postlarval shrimp were found in the plankton samples from about October 1 until December 6, 1963, when a sample containing a few pink shrimp postlarvae was obtained. The occurrence of brown shrimp postlarvae could not be correlated with any recorded environmental or temporal variation such as tidal stage or time of day. Pink shrimp postlarvae always occurred in greatest numbers during highest flood tides regardless of the time of day. (This research is conducted by Texas Institute of Marine Science under contract.)

ESTUARINE PROGRAM: Ecology of Western Gulf Estuaries: Biological and hydrological sampling in the Galveston Bay system continued without interruption during the quarter. The second series of bottom fauna samplings, which included the identification and enumeration of all sample specimens, was completed. An investigation of the relationships between the distribution and abundance of bottom organisms and variations in

temperature, salinity, and bottom type was begun. In conjunction with the description of bottom types, an analysis of bottom sediments was almost completed. Checklists of the fish, shrimp, and crabs inhabiting the Galveston Bay system are being prepared. Researchers have identified 104 fish, 13 shrimp, 27 crab, and 34 mollusc species collected since January 1963. Previous literature is being reviewed to provide as complete a species list as possible. A reference collection of typical specimens has been established.

Due to the heavy rainfall accompanying the passage of Hurricane Cindy slightly northeast of the Galveston area on September 17, 1963, salinity was temporarily reduced throughout most of the Bay system and in the Gulf of Mexico near the Bay entrance jetties and in the entrance itself. Reductions of as much as 10 ‰ (parts per thousand) were noted in upper East Bay. The salinity in Trinity Bay, however, increased and remained abnormally high. In general, salinity during the fourth quarter of 1963 was lower at the Gulf of Mexico stations and in Galveston Entrance than during the previous quarter, and higher in the Bay system, with the exception of East Bay which was nearest the hurricane's path.

White shrimp, sand seatrout, and bay anchovy continued as the predominant species. Young-of-the-year Atlantic croakers began appearing in November 1963 with their numbers increasing in December. A decline in the number of brown shrimp and blue crabs was noticeable at the onset of cooler temperatures in November and December. White shrimp abundance also declined rapidly with a lowering of the water temperature during the latter half of December.

Between December 3 and 5, 1963, with the water temperature averaging 14.1° C. (57.4° F.), small white shrimp were caught at 60 of 64 stations at the rate of 38 individuals per 5 minutes of trawling with a 10-foot net. Only 8 percent of those shrimp were caught at stations located in deep channels. On December 20, at which time the water temperature averaged 8.3° C. (46.9° F.), the same species was collected at only 18 (mostly deep-water) stations at the reduced rate of 12 per 5 minutes of trawling. A limited amount of sampling activity 3 days later (December 23), when the water temperature reached a low of 2.0° C. (35.6° F.), yielded no shrimp. At that time numerous stunned and dead fish were observed and caught, including spotted seatrout, redfish, menhaden, croaker, black drum, and mullet. Neither the extensiveness nor severity of the mass mortality could be determined. Low temperatures occurred almost a month earlier this winter than last. In the previous winter (1962/63), comparable low temperatures were not recorded until the latter half of January. Last winter, white shrimp were also plentiful in the Bay system just prior to the onset of cold weather, but then virtually disappeared; and, although numerous stunned fish were also observed and collected in the previous winter, there was no indication that the low temperature had caused any mortality.

Effects of Engineering Projects: A study is being made of the possible effects of the Texas Basins Project on the fishery resources. This major project includes proposals to construct numerous upland reservoirs as well as a water transport canal to divert the flow of principal streams in water-rich east Texas to arid portions of southwest Texas. Such a plan would greatly reduce tributary inflow into most Texas estuaries. During drought years, this reduction could become critical, especially in view of other water demands which are expected in the future. Thus, from the standpoint of lowering the quality of fishery resource habitat, the proposed Texas Basins Project would compound an already critical problem.

Data thus far analyzed include, for the years 1956-1963, monthly fresh-water discharges from major rivers and streams, and the quantity as well as value of inshore and offshore harvests of fish and shellfish. Preliminary inspection of the data indicates a definite relationship between river discharge and shrimp harvest in the estuaries of eastern Texas. The data for west Texas estuaries and for fishery resources other than shrimp have not yet been analyzed.

INDUSTRIAL FISHERY PROGRAM: Life Histories of Central Gulf Bottomfish: Sampling of Atlantic croaker has been expanded to include juvenile specimens from Mobile Bay, Ala., and adult fish from the northern Texas Gulf coast.

Analysis of data on the length, age, sex composition and reproductive status of croaker stocks was continued at an accelerated pace.

Distribution and Abundance of Western Gulf Bottomfish: In mid-fall 1963, information on the diurnal variation in the size and composition of sample bottomfish catches was obtained during a special cruise by a chartered research vessel. Results of comparative trawl hauls just above as well as on the bottom revealed, as in previous trials, day-night differences in the catchability of Atlantic croaker by bottom trawls. During periods of the day when trawling on the bottom proved ineffective, relative catches of that species increased measurably upon raising and fishing the trawl a short distance off the bottom. Sample catches of butterfish yielded similar results. The longspine porgy, though very abundant at one of the sampling depths, failed to exhibit diurnal variation in its catchability.

To facilitate night observations in a study concerning the diurnal activity of an experimental group of Atlantic croakers, a system of red floodlights was installed in a recirculating sea water system reservoir especially modified for such work.

SEA-WATER LABORATORIES: Facilities of the recirculating sea water system are being successfully used for experiments which involve raising to an identifiable size shrimp larvae hatched from eggs of known parentage. Experiments are also under way to determine if the stingray (Dasyatis sabina) is the final host of a parasitic cestode known to infect certain shrimp. In addition, researchers from the University of Texas School of Medicine are employing the facility to conduct experiments dealing with various aspects of the biochemical basis of learning in fish.

Toward the end of 1963, plans were almost completed for a long-term experiment to determine the physiological effects (if any) of marking-stains on shrimp.

BIOLOGICAL INDICATORS IN EAST LAGOON: Oyster growth experiments employing specimens suspended in the lagoon at the laboratory site revealed that the maximum increase in weight occurred during October. The average gain in October 1963 was 12.7 grams. This dropped to 8.0 grams in November, and to 4.0 grams during December. The average growth increments of oysters held in the laboratory itself, i.e., in a tank receiving the initial discharge from a circulation pump, were 2.0, 2.0, and 2.5 grams, respectively, for the same 3 months.

Note: See Commercial Fisheries Review, December 1963 p. 28.

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SKIPJACK TUNA LANDINGS, 1963: Skipjack tuna landings in Hawaii in Decem- 1963 were estimated to be about 200,000 nds--35,000 pounds below the 1948-62 nthly average for that month. The total ch of skipjack tuna in 1963 was estimated 8,245,000 pounds, or 1,627,000 pounds be- the 1948-1962 annual average for the same od.

In December there were 54 productive s, giving an average of 1,871 pounds per uctive trip. Individual catches ranged n 45 pounds to 6,975 pounds.

dustrial Fishery Products

U.S. FISH MEAL, OIL, AND SOLUBLES: Production, December 1963: Preliminary a on U.S. production of fish meal, oil, and ubles for December 1963 as collected by U.S. Bureau of Commercial Fisheries and mitted to the International Association of h Meal Manufacturers are shown in the le.

U.S. Production[1/] of Fish Meal, Oil, and Solubles, December 1963 (Preliminary) with Comparisons

a	Meal	Oil	Solubles	Homog-enized[3/]
	Short Tons	1,000 Pounds	(Short Tons)	
mber 1963:				
& Gulf Coasts	6,642	5,478	2,271	-
Coast[2/]	1,749	254	986	-
l	8,391	5,732	3,257	-
Dec. 1963 l	230,045	184,005	92,554	7,216
Dec. 1962 l	298,413	255,808	113,238	11,096

s not include crab meal, shrimp meal, and liver oils.
ludes American Samoa and Puerto Rico.
ludes consensed fish.
Beginning with March 1963 fish oil is shown in pounds in- d of gallons. Conversion factor, 7.75 pounds equal 1 gallon.

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roduction, November 1963: During November 1963, 6 tons of fish meal and 10.0 million pounds of oil were uced in the United States. Compared with November 1962, was an increase of 1,211 tons of meal and 1.8 million ds of oil. A total of 4,139 tons of fish solubles was pro- d in November 1963--slightly less than in November 1962.

ish meal production for January-November 1963 amounted 1,056 tons--74,674 tons less than in the same period of . Fish oil production for the first 11 months of 1963 unted to 178.0 million pounds--a decrease of 77.2 million ds. Fish solubles and homogenized condensed fish pro- on amounted to 94,398 tons--a decrease of 28,098 tons or ercent.

U. S. Production of Fish Meal, Oil, and Solubles, November 1963[1/] with Comparisons

Product	November		Jan.-Nov.		Total
	1/1963	1962	1/1963	1962	1962
	(Short Tons)				
Fish Meal and Scrap:					
Herring	-	35	7,283	5,070	5,095
Menhaden 2/	8,736	7,272	173,904	238,372	238,680
Sardine, Pacific	2/ 4	13	2/33	702	702
Tuna and mackerel	1,959	2,241	20,242	24,910	26,559
Unclassified	687	614	19,594	26,676	27,297
Total	11,386	10,175	221,056	295,730	298,333
Shellfish, marine-animal meal and scrap	3/	3/	3/	3/	12,899
Grand total meal and scrap	3/	3/	3/	3/	311,232
Fish Solubles:					
Menhaden	3,324	2,561	71,746	84,760	84,885
Other	815	1,714	15,428	26,772	28,353
Total	4,139	4,275	87,174	111,532	113,238
Homogenized condensed fish	-	544	7,224	10,964	11,096
	(1,000 Pounds)				
Oil, body:					
Herring	279	31	5,540	5,085	5,255
Menhaden 2/	9,195	7,612	159,694	237,746	237,815
Sardine, Pacific	-	-	2/ 6	166	167
Tuna and mackerel	425	475	5,275	4,832	5,175
Other (including whale)	108	136	7,457	7,300	7,396
Total oil	10,007	8,254	177,972	255,129	255,808

1/Preliminary data.
2/Includes a small quantity of thread herring.
3/Not available on a monthly basis.
Note: Beginning with February 1963, fish oil is shown in pounds instead of gallons. Conversion factor, 7.75 pounds equal 1 gallon.

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U.S. FISH MEAL AND SOLUBLES: Production and Imports, January-November 1963: Based on domestic production and imports, the United States available supply of fish meal for January-November 1963

U. S. Supply of Fish Meal and Solubles, January-November 1963 with Comparisons

Item	Jan.-Nov.		Total
	1/1963	1962	1962
	(Short Tons)		
Fish Meal and Scrap:			
Domestic production:			
Menhaden	173,904	238,372	238,680
Tuna and mackerel	20,242	24,910	26,559
Herring	7,283	5,070	5,095
Other	19,627	27,378	40,898
Total production	221,056	295,730	311,232
Imports:			
Canada	47,177	40,470	42,806
Peru	268,938	173,099	186,249
Chile	23,197	8,475	9,247
So. Africa Republic	9,374	9,984	10,084
Other countries	3,942	1,302	3,921
Total imports	352,628	233,330	252,307
Available fish meal supply	573,684	529,060	563,539
Fish Solubles:			
Domestic production 2/	94,398	122,496	124,334
Imports:			
Canada	1,902	1,236	1,335
Iceland	55	2,205	2,332
So. Africa Republic	191	1,717	1,717
Other countries	1,465	763	924
Total imports	3,613	5,921	6,308
Available fish solubles supply	98,011	128,417	130,642

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

amounted to 573,684 short tons--44,624 tons (or 8.4 percent) more than during the same period in 1962. Domestic production was 74,674 tons (or 25.3 percent) less, but imports were 119,298 tons (or 51.1 percent) higher than in the same period in 1962. Peru continued to lead other countries with shipments of 268,938 tons.

The United States supply of fish solubles (including homogenized fish) during January-November 1963 amounted to 98,011 tons--a decrease of 23.7 percent as compared with the same period in 1962. Domestic production and imports dropped 22.9 percent and 39.0 percent, respectively.

Maine Sardines

CANNED STOCKS, JANUARY 1, 1964:

Canners' stocks of Maine sardines on January 1, 1964, were 29,000 cases less than those on hand January 1, 1963, but were 919,000 cases above stocks on hand two years ago on January 1, 1962 (the pack for the 1961 season was unusually small).

A total of 60,000 cases or 23.0 percent of distributors' stock were held in warehouses of retail multiunit organizations on January 1, 1964, compared with 67,000 cases or 24.7 percent a year earlier.

The 1963 season pack totaled 1,584,000 standard cases, according to the Maine Sardine Council. On April 15, 1963, carryover stocks at the canners' level amounted to about 660,000 cases. Adding the 1963 season pack results in a total supply of 2,244,000 cases as of Jan. 1, 1964--up 4.4 percent from the total supply reported Jan. 1, 1963, and higher by 98.9 percent from the short supply of 1,128,000 cases as of Jan. 1, 1962. Shipments in 1963 from the start of the canning season amounted to 1,181,000 cases compared with 1,057,000 cases shipped in the previous year.

Table 1 - Canned Maine Sardines--Supply as of December 31, 1963, with Comparisons

Item	1963	1962	1961
	..... (Std. Cases 1/)		
Canners' carryover stocks on April 15 2/	660,000	33,000	457,000
Season pack 2/	1,584,000	2,117,000	671,000
Total supply at end of year	2,244,000	2,150,000	1,128,000

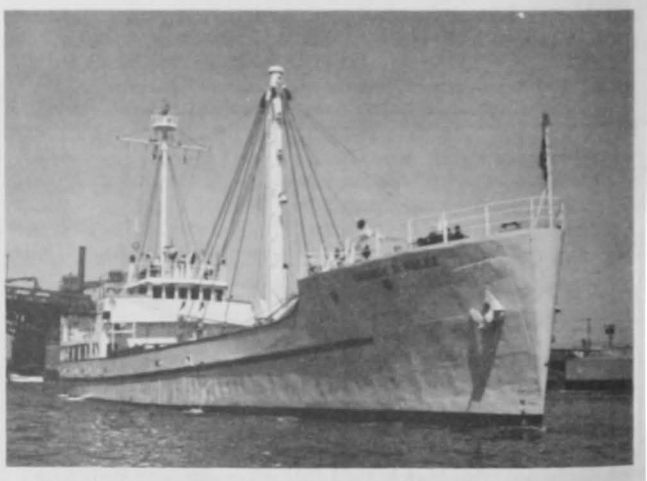
1/100 3¾-oz. cans equal one standard case.
2/The usual legal packing season in Maine, extending from April 15 to Dec. 1, was in effect during the 1961 and 1963 season. The 1962 season was extended to 13 months--Dec. 2, 1961-Jan. 1, 1963--but the 1962 pack canned before April 15 was insignificant.

North Pacific Fishery Investigations

JOINT UNITED STATES-CANADA SALMON RESEARCH IN NORTH PACIFIC:

A salmon winter research cruise into the North Pacific Ocean and Bering Sea during January-March 1964 was scheduled by the research vessel George B. Kelez (operated by the U. S. Bureau of Commercial Fisheries Biological Laboratory, Seattle, Wash.).

During the first part of the cruise the United States vessel was to operate jointly with



Research vessel George B. Kelez of the U. S. Bureau of Commercial Fisheries.

Table 2 - Canned Maine Sardines--Wholesale Distributors' and Canners' Stocks, January 1, 1964, with Comparisons 1/

Type	Unit	1963/64 Season		1962/63 Season					1961/62 Season				
		1/1/64	11/1/63	7/1/63	6/1/63	4/1/63	1/1/63	11/1/62	7/1/62	6/1/62	4/1/62	1/1/62	11/1/61
Distributors	1,000 actual cases	261	308	217	215	264	271	230	134	99	148	193	202
Canners	1,000 std. cases 2/	1,063	1,255	643	536	699	1,092	1,348	374	50	45	144	221

1/Table represents marketing season from November 1-October 31.
2/100 3¾-oz cans equal one standard case.
Note: Beginning with the Canned Food Report of April 1, 1963, U. S. Bureau of the Census estimates of distributors' stocks were based on a revised sample of merchant wholesalers and warehouses of retail multiunit organizations. The revised sample resulted in better coverage. The January 1, 1963, survey was conducted with both samples to provide an approximate measure of the difference in the two samples. That survey showed that the estimate of distributors' stocks of canned Maine sardines from the revised sample was 13 percent above that given by the old sample.
Source: U. S. Bureau of the Census, Canned Food Report, January 1, 1964.

e Canadian research vessel G. B. Reed in a lmon fishing and tagging operation covering e North Pacific Ocean between the North erican coast and longitude 180° and exding from the Alaskan coastline and Aleun Islands arc to approximately latitude 41° Following that phase of the cruise, the rge B. Kelez was to sail into the Bering and fish stations between longitudes 175° and 170° W. and extending north as far as ther and ice conditions permitted.

The research cruises of the United States Canada are part of a continuing study to ermine salmon distribution and abundance, ration routes during the winter months, to study ecological and oceanographic tors affecting salmon. The research vesls of both countries were to fish Japanese g-line gear to catch salmon for tagging. e United States also was to carry on comative fishing with gill nets.

The cruise of the George B. Kelez was to e about 2½ months with the vessel returnto her home port of Seattle about the end March.

trition

SEARCH PROGRAM ON COMPOSITION D NUTRITIVE VALUE OF HERY PRODUCTS:

Only very little documented information he composition and nutritive value of fish fishery products has been available. Such rmation would be valuable to scientists are planning programs of basic and apd fisheries research since much essenl information necessary for such problems ld be immediately at hand. Also, a knowle of the composition and nutritive value ld enhance the marketing of various spes of fish and shellfish. The American peo- have become increasingly diet conscious are demanding more knowledge on chotterol, vitamin, mineral, and caloric con- of various food items.

In view of this, the U. S. Bureau of Comrcial Fisheries early in 1963 initiated a search program on the composition and nutive value of fishery products. The pro- m is being conducted by scientists at the reau's Pascagoula Technological Laboray.

The following data is being accumulated on the composition and nutritive value of fish products: (1) Proximate composition (moisture, oil, protein, ash, carbohydrate), (2) Amino acid analysis, (3) Trace mineral content, (4) Vitamin content, (5) Essential fatty acids, (6) Sterols and phospholipids.

As the data is collected it will be the objective of the Pascagoula Technological Laboratory to set up an automatic data processing (ADP) center for assembling and making available information on the nutritive value of fishery products on a national scale. The availability of an ADP would add to the value of the data because it could be evaluated statistically as influenced by various factors. The principal factors involved in this study include: (1) influence of seasonal changes; (2) influence of geographical considerations; (3) influence of inter-species relationship; and (4) influence of type of tissue.

Another objective of the study is to publish a nutritive profile of each species of fish of major commercial importance, both in terms of 100 grams of meat and in terms of table portion size. This would be of considerable help to the dietician or housewife in preparing well-balanced meals.

Oceanography

INDIAN OCEAN EXPLORATIONS BY THE "PIONEER"

The U. S. Coast and Geodetic Survey research vessel Pioneer sailed from San Francisco, Calif., on February 11, 1964, for a six-months cruise in the Indian Ocean that will involve a traverse of more than 27,500 miles. The 312-foot oceanographic vessel is participating in the International Indian Ocean Expedition. This five-year study (1960-64), involving about 25 countries and 44 vessels, is sponsored by the United Nations Educational, Scientific, and Cultural Organization (UNESCO). One of the major objectives of the expedition is the location and subsequent development of new fisheries in the area.

The scientists aboard the Pioneer will study the Indian Ocean's physical, chemical, meteorological, geological, biological, and geophysical aspects. It is anticipated that a wealth of new knowledge will be accumulated.

Among the subjects of detailed exploration will be undersea canyons, including the Ganges Submarine Canyon in the Bay of Bengal and the Trincomalee Submarine Canyon off Ceylon. Elsewhere during the cruise, the Pioneer will study the deep trenches found en route, including the Java, Philippine, Palau, and Yap Trenches, as well as the Mariana Trench off Guam, the deepest spot on earth.

Scientists will chart the mountains and valleys of the ocean floor; photograph the bottom with deep-sea cameras; study its subsurface structure; and take samples of marine rocks and sediment. They will also measure the temperature of the water at various depths (five miles deep at some points), and will analyze its salinity and dissolved oxygen content. They will also record the surface and deep ocean currents. Particular study will be given to the interplay of winds and ocean currents and U.S. Weather Bureau specialists will compile data on the atmosphere above the ocean. Scientists are especially interested in the influence of the Asiatic monsoons on the surface currents of the Indian Ocean. (U.S. Coast and Geodetic Survey, February 9, 1964.)

SALMON EGG TAKE IN 1963 SETS NEW RECORD:

Over 100 million salmon eggs were taken by Oregon State hatcheries in 1963. This included 41,895,203 fall chinook, 18,033,515 spring chinook, 40,311,943 silver salmon, 344,898 chum salmon, and 694,385 steelhead eggs. The yield in 1963 surpassed the previous record in 1939 when 91 million salmon and steelhead eggs were taken for hatchery use. In the years since the end of World War II, the average annual Oregon State salmon egg take has been 43.5 million.

With the 1963 salmon egg take far exceeding the yearling rearing capacity of the 15 Oregon State Fish Commission hatcheries, 14.5 million silver salmon eggs and 8.6 million fall chinook eggs were transferred to other Agencies, including the Washington State Department of Fisheries, the U.S. Fish and Wildlife Service, the Idaho Department of Fish and Game, and the California Department of Fish and Game. (Oregon Fish Commission, January 20, 1964.)

Preservation

QUALITY OF FISH HELD IN REFRIGERATED SEA WATER TESTED:

Better refrigeration techniques for holding fish at sea are being continually sought by the U.S. Bureau of Commercial Fisheries. This is essential since the quality of a fish product marketed for human consumption is largely dependent on the treatment received before it enters the processing plant. Several studies were under way early in 1964 at the U.S. Bureau of Commercial Fisheries Technological Laboratory at Gloucester, Mass., to determine methods for extending the shipboard storage life of fish, one of which includes the use of refrigerated sea water.

The project is being conducted in two major phases: (1) laboratory tests, and (2) shipboard trials.

The laboratory tests were conducted to determine whether or not an increase in storage life of fish can be attained when using refrigerated sea water as compared to ice. In addition, an ultraviolet sterilizing unit was installed in the sea-water tank to determine its effectiveness in reducing the bacterial load in the circulating sea water and the feasibility of installing this unit for shipboard use. Ocean perch were held in the laboratory sea-water tanks at a temperature of 30° F. Samples from the same lot were held in ice for comparative purposes.

Organoleptic examinations were made at varying intervals of storage on both the raw and cooked fish. The final evaluation of cooked ocean perch by a taste panel was based on the average ratings for appearance, odor, flavor, and texture. The ratings indicated that iced ocean perch was acceptable until the 10th day, whereas those stored in refrigerated sea water were acceptable from the 14th to 17th days. Striking reductions in bacterial plate counts were found as a result of circulating sea water through the ultra-violet water unit. In two separate tests, plate counts were reduced from 12 million bacteria per milliliter to 3,000 per milliliter and 380,000 to less than 10 milliliter when circulated for 2 hours and $3\frac{1}{2}$ hours, respectively.

The ocean perch vessel Judith Lee Rose (home port Gloucester, Mass.) was equipped with the necessary refrigeration equipment to conduct shipboard trials for evaluating the use of refrigerated sea water for fish storage. In

dition to the refrigeration system, an ultra-
olet sterilizing unit was installed to reduce
e buildup of bacteria in the circulating sea
ter. Several adversities were encountered
ring the trials carried out as of January
64. Overheating of refrigeration condenser,
lfunction of recording thermometer, break-
e of ultraviolet units, and improper rate of
ter circulation. After the experience of 2
3 sea trials the shortcomings of the storage
ipment were determined and subsequently
dified.

During the final trial, 1,200 pounds of ocean
ch were held for 10 days in refrigerated
water circulated through the ultraviolet
. All systems functioned properly during
entire trip, with the water remaining at a
perature of 30°-33° F. The use of refrig-
ted sea water for the storage of ocean
ch on the vessel has a tendency to leach
the normal red color. This phenomenon
no adverse effects on the edible meat qual-
, but fish buyers are found to be somewhat
ptical about buying the discolored product.

Although the success of the shipboard trials
s limited it is felt that much was learned
ncerning the technical problems encountered
setting up and operating a shipboard unit.
e knowledge gained should be of consider-
e value on future trials.

See Commercial Fisheries Review, January 1963 p. 47.

th Atlantic Exploratory Fishery Program

HERY EXPLORATIONS FOR COMMER-
L SPECIES OFF GEORGIA CONTINUED:
M/V "Silver Bay" Cruise 52 (December 3-
1963): To continue assessment of the dis-
ution, composition, density, and availabili-
bottomfish resources of the continental
f off the coast of Georgia in depths greater
10 fathoms was the primary objective of
15-day cruise by the U. S. Bureau of Com-
cial Fisheries exploratory fishing vessel
er Bay.

To delimit areas of trawlable bottom and
etermine if "broken bottom" areas (snapper
ps) similar to those previously located off
h Carolina and north Florida exist off
rgia, a preliminary survey of the topo-
phic features of the area was made. Ex-
atory gear used consisted of 50/70-foot
70/90-foot nylon, roller-rigged fish trawls with $6\frac{1}{2}$- and 8-foot bracket doors. Cod ends were 2-inch mesh.

Over 900 miles of transects were run with a "whiteline" depth recorder for fish detection and bottom discrimination. A total of 17 trawl sets were made after locating fish shoals on the recorder and 17 sets were made when there were no recorded indications of fish. The entire area surveyed was found to be trawlable with the gear used and only two minor tearups were experienced.

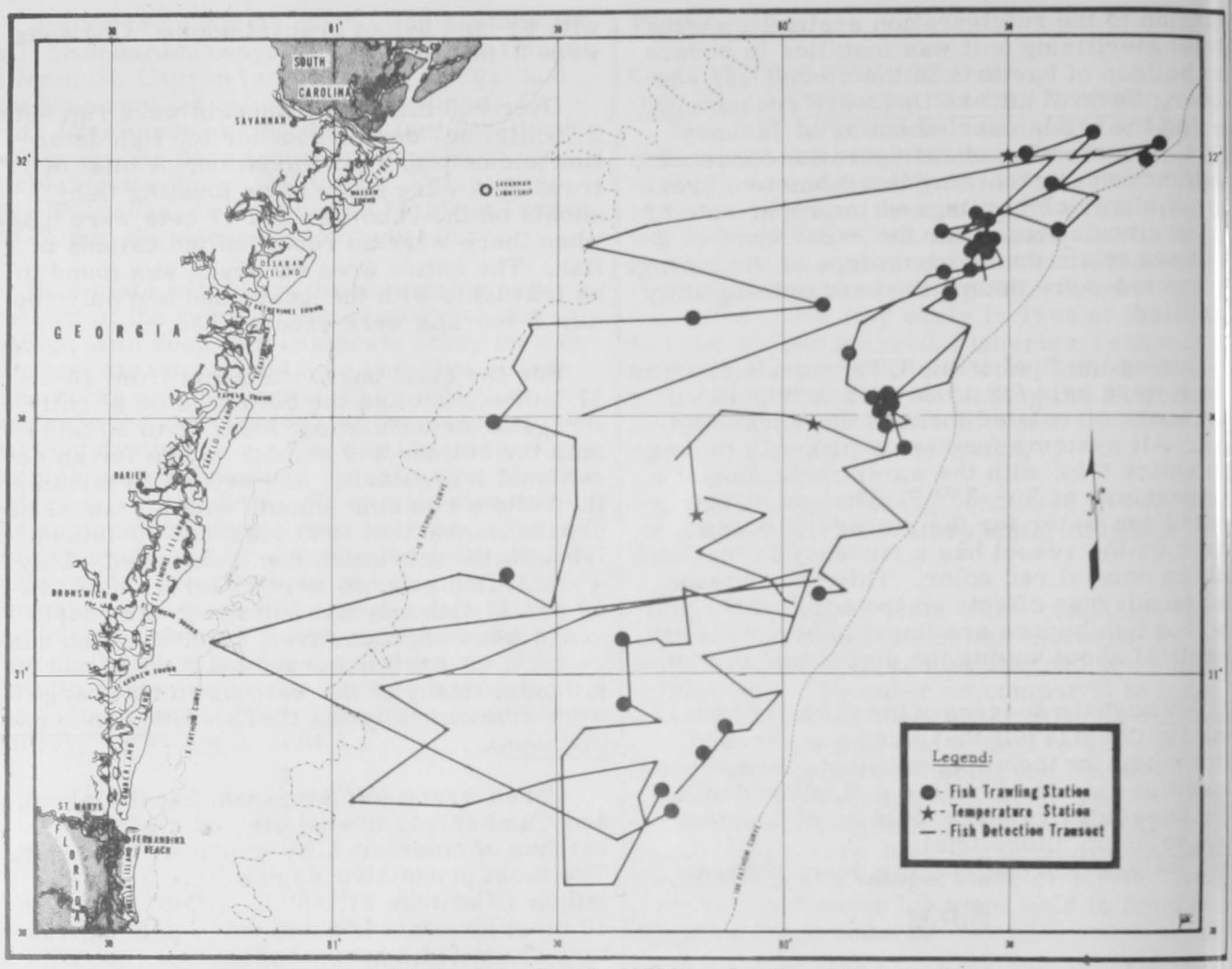
For the most part, transects from 10 to 17 fathoms showed the bottom to be slightly irregular or undulating; from 17 to 30 fathoms the bottom was smooth except for an occasional irregularity; and beyond 30 fathoms the bottom remains smooth with a gradual increase in gradient to at least the 80-fathom isobath, the maximum depth surveyed. Only 4 small fish schools were observed between 10 and 17 fathoms and 3 drags in that depth range were unproductive. Extensive fish concentrations were observed between 18 and 50 fathoms. Many of the catches in that range were dominated by the filefish (Stephanolepis hispidus).

Three areas (off Savannah, Sapelo Island, and Cumberland Island) yielded moderate catches of commercially important food fish. The most productive depths were 35 to 40 fathoms (latitude 31° 45' to 32°00' N.). The 10 most abundant species taken in 8 exploratory drags (14.3 hours fishing time) in that area were:

Species Caught by M/V Silver Bay on Cruise 52

Species		Total Weight
Common Name	Scientific Name	Pounds
Pink porgy	Pagrus pagrus	3,420
Filefish	Stephanolepis hispidus	2,578
Roughtail stingray	Dasyatis centroura	575
White porgy	Calamus sp.	570
Vermilion snapper	Rhomboplites aurorubens	511
Grouper	Mycteroperca & Epinephelus	141
Jack	Seriola sp.	113
Red snapper	Lutjanus aya	102
Grunt, tomtate	Haemulon aurolineatum	58
Black bar drum	Pareques sp.	47
Other		250
Total		8,365

One- to two-pound pink porgies dominated those catches. Black sea bass, (Centropristes striatus), white porgy, red snapper, grouper, small vermilion snapper, and gray triggerfish (Balistes capriscus) were taken in moderate numbers over a small area of broken bottom in 28 fathoms at latitude 31°31' N.,



Areas investigated during Cruise 52 of the M/V Silver Bay (December 3-17, 1963).

longitude 70°46' W. Combined catches of those species were near 600 pounds per drag east of Cumberland Island in 21 to 22 fathoms. The species composition in that area was similar to the broken bottom areas off northern Florida and South Carolina.

No recordings of bottom fish schools were observed in the 50 to 80 fathoms depth range, although two 1-hour drags in 75 to 80 fathoms yielded catches of 4,000 and 3,000 pounds of small butterfish (Poronotus triacanthus). They averaged 12 per pound and modally were 10.5 centimeters (about $4\frac{1}{4}$ inches) long. Two drags in 50 to 60 fathoms yielded small catches of butterfish and round herring (Etrumeus sp.). Strong winds halted further exploration in that depth range.

Midwater schools of fish were observed in 30 to 60 fathoms from latitude 31°10' to 31°50' N. No surface schools of fish were observed during this cruise.

Note: See Commercial Fisheries Review, July 1963 p. 52.

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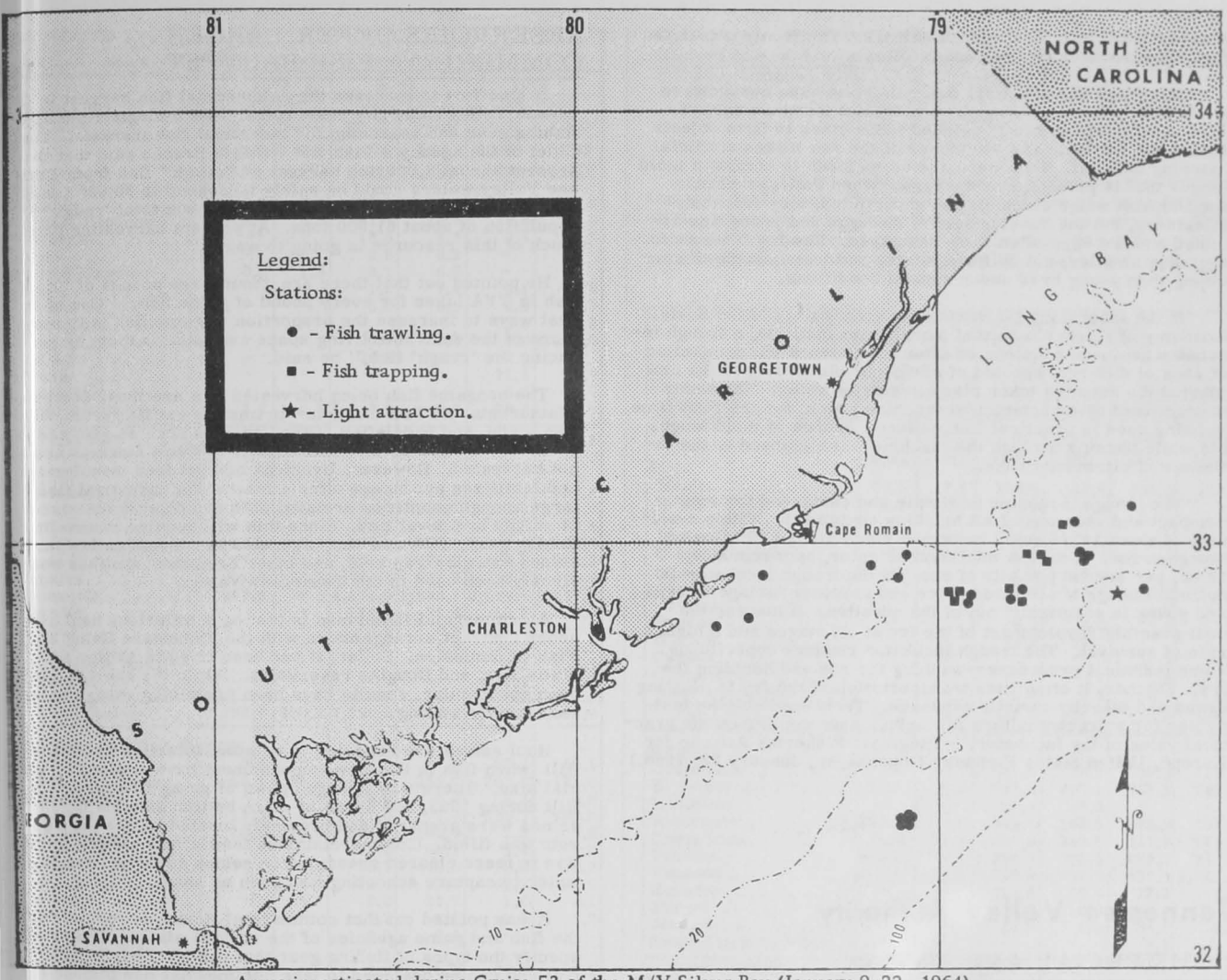
EXPLORATORY TRAWLING FOR COMMERCIAL SPECIES OFF SOUTH CAROLINA

M/V "Silver Bay" Cruise 53 (January 9-22, 1964): To determine the seasonal availability of bottomfishes to fish trawls off the coast of South Carolina was the principal objective of this 14-day cruise by the exploratory fishing vessel Silver Bay. A second objective was to conduct preliminary trials with fish traps. Explorations during the cruise were hampered by strong northerly winds.

Sixteen fishing stations were fished with a 70/90-foot roller-rigged nylon fish trawl with 8-foot bracket doors. Most catches were



Areas investigated during Cruise 53 of the M/V Silver Bay (January 9-22, 1964).

dominated by small (3 to 4 per pound) scup (Stenotomus chrysops) which were taken in amounts averaging 1,653 pounds per drag and ranging up to 2,600 pounds per 1-hour drag. Average and maximum catches of other food-fish species, on a per drag basis, were: vermilion snapper (Rhomboplites aurorubens) 50 pounds average, 500 pounds maximum; white porgy (Calamus sp.) 100 pounds maximum; pink porgy (Pagrus sp.) 100 pounds maximum; and sea bass (Centropristes striata) 20 pounds average and 150 pounds maximum. A 1,000-pound catch of spadefish (Chaetodipterus faber) was made in 25 to 27 fathoms east of Charleston.

Six drags with a 60/80-foot shrimp trawl in the 7- to 13-fathom depth range northeast of Charleston yielded only small numbers of skates and sharks.

A total of 9 stations were covered east of Cape Romain where modified crab-type and arrowhead fish traps were used in a depth range of 13 to 17 fathoms. Catches were generally small and ranged from 0 to 70 pounds of black sea bass per trap per 3-hour set. Small numbers of puffers (Sphaeroides sp.) and individual porgies were also occasionally taken.

Note: See Commercial Fisheries Review, April 1963 p. 25.

Sturgeon

SOVIETS USE NEW TYPE EQUIPMENT TO HATCH FRY ARTIFICIALLY:

The hatching of sturgeon fry by artificial methods was reported in the January 8, 1964, issue of Pressebureauet Novostis Bulletin, a mimeographed Danish-language Soviet period-

ical published in Copenhagen, Denmark. The freely translated English version from the Danish follows:

"Scientists and practical fish culturists have encountered great difficulties in research on artificial sturgeon culture. In nature, sturgeon roe is hatched while stuck to firm objects on the sea bottom. The stickiness of the roe makes artificial hatching difficult. Also there are no methods to combat a mold fungus that is parasitic on the eggs. When the eggs were washed with water containing mud particles, they lost their stickiness, but the development of the eggs and young was affected and the eggs often were destroyed. The fry from such eggs are smaller, not uniform in size and less capable of surviving than young bred under natural conditions.

"In the laboratory for vertebrate embryology of the Soviet Academy of Science's animal morphology institute, a trough incubator has been constructed after many years of examination of roes of different species of sturgeon. According to the new method the hatching takes place in sterile water. The water is sterilized by a bactericidal machine which, for the first time, is being used in practical fish culture. Spores of mold fungus die while passing through the machine when exposed to the influence of ultraviolet rays.

"The trough incubator is simple and cheap and the most compact and spacious of all hatching equipment. Within a volume of about 1-1/2 cubic meters it holds almost 17 kilos of sturgeon roe. It uses a minimum of water, approximately 18 cc. per second per kilo of roe. In the trough incubator an optimal change of air takes place and physical damage to eggs and young is practically out of the question. It insures the best possible development of the fry at all stages and a higher rate of survival. The trough incubator renders superfluous some technical processes--washing the roe and handling the fry. Further, it simplifies transportation of the fry to planting areas and thereby curtails expenses. Tests made by the test center for sturgeon culture in Kurinsk have confirmed the practical value of the incubator." (Regional Fisheries Attache for Europe, United States Embassy, Copenhagen, January 22, 1964.)

Tennessee Valley Authority

COMMERCIAL AND SPORT FISH CATCHES, 1963:

The 1963 commercial fish catch in the Tennessee Valley Authority (TVA) water complex and impoundments was about 5.6 million pounds with a market value of some $2 million. The catch by sports fishermen amounted to more than 16 million pounds and involved expenditures by the anglers of some $41 million.

In 1963, TVA and State agencies continued studies to increase the value of fish and wildlife resources. The TVA organized a large-scale study and investigation in mid-1963 aimed at rebuilding and maintaining Tennessee River mussel beds. The average annual Tennessee River mussel harvest of 10,000 tons between 1945-1955 declined drastically in 1962--down to only 4,700 short tons.

Note: See Commercial Fisheries Review, October 1963 p. 27.

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RESERVOIRS OFFER LARGER COMMERCIAL FISH HARVEST:

In an effort to increase the commercial fish harvest in Tennessee Valley Authority reservoirs, TVA biologists are testing fishing gear and searching for industrial fish markets. The Chief of the agency's Fish and Wildlife Branch said that the present annual 3,000-ton harvest of "rough" fish from Tennessee Valley waters could be safely increased to 30,000 tons. "Our inventories of TVA reservoirs show a total 'rough'-fish population of about 61,000 tons. At present harvesting rates much of this resource is going to waste."

He pointed out that there are about three pounds of "rough" fish in TVA lakes for every pound of game fish. "One of the best ways to increase the proportion of game fish is to make more of the desirable living space available to them by reducing the 'rough' fish," he said.

The nongame fish being harvested now are those desired by restaurants and fish markets--primarily catfish, drum, buffalo fish, carp, and paddlefish. Other species such as gar, redhorse and suckers have little or no demand in those markets and are not harvested. However, livestock and pet feed manufacturers and fertilizer producers offer a market for industrial fish if large enough quantities are available and dependable sources of supply are developed. Since this will require more efficient fishing gear, TVA and state agencies are investigating purse seines, trawls, trap nets, and other equipment that has not previously been used in the Tennessee Valley.

A commercial fisherman is testing a mile-long haul seine under contract arrangements with the Tennessee Game and Fish Commission. So far, it has been tried in Melton Hill, Watts Bar, and Douglas reservoirs. While the harvest has not been spectacular, results have been promising enough to warrant further testing.

Haul seines are expected to be more effective in Melton Hill when fish in that new impoundment have attained commercial size. There was a large spawn of young fish in Melton Hill during 1963, and areas of clean bottom suitable for haul seines were prepared and precisely located before the reservoir was filled. Commercial-size trawls may also be productive in these cleared areas; purse seines could be used in open water to capture schooling fish such as shad.

It was pointed out that commercial fishing is regulated by the fish and game agencies of the various states. The states specify the types of fishing gear that can be used. Gear is selective and can be designed to take commercial fish almost exclusively. The Chief of the TVA Fish and Wildlife Branch said "Instead of fighting commercial fishermen, the sportsmen ought to join them and advocate a larger commercial harvest. The fish is just so much good living space for fish, and 'rough' fish will take it over in many places if they aren't controlled. The best way to control them is through commercial fishing."

U. S. Foreign Trade

AIRBORNE IMPORTS OF FISHERY PRODUCTS:

October 1963: Airborne fishery imports into the United States in October 1963 were down 12.6 percent in quantity and 5.2 percent in value from those in the previous month. Total airborne imports during January-October 1963 were almost the same as those in the same period of 1962.

Raw headless shrimp continued to make up the bulk of the airborne shrimp imports--in October 1963, shipments consisted of 335,656 pounds of fresh or frozen raw headless, 7,250 pounds of frozen raw peeled, and 37,033 pounds of unclassified shrimp. Over 92 percent of the airborne shrimp arrivals in October entered through the U. S. Customs District of Florida. The remainder entered through the Customs Districts of New Orleans (La.), Laredo (Tex.), and Los Angeles (Calif.).

U. S.[1] Airborne Imports of Fishery Products, January-October 1963 with Comparative Data

Product and Origin[2]	1963 October		1963 Jan.-Oct.		1962 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
sh:						
exico	19.6	2.5	245.2	66.4	811.0	140.8
itish Honduras	2.9	0.5	41.7	10.2	19.4	4.8
nduras	-	-	16.5	4.3	0.4	0.1
pan	-	-	2.0	8.2	-	-
ited Kingdom	0.9	1.5	3.1	6.7	-	-
n	-	-	1.2	7.4	8.1	84.2
ance	-	-	5.2	6.1	0.3	0.7
mania	-	-	-	-	1.3	11.3
nama	-	-	0.9	0.4	7.8	1.3
S.S.R.	-	-	26.8	70.2	-	-
nada	-	-	-	-	21.3	16.9
sta Rica	-	-	-	-	5.6	0.9
her countries	2.7	0.6	3.5	0.9	38.8	12.1
Total Fish	26.1	5.1	346.1	180.8	914.0	273.1
mp:						
atemala	-	-	141.6	74.0	261.7	130.8
l Salvador	24.4	15.6	258.0	172.7	545.2	341.7
nduras	-	-	99.8	52.3	25.2	18.6
icaragua	28.5	17.0	477.2	159.1	989.9	335.9
sta Rica	72.7	36.1	582.5	278.9	498.8	213.2
nama	91.8	53.7	1,442.5	776.2	1,653.5	919.4
nezuela	162.5	78.5	4,161.9	1,956.1	2,884.9	1,557.3
uador	-	-	111.6	39.4	12.2	3.4
ance	-	-	2.6	0.9	-	-
exico	-	-	13.2	6.9	24.8	9.1
therlands Antilles	-	-	-	-	3.1	2.7
rgentina	-	-	-	-	10.5	4.8
Total Shrimp	379.9	200.9	7,290.9	3,516.5	6,909.8	3,536.9
llfish other than Shrimp:						
exico	5.4	4.1	97.6	57.6	68.3	45.1
itish Honduras	63.1	54.1	309.9	253.7	206.6	121.0
l Salvador	-	-	5.0	3.6	6.2	4.6
nduras	11.5	3.7	17.0	7.0	139.7	103.4
icaragua	18.6	11.0	164.5	100.0	1.2	0.6
sta Rica	-	-	73.8	60.1	1.4	1.2
maica	14.7	9.4	65.7	49.5	30.0	21.3
therlands Antilles	-	-	32.8	20.9	43.1	28.5
lombia	-	-	8.0	21.7	1.8	5.1
uador	-	-	2.2	1.8	1.6	1.2
nisia	-	-	0.8	0.9	-	-
eward and Wind-ward Islands	-	-	1.6	0.5	24.0	9.1
itish Guiana	-	-	1.7	0.3	-	-
nada	-	-	213.3	109.2	224.1	91.1
nezuela	-	-	13.7	6.0	22.3	13.6
nama	0.4	0.4	3.1	2.6	1.0	1.0
atemala	-	-	-	-	11.5	5.7
hamas	-	-	5.3	5.2	17.8	6.5
minican Republic	3.1	2.9	25.3	23.8	25.6	23.7
goslavia	-	-	1.2	0.7	-	-
nidad	-	-	-	-	2.3	1.0
her countries	-	-	2.0	2.9	1.1	2.2
Total Shellfish (except shrimp)	116.8	85.6	1,044.5	728.0	829.6	485.9
Grand Total	522.8	291.6	8,681.5	4,425.3	8,653.4	4,295.9

orts into Puerto Rico from foreign countries are considered to be United States imports and are cluded. But United States trade with Puerto Rico and with United States possessions and trade tween United States possessions are not included.
n the country of origin is not known, the country of shipment is shown.
s weight of shipments, including the weight of containers, wrappings, crates, and moisture ntent.
.o.b. point of shipment. Does not include U. S. import duties, air freight, or insurance.
These data are included in the over-all import figures for total imports, i.e., these imports not to be added to other import data published.

Airborne imports of shellfish other than shrimp in Octo- consisted mainly of 105,974 pounds of fresh or frozen ny lobster products. Almost 95 percent of the airborne orts of spiny lobsters entered through the Customs Dis- ct of Florida. The remainder entered through the Cus- ms Districts of New York (N.Y.), and South Carolina.

Fish fillets from Mexico were the leading finfish product orted by air in October.

The data as issued do not show the state of all products-- sh, frozen, or canned--but it is believed that the bulk of the airborne imports consists of fresh and frozen products. (United States Airborne General Imports of Merchandise, FT 380, October 1963, U.S. Bureau of Census.)

* * * * *

September 1963: Airborne fishery imports into the United States in September 1963 were down 51.6 percent in quantity and 48.0 percent in value from those in the previous month. Total airborne imports during January-September 1963 showed an increase of 9.5 percent in quantity and 15.2 percent in value from

U. S.[1] Airborne Imports of Fishery Products, January-September 1963 with Comparative Data

Product and Origin[2]	1963 September		1963 Jan.-Sept.		1962 Jan.-Sept.	
	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	30.5	7.1	225.6	63.9	691.5	121.4
British Honduras	1.1	0.2	38.8	9.7	14.7	3.7
Honduras	-	-	16.5	4.3	-	-
Japan	-	-	2.0	8.2	-	-
United Kingdom	0.4	0.7	2.2	5.2	-	-
Iran	-	-	1.2	7.4	-	-
France	-	-	5.2	6.1	0.3	0.7
Rumania	-	-	-	-	1.3	11.3
Panama	-	-	0.9	0.4	7.8	1.3
U.S.S.R.	-	-	26.8	70.2	-	-
Canada	-	-	-	-	21.3	16.9
Costa Rica	-	-	-	-	5.6	0.9
Other countries	-	-	0.8	0.3	38.1	9.9
Total Fish	32.0	8.0	320.0	175.7	780.6	166.1
Shrimp:						
Guatemala	-	-	141.6	74.0	230.2	115.3
El Salvador	12.0	6.5	233.6	157.1	467.1	292.8
Honduras	-	-	99.8	52.3	-	-
Nicaragua	22.7	6.6	448.7	142.1	979.9	330.2
Costa Rica	54.8	25.6	509.8	242.8	327.7	138.8
Panama	133.0	75.3	1,350.7	722.5	1,423.2	776.3
Venezuela	269.1	128.3	3,999.4	1,877.6	2,482.4	1,343.4
Ecuador	-	-	111.6	39.4	12.2	3.4
France	-	-	2.6	0.9	-	-
Mexico	-	-	13.2	6.9	24.7	9.1
Netherlands Antilles	-	-	-	-	3.1	2.7
Total Shrimp	491.6	242.3	6,911.0	3,315.6	5,950.5	3,012.0
Shellfish other than Shrimp:						
Mexico	2.2	0.8	92.2	53.5	53.9	33.6
British Honduras	44.6	38.0	246.8	199.6	177.2	102.3
El Salvador	-	-	5.0	3.6	0.8	0.5
Honduras	3.6	2.3	5.5	3.3	113.0	80.7
Nicaragua	17.7	10.0	145.9	89.0	1.2	0.6
Costa Rica	-	-	73.8	60.1	1.4	1.2
Jamaica	-	-	51.0	40.1	30.0	21.3
Netherlands Antilles	-	-	32.8	20.9	31.2	19.9
Colombia	-	-	8.0	21.7	1.8	5.1
Ecuador	-	-	2.2	1.8	1.6	1.1
Tunisia	-	-	0.8	0.9	-	-
Leeward and Windward Islands	-	-	1.6	0.5	22.9	8.7
British Guiana	-	-	1.7	0.3	-	-
Canada	-	-	213.3	109.2	223.4	90.9
Venezuela	-	-	13.7	6.0	22.3	13.6
Panama	1.2	1.0	2.7	2.2	1.0	1.0
Guatemala	-	-	-	-	8.5	4.6
Bahamas	5.3	5.2	5.3	5.2	1.9	0.8
Dominican Republic	-	-	22.2	20.9	22.1	20.2
Yugoslavia	-	-	1.2	0.7	-	-
Trinidad	-	-	-	-	2.3	1.0
Other countries	-	-	2.0	2.9	0.5	1.5
Total Shellfish (except shrimp)	74.6	57.3	927.7	642.4	717.0	408.6
Grand Total	598.2	307.6	8,158.7	4,133.7	7,448.1	3,586.7

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

arrivals in the same period of 1962, due mainly to larger shipments of shrimp and spiny lobsters.

Raw headless shrimp continued to make up the bulk of the airborne shrimp imports--in September 1963, shipments consisted of 470,027 pounds of fresh or frozen raw headless, 11,580 pounds of frozen raw peeled and deveined, and 9,952 pounds of unclassified shrimp. All of the airborne shrimp arrivals in September entered through the U. S. Customs District of Florida.

Airborne imports of shellfish other than shrimp in September consisted of 72,385 pounds of fresh or frozen spiny lobster products which entered through the Customs District of Florida, and 2,200 pounds of oysters which entered through the Customs District of Laredo (Tex.).

Airborne imports of finfish in September consisted of fresh or frozen fish and fish fillets from Mexico and British Honduras.

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. (United States Airborne General Imports of Merchandise, FT 380, September 1963, U. S. Bureau of Census.)

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IMPORTS OF CANNED TUNA UNDER QUOTA:

United States imports of tuna canned in brine during January 1-December 31, 1963, amounted to 56,413,638 pounds (about 2,686,364 std. cases), according to preliminary data compiled by the Bureau of Customs. This was 6,717,004 pounds (319,857 std. cases) less than the quota. But the imports in 1963 were 3.5 percent above the 54,483,996 pounds (about 2,594,476 std. cases) imported during 1962.

The quantity of tuna canned in brine which could be imported into the United States during the calendar year 1963 at the 12½-percent rate of duty was limited to 63,130,642 pounds (or about 3,006,221 std. cases of 48 7-oz. cans). Any imports in excess of the quota are dutiable at 25 percent ad valorem.

* * * * *

IMPORTS OF FISH MEAL AND SCRAP BY CUSTOMS DISTRICTS:

December 1963: U. S. imports of fish meal and scrap in December 1963 totaled 29,729 short tons, an increase of 71.2 percent from the 17,369 tons imported in the previous month, and up 56.7 percent from the 18,977 tons imported in December 1962.

About 89.3 percent of the fish meal and scrap imports in December 1963 entered through the Customs Districts of Maryland, Georgia, Mobile (Ala.), Galveston (Tex.), San Francisco (Calif.), Los Angeles (Calif.), and Washington.

U. S. Imports of Fish Meal and Scrap by Customs District, December 1963

Customs Districts	December 1963
	Short Tons
Maine & New Hampshire	500
Massachusetts	67
New York (N. Y.)	242
Philadelphia (Pa.)	222
Maryland	7,074
North Carolina	331
Georgia	3,351
Florida	548
Mobile (Ala.)	6,335
Sabine (Tex.)	557
Galveston (Tex.)	2,328
Los Angeles (Calif.)	1,187
San Francisco (Calif.)	3,129
Oregon	110
Washington	3,136
Duluth (Minn.) and Superior (Wis.)	550
Michigan	62
Total	29,729

Note: A list of the entry ports included within each Customs District is given in Schedule D, Code Classification of United States Customs Districts and Ports, which may be obtained free from the Foreign Trade Division, Bureau of the Census, U. S. Department of Commerce, Washington, D. C., 20233.

* * * * *

November 1963: United States imports of fish meal and scrap in November 1963 totaled 17,369 short tons, a decline of 44.8 percent from the 31,449 tons imported in the previous month, but a considerable increase from the 11,904 tons imported in November 1962.

About 80.4 percent of the fish meal and scrap imports in November 1963 entered through the Customs Districts of North Caro

U. S. Imports of Fish Meal and Scrap by Customs Districts, November 1963

Customs Districts	November 196
	Short Tons
Maine & New Hampshire	679
Massachusetts	72
New York (N. Y.)	129
Maryland	882
North Carolina	1,433
Mobile (Ala.)	1,314
New Orleans (La.)	1,540
Galveston (Tex.)	4,159
Los Angeles (Calif.)	330
San Francisco (Calif.)	3,154
Oregon	343
Washington	2,360
Hawaii	100
Dakota	210
Duluth (Minn.) and Superior (Wis.)	263
Michigan	401
Total	17,369

Note: A list of the entry ports included within each Customs District is given in Schedule D, Code Classification of United States Customs Districts and Ports, which may be obtained free from the Foreign Trade Division, Bureau of the Census, U. S. Department of Commerce, Washington, D. C., 20233.

ia, New Orleans (La.), Mobile (Ala.), Gal-ston (Tex.), San Francisco (Calif.), and shington.

* * * * *

IBLE FISHERY PRODUCTS:

November 1963: Imports of processed ible fish and shellfish into the United States November 1963 were down 2.3 percent in antity and 6.9 percent in value from those the previous month. Imports of most fish lets were down in November and shipments canned sardines also declined. There was ain in imports of canned tuna in brine and nned oysters.

Compared with the same month in 1962, imports in November 1963 were down 2.6 rcent in quantity and 4.5 percent in value. November 1963, there were lower imports canned sardines in oil, haddock fillets, libut fillets, swordfish fillets, and sea cat-h (wolffish) fillets. The decline was al-st offset by larger imports of ocean perch lets, canned tuna in brine, and canned oys-rs.

In the first 11 months of 1963, imports re down 3.6 percent in quantity and 3.4 rcent in value. Fluctuations in individual port items were much greater than the r-all totals indicate. Imports were down rply in 1963 for canned tuna in brine, nned sardines in oil, and canned salmon. orts were also down for flounder fillets, libut fillets, sea catfish fillets, and sword-h fillets. On the other hand, there was an rease in imports of canned sardines not-oil (mostly from South Africa Republic), an perch fillets, blocks and slabs, canned b meat from Japan, and yellow pike fillets.

U. S. Imports and Exports of Processed Edible Fishery Products, November 1963 with Comparisons

Item	QUANTITY				VALUE			
	Nov.		Jan.-Nov.		Nov.		Jan.-Nov.	
	1963	1962	1963	1962	1963	1962	1963	1962
	. . (Millions of Lbs.). .				. . (Millions of $) . .			
Fish & Shellfish:								
Imports[1]/ . . .	51.8	53.2	492.4	510.7	14.8	15.5	143.7	148.8
Exports[2]/ . . .	3.7	3.5	30.1	30.8	1.8	2.0	14.5	13.9

[1]/ Includes only those fishery products classified by the U. S. Bureau of the 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 fish and shellfish from the United States in November 1963 were up 5.7 percent in quantity but down 14.3 percent in value from those in the previous month. The gain in volume was concentrated in the lower-priced canned mackerel and canned sardines while exports of the higher-priced canned salmon and canned shrimp declined.

Compared with the same month in 1962, November 1963 exports were up 5.7 percent in quantity but down 10.0 percent in value. Again, there were larger shipments of lower-priced canned fishery products but a drop in exports of the more expensive items.

Processed fish and shellfish exports in the first 11 months of 1963 were down 2.3 percent in quantity but up 4.3 percent in value from those in the same period in 1962. The decline in quantity was due mainly to lower shipments of canned sardines and a drop in exports of canned mackerel to the Congo Republic. There were increases in exports of the higher-priced canned salmon and canned shrimp, as well as larger shipments of canned squid. Although not covered in the table, exports of frozen shrimp were up sharply in the first 11 months of 1963 (increase mostly in exports to Japan), and there was a substantial increase in exports of frozen salmon.

* * * * *

October 1963: Imports of processed edible fish and shellfish into the United States in October 1963 were up 16.0 percent in quantity and 18.7 percent in value from those in the previous month. There was a general increase in imports of fish fillets as well as canned fishery products (with the exception of canned albacore tuna in brine).

Compared with the same month in 1962, imports in October 1963 were down 1.1 percent in quantity but up 3.9 percent in value.

In October 1963, there were larger imports of cod fillets, haddock fillets, yellow pike fil-

U. S. Imports and Exports of Processed Edible Fishery Products, October 1963 with Comparisons

Item	QUANTITY				VALUE			
	Oct.		Jan.-Oct.		Oct.		Jan.-Oct.	
	1963	1962	1963	1962	1963	1962	1963	1962
	. . (Millions of Lbs.). .				. . (Millions of $) . .			
Fish & Shellfish:								
Imports[1]/ . . .	53.0	53.6	440.6	457.5	15.9	15.3	128.9	133.3
Exports[2]/ . . .	3.5	3.6	26.4	27.3	2.1	2.0	12.7	11.9

Note: For explanation of footnotes see table for November.

lets, canned sardines in oil, and canned crab meat. The gain was offset by a drop in imports of halibut fillets, canned tuna in brine, and canned sardines not-in-oil.

In the first 10 months of 1963, imports were down 3.7 percent in quantity and 3.3 percent in value. Fluctuations in individual import items were much greater than the overall totals indicate. Imports were down sharply in 1963 for canned tuna in brine, canned sardines in oil, and canned salmon. On the other hand, there was a large increase in imports of canned sardines not-in-oil (mostly from South Africa Republic); fish blocks and slabs, and canned crab meat from Japan.

Exports of processed fish and shellfish from the United States in October 1963 were down 2.8 percent in quantity but up 5.0 percent in value from those in the same month of 1962. Lower shipments of canned squid and canned sardines were about offset by larger exports of canned salmon, canned shrimp, and canned mackerel.

Processed fish and shellfish exports in the first 10 months of 1963 were down 3.3 percent in quantity but up 6.7 percent in value from those in the same period in 1962. The decline in quantity was due mainly to lower shipments of canned sardines and a drop in exports of canned mackerel to the Congo Republic. There were increases in exports of the higher-priced canned salmon and canned shrimp, as well as larger shipments of canned squid. Although not covered in the table, exports of frozen shrimp were up sharply in the first 10 months of 1963 (increase mostly in exports to Japan), and there was a substantial increase in exports of frozen salmon.

Notes: (1) The data shown above were previously included in news releases on "U. S. Imports and Exports of Edible Fishery Products." In the past, data showing "U. S. Imports of Edible Fishery Products" summarized both manufactured and crude products. At present, a monthly summary of U. S. imports of crude or nonprocessed fishery products is not available, therefore only imports of manufactured or processed edible fishery products are reported above. The above import data are, therefore, not comparable to previous reports of "U. S. Imports of Edible Fishery Products."

The export data shown above are comparable to previous data in "U. S. Exports of Edible Fishery Products." The export data in this series of articles have always been limited to manufactured or processed products.

(2) See Commercial Fisheries Review, Jan. 1964 p. 34, Nov. 1963 p. 49.

U. S. Vessels

NEW RESEARCH VESSEL COMMISSIONED FOR BUREAU OF COMMERCIAL FISHERIES

The Townsend Cromwell, the new oceanographic and fisheries research vessel of the U. S. Bureau of Commercial Fisheries, was commissioned January 25, 1964, at Honolulu, Hawaii. The new vessel is named in honor of an oceanographer who discovered in 1951 a major Pacific Ocean current which now carries his name. The Townsend Cromwell is designed to provide the range, seaworthiness and laboratory facilities needed for applying a variety of research techniques to the study of fishery resources and their oceanographic environment over a vast area of the central Pacific. The vessel was built in Louisiana at a cost of $1,700,000.

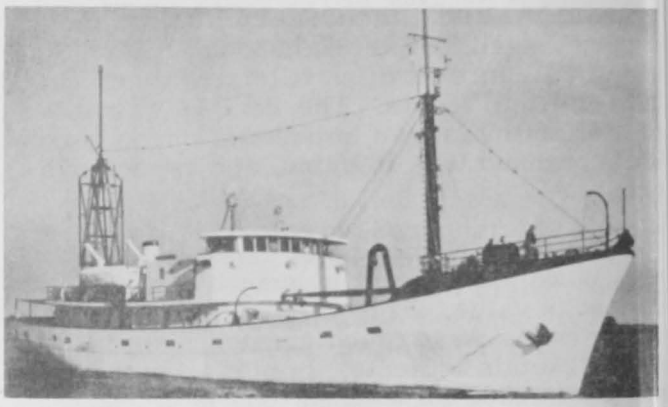


Figure 1 - Townsend Cromwell viewed from the side.

In appearance, the Townsend Cromwell, a 158-foot vessel of 565 gross tons, is similar to a modern distant-water trawler. Its fishing capabilities emphasize midwater trawling and long-line fishing, but it can be adapted to other types of net and line fishing.

Hydrographic, biological, and chemical laboratories are centrally located on the main deck in a position of minimum motion near the overside work platform.

To maintain the slow speeds necessary for plankton investigations and gain the maneuverability needed at oceanographic stations, twin screws, variable pitch propellers, and twin spade rudders have been installed. Two 400-horsepower Diesel engines drive the vessel at a cruising speed of 12 knots. Electric power is supplied by three 60-kilowatt Diesel generators. The vessel has a range of about 10,000 miles and will be able to cruise up to 2 months without refueling. Her complement of 25 men will include 7 scientists.

The vessel is designed to enable scientists continue their work during rough weather. here are anti-roll features and a bulbous se under the bow which will dampen pitching om fore to aft. The bulbous nose also will rve as a viewing chamber to permit observions and photographs of marine specins underwater. The high transparency of tropical Pacific in daylight permits visility for several hundred feet.

Figure 2 - Townsend Cromwell viewed from the stern.

The Hawaiian Area Director of the U. S. reau of Commercial Fisheries said that vessel will engage in oceanographic studand in experimental fishing to learn more the basic processes in the ocean and to d new areas where fish may be caught, particularly tuna.

Beginning in the early summer of 1965, the reau of Commercial Fisheries will use the ssel to participate with other Government encies in the Pacific Trade Wind Zone eanographic Program, a planned two-year operative study in a rectangular area of the cific roughly the size of the United States.

The study is expected to provide information on interactions between the atmosphere and the ocean that affect our climate and even the distribution of fish. One phase of the research will try to determine how weather is affected when the ocean absorbs heat in one part of the world and transports it to another.

Wholesale Prices

EDIBLE FISH AND SHELLFISH, JANUARY 1964:

The wholesale price index for edible fish and shellfish (fresh, frozen, and canned) rose steadily each month from November 1963 to January 1964. At 110.0 percent of the 1957-59 average, the index in January 1964 was up 2.3 percent from the previous month. Compared with January 1963, prices this January were down substantially for nearly all items with the over-all index down 9.8 percent.

The subgroup index for drawn, dressed, or whole finfish was up 1.8 percent from December to January 1964, but was lower than January a year earlier by 15.1 percent. Prices at Boston for ex-vessel large haddock (up 6.0 percent) moved up from December to January because of lighter landings, but were 13.4 percent below January 1963. A substantial increase from the previous month in prices for fresh Lake Superior whitefish (up 13.4 percent) at Chicago was partly offset by lower prices for Great Lakes round yellow pike at New York City. Prices at New York City for frozen dressed western halibut and king salmon this January were the same as in the previous month but were considerably lower than in January 1963 because of large stocks in cold storage.

Higher January 1964 prices for all processed fresh fish and shellfish products were responsible for a 3.5-percent increase from the previous month in that subgroup index. Prices for South Atlantic fresh shrimp at New York City were up 5.5 percent from December to January, but down 20.8 percent from January 1963. Fresh small haddock fillets at Boston were higher-priced (up 2.6 percent) this January than the previous month, and were up 3.5 percent from the same month a year earlier. Compared with January 1963, the subgroup index this January was 11.5-percent lower mainly because of sharply lower fresh shrimp prices and some decline in prices for standard shucked oysters at Norfolk.

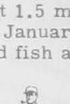
Wholesale Average Prices and Indexes for Edible Fish and Shellfish, January 1964 with Comparisons

Group, Subgroup, and Item Specification	Point of Pricing	Unit	Avg. Prices 1/ ($)		Indexes (1957-59=100)			
			Jan. 1964	Dec. 1963	Jan. 1964	Dec. 1963	Nov. 1963	Jan. 1963
ALL FISH & SHELLFISH (Fresh, Frozen, & Canned)					110.0	107.5	106.1	121.9
Fresh & Frozen Fishery Products:					113.0	110.5	109.0	130.0
Drawn, Dressed, or Whole Finfish:					116.5	114.4	117.0	137.2
Haddock, lge., offshore, drawn, fresh	Boston	lb.	.18	.17	141.0	133.0	124.7	162.9
Halibut, West., 20/80 lbs., drsd., fresh or froz.	New York	lb.	.33	.33	96.1	96.1	97.1	128.1
Salmon, king, lge. & med., drsd., fresh or froz.	New York	lb.	.85	.85	118.4	2/118.4	124.0	134.5
Whitefish, L. Superior, drawn, fresh	Chicago	lb.	.47	.41	69.4	61.2	83.6	106.0
Yellow pike, L. Michigan & Huron, rnd., fresh	New York	lb.	.49	.51	80.2	83.5	75.3	88.5
Processed, Fresh (Fish & Shellfish):					115.4	111.5	107.2	130.4
Fillets, haddock, sml., skins on, 20-lb. tins	Boston	lb.	.59	.57	142.0	2/138.4	131.1	137.2
Shrimp, lge. (26-30 count), headless, fresh	New York	lb.	.86	.82	100.8	95.5	85.0	127.2
Oysters, shucked, standards	Norfolk	gal.	7.63	7.50	128.6	126.5	130.7	132.8
Processed, Frozen (Fish & Shellfish):					102.8	101.3	98.6	117.5
Fillets: Flounder, skinless, 1-lb. pkg.	Boston	lb.	.39	.39	98.9	98.9	98.9	100.1
Haddock, sml., skins on, 1-lb. pkg.	Boston	lb.	.39	.40	114.3	115.8	111.4	107.0
Ocean perch, lge., skins on 1-lb. pkg.	Boston	lb.	.34	.35	117.5	121.0	119.2	117.5
Shrimp, lge. (26-30 count), brown, 5-lb. pkg.	Chicago	lb.	.81	.78	95.5	91.9	89.5	123.9
Canned Fishery Products:					104.7	102.5	101.2	108.0
Salmon, pink, No. 1 tall (16 oz.), 48 cans/cs.	Seattle	cs.	23.50	23.50	102.4	102.4	101.3	107.9
Tuna, lt. meat, chunk, No. 1/2 tuna (6-1/2 oz.), 48 cans/cs.	Los Angeles	cs.	11.63	11.06	103.3	98.2	96.6	104.4
Mackerel, jack, Calif., No. 1 tall (15 oz.), 48 cans/cs.	Los Angeles	cs.	5.75	5.75	97.5	97.5	97.5	3/100.0
Sardines, Maine, keyless oil, 1/4 drawn (3-3/4 oz.), 100 cans/cs.	New York	cs.	8.96	8.96	114.9	114.9	113.3	119.4

1/Represent average prices for one day (Monday or Tuesday) during the week in which the 15th of the month occurs. These prices are published as indicators of movement and not necessarily absolute level. Daily Market News Service "Fishery Products Reports" should be referred to for actual prices.
2/Revised.
3/New product replaced California canned sardines starting December 1962; entered wholesale price index at 100 under revised procedures of Bureau of Labor Statistics.

The subgroup index for processed frozen fish and shellfish rose 1.5 percent from December to January due to higher prices at Chicago for frozen shrimp (wholesale price up 3 cents a pound). Prices for frozen haddock and ocean perch fillets were slightly lower than in December, and flounder fillet prices were unchanged from those of the previous month. The January 1964 subgroup index was down 12.5 percent from the same month a year earlier largely because of lower frozen shrimp prices. But prices for frozen haddock fillets this January were up 6.8 percent from January 1963.

Although prices for most canned fish products were relatively unchanged from December to January, those for canned tuna moved up 5.2 percent and were solely responsible for a 2.1-percent increase in that subgroup index for January 1964. The California canned tuna pack for 1963 of 9 million cases was about 1.5 million cases below the 1962 pack. As compared with January 1963, prices this January were lower for all canned fish and that subgroup index was down 3.1 percent.



Yellow Pike

INCREASE PREDICTED OF COMMERCIAL LANDINGS IN LAKE ERIE:

A greatly increased commercial catch of yellow pike (walleyes) in western Lake Erie, based on fish developing from a highly successful spawning in the spring of 1962, has been predicted by Ontario's Department of Lands and Forests, Canada. This should mean that sport fishing for that species will also be much better. Down from record-high landings in 1956 of 9,275,000 pounds to a record low of 269,000 pounds in 1961, the catch prediction for 1964 is between 1 and 1¼ million pounds.

An abundance of young yellow pike resulting from the unusually successful 1962 hatch, coupled with much faster growth, led to the prediction. The Ontario Government agency noted that an accelerated rate of growth also seems to be matched by an accelerated development of sexual activity. As a result, males appear likely to reach breeding maturity at 2 years of age and females at 3 years, whereas the more usual ages are 3 for males and 4 for females.