



Sorting the species.



## BCF IS SHAPING MASTER PLAN TO AID U. S. FISHING INDUSTRY

The Bureau of Commercial Fisheries is devising a plan that will evaluate the status of 28 fisheries and systematically determine the projects necessary to solve their most urgent problems.

At the beginning, this master plan would be useful primarily for Federal programs. Later, after industry, academic institutions, State governments, and public or private agencies concerned with the fishing industry have analyzed and contributed to it, the plan would be elevated to the rank of a national plan.

The plan was introduced to fishery groups meeting in Miami Beach, Fla., on June 10 by BCF Director H. E. Crowther. He said several segments of the fishing industry face financial difficulties, while for others, if appropriate action is taken, "prosperity could be just over the horizon." The problem facing all persons concerned with the industry is how to set a course "so that the industry as a whole can prosper."

Director Crowther stated: "Never in the history of the U. S. fishing industry have so many been so concerned about the direction in which our fisheries are heading." The following developments have contributed to this state of affairs:

- Hundreds of large, modern, foreign trawlers have appeared off U. S. coasts and changed the fishing future for U. S. fishermen. If the latter do not fish these resources, foreign fishermen will.

- At least one-half of humanity suffers from malnutrition. World leaders have begun to realize the ocean's potential in feeding the hungry.
- There is need for oceanographic research to tap the ocean's wealth, study the ocean floor, and for military operations.
- Foreign seizure of U. S. vessels has thrust fishing onto the world diplomatic stage.
- The U. S. has not increased its catch in the past 10 years, while other nations have made remarkable gains.

Against this background, BCF began to take a harder look at its own past efforts, programs, and goals to see if it was using its money most effectively. The Bureau came to several conclusions:

- It is a mistake to assume that a few, or even all, actions would solve all or most industry problems. There is no single fishing industry. There are harvesting, processing, and distributing segments. There are many fisheries. And many of these can be broken down into smaller segments on the basis of geography, gear or vessels used, and types of markets and products for which the fish primarily are caught. Each segment "must be treated separately in order to identify the problems and decide what is needed to provide solutions."

● The efforts of those working on fishery problems are spread over about 250 species. In the past, "it has been possible to attack only a few of the most critical ones."

● Never have the U. S. fisheries received so much attention. Many individuals and groups are concerned about the fisheries, yet our course is not clear. The belief that problems should be identified on a fishery-by-fishery basis impelled BCF to start developing a "Master Plan for Commercial Fisheries."

### THE BCF PLAN

In its final form, the plan will divide U. S. fisheries geographically: New England, Mid-Atlantic, South Atlantic, Gulf, etc. Each section will contain information on major fisheries in one area. In New England, for example, such species as haddock, cod, yellow-tail, lobster, and herring will be included. For each of these fisheries, there will be a priority list of work needed. Each item of work will contain an estimate of cost, and designate the body responsible for carrying it out: industry, a university, a State, or the U. S. For the BCF plan to become a national plan, there would have to be agreement among all groups regarding "priority, cost, and responsibility."

#### Fashioning the Plan

● BCF selected 28 fisheries with which to work initially. These account for over 90 percent of the U. S. catch both by volume and value. Additional fisheries will be included as experience is gained with the plan.

● The second task was to find a method selecting projects or actions necessary to solve the most pressing problems of a fishery. Because BCF's experience showed that it is almost impossible for any person to consider all of a fishery's possible needs when determining priorities, the Bureau developed a checklist. This checklist is divided into five major categories: resource supply; access to and efficient harvesting of resource; handling and processing (aboard vessels and ashore); distribution and marketing; fundamental knowledge. And these 5 categories are divided into many components.

BCF "attempted to include in the checklist all actions or projects that may be needed in any U. S. fishery. It is simply a means of insuring that all possible courses of action are considered when a program of work is being developed."

Before the checklist can be used meaningfully, there must be agreement on the objectives of work to be included in the Master Plan. Suggested national objectives are being developed.

● To produce a working document involving each major fishery, BCF selected from the checklist those actions or projects necessary to accomplish the national objectives. These projects--in order of priority--would give the proposed program for that fishery or species. Shown on next page are sample priority lists developed for thread herring and king crab.



### THREAD HERRING

#### Priority Areas of Work

##### Resource Supply

##### Resource assessment

- Distribution in time and space
- Magnitude and potential yield
- Commercial feasibility

##### Access to and Efficient Harvesting of Resource

##### Improved harvesting efficiency

- Gear development and improvement
- Fish behavior
- Economics of harvesting
- Prediction, including intelligence system
- Extension

### KING CRAB

#### Priority Areas of Work

##### Resource Supply

##### Maintaining the yield

- Life history
- Population dynamics
- Subpopulations
- Environmental relationships
- Prediction
- Economic, political, social and legal aspects, domestic and international

##### Statistics

##### Resource assessment

- Distribution in time and space
- Magnitude and potential yield
- Commercial feasibility

### KING CRAB (Contd.)

#### Priority Areas of Work (Contd.)

##### Assess to and Efficient Harvesting of Resource

##### Resource allocation

- Domestic versus international fisheries
- Limited entry

##### Distribution and Marketing

##### Quality maintenance

- After the list is completed, program planning experts must assign costs and time periods to the priority actions. Because items on the priority list identify only major work areas, specialists will have to develop detailed project plans.
- Limited financial, physical, and human resources make it impossible to implement all items for all fisheries. "So the final question becomes: Which fisheries are most urgently in need of assistance or can be helped most effectively with limited program dollars?"

The answer seems simple: Invest in fisheries with the greatest potential--or where the payoff per dollar spent is greatest. Actually, the answer is not quite that simple. More detailed information must be obtained before some decisions can be made. BCF is moving to improve its information base. The Bureau "is convinced a Master Plan will provide a systematic approach to select among alternatives."



● BCF will consult with all interested public and private groups to complete the Federal plan and then develop it into the form of a national Master Plan for Commercial Fisheries.

Such a comprehensive national plan would have many advantages. It would

1. Consolidate thinking in the commercial fisheries and provide agreement on charting the course for the future.

2. Avoid duplication of effort.

3. Guide BCF and the States in matching fund programs.

4. Permit orderly development of legislation needed for the fisheries.

5. Give U. S. and State appropriate agencies the information about the fisheries that is needed to make decisions.



Dressing fish. (J. J. Murray)



# UNITED STATES

## S. Trades Fish With USSR

The U. S. has obtained from the Soviet Union the only species of pike foreign to North America--the Amur pike. In return, the Soviet Union received shipments of 20,000 newly hatched striped bass and 50,000 steelhead trout eggs. All shipments arrived in Moscow in satisfactory condition. This was the fourth and largest exchange of fish and fish eggs between the two countries. The purposes of the trades are to further science and to help the USSR increase its food supply.

### Amur Pike Research

The Amur pike--over 1,000 healthy fry--have been given to Pennsylvania for genetics research and related projects.

If enough pike survive, some will be placed in reservoirs. There is the possibility of a new American sport fish--if the Amurs thrive in Pennsylvania waters. They occasionally grow to 40 inches and 35 pounds. Their natural habitat is the Amur River separating China from the Soviet Union.

### Began In 1964

Limited exchanges of fish and fish eggs allowed discussions begun in 1964 by Interior's Fish and Wildlife Service and the Soviet Union's All-Union Research Institute of Marine Fisheries and Oceanography.

A series of striped bass, steelhead trout, and smallmouth bass shipments was made to the USSR in exchange for sockeye salmon. Transportation problems often caused mass mortalities. No exchange was attempted in 1967.

Sockeye salmon, received in 1965, are the subject of research at the BCF laboratory in Bowman's Bay, Wash.



## Report Analyzes Ocean's Economic Effects on Southern New England

In 1965, 11.1 percent of total personal income in the Southern New England Marine Region was produced by economic activity directly dependent on the closeness of the ocean. This is revealed in a recently published study by economists of the University of Rhode Island (URI).

The Southern New England Marine Region includes Rhode Island, New London County, Conn., and Barnstable, Bristol, Dukes, Nantucket and Plymouth counties, Mass.

The study focused on the impact of ocean and continental shelf resources on the economy of a coastal region. It was designed to help planners develop those resources. The economists say their study of the southern New England region can be applied to other regions--if marine activities there operate in a similar framework.

The study was part of a cooperative program with the U. S. Department of Commerce's ESSA and Economic Development Administration. It is one of several projects Commerce agencies are supporting to encourage economic development of the continental shelf and coastal regions.

### The Study Findings

The 11.1 percent figure did not include money spent by tourists in such nonmarine places as motels, restaurants, and gas stations.

A URI team surveyed 400 individual ocean-oriented businesses during the summers of 1965 and 1966 to gather the data.

The report divides the marine industries into 13 categories: fish catching; fresh fish processing; frozen fish processing, fish wholesaling and jobbing; ship and boat building; marinas and boat yards; marine retail and wholesale; marine manufacturing; construction, towing, agents; research and education; marine military; charter fishing; and other marine activities.



In the Southern New England Marine Region, the gross sales of ocean-oriented businesses were \$773,049,000 in 1965. The ship and boat building category had the highest sales: \$318,290,000. The marine military category had the greatest effect on personal income because the Navy spent much on wages and salaries.

#### Stimulates Economy

Activities based on catching, processing, and using fish can stimulate the region's economy: "A modest rate of growth in landings value of 1 percent per year over 5 years (\$284,840 the first year) would yield an average annual increase of \$769,583 in gross output of the region. . . . The resulting average annual rate of increase in personal income is .66 percent in the region and gross non-marine output would increase at an average annual rate of .26 percent."

To make it easier to use the data in other regions, the report describes the physical and economic setting of the Southern New England Marine Region. It covers land environment, coastal and offshore environment, the region's economy, population, labor market, and patterns of trade. There are maps of topography, river basins, tidal currents, average annual precipitation, mean temperatures for January and July, transportation network, population density, and land use.

The 132-page report is titled, "Economic Impact of Marine-Oriented Activities--A Study of the Southern New England Marine Region." It was prepared by Niels Rorholm (chairman), Harlan C. Lampe, and Joseph F. Farrell of URI's department of food and resource economics, and Nelson Marshall of the Graduate School of Oceanography.



### Save-the-Estuaries Campaign Is Announced

A national campaign to alert the public to the critical condition of the Atlantic Coast estuaries has been announced by the American Littoral Society of Sandy Hook, N. J. The Society's campaign will cover the coast from Maine to the Gulf of Mexico. It will include

an inventory of estuarine resources, surveillance of operations that threaten those resources, and a program of conservation education.

John Clark, Society President, said: "In the recent development of interest in the ocean depths, we seem to have lost sight of the importance of the estuaries. The wealth of our estuarine frontier, including the coastal marshes, tidelands, bays, sounds, and tidal rivers is being rapidly dissipated because of the lack of understanding of their unique values."

The program is funded by grants from the Old Dominion Foundation and the American Conservation Association.

#### The Society's Program

The Society will concentrate on these estuarine problems: "the effects of pollution upstream, at the bay mouths, and offshore; the conflict between developing estuarine areas for housing and industry and preserving them for fishing, recreation, nature study, and scenic enjoyment, the conflict between the navigational and the ecological needs of estuaries; and the complexities of local, state, and Federal laws which govern the use of coastal lands."

Clark added: "Our area of interest is under heavy population pressures. Almost half the Nation's population lives within a day's drive of the coast. Over 50 percent of the estuarine area has already been lost in certain areas and this is the area where about 65 percent of our fish population either breeds or spends its juvenile period of growth.

"There has to be a balance between the legitimate human needs for space on the coastline and the wildlife needs for the same area. If this balance is not struck soon, the values which attract man to the ocean will be lost forever. An acre of marsh covered with refuse or filled in for housing is a lost resource and these resources are being lost too fast.

"Our program will take into account the needs of the commercial fisherman, the sports fisherman, the boat owner, the people who simply wander the beaches and marshes, as well as the needs of communities and industries located near the shore."



The American Littoral Society is a national, nonprofit organization started in 1961 by fishermen, skin divers, and nature lovers interested in preserving the estuarine area. It has thousands of members.



## Mechanical Feeder Aids Fish Farmer

A mechanical fish feeder has been invented by the director of training programs for the Arkansas Office of Economic Opportunity, Dr. Earl E. Evans. He says it will reduce the farmer's work and insure equal distribution of feed. Dr. Evans operates a 45-acre farm of blue and channel catfish near Pine Bluff, Ark. He added that one man using the mechanical feeder could distribute as much feed in an hour as 10 men working by hand in the same time.

Dr. Evans noted that the feeder was made up of a hopper that holds 600 pounds of pellet or bran feed, a blower fan, and a feeder pipe. The machine can be mounted on almost any farm tractor. It is run by the tractor's power takeoff.

### How It Works

Dr. Evans pointed out that the machine could blow the feed as far as 15 feet from the banks of the pond. This would make for more even distribution of feed. When feed is spread by hand, he said, most of it will be at the pond edges. The fish in the middle would not get as much. With his portable mechanical feeder, the farmer can circle the pond and get equal distribution.

He began work on the feeder in 1966 and perfected it early this year. He was granted patent pending rights in January. Dr. Evans said the machine is not in full production yet, but some are produced on special order. ("Feedstuffs," June 8, 1968.)



## Interior Apportions Funds to States for Fish and Wildlife

On July 1, \$22.1 million in Federal Aid funds for fish and wildlife restoration became available to the 50 States--an increase of \$1.5 million over last year's record.

Of the \$22.1 million, \$17.4 million is for wildlife restoration, and \$4.7 million is for sport-fishery projects. Another apportionment for fish and wildlife restoration projects will be made in the fall.

### Excise Taxes Provide Funds

The fish and wildlife funds come from Federal excise taxes collected from manufacturers, importers, and producers of certain types of hunting and fishing equipment.

Under the Federal Aid programs, States are reimbursed up to 75 percent of the cost of approved projects. The laws creating these programs also provide \$10,000 each to the Commonwealth of Puerto Rico, Guam, and the Virgin Islands. The 1969 fiscal year apportionments to these areas are included in the total apportionment.

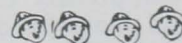
Distribution of funds is based on the number of paid hunting and fishing license holders in a State and the area of that State. The programs are administered by Interior's Bureau of Sport Fisheries and Wildlife.



## "People to People" Tour of South America

Dr. Mark Keyes, a staff veterinarian of the BCF Marine Mammal Biological Laboratory, Seattle, Wash., completed a 28-day "People to People" tour of 7 South American countries. He was part of a 12-person delegation of veterinarians and wildlife scientists.

Their objective was to contact their counterparts personally in order to establish the lasting lines of communication that could promote goodwill and understanding between the U. S. and South American countries. The tour was initiated by the Citizens Ambassador Travel Program, an organization formed under President Eisenhower's leadership when he was in office.





## OCEANOGRAPHY

### U. S. Invites World to Join in Decade of Ocean Exploration

The United States is urging all nations to join in a 10-year effort to explore the world's oceans. The invitation is contained in a report released on May 29 by the National Council on Marine Resources and Engineering Development. The Council, better known as Marine Sciences Council, is a Cabinet-level advisory group headed by Vice President Humphrey.

The report elaborates on President Johnson's proposal of March 8, 1968, for an International Decade of Ocean Exploration in the 1970s. It seeks to encourage development of the "Decade" concept by scientists, engineers, and representatives of industry and governments. It gives examples of the kinds of projects that nations might undertake-- and discusses aspects of the projects that must be worked out together.

The report notes that a joint non-Government/Government planning staff will be created under the Council to plan the U. S. contribution to the Decade. It invites the scientific and technical communities to take part in this planning, especially through the National Academies of Science and Engineering.

#### The President's Proposal

Following his proposal, the President stated that the activities of the Decade could:

- "expand cooperative efforts by scientists from many nations to probe the mysteries of the sea;
- increase our knowledge of food resources, to assist in meeting worldwide threats of malnutrition and disease;
- bring closer the day when the people of the world can exploit new sources of minerals and fossil fuels."

#### The Concept

Science has shown that the ocean is an important source of food and minerals for a booming world population. The capability now exists to explore the seas. Because of the vastness and complexity of the marine environment, a broad program of exploration can be carried out only through international cooperation. The Decade can further the

economic and scientific development of all participants. It can develop resources, especially new sources of food, badly needed in the world's developing areas. "Thus, emphasis should be placed on the identification and assessment of food and mineral resources as well as investigation of ocean processes."

#### Geographical Exploration

To realize the sea's full food potential, scientists will have to assess unused fish stocks "readily available to current fishing techniques." Also, there are known resources in the deep ocean and in mid-depths that cannot be harvested economically at the present time.

The report states: "Expanded efforts to locate fish more precisely, increase the efficiency of capture, and predict abundance and availability of the stocks on a seasonal basis should lead to substantial improvements in fish catch. Increased efficiency also will expand the need for scientific management techniques to avoid overfishing and disturbing the ecological balance. Improved understanding of fishery resources and their reactions to natural and manmade disturbances is necessary to increase and maintain the yield and to resolve international fishery conflicts."

There is need to learn much more about the "composition and distribution of nonliving seabed resources." The growing demand for energy and minerals has spurred the search for these resources on the Continental Shelf.

#### Development of National Programs

Almost every operation a nation conducts to investigate or operate in the marine environment aids its general capability to explore the oceans and to understand them better. And, the report emphasizes: "During the Decade all nations would be encouraged to identify how ocean exploration can contribute to scientific and economic development, and accordingly

- develop their capabilities for exploring the oceans;
- expand national ocean exploration programs; and
- share with other nations experience and scientific data acquired from these national programs."



Most nations are interested primarily in ocean exploration programs close to home shores--"exploration of the Continental Shelf and of coastal fishery stocks." Some nations are moving their investigations farther out to sea. But most ocean exploration in the foreseeable future will probably continue to be coastal activity. However, if nations conducting this kind of activity would share their experiences and data, other nations would benefit. "Advances in marine science and technology depend critically upon the effective flow of information--from data collectors to data consumers."

The existing national and international systems for exchanging the ever-increasing marine data have to be strengthened. Attention should be paid to the "compatibility of national data systems."

National programs to improve navigational accuracies can contribute much to the Decade's success.

"Skilled manpower is essential for any nation to enhance its capabilities for exploring the oceans."

#### Suggested International Projects

The report of the Marine Sciences Council suggests the following types of projects "as a point of departure for international discussions":

- "surveys of selected ocean areas, principally from oceanographic ships, complemented by increasing use of other platforms such as spacecraft, buoys, submersibles, and ships of opportunity;
- intensive study of designated ocean areas of limited expanse;
- research directed to specific ocean phenomena;
- development of improved world-wide data collection, processing, storage, and distribution facilities and services to facilitate international exchange of data; and
- assistance in strengthening the capabilities of the developing nations to participate in exploration programs, including manpower training."

The report puts forward these types of objectives for international collaborative projects:

#### "1. Exploration of Living Resources

Assessment of living resources useful to man in uncharted regions of the world ocean.

Assessment of current utilization of known fishery stocks.

Acquisition of knowledge relating living resources to their environment in order that greater efficiency in their capture and conservation can be achieved.

#### 2. Exploration of the Ocean Floor

Determination of the geological structure and mineral and energy resource potential of the world's continental margins.

Preparation of topographic, geological, and geophysical maps of selected areas of the deep ocean floor.

Coring and drilling on the continental margins and deep ocean floor in selected areas.

#### 3. Exploration of Ocean Processes

Study of scales of motion in the sea and the dynamics of ocean current systems.

Investigations of surface boundary processes, such as the growth and propagation of ocean waves.

Investigations of evolutionary processes of ocean basins.

#### 4. Assistance to the Developing Nations

Mapping of selected areas of the Continental Shelf of developing nations.

Surveys of the coastal fishery resources of the developing nations."



## Past International Cooperation

The report notes the record of international cooperation by scientists throughout the world to show that a good basis exists for cooperation in the 1970s. It mentions the International Geophysical Year in the late 1950s, the International Indian Ocean Expedition, the International Cooperative Investigation of the Tropical Atlantic, the Cooperative Study of the Kuroshio, and the work of international organizations and of scientific bodies.

The report urges that international planning for the Decade be "pursued as quickly as practicable." The U. S. has begun discussions with other nations on the concept of the Decade. "The U. S. has not attempted to prejudge the scope, the international collaborative projects which would develop, nor the international arrangements for planning and coordination."

And the Marine Sciences Council points to a primary target: "The continental margins will undoubtedly provide the greatest economic return during the Decade. However, the deep oceans cover by far the largest and least known areas. It is in the deep oceans that international cooperation will provide a common scientific return leading to future economic reward. Because of the high cost of operations at sea, it is of great importance that plans be coordinated internationally to insure that areas with the highest potential interest to the most users be given priority attention."



### WHAT IS THE PRESSURE AT THE DEEPEST PART OF THE OCEAN?

The pressure at the deepest part of the ocean is close to 7 tons per square inch, almost a thousand times the atmospheric pressure on the earth's surface.

At a depth of 3,000 feet, a pressure of 8,100 pounds per square inch is sufficient to squeeze a block of wood to half its volume so that it will sink.

At a depth of 20,000 feet, air will be compressed so much that it will weigh as much as the surrounding water. ("Questions About The Oceans," U. S. Naval Oceanographic Office.)

## First Estuarine Prediction Service Launched

The first estuarine prediction service in the U. S. has been launched. The Federal Government hopes it may develop into an important service for government and private agencies in pollution control.

The service will be conducted by ESSA as a 1-year pilot program for Penobscot River and Bay Estuary in Maine. Other Maine estuaries may be added later. The possible expansion of the program to other states will be considered.

The predictions will be made by ESSA's Coast and Geodetic Survey--with the necessary river discharge forecast and advisory information provided by ESSA's Weather Bureau.

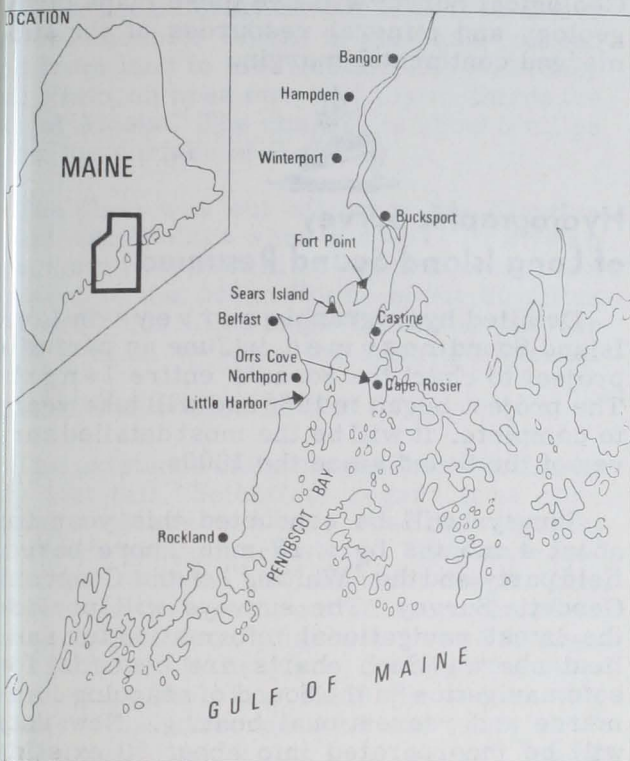
The program is designed to aid Federal, State, county, and municipal agencies and private industries concerned with water pollution. It is concerned with fisheries, public health, recreation, drinking and industrial water, sewage, industrial wastes, and both industrial and residential development.

### How Program Will Work

Advance forecasts will be issued the 3rd and 18th of each month on the rate possible pollutants will pass through the estuary. The rates will be computed through the modified tidal prism concept developed by B. H. Ketchum of the Woods Hole (Mass.) Oceanographic Institution.

The "flushing rate" is the average time fresh water or suspended matter (potential pollutants) will remain in various parts of the estuary. Such predicted rates will give the number of days fresh water or suspended matter need to travel from selected points past the outer end of the pilot area at a line extending from Cape Rosier to Little Harbor. "The selected points are at lines drawn across the estuary at Bangor, Hampden, Winterport, Bucksport, Fort Point, southern tip of Sears Island, Belfast to Castine, and Northport to Orrs Cove. The predictions can also be made for any other points along the estuary."





Penobscot River and Bay Estuary in Maine where Nation's first estuarine prediction service is being launched. The Federal Government hopes it may develop into an important pollution control service for government and private agencies.

### Service's Practical Effects

Charles R. Muirhead, acting chief of Coast and Geodetic Survey's Oceanographic Predictions Section, described the service's practical effects:

"Let us assume that various commercial wastes are being deposited at the head of the estuary. Dependent on the rate of speed at which these wastes travel, they will either pass to the ocean without any harmful effect to the estuary or they will slow down and perhaps pollute the areas in which they linger.

"A decrease in the water's flow and circulatory patterns, such as may occur during the summer months when rainfall is normally reduced, may cause the water to become polluted.

"This service will enable State and local authorities to institute possible remedial measures to reduce the rate at which potential pollutants are being added to the water until the water flow increases."

Muirhead said the service could be "of tremendous importance to commercial and sport fisheries, wildlife conservation, and recreational activities during summer months, including swimming and boating."

The forecasts will be issued to Maine and Federal agencies.



### Bering Sea Floor Survey Planned

The U.S. is undertaking an extensive survey this summer of the continental shelf beneath the Bering Sea. It will include a search for indications of gold, tin, platinum, or petroleum beneath the sea floor.

The survey is being conducted by scientists of ESSA and Interior Department's Geological Survey as part of a long-range national program to map the 862,000 statute square miles of the continental shelf--the last frontier of the U. S.

The survey will be concentrated off Nome, Alaska, between St. Lawrence Island and the Seward Peninsula, in western Norton Sound. It will be the most comprehensive survey of these waters ever made.

### A Different Gold Rush

During the gold rush of 1896-99 there was gold placer mining of the sands at Nome. Now the search for gold is turning to the waters offshore, where old beaches and stream deposits exist. The Norton Sound area was uncovered during the Ice Ages. Then, the sea level was much lower than today, and gold was concentrated along streams and beaches as it is today. This was confirmed by U. S. Geological Survey reconnaissance last year. It was conducted in cooperation with the University of Washington and the U. S. Bureau of Mines. The survey also showed the presence of thick layers of sedimentary rock under much of the northern Bering Sea. This raised the possibility of petroleum deposits under Norton Sound.

### The Operation

The survey will be conducted from 2 Seattle-based ships of ESSA's Coast and Geodetic Survey, the USC&GSS "Surveyor"



and "Oceanographer." The Surveyor was scheduled to be in the area from June until September; the Oceanographer from about mid-July until late August.

The ships will map the offshore area using precise electronic navigational control. Sediment samples of the Bering Sea bottom and profiles of the geologic formations beneath the sediment will be obtained on the ships by a team of five U. S. Geological Survey (USGS) scientists. The samples will be analyzed for mineral content at the USGS laboratories, Menlo Park, Calif.

Data gathered will be analyzed by scientists of both agencies. The survey will provide data for bathymetric maps showing the shape of the ocean floor, for nautical charts, and for magnetic anomaly and gravity anomaly maps. These Coast and Geodetic Survey maps will provide a base for plotting the sediment analyses and profiles of the geological structure. This will permit the Geological Survey geologists to evaluate mineral and oil potential under Norton Sound.

#### Geologic Information

The survey also will provide geologists with information on the area's geological history. It may prove possible to map the outline of shorelines, river valleys, and glacial deposits that once existed above sea level.

The scientists will search for submerged beach ridges and stream valleys to determine the area's drainage pattern when it was emergent. The sea valleys are particularly interesting because they drained the area of the gold placer deposits near Nome.

The Bering Sea survey is a pilot project conforming with recommendations of the National Council on Marine Resources and Engineering Development. The long-range view is to extend the program to the continental shelves off the Pacific, Gulf, and Atlantic coasts.

The Alaskan shelf is about two-thirds of the entire submerged area. ESSA currently is surveying the entire shelf. Bathymetric maps of its topography already have been issued for parts of the coast off the Aleutian Islands, Oregon, Southern California, New England, and the mid-Atlantic Coast. The

Geological Survey will use these maps of the geology and mineral resources of the submerged continental margin.



### Hydrographic Survey of Long Island Sound Resumed

Detailed hydrographic surveys in Long Island Sound resumed in June as part of a project to chart the Sound's entire length. The project began in 1966 and will take years to complete. It will be the most detailed survey of the Sound since the 1800s.

Surveys will be conducted this year for about 4 months by a 15-man, shore-based, field party and the "Whiting" of the Coast and Geodetic Survey. The surveys will provide the latest navigational information for nautical charts. Such charts are essential for safe navigation in the Sound of seagoing commerce and recreational boating. New data will be incorporated into about 20 existing charts and be used in producing 4 new, large-scale, charts planned for Long Island's north shore.



### Study Ancient Alaskan Sea Channel

U. S. oceanographers are studying new data on a sea channel at the bottom of the North Pacific. It is just south of the Aleutian Islands and once connected North America with a vast underwater plain.



Dotted line indicates how sea channel may have once connected the vast Aleutian Abyssal Plain, three miles below the surface of the sea, with Alaska. When the Aleutian Trench was formed some 10 to 50 million years ago, it apparently broke the connecting link. U. S. oceanographers recently investigated the channel for new evidence on the geological history of the area.



Some oceanographers believe it is one of several channels which, in the past, carried mud from land to the Aleutian Abyssal (deep sea) Plain, an area one-half to two-thirds the size of Alaska. The channel is about 3 miles below the surface of the sea.

The plain was cut off from the Aleutian Island Archipelago when a subterranean cataclysm 10 to 50 million years ago caused a segment of the ocean floor--about 50 miles wide and 2,000 miles long--to subside into the earth's crust to form the Aleutian Trench.

#### Channel Discovered in 1967

The existence of the channel became known only last fall. Scientists regard it as convincing evidence that may shed new light on the area's geological history. They state that the trench, several thousand feet deeper than the plain to the south, cut off from the plain vast supplies of mud that once flowed through the channels. In its place, the only deposits received by the plain since the trench was formed were airborne dust and remains of drifting organisms, known as pelagic "snow fall" sedimentation.

#### ESSA Survey

ESSA investigated the sea channel in April. It was a cooperative venture of ESSA's Pacific Oceanographic Research Laboratory, Seattle, Wash., and ESSA's Coast and Geodetic Survey Ship "Oceanographer."



#### Government Boosts Nautical Chart Output

During the summer, an estimated 41 million Americans take to the water in boats--many without the nautical charts essential to all navigators.

To meet the rapid expansion in recreational boating, more nautical charts are being turned out to guide these 41 million Americans safely through navigable waters on the Atlantic, Gulf, and Pacific coasts.

A leader in this program is the Coast and Geodetic Survey of the Environmental Science Services Administration (ESSA). This Commerce Department agency produces about 2,000,000 nautical charts a year to

meet recreational and commercial boating needs. The Coast Survey estimates that 223 new charts may have to be produced during the next 10 years.

Conventional charts are used aboard ships where room for display and plotting is available. These charts range from large-scale harbor charts for navigating in harbors and narrow waterways and for anchoring--to small-scale sailing charts for offshore navigation between distant ports.

Small-craft charts are compact and specially designed for cockpit use. They are valuable, too, as hand-held copies on the bridge of large commercial ships. These accordion-folded charts lead skippers to docks, supplies, and services. Printed on the covers are tides, currents, symbols and abbreviations, and many helpful small-craft notes.

#### 2½ Million Sq. Miles Covered

During the past 125 years, the Coast Survey has produced about 850 separate nautical charts covering about 2½ million square miles of navigable waters. "These charts play an important role in the Nation's economic growth and national security. Long-range plans must promote the development of the waterway systems, increased foreign trade, water-related recreation, and the fishing industry to meet the requirements of an expanding population."

This job entails extensive hydrographic surveying along U. S. coasts and estuaries. It includes "the operations of 14 ships, coastal photogrammetric (aerial photo) surveys and mapping; geodetic control surveys; investigations of navigational hazards; nautical chart compilation and maintenance; reproduction and distribution of charts and coast pilot information; and research and development in instrumentation, automation, and cartographic techniques."

Surveying must precede chart compilation, and nautical charts require a great deal of it. This includes hydrographic surveys to chart water depths and bottom topography; wire-drag surveys to find such hidden dangers as pinnacle rocks and wrecks; tide and current observations; and aerial photo surveys to map the coastline. It is estimated that field surveys take two-thirds of each dollar spent to make nautical charts.

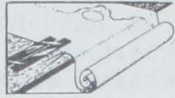
#### Need for Charts Grows

The need for up-to-date nautical charts has increased with the expansion of commercial shipping and recreational boating.



The U. S. Coast Guard reported that 3,373 commercial vessels in fiscal year 1966 were involved in marine accidents. Losses reached nearly \$76 million. A total of 534 vessels was grounded.

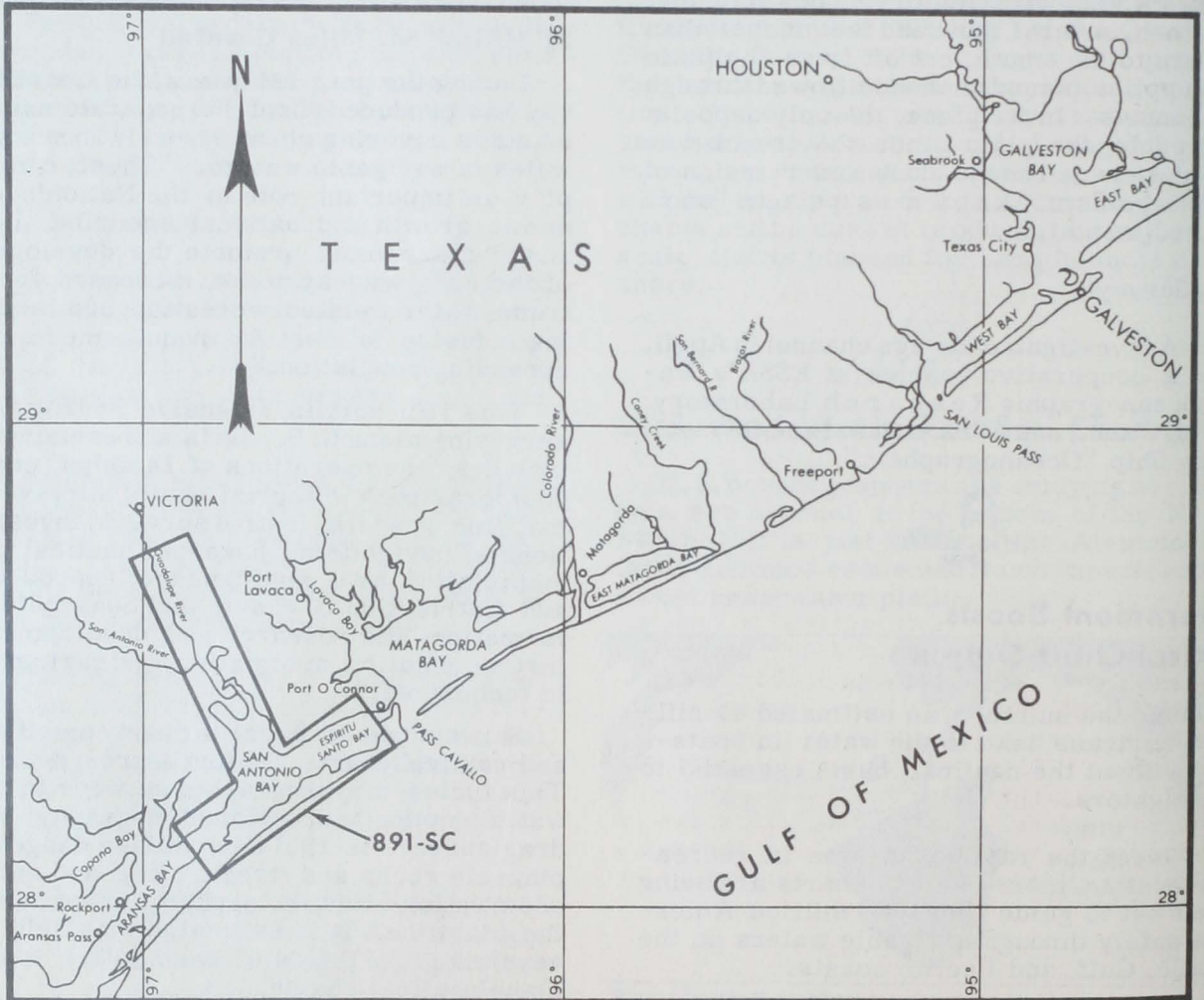
In recreational boating, the number of craft has increased since 1950 from 3½ million to over 8 million in 1966. The Coast Guard reported 4,350 marine accidents involving 5,567 recreational boats in 1966, losses were \$7,334,500. Of the 4,350 accidents, 283 resulted from groundings.



### Nautical Chart Issued for Intracoastal Waterway in San Antonio Bay

ESSA's Coast and Geodetic Survey has published a new small-craft nautical chart for the Intracoastal Waterway in San Antonio Bay, Texas. The chart includes for the first time the 9 by 100-foot channel from Long Point to Victoria. This recently completed channel, connecting with the Waterway in San Antonio Bay, extends nearly 35 miles inland to provide water transportation for recreation and industry.

The new chart (891-SC), produced at a scale of 1:40,000, contains the latest marine data, including that obtained in 1967 by aerial photography. It replaces conventional charts 890 and 891 and costs \$1.50.



Area covered by new small-craft nautical chart being issued by the ESSA Coast and Geodetic Survey for the Intracoastal Waterway in Texas.



## Foreign Fishing Off U. S. in May

### OFF ALASKA

**Japanese:** About 140 vessels fished off Alaska during the first half of May--the same number as in April. The pattern of past years was repeated: the number increased to over 100 in second-half May. This resulted primarily from the beginning of the high-seas salmon fishery, and from increased effort in the minced fish meat and fish meal fishery in the eastern and central Bering Sea.

The Pacific ocean perch fishery in the Gulf of Alaska was continued by about 7 stern trawlers during 3 weeks of May. Then the effort dropped to about 5 when 2 moved south to Queen Charlotte Island. The major Gulf activity in May occurred off southeast Alaska in the eastern Gulf.

The perch fishery along the 100-fathom curve in the eastern and central Bering Sea was continued by about 5 stern trawlers during most of May. By month's end, however, the fishery decreased to about 3 vessels--when one transferred to a new herring fishery in the eastern Bering Sea, and another moved south of eastern Aleutians to resume perch fishery. One factoryship, plus 7 trawlers, remained active in central Bering Sea until late May, presumably fishing for ocean perch. At month's end, however, most trawlers were observed fishing for herring in eastern Bering Sea, and it is believed entire fleet had switched to this new fishery.

The trawl fishery for Alaska pollock and flatfish for production of minced fish meat and fish meal was intensified in early May when another factoryship fleet arrived in eastern Bering Sea. This brought to 5 the number of fleets (5 factoryships plus about 88 trawlers). During month, the 5 scattered on Continental Shelf of eastern and central Bering Sea--from just north of Alaska Peninsula to northwest of Pribilofs. Japanese officials reported very good catches being made and, in addition to production of minced fish meat and fish meal and oil, small quantities of fish also are being frozen for human consumption.

The tangle net and pot fishery for crabs in eastern Bering was continued by 2 factoryship fleets. By month's end, both fleets had moved from Continental Shelf just north of Alaska Peninsula to Pribilofs. A similar pattern was followed by the 2 fleets in 1967, and 1 of the 2 fleets in 1965 and 1966. Such moves in pre-

vious years were made primarily because of Soviet competition north of Alaska Peninsula. The Japanese catches this year, like the Soviets', have been predominately tanner crab. The 2 fleets moved to Pribilofs to catch king crab primarily. At least 4 net-setters preceded the 2 factoryships to Pribilofs by 1 month.

The sablefish fishery in Gulf of Alaska was continued by 2 to 4 long-line vessels in May. The major effort was off southeast Alaska coast.

By late May, the Japanese had begun a trawl fishery for herring on the Bristol Bay "flats" about 20 miles south of Togiak Bay. This probably resulted from success of the 3 vessels that searched for herring by fishing with gill nets in central and eastern Bering in April and May. At month's end, at least 12 trawlers and 1 factoryship were fishing. The factoryship and 7 trawlers transferred to this fishery from perch fishery in central Bering.

The 1968 high-seas salmon fishery in North Pacific began in last week of May. As in preceding 6 years, the fishery is being conducted by 11 fleets (11 factoryships and 369 gill-net vessels). The fleets began fishing well southwest of western Aleutians. By end of May, at least half the fleets were working northeast toward the western and central Aleutians.

**Soviet:** About 50 vessels fished off Alaska during first-half May; in the next 2 weeks, their number was lowest since Nov. 1963. Only about 10 vessels remained at month's end--about  $\frac{1}{7}$  number sighted off Alaska in April 1968 or May 1967.

Pacific ocean perch fishing was concentrated along Aleutians: 12 medium trawlers and 2 processing vessels fished south of eastern Aleutians during first 3 weeks, then left. At month's end, only a stern trawler continued to fish for perch south of central Aleutians.

Shrimp fishing on Portlock Bank just east of Afognak Island in central Gulf of Alaska followed the 1967 pattern, when operations began in late March and ended in mid-May. The number of medium trawlers accompanying the 2 Zakharov-class factoryships decreased from 20 in late April to 10 in early May. A BCF agent visited one shrimp-processing floating factory in early May. He was advised



that (1) the medium trawlers had been continually hampered by bad weather since fishery started in March, and so they were not able to achieve planned catch; (2) the shrimp fishery on Portlock Bank would be terminated by mid-May. U. S. fishery patrol units did not find any Soviet vessels on May 14 in the Portlock Bank area.

The trawl fisheries for pollock, flatfish, perch, and gray cod along Continental Shelf edge from Unimak Pass to latitude of St. Matthew Island in central Bering Sea was continued by 15-20 medium trawlers and a few refrigerated transport vessels during first-half May. About mid-May, the number began to decline; by month's end, only about 10 remained active.

Soviet king crab fishing in eastern Bering ended on May 2. A BCF agent who boarded the 2 Zakharov-class factoryships in April was advised that catches were primarily tanner crab; in previous years, such catches were almost entirely king crab. Soviet officials said that if catches did not improve, and if tanner crabs continued to dominate, they would abandon crab fishery much earlier than planned date of late June. The Soviet withdrawal from eastern Bering by May 2 indicates that tanner crab continued to prevail. The Soviets apparently believed the 2 fleets could be used more economically elsewhere.

Two whaling fleets began North Pacific whaling in mid-May. No vessels had been observed near Alaska by month's end; apparently, the fleets are remaining well offshore.

South Korean: After attempting to enter North Pacific fisheries off Alaska in fall 1967, the fleet of "Sam Su No. 301" accompanied by

6 small pair trawlers returned in early May. The fleet proceeded eastward along Aleutians to Unimak Pass, then sailed northwest to central Bering. At month's end, the South Korean fleet was located on or along edge of Continental Shelf west of St. Paul Island. Presumably, it was fishing for flatfish, Alaska pollock, and ocean perch. The expedition had difficulties. Part of the fleet experienced mechanical difficulties, one trawler ran aground, and 2 narrowly missed severe damage when they hit icebergs.

#### OFF PACIFIC NORTHWEST

Soviet: During May, 56 individual vessels were sighted off Washington and Oregon, compared to 54 vessels in April 1968. Because not all fished entire month, weekly average off Pacific Northwest fluctuated between 35 and 45 different vessels through May (see table). This is considerable decrease from average number observed in 1967, when over 100 were sighted each week.

It was not until week ending May 23 that commercial quantities of fish were observed on Soviet vessels. A side trawler off Oregon had good-to-excellent catches of Pacific hake. Most side trawlers were observed catching up to 10,000 pounds per haul; a couple of pair trawls contained about 75,000-100,000 pounds--mostly hake.

During 4th week, part of fleet moved north off Grays Harbor, Wash. There, and off Heceta Head, Oregon, good-to-excellent catches (primarily hake) also were observed.

Off Oregon, 2 stern trawlers completed hauls of about 60,000 to 80,000 pounds of hake. Several stern trawlers had side bins full of what appeared to be hake.

Soviet Fishing Vessels Sighted Off U. S. Pacific Northwest in May 1968

Week Ending	Area	Type of Vessel					Total
		Medium Side Trawlers	Stern Factory Trawlers	Support Vessels	Research Vessels	Other	
May 9	Wash.	1	-	-	1	1 tug	3
	Oregon	21	13	6	1	1 tanker	42
	Total	22	13	6	2	2	45
May 16	Wash.	-	-	-	-	1 tug	0
	Oregon	17	6	7	2	1 tanker	34
	Total	17	6	7	2	2	34
May 23	Wash.	1	-	-	-	1 tug	1
	Oregon	14	13	5	2	1 tanker	36
	Total	15	13	5	2	2	37
May 30	Wash.	11	-	5	-	1 tug	16
	Oregon	4	15	2	2	1 tanker	25
	Total	15	15	7	2	2	41



During May, the Soviets had 3 medium trawlers off Pacific Northwest. These are probably vessels searching for fish concentrations for the fleet.

#### OFF CALIFORNIA

Soviet: Foreign fishing decreased during May. Poor weather prevented routine aircraft patrol early in the month, when the Coast Guard reported 8-10 unidentified Soviet vessels off Santa Cruz. During week ending May 11, 7 factory trawlers were sighted fishing 10-20 miles off Russian River. During week ending May 24, only 2 vessels were sighted.

The research vessel "Druzhnii" again came to Los Angeles Harbor from May 22-26 to take on fuel and supplies. This vessel, an ice-whaler, reportedly is conducting oceanographic research off Central and South America.

#### OFF NORTHWEST ATLANTIC

An estimated 250 foreign vessels from USSR, Poland, East Germany, and Japan were sighted off U. S. coast in May--a slight increase over number reported in April 1968. The Soviets had the most vessels, averaging between 120 and 130; during one week, they reached 150.

207 individual Soviet vessels were sighted and identified in May; in April, 188.

32 Polish vessels and 9 East German vessels also were sighted.

Two Japanese stern trawlers were intermittently reported off the U. S. coast.

Soviet: Through May, the main fleet was divided into large groups generally dispersed from south of Block Island, R. I., to southwest slopes of Georges Bank. More vessels began fishing those areas in early May, when Soviets suddenly shifted many vessels from mid-Atlantic (off New York and New Jersey) eastward.

Early in May, about 150 Soviet vessels were in a 30-mile area 30-40 miles south of Block Island and Martha's Vineyard. Moderate catches of fish visible on deck appeared to be mostly herring, with some whiting and red hake. By mid-month, fleet shifted to nearby area south of Nantucket Island to

southwest part of Georges Bank. Observed catches were primarily herring and whiting. By month's end, an estimated 140 vessels were dispersed along eastern slopes (southwest and southeast parts) of Georges Bank fishing in 30 to 40 fathoms, primarily for herring.

#### OFF MID-ATLANTIC

Soviet: In May, 50-60 vessels fished primarily off New York and New Jersey; 100 had been sighted in April. The decrease was caused by shifting operations to southern New England and Georges Bank area.

Early in May, about 40 vessels were spread out from about 40 miles east of Atlantic City, N. J., to 30 to 70 miles south of Long Island. Catches seen on board were mostly herring, with some whiting and red hake. By mid-month, 60 vessels were in Hudson Canyon area 60-70 miles south of Long Island; several vessels were also scattered east of Cape May, N. J. Catches were mostly herring. By month's end, 50 vessels were sighted in a 20-mile area 50 miles south of Montauk Point, L. I.; several vessels were also fishing near Hudson Canyon. Catches on board were primarily herring.

Polish: During May, 25-30 vessels were sighted fishing off New York, New Jersey, and southern New England. Early in month, an estimated 25 were 20 to 40 miles south of Montauk Point and Block Island, R. I. By mid-month, 15 to 20 vessels fished east of New Jersey and south of Long Island. By month's end, those vessels were scattered from New York to eastern slopes of Georges Bank. Herring was primary catch observed.

East German: In May, 6-7 East German vessels (side trawlers) continued fishing among Polish and Soviet fleets. Catches on board were identified as herring.

Japanese: Early in month, 2 stern trawlers were reported fishing off New York and New Jersey. Late in month, those vessels were sighted on southwest part of Georges Bank. Japanese press reported that by end of May 8 to 9 trawlers were expected to be "exploring" off U. S. east coast, specifically off New York and New Jersey. Apparently, the arrival of some of those vessels has been delayed.



## IN GULF OF MEXICO AND OFF SOUTH ATLANTIC

No foreign vessels were sighted during May fishing off the U. S. Atlantic coast south of Cape Hatteras (including off Florida coast) or off U. S. Gulf of Mexico coast.

Note: During surveillance patrols, a certain number of vessels is sighted. The total is recorded; also, each vessel is identified as to type. At month's end, all sighted vessels are counted only once. If a vessel was sighted more than once, it will be counted only once. Since vessels arrive at and depart from fishing areas all the time, the total of identified vessels for the month always will be larger than actual size of fishing fleets observed during individual surveillance patrols.



### CRAB DABS



1 can (12 ozs.) Dungeness crab meat or  
other crab meat, fresh or frozen or  
2 cans (6½ or 7½ ozs. each) crab meat  
½ cup fine soft bread crumbs  
2 tablespoons dry sherry

1 teaspoon chopped chives  
1 teaspoon dry mustard  
¼ teaspoon salt  
10 slices bacon, cut in thirds

Thaw frozen crab meat. Drain crab meat. Remove any remaining shell or cartilage. Chop the crab meat. Combine all ingredients except bacon. Mix thoroughly. Chill for 30 minutes. Portion crab mixture with a tablespoon. Shape into small rolls. Wrap bacon around crab rolls and secure with a toothpick. Place crab rolls on a broiler pan. Broil about 4 inches from source of heat for 8 to 10 minutes or until bacon is crisp. Turn carefully. Broil 4 to 5 minutes longer or until bacon is crisp. Makes approximately 30 hors d'oeuvres.

This idea for entertaining is from a new, 22-page, full-color booklet, "Nautical Notions for Nibbling," released by the United States Department of the Interior's BCF. It is available for 45¢ from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. Ask for Market Development Series No. 10, (catalog no. I-49.49/2:10).



## STATES

## Alaska

SURVEY SHOWS SHARP CONTRAST  
IN SCALLOP ABUNDANCE

The Federally aided, State-chartered exploratory fishing cruise to determine the commercial feasibility of an Alaskan scallop fishery ended June 6, 1968, at Kodiak. In 40 days of fishing, the F/V "Viking Queen" made 72 one-half hour drags using 2 standard New England dredges each 13 feet wide. She fished the area between Lituya Bay and Cape Saint Elias along the east coast of the Gulf of Alaska, the vast flats off Prince William Sound between Hinchinbrook, Montague, and Middleton Islands, along the southeast shore of the Kenai Peninsula and the entrance to Cook Inlet, and around Kodiak Island.

## The Results

The cruise results indicate sharp contrasts in scallop abundance, with the dividing line near Cape Saint Elias. Eastward of Cape Saint Elias, the Viking Queen found scattered beds capable of supporting commercial operation--but none to the westward.

Over 200 drags were made in Lituya Bay-Cape Saint Elias area. Scallops appeared to be most abundant along the coast east of Yakutat Bay, where 100-bushel catches were made. Based on 6 hours' production fishing on a bed near Yakutat, Captain Ness of the Viking Queen estimates he can produce 4,000 pounds of scallop meats per day in this area with a full 11-man crew fishing round the clock.

## Kodiak Catches Disappointing

The Viking Queen catches in the Kodiak area proved disappointing. Earlier landings by Kodiak fishermen suggested an apparent abundance of scallops. The Viking Queen made 110 drags around the Island from Cape Ugank to Marmot Bay--and found no large concentrations. Most drags produced few or no scallops. The Marmot Flat bed, pioneered by the "Virginia Santos," proved to be small and apparently already depleted.

\* \* \*

## HYDROLOGY OF ESTUARIES STUDIED

Small bays and inlets abound in southeastern Alaska and serve as spawning and nursery areas for many species of commercially important fish. BCF's Auke Bay Laboratory and the Alaska Water Laboratory of the Federal Water Pollution Control Administration are making a joint study of several of these bays to determine the extent and intensity of natural and manmade changes in oceanographic conditions. These changes can drastically affect the biological productivity of the bays.

## 2 Estuarine Bays Surveyed

Two estuarine bays that are affected by pulp mill discharge were surveyed recently--Ward Cove near Ketchikan and Silver Bay near Sitka. The work is aimed at determining the detailed oxygen budget of the estuaries, mapping the bottom sediments, and measuring the effects of pulp mill discharge on the intertidal fauna. The two bays are significantly different in hydrology, and the study will provide comparative data on the susceptibility of the bays to pollution. The data from Silver Bay can also be compared with data collected in 1957 before the pulp mill went into operation.



## California

1968/69 ANCHOVY REDUCTION  
FISHERY SEASON PROPOSED

The California Fish and Game Commission intends to adopt a 1968/69 anchovy reduction fishing season of 75,000 tons, the same as 1967/68. It scheduled a hearing in San Diego for July 26.

The proposed season would have 3 zones instead of 6. The dates would be changed from the previous season. The reason for the proposed fewer zones is that tagging studies have shown that anchovies migrate between S. California and Central California, between S. California and Baja California and inshore to offshore; thus the current zones were of little value.



Proposed Fishery

The proposed fishery would have 1 northern zone, north of Point Conception, with a 10,000-ton quota, and 2 southern zones instead of the 5 in the 1967/68 season. The total quota for the 2 southern zones would be 65,000 tons--15,000 in inshore zone and 50,000 for offshore.

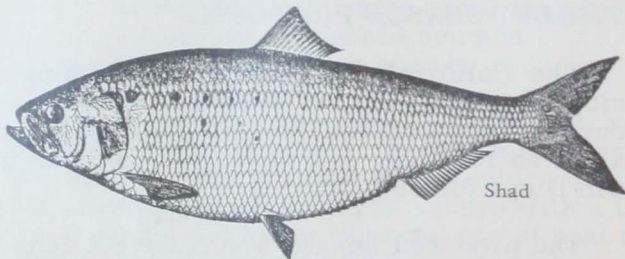
A smaller inshore quota is proposed to reduce competition in the area of heaviest sportfishing. The northern season would be August 1 through Memorial Day; the Southern from Labor Day through Memorial Day. The Department of Fish and Game recommended that the Commission consider raising the quota if commercial fishermen reach the 75,000-ton allotment during the season. It estimates the anchovy population in California waters at the minimum of 2 million tons.



Oregon

COLUMBIA RIVER SHAD  
NEARING CENTENNIAL

The Oregon Fish Commission has recorded the story of the nearly-century-old American shad. The fish first appeared in the Columbia River in the late 1870's. It came from a stock introduced into California's Sacramento River from the Atlantic Coast in 1871. In 1885, about 1 million shad fry from the Susquehanna and Potomac Rivers were released into the Columbia, Willamette and Snake Rivers.



Shad

Since then, the shad runs have fluctuated considerably. The bulk have spawned below Bonneville Dam. In recent years, however, dams have changed the river environment. The shad extended their range into the upper Columbia and Snake Rivers. Since 1960, annual passage over Bonneville has exceeded 200,000.

The Columbia has become one of North America's largest shad producers. The potential commercial harvest was 2-4 million pounds in recent years. Despite this abundance, commercial shad landings since 1938 have ranged from a high of about 1.4 million pounds in 1946 to a low of 136,000 pounds in 1959.

Fishing Restrictions

Before 1953, "there were no season restrictions on commercial shad fishing, although mesh size restrictions were enforced during the closed period between the spring and summer commercial fishing seasons. Since then, however, the fishery has had problems: summer chinook salmon.

In 1955, shad fishing was prohibited between normal salmon seasons except in the Camas-Washougal area. This was not to "protect" summer chinook. It was designed to raise early-summer chinook escapement by eliminating incidental catch during shad season--so the regular summer commercial fishing season could begin.

The present restrictions on the shad fishery aim to protect dwindling summer chinook numbers. The restrictions began to develop after 1957, the year of the largest summer chinook run since 1938. After 1957, the run declined steadily:

1957-200,000	1964- 91,000
1958-187,000	1965- 76,000
1959-170,000	1966- 72,000
1960-143,000	1967- No precise estimate due to early end of spring commercial fishing season
1961-130,000	This resulted in large-scale mixing of spring and summer chinook.
1962-108,000	
1963-100,000	

Hydroelectric Installations

This decline is directly related to hydroelectric installations. These limited several and, in some cases, eliminated races of fish by "blocking spawning runs, inundating spawning areas, delaying migrations, and creating mortalities to both upstream and downstream migrants."

The Fish Commission first became concerned about the upriver runs and the increasing interdam problems in the late 1950s. But at that time the losses hadn't seriously affected sport or commercial fisheries.

Later, the number of dams increased rapidly--and the number of fish in the upriver



runs generally decreased. By 1953, the decline in summer chinook had become serious. The Fish Commission and Washington Department of Fisheries biologists recommended a reduced 1964 summer commercial fishing season. More research in 1963 and early 1965 substantiated the summer chinook's plight. But it took a 70% interdam loss of the 1965 spring chinook run between Bonneville and Ice Harbor-Priest Rapids Dams to point up the commission's concern about problems between the dams.

In 1965, the Fish Commission and the Washington Department of Fisheries recommended no summer commercial fishing season. They requested an end of sport fisheries in Oregon, Washington, and Idaho. (The Indian fishery continued, harvesting about 100,000 summer chinook.)

#### Experimental Shad Season

An experimental shad season was started in 1965 at the request of the commercial fishing industry. It was limited to the upper 13 miles of the regular commercial fishing area below Bonneville Dam. To protect the summer chinook, possession of salmonoids during the fishery was prohibited.

The incidental catch of summer chinook was minimal. However, fishermen harvested only 68,400 shad from a run estimated at 700,000 fish minimum (catch plus Bonneville count).

In 1966, sport and commercial closures on summer chinook continued throughout the 3-state area. The experimental shad fishery was expanded to include 60 miles of fishing area; fishing time was extended.

Nearly 165,000 shad were harvested from the run estimated at about 700,000 (catch plus Bonneville count). However, nearly 6% of the total catch was salmon and steelhead. This increase was attributed partly to increase in tight fishing, when salmonoids apparently are more vulnerable to shad nets.

#### Closures in 1967

The summer chinook sport and commercial fishing season closures continued in 1967. Night fishing for shad was eliminated and gear restrictions increased. Despite this, biologists found that incidentally caught salmonoids were nearly 6% of total catch. About

230,000 shad were landed. Nearly 10,000 summer chinook were caught and released. The biologists estimated, however, that 24% of the chinook were dead when removed from nets. The chinook catch was greatest during the week of highest roe shad landings.

Based on historical data and daily monitoring of shad fishery in '65, '66, and '67, biologists concluded that a maximum harvest of shad could not be taken by gill nets without catching large numbers of chinook. Also, that increased protection of chinook would be difficult because shad and chinook reach peak in fishing area about the same time.

So, on January 31, Fish Commission and Washington Department of Fisheries biologists recommended that there be no shad fishery in 1968, except in Camas-Washougal area, where few salmon or steelhead are caught. Also, research should begin in 1968 to find new ways of harvesting shad--seines, traps, etc.

#### Fishermen's Views

Commercial fishermen recommended that no action be taken to end the shad fishery at the January meeting. They believed they could develop gear restrictions that would virtually eliminate the incidental catch of summer chinook--and still harvest many shad. The joint commission deferred action.

At the March 27 commission meeting, industry spokesmen presented gear restrictions developed jointly by packers, fishermen, and net companies. The restrictions were to make the gill net hang in the water as a straight wall without folds or slack. With the net hung "tight," salmon would easily break through fine mesh. The spokesmen recommended a season to test the gear restrictions from June 5 to July 15 during daylight only; possession of all salmonoids was to be prohibited.

#### The Test

The commission later set a 4-day season to test these gear recommendations for reducing the high incidental take of chinook salmon. The season began June 10 and ran through June 13 from Gary Island upstream about 17 miles to the commercial fishing deadline 5 miles below Bonneville Dam.



Biologists monitored the fishery. They estimated the catch at 21,000 shad, 700 chinook, 44 steelhead, and 29 sockeye. All salmonids were returned to the river.

Based on these observations and previous data, the two agencies concluded that the gear restrictions did not reduce substantially the incidental summer chinook catch--and probably reduced the shad catch. At the June 14 public hearing, they recommended no further gill-net fishing for shad in the Columbia River, except in the Camas-Washougal area.

They emphasized the need for research to develop shad fishing gear that would protect summer chinook--and be more effective in harvesting large numbers of available shad.

\* \* \*

#### SHAD AND STRIPED BASS ARE TAGGED IN STUDY

Shad and striped bass are being tagged in Coos Bay by Oregon Fish Commission biologists who want to learn about the life histories of these important food and sport fish. These fishes spend part of their life cycle there. So far, several hundred have been marked with yellow plastic "spaghetti" tags.

The Commission's Charleston Research Laboratory appealed to fishermen to turn in tags with a note giving date and specific area of catch.

The study is being financed partially with Federal funds available to the state under the Anadromous Fisheries Act, Public Law 89-304.

The Commission is continuing its collection and analysis of information on the "commercial catch, fishing intensity, age composition of the runs, sex ratios, spawning history and work on juvenile ecology" on the Siuslaw, Umpqua, Smith, and Coquille Rivers.



## Washington

### OCEANOGRAPHIC COMMISSION SPONSORS SEAMOUNT STUDY

The Oceanographic Commission of Washington will sponsor a program to place a manned habitat and researchers on Cobb Seamount off the Washington coast in summer 1969. Called "Project Sea Use," the program calls for explorations during summer 1969 to prepare for a multipurpose ocean laboratory.

Cobb Seamount is a volcanic mountain in the Northeast Pacific Ocean 270 miles due west of Grays Harbor, Wash. It rises from a 9,000-foot deep basin to within 122 feet of the surface. It rises closest to the surface of any of the seamounts in the Northeastern Pacific, within the zone penetrated by sunlight.

Though it lies nearest to the United States it still is a basically undisturbed deep-ocean environment. Discovered in 1950, the mount has stimulated much interest. Many believe it is a regional resource with "great potential significance for scientific exploration, development of new marine engineering applications and eventual operational utilization."

Project Sea Use will seek to accomplish these objectives:

- "Characterize the chemical, physical, geological and biological features of the seamount and its environs.
- "Demonstrate that man can occupy, perform meaningful scientific work and do underwater construction at a seamount far distant from land based support and facilities.
- "Use presently available deep ocean technology in integrated support of a scientific program."





## BUREAU OF COMMERCIAL FISHERIES PROGRAMS

### Undaunted' Finds Many Tunas in W. African Cruise

BCF's R/V Undaunted returned to Miami, Fla., on May 21 after a successful cruise to West Africa. (Cruise 6801, Jan. 9-May 21, 1968.) She found excellent tuna fishing throughout most of the cruise.

Open houses and press conferences were held at Freetown, Sierra Leone; Accra, Ghana; and Abidjan, Ivory Coast.

The Undaunted's missions were: 1. Investigation of the distribution and biology of surface tunas and other open-sea fishes--with measurements of the physical and biological environment. In particular, investigation of tuna distribution in the Gulf of Guinea and off Angola in relation to the oceanographic features of the Berrit Front and the Angola Dome.

2. Investigation of the distribution and biology of fishes suitable for use as live bait for tuna fishing.

3. Collection of bottom-dwelling fishes and invertebrates from the continental shelf off Angola and southwest Africa.

#### TUNA SURVEYS

The tuna fishing was excellent throughout most of the cruise: 88 tuna schools were sighted or detected by trolling catches. During Tuna Survey I (Feb. 18-25), 72 skipjack (*Katsuwonus pelamis*) and 3 yellowfin tuna (*Thunnus albacares*) were caught on jig lines and sampled for length, weight, sex, stomach contents, viscera, muscle tissue, and eye ball. Most skipjack were small (2-3 lbs.). Weather in the survey area (fig. 1) was excellent, and the behavior of the tuna schools sighted was judged acceptable for purse seining. The schools were not fished with live bait.

During the Frontal Survey (March 3-16) 11 tuna schools were sighted or located by trolling in 13 days. These were generally located close to the 24° C. isotherm (fig. 2). Two schools were fished using live bait. A total of 125 skipjack (2-3 lbs.) was sampled, 100 from one school. Two 35-pound yellowfin tuna were caught on sport tackle in the Baía

dos Tigres (17° S. Lat.). The bay is shallow, and the water was dirty green. The weather was generally poor with low visibility and rough seas, and tuna sighting and fishing were severely hampered.

#### Excellent Fishing

Numerous tuna schools, combined with excellent weather, produced excellent fishing during Tuna Survey II (April 13-26). The scientists sampled 341 skipjack and 116 yellowfin tuna from 41 schools sighted. Seventeen schools were fished, using live bait. Tuna were particularly abundant around São Tomé Island (fig. 1). As many as 6 schools were sighted in a single day. Most were small (3-5 lbs.) skipjack. Whales and birds were also numerous. One school of yellowfin tuna, averaging 12 pounds each, was worked just a few miles from São Tomé; 74 fish were sampled from this school. Most of the larger skipjack (6-8 lbs.) in the area were in advanced stages of maturity. Ovaries had large, clear eggs with well defined oil globules; the testes extruded milt on cutting and squeezing.

Most schools sighted seemed suitable for purse seining, although many skipjack were less than 4 pounds and below the size acceptable to American canners. No commercial tuna boats were sighted during the cruise, although local bait boats were reported fishing skipjack out of Lobito and Mossamedes, Angola, with good success.

#### BAITING RESULTS

Good quantities of bait were located at Cabo Ledo, 60 miles south of Luanda, Angola, and in the harbor at Lobito.

In 3 sets at Cabo Ledo, 150 scoops were captured. *Sardinella eba* was the most abundant species; *Chloroscombrus chrysurus*, *Ethmalosa fimbriata*, and *Trachinotus glaucus* were also present. Survival of *S. eba* was excellent, but the *Chloroscombrus* died within 3 days.

At Lobito, 150 scoops of bait, almost exclusively small (2-3") *S. eba*, were captured. Survival was excellent. Baiting was unsuccessful at Freetown, Sierra Leone, and Luanda.



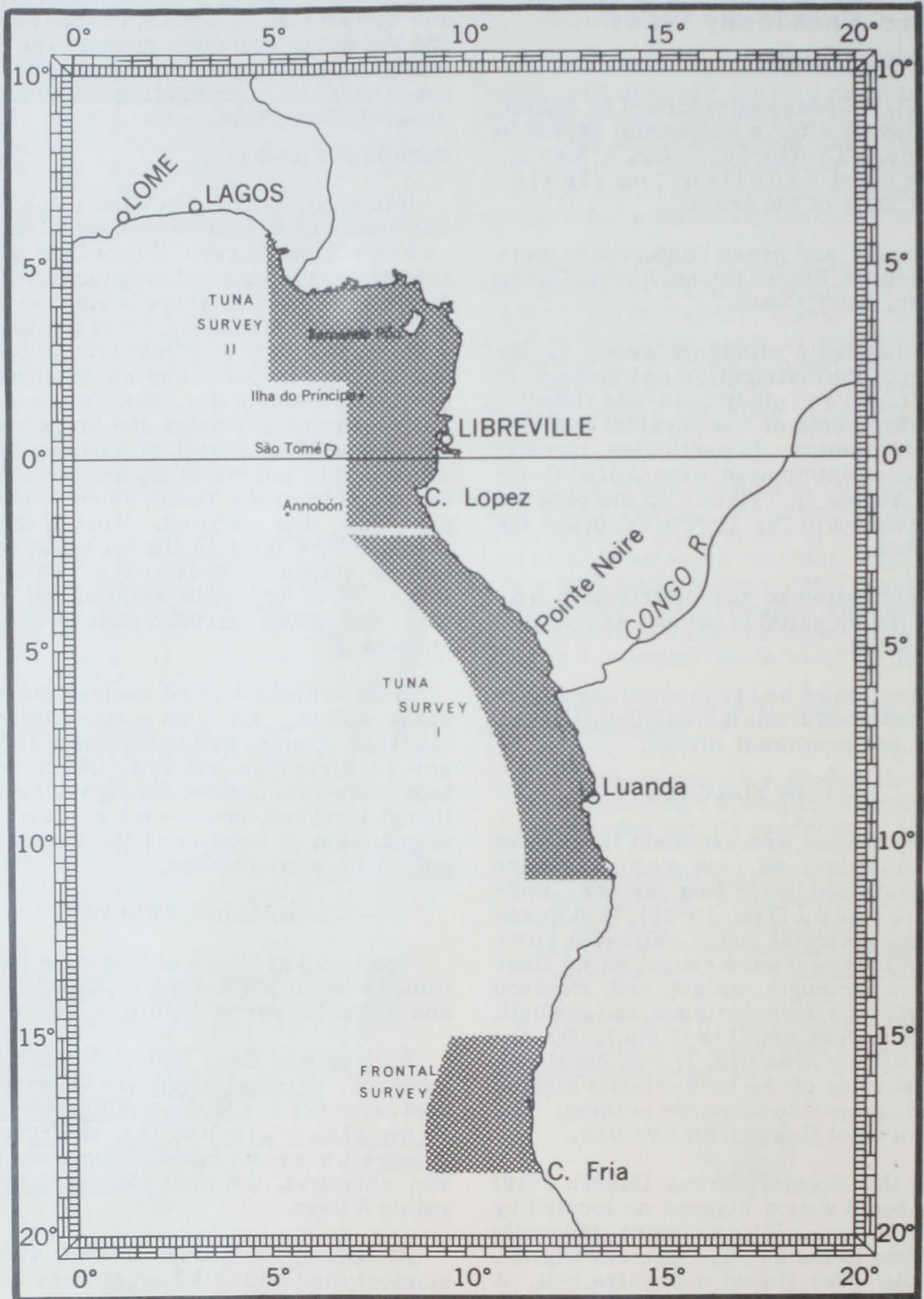


Fig. 1 - Survey areas, UN-6801.



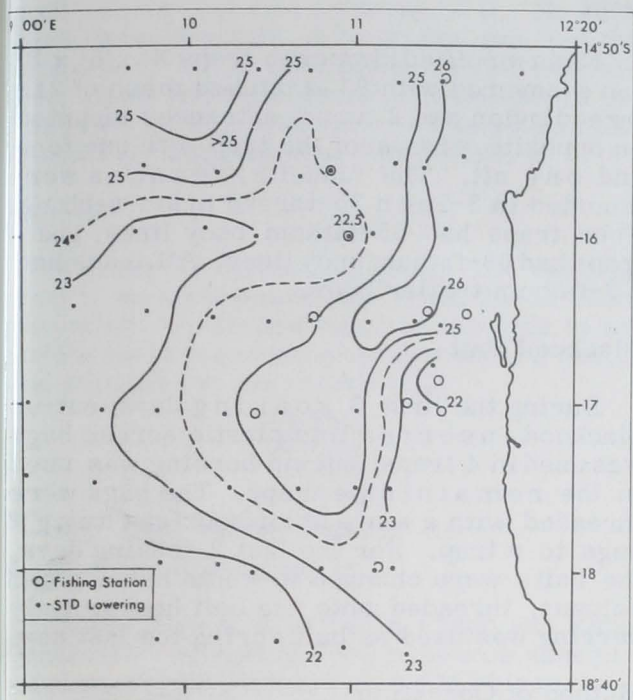


Fig. 2 - Surface isotherms, Mar. 3-Mar. 16.

### FRONTAL SURVEY

After baiting at Cabo Ledo on March 2, a southerly course was followed to intercept the Berrit Front. Surface water temperature was monitored by a continuous recorder. No abrupt change in temperature was noted. At 17° S. Lat., temperature of 23.5° C., station grid was set up to survey the general area where the front was supposed to be located during this period. Oceanographic observations (temperature, salinity, inorganic phosphate, iron, and oxygen) were made to a depth of 500 m. with a salinity-temperature-depth probe (STD) and Niskin water samplers. Duplicate, oblique, 1-meter plankton net tows from the depth of the thermocline to the surface were made at all hydrographic stations. Single plankton net tows were made at all fishing stations. Primary productivity and meteorological observations were also taken.

Surface temperature plots revealed the front to be S-shaped, with the lower part beginning at about the Baia dos Tigres (fig. 2). The position and shape of the front agreed with previous observations by other workers.

### TRAWLING SURVEY

The trawling portion of the cruise was terminated after 3 days because the engine

needed repair. Of five planned transects, 1½ were completed. Seventy-five gallons of fish were preserved. Crustaceans and other invertebrates were dispensed to specialists actively working on African species.



## 'Undaunted' and ESSA's Weather Satellites to Pioneer Ocean Study

When BCF's Undaunted sails from Miami, Fla., on August 5 for the west coast of Africa, she will sail a charted course. But after she arrives there, she will help to pioneer an uncharted course: she will work with ESSA's weather satellites to see if data gathered by the satellites can be useful to fishermen and oceanographers in locating an oceanic "front." If the mission is successful, it could lead to the prediction of favorable fishing conditions and to larger catches.



The R/V Undaunted. (Photo: Jossi, TABL.)

The Undaunted is the first fishery research vessel to join with satellites to determine whether it is practicable to monitor oceanic fronts from the skies. Such fronts are present in some areas of the world and constitute boundaries between masses of water. The fronts seem to be instrumental in concentrating fish that school on the surface; the tuna is one of these.

### The Operation

The Undaunted will use her conventional equipment to collect data on fish, the ocean, and weather conditions. In addition, she will have an automatic picture transmission (APT) receiver aboard. The satellites, orbiting the earth at about 700 miles, will transmit daily APT meteorological photos.



A single photograph by satellite could cover an area that would take an oceanographic vessel days or weeks to cover. Ordinarily, a research vessel stops fairly often to sample marine life and water. Together, the Undaunted and the satellites would be a quicker and more effective way of studying the ocean.

The Undaunted is part of BCF's Tropical Atlantic Biological Laboratory (TABL) in Miami. Dr. Paul M. Maughan of Washington, D. C., and Dr. Merton C. Ingham of TABL are BCF leaders of the project.

#### Undaunted's Other Missions

In addition to her work with the satellites, the Undaunted will investigate the distribution of surface schooling tunas in relation to oceanic, physical, chemical, and biological factors. She will provide specimens for biological studies. The vessel also will investigate the distribution and biology of fishes suitable as live bait for tuna fishing, and will collect bottom-dwelling fishes and invertebrates from the west African continental shelf.



### Use of Traps to Capture Halibut Under Study

The charter vessel M/V "Commando" returned to Seattle, Wash., on June 10, 1968, after a 10-day halibut gear research cruise (No. 11) between Scott Islands and Hecate Strait. Due to the absence of halibut, only part of the mission was accomplished.

The cruise's major objective was to determine the feasibility of using traps, or pot-type gear, to capture Pacific halibut in commercial quantities. Other aims were to (1) compare catch rates of trap gear with those of commercial longline gear fished in the same area; (2) determine the optimum soaking time of baited traps; (3) compare suitable baits for taking halibut with traps.

#### Conclusion

Halibut can be captured with traps. Absence of halibut in the Goose Island area prevented evaluation of trap efficiency compared to longline gear. Therefore, the study of the effectiveness of traps for capturing halibut in commercial quantities--and the most suitable baits to use--is inconclusive.

#### Gear

Eight modified king crab traps 8' x 6' x 3' were covered with 9" stretched mesh of 21-thread nylon and 2 tunnel entrances mounted on opposite sides of the trap with one fore and one aft. The tunnel entrances were mounted in 3-inch 36-thread nylon webbing. Four traps had 65-fathom buoy lines, and 4 traps had 83-fathom buoy lines. All traps had a 3-fathom trailer buoy.

#### Blackcod Bait

During the first 3 soaking days, cut-up blackcod inserted into plastic screen bags was used in 4 traps; cut-up herring was used in the remaining 4 traps. The bags were threaded with a steel bait hook and hung 2 bags to a trap. For the last 2 soaking days, the baits were changed to whole herring and octopus, threaded onto the bait hooks. Only herring was used as bait during the last day.

#### Method of Operation

Traps were set about one-half mile apart in 2 rows in 3 different locations: (1) Southwest corner of Goose Island Bank in 25-35 fathoms; (2) Northwest corner, Goose Island Bank in 52-61 fathoms; (3) between Scott Islands and Cook Bank at 52-54 fathoms. Traps were lifted after soaking 6 hours, 12 hours, and 22 hours, and were rebaited with fresh bait after soaking for 22 hours.

One skate of longline gear with 120 hooks was baited with octopus and herring and set between the 2 rows of traps. The gangion lines were spaced about 3 fathoms apart.

#### Results

Two halibut, 78 cm. and 108 cm., were taken in separate traps baited with whole herring threaded onto bait hooks. One large petrale sole was taken in a trap baited with cut-up herring in a plastic screen bag. No halibut were taken with the longline skate of gear or handlines. Two commercial halibut vessels were observed and only one halibut was taken during observation. No other halibut vessels were seen.

#### Herring Baited Traps

Herring-baited traps captured the 3 fish taken. The bait (herring) needed replacing after soaking 22 hours because small fish or



sand fleas had eaten much of it. No sand fleas were observed on or in the bait, but the appearance of the eaten bait would indicate sand fleas were present. Cut-up bait in the fine-webbed plastic screen bags was untouched by sand fleas or small fish.

#### Weather

Weather was generally good. The sea was choppy as northwest winds from 20-30 knots prevailed. On the last day, the sea was calm, and the large traps were brought aboard easily and stacked for the return trip.



### 'Cisco' and 'Kaho' Assess L. Michigan Resources

BCF's research vessels Cisco and Kaho concluded the spring 1968 resource assessment survey in southern Lake Michigan during May. (Cisco Cruises 1 & 2, 1968, Kaho Cruise 47.) Primary objective of the study was "to determine the relative abundance, condition, and seasonal movements of alewife and other important fish stocks in the southern portion of the lake."

The researchers emphasized collection of biological data on alewives during their normal inshore spawning run to better determine the

status of year class stocks; also, to monitor conditions as the summer die-off period approaches.

Besides collecting important life-history data on the alewife and other commercial species, the Kaho also sampled adult alewife populations at established stations. This was done to compare production rates with those of previous years--and to be better able to predict their availability to commercial fishermen.

Extensive echo-sounding surveys were made in southern L. Michigan to pinpoint the location of large concentrations of alewife. This information is important to fishermen who supply pet-food and fish-meal plants--and to industrial water users who have faced the problem of live alewife clogging water intakes during their spring spawning migrations.

#### What Vessels Found

In general, alewives were found in extremely dense concentrations, which were limited in size and moved in and out of an area. Commercial trawlers provided evidence of scattered and mobile concentrations reflected by daily catches. For a day or two, catches were exceptional, then the following day or two produced moderate or very poor catches. Catch rates of adult alewife with the Kaho's standard 52-foot (headrope) trawl were

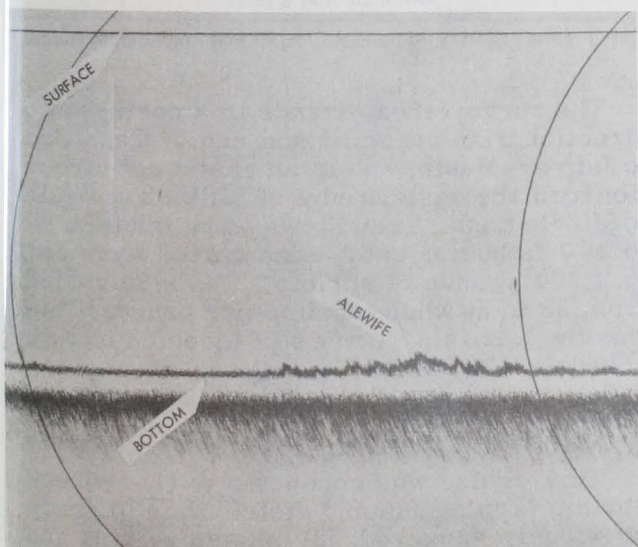


Fig. 1 - High-resolution "white line" echo sounder recording (left) showing alewife concentration on the bottom in 20 fathoms of water off Waukegan, Illinois, on April 13, 1968. Some 11,000 pounds of alewives (right) were taken in a 15 minute trawl drag which was in this concentration about eight minutes. Note that concentration of alewives was so dense that top of school produced "white line" effect which usually is caused by the bottom only.



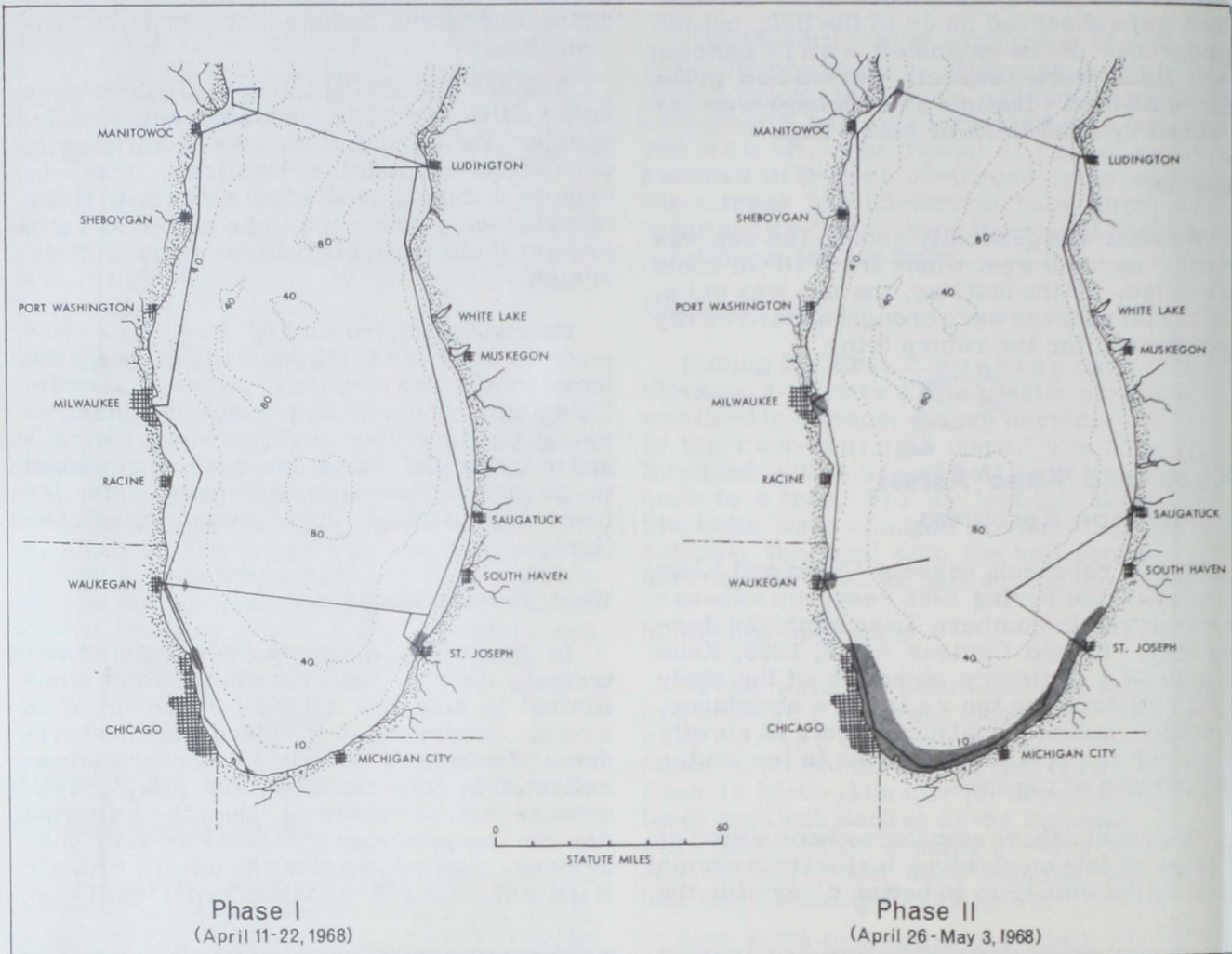


Fig. 2 - Track lines of the resource assessment echo-sounding and sampling surveys by R/V Kaho during April and May 1968. Shaded areas indicate bottom concentrations of alewives.

roughly comparable to those in 1963 and 1964. Sampling with a standard small-mesh trawl by both Cisco and Kaho on both sides of the lake revealed extremely abundant yearling alewife (1967 year class).



### 'Delaware' Finds Many Northern Shrimp

Extensive populations of northern shrimp (*Pandalus borealis*) were found in waters of the western Gulf of Maine.

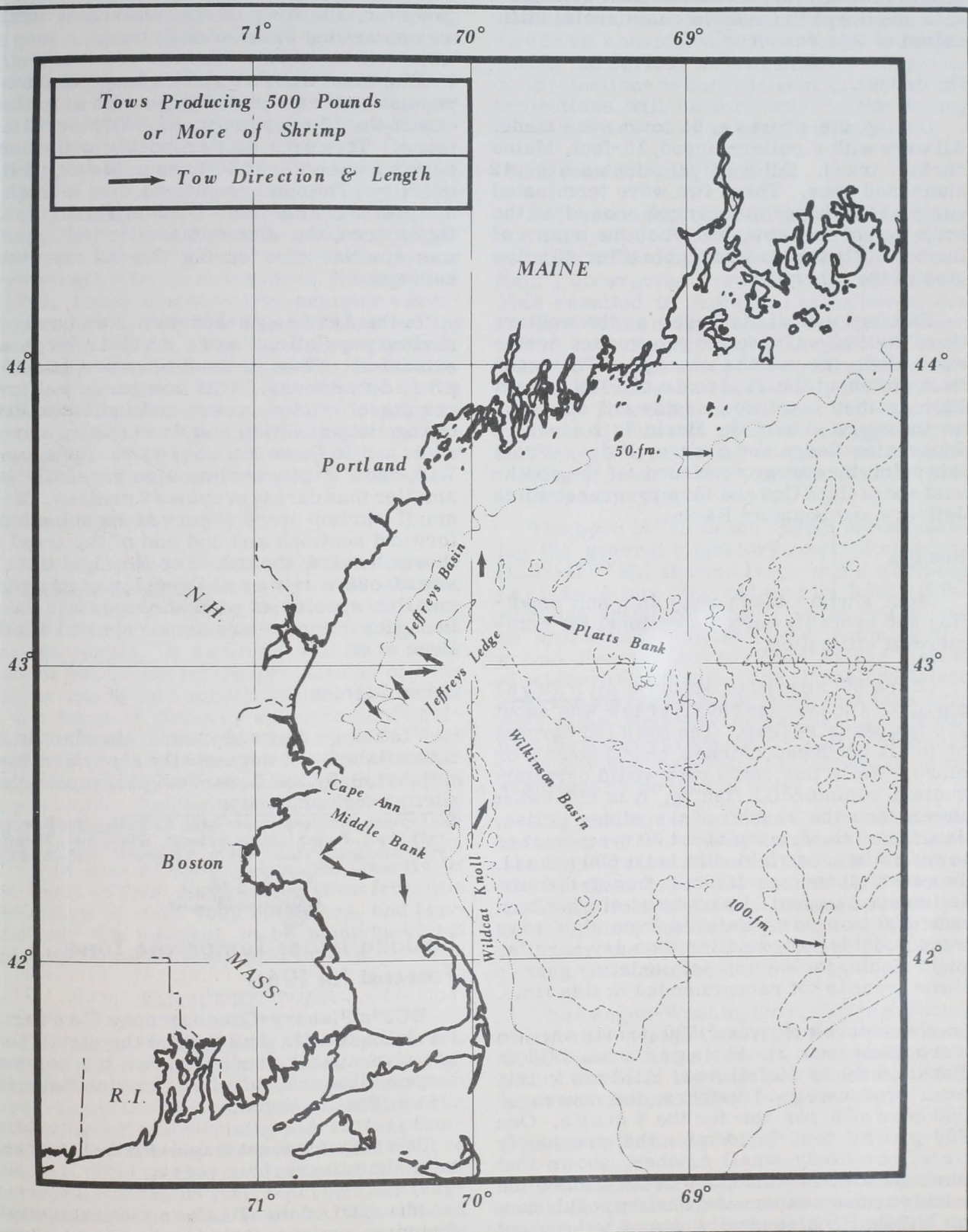
BCF's Delaware returned to Gloucester, Mass., on May 17 after a spring resurvey for shrimp in areas explored Nov.-Dec. 1967 and Jan.-Feb. 1968 (Del. 68-4, May 8-17, 1968).

The survey area extends in a north-south direction from the southeast end of Cape Cod to Jeffreys Basin, and in an east-west direction from the western edge of Wilkinson Basin to Middle Bank. Trawl tows were made in 40 to 140 fathoms; catch size varied from one to 1,300 pounds of shrimp. The size varied from 33 to 50 whole shrimp per pound. This was the last in a series of three cruises scheduled for the 1967/1968 season.

### Purpose

This cruise was conducted to (1) recheck shrimp populations and distribution in areas previously surveyed; (2) determine kind and extent of any population changes that may have occurred, and their effects on the availability of shrimp to commercial fishing in this area





Delaware Cruise 68-4, May 8-17, 1968.



at this time of year; and (3) collect biological data pertinent to possible commercial utilization of this resource.

#### Procedure

During the cruise, 51 tows were made. All were with a roller-rigged, 70-foot, Maine shrimp trawl. All were 60 minutes except 2 shortened ones. These two were terminated early when a hang-up occurred soon after the hook-up for one tow, and when the nature of the bottom became untrawlable after 40 minutes of the other tow.

Fishing operations began on the western tip of Stellwagen Bank and progressed northward along the western edge of Wilkinson Basin to about the latitude of Platts Bank. Fishing then continued southward along the northeastern side of the Basin to between Fippennies Ledge and Sharrer Ridge. From this point, the survey continued off the southeast end of Cape Cod and then progressed into Jeffreys and Scantum Basins.

#### Results

Most shrimp taken were in a soft condition and probably were not optional for commercial utilization.

Of the 50 completed tows, all caught shrimp. The average catch per tow was about 276 pounds of shrimp. Ten tows (20 percent of total) produced catches of 500 pounds or more. While this catch rate would certainly sustain commercial fishing, it is somewhat lower than the results of the winter cruise, Jan. 6 to Feb. 7, when about 30 percent of tows in this area yielded at least 500 pounds. However, these results were better than the fall cruise's, when 14 percent of tows took over 500 pounds. Catches from night tows were considerably smaller than day tows; so night fishing for shrimp with existing gear in these areas is not recommended at this time.

Two catches of over 1,000 pounds per tow were made near Stellwagen Bank (Middle Bank) in 40 to 50 fathoms. All tows in this area produced good catches; they averaged 900 pounds per tow for the 4 made. One 700-pound tow, in location that previously produced only small catches, shows that shrimp had moved into this section since the winter cruise. Otherwise, shrimp populations on Middle Bank generally appear to be about

the same now as during the winter season. However, the size of the individual shrimp was somewhat smaller than then.

The most noticeable change in shrimp populations was in Wilkinson Basin. Only one of the 27 tows produced 500 pounds or more. This compares poorly with winter survey, when 14 of 40 tows produced this quantity. The one exceptional tow, a catch of 800 pounds, came from Wildcat Knoll. In the Basin area, the size composition of catches was smaller than during the fall and winter surveys.

In the Jeffreys-Scantum Basin areas, shrimp populations were rather large and extensive. Four of the 8 tows produced 500 pounds or more. This compares well with results of winter survey and indicates little change in population and distribution of shrimp in these 2 sections. Here, as in Wilkinson Basin, shrimp size generally was smaller than during previous 2 cruises. Many small shrimp were observed escaping from forward sections and cod end of the trawl as it was hauled aboard. For the first time in any of our surveys, Pandalus montagui (a smaller species of pink shrimp), was taken in noticeable numbers from this and Middle Bank area.

#### Other Species

Finfish generally were abundant in all areas fished and were easily separated from the shrimp by the Base-designed mechanical shrimp-fish separator.

For further information contact Keith A. Smith, Base Director, or Phillip S. Parker, Fishery Biologist, EF&GR Base, State Fish Pier, Gloucester, Mass., 01930, Telephone: 617-283-6554.



### La Jolla Issues Temperate Tuna Forecast for 1968

BCF's Fishery-Oceanography Center in La Jolla, Calif., has issued the eighth consecutive annual prediction for the summer season albacore and bluefin tuna fisheries off the Pacific Coast.

The 1968 forecast was made 3-4 weeks later than in previous years.

The staff of the Fishery-Oceanography Program explains the change in prediction date and outlines its forecast:



The delay in issuance of our predictions arises from experience accumulated during the past 8 years. This showed that prediction techniques once thought valid have not withstood the test of time satisfactorily. Our prediction techniques were based on the expected persistence of large-scale sea-surface temperature anomaly patterns. Consequently, the offshore thermal trends observed in April of each year were assumed to persist at least through July. Last year, this assumption failed: the abnormally cold conditions observed in April 1967 were the basis for our predicting a late, more southern, fishery than in 1966. Later, intense early-summer warming completely overtook the previous cooling trend. By July 15, abnormally warm conditions were established in the Pacific Northwest and persisted for the remainder of the season. The albacore responded rapidly to these dynamic changes, producing near-record catches off Oregon and Washington, while California experienced very poor fishing.

#### A New Approach

This experience dictates that we alter substantially our approach to the 1968 season. One major change will be the temporary suspension of long-term quantitative landings and area forecasts. A second will be to make heavier use of short-term projections of conditions based on current information issued in the form of outlooks and occasional bulletins. These bulletins, well received last year, will include: changes in oceanographic and atmospheric trends; changes in location of productive fishing areas; changes in total fishing effort; and other data pertinent to the fishing community. As before, the success of these operations depends necessarily on the input of first-hand information from the fishermen at sea, dock operators, and processors. We continue to be hampered by a scarcity of such timely information.

#### ALBACORE TUNA

The basis for depicting the shaded areas in Figure is previous knowledge of the high correlation between catch and sea temperature--combined with an 8-year experience in observing and summarizing sea-surface temperatures at 15-day intervals from April to October. The isotherm fields for the first and second halves of July represent our long-term averages for each interval. The shaded areas delineate the region where, on the basis of sea temperature averages, most albacore

would be available in July. Since prevailing weather and sea temperature patterns may deviate considerably from these averages during the period, we will modify and update our projections as conditions indicate. These projections will be forwarded to the fishing community as soon as practicable.

#### Preseason Scouting Minimal

Preseason scouting activities will be minimal this year. The usual May-June offshore scouting cruise by California's "N. B. Scofield", undergoing overhaul, was cancelled. This resulted in substantial reduction of our ability to make early-season judgments based on data she normally acquired. BCF's "David Starr Jordan" first reported taking 4 albacore near San Juan Seamount (33° N., 121° W.) on June 12. This catch is the first authenticated report available this season. It suggests the fish may be arriving on the Pacific Coast feeding grounds up to 2-3 weeks earlier than in the past 3 years.

The open ocean in the region encompassing the general migratory route of albacore (130°-150° W.) showed large-scale warming trends in late May and early June. If the warming trend continues, we expect to see an appreciable portion of the incoming migrants diverted into northern waters instead of southern California. The Guadalupe Island area and the region to the northwest may produce some early-season catches, but we expect the fishery to advance rapidly northward from San Juan Seamount to west of Davidson Seamount by the end of July.

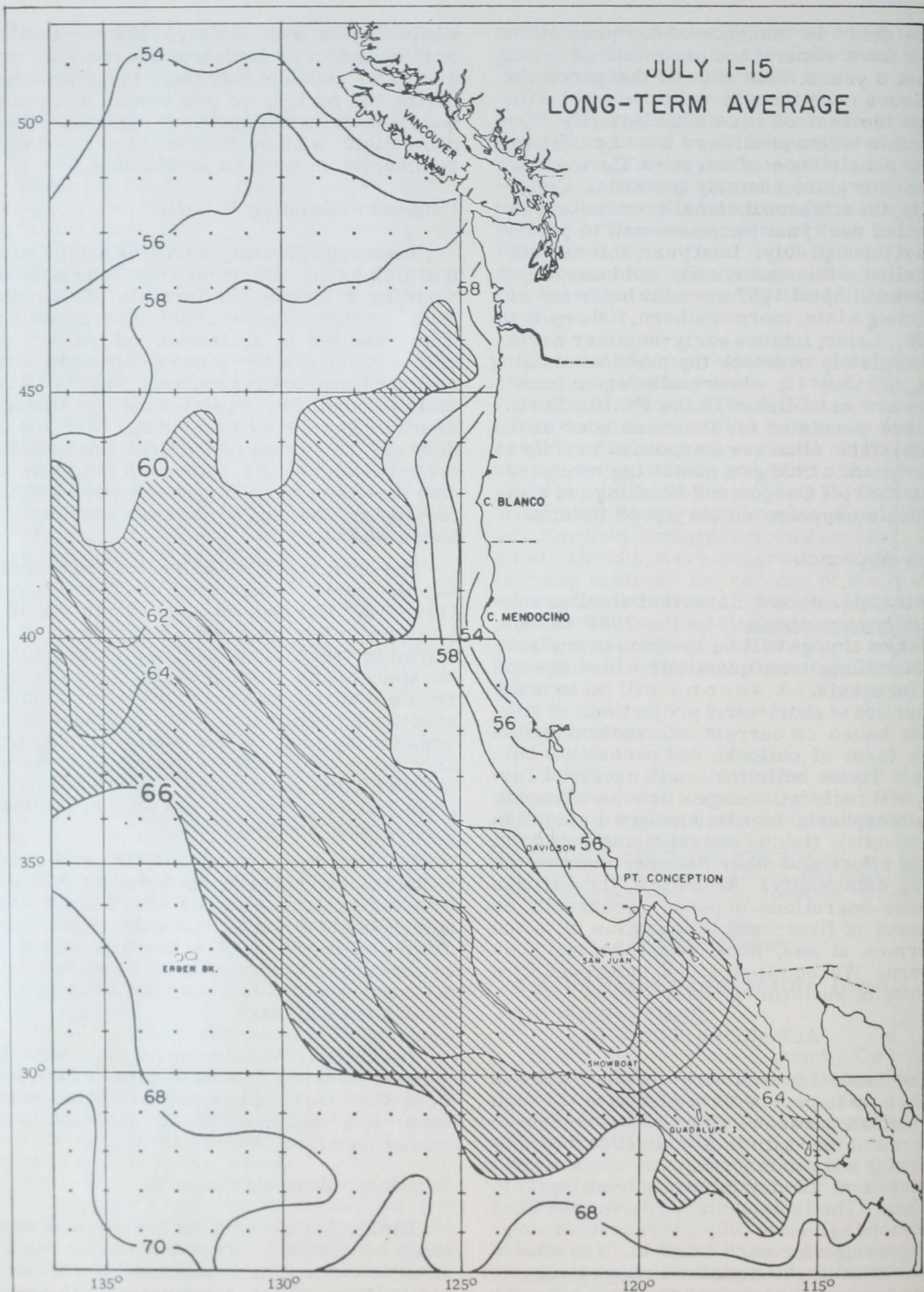
July landings in southern California should reflect a return to more normal conditions. The landings should be near the 1940-66 average of about 6,600,000 pounds (3,300 tons). Total California season landings cannot yet be estimated, but we expect they may also fall near the 1940-66 average of 30,000,000 pounds (15,000 tons).

The Oregon-Washington region is expected to receive a significant portion of the total U. S. West Coast albacore production this year. But total landings are expected to fall somewhat below 1966-67 levels.

#### Preseason Scouting Valuable

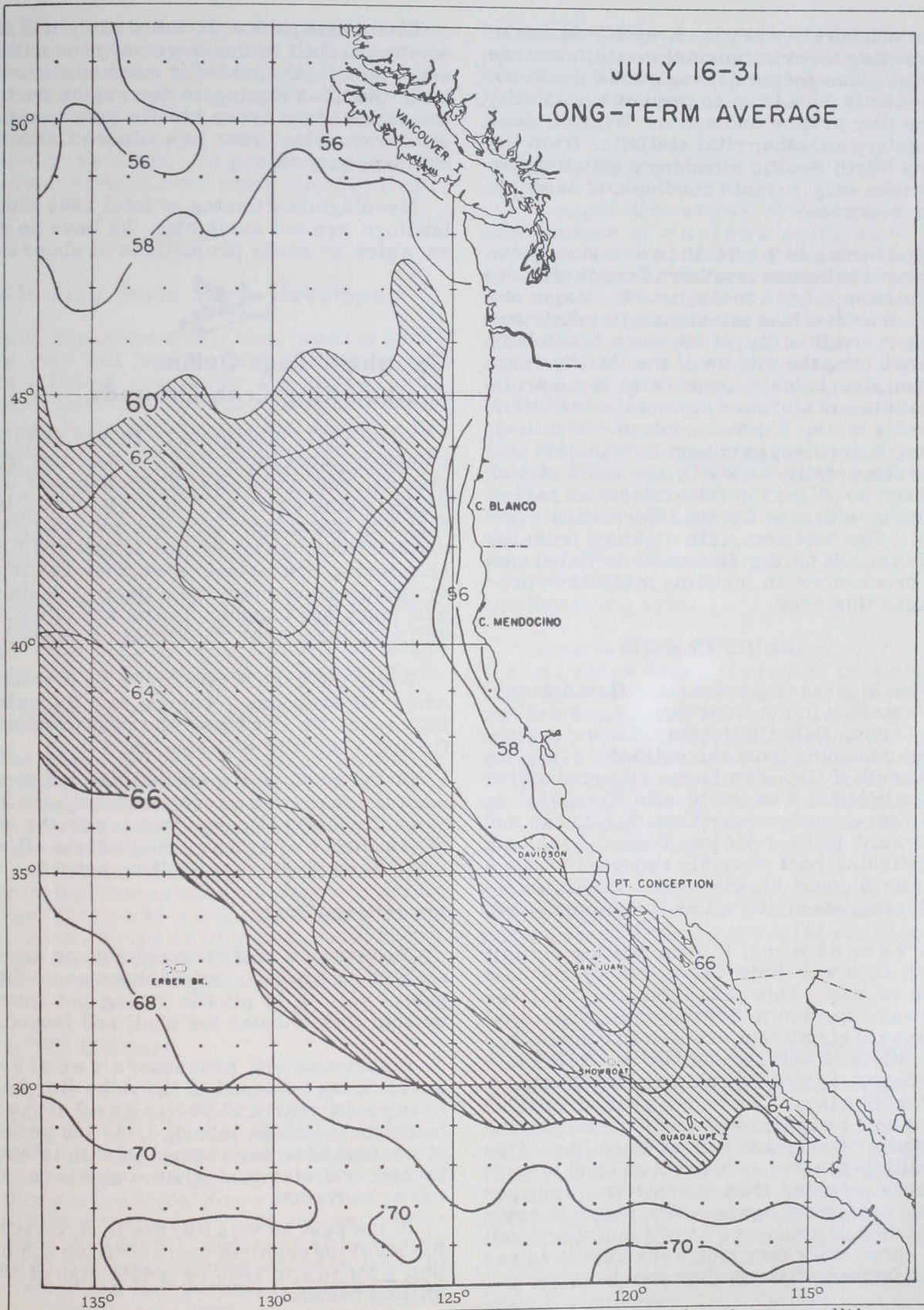
The Jordan's recent early-season albacore catch continues to demonstrate the value of preseason scouting cruises to determine the arrival time of the albacore tuna in Pacific





Average sea-surface temperature fields for the July 1-15 and 16-31 intervals. Shaded





zone delineates region where most albacore would be available under these conditions.



Coast offshore waters. Even if successful forecasting of environmental conditions were possible, knowledge of these trends would not necessarily enable us to predict availability of the fish in time and space. Without more life history and other vital statistics from the entire North Pacific albacore population, we can make only certain conclusions based on other sources.

The Jordan is scheduled to survey the northern California-southern Oregon offshore region from July 15 to August 16. Major objectives will include establishing the distribution and availability of albacore in offshore waters during the middle of the Pacific coast season; also, to test prospects for commercial exploitation of albacore beyond the traditional limits of the fishery (about 300 miles). During the cruise, pertinent information will be radioed daily to WWD, the radio station licensed to BCF, for rebroadcast as part of the daily albacore fishing information summary. The information gained from the Jordan should be of prime value to fishermen and processors in updating midseason projections this year.

#### BLUEFIN TUNA

The high-seas purse-seine fleet intensified scouting in the Cape San Lazaro-Cape San Lucas, Baja California offshore region. Boats returning from the yellowfin fishing area south of Cape San Lucas reported sighting in the past 2 weeks bluefin "jumpers" in cold, green water near Cape San Lucas and northward to near Point Tosco. Also, one sportfishing boat recently reported taking a few 10-15 pound bluefin in the Guadalupe Island area, about 400 miles to the northwest.

In recent years, bluefin fishing activity began in lower Baja California by the last week of May. This year, however, the fishery was expected to develop later than usual because of significant changes in climatological events in that region. Lower Baja California has experienced a spate of strong northerly winds. The heavy weather created has severely limited fishing activity and caused greatly intensified upwelling. This upwelling created a nearshore band of considerably colder than normal sea temperatures and green water. These events combined to delay the onset of the fishery well into June; they may cause the bluefin to remain farther offshore than usual.

One consequence of the delay will be a northward shift in the center of production--and a delay in the period of maximum production. Rapid warming in the region north of Guadalupe may cause bluefin tuna to appear earlier than last year in southern California offshore waters.

Meaningful estimates of total 1968 bluefin landings are not available. We have no data on which to make projections of abundance.



#### 'Spaghetti' Tags Outline Alaskan King Crab Grounds

Since 1961, biologists of BCF's Auke Bay (Alaska) Laboratory have been capturing, tagging, and releasing thousands of male Alaskan king crabs. Their purpose is to find out how many there are and where they are distributed in the Kodiak Island and Eastern Bering Sea areas. Also, they are trying to estimate how many die a natural death and how many are caught. These and other data will help determine conservation measures.

While the crab's size makes it troublesome--it averages 7 pounds and its walking legs reach 24 inches--the real problem is finding a tag that will stay on.

In the past, a tag shaped like a disk was used to trace crab migration during one season. The disk, attached to a leg or the edge of the shell covering, would come off with these parts during the molting season.

#### Long-Range Study

To conduct a study through one or several molting seasons, researchers use a "spaghetti" tag. It is plastic tubing put through muscle tissue under the shell and looped.

Fishermen and processors receive \$2 for each tag returned to the Auke Bay Laboratory. Of nearly 17,000 tagged crabs released near Kodiak Island, 6,443 (38 percent) of the tags have been turned in with information on crab size and when and where they were recovered.

In the past 20 years, the U. S. catch of Alaskan king crab has soared--from 1.5 million pounds in 1950 to 1966's high of 159.2 million pounds.



In late 1964 and early 1965, Japan and the USSR agreed not to fish for U. S. stocks of king crab except in the eastern Bering Sea. Quotas for this area are negotiated annually. There was agreement, too, on type of gear that may be used and size and sex of crabs allowed to be taken. At present, only males with over 5½-inch body width may be kept.



## Fast-Sinking Purse Seine Developed

BCF has developed a fast-sinking purse seine that will provide tuna fishermen with more efficient gear. The new net retains the desirable features of the tuna purse seine now used in the eastern tropical Pacific--but will sink faster and use webbing with greater economy. The importance of a net sinking fast is illustrated by the fact that about 50 percent of purse-seine sets for tuna are unsuccessful because fish escape the net during setting and pursing operations.

The net was developed by BCF's Fishery-Oceanography Center in La Jolla, Calif., in cooperation with the BCF Exploratory Fishing and Gear Research Base in Seattle, Wash.

### The Conventional Purse Seine

The purse seine in use today is a large encircling net with a closable bottom. It is one of the fisherman's most effective instruments for capturing mobile, dense schools of open-sea fish. Throughout the world's oceans, fishermen use purse seines to take fish ranging from small anchovies and sprats to huge bluefin and yellowfin tuna. In the U. S. alone, in recent years, more than 1 million metric tons of fish worth over \$75 million have been caught annually with purse seines.

### About 50% Efficient

Despite the growing importance of purse seining, researchers made few attempts to improve the net's catch efficiency of about 50 percent. The proportion of unsuccessful sets increases with the depth and nature of the thermocline--the zone of water in the ocean where there is a rapid change in temperature with depth. Biologists theorized that if tuna purse seines could be made to sink faster and fish deeper, efficiency would

improve. It was estimated that only a 10 percent improvement in the rate of successful sets would reduce operating costs for the U. S. tuna fleet by more than \$1 million annually.

### Attacking the Problem

A comparative study of the design and performance of various purse-seine nets was undertaken at BCF's Fishery-Oceanography Center. Several scaled-down models were built and tested. Evaluation of the data revealed that the best net for fishing tuna should be a combination of the fast-sinking North Atlantic purse seine with the strength, deep fishing, and ease of handling of the American tuna seine. A model hybrid purse-seine net incorporating desirable design elements was built and tested. Results of the model tests were so encouraging that in spring 1968 the Center, in cooperation with the Seattle Base, undertook construction of a full-scale net, 460 by 55 fathoms, in a San Pedro net yard.

### Net Ready for Trial

The net is now ready for sea trial. Several vessel owners have offered to participate. The trials will consist of 2-3 days of routine net handling, including setting, hauling, and stacking, to determine if any special handling techniques must be devised or net modifications made. At the same time, bathymograph data on net depth and sinking rate will be collected. This will be followed by fishing trials during the summer.

If the net performs as promised, and the California purse-seine fleet accepts it, tuna fishermen will have more efficient gear.



## Antibiotics Improve Algal Food But Somewhat Toxic to Oyster Larvae

Microscopic examination of oyster larval cultures in studies conducted by BCF's Milford (Conn.) Biological Laboratory confirmed earlier evidence that poor food cultures will improve significantly when antibiotics are added. In all instances, the percentage survival of oyster larvae fed flagellates plus antibiotics was higher than oyster larvae fed flagellates without antibiotics.



## Somewhat Toxic

When algal culture is an acceptable food (larval survival is good), then antibiotics do not help appreciably. When algal culture is an unacceptable food (larval survival is poor), then antibiotics can increase larval survival significantly. These experiments also showed that the antibiotics used were toxic, to some degree, to the oyster larvae.

The researchers say it would be desirable to increase larval survival using antibiotic concentrations that did not retard larval growth. Although it would be possible to compensate for the growth-suppressing effect of antibiotics by prolonging culture time, this undoubtedly would be an undesirable hatchery procedure.



## Sea-Surface Temperature Affects Success of Net Sets

Michael Scott, fishery biologist at BCF's Fishery-Oceanography Center at La Jolla, Calif., examined over 2,000 records of purse-seine sets from logbooks of U. S. tuna fishermen. He related these sets to sea-surface temperature. He found a significant negative correlation between the temperature and the percent of successful sets. Only 47 percent of sets made on bluefin at a water temperature of 70°-76° F. were successful, while 64 percent of sets at 59°-65° F. were successful.



## Lab to Develop Feeds for Navy's Trained Porpoises

BCF's Seattle Laboratory won a small contract from the Naval Test Facility at Pt. Magu, Calif., to develop suitable feeds for the trained porpoises that are important part of the Navy's Man-in-the-Sea program.



These studies will include the nutritional value and appetite appeal of fish feeds--and the problems of feed formulation and storage.



## Turtle Grass Added to Sheep Ration Stimulates Growth

Studies by BCF's College Park (Md.) Technological Laboratory and the Biological Laboratory in St. Petersburg Beach, Fla., indicate that turtle grass added to sheep ration stimulates the animal's growth. There are large areas of turtle grass in the waters of southern U. S. Feeding trials were carried out to determine if it was practicable to use the grass in sheep rations.

### Turtle Grass Beneficial

The trials showed that a ration of turtle grass replacing 20% alfalfa in a sheep diet produces a significant increase in rate of sheep growth--compared to the effects of a control diet of 50% alfalfa and 50% corn.

The turtle grass has flat, narrow leaves originating from a rhizome system (rootlike stem sending up leafy shoots from upper surface and emitting roots from lower side). When leaves are cut, regrowth begins immediately. This indicates material can be available all the time without harming plant. Regrowth occurs at rate of about 1 inch a week.



## Shipping Test of New Container Is Successful

BCF's Gloucester (Mass.) Technological Laboratory, which recently designed a leak-proof, corrugated fiberboard container, test shipped 35 containers of its design in late May. It had been asked by the National Fisheries Institute for additional data under commercial conditions. The Institute supplied 250 containers.

The lab shipped by air freight the 35 boxes containing fresh fillets and wet ice from a Gloucester processor to a Chicago food chain. A representative of the box manufacturer reported that the container performed satisfactorily. He said store personnel preferred the boxes because they were cleaner and more convenient to handle than wood boxes.

### Excellent at Arrival

The fillets were warm (50° F.) when packed. An unscheduled 24-hour delay developed in route. However, the fish cooled to 33° in transit and were reported in excellent condition when they arrived.





## Interest on Fishery Loans Raised

Starting July 1, Government interest rates on fishery loans became  $6\frac{1}{2}$  percent. Fishery loans may be authorized to finance or refinance the cost of buying, building, equipping, maintaining, repairing, or operating commercial fishing vessels or gear--when funds are not available on reasonable terms elsewhere.



## Mortgage Insurance Rules Changed

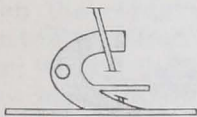
BCF has announced changes in regulations governing interest rates on fishing vessel mortgages insured by the Department of the Interior. The new regulations are designed to make the rates charged more flexible. They should make it easier for fishermen to get these loans.

Under previous legislation, there was a 6-percent interest ceiling on such loans. In the past few months, there was a general rise in interest rates. This caused most lenders to push aside requests for fishing vessel loans in favor of others bringing a higher return.

### Law Amended

The law covering insured fishing vessel mortgages has been amended. It now permits Interior Department to determine the interest rate to charge--taking into account the risk assumed by the Department, and the private interest rates at the time of the loan.

Mortgages to finance building, rebuilding, or reconditioning fishing vessels can be insured by Interior Department in the way the Federal Housing Authority insures mortgages to finance home building.



## Promotes Lesser Known Fishery Products in Europe

Some lesser known U. S. fishery products will make their debuts at European trade fairs this fall: fresh and frozen eel meat, frozen fish chowder concentrate, haddock and cod portions shaped like hot dogs, frozen carp. BCF will sponsor exhibits at the Munich Fair, Sept. 21-29, and the Paris Fair, Oct. 24-Nov. 4.

Most of the world's major food producers and processors will display their products. Buyers from all over Europe will attend. In previous fairs, U. S. fishery displays concentrated on gourmet items--lobster, king crab, oysters. This fall some lesser-known U. S. products will be shown. Many of these are processed by small firms reaching across the ocean for the first time.

### Industry Is Invited

U. S. producers and processors are invited to display their products at both trade fairs. With BCF personnel manning the exhibits, the firms will not have to send representatives. The number of U. S. participants will be limited to available space on a "first come-first served basis."

For more information, contact Office of International Trade Promotion, Bureau of Commercial Fisheries, 1801 N. Moore Street, Arlington, Va. 22209. Telephone: Area Code 703-557-4731.



## Thai Fisheries Officer Visits Milford Lab

Tomoron Tangkulen, a fisheries officer from Thailand, recently spent a week at BCF's Biological Laboratory at Milford, Conn. He is studying the techniques for spawning and culturing larval shellfish. Mr. Tangkulen also observed oyster harvesting operations and the use of predator control gear in Long Island Sound.

### And Visitors From Oregon

The lab also received visits by Dr. William Breese, Oregon State University Marine Laboratory, and Dale Snow, Oregon Fish Commission. They are planning a shellfish hatchery to be built in Oregon.





## BCF Labs Aid College Students

During the past semester, staffs of BCF laboratories across the Nation continued their practices of inviting students to visit, lectured on phases of their research, and took their visitors on cruises to observe natural phenomena or to collect specimens.

The following were representative sessions:

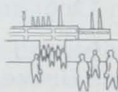
**At Oxford (Md.):** A class of 44 students from Hiram College in Ohio spent 3 days in concentrated field research and study. Field trips were made on BCF's research vessel "Alosa" under the direction of laboratory scientists. Staff members lectured on various aspects of marine biology to the students and their professor. Temporary classroom laboratories were set up in beach-front buildings of the laboratory.

**At La Jolla, Calif.:** Dr. Reuben Lasker, Assistant Director of BCF's Fishery-Oceanography Center, lectured to 55 oceanography students and 16 faculty members from the University of Baja California at Ensenada. He also showed the group the Center's facilities.

The students' visit to the Fishery-Oceanography Center and to the Scripps Institution of Oceanography is an annual event. It is sponsored by the Oceanids, a women's group at the University of California, San Diego.

**At Milford, Conn.:** The lab continued its cooperative program with colleges and universities in the New England area. Staff members spoke to biology classes from the University of Massachusetts and Southern Connecticut State College on research being done at the lab. Each group was taken aboard the "Shang Wheeler" to collect invertebrate specimens in Long Island Sound.

Maria Panciera and John Manzi spoke at their old Alma Mater, Southern Connecticut State College, the former on her study of quahog culture, the latter on oyster drill biology.



## Emergency Water Pump Available for New England Demonstration

BCF's Fishing Vessel Safety Unit has a new-type emergency water pump available for inspection and demonstration to fishermen along the New England coast.

This is the pump used by the Coast Guard in search and rescue operations involving commercial fishing vessels. In 1967, 38 fishing vessels from Maine, Massachusetts, and Rhode Island received the pumps--by helicopter lowering, a plane drop, or transfer from a Coast Guard surface vessel.

The Bureau is eager to show interested groups of fishermen how the unit is operated in pre-emergency sessions.

For further details, write to BCF Safety Unit, 408 Atlantic Ave., Boston, Mass., 02210, or phone 617-223-7748.



## Marketing Services Chief Wins Golden Chef Award

Bob Finley, Chief, National Marketing Services Office, BCF, Chicago, won the Golden Chef Award from the Executive Chef's Association. The award was given to him for significant contributions to the culinary arts by promoting the increased use of fish and shellfish.

Finley has been asked to accompany the American Culinary Olympic team to Frankfurt, Germany, for the international competition. He helped judge this year's U. S. competition. The team will demonstrate and feature American seafoods on the continent in a gourmet manner.

