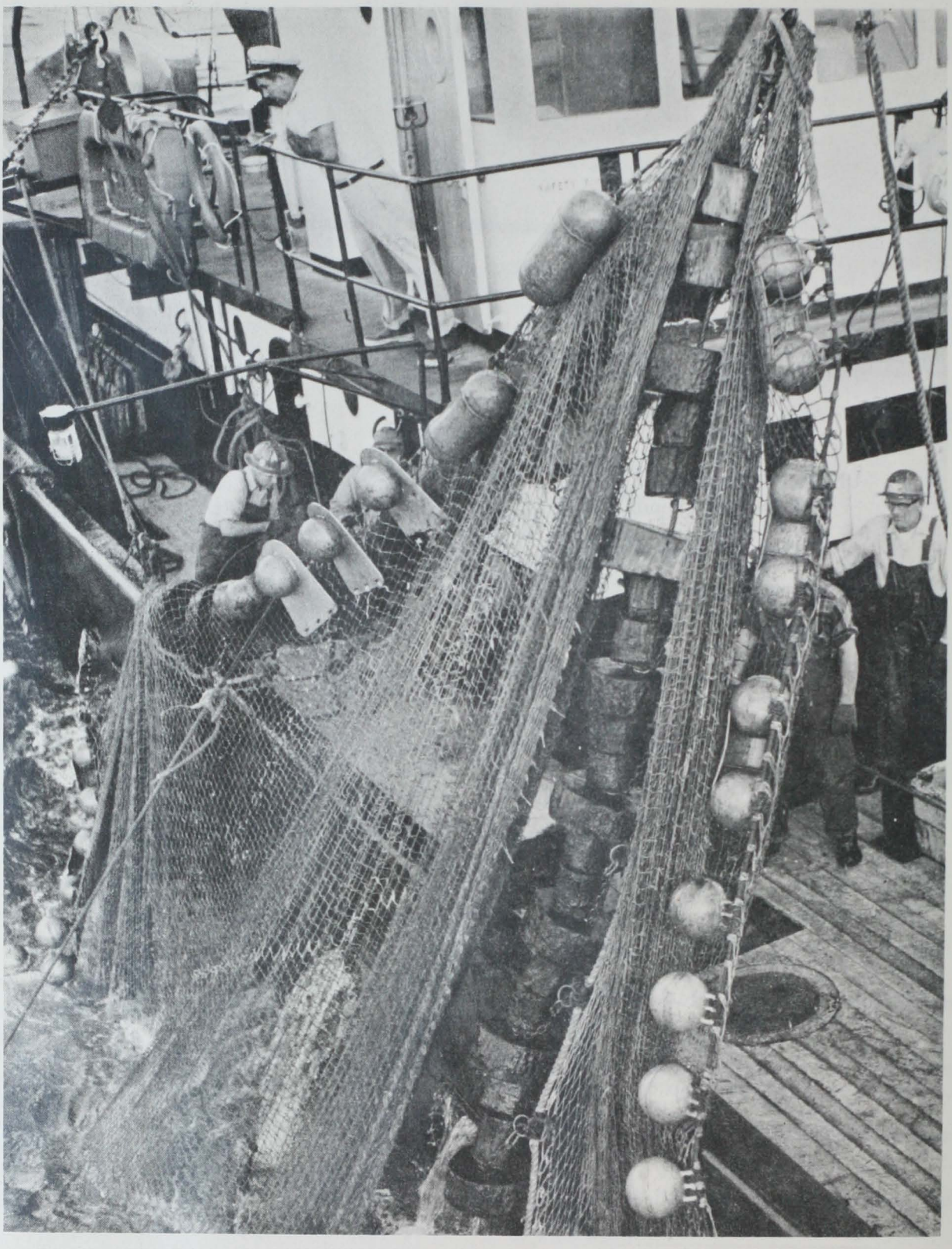


Whipping the "belly rollers" of a fish trawl aboard the "Silver Bay" during bottom fish explorations off Florida's East Coast. (Photo: J. B. Rivers)

1967 U. S. CATCH IS LOWEST SINCE 1943

The 1967 U. S. catch of fish, shellfish, and other aquatic products is expected to be 4.1 billion pounds--a drop of about 200 million from 1966 and the smallest catch since 1943.

The shrimp catch will set a record. It is expected to be about 292 million pounds, 24 million pounds higher than 1954's record 268 million pounds. Again this year, shrimp will be by far the most valuable commercial species.

There also were increased catches of alewives, cod, Dungeness crabs, Pacific hake, Maine sea herring, tuna, and anchovies.

Landings of menhaden this year are expected to be about 1.2 billion pounds--almost 100 million pounds below 1966 and only about half the 1961 record of 2.3 billion pounds. Landings of other industrial fish also declined.

There will be declines in catches of haddock, New England flounders, king crab, ocean perch, jack and Pacific mackerel, Alaska salmon, sea scallop meats, and whiting.

After many years, the steady climb in king crab landings ended. The 1967 catch will be about 130 million pounds, 29 million less than 1966.

The strong 1963 year-class of haddock that has supported the fishery for the past few years appears to have passed its peak. The 1967 catch will be only about 116 million pounds, down 16 million from 1966.

Landings of New England flounders, principally yellowtail, continued to decline in 1967. They will be about 15 million pounds less than the 1966 catch of 105 million pounds.

Perhaps the greatest disaster for U. S. fisheries in 1967 was the failure of Alaskan salmon runs. The catch is expected to be the lowest since 1959.

Landings of sea scallop meats will decline to about 7 million pounds--down 4 million from 1966 and the lowest since 1945.

Landings of whiting will be about 57 million pounds, down 24 million pounds from 1966.

1967 TUNA CATCH

The catch of tuna by the United States and Puerto Rico will be about 380 million pounds--one of the highest on record. California landings usually account for about 90 percent of all landings. During the first 11 months of 1967, the state's landings reached 281.9 million pounds--nearly 30 percent above the 218.8 million pounds of the 1966 period. A record albacore catch of 15,738 tons was made off Oregon.

U. S. SUPPLY OF FISHERY PRODUCTS

Since 1957, the total supply of fishery products--domestic catch plus imports on live-weight basis--has increased 94 percent. It rose from 7.2 billion pounds in 1957 to nearly 14 billion in 1967. The 1967 supply will be 12 percent above 1966's. The estimated 1967 domestic catch of only 4.1 billion pounds is 6 percent less than in 1966 and only 29.5 percent

of the total available supply. This is the lowest percentage in U. S. history.

Record imports of fish meal from Peru and Norway account for a large part of the increase in total quantity available. The supply of edible fishery products will be down from 5.4 billion pounds in 1966 to about 5.2 billion pounds in 1967. Both domestic catch and imports were slightly off the 1966 volume. The supply of industrial products will reach a record 8.7 billion pounds in 1967 because of heavy imports. Only 20 percent of the supply of industrial products was produced domestically.

Pack of Canned Fishery Products		
	January-September	
	1967	1966
	(Standard Cases)	
Salmon	2,110,000	4,344,047
Tuna	21,729,964	19,953,567
Maine sardines	1,250,000	1,332,783
Shrimp	2,360,000	2,234,676
Oysters	530,000	200,000

EXPORTS

U. S. exports of fishery products in 1967 will be at about the 1966 level. During the first 9 months of 1967, exports of fresh and frozen items were on about the same level, or slightly better, than during the 1966 period. Fresh and frozen shrimp, and canned salmon, shrimp, and squid were well above the 1966 amounts. Exports of menhaden oil (66.3 million pounds) were 8 percent less than the 72.3 million pounds of the 1966 period, but it was thought this could easily change by the end of year.

PROCESSED FISHERY PRODUCTS IN 1967

U. S. production of processed fishery products will be at about the 1966 level. Canned salmon is down more than 50 percent, but packs of tuna, shrimp, and oysters will be larger. The pack of Maine sardines will total 1,250,000 standard cases; the 1966 pack was 1,333,000 cases. Domestic production of fish sticks and portions will be only slightly above 1966's, while breaded shrimp and production of fillets and steaks will be less. Domestic fish meal production will be 12 percent below 1966's due to a smaller catch of menhaden.

Foreign Trade in Fishery Products		
	IMPORTS	
	January-September	
	1967	1966
	(Million Pounds)	
Fresh and Frozen:		
Groundfish fillets and fillets	221.9	244.2
Other fillets	62.5	66.3
Tuna	205.5	239.9
Shrimp	124.8	117.9
Sea scallops	10.7	13.3
Canned:		
Tuna	46.8	46.3
Sardines	38.7	41.2
	(Tons)	
Fish meal	468.1	345.9
	EXPORTS	
	(Million Pounds)	
Fresh and Frozen:		
Salmon	11.4	11.3
Shrimp	5.3	3.4
Canned:		
Salmon	16.7	13.3
Shrimp	4.2	3.5
Squid	9.5	7.9
Fish oils	66.6	72.9

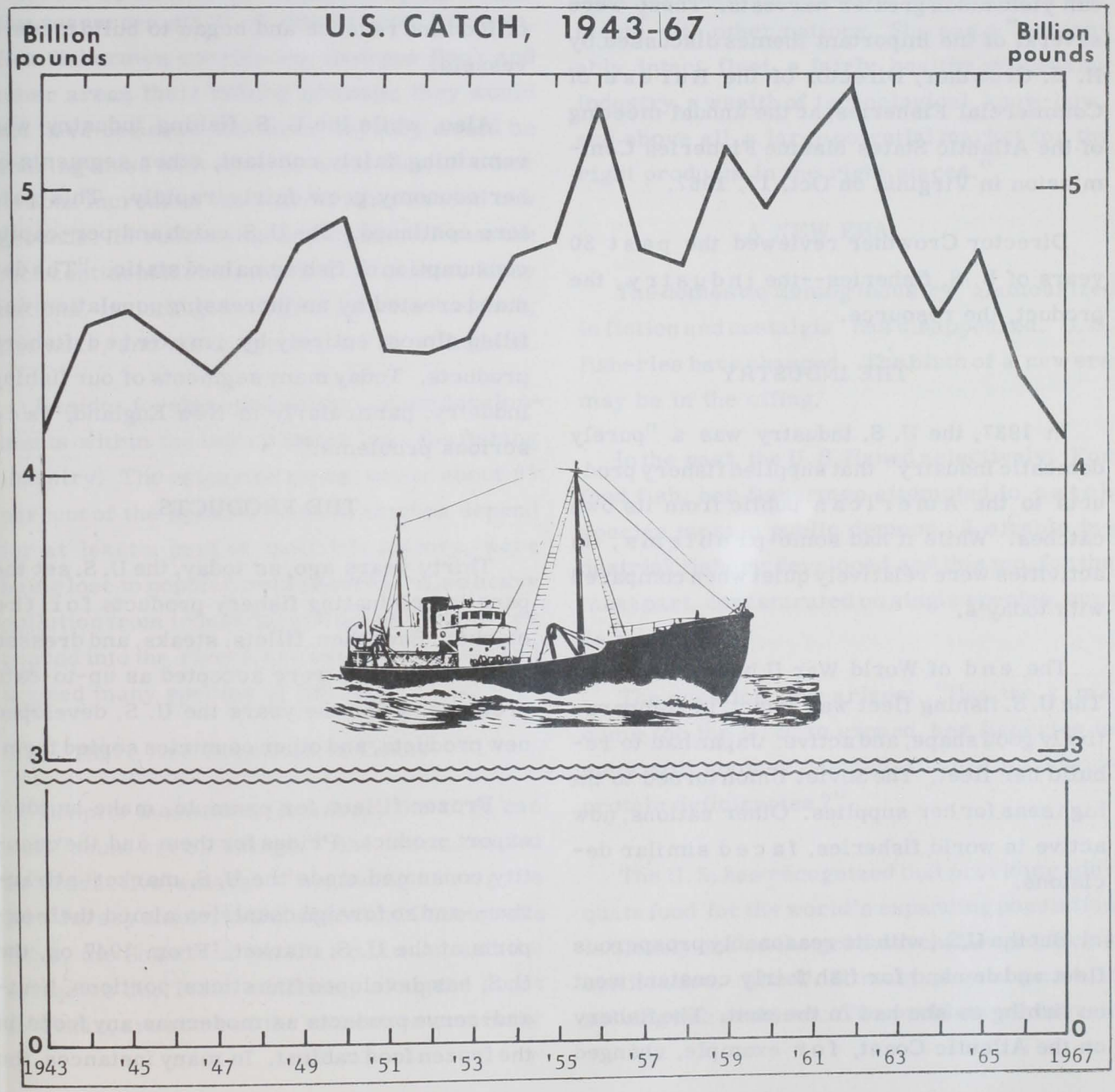
The 1967 pack of canned salmon will be around 2.1 million standard cases--less than half the previous year's production of 4.3 million cases and the smallest pack since 1905.

The 1967 pack of tuna will be a new record of about 21.7 million standard cases--1.8 million cases, or 9 percent, larger than in 1966. For the first time since 1957, 50 percent (or more) of the total U. S. pack of tuna will come from U. S.-caught fish.

The pack of shrimp will be about 2,360,000 standard cases; in 1966, it was 2,235,000.

Production of canned oysters will be around 500,000 cases, a 40 percent increase over 1966.

There are no reports or indications that other canned fishery products will show any large volume changes from the 1966 packs. (BCF Branch of Fishery Statistics.)



BCF DIRECTOR URGES RESURGENCE OF U. S. FISHERIES

The U. S. fishing industry must use more scientific methods to find and harvest fish if it is to play a significant role in an era of changing fisheries. The demand for the riches of the sea exists in the U. S. and is urgent in the developing nations. And, fortunately, the waters fished traditionally by American fishermen can yield much greater harvests. These were several of the important themes discussed by H. E. Crowther, Director of the Bureau of Commercial Fisheries, at the annual meeting of the Atlantic States Marine Fisheries Commission in Virginia on Oct. 17, 1967.

Director Crowther reviewed the past 30 years of U. S. fisheries--the industry, the product, the resource.

THE INDUSTRY

In 1937, the U. S. industry was a "purely domestic industry" that supplied fishery products to the American public from its own catches. While it had some problems, its activities were relatively quiet when compared with today's.

The end of World War II brought change. The U. S. fishing fleet was intact, in comparatively good shape, and active. Japan had to rebuild her fleet. The Soviet Union turned to the high seas for her supplies. Other nations, now active in world fisheries, faced similar decisions.

But the U.S., with its reasonably prosperous fleet and demand for fish fairly constant went on fishing as she had in the past. The fishery on the Atlantic Coast, for example, changed somewhat over the years. "A few vessels were built--but not enough to solve the problem of obsolescence." Not enough young people entered the industry to replace those who left.

During the post World War II period, the fishing industries of several nations recognized the potential of the oceans as a source of food and revenue and began to build modern vessels.

Also, while the U. S. fishing industry was remaining fairly constant, other segments of her economy grew fairly rapidly. This pattern continued. The U. S. catch and per-capita consumption of fish remained static. "The demand created by an increasing population was filled almost entirely by imported fishery products. Today many segments of our fishing industry, particularly in New England, face serious problems."

THE PRODUCTS

Thirty years ago, as today, the U. S. set the pace in originating fishery products for the market. Back then, fillets, steaks, and dressed and whole fish were accepted as up-to-date products. Over the years the U. S. developed new products, and other countries copied them.

Frozen fillets, for example, make an ideal export product. Prices for them and the quantity consumed made the U. S. market attractive--and so foreign countries aimed their exports at the U. S. market. From 1947 on, the U. S. has developed fish sticks, portions, heat-and-serve products as modern as any foods in the frozen food cabinet. In many instances, the

industry developed products more advanced than any in the food trade. The U. S. was the world leader. Today there is need for even more modern fishery products than those produced. Convenience products are capturing more of the market and all fishery products are not keeping up with this development.

THE RESOURCE

In 1937, and for many years thereafter, the resources off U. S. coasts were her own. Her fishermen considered Georges Bank and other areas their fishing grounds; they would not have believed that some day they would be sharing these with other nations. But, as other nations increased their fleets, they needed new grounds. In recent years, they moved onto the rich continental shelf off the U. S. coasts. Many nations, including the USSR, fish for haddock, red hake, and other species off New England.

Besides foreign competition, other developments within the United States hurt the fishing industry. The estuarine zones, where about 65 percent of the species the U. S. catches depend for at least a part of their life history, were being lost to population pressures. Also heavy pollution from industrial and domestic sources poured into the rivers and estuarine areas and injured many species of fish.

Still, There Are Blessings to Count

Despite these woes, however, the U. S. can still "count her blessings." She is surrounded by productive waters. "Beginning along the New Jersey shore, to Delaware and Chesapeake Bays, the Sounds of the Carolinas, and the estuaries and inlets extending along the coast to Texas, are some of the richest waters in the world. The broad areas of the continental shelf off New England and the Gulf of Mexico have produced tremendous catches of fish and shellfish. The traditional fisheries can be maintained with proper manipulation."

In addition, the U. S. has vast underutilized and unutilized resources off her shores. Her successful experience with international commissions shows that it is possible in some cases to establish resource-sharing arrangements with other nations. She has a "reasonably intact fleet, a fairly healthy processing industry, a wealth of technological know-how, and above all, a large potential market for the right products in the right places."

A NEW ERA

The domestic fishing industry "glamourized in fiction and nostalgia" has disappeared. U. S. fisheries have changed. The birth of a new era may be in the offing.

In the past, the U. S. fished selectively. For food fish, her fishermen attempted to catch species most in public demand. A sizable industrial fishery developed and this too, for the most part, concentrated on single species, such as menhaden.

The question now arises: "Has the time come for the U. S. to expand her fisheries to meet still another demand--that of worldwide protein deficiencies?"

The U. S. has recognized that providing adequate food for the world's expanding population is clearly one of the greatest challenges facing civilization. The U. S. must play a part in solving this problem. The problem already is

acute. Drastic and comprehensive actions must be taken immediately.

Animal Protein Needed

Today, the limited quantity of all food (calories) greatly concerns many parts of the developing world--but even more crucial is the shortage of animal protein needed to provide a balanced diet.

The recent report of the President's Science Advisory Committee on the World Food Problem concludes:

"It is imperative for programs designed to alleviate protein deficiency to produce big results in a relatively short time. Since even the most vigorous efforts probably will fall short of the goal, work should be initiated promptly on any program which shows promise of possible significance."

No steps taken to date to solve this problem have stemmed the worsening trend. There is no adequate solution in sight. President Johnson recently warned that "the shadow of starvation and impending famine has grown even darker." He said that a "massive effort" by the U. S. and other nations" to help the less fortunate of the earth to help themselves" is necessary.

The urgency of this problem is demonstrated by these facts:

1. World population was expected to increase from 3.3 billion in 1965 to 5 billion in 1985--and to between 6 and 7.5 billion by the year 2000.

2. At least 20 percent of the 2.25 billion people living in underdeveloped countries today receive too few calories. About 60 percent have diets that are inadequate in nutritional quality.

3. If present rates of population growth continue, by the year 2000 there will be more than four times as many people in less-developed countries than in the developed ones.

4. Calculated nutritional requirements indicate that food needs in developing countries will at least double in the next 20 years.

Overlooked Source of Animal Protein

It has become apparent to many that one important source of animal protein that has been largely overlooked and neglected is the fishery resource of the seas and inland waters. "There is little doubt that the potential productivity of fish for food is many times the 1965 harvest of 58 million metric tons." Scientists offer different estimates of the oceans' annual potential production. They range from 200 million metric tons to 4,000 million metric tons. But, as one scientist noted, it makes little difference who is right. Even the smaller figure is sufficient to provide the animal protein needed in the diet for twice today's world population.

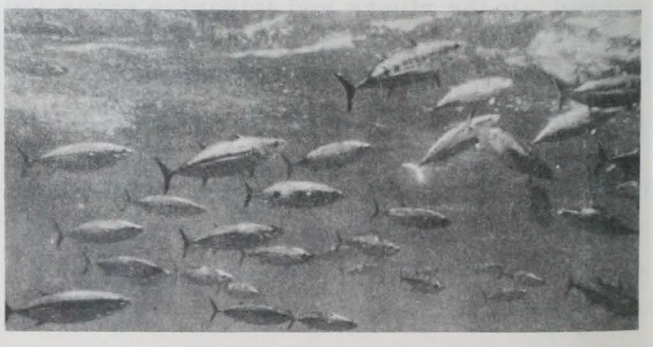


Fig. 1 - Tuna seen from observation chamber of research vessel.

The U. S. estimate of the sustainable yield of the resources in areas traditionally fished

by American fishermen--in U.S. coastal waters and off certain foreign coasts in the western hemisphere--is that these resources, in the aggregate, can produce at least five or six times the present yield. That is about 28 billion pounds.

Reduced to its simplest terms, the problem is to get food from the sea to those who need it. This requires introduction into world markets of products "that are economical, easily stored and transported, require no refrigeration, and that can be readily incorporated into diets acceptable by the consumers. One such product with a tremendous potential is fish protein concentrate."

Fish Protein Concentrate

FPC contains 80 percent animal protein of highest quality. Not all of the sea's annual potential production would be available or required to manufacture FPC. Each ton of fish yields 300 to 400 pounds of protein. Using conservative estimates of potential world fish production--200 million metric tons--the sea could produce at least 30 to 40 million tons of animal protein annually--enough to provide 20 grams a day for about 5 billion people.

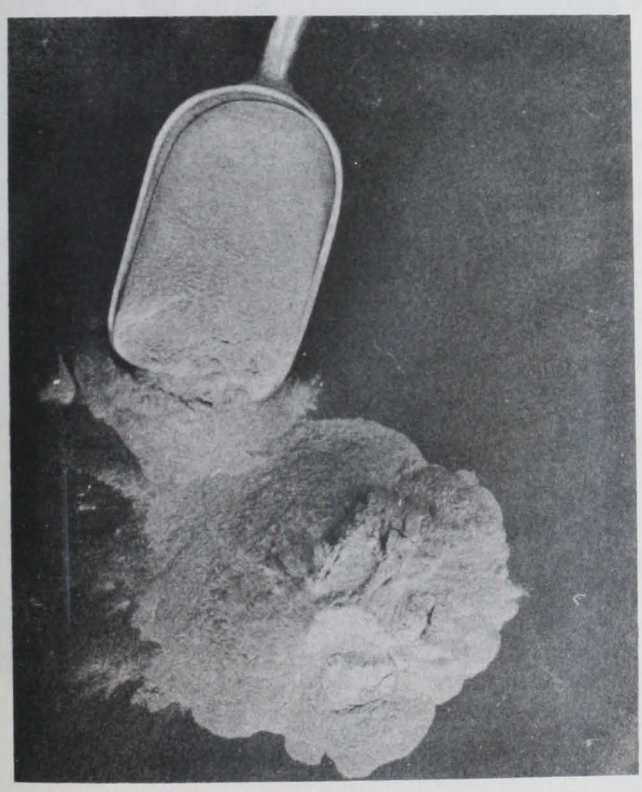


Fig. 2 - Fish Protein Concentrate.

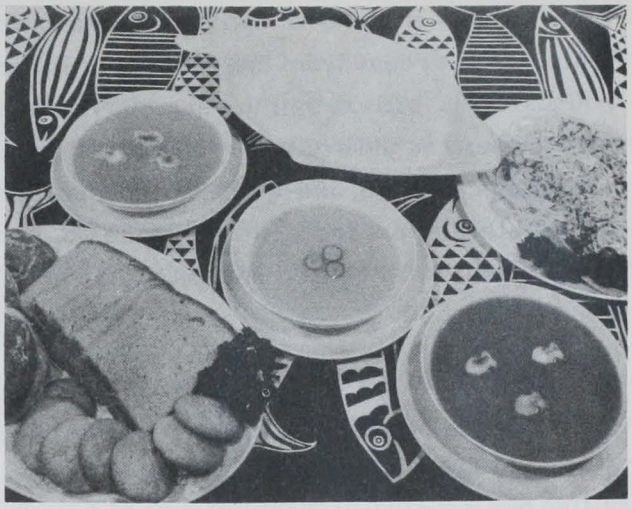


Fig. 3 - All these foods contain FPC.

Growing U.S. Demand for Fisheries Products

In addition to the needs of developing nations for animal protein, there is a growing demand for edible and nonedible fish and fish products in the U.S. This demand has increased more rapidly than the population. Per-capita use of fish and fish products has increased from 42 pounds (round weight) in 1950 to 62 pounds in 1966.

"Demand studies using population projections, income projections, and competitive price relationships among commodities have been used to make estimates of future demand. An estimate based on conservative projections of population, income, and per-capita consumption is that total utilization of fish and

fish products in the U. S. will increase a minimum of 72 percent from the current 12 billion pounds to 21 billion by the year 2000. Using higher, but not unrealistic projections of population, income, and per capita consumption for edible fish products, the increase would be 162 percent to 32 billion pounds by the year 2000."

As the need for increased food production from the sea becomes more urgent, two basic questions must be asked:

"Is the industry prepared to play its role in this new era of changing fisheries?"

"What can the States and the Bureau of Commercial Fisheries do to assist the industry in increasing production?"

Industry Must Overcome Obstacles

The U. S. producer's future role in world fisheries depends on solving certain problems. The resource base for the U. S. fishing industry is considerably greater than is being used now. It involves many latent or underutilized resources. They are not exploited, or are only partially exploited, by American fishermen; in large part this is because the American industry, "beset with many problems reflected in high costs, cannot now harvest them and produce end-products in a form and at a price competitive with imports. High costs, to a great extent, result from lack of technological innovation, inadequate data about the resources, and the presence of institutional barriers."

Need for Technological Improvement

Technological improvements, combined with the lowering of institutional barriers and study of resources can reduce costs substantially--and improve the competitive position of the U. S. industry. "Technological improvement can be undertaken by the industry, provided the fundamental technological, biological, and oceanographic research necessary to a better understanding of the resources and the means to harvest and process them are first provided by the States and the Federal Government. The removal, or mitigation, of the effects of institutional and political barriers is largely beyond the capability of the industry. The application of technological discoveries by industry is not alone enough to solve industry's problems. Indeed it is unlikely to come about unless there is some promise of progress in all areas of research and development."

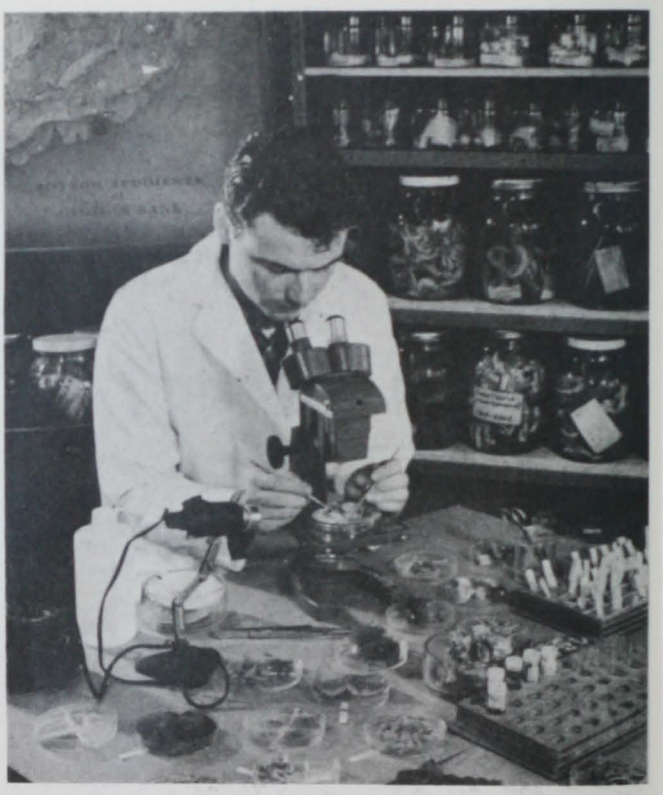


Fig. 4 - Bruce R. Burns, Fishery Biologist at BCF's Biological Laboratory, Woods Hole, Mass., identifying bottom-dwelling invertebrates from the New England fishing grounds.

The State and the Federal Government must do more in the near future to assure an eco-

nomically sound fishing industry. This condition is necessary before the U.S. can guide the developing nations in obtaining food from the sea. "There is a good probability that major improvements can be made."

Fishing Methods Barely Changed

"There has been no fundamental change in fishing methods since fishing began. The great technological developments of the last 30 years have scarcely been applied to the art of locating and catching fish. Exploitation of fishery resources, especially those now unutilized or underutilized, awaits major improvements in present harvesting methods. It also awaits entirely new concepts of fishing vessel design, deck equipment, fishing gear and techniques, and fish handling and processing methods which will maximize catches and quality--improve efficiency--and increase the profit earning capacity of the fishing industry."

An increased harvest will create a need for new resource management techniques. Otherwise the catch of each species in turn will rise to a maximum and decline as fishing and other pressures take effect. "The present understanding of how to realize the potential of our ocean resources is so imperfect that even the most optimistic experts find it difficult to visualize an average yield--over the entire ocean--greater than 20 pounds per acre. This is despite the fact that some extensive ocean regions--without cultivation--produce 300 to 400 pounds per acre per year."

There is need to develop better methods of applying the existing wealth of technological skills to fisheries exploitation and management. Many research and development programs must be continued and expanded. The many excellent State projects along the Atlantic Coast under P.L. 88-309 and P.L. 89-304 are already providing some answers to resource and industry problems. These Federal Aid programs may lead to alleviation, wherever possible, of institutional barriers that inhibit efficient resource utilization.

Research and development on Atlantic Coast resources also may lead to a change in the nature of the fisheries, from hunting and capturing to new methods of herding and cultivation--aquatic husbandry.

Space Science May Help

"We must also consider approaches which heretofore have been impossible or too expensive to undertake. These opportunities occur as 'spin offs' from space science, from recent advances in underwater technology, genetics, and other disciplines. A good example of such 'spin off' may be drawn from the space program. The competition in our race for the moon has and will continue to pay many dividends in areas not connected with the space battle. This program has given birth to thousands of inventions and discoveries. From 'greaseless frying pans' to sophisticated communications equipment to observing schools of fish and ocean currents--many new developments are springing from the launching pads to feed the insatiable hunger of science and industry for new technological concepts."

International Efforts for Conservation

Intensive and selective fishing by foreign fleets have created dangers that certain fish species along the Atlantic Coast may be overharvested.

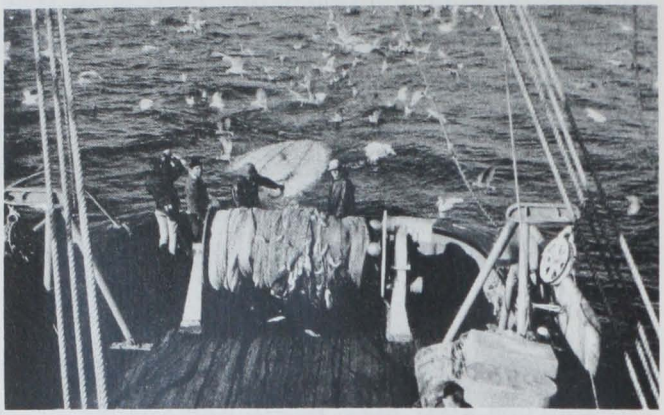


Fig. 5 - Bringing in catch of Pacific hake (Merluccius productus) aboard BCF research vessel "John N. Cobb." The Russians have made large catches in this relatively new, BCF-discovered, fishery.

"Our efforts to meet this problem through international conventions, and supplemented by bilateral agreements where necessary, have, for the most part, met with success. We have made a good beginning in fostering conservation and in maintaining or increasing access to high seas fisheries resources by our fleets. However, there is a difficult road ahead. Sooner or later we will need to find new international concepts which will resolve international fisheries problems once and for all."

The States and Federal Government "should plan and carry out their work cooperatively with industry--then turn over to private enterprise the development of a productive fishing industry as early as possible."

"There is no doubt in my mind that in the near future the underutilized resources of the ocean will be harvested and converted into protein products for human food and industrial uses.

"It is my hope that as this time draws near, the fishing industry will take advantage of current technological developments, and will establish expanded and more efficient fish harvesting and processing capabilities at home and abroad. I believe the fish protein concentrate program can foster the encouragement of large-scale investment in all aspects of the exploitation of the sea's living resources. If it can be established that fish can be converted into a protein food supplement at a profit--and all indications are that it can--then industry itself will make greater investment in research and development for an even more advanced technology in the 30 years ahead.

"I cannot emphasize strongly enough that the present situation--this beginning of a new era in fisheries exploitation--is one in which basic decisions must be made by the States, the industry, and the Federal Government. We must decide soon what the position of our fishing industry should be during the next 30 years. Shall we maintain the status quo of our industry and perhaps slip even further down the production ladder--or shall we, through a cooperative effort, take the necessary steps to achieve a greater share of the world potential of fish and shellfish resources?

"An early resurgence in our fisheries will come at a most critical time in world history--when the people of the world are taking up more and more of the earth's land areas--and when the tapping of the ocean wealth was never more opportune and needed.

"The U. S. can and must take the initiative to help our own economy, and to spread enormous good will by harvesting the ocean to feed a hungry world."

UNITED STATES

Shrimp Fishery of New England

During the past 3 years, the large population of shrimp that inhabits the North American coast from Cape Cod to Nova Scotia has provided Maine fishermen with a profitable fishery. It bids fair to rival the groundfish and whiting fisheries that have been the mainstay of the small and medium sized otter trawlers.

Center of the thriving fishery is Portland, Maine. There 41 of the estimated 100 shrimp trawlers operating from Maine ports in 1967 landed their catches during the fishing season from mid-December until early April. Production, value of catch to the fishermen, and number of boats in the fishery--all have shown a steady increase since 1965. In that year, a fleet of 20 trawlers landed over 1,000,000 pounds of shrimp worth $120,000 to the fishermen.

In 1966, 36 vessels fished out of Portland and caught close to 3,000,000 pounds of shrimp with an exvessel value of nearly $400,000. Besides Portland landings, production from other ports, such as New Harbor and Boothbay Harbor, was considerable. It is estimated that the total Maine catch for 1967 will be 5,000,000 pounds.

Groundfish Caught With Shrimp

In addition, substantial quantities of groundfish captured with the shrimp contribute measurably to profits of the operations. A conservative estimate for the three-month season is 15 percent of the shrimp catch, or 750,000 pounds valued at $45,000.

Boats operating out of Portland in the shrimp fishery range from 35 to 65 feet long and have 2-man crews; a few boats carry 3 men. Smaller boats converted into otter trawlers during the shrimp season work out of small ports within a 50-mile radius of Portland. Most of these carry a single man, the owner-captain.

Fishing operations similar to the ocean perch fishery are carried out only in daylight hours. Fishing grounds are within reasonable steaming distance of the ports--3 to 4 hours or 20 to 30 miles. Generally, the boats leave port between 3 and 4 o'clock in the morning and reach the fishing grounds shortly after daybreak, when fishing begins.

A Typical Boat

Typical of the boats in the Portland fleet is the F/V "Tern," a 3-man, Western-rigged, 63-foot, steel trawler built in 1963.

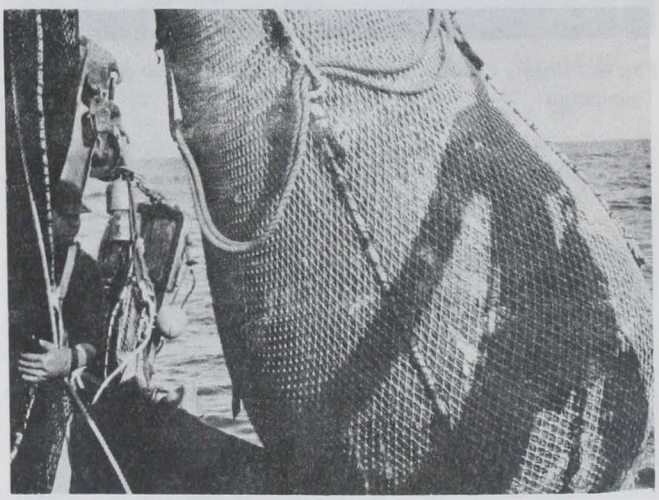


Fig. 1 - Catch of 1,000 pounds of shrimp and 800 pounds of groundfish coming aboard Maine shrimper F/V Tern in March 1967.

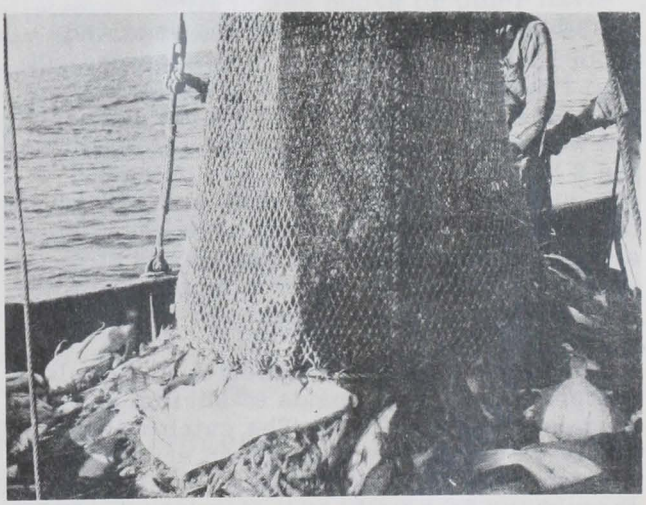


Fig. 2 - Dumping result of 2-hour tow in March 1967 on shrimp grounds ESE of Portland Light Vessel.

Fig. 3 - Shrimp catch of about 1,500 pounds and 500 pounds of groundfish--2½-hour tow--March 1967.

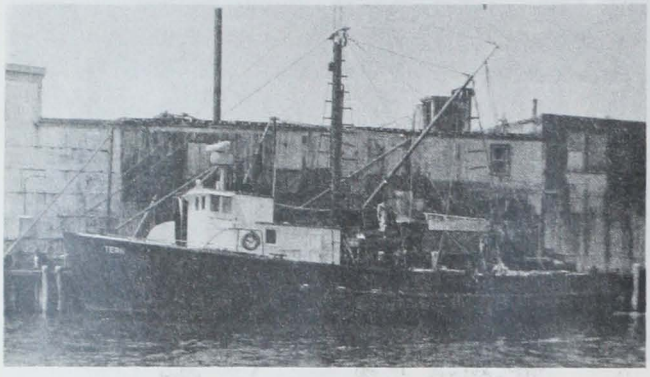


Fig. 4 - F/V Tern--65' otter trawler operating in shrimp, whiting, and ocean perch fisheries out of Portland, Maine.

On March 31, 1967, the Tern departed from Portland at 4:00 a.m. and steamed out past Portland Light Vessel to the deep waters off Cape Elizabeth. The first set of the net was made at 7:15 a.m. The net was towed for 3 hours in 81 to 84 fathoms of water. It caught 1,000 pounds of shrimp and 500 pounds of mixed groundfish, mostly dabs, gray sole, and hake. The catch was sorted and stowed in the fish hold in about 45 minutes while the boat continued on its second tow of the day.

The second set was hauled at 1:00 o'clock and produced 1,000 pounds of shrimp and 800 pounds of groundfish. The catch was relatively free of so-called trash species that must be picked out before guiding the shrimp through the deck bunker opening into the fish hold. In about 40 minutes, the crew had stowed the shrimp in the hold and dressed and washed the groundfish. Last haul of the day, a tow of 2½ hours, added another 800 pounds of shrimp and 500 pounds of flounders and codfish to the catch. At 3:30 p.m., the Tern headed for home. It arrived in Portland at 6 o'clock. The catch was unloaded, the fish hold washed down, and the boat made ready for another trip the next day.

--By J. J. Murray
Safety Officer, BCF
Gloucester, Mass.

Great Lakes Commercial Fishery Declines in First Half of 1967

Catch statistics available to the Great Lakes Commission for four states--Michigan, Ohio, Pennsylvania, and Wisconsin--show that commercial fishermen landed 32.5 million pounds of fish through June 1967. This was 3 million pounds less than during the 1966 period. In 1966, the catch for these states was 65.2 million pounds, or 97 percent of the total for the eight Great Lakes states.

Canadian commercial landings in the Lakes also were down in first-half 1967; the total was 17.4 million pounds, compared to 22.5 million for the 1966 period.

The decrease in U. S. landings this year was due primarily to a substantial decline in several major species, according to BCF statistics. While the 1967 alewife catch was nearly 1.4 million pounds below 1966 (see table which provides first-half summaries for the states and prominent species), it continued to contribute the largest share of U.S. landings--42 percent. While the alewife total was down, Michigan's part of the catch increased from 3.5 to 5.1 million pounds. This resulted in the state showing an overall gain from 1966 to 1967.

First-Half 1967 Catches in Thousands (000s) of Pounds

State	1966	1967	Species	1966	1967
Michigan	10,884	11,778	Alewives	15,069	13,681
Ohio	7,719	7,079	Yellow perch	3,102	2,191
Penna.	214	172	Lake herring	1,593	983
Wisconsin	16,665	13,451	Chubs (all)	3,816	3,833
Total	35,482	32,480	Carp	4,940	4,499

Yellow Perch Landings

As alewife affects total Lake Michigan catch, so yellow perch landings are important to the yield from U. S. waters of Lake Erie. In 1967, perch landings here were 1.4 million pounds, or a million pounds less than through

June 1966. The reporting states--Michigan, Ohio, and Pennsylvania--noted declines. However, the outlook for 1968 is optimistic because the 1965 year-class is reported one of the most successful hatches on record. These fish, now averaging about $7\frac{1}{2}$ inches long, should provide the bulk of the catch for the next few years.

For lake herring, the 1967 decrease of some 600,000 pounds was primarily in Lake Superior. It continues the downward trend begun in the early 1960's.

The total weight of chubs landed shows little change from 1966 to 1967. But the quantity to be processed for retail market, the major share, rose about 110,000 pounds to 3,567,000 pounds. Landings of the smaller chubs, used for animal food, were 266,000 pounds in 1967.

Canadian Catch

While Canada's Great Lakes catch dropped 5.1 million pounds from 1966, the value rose about 6 percent to $1,932,000, according to preliminary statistics of the Ontario Department of Lands and Forests.

Lake Erie landings in first-half 1967 were slightly more than 5 million pounds below 1966's figure (see table below). They accounted for most of the decline in the Canadian catch. This was due largely to declines in the smelt, white bass, and yellow perch catches. Landings of these species in 1966 and 1967 were (in thousands of pounds): yellow perch 8,643 and 8,239; smelt 7,866 and 4,576; white bass 1,159 and 309. In value, however, revenue from the sale of Lake Erie fish was $1,215,000, or $176,000 above 1966. Walleye production also increased in Lake Erie: from 89,000 to 202,000 pounds.

In other Canadian waters of the Lakes, total catches show no major change, although sizable differences occurred in some species. The 1966 and 1967 Canadian catch data, by lake, are:

	Erie	Huron	Ontario	Superior	St. Clair
1966 (000s of lbs.)	19,199	1,187	976	548	592
1967 (000s of lbs.)	14,145	1,107	1,056	544	530

OCEANOGRAPHY

Pamphlet Lists Distances Between 700 U. S. Ports

How far is it from Boston, Mass., to Anchorage, Alaska? As the crow flies, about 2,925 nautical miles; by ship, via the Panama Canal, 7,312 miles. This information is contained in a new edition of the U. S. Coast and Geodetic Survey (ESSA) publication "Distances Between United States Ports." It also gives the nautical distances between 700 U. S. ports and much other useful information.

How long would it take to go by ship from Boston to Anchorage? A table enables you to estimate the time it takes to travel so many nautical miles at varying speeds: a 7,312-mile trip would take 38 days and 2 hours at 8 knots, but only 15 days and 6 hours at 20 knots. Another table converts nautical into statute miles.

The 49-page pamphlet includes distances for the Great Lakes and the Mississippi River system compiled from data of the U. S. Army Corps of Engineers.

Significant Changes Made

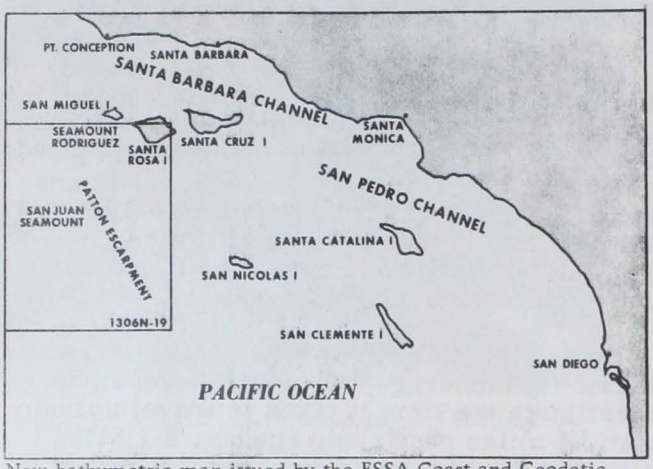
Significant changes from previous editions are the recomputation of distances between ports on the Gulf of Mexico, in accord with new shipping safety fairways, and the addition of distances between sea buoys or other navigational aids inside harbors. Worldwide distances between ports can be estimated by using the pamphlet with H. O. Publication 151, a U. S. Naval Oceanographic Office publication of foreign port distances.

The pamphlet may be purchased for 40 cents from the Coast and Geodetic Survey (Attn. C44), Rockville, Md., 20852, or from its sales agents at most seaports in the U. S.

New Map Printed of Seabed off California

The U. S. Coast and Geodetic Survey has published a new bathymetric map covering 14,700 square miles of sea bottom off the southern California coast. It includes an

undersea mountain more than two miles high and a submerged cliff more than 100 miles long. It depicts in detail the topography of the sea floor south and west of Santa Rosa Island.



New bathymetric map issued by the ESSA Coast and Geodetic Survey covers seabottom off Southern California coast west and south of Santa Rosa Island.

The map is the fourth in a series designed to give bathymetric coverage of the entire west coast. Similar maps are planned for the seabeds off the Atlantic and Gulf of Mexico coasts.

The depth covered is almost three miles at the map's most seaward point, 140 nautical miles southwest of Santa Rosa Island. Prominent underwater features include San Juan Seamount, with a base area of 1,200 square miles, which rises 11,144 feet to within 1,812 feet of the surface; 100 miles of the Patton Escarpment; and the lower part of Rodriguez Seamount.

Aid Economic Development

The bathymetric maps are designed to help Federal, state, and industrial interests explore and develop potentially vast resources of the Continental Shelf--800,000 square miles off the American coasts. Developing these resources depends heavily on bottom topographic maps; few exist. Knowledge of the sea bottom is essential for marine engineering, scientific studies in recovering offshore oil and minerals, and to evaluate shoreline erosion and accretion.

The new map (1306N-19) may be purchased for 50 cents from the Coast and Geodetic Survey (Attn. C44), Washington Science Center, Rockville, Md. 20852, or from chart distribution centers of the Coast and Geodetic Survey at 121 Customhouse, San Francisco, Calif. 94126, and 602 Federal Office Building, 90 Church St., New York, N. Y. 10007.

New Coast Pilot Published for Gulf of Mexico, Puerto Rico, and Virgin Islands

The Coast and Geodetic Survey has published a new edition of U. S. Coast Pilot 5, a 301-page nautical book describing the Gulf of Mexico from Key West, Fla., to Brownsville, Tex., and the coasts of Puerto Rico and the Virgin Islands. The Coast Survey publishes 8 Coast Pilots covering all U. S. coastal and intracoastal waters.

Generally, the book provides information that cannot be shown graphically on marine charts: "navigation regulations, outstanding landmarks, channel and anchorage peculiarities, dangers, weather, ice, freshets, routes, pilotage, and port facilities." Supplements containing changes reported since the most recent editions are published early each year.

Major Gulf ports described handle millions of tons of waterborne commerce annually in ships with drafts up to 40 feet. They include: Port Boca Grande, Tampa, and Panama City, Fla.; Mobile, Ala.; Pascagoula, Miss.; New Orleans, Baton Rouge, and Lake Charles, La.; and Orange, Beaumont, Port Arthur, Houston, Texas City, Galveston, Freeport, Port Lavaca, Corpus Christi, and Brownsville, Tex.

Major ports in Puerto Rico and the Virgin Islands covered are San Juan and Ponce, P. R., Charlotte Amalie, St. Thomas, and Christiansted, St. Croix, V. I.

All other seaports in the areas that provide bases for fishing fleets and small-boat operators, and smaller ports handling petroleum products and general merchandise, also are described.

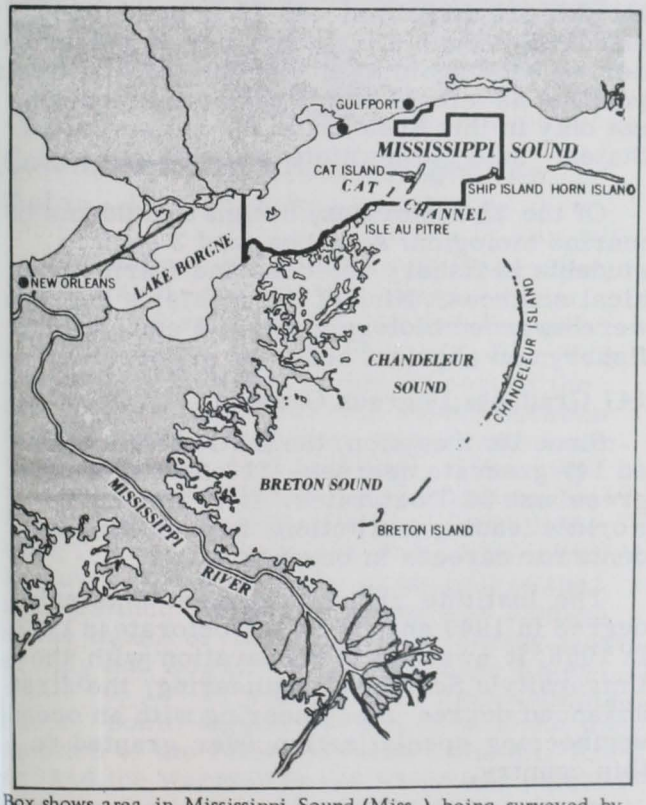
The publication also describes the 900-mile Gulf Intracoastal Waterway from Carrabelle, Fla., to Brownsville, Tex., and almost 220 miles of the Mississippi River to Baton Rouge, La.

Particularly interesting to mariners are Federal regulations concerning Safety Fairways and Anchorage Areas established for major Gulf ports.

The volume maybe bought for $2.50 from the Coast and Geodetic Survey (C44), Rockville, Md. 20852, or from Coast Survey sales agents throughout the area. The annual supplements are distributed free.

Hydrographic Survey of Mississippi Sound Begins

The Coast and Geodetic Survey is conducting a hydrographic survey of Mississippi Sound, Miss., including a search for a mile-long island reportedly no longer existent. The island, Isle au Pitre, appears on existing nautical charts about 10 miles offshore, halfway between Pass Christian and Gulfport. The island "appears almost obliterated, except for some shoal areas at the northeast end during low water."



Box shows area in Mississippi Sound (Miss.) being surveyed by ESSA-Coast and Geodetic Survey.

The survey continues a program begun in 1959 at Mobile Bay. It will continue westward through Mississippi Sound to Lake Borgne, La.

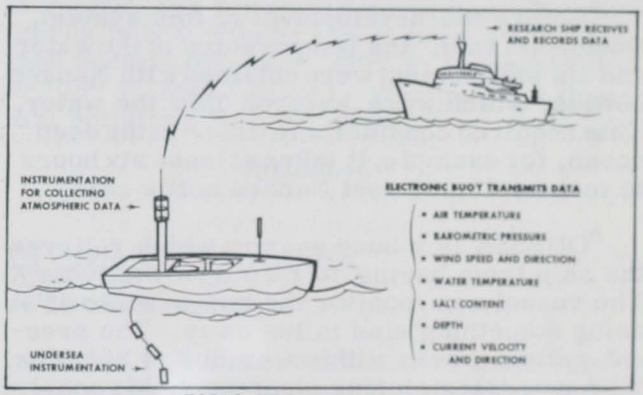
The survey party will use a 32-ft. launch in offshore areas, where its location will be pinpointed by electronic positioning equipment.

Except for deep-water channels, Mississippi Sound waters generally are not deeper than 18 feet. When hurricanes strike the area, shifting sands swirl around the islands and long shore currents disrupt the sand beds.

Major changes discovered during the survey will be noted immediately on existing nautical charts.

Deep-Sea Buoy System Developed

An unmanned, deep-sea, automated buoy system that records oceanographic and meteorological data simultaneously has been developed, announces the Environmental Science Services Administration (ESSA), U. S. Department of Commerce.



ESSA's "Odessa" system.

The system, known as ODESSA (Ocean data enivronmental science services acquisition), was developed by ESSA's Coast and Geodetic Survey (CGS).

ODESSA measures the temperature, salt content, and depth of the water, speed and direction of its currents, and barometric pressure, air temperature, and wind speed and direction.

The system is a number of buoys. Each supports a group of surface and subsurface electronic sensing packages. The data gathered by the sensors is telemetered to a central recording station (a console), either

aboard a ship or on land. Each buoy also contains a magnetic tape recorder so data can be recorded at each buoy station as well as central recording site.

The system was developed by A. J. Goodheart, chief of the Coast Survey's Ocean Engineering Branch, and Charles Kearse, an electronic development technician. It can accommodate up to 10 buoys, each supporting several surface and subsurface sensor packages, with 5 sensors per package.

The data can be gathered at various depths, and the buoys can be left unattended for weeks.

How System Works

Goodheart explained the way the buoy system works. "We can set the mechanism so that the buoy reports its data every 6, 12, 30, or 60 minutes," he stated. "Or, the receiving station can call up the buoy and request a data report, in which event the 10 buoys will report five times each during a period of 45 seconds."

"Before the development of this system," Goodheart said, "the temperature of the water and its salt content were obtained with Nansen bottles, which were lowered into the water. This required considerable time. In the deep ocean, for example, it takes at least six hours to make a 15,000-foot Nansen bottle cast.

"ODESSA is a buoy system which relieves the ship from having to remain stationary. The vessel can monitor the buoys while it's doing something else miles away. The present system works within a radius of 30 miles. With new telemetering equipment, this could be extended to 1,000 to 1,500 miles."

The buoys can be left at sea for 30 days and then be inspected and serviced if necessary. A lost buoy can be recovered by beaming in on its telemetry device.

The system was designed so that other sensors eventually can be added to obtain more data on the marine environment.

Other Potential Uses

The ODESSA system also has potential uses in studies of pollution in harbors and estuarine waters, and in collecting data on fish habitats. It will play a major role in ESSA's investigations of the continuous exchange process occurring at the interface between air and sea.

ODESSA has been under development by the Coast Survey for two years. It is a highly advanced version of TICUS (Tidal current survey). TICUS measures only the current's speed and direction.

University of Miami Is A Leader in Ocean Sciences Studies

Graduate degrees in oceanography were granted to 31 students by the University of Miami's Institute of Marine Sciences during the 12-month period ending September 1, 1967. It was twice that of any previous year.

Of the 31, doctorates were awarded to 12 students and master's degrees to 19. The largest previous total was 15 in both 1964 and 1965. "Such a large number of graduates serves once again to emphasize the Institute's position as a focal point for ocean sciences, not only in this area but in the entire United States," said the Institute's director.

Of the 12 doctorates, 6 went to students of marine biological sciences, and 3 each to students in fishery sciences and marine physical sciences. Nine of the master's degrees were awarded biology majors; 5 each went to fishery and physical sciences majors.

147 Graduate Degrees Granted

Since its inception, the Institute has granted 147 graduate degrees--113 Master's degrees and 34 Doctorates. It is among the world's leading institutions in preparing students for careers in oceanography.

The Institute granted its first Master's degree in 1949 and its first Doctorate in 1962. In 1966, it awarded in cooperation with the University's School of Engineering, the first advanced degree in engineering with an ocean engineering specialization ever granted in this country.

The Institute has 120 students enrolled for the current academic year, including those specializing in ocean engineering. (Institute of Marine Sciences, University of Miami, Oct. 4, 1967.)

Devaluation of British Pound Could Affect U. S. Fishing Industry

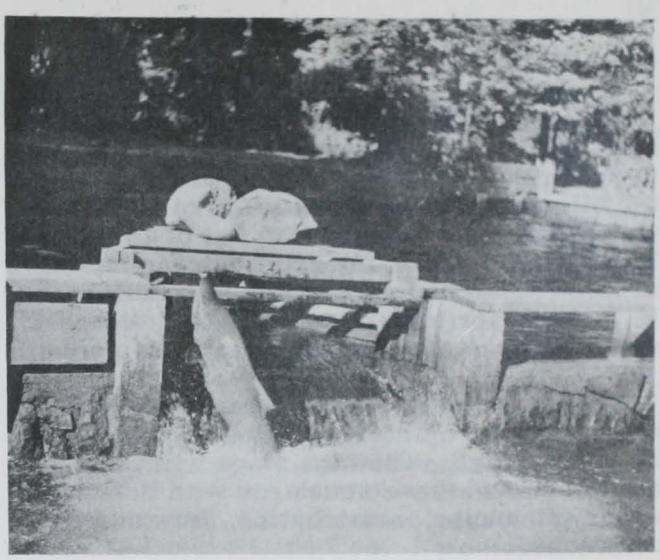
The devaluation of the British pound could have extensive effects on the U. S. fishing industry--most likely in a potential decrease in exports to the United Kingdom and other countries that devalued.

Exports of fish and fish products to the United Kingdom and these other countries are about one-fourth the value of all fish exports. In 1965, these exports to England were worth $15,530,000. At the pre-devaluation rate of exchange (1 pound = $2.80), the U. S. exports cost England 5,546,429 pounds. After devaluation (1 pound = $2.40), these same exports would cost Britain 6,470,833 pounds, or almost 1 million pounds more. This is equivalent to raising overnight the price (expressed in U. S. terms) of a can of salmon from 69 cents to 81 cents. Because U. S. prices to British now are relatively higher, purchases probably will tend to be lower.

Columbia River Salmon Migration Delayed by High Temperatures

The salmon migration in the Columbia River was delayed by high temperatures. About 1,000 summer chinook salmon and 1,500 steelhead had been tagged in June, July, and August at McNary Dam as part of the study of unaccountable fish losses between dams. Half the fish were tagged with sonic tags; half with vinyl loop tags. The early run of summer chinook salmon passed Ice Harbor and Priest Rapids dams with little delay. The loss was less than 10 percent. However, the bulk of the latter half of the run destined for Salmon River was blocked at the mouth of the Snake River during most of July and August--when the Snake River was 6° to 10° F. warmer than the Columbia River. Sonic-tagged fish milled about the junction of the relatively cool Columbia River, and the warmer Snake River and refused to enter the latter only yards away.

In mid-September, the temperature differential decreased to 3° F. (66° Columbia River, 69° Snake River). Fish passing McNary Dam since September 1 began moving up the Snake River and over Ice Harbor Dam with no apparent delay. Very few steelhead or summer chinook tagged in July and August accompanied them; the fate of these fish has not been determined. Temperatures in both rivers ran at least 4° F. higher than normal this year (72° F. Columbia River, 79° F. Snake River). Weather, not thermal pollution, was the cause.



A last leap and the long voyage home is done. A chinook salmon returns to the hatchery 4 years after being released as fingerling. (Photo: USIA in National Archives)

Di Luzio Calls Pollution A Local Challenge

It now is the responsibility of local communities throughout the U. S. to implement the Federal Government's clean-water goals, Frank Di Luzio, Assistant Secretary of the Interior for Water Pollution Control, recently told the Federation of Fly Fishermen in Moran, Wyoming. "This will not be an easy job," he said. "But it must be done and done well for the quality of the Nation's water is at stake."

Di Luzio added: "The priority problem now will be for the states, for the local communities and for industries to implement (clean water) goals efficiently."

He called on state officials and conservationists to "analyze the full range of alternative ways to handle problems such as municipal, industrial, and agricultural wastes, thermal pollution, detergents, saline water, oil, chemicals and silt."

Cites Major Challenge

Di Luzio said the major challenge was to build and operate waste treatment plants and to reach the goals of two Federal clean-water bills: the Water Quality Act of 1965 and the Clean Water Restoration Act of 1966. The first called for interstate stream standards. The second earmarked $3.5-billion in U. S. funds for a four-year period of construction grants for sewage-treatment plants.

Di Luzio said: "The program now is at the stage where water quality standards have been submitted. The next stage will be to act to enforce these standards with the necessary financing, construction, laws and institutions."

Our Waters Threatened

"Our water resources and the environment should never be used as sinks for untreated wastes," Di Luzio said. "Our ignorance--about the adverse and irreversible effects of pollution--is great enough to require all levels of government to take special care now to prevent damage to our waters.

"Industrial expansion does not have to mean water pollution. Today, you have to drive farther to find poorer fishing (and cleaner water) than ever before. This does not have to be."

Hawaiian Tuna Fleet Operations Studied

More numerical data on the operations of the Hawaiian skipjack tuna fleet were collected during summer 1967 by BCF's Biological Laboratory in Honolulu than ever before. Seven of the fleet's 13 vessels carried BCF observers to document every aspect of the fishing operations they could. The object of the study was to obtain information to improve fishing strategy.

The time spent by each element of the fishing operation was recorded to the nearest minute. The observers measured the temperature of the waters in which fish were caught. They took water samples to determine salinity. They also noted the amount of cloud cover. Fish schools usually are found beneath bird flocks, which feed on the small fish tunas eat. The observers estimated the numbers of birds in flocks and attempted to identify the species. The data collected by the observers during summer 1967 now are being prepared for analysis by computer. They will form the basis of one of the most detailed studies of a fishing fleet ever made.

Booklet Cites Progress in Sport Fishing Under Federal Program

The U. S. Department of the Interior has published "Fifteen Years of Better Fishing," a booklet describing the achievements of the Federal Aid to Fish Restoration Act of 1950 (Dingell-Johnson).

The 32-page booklet was produced by Interior's Bureau of Sport Fisheries and Wildlife (BSFW) in cooperation with State fish agencies and the Sport Fishing Institute. It reports on the projects that make up the Dingell-Johnson program of Federal-State cooperation to improve fish populations and habitats.

Excise Tax Pays for Program

Money for the program comes from a 10-percent excise tax collected by manufacturers of fishing rods, creels (a wickerwork basket for fish), reels, and artificial lures. The tax is paid to the U. S. Treasury, which gives it to BSFW to be divided among State wildlife agencies to finance approved programs.

BSFW Director John Gottschalk calls the booklet "a report to the fishermen who pay these taxes, telling them how the money was spent."

The publication is for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20420, for 50 cents.

Foreign Fishing off U. S. Coasts in October 1967

IN NORTHWEST ATLANTIC

During October 1967, 4 foreign nations fished in the North Atlantic off the New England coast. Early in the month, there were about 70 vessels; by month's end, about 30. In October 1966, about 60 foreign vessels fished on Georges Bank--mostly Soviet, with only occasional sightings of Polish, East German, and Romanian vessels. This year, however, Polish and East German vessels reappeared on Georges Bank in strength. This probably developed because their winter herring and cod fisheries in the North and Northwest Atlantic were not too successful.

Polish: Polish vessels constituted the bulk of foreign vessels on Georges Bank. Throughout October, 51 individual vessels were identified as 15 freezer stern trawlers, 32 large side trawlers, one factory base ship, and 3 supply vessels.

Early in the month, 37 Polish vessels were fishing along the Northern Edge of Georges Bank. Huge catches of herring were observed in open storage areas on deck and in trawl nets. Processing of these enormous catches was done, in part, aboard the new 13,000-gross-ton factory base ship "Gryf Pomorski," which arrived on Georges Bank recently. During second half of October, the Polish fleet of 25-30 vessels dispersed more widely. Small groups of 10 to 15 vessels were located along the Northern Edge and eastern slopes of Georges Bank. The vessels also appeared in the Great South Channel, 30 to 40 miles east of Cape Cod. Although these fleets were fishing actively, their herring catch had declined noticeably from the first 2 weeks.

On several occasions, Polish trawlers were anchored, or nested alongside the large factory base ship stationed 18-20 miles north of Race Point, Cape Cod. Though some U. S. fishermen reported Polish fishing, it is believed the vessels mostly transferred fish and replenished supplies.

Soviet: The number of vessels on Georges Bank was reduced sharply from about 20 early in the month to a few isolated ones by month's end. This near-withdrawal of all vessels occurred a month earlier than last year. Throughout October 1966, 50 to 60 vessels continued fishing south of Nantucket Island and along North Edge of Georges Bank.

22 individual vessels were identified: 16 factory stern trawlers, 3 medium side freezer trawlers, and 3 support vessels. Early in the month, they remained widely scattered between Cultivator Shoals and the northern slopes of Georges Bank. Small catches of herring were noted.

East German: Early in October, 6 freezer stern trawlers were sighted on Georges Bank among Soviet and Polish fleets. Large catches of herring were observed on board. By mid-month, East German vessels shifted to areas east of Cape Cod. No catches were seen there. By month's end, only one was reported fishing off New England coast.

West German: Six freezer stern trawlers sighted on Georges Bank and areas east of Cape Cod early in the month were reduced to two at month's end. Herring is believed to be their principal catch.

IN THE GULF OF MEXICO

No foreign fishing vessels were sighted off U. S. coasts during October.

OFF CALIFORNIA

Soviet: The decrease in the number of vessels that began in late September continued. No vessels were sighted during the first 2 weeks of October. By mid-month, however, 6 large stern trawlers (each about 3,000 gross tons) were sighted off northern California accompanied by 2 processing factoryships. By month's end, only one trawler was sighted fishing 25 miles off Point Reyes.

No information is available on the species caught.

OFF PACIFIC NORTHWEST

Japanese: Early in October, about 7 fishing vessels were operating off coasts of Washington and Oregon; by mid-month, between 13 and 15. One long-liner was reported making good catches of sablefish and ocean perch. One trawler was making good catches of ocean perch south of Columbia River's mouth.

Soviet: About 60 fishing and support vessels were sighted off Washington and Oregon

throughout October 1967, except in first week when bad weather prevented aerial surveillance off Oregon. In October 1966, 70 to 80 vessels were sighted off Pacific Northwest.

As in September 1967 and October 1966, fleet concentrations changed rapidly from area to area, apparently following fish concentrations. By mid-month, however, about two-thirds of all vessels operated off Washington and remained through month.

Off Washington, the fleet concentrated in first week off Cape Flattery (18 miles to northwest, with 11 vessels); in second week off Willapa Harbor (27 miles to southwest, 28 fishing and 8 support vessels); for rest of month, they were scattered along coast in small groups of not more than 6-7 vessels.

Off Oregon, no vessels were sighted in first week because of bad weather. In second half of month, a scattered pattern of fishing similar to that off Washington was observed. Many vessels fished alone or in groups of 2-3, possibly indicating no large schools were found. For first time, Soviet fishermen also had to cope with strong Japanese competition.

Reports on Soviet catches were not conclusive. Good catches of Pacific hake off Washington were observed in second week and excellent hake catches off Willapa Harbor in third week. Elsewhere, catches were reported poor, or conclusive observations were lacking.

Only 1-2 exploratory vessels were seen with Soviet fleets in early October.

During the month, the U. S. twice extended medical assistance to Soviet fishermen. In first week, a Soviet woman worker was evacuated from base ship "Churkin" to the U. S. Public Health hospital in Seattle with severe blood poisoning. She was returned in good health two weeks later.

On October 19, a Soviet fisherman was flown to the same hospital by the U. S. Coast Guard with fractured collar-bone, leg, ribs, and suspected internal bleeding.

On Oct. 7, the Soviet rescue tug "Bditelnii" requested permission from U. S. Coast Guard to tow medium fishing trawler "Kruzenshtern" into Strait of Juan de Fuca (off Washington) to permit divers to clear trawler's fouled propeller. Permission was granted.

OFF ALASKA

Japanese: The number of vessels decreased from about 145 in late September to about 60 in early October, to about 50 by mid-October, and then to about 14 by month's end. The initial decrease in effort in early October resulted from departure from Alaska area of 4 of the 5 eastern Bering Sea fish meal and oil fleets. The second decrease resulted from a decline in trawlers perch fishing--particularly in Gulf of Alaska. The last decrease occurred when the last fish meal and oil fleet in eastern Bering returned to Japan.

About 16 factory trawlers engaged in the Pacific Ocean perch fishery in Gulf of Alaska during first-half October. The effort nearly was equally divided in 2 major areas--7 trawlers on Albatross Bank and 6 trawlers off southeast Alaska. There was 1 trawler in each of the following areas: Chirikof Island, Middleton Island, and the Yakutat grounds. The pattern of previous years was repeated: The effort in the Gulf began to decline about mid-October. By month's end about 8 factory trawlers were active in the Gulf: 3 on Albatross Bank, 3 on Yakutat grounds, and 2 off southeastern Alaska. The number of trawlers along western Aleutians decreased from 4 to 2; in eastern Bering Sea, from 3 to 1 or 2 during October.

Four of the 5 fish meal and oil fleets terminated operations October 1 and returned to Japan. The remaining fleet, a factoryship and 29 accompanying trawlers, fished primarily on Alaska pollock grounds north of Fox Islands until late October. Then this fleet sailed for home.

At least 5 longliners fishing for sablefish were active in Gulf of Alaska during first two weeks. Four were off coast of southeast Alaska; the fifth fished south of Shumagin Islands in western Gulf. By mid-month, number of longliners in Gulf increased to 6 and a shift in areas of operation had occurred. Two longliners continued fishing off coast southeast Alaska, 3 were off Yakutat grounds, and 1 was southwest of Middleton Island. By month's end, only 1 longliner was located southwest of Middleton Island.

On October 17, a BCF agent and Coast Guard personnel on joint Coast Guard-BCF surface patrol in Gulf of Alaska boarded Japanese longliner "Eitan Maru" southwest of Middleton Island in central Gulf. While

inspecting ship, about 2.5 tons of halibut were found in a refrigerated hold. Because possession and transportation of, as well as catching, halibut by Japanese longline vessels in Gulf of Alaska violates INPFC treaty, the Eitan Maru was seized and taken to Kodiak. It was released later to Japanese authorities, who are responsible for prosecuting their nationals under the treaty. Since there were no Japanese patrol vessels in Gulf, the holds of the Eitan Maru were sealed. She sailed for Tokyo under orders by Japanese authorities. Documentation of the violation has been forwarded to Japan for use in prosecution.

Soviet: There were about 20 vessels through October engaged in Pacific ocean perch fishery.

The Gulf of Alaska perch fishery remained at low level; only about 5 large factory stern trawlers fished during first half. Most fished in the Western Gulf. During second half, the effort shifted somewhat--3 of 6 factory stern trawlers fished Yakutat grounds.

About 12 trawlers, primarily large factory stern trawlers, supported by a few refrigerated fish carriers, fished along Aleutians chain throughout month; during first half, 4 trawlers and a reefer south of Leguam Island, 4 trawlers southwest of Adak Island, and 4 trawlers south of Near Islands.

During first half, this total was divided equally between the Adak, Leguam, and Near Islands; by mid-month, 6 trawlers fished south of Leguam Island and only 3 in the two other areas.

The October 1967 Commercial Fisheries Review summarized, starting on page 3, the 84-page, illustrated booklet, "Fish & Man," published by the American Littoral Society. The booklet can be bought for $1.00 from:

Executive Secretary
American Littoral Society
Highlands, N. J. 07732

THIS CHRISTMAS TREE IS SHRIMPLY DELICIOUS

In answer to many requests, the United States Department of the Interior's Bureau of Commercial Fisheries has once again released instructions for its Shrimp Christmas Tree for the most exciting holiday table in the neighborhood.

From a commanding position on a buffet table or as a colorful centerpiece for a well-appointed holiday dinner, this unusual tree is certain to capture compliments. Leafy green endive duplicates crisp holly while ever-popular shrimp add shape and color interest to this creative conversation piece.

This intriguing tree is elegant but deceivingly simple. The materials are readily available at most local variety stores and supermarkets.

SHRIMP CHRISTMAS TREE

3 pounds shrimp, fresh or frozen
2 quarts water
$\frac{1}{2}$ cup salt
4 large bunches curly endive
1 styrofoam cone, $2\frac{1}{2}$ feet high
1 styrofoam square, 12 x 12 x 1 inch
1 small box round toothpicks
Cocktail Sauce

Thaw frozen shrimp. Place shrimp in boiling salted water. Cover and simmer about 5 minutes or until shrimp are pink and tender. Drain. Peel shrimp, leaving the last section of the shell on. Remove sand veins and wash. Chill. Separate and wash endive. Chill.

Place cone in the center of the styrofoam square and draw a circle around the base of the cone. Cut out circle and insert cone. Cover base and cone with overlapping leaves of endive. Fasten endive to styrofoam with toothpick halves. Start at the outside edge of the base and work up. Cover fully with greens to resemble Christmas tree. Attach shrimp to tree with toothpicks. Provide Cocktail Sauce for dunking. Serves 12.

STATES

Alaska

KING CRAB FISHERMEN OPPOSE HIGH COST OF STABILITY TESTS

Crab vessel owners testified at a meeting on October 19, 1967, that they were completely dissatisfied with insurance company requirements for vessel stability tests. The cost of the stability test was quoted at $1,600 to $2,000 per vessel, depending on the availability of vessel plans.

After much discussion, the vessel owners decided to organize a group insurance plan using the king crab marketing association as a means to start the plan.

* * *

KODIAK KING CRAB LANDINGS DOWN 22 PERCENT

King crab landings in Kodiak during the first 9 months of 1967 were 49.5 million pounds--a decline of 13.6 million pounds, or 22 percent, from the 1966 period's catch of 63.1 million pounds. However, increased production in the Alaska Peninsula and Unalaska areas has kept statewide landings close to 1966 production. Through August, the 1967 catch was 80.7 million pounds, compared to the 1966 period's landings of 84.4 million pounds. Currently, it is predicted that about 128 million pounds will be landed in 1967.

Oregon

RAZOR CLAM SET IS HEAVY

The heaviest "set" of razor clams ever recorded by Oregon Fish Commission biologists occurred on the Clatsop beaches in 1967. Sample screening of beach sands from Seaside north showed an average of 100 small seed clams for each square yard surveyed. The previous high set was in 1954 when Clatsop beaches showed 41 small clams per square yard. The lightest set occurred in 1955: average of less than one-half clam per yard.

At Cannon Beach and in Arch Cape-Cove Beach areas, the set was "average," 10 small clams per yard.

Growth of Razor Clam

During first few weeks of life, the larval razor clams (or veligers) are free floating and at mercy of ocean currents. In 5 to 16 weeks, the developing shell makes young clam heavier than surrounding water and it settles to the bottom. There it burrows into the sand. Within a few weeks, the youthful razors reach $\frac{3}{4}$ to 1 inch. Fish Commission biologists screen sample sections of the beach to determine success of year's clam "set."

1967 Augurs Well for 1968-69

The clams from the 1967 set will be taken during 1968 as one-year olds. But they will have greatest impact on the harvest when, in 1969, they enter the fishery as two-year olds. This year's heavy set augurs well for both years barring a natural catastrophe.

* * *

CRAB LAWS MODIFIED

The minimum legal size for Dungeness crab taken commercially in Oregon bays was raised from $5\frac{3}{4}$ inches to $6\frac{1}{4}$ inches by the Oregon Fish Commission in November 1967. (The sport crabbing minimum size remains $5\frac{3}{4}$ inches.) This action provides uniform minimum size limits for the bay and ocean commercial fisheries. The new regulation is expected to have little effect on the commercial crab harvest, which has averaged about 8 million pounds over the last 20 years, because the bays contribute less than 5 percent of the total landings.

New Regulations Follow Tagging Information

The uniform commercial regulations result from recent tagging breakthroughs by Fish Commission shellfish biologists, which disprove the idea that some Dungeness crab live solely in the bays while others live strictly in the ocean. The biologists developed a colorful spaghetti-like tag that will stay

with a crab through several sheddings of its shell and found that crabs move freely between bays and ocean. Crabs tagged in Yaquina Bay have been recovered in the ocean commercial fishery as far south as Coos Bay.

The commission also authorized commercial crab fishermen to set out fishing gear in the ocean and Columbia River 96 hours prior to the December 1st landing date. There is no closed season on crab in the bays.

Mississippi

CHEMICAL CO. WITHDRAWS APPLICATION TO DUMP WASTE

In a special public notice dated October 26, 1967, the U. S. Corps of Engineers announced that the Coastal Chemical Corporation of Pascagoula, Mississippi, had withdrawn its application for a permit to dump several million tons of gypsum slurry waste about 15 miles off the mouth of the Pascagoula River.

The Corps' notice concluded: "Furthermore, let it be known that the District Engineer will grant no permits for dumping waste material in navigable waters under his jurisdiction unless thorough studies and complete coordination with appropriate Federal and State agencies indicate that such material would have no adverse effect on navigation, marine life, or other activities in relation to the general public interest."

California

REPORT ON PELAGIC AND PARTYBOAT CATCHES

The Resources Agency of California reported that the California catch of pelagic (open sea) fish through October 31 was:

Landings in Tons	October		January 1 - October 31		
	1967 1/	1966	1967 1/	1966	10 yr. mean 1956-1965
	(Landings in Tons)				
Anchovy	2,560	3,161	30,661	22,183	6,528
Macherel, Jack	300	1,419	15,029	18,415	28,107
Mackerel, Pacific	25	764	223	1,948	14,630
Sardines	2	35	64	416	19,790
Squid	10	370	8,081	7,593	5,431
Total	2,897	5,749	54,058	50,555	74,486

1/Estimated. Accumulated landings are revised monthly.

Partyboat Catch

The 1967 partyboat catch of key marine species, through September, showed the take of rockfish and salmon running ahead of 1966, but other key species behind.

Species	Through September Totals		Gain or Loss
	1967	1966	
	(Nearest 100)		%
Rockfish	1,480,500	1,300,500	+14
Kelp, sand bass	870,000	1,126,700	-23
Barracuda	420,200	817,100	-49
Bonito	248,300	503,100	-51
Salmon	77,700	61,900	+26
Calif. halibut	56,000	80,600	-31
Yellowtail	22,300	56,700	-61
Striped bass	16,200	28,500	-43

See First Pacifics Since 1960

Biologist divers saw about fifty 10-inch Pacific mackerel schooled with jack mackerel off Palos Verdes Point. These are the first Pacifics they have observed since November 1960. In September, they saw firecracker sardines for the first time since 1962. In October, firecrackers appeared in unusual quantities in the San Diego bait catch.

Survey dives around the Richfield oil island, Rincon, disclosed that a large population of sea urchins had destroyed much of the once luxuriant kelp beds.

Maine

FIRST HALF 1967 LANDINGS ABOUT SAME AS IN 1966

During the first 6 months of 1967, Maine landings totaled 61.8 million pounds worth $7.5 million--up less than one percent in quantity and value from the 1966 period. The figures come from the Maine Sea & Shore Fisheries Department and BCF.

BUREAU OF COMMERCIAL FISHERIES PROGRAMS

"Cromwell" Studies Juvenile Skipjack

BCF's Honolulu-based Townsend Cromwell completed a cruise in Hawaiian waters on October 4, 1967, which was devoted largely to a study of juvenile skipjack and the effectiveness of a midwater trawl in catching them. (Cruise 32, July 12-October 4, 1967.)

These were the Cromwell's missions and the results:

• Collect juvenile skipjack and other tunas with the new small-mesh midwater trawl (Anchovy No. 2 Cobb Pelagic Trawl).

83 tows were made in 37 days of trawling. These included 36 tows inshore, about 5 miles off Waianae, Oahu; 29 tows offshore, 30 miles southwest of Barbers Point, Oahu; 12 tows off leeward Hawaii, 4 off leeward Lanai; and 2 off leeward Molokai over Penguin Bank.

About 996 larval, postlarval, and juvenile tunas were caught: 254 off Waianae, 539 off Barbers Point, 202 off Hawaii, and 1 off Molokai. The tunas included 5 or 6 species: skipjack, yellowfin, bigeye, albacore (?), little tunny, and frigate mackerel. The tunas ranged in fork length from 7 to 168 mm.

• Determine the type of midwater trawl haul that tends to catch the largest number of juvenile skipjack and other tunas.

A systematic sampling routine was followed in the primary sampling areas off Waianae and Barbers Point, Oahu, for the first 57 stations. This routine consisted of making 3 midwater trawl hauls each day at 8-hour intervals. The duration of tow was kept constant at 6 hours and the speed of tow constant at about 2 knots. Tows were made at approximately 1200-1800, 2000-0200, and 0400-1000 hours local time. The depth of tow was alternated between shallow (ca. 10-20 m.) and deep (ca. 80-120 m., or the depth of the salinity maximum). A bathykymograph attached to the net recorded the depth of each tow. A BT cast was made before each tow.

The most successful type of tow was the shallow tow at 2000-0200 hours: 10 of these tows caught 255 of the 619 tunas taken at the first 57 stations.

• Investigate the spatial and temporal distribution of juvenile skipjack and other tunas.

A comparison between the "inshore" area off Waianae (ca. 21.3° N., 158.2° W.) and the "offshore" area off Barbers Point (ca. 21.0° N., 158.5° W.) revealed that the offshore area produced the best catches of young tunas in July and August. Specifically, 539 tunas were taken in 29 offshore tows in July and August, as opposed to 83 tunas in 28 inshore tows.

• Make plankton tows to collect larval tunas for taxonomic studies.

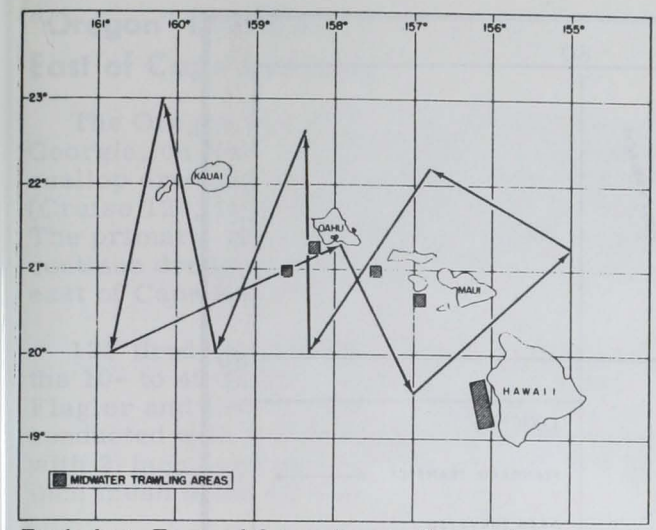
20 one-hour surface plankton tows were made with the 1-m. net in August and September and 83 tuna larvae were caught. These included 36 yellowfin, 30 frigate mackerel, 7 bigeye, 6 skipjack, 2 little tunny, and 2 albacore (?).

These larvae and about 700 tunas caught in the trawl were examined under the microscope at sea for red and black pigment spots, which are important taxonomic characters. The trawl provided an excellent series of specimens for comparing the pattern of pigmentation of the different species. For later electrophoretic studies, 141 whole specimens and 242 eye lenses were frozen.

• Obtain blood from all juvenile skipjack tuna, establish procedures for blood typing at sea and, if feasible, carry out such procedures.

The fork length of the largest juvenile skipjack tuna collected with the trawl was 48 mm. Some blood probably could have been obtained, but the cardiac region was torn open and no blood was present. No other skipjack larger than about 28 mm. was collected, so that blood typing was not possible for this species.

7 frigate mackerel (117-168 mm. FL) and 2 little tunny (110 and 147 mm. FL) were bled successfully. Procedures were quickly worked out and the blood, when tested against 15 skipjack reagents, gave strong agglutination reactions. The small amount of blood obtained from the 96-mm. little tunny was not sufficient for complete testing. The tentative conclusion is that for testing against as many as 15 reagents, sufficient quantities of blood can be obtained only from tunas at least 10 cm. long.



Track chart, Townsend Cromwell cruise 32, showing course taken for environmental and biological survey runs and areas of midwater trawling.

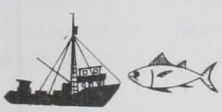
• Collect data on surface temperature, surface salinity, CTFM sonar targets, and sightings of bird flocks and fish schools in an area that surrounds and encompasses the Hawaiian skipjack tuna fishery (track shown in chart.)

3 environmental and biological survey runs were completed. Surface temperature and surface salinity were recorded along the cruise shown in track chart.

BT casts and salinity samples were taken about every 30 miles while underway, and the information transmitted by radio the same day.

A standard watch was maintained for bird flocks and fish schools. In 24 days of observation, 62 bird flocks were sighted: 13 were associated with skipjack schools, 1 with porpoise, and 46 with unidentified fish.

The CTFM sonar was operated for 24 hours on the downward legs of the cruise track. Of 128 targets, 42 were sighted on 3 runs down the Molokai Channel, 48 on 3 runs down the Kauai Channel, and 38 on 2 runs down the Kaulakahi Channel.



"Oregon" Surveys Scallop Beds North of Cape Kennedy

After 16 days of scallop dredging off Florida's east coast, BCF's exploratory fishing vessel Oregon returned to St. Simons Island, Georgia, on October 24, 1967. (Cruise 122, 10/9-24/67; see chart p. 26). This was the second in a series of industrial development cruises designed to re-survey the Cape Kennedy scallop beds. Cruise 122 stressed the area north of Cape Kennedy. The purpose of the explorations is to assess Florida's east coast grounds, previously shown to hold the greatest potential for commercial use of calico scallops (Pecten gibbus).

Between Mayport and Bethel Shoal, 168 dredging stations were occupied in the 10- to 40-fathom range. All dredging was conducted with 8-foot tumbler dredges fished with 2-inch bag rings, 20 rings deep, and $2\frac{1}{2}$-inch mesh nylon liners.

Catch Rates Significant

In the north portion, from new Smyrna Beach to Mayport, 142 dredging stations were occupied. East of New Smyrna Beach, where commercial concentrations were located during September, catch rates were again commercially significant, ranging up to 32 bushels of scallops per 30-minute drag in 25 to 27 fathoms. In this depth range, catch rates up to 7 bushels per 30-minute drag were obtained northward to east of Daytona Beach, where counts averaged 67 to 78 meats per pound and yields averaged 6 pounds per bushel.

Smaller sized and "seed" scallops were caught in amounts ranging up to 7 bushels per 30-minute drag at scattered locations throughout the area surveyed.

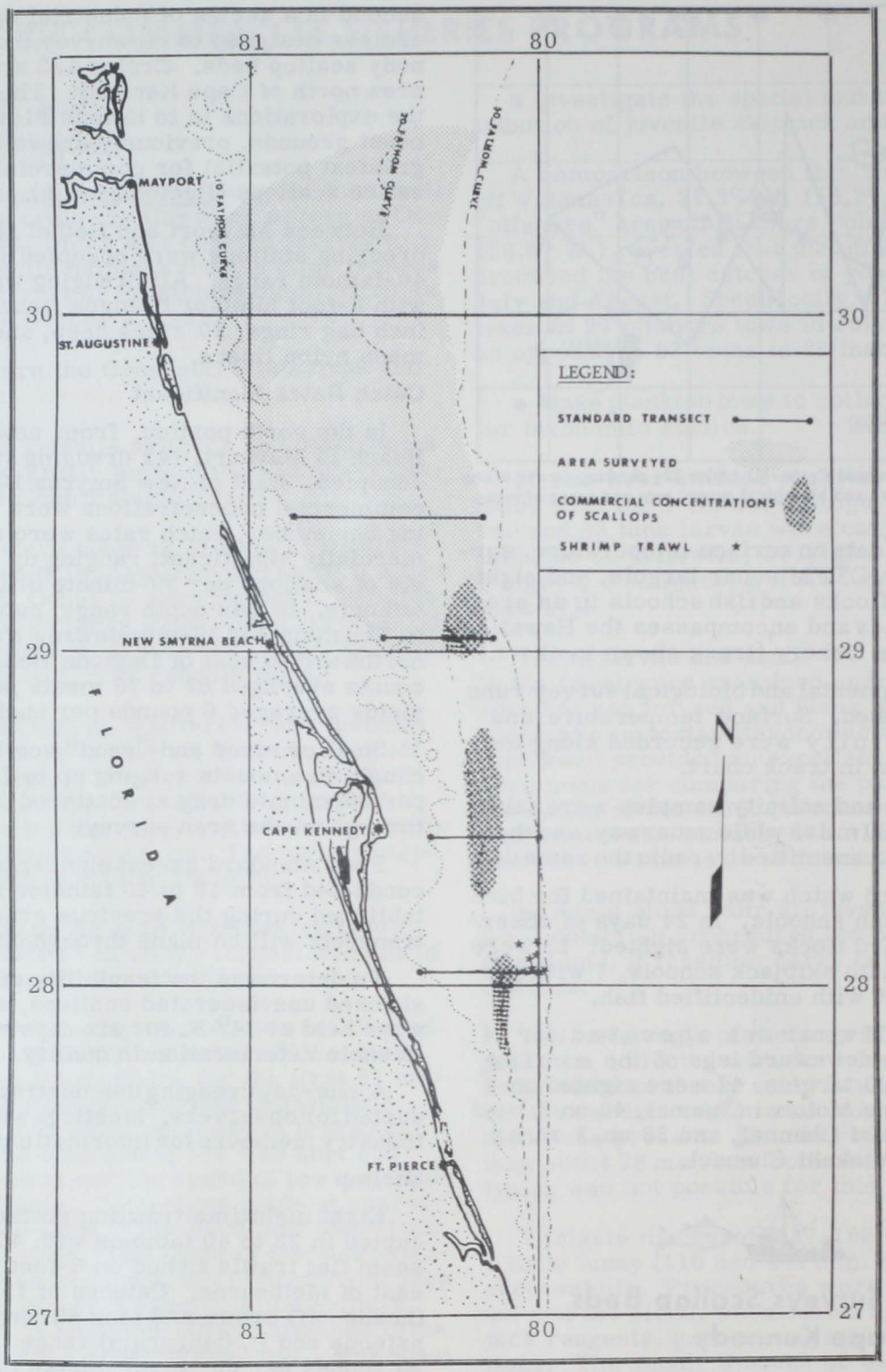
Four standard assessment transects were conducted from 10 to 40 fathoms in areas established during the previous cruise. These transects will be made throughout the series.

To determine the feasibility of holding shucked uneviscerated scallops, samples were held at 34° F. for six days with no noticeable deterioration in quality.

A one-day dredging demonstration was conducted for observers. Meetings were held with industry members for informational purposes.

Shrimp

Eight nighttime trawling stations were occupied in 22 to 40 fathoms with 40-foot 4-seam flat trawls fished on 6-foot chain doors east of Melbourne. Catches of 15/20 count (heads-off) brown and pink shrimp (Penaeus aztecus and P. duorarum) ranged from $3\frac{1}{2}$ to 25 pounds per 60- to 90-minute drag. Catches of rock shrimp (Sicyonia brevirostris) ranged from 50 to 165 pounds (heads-on) per drag. Eight drags totaled 802 pounds of 36/40 and 41/45 count (heads-on) rock shrimp in $10\frac{1}{2}$ hours.



R/V Oregon (Cruise 122).

"Oregon" Dredges East of Cape Kennedy

The Oregon returned to St. Simons Island, Georgia, on Nov. 20, 1967, after 15 days of scallop dredging off the Florida east coast. (Cruise 123, 11/6-20/67; see chart p. 28.) The primary objective of this cruise was to continue dredging with emphasis on the area east of Cape Kennedy.

121 dredging stations were occupied in the 10- to 40-fathom depth range between Flagler and Bethel Shoal. All dredging was conducted with 8-foot tumbler dredges fished with 2-inch bag rings, 20 rings deep, and $2\frac{1}{2}$-inch mesh nylon liners.

Catch Rates Significant

East of New Smyrna Beach, where commercial concentrations were located during September, catch rates again were commercially significant. They ranged up to 22.6 bushels of scallops per 30-minute drag in 23-27 fathoms. Counts ranged from 58-78 meats per pound, and yields averaged 6 pounds of meats per bushel.

East of Cape Kennedy, catch rates again were commercially significant. Here they ranged up to 16.8 bushels per 30-minute drag in 22-26 fathoms. Counts ranged from 68-90 meats per pound.

Smaller sized and "seed" scallops were caught at scattered locations throughout the area surveyed.

Four standard assessment transects were conducted from 10 to 40 fathoms in areas established during the September cruise. These transects are occupied during each cruise in the series.

A one-day dredging demonstration was conducted for observers. Meetings were held with industry members for informational purposes.

Shrimp

Eight nighttime trawling stations were occupied east of Melbourne in 26-38 fathoms with 65-foot 2- and 4-seam trawls fished on 8-foot chain doors. Catches of 15/20 count (heads-off) brown and pink (Penaeus aztecus and P. duorarum) ranged from 2 to 46 pounds per 60- to 180-minute drag. Catches of rock shrimp (Sicyonia brevirostris) ranged from 25 to 111 pounds (heads-on-per drag).

Expert Loaned to International Bank for Ecuadorean Study

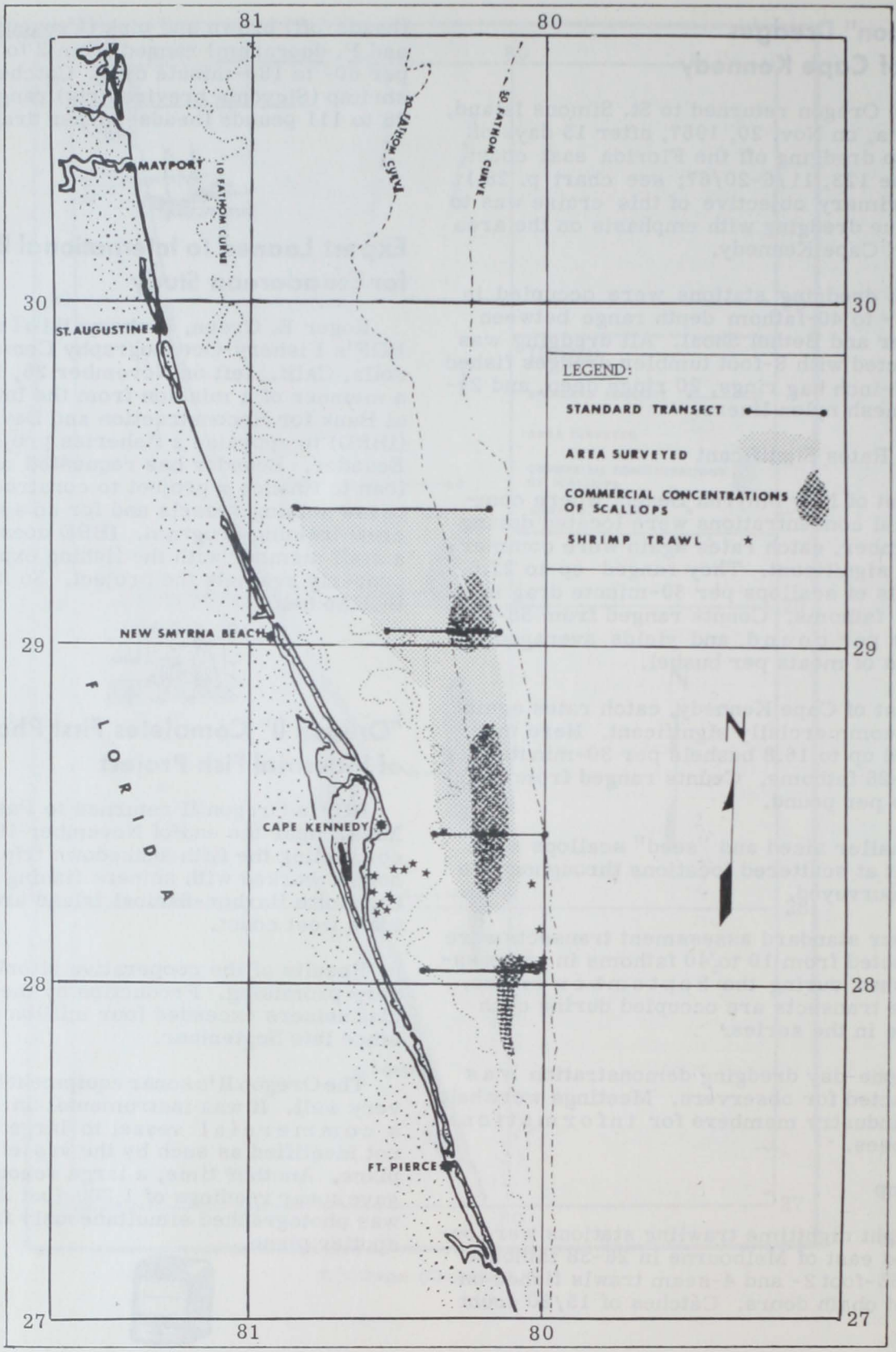
Roger E. Green, Fishery Biologist at BCF's Fishery-Oceanography Center in La Jolla, Calif., left on November 25, 1967, as a member of a mission from the International Bank for Reconstruction and Development (IBRD) to appraise a fisheries project in Ecuador. Ecuador has requested an IBRD loan to finance a project to construct 12 tuna purse seining vessels and for an associated crew training program. IBRD does not have a staff member with the fishing expertise to properly evaluate the project. So it asked BCF to help.

"Oregon II" Completes First Phase of Industrial Fish Project

BCF's Oregon II returned to Pascagoula, Miss., near the end of November 1967 after completing the fifth shakedown trip. Its personnel worked with seiners fishing in the Charlotte Harbor-Sanibel Island area of Florida's west coast.

Results of the cooperative effort have been very promising. Production by the commercial seiners exceeded four million pounds since late September.

The Oregon II's sonar equipment has worked very well. It was instrumental in directing a commercial vessel to large schools not identified as such by the vessel's spotter plane. Another time, a large school that gave sonar readings of 1,200-foot diameter was photographed simultaneously from the spotter plane.



R/V Oregon (Cruise 123).

"Bowers" Studies Effectiveness of Seines on Anchovies

The R/V George M. Bowers returned to Pascagoula, Miss., on September 22 after cruise No. 81 designed to determine the effectiveness of small-mesh purse seines for catching anchovies and other clupeoids attracted to lights. (Phase I: Sept. 5-15 in Mississippi Sound, Perdido and Pensacola Bays, and the Gulf of Mexico. Phase II: September 19-22, in Mississippi and Chandeleur Sounds.)

The types of above-surface light attractors and controllers included a 90-lamp (13,500-watt a.c.) incandescent bank; a 72-lamp (10,800 watt a.c.) incandescent bank; a 3,000-watt a.c. incandescent cluster; a 3,250-watt a.c. mercury vapor system; and two 12-V d.c. seal-beam lamps. Subsurface light attractors were: a 1,000-watt a.c. quartz iodide lamp; a high intensity photo lamp; and a 500-watt d.c. incandescent lamp. Various combinations of these systems were used; however, one consisting of the 72-lamp (10,800 watt) incandescent and 3,250-watt mercury vapor above-surface attractors was the most effective. There was no appreciable difference in effectiveness of 2 subsurface control systems. Both systems appeared adequate to control schools away from the Bowers by the light skiff.

The Catches

Nineteen purse seine sets were made. The largest individual catch was 500 pounds. Catch composition was generally similar to previous cruises--small anchovies predominated; scaled sardines, thread herring, Spanish and king mackerel, menhaden, catfish, bumpers, pinfish, and other minor species generally were present. Significant catches of species other than anchovies were made in Perdido Bay, Florida. There, 79 percent of the 212-pound catch was menhaden, and a 406-pound catch in Chandeleur Sound was predominately bumpers and pinfish. Representative specimens were preserved from each catch for biological study. Specimens were also collected for studies by the BCF Technology Laboratory, Pascagoula.

BCF La Jolla Studies Long-Line Fishery for Broadbill Swordfish

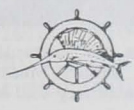
The BCF Fishery-Oceanography Center at La Jolla, Calif., is conducting a preliminary study of the feasibility of starting a long-line fishery for broadbill swordfish off California and Baja California to replace the present harpoon method. As part of the study, the research vessel "Miss Behavior" went on a 60-hour cruise October 2-4. Two floating-line sets, consisting of 100 and 120 hooks, were made at Channel Islands at night. No teleosts (the bony fishes) were caught, but 80 blue sharks were caught on one set, and 4 blue sharks and 4 spiny dogfish were caught on the second set. The difference in catches of blue sharks was due partly to the longer soaking time of the first set: It was hauled at noon, while the second set was hauled at dawn.

Samples of blood and ultimobranchial glands for use in a study of calcium metabolism were taken from the sharks by Dr. Shelton P. Applegate of the Los Angeles County Museum and Charles Glover, physiologist at Marineland.

Long Lining In W. North Atlantic

The long-line method has been adopted by Canadian and U. S. fishermen in the western North Atlantic with impressive results. The Canadian catch of broadbill, for example, has risen from about 2.5 million pounds to 12 million pounds annually. The increase is due not only to the change in gear. Other contributing factors included increased effort and extension of the range of the fishery and fishing season.

Application of new gear and ideas, pioneered principally by biologists of BCF and Woods Hole Oceanographic Institute (Mass.), has made it possible for small boats with limited crews to fish several hundred hooks with ease. The researchers of BCF La Jolla feel that if these methods are perfected, the California catch, which averaged 220,000 pounds annually from 1949 to 1965, might be increased considerably. They believe that the failure to catch broadbill during this preliminary survey cruise may have been due partly to the lateness of the season.



BCF Juneau Uses Camera As Deep-Water Research Tool

BCF Juneau (Alaska) is using a new underwater camera as a research tool for the first time to aid in studies of the sea-bottom environment and its kinds and numbers of animals. Such information is necessary to understand the relation between bottom and near-bottom animals--flatfishes, cod, Pacific ocean perch--such shellfish as shrimp and crab, and many others.

The camera also may be used to record changes caused by man on the bottom environment of inshore areas and estuaries. It may reveal new or seldom observed fishes and other animals.

Dr. Richard T. Myren, fishery research biologist engaged in these studies, and Herbert Knudson, engineer of BCF's research vessel M/V "Murre II," recently surveyed areas near Juneau to test the camera.

Similar to the one that searched for the nuclear submarine "Thresher," the camera can be used to a depth of nearly two miles (9,870 feet).

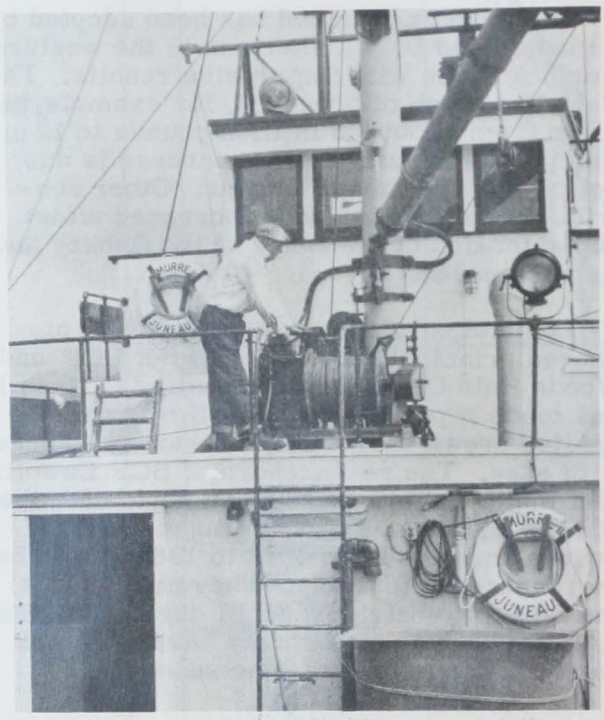


Fig. 1 - Knudson operates the hydraulic winch used to raise and lower the camera. Henry Museth, Master of M/V Murre II, holds vessel stationary and keeps track of camera on depth finder.

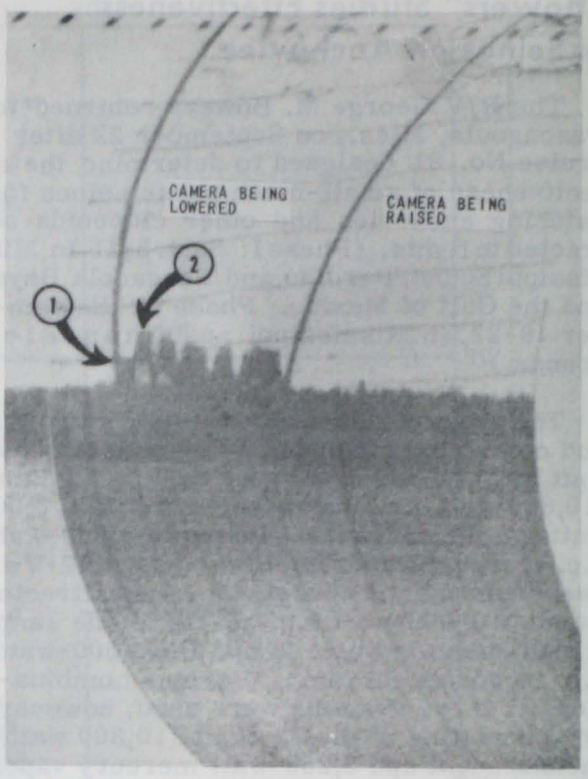


Fig. 2 - Chart produced by depth finder in pilot house of M/V Murre II. The camera can be touched down gently on bottom by watching its descent on chart. The chart also records permanently depth and general contour of area photographed. Above, (1) shows camera touching bottom; (2) shows camera being raised a little off bottom to advance film for another photo. The camera is lowered again and another photograph taken.

Fig. 3 - Photo taken at south end of Shelter Island in 168 feet of water. The bottom is littered with broken clam shells. Animals visible are two sea urchins (bottom and top) and a brachipod (close adjacent to right side of bottom sea urchin). Other animals and plants are present but less apparent.

Fig. 4 - Photo taken in 168 feet of water, near Aaron Island in Favorite Channel. The bottom is hard sand and scattered small rocks. A sea cucumber of genus Stichopus is in center and the worm-like objects are thought to be its castings. A small pink coral is near lower left.

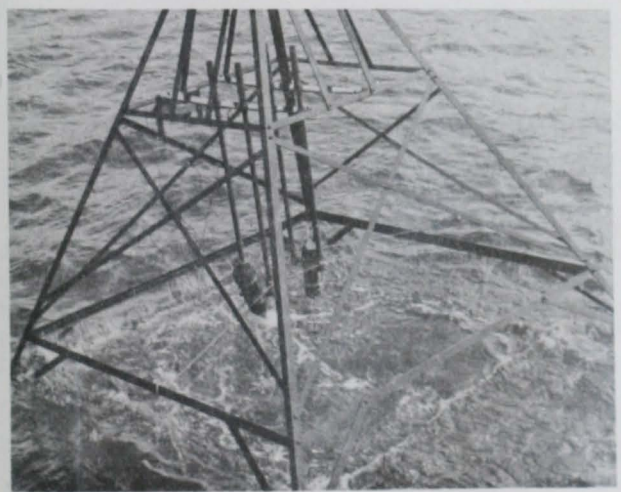


Fig. 5 - Camera and frame being brought out of water.

How Camera Works

Knudson built a pyramid-shaped frame to hold the camera and flash unit. The frame is so designed that it causes the camera to take a photograph the moment the frame touches the sea floor. Consecutive photographs may be made in two ways: Manually by raising and lowering the frame, and automatically by a self-contained unit. For manual operation, the frame is lifted off the bottom to advance the film and recharge the flash unit. This enables the researchers to photograph several areas before raising the camera to the boat. In automatic operation, a timer is set to take photographs at regular intervals from the time the unit leaves the boat.

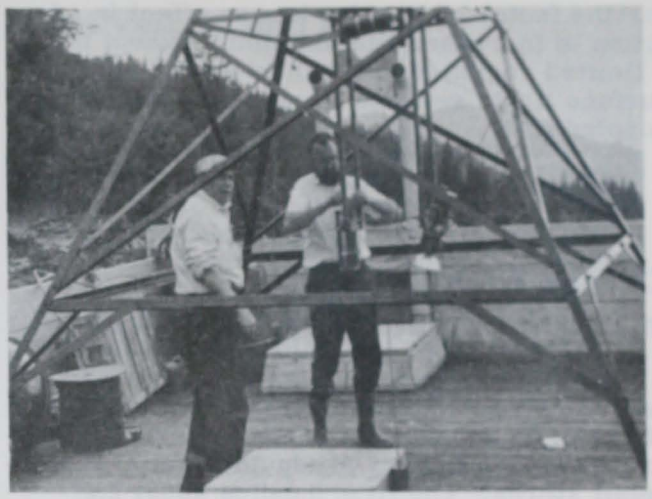


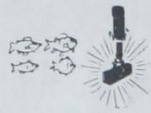
Fig. 6 - Herbert Knudson (left) and Dr. Richard Myren examine camera after using it. When the weight (hanging against box in center foreground) strikes ocean floor, the cylinder (center top) rotates causing a mercury switch to close and activate camera and flash unit. When frame is lifted off ocean floor, the weight pulls cylinder down again. This breaks electrical circuit and lets camera advance film.

Experiment Shows Herring More Attracted to Below-Surface Lights

The results of an experiment by BCF's Boothbay Harbor (Maine) laboratory comparing the relative attractiveness to herring of above-surface and below-surface light sources indicate the latter, wattage for wattage, is significantly more attractive. The researchers say this may be partly because much of the light from above-surface sources is lost by reflection from the surface. That's why underwater lights produce more illumination for a given wattage.

However, the researchers point out, the increase in efficiency due to increased intensity of either light source is far less pronounced than that due to location. It appears

that the factor of location has an effect in addition to increased illumination. Except for a limited region of optimal intensity, above-surface lights seem to attract none but light-adapted fish.



Chicago Food Chain Asks Interior Department Fish Inspection

The Hillman Supermarket chain of Chicago has requested the fishery inspection services of the U. S. Department of the Interior (USDI) for the frozen fishery products it sells in 15 retail stores. The firm handles about 2.5 million pounds of fresh and frozen products annually. This is the first use of the service by a retail-store chain.

The firm ran a 2-page ad in the Chicago "Sun Times" announcing it sells only USDI-inspected fresh and frozen fishery products. Expecting greater sales, Hillman doubled its normal supply. But consumer response was so large that more inspected fish had to be ordered to keep from running out of stock. The firm had never before sold so much fish.

USDI Inspection

The USDI fishery product inspection services are voluntary and are offered on a fee-for-service basis. Inspectors examine products and issue certificates stating their "quality, quantity, condition" and other pertinent findings that affect their marketability.

Gloucester Lab Taps A New Shellfish Resource

Research on utilization of the mahogany clam (Arctica islandica) has reached a milestone at the Gloucester Technological Laboratory (Mass.). Results strongly suggest that the potential market for this abundant species might lie in frozen or dehydrated convenience food items such as stuffed-clam-on-the-half-shell instead of canned chowders. Commercial products of this type are available, but they utilize quahogs (Mercenaria mercenaria) instead of mahoganies.

The commercial product tasted more like poultry stuffing than clams. This was due to the mild taste of quahogs and to the large proportion of spice and the starchy ingredient (bread and/or cracker crumbs) in the product. However, most panelists preferred the stuffed clam product that utilized mahoganies because it had a clam-like flavor. In addition, the costs of harvesting and processing mahogany clams for this type of food product appear to be equal to, or less than, the costs for quahogs or surf clams (Spisula solidissima).

3 Industrial Firms Interested

Since these observations were made, three industrial firms have been contacted with respect to the stuffed clam product developed by the Gloucester personnel. One of the firms expects to produce this product commercially by January 1968. A second firm is now testing potential outlets. The third firm (much larger than the others) is interested, but its decision makers have not arrived at a verdict yet.

The future for utilization of this clam appears bright. It is obvious already that BCF research efforts expended on this practical problem are bearing fruit.

BCF Tuna Resources Lab Helps Albacore Industry

The BCF Tuna Resources Laboratory at La Jolla, Calif. helped fishermen find the areas of greatest albacore abundance along the Pacific Coast during the 1967 season, which was the Pacific Northwest's best since 1944. Fishing conditions were excellent for the albacore fleet in Oregon and Washington waters during the July-September period. However, the California and Baja California regions produced insignificant commercial quantities of albacore.

BCF's monitoring of the environment and its forecasting services were well received by industry.

BCF believes that these activities "are beginning to effectively meet the needs of the fishing and canning communities."

New "Live Car" Improves Catfish Harvesting and Handling

By Marvin F. Boussu*

Harvesting pond-reared catfish usually is accomplished by draining the pond or by effecting a substantial drawdown, and then netting with small seines. These methods sometimes are satisfactory if the ponds are sloped properly for drainage, and if the harvesting is done in the winter when water temperatures are cool. Summer harvest, however, usually is thought impracticable because of excessive fish mortality. Significant fish loss has occurred as a result of extreme turbidity and high water temperatures resulting from drawdowns, and from crowding seined fish into shallow hot water (see fig. 1).

Recent tests by the BCF Unit at Rohwer, Arkansas (Kelso Station) indicate that summertime harvest of catfish can be done without significant loss. This is accomplished by using relatively large seines, about 2,400 feet long, in ponds where the water level is maintained or increased by the addition of fresh water during harvesting (see fig. 2). Another important development in making summer harvest practicable was the design and utilization of a detachable "live car" (see figs. 3, 4, and 5).

What "Live Car" Is

The "live car" is essentially an open-top, fish-holding bag made of 2-inch mesh (stretched measure) nylon webbing and buoyed by a series of floats on the top lines. Its unique feature is the wood-framed opening at one end. The opening frame mates with a

Fig. 1 - Seine bag full of buffalo fish dragged into shallow shore waters of farm pond. Note extreme turbidity of water and crowding of fish. High mortality rates are experienced under such conditions--especially when air and water temperatures are high.

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Fig. 2 - Setting mechanized haul seine in 50-acre farm pond.

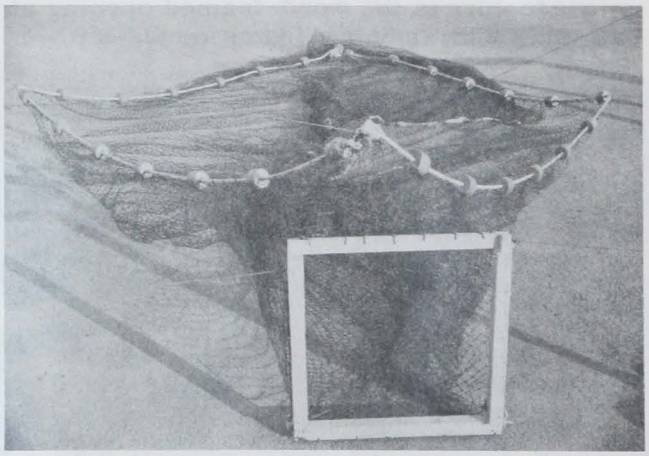


Fig. 3 - Small prototype farm pond catfish "live car" showing some construction details.

similar device sewn into the trailing side of the seine bag. Before the "live car" is attached to the seine bag, the top is closed by drawing the float lines from the opposite longitudinal sides and fastening them together with spring snaps. The "live car" is then roughly sausage shaped, about 75 feet long and about 20 feet in circumference.

While the seine is being hauled and still well out in the pond, a "live car" is attached to the bag. Then, when the "live car" becomes filled with fish, it is detached from the seine. The openings are closed by the insertion of sliding screens, and another "live car" can then be attached. The detached "live car" is towed to an area of the pond where water conditions are best.

Fig. 4 - Seine bag full of farm pond catfish and without "live car" attached. Note framed opening with sliding screen in place.

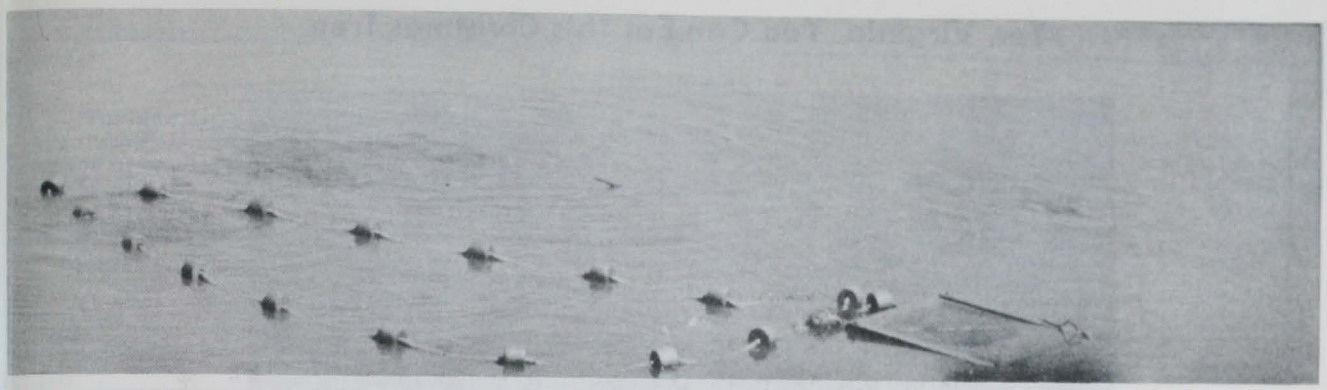


Fig. 5 - Detached small prototype farm pond catfish "live car" with top open. Fish escape open top "live car" when swimming pressure against netting pulls part of float line below the surface.

Use of "live cars" makes it necessary to pull only a very few fish into the warm, turbid waters near shore where mortality usually occurs. Moreover, the bagged fish are conveniently available for transfer to trucks while the seining operation is still active, or at some later time. The system ensures a harvesting operation that is more efficient and less hectic than usually is the situation during traditional draining and seining endeavors.

Various Sizes Tested

"Live cars" of various sizes have been tested. Overall dimensions and construction of the largest are: length--75 ft.; circumference--20 ft.; mesh size--2-inch stretched measure; twine--No. 18 nylon; headline rope--$\frac{1}{2}$-inch braided nylon; floats--3" x 3" spongex spaced one foot apart; opening--2' x 4' wood frame with insert of framed $\frac{3}{4}$" hardware cloth.

As much as 30,000 pounds of channel catfish have been put into the large "live cars" and removed in small amounts over several days. Nearly 20,000 pounds of catfish have been held 4 days in a "live car," such as the one described, during cool (70°) weather without any loss of fish. A smaller "live car," about one-sixth the above size, has been used to hold 4,000 pounds for one day under summertime conditions, also without any loss. Because only valuable, privately owned fish are available for testing, attempts to determine the probable maximum holding limits have been discouraged.

Present market demands are such that some summer harvesting is mandatory, if producers are to realize the best possible returns. Development of the "no drawdown - large seine - live car technique" has shown that summertime harvest is entirely practicable.

Boothbay Lab Aids Teaching of Biology

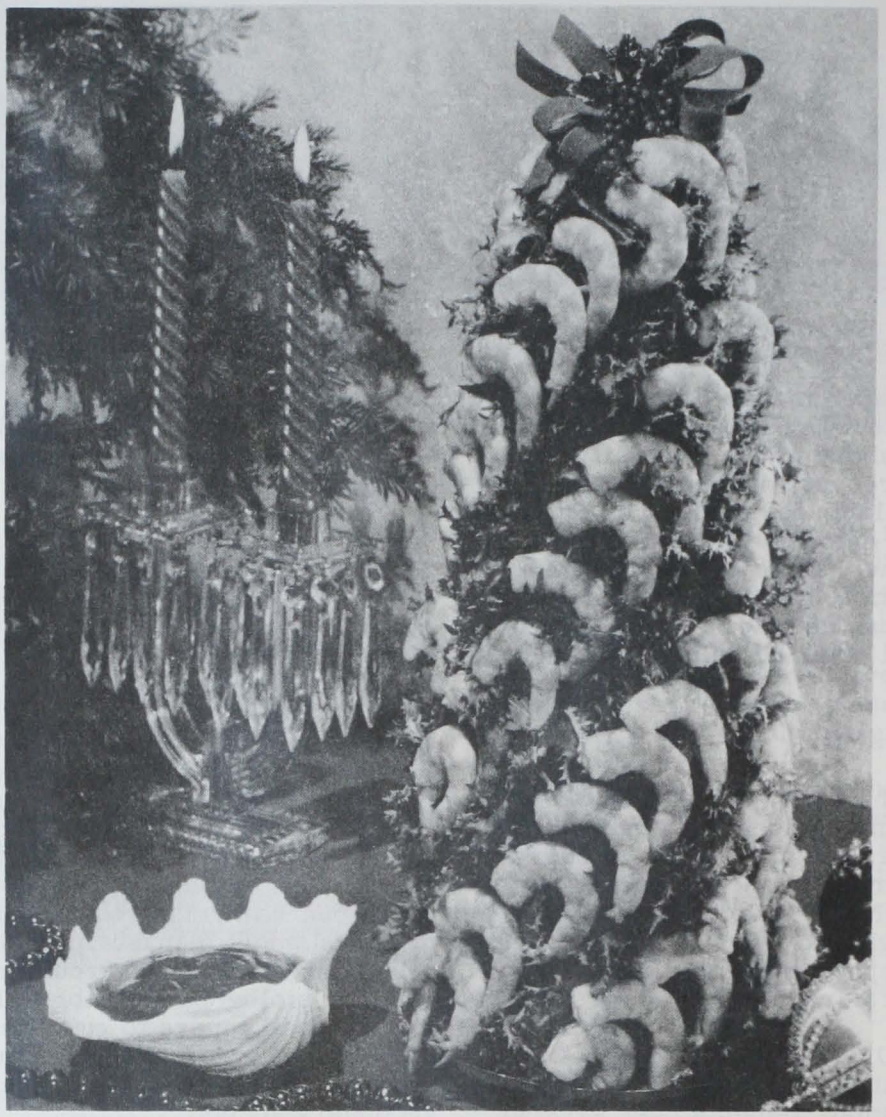
For several years, biologists of BCF's Boothbay Harbor (Maine) laboratory have provided instruction in biological oceanography at the Boothbay Region High School as part of a curriculum enrichment program.

To benefit a wider audience, the biologists prepared short manuscripts describing methods and providing background material for teaching biological oceanography. They designed these papers to guide the classroom teacher who was interested in using such information in the biology curriculum of the secondary school.

Manuscripts Are Published

The series of papers was published in the September 1967 issue of "The American Biology Teacher." It included: ocean currents, coastal zooplankton, sedentary bottom animals, physiology of marine organisms and adaptation to their environment, swimming behavior of fishes, age and growth of fishes, blood types in fish, and the use of population dynamics in marine fishery studies.

Yes, Virginia, You Can Eat This Christmas Tree



BCF's Branch of Marketing has fashioned a Christmas tree that is not the tallest in the land, but it is the tastiest. It's made of shrimp.

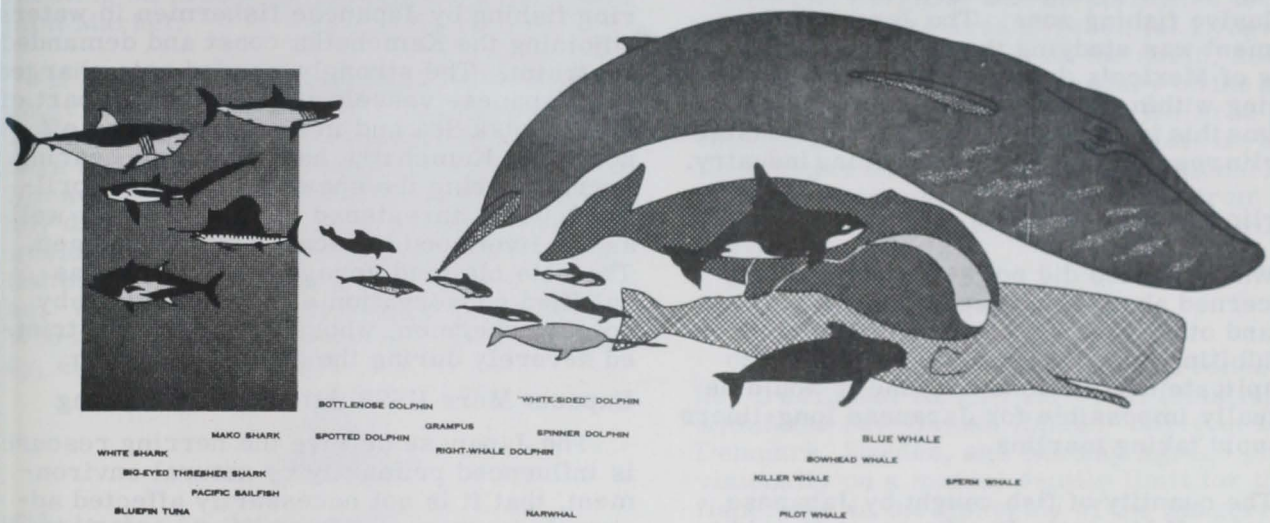
The tree is a cone-shaped piece of plastic form covered with endives. When individual cooked shrimp are arranged symmetrically over the greens, the result looks like a decorated Christmas tree.

Several magazines are using the shrimp tree in color. Major retail food chains are including it in their newspaper advertising and in-store promotions. (For recipe, see page 21.)

THE BLUE WHALE

The blue whale is the largest mammal existing today, and probably the largest that has ever lived. Whales are mammals and exhibit all the characteristics of true mammals. They are backboned, warm-blooded, bear traces of hair, and suckle their young. The blue whale calf at birth may be as much as 26 feet long. Full grown it may attain a lenght of 100 feet and weigh 150 tons. The life span apparently does not exceed 25 years.

Blue whales are found from the polar to the temperate seas, and occasionally, even at the equator. Their migrational routes depend largely on the seasonal locations of food supply.



Millions of years ago the ancestors of the whale lived on land and walked on four legs. During the Tertiary period, whales became completely adapted to aquatic life. Now their physical characteristics are such that they cannot survive on land. If not buoyed up by water, the whale's great weight would crush its skeletal framework and collapse its lungs.

The body has become streamlined and torpedo shaped. The whale steers itself through the sea and maintains its balance with paddle-shaped forelimbs (the hind limbs have completely disappeared externally and are buried within the body). Foreward movement is produced by powerful up-and-down motion of the tail flukes which lie in a horizontal plane. A speed of more than 16 knots can be attained for short distances. Blubber serves as an insulation that retards the escape of body heat into the cold sea. A large blue whale can contain 20 or more tons of blubber, normally about 25 percent of its total weight. Tough membranous eyes are protected from salt water by a tear gland secretion. Whales appear to be highly sensitive to water-borne vibrations, though the external ears have entirely disappeared, leaving only minute auditory openings. The animal breathes while submerged through nostrils located on top of its head. Nasal passages lead directly into the windpipe instead of the throat, as in land mammals. Beneath the surface, the animal holds its breath and nostrils are tightly closed. On the surface, the whale "blows" warm breath that condenses in colder air.

The blue whale's throat is so narrow it can swallow nothing larger than a small fish. Because of this, its diet normally consists of tremendous masses of small crustaceans, collectively known as krill. When quantities of krill are taken in, the whale closes its jaws, and the huge tongue, weighing as much as 4 tons, forces water out through the baleen sieve, leaving krill to be swallowed. The stomach of a blue whale has been found with up to ton of krill (probably not a full day's quota of food.)

Throughout history whales have served man in a variety of ways. In the nineteenth century whalebone sold for as much as $7.00 per pound and was used primarily as braces for ladies' corsets. Whale oil went into soaps, varnished, paints, and was used to treat leather. Now that new uses for whale oil have been discovered, the search for whales is more active than ever before. Because of man's modern methods of hunting and killing whales, their number has greatly decreased over the years.

Despite international agreements limiting the yearly catch, whalers each year take a toll in excess of the whale's natural rate of reproduction. If this exploitation continues, whaling may become commercially unprofitable in the foreseeable future. (Abstracted from Smithsonian Institution Information Leaflet 357.)