



BROAD U.S. EFFORT URGED TO UNDERSTAND, USE AND PRESERVE OCEANS

"We believe that a vigorous, systematic investment in the oceans will yield a tremendous return over the years ahead--a tangible return to the economy and an intangible return of priceless value, the quality of the environment in which we live."

The speaker was Dr. Julius A. Stratton, Chairman of the Commission on Marine Science, Engineering and Resources, at a press conference held Jan. 11, 1969, before public release of the Commission's final report to the President and Congress. Dr. Stratton is chairman of the Ford Foundation and former head of M.I.T.

After nearly 2 years of study, the 15-member Commission urged a large U.S. investment in ocean research to understand, use, and protect the oceans. The Commission members included experts from U.S. and State governments, universities, industry, and marine laboratories.

The Commission studied a vast range of marine problems--from preserving coastal shores and estuaries to "more effective use of the vast resources that lie within and below the sea." Its members consulted with more than 1,000 people: marine scientists, engineers, leaders of business and industry, academic community, and many marine specialists in U.S., State, and local governments.

The Commission recommended creation of a new U.S. agency for the oceans and the atmosphere: The National Oceanic and

Atmospheric Agency (NOAA). Initially, NOAA would be composed of the U.S. Coast Guard, the Environmental Science Services Administration, the Bureau of Commercial Fisheries (plus the marine and anadromous fisheries functions of the Bureau of Sport Fisheries and Wildlife), the National Sea Grant Program, the U.S. Lake Survey, and the National Oceanographic Data Center.

The Commission did not urge a crash program--"but one geared realistically to the means of the Nation." The 1969 budgets for the agencies and programs that would be transferred immediately to NOAA--if President Nixon and the 91st Congress approve--total \$773 million. The Commission projects for 1980 a \$2 billion annual operating budget for NOAA.

BIRTH OF COMMISSION

Creation of the Commission was authorized by Public Law 89-454, enacted by Congress on June 17, 1966. President Johnson appointed the members on Jan. 9, 1967. The Act also set up the National Council on Marine Resources and Engineering Development.

The Council chairman is the Vice President. The Council is made up of the heads of major Federal departments and agencies with marine missions. It plans and coordinates the existing marine programs and advises the President. It surveys the state of marine affairs and shapes and strengthens Federal programs.

The Commission was not given operating responsibility. In its Report, the Commission recommended that the Council, scheduled to expire June 30, 1969, continue until NOAA is established.

The Act expressed the conviction that the U.S. ought to give serious attention to its marine environment--and to the seas' potential resources. It also showed, the Commission Report noted, U.S. determination to act in order to "stimulate marine exploration, science, technology, and financial investment on a vastly augmented scale."

The Commission was asked to study the U.S. stake in the "development, utilization, and preservation of our marine environment. . .to review all current and contemplated marine activities and to assess their adequacy to achieve the national goals set forth in the Act. . . ." And the Commission was asked "to formulate a comprehensive, long-term, national program for marine affairs designed to meet present and future national needs in the most effective possible manner. . .and to recommend a plan of government organization best adapted to the support of the program and to indicate the expected costs."

To carry out its mission, the Commission divided itself into 7 panels: basic science; marine engineering & technology; marine resources; environmental monitoring and the management of the coastal zone; industry and private investment; international issues; and education, manpower, and training.

U.S. AND THE SEA

The Report states: "How fully and wisely the United States uses the sea in the decades ahead will affect profoundly its security, its economy, its ability to meet increasing demands for foods and raw materials, its position and influence in the world community, the quality of the environment in which its people live."

By 2000, the U.S. will have 350 million people and will rely more on food from the sea. New jobs will be needed and the expanded ocean industries will offer opportunity for economic growth. Today's industrial operations in the sea show the potential for greater economic operations: offshore petroleum, gas, and sulphur recovery; mining of tin, diamonds, sand, gravels, and shells from the seabed.

Along with economic development must go other considerations. The oceans are one part of the whole physical environment--and much more must be known about it. "It is critical to protect man from the vicissitudes of the environment and the environment, in turn, from the works of man." Today, the chance of quick economic gain makes man ignore the environment.

If the sea and shoreline are protected, they can provide recreational opportunities for the growing U.S. population. But, the Report warns, "the pollution problem pervades all aspects of our expanding technological society."

"The oceans and marine-related activities must be viewed in the context of the total land-air-sea environment. In many ways, the oceans are the dominant factors in this total environment." Man's intervention in any one element affects the others. "The Nation's stake in the oceans is therefore an important part of its stake in the very future of man's world."

A PLAN FOR NATIONAL ACTION

A solid base of science and technology is "the common denominator" to accomplishment in the marine world, the Report emphasizes. It makes clear what is needed to advance U.S. technical capability in order to realize fully the sea's potential:

- Marine Science: It is vital to support basic marine research if the U.S. is to "understand the global oceans, to predict the behavior of the marine environment, to exploit the sea's resources, and to assure the national security."

Today, the U.S. "is poorly organized to marshal the arrays of multiple ships, buoys, submersibles, special platforms, and aircraft, as well as the complex undersea facilities required for important oceanic investigations and experiments of a basic character."

The Commission proposes that several leading institutions in ocean research be designated by the U.S. "University-National Laboratories" and be "equipped to undertake major marine science tasks of a global or

regional nature." Their establishment should not prevent other marine science research in other schools from getting help.

- Marine Technology: The Commission urges that NOAA begin a program to encourage development of basic marine technology and engineering to expand undersea operations and to lower their costs. It proposes that 2 U.S. goals be pursued at same time:

- Development of technology to carry out production work "for sustained periods" down to 2,000 feet.

- Development of technical capability to go down for useful purposes to 20,000 feet. (This takes in about 98% of world's ocean floor.)

- Scientific & Technical Information: A successful national ocean effort needs improved communications throughout the marine community.

- Manpower for a Marine Effort: NOAA should help to "develop and maintain manpower inventories, statistics, trends, and projections."

- Support Capability for Marine Operations: Marine operations depend on services provided primarily by the Federal Government. These services include: "mapping and charting, aids to navigation, maintenance of waterways, salvage, safety, law enforcement, and certification of some types of personnel and equipment." Some of these are satisfactory, others need upgrading, and virtually

all "will be inadequate to satisfy the demands of an expanded national effort."

● Exploring, Monitoring, Predicting, & Modifying Environment:

The Commission says the U.S. "must have a comprehensive system for monitoring and predicting the state of the oceans and the atmosphere. The U.S. has the beginnings of such a system today. . . ." Because increasing technological capabilities give man the power "to intervene in natural environmental processes for beneficial ends," the Commission believes that the problems of modifying the environment cannot be separated from those of monitoring and predicting the environment. It recommends "a concerted effort by NOAA to explore the feasibility and consequences of environmental modification."

● Exploring the Deep Sea: "Present instruments to observe and measure in the depths are entirely inadequate. Except for occasional samples of the bottom and the living organisms of the abyss, little is known about the deep ocean." Instrumentation must be improved drastically, especially that for surveying marine resources accurately.

But instruments alone are not enough. Man must be able to go to the depths for extended periods. The U.S. should start "to develop deep submersibles with ocean transit capabilities for use as research and exploration platforms at depths to 20,000 feet under the sea, and to study the feasibility of manned deep ocean stations."

● Environmental Modification: The U.S. must develop the skills and equipment to assess "the global consequences of man's activities, such as the burning of fossil fuels, the use of pesticides and insecticides and the effects of particulate and gaseous pollutants."

A PLAN FOR COASTAL ZONE

● Managing the Coastal Zone: 30 States border sea coasts and the Great Lakes. They are principally responsible for determining whether actions "on or near our shores are beneficial or damaging." Effective State action often is very difficult because of conflicting and overlapping U.S., State, and local laws concerning coastal-zone activities. There is little coordination.

The Commission recommends that primary responsibility for managing the coastal zone remain with the States--but that Federal legislation be enacted "to encourage and support the creation of State Coastal Zone Authorities to carry out specified national objectives with regard to the zone. The Authorities should have clear powers to plan and regulate land and water uses and to acquire and develop land in the coastal zone." The legislation should give NOAA primary responsibility for working with the States.

● Science & Technology in Coastal Zone: More scientific knowledge is needed about natural coastal-zone processes on which to base important management decisions.

The Commission recommends "designation and support of university-affiliated Coastal

Zone Laboratories to work on regional and local problems." These labs will perform services like those of agricultural research stations and extension services. They should be developed and supported by NOAA.

In addition to the labs, representative coastal and estuarine sites should be set up "as natural preserves." There, necessary studies should be conducted "to establish a proper base from which the effects of man's activities can be determined and ultimately predicted."

- **Attacking Coastal Zone Pollution Problems:** Coastal waters have been polluted by wastes dumped into the rivers, the filling of marshlands, and the spreading of spoil from dredging. Research into these pollution problems must be speeded, and methods devised to handle waste collection and treatment. U.S. labs, universities, and industry must concentrate on this purpose. The work should begin "far upstream."

- **Great Lakes Restoration:** To reverse the deterioration of the Great Lakes under man's assault for a century is an "urgent national need." Restoration may be possible. The Commission proposes a "National Project" to speed the necessary scientific research and technological development.

- **Interim Policies:** The plans for the estuaries and coastal zones will take time. Meanwhile, existing U.S. and State laws on water quality must be enforced strictly. States must move very slowly before approving operations that may alter the coastal zone

until more information about the effects of these operations are known--and until State plans can be developed.

Developing Resources of Sea

There are many resources beyond the shoreline already contributing much to the U.S. economy. There is need for an "institutional framework and the scientific and technological foundation" to assure that the U.S. can get these resources when she needs them.

Commercial exploitation of these resources is the domain of profit-oriented industry. The U.S. plan should make it possible for industry to operate effectively with U.S. help when it is needed.

Drugs from the Sea

Both marine plants and animals have active substances that are potential drug sources to treat humans. The Commission recommends establishment of a new Institute of Marine Medicine and Pharmacology in the Department of Health, Education, and Welfare to evaluate these substances. The Institute should establish the basic information the pharmaceutical industry needs.

World fisheries remain the sea's largest economic harvest--despite the large amount of oil taken and the growing production of other marine minerals. The annual value of the world catch of fish and shellfish, estimated at \$10 billion in 1968, is nearly one and a

third that of all other resources. During the past decades, it has increased over 6% a year.

While world fishing has increased, the relative position of the U.S. has dropped. During the past 30 years, the U.S. catch has remained "almost constant." Although she accounts for only 4% of world catch, the U.S. consumes about 12% of the total and is the world's largest market.

Foreign nations catch more fish on traditional U.S. fishing grounds than U.S. fishermen. The latter harvest less than 10% of the useful and available species adjacent to the coasts. Except for such fisheries as tuna and shrimp, the U.S. fleet is technically outmoded. U.S. fishermen are unemployed more and earn lower incomes than other workers of comparable age and skill.

While there is "no compelling reason" for U.S. fishermen to catch all fish consumed here, major parts of the U.S. fishing industry "can be restored to a competitive, profitable position with consequent benefit to the economy." Modern U.S. vessels on the world's fishing grounds would strengthen U.S. ability to negotiate a "productive and equitable system to regulate international fisheries."

The Commission proposes a "multiple attack" on fishery problems "with scientific research to improve understanding of the resources, exploration to determine quantities and locations, technology to develop efficient methods of harvesting and processing, and an improved framework (principles, procedures, and institutions)." These should

enable U.S. fisheries to compete without subsidy or protection.

Framework for Fishery Development

To rehabilitate the fisheries, the U.S. "must eliminate the overlapping, conflicting, restrictive Federal, State and local laws which have hampered even those fisheries with sufficient capital and technological skill to be truly competitive." Protectionism and parochial state laws "have impeded the development and use of modern fishing technology. Federal support programs have not served their purpose."

Fishery laws and regulations should be studied and restructured. A new framework should be created based on U.S. objectives for fishery development and the best information. The interests of sport fishermen should be considered.

The Commission proposes that State responsibility for managing fish stocks in coastal zone waters continue--but that NOAA take jurisdiction over endangered fisheries if the States fail to take conservation measures. To rehabilitate the U.S. fisheries, the requirement that fishermen buy only U.S.-produced vessels and gear should be ended. Fishermen should be allowed to buy better gear, boats, and at lower prices anywhere.

Research, Technology, & Survey Programs

We have inadequate knowledge of the availability and distribution of marine species; optimum annual harvest consistent with

conserving valuable species; life cycle and ecological relationships among species; how estuarine-dependent species are affected by man's changes. Yet about 70 of such species make up about two-thirds of U.S. catch.

The Commission recommends that NOAA begin to get this information. It should seek, particularly, underutilized fisheries off U.S. "Once located and sustainable yield determined, the fish should be caught with maximum efficiency, carried to market in the best condition, and ultimately retailed or processed." New technology is needed to improve these operations. To increase fish consumption, "new fish stocks, new processes, and new markets must be created. The Commission recommends that NOAA develop its technology program to accomplish these ends."

Aquacultural Research and Development

Aquatic culture of some species can contribute much to the economy and to the war on hunger. The harvestable surplus of natural stocks is limited. But harvests of cultured species are limited only by the acreage used, and by economic competition with other marine stocks.

Sea plants have industrial value, "but many promising commercial uses are still limited by the availability of seaweed supplies." Evidence shows some useful seaweeds can be cultured. "Although research is rapidly demonstrating the feasibility of aquaculture, full-scale commercial application is limited by legal, organizational, political, and technical constraints." As these are removed,

aquaculture "should become a powerful new global resource."

The Commission recommends that NOAA be responsible for advancing aquaculture.

HOW TO HELP INDUSTRY

The Commission recommends these approaches to aid the U.S. fishing industry:

- "The U.S. should continue its own research programs aimed at improving stock and yield estimates, cooperate with other nations in programs for this purpose, and explore new techniques for preliminary assessment of stock size and potential yield where new fisheries are contemplated."

- Fisheries management should have as a major objective "production of the largest net economic return consistent with the biological capabilities of the exploited stocks."

- Voluntary steps should be taken--and, if necessary, governmental action--to reduce excess fishing effort. This would make it possible for fishermen "to improve their net economic return and thereby to rehabilitate the harvesting segment of the U.S. fishing industry."

- "The goal of domestic fisheries management must be the development of a technically advanced and economically efficient fishing fleet with the minimum number of units required to take the catch over a prolonged period of time. This goal must be achieved in fisheries which are now heavily

over-capitalized without seriously dislocating those fishermen who entered the industry in good faith."

The international law of fisheries prevents the U.S. from acting alone to "maximize the net economic returns" of U.S. vessels fishing on international grounds. If the U.S. tried to limit its fleet in these fisheries, other nations could increase theirs--and so prevent the U.S. from raising its share per unit of effort.

Where U.S. fishermen alone are permitted to fish, U.S. or State action can control the amount of fishing. The action should meet local conditions.

Fishermen & Fishing

The Commission Report notes: "Fishing is an ancient business, and its practitioners often are less concerned with economic efficiency than with the simple fact of making a living from the sea. Fishermen may be perfectly aware that a half-dozen modern, efficient ships could harvest the permissible crop with high monetary return, but they still may prefer a system under which a number of fishing families can eke out what, to them, is an adequate living of the kind they prefer. Because such fishing communities form the constituencies of important elements in state legislatures, their desire to maintain the status quo has a strong influence on fishing legislation and on regulations of state agencies."

REHABILITATING THE INDUSTRY

The U.S. fishing record contrasts sharply with the record growth of world high-seas fisheries. During the past 30 years, U.S. landings have remained about the same, and the U.S. position among the world's fishing nations has fallen from second to sixth. U.S. vessels land about one-third of the fish eaten in the U.S.

There are a few bright spots on the record--most notably, the tuna and shrimp fisheries. And, overall, the U.S. catch is third or fourth in the world when measured in dollar value. But the U.S. fishing fleet is outmoded technically. It cannot carry out high-seas operations needed to maintain a world-leadership position--and it cannot attract "a stable and efficient labor supply."

Demand for Seafood Strong

This fishing industry decline has occurred despite the strong demand for fish and shellfish products. Per-capita human consumption has remained about the same during the past 30 years, but population growth has expanded the market. U.S. agriculture has reduced the cost of livestock feeds by using fish meal as an ingredient. So total U.S. per-capita consumption has increased sharply since 1950--but the increase has been met by imports, not by increased U.S. production.

The Commission says that the U.S. does not have to be completely self-sufficient in

fishery products any more than in other products. The total welfare of the fishing industry, including processing and marketing, "dictate the desirability" of buying marine products from the cheapest and best sources. The two healthiest fisheries, tuna and shrimp, are among the largest importers--yet have increased demand for U.S. production.

The Commission believes that important industry segments can be restored to "competitive, profitable operation." But it will be necessary to overcome obstacles to efficient operation even where U.S. technology and capital should have given the fleet a competitive advantage.

Federal & State Management Roles

There are too many restrictive and overlapping laws and regulations concerning U.S. fishing. The States have most jurisdiction over management and development; the lines between the States and U.S. are poorly defined. Too much protective legislation "militates against research, development, and innovation. Consequently, the fishing industry has been slow even to borrow useful techniques from other industries, much less to pursue a progressive program of its own."

The U.S. has "no explicit role" in managing fisheries within U.S. territorial waters. Because there is a "discouraging lack of coordination among State programs," the Commission concludes that U.S. leadership and, when necessary, regulatory power, "must be asserted."

The Commission recommends: "The National Oceanic and Atmospheric Agency [BCF in this operation] establish national priorities and policies for the development and utilization of migratory marine species for commercial and recreational purposes in cooperation with other Federal agencies, States, and interstate agencies."

Further, says the Commission: "NOAA (BCF) should encourage interstate cooperation for regulation and conservation, sponsor research on the impact of institutional barriers inhibiting the efficient development of our commercial fisheries, and encourage enactment of improved state laws relating to the regulation and conservation of such fisheries. The Federal Government also should reorient its fisheries research and survey activities in support of specific fisheries missions."

But even more is needed, the Commission states. It recommends that NOAA (BCF) "be given statutory authority to assume regulatory jurisdiction of endangered fisheries when it can be demonstrated that:

- "A particular stock of marine or anadromous fish migrates between the waters of one State and those of another, or between territorial waters and the contiguous zone or high seas; and

- "The catch enters into interstate or international commerce, and

- "Sound biological evidence demonstrates that the stock has been significantly reduced or endangered by act of man, and

- "The State or States within whose waters these conditions exist have not taken effective remedial action."

Vessel Subsidy Program

The U.S. fishing fleet is the world's second largest, but 60% of it is over 16 years old and 27% over 26 years. The tuna, shrimp, and Alaska king crab fleets are fairly modern, but fishing technology progress has made most of U.S. fleet obsolete.

The cost of building fishing vessels in some foreign shipyards is 40 to 50 percent lower than in U.S. shipyards. Yet U.S. laws prohibit fishermen from buying foreign-built vessels for use in domestic fisheries. To help correct this inequity, Congress passed in 1964 the United States Fishing Fleet Improvement Act (P.L. 88-498).

Under this program, the Interior Secretary can pay up to 50% of construction cost of new fishing vessel if vessel, the owner, and the fishery meet certain requirements.

The Commission recommends enactment of legislation "to remove the present legal restrictions on the use of foreign-built vessels by U.S. fishermen in the U.S. domestic fisheries."

Research and Technical Programs

NOAA (BCF) should concentrate its efforts where the greatest opportunities exist for successful economic expansion. These areas and species "might include Mid-Pacific tuna, demersal, and other fish and shellfish

resources in the Gulf of Alaska, anchovy off the southern California coast, clupeids in the Gulf of Mexico, alewives (and their predators) in the Great Lakes, and Pacific hake."

The development of these high-potential fisheries can be aided by:

- "Surveys and exploratory fishing programs to establish the potential of latent stocks;

- "Basic biological studies to provide a basis for yield assessment;

- "Development of new harvesting techniques and strategies;

- "Development of more efficient methods for processing and handling fish products, including quality control and increasingly diversified product utilization."

The Commission recommends that NOAA (BCF) "analyze each major fishery and develop integrated programs designed to exploit those fisheries where opportunities for expansion exist."

Not enough is known about the stocks available off the U.S. and about the factors determining their yield, particularly for low-valued species. To develop new fisheries, it is necessary to determine the amount of the resources that fishermen can "reasonably expect to harvest profitably." The U.S. Government must support this expanded survey program because no single sector of the industry can afford it. The program also would obtain the basic information to manage the

resources rationally. "Only by delineating resource potentials can overfishing be detected before the damage is done and new fishing grounds be identified to relieve the pressures on the old," the Report states.

The Commission has endorsed a BCF proposal that gives priority to those species and areas where U.S. vessels might have strong competitive advantage. By adding 11 chartered vessels to its fleet, BCF would be able to map completely the groundfish and shellfish resources of the U.S. continental shelf--and complete preliminary work on pelagic and midwater fisheries--within 10 years.

The Commission recommends that NOAA (BCF):

- "Develop rapid means for stock assessment;
- "Conduct surveys and exploratory fishing programs to identify and establish the dimensions of latent fisheries off the U.S. coast;
- "Continue to support basic studies relating to fish habitats, population dynamics, and the effects of environmental conditions;
- "Give priority attention to development of improved statistical data and analytic techniques."

Technical Programs

The expense in U.S. fisheries can be reduced by improving conventional gear and

using equipment developed abroad. The Commission recommends that NOAA (BCF) set up "an expanded program to develop fishing technology by improving the efficiency of conventional gear and developing new concepts of search, detection, harvesting, transporting, and processing."

Extension Services

The Commission recommends that "fisheries extension services, analogous to the Agricultural Extension Service, be established in order to facilitate transfer of technically useful information to fishermen at the local level."

Fish Protein Concentrate

The Commission recommends "expanded support for the BCF program to develop fish protein concentrate technology." (See CFR, Jan. 1969, on U.S. FPC Program.)

INTERNATIONAL FISHERY MANAGEMENT

The Commission concludes that the existing framework of international fisheries management "is seriously deficient." But it is not time to recommend "a single framework for the management of all the uses of the oceans." The Commission recommends that the U.S. propose:

"New international frameworks (principles, rules, procedures, and institutions) for the exploration and exploitation of the numerous resources underlying the high seas and the conduct of scientific inquiry in the oceans,

"Improvement and extension of the existing network of international fisheries agreements."

Specifically, the Commission recommends that the U.S. seek agreement in the International Convention for the Northwest Atlantic Fisheries (ICNAF, 14 nations, including U.S.) to collaborate with the Northeast Atlantic Fisheries Convention (NEAFC, 13 nations, but not U.S.) to fix a single, annual, overall catch limit for cod and haddock of the North Atlantic. This would include the whole ICNAF area and Region 1 of NEAFC area (East Greenland, Iceland, Northeast Arctic).

"This single annual overall catch limit," the Commission recommends, "should be designed to maintain the maximum sustainable yield of the fishery and, in turn, should be divided into annual national catch quotas. The overall catch limit should be adjusted regularly to take account of such factors as year-class fluctuations of the stocks, recovery of the stocks due to conservation measures, and errors in setting prior limits. Every participating nation should be authorized to transfer all or part of its quota to any other nation."

Further, the Commission recommends that the U.S. "take advantage of the opportunity presented by a quota system to rationalize its fishing effort in the North Atlantic."

And the Commission recommends that "early consideration be given to instituting national catch quotas for the high seas fisheries of the North Pacific."

The Report also contains these Commission recommendations on international fisheries:

- Coastal nations should have preferential access to marine resources off their coasts to reduce international tensions and the seizure of vessels. "It is not easy, however, to apply this principle in particular cases."

- Attempts should be made to agree on the maximum breadth of the territorial sea.

- International fishery organizations should be strengthened with more funds and staffs.

- Diplomatic efforts should be renewed to persuade all fishing nations to adhere to the Convention on Fishing and Conservation of the Living Resources of the High Seas.

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UNITED STATES

U.S. Fishermen Get Protection Against Losses from Vessel Seizure

The Fishermen's Protective Act has been amended to cover losses sustained by owners of U.S. vessels seized by foreign countries on the basis of rights or claims in territorial waters or the high seas which are not recognized by the U.S. The Secretary of the Treasury, through the Secretary of State, will reimburse owners for fines, license or registration fees, or any other direct charges paid to secure release of the vessel and crew.

Protection Against Loss or Damage

Protection against other losses incurred as a result of seizure and detention will be provided through a Fishermen's Protective Fund, to be administered by BCF. These losses include damage to, or loss of, the vessel, its fishing gear or other equipment, and charges for dockage fees and utilities. Payment may also be claimed for the market value of fish or shellfish caught before seizure and confiscated or spoiled during detention, and for 50% of the gross income lost to owner and crew as a direct result of the seizure.

Eligibility and Fees

Any owner of a commercial fishing vessel documented or certified in the U.S. is eligible to apply for protection under this Fund by submitting an application form, and a fee of \$60 plus \$1.80 per gross ton. The fees will cover the administrative costs and one-third of claim estimated to be paid from the Fund.

Application forms and further information may be obtained from BCF's regional offices or from Bureau of Commercial Fisheries, Division of Financial Assistance, 1801 N. Moore St., Arlington, Va. 22209.



BCF Increases Calico Scallop Investigation

The Bureau of Commercial Fisheries is intensifying its investigation of the abundant, potentially important, calico scallop resource discovered off northern Florida in 1960 by Bureau scientists. BCF's Tropical Atlantic Biological Laboratory (TABL) of Miami, Fla., has joined in the work that has been conducted for 8 years by BCF's Pascagoula (Miss.) and St. Simon's Island (Ga.) exploratory fishing bases.

The scallop beds lie off Cape Kennedy and extend more than 200 miles, roughly from St. Augustine to south of Stuart, generally between 15 and 30 fathoms. BCF scientists hope for an annual production, in 5 years, of 15 million pounds worth an estimated \$20 million. In the U.S., calico scallops (*Aequipecten gibbus*) apparently are confined to the southeastern coast and the Gulf of Mexico.

The Lab's Project

TABL's marine scientists assigned to the new program will seek biological understanding of the life history of the bottom-dwelling mollusc. As the fishery develops, information will be needed about "growth and reproduction rates, stock sizes, longevity, diseases to which the scallop may fall prey, and the marine environment in which the animal lives." Laboratory research will include attempts to rear the species artificially. The goal of TABL's biological studies will be to provide information and advice to the commercial industry that will help maintain a good supply of calico scallops and, when an intensive fishery has been activated, to protect it from overexploitation. Other BCF units will continue to work on exploratory fishing and gear research, technology, marketing, and statistics.

New Shucker Available

One problem that has slowed the development of a calico scallop fishery has been the lack of a mechanism that can efficiently shuck the relatively small shellfish. (A 75-pound bushel of live scallops yields only 3½ to 6½ pints of edible meats.) An automatic shucker

has been devised which could have a revolutionary effect on the beginning fishery. The combination shucker-eviscerator-cleaner can be installed aboard ship for rapid processing of scallop meat. Its inventor claims the apparatus can prepare scallops for the market--from shell to frozen meat--at the rate of 8 pounds of meat a minute. Also, at least 6 new factory-style vessels are nearly ready to enter the fishery; others are expected to be built or converted soon.

Related to Gourmet Scallop

The calico scallop is closely related, scientifically and dietetically, to the bay scallop, a seafood delicacy. The few people who have tasted the calico scallop claim it is as delicious as the somewhat-smaller bay scallop. The difference in meat size is due to an unusually large adductor muscle, the edible part of a scallop, which holds the 2 shell halves together. Calico scallops are called that because of their shells' mottled appearance.

Encouraging Fishing Results

Catches of calico scallops have been very small because of the lack of proper equipment and data concerning exact locations of commercial quantities. But some BCF findings may be a stimulant to commercial fishermen: During simulated commercial fishing from BCF's 'Silver Bay,' catches in 30-minute periods often amounted to more than 1,500 pounds; one reached 2,200 pounds. On a 6-day fishing cruise by BCF's 'Oregon,' the average catch was 1,600 pounds per hour. Once, the Oregon caught 5,800 pounds of scallops in an hour; at current retail prices, the catch would be worth more than \$800.



Industrial Fish Will Be Sought Off Midatlantic Coast

BCF has made a 1-year, \$95,000, research grant to the Virginia Institute of Marine Science (VIMS) to discover and test underutilized fish off the Midatlantic coast. Exploratory fishing operations were slated to begin in February 1969.

VIMS has chartered an industry vessel, the 'W. T. James, Jr.,' to locate winter supplies of marine herring. Initial fish scouting

will be conducted between Cape Henry, Va., and Cape May, N.J., and off Long Island. Results will be relayed to the fishing industry as they are obtained.



1968 New England Food Fish Landings Declined

Preliminary data show that food fish landings for 1968 at principal New England ports totaled 344 million pounds; in 1967, the figure was 355 million. In 1968, New Bedford, Mass., led with 90 million, Gloucester had 75, and Boston was in third place with 60 million.

In 1968, industrial fish landings at those ports were up substantially--105 million pounds; in 1967, 97 million. The leader in 1968 was Point Judith, 44 million; followed by New Bedford, 36 million; and Gloucester, 23 million. In 1967, such landings at Gloucester were only 8 million pounds.



Cooling Trend in New England Waters May Be Over

The downward trend in sea-water temperatures of the New England fishing banks that began in 1953 may have stopped. This was reported by scientists of BCF's Woods Hole (Mass.) Biological Laboratory. Their analysis of temperature conditions in 1968 showed marked increases over 1967--as much as 1° C. for the annual average of inshore surface temperatures. Comparing September temperatures in 1968 with those in 1965 and 1966, they found inshore temperatures 1° C. higher and offshore temperatures up to 6° C. higher.

An important part of the Woods Hole study indicates that temperature trends are more than surface phenomena. The trends are related to movement of warm slope water onto the Continental Shelf. This thesis is supported by observations made by BCF's 'Albatross IV' and the U.S. Coast Guard's 'Evergreen' in the ICNAF environmental studies.



1968 Lake Erie Commercial Catch Shows Slight Increase

The commercial landings for Lake Erie in 1968 are expected to total over 49 million pounds, a slight increase from the 1967 catch, reports BCF. This increase results from larger catches in the Ohio and Ontario waters.

The 1968 lakewide landings, however, are still about average for the past 50 years. Canadian fishermen harvested more than 77% of the total, up 1% over 1967. Ohio fishermen harvested about 20%; Michigan, Pennsylvania, and New York totaled the remaining 3%. Until 1954, U.S. landings had always provided the majority of the catch. Thereafter, the U.S. catch declined steadily and commercial fishing became primarily a Canadian enterprise.

STATUS OF THE YELLOW PERCH

During 1968, there were excellent landings of yellow perch. The Lake Erie catch comprised over 26 million pounds: Canadian landings over 22 million; U.S. landings, slightly less than 4 million. Ohio's production is expected to total about 3 million pounds, slightly better than 1967. Michigan and Pennsylvania catches are also slightly higher and New York's lower. This continued "high level" of perch production in 1968 is attributed to the large influx of the strong 1965 year-class, which first entered the fishery in significant numbers. Analyses of the scale collections from BCF's sampling program indicate that this year-class, as III-year-old fish, contributed 39% of the total spring production. In the fall fishery, it contributed nearly 75% of the total catch.

The only previous strong year-class produced in the 1960's was hatched in 1962. These fish were responsible for high production from 1965 through 1967, but have now passed out of the fishery.

The 8-inch limit on perch put in effect several years ago continues to have considerable influence on Ohio landings. The sampling program revealed that approximately 39% of the fish in the spring fishery, and 55% in the fall fishery, were below 8½ inches, the previous limit.

The growth rate of the yellow perch is as good or slightly better now than during the early 1960's. Then, yellow perch required

a minimum of four complete growing seasons to reach 8 inches. At the end of 1968, the 1965 year-class of perch (completing their fourth year) averaged 8.2 inches; the 1966 year-class, 7.3 inches; the 1967 year-class, 5.9 inches; and the 1968 year-class, 3.7 inches.

The spawning success and survival of young perch has undergone considerable fluctuation during the past decade. Good hatches occurred in 1959, 1962, and 1965, but the hatch in 1966 was the lowest. The 1967 hatch was rated fair, followed by another weak year-class in 1968. The lack of a relative good year-class within the past 3 years is discouraging. These poor hatches, and low survivals from a stock more than adequate to replenish the population, point toward "deteriorating environmental conditions" as the contributing factor.

BCF concludes: "We can expect another good year in 1969, although the landings will undoubtedly be less than in 1968. A marked decline will follow in 1970 and continue until such time as another successful year-class is produced."

STATUS OF THE WALLEYE

Lake Erie walleye landings dropped from 1,258,000 pounds in 1967 to approximately 831,000 pounds in 1968, the third lowest since 1920. Preliminary 1968 figures for states and the Province of Ontario reveal: Ontario landed 311,000 pounds; Ohio, 304,000 pounds; New York, 120,000 pounds; Michigan, approximately 88,000 pounds; and Pennsylvania, about 8,000 pounds. Compared with 1967, the catch in Ohio increased almost 75 percent, while production in New York and Pennsylvania remained about the same. However, Ontario and Michigan both experienced a 58-percent reduction.

BCF's analysis of the 1968 landings in the lake's western basin showed the 1965 year-class, the last remaining strong year-class, constituted over 90% of the U.S. spring catch. However, fall landings revealed that the 1965 year-class accounted for only 32%. This year-class, which entered the commercial fishery during fall 1966, has contributed the following to the Ohio seasonal landings: fall 1966--5,000 fish; spring 1967--44,000; fall 1967--23,000; and spring 1968--127,000 walleyes. In fall 1968, however, the number of 1965 year-class walleyes in the Ohio catch

dropped to about 1,000 fish; this indicated this year-class was fairly well fished out. Other year-classes present in fall landings included the 1966 year-class (15%) and the 1967 year-class (53%). BCF notes: "We do not expect these relatively weak year-classes to contribute to the catch anywhere near the 1965 year-class."

The population in the lake's western basin has been experiencing good year-classes every 3 years (1959, 1962, and 1965). A substantial year-class hatch had been anticipated in spring 1968, but this did not occur. A sufficient number of spawning fish of the 1965 year-class were present, but for unknown causes the spawn did not hatch and survive.

The commercial fishing outlook for walleyes in the near future looks quite disappointing for the western basin. The industry will have to depend upon the weak 1966 and 1967 year-classes. Total lake production will probably drop to an all-time low in 1969 and may not reach 600,000 pounds.

On the other hand, landings in the eastern basin revealed a much healthier population as large mesh gill-net catches were composed of 8 to 10 age groups. A tagging program was conducted during the spring and fall fishing season of 1968. Over 2,500 walleyes of various ages were marked and released in hope that the recovered fish would provide an estimate of the population size, their seasonal movements, and the discreteness of the population.



Oregon Shipped Nearly 14 Million Coho Eggs in 1968

With the shipment of 500,000 coho eggs to Korea at the end of 1968, the Oregon Fish Commission completed a record season of egg-shipping operations. Almost 14 million eggs were sent to more than 20 State and Federal resource agencies throughout the U.S. during November and December. All were surplus to the Commission's needs.

The shipment to Korea was one of the official gifts promised her by Governor Tom McCall, who was head of the Oregon Trade Mission to Korea last November. It is hoped these eggs will help increase the salmon runs.

Requests for Eggs Soar

The requests for eggs have skyrocketed in recent years following the successful introduction of coho into Lake Michigan. Eggs from the Oregon Fish Commission were used there.

Ordinarily, the Fish Commission states, eggs that will be shipped by air a long distance are raised to the eyed stage, packaged in special styrofoam containers, and rushed to a jet flight--after telephoning or wiring the recipient of the time of arrival.

In addition to coho eggs, the Fish Commission sent 1.4 million spring chinook eggs to Washington's Department of Fisheries and 400,000 to the Oregon Game Commission.



Aircraft Planted 4.1 Million Trout in California in 1968

In 1968, 4.1 million trout were planted in California's back-country waters by airplane, reports the Department of Fish and Game.

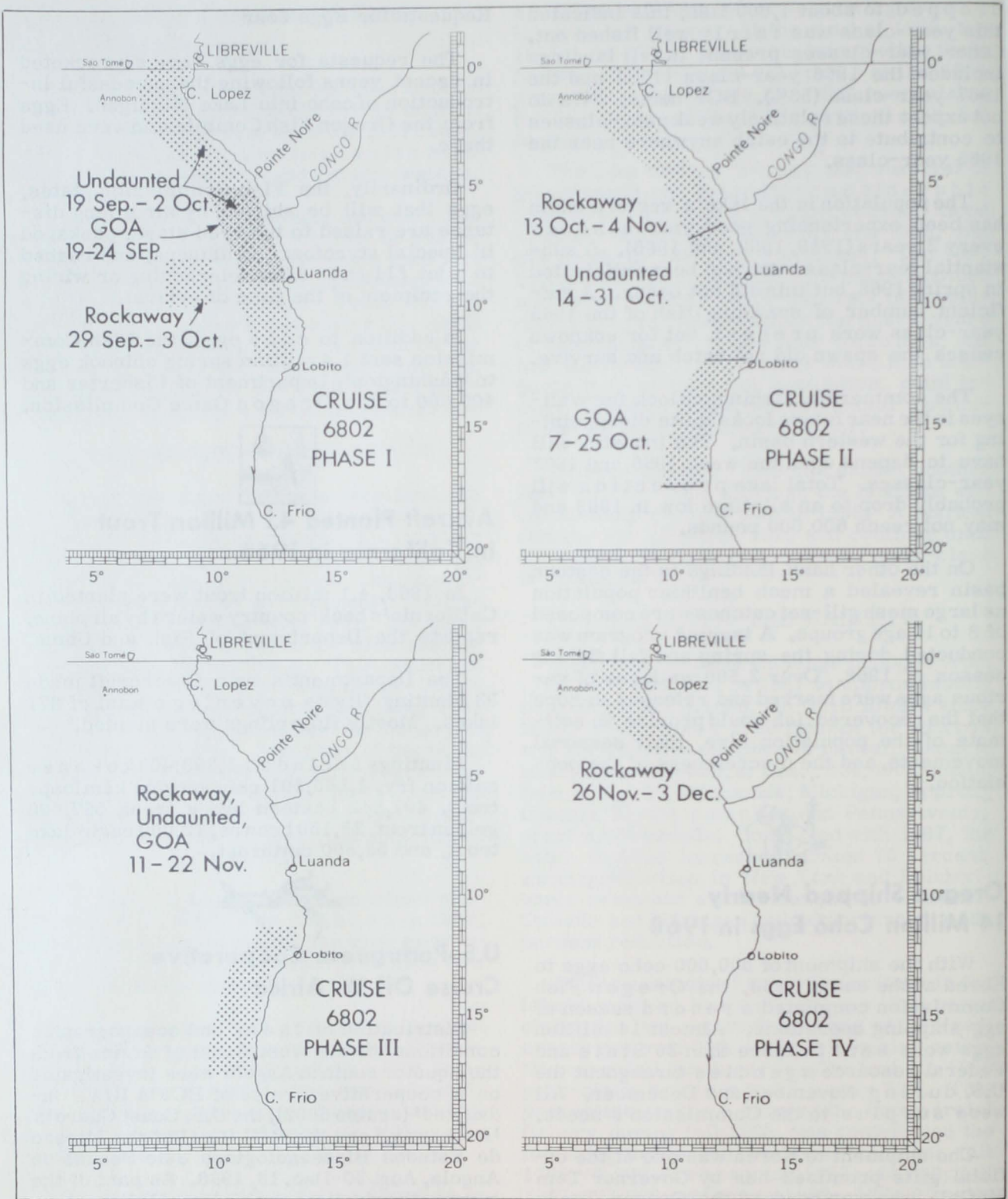
The Department's twin Beechcraft made 93 planting flights covering a total of 871 lakes. Mostly fingerlings were planted.

Plantings included 1,288,400 kokanee salmon fry, 1,565,507 rainbow and kamloops trout, 497,942 eastern brook trout, 567,000 golden trout, 25,150 browns, 12,000 eagle lake trout, and 53,500 cutthroat.



U.S.-Portuguese Cooperative Cruise Off W. Africa

Distribution of tunas and oceanographic conditions off the West Coast of Africa from the equator south to Angola were investigated on a cooperative cruise of BCF's R/V 'Undaunted' (cruise 6802), the U.S. Coast Guard's 'Rockaway,' and the R/V 'Goa' of the Missao de Estudos Bioceanologicos e de Pescas de Angola, Aug. 20-Dec. 18, 1968. As part of the survey, the physical and biological characteristics of the Gabon-Angola front, which moves from the Equator south to off Angola in the southern spring months, were investigated.



The frontal movement, its definition by specific isotherms, and the association of tunas with the front were parts of the study.

Tuna Schools Mostly Skipjack

A total of 125 tuna schools were observed, primarily in a restricted coastal band from the Congo River south to Angola. The fish were predominantly skipjack, but yellowfin and other species of tuna also were present. The yellowfin schools occurred in waters warmer than about 23° C. (73° F.), but skipjack were found in waters as cool as 20° C. (68° F.). Preliminary study did not show the tuna in close association with the front, possibly because of the weak nature of this feature during the cruise period.



Commonwealth of Puerto Rico Plans Commercial Fishery Lab

The Puerto Rico Planning Board has approved the preliminary drawings of a commercial fishery laboratory to be built at Punta Guanajibo, south of Mayaguez, on the west

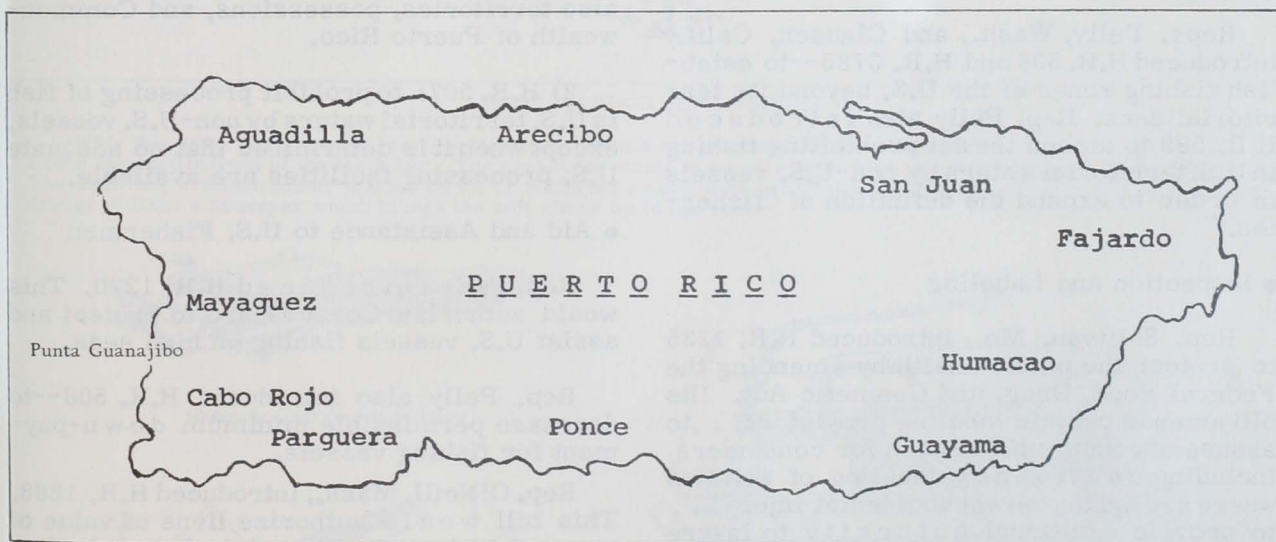
coast. The lab will be headquarters for the commercial fishery research and development program of Puerto Rico. This is supported by the Department of Agriculture of the Commonwealth of Puerto Rico and the U.S. Department of the Interior under Public Law 88-309.

Under the development program, several projects are underway to promote the fishing industry. These include demonstration and testing of improved boats and fishing gear, collection of fishery statistics, training of fishermen aboard tuna clippers, and experimental fishing for tuna in the Caribbean Sea and adjacent waters.

The Laboratory

The laboratory will include space for studies related to exploratory fishing, fishing gear, processing and preserving fish, and marine biology. It also will contain a library, assembly room, and administrative offices.

Facilities for docking, and a shipyard, will be constructed near the lab by the Atomic Energy Commission for the University of Puerto Rico Nuclear Center on Puerto Rico (Department of Agriculture property).



Much Fishery Legislation Proposed in Congress

The "hoppers" of the 91st Congress already contain a fair-sized catch of bills concerning fish and their environments and fishery products:

● Marine Sanctuaries

Five bills were introduced in the House to authorize the Secretary of the Interior to study the most feasible and desirable means of establishing certain portions of the tidelands, Outer Continental Shelf, seaward areas, and Great Lakes of the U.S. as marine sanctuaries.

The bills were introduced by Reps. Boland, Mass. (H.R. 145), Wyman, N.H. (H.R. 727), Brown and Keith, Calif. (H.R. 5955 and H.R. 5824), and Rep. Tunney, Calif., who included bays and estuaries (H.R. 6059).

Rep. Brown also introduced H.R. 5956 to authorize the Secretary of the Interior to study the feasible and desirable means of establishing a marine sanctuary in the Santa Barbara Channel, California.

● Territorial Waters and Fishing Zones

Reps. Pelly, Wash., and Clausen, Calif., introduced H.R. 506 and H.R. 3785--to establish fishing zones of the U.S. beyond its territorial seas. Rep. Pelly also introduced H.R. 509 to amend the act prohibiting fishing in U.S. territorial waters by non-U.S. vessels in order to expand the definition of "fisheries."

● Inspection and Labeling

Rep. Sullivan, Mo., introduced H.R. 1235 to protect the public health by amending the Federal Food, Drug, and Cosmetic Act. His bill amends certain labeling provisions...to assure adequate information for consumers, including cautionary labeling of articles where needed to prevent accidental injury...to provide additional authority to insure wholesomeness of fish and fishery products; etc.

Rep. Pepper, Fla., introduced H.R. 3683--to regulate interstate commerce...to provide inspection of facilities in harvesting and processing fish and fishery products for commercial purposes; inspection of fish and fish-

ery products; and for cooperation with States in regulation of intrastate commerce with respect to State fish-inspection programs.

Rep. Pepper also introduced for himself and Rep. Dingell, Mich., H.R. 5550. It is designed to protect consumers and to assist the commercial fishing industry through inspection of establishments processing fish and fishery products.

Rep. Pelly, Wash., introduced H.R. 505. This would require imported fish and fish-food products made completely or partly with imported fish to bear a label showing country of origin.

● Imports

Rep. Pelly introduced H.R. 510. Its purpose is to amend U.S. Tariff Schedules to provide that the amount of groundfish imported shall not exceed average annual amount imported during 1963 and 1964.

● Landings and Processing by Foreign Vessels

Rep. Pelly introduced: 1) H.R. 1272. This seeks to prevent certain foreign-flag vessels from landing catches of fish in U.S. ports, also territories, possessions, and Commonwealth of Puerto Rico.

2) H.R. 507: to prohibit processing of fish in U.S. territorial waters by non-U.S. vessels, except when it is determined that no adequate U.S. processing facilities are available.

● Aid and Assistance to U.S. Fishermen

Rep. Pelly introduced H.R. 1270. This would authorize Coast Guard to protect and assist U.S. vessels fishing on high seas.

Rep. Pelly also introduced H.R. 508--to decrease permissible minimum down-payment for fishing vessels.

Rep. O'Neill, Mass., introduced H.R. 1268. This bill would authorize liens of value of secured equipment used solely for navigation or fishing on a U.S. vessel--and to permit recording of such liens.

● Pesticides

Rep. Dingell, Mich., introduced H.R. 1057: to prevent or minimize injury to fish and wildlife from insecticides, herbicides, fungicides,

and pesticides, etc.; also H.R. 1059: to provide for advance consultation with Fish and Wildlife Service and State wildlife agencies before any Federal program begins involving the use of pesticides or other chemicals designed for mass biological controls.

● Pollution

Rep. Dingell, for himself and Rep. Karth, Minn., introduced: 1) H.R. 1058. This would protect fish, wildlife, and recreation from damages resulting from discharge of heated effluents into certain waters; 2) H.R. 1060 to require certain vessels in U.S. navigable waters to conform to standards of waste disposal; and 3) H.R. 1062: to control pollution from vessels and other sources in Great Lakes and other U.S. navigable waters.

Rep. Cahill, N.J., introduced H.R. 2155 and H.R. 2156. These would give President authority to alleviate or remove threat to navigation, safety, marine resources, or coastal economy by releases of fluids or other substances carried in ocean-going vessels, etc. He also introduced H.R. 2157: to provide Coast Guard with authority to conduct re-

search and development to deal with release of harmful fluids carried in vessels.

Rep. Tunney, Calif., introduced H.R. 6296. It would create commission to make comprehensive study of discharge of oil and other pollutants from vessels, onshore and offshore facilities, and other sources, into or upon navigable waters of U.S. or adjoining shorelines.

Rep. Horton, N.Y., introduced H.R. 6019: to authorize grants for research and development of methods to abate pollution of Lake Ontario, Lake Erie, and for other purposes.

● Anadromous Fish

Rep. Dingell, Mich., introduced for himself and others H.R. 1049. This would contribute to conservation and enhancement of U.S. anadromous fishing resources--and encourage joint research and development projects.

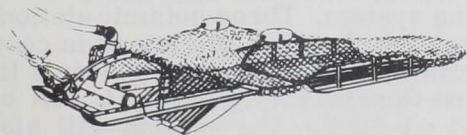
Rep. Pelly introduced H.R. 309: to conserve and protect Pacific salmon of North American origin.

--Barbara Lundy

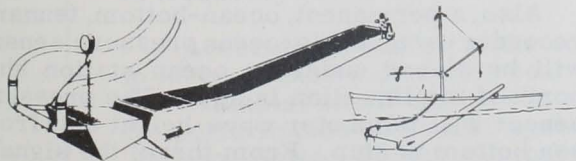


HYDRAULIC OR JET DREDGES

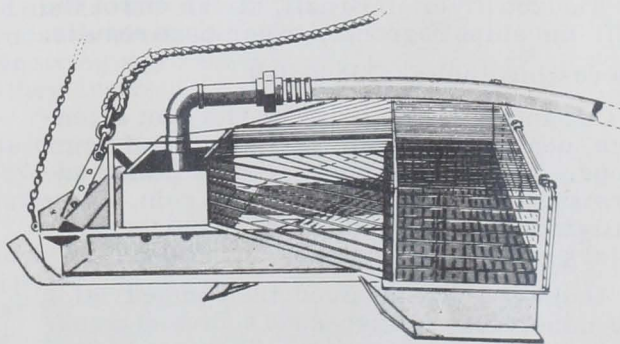
With this type of equipment, surf, soft, or hard clams are washed out of the bottom by action of jets of water from a pipe attached in front of the tooth bar. The pressured water is supplied by a high powered pump on the fishing vessel. The shellfish are then either washed on to, or collected by the tooth bar of the dredge. The Maryland type of hydraulic dredge utilizes a conveyor which brings the soft clams up to the vessel.



Hydraulic or jet dredge, surf clam



Hydraulic or jet dredge, soft clam



Hydraulic or jet dredge, hard clam

Note: Excerpt from Circular 109, Commercial Fishing Gear of the United States, for sale from the Superintendent of Documents, Government Printing Office, Washington, D. C. 20402, single copy 40 cents.

OCEANOGRAPHY

International Scientific Expedition Drifts Across Atlantic

In February 1969, U.S., British, and West German scientists spent 3 weeks aboard 4 vessels drifting across the equatorial region of the Atlantic Ocean. They were studying in detail the interaction of sea and air where the tradewinds generate much of the weather for North America and Europe. The study is called the Atlantic Tradewind Experiment (ATEX).

By drifting, rather than sailing, the scientists hoped to conduct their sea/air experiments--and measurements of air and water motions--without the problem of ship movements.

The vessels were ESSA's 'Discoverer,' the British Navy hydrographic survey ship 'Hydra,' and the West German research ships 'Meteor' and 'Planet.' Several German scientists were aboard the U.S. vessel.

The Operation

The 4 ships met off Africa about 850 miles west of Dakar and 600 miles west of the Cape Verde Islands to synchronize instruments. Three vessels then took stations at the corners of an equilateral triangle 435 miles on a side, with the fourth vessel centered on the downwind (South American) side. The vessels began drifting southwestward with the prevailing winds and currents. The ships drifted about 550 miles towards the mouth of the Amazon River off Brazil. At the end of the drift, the ships regrouped to compare results.

Interesting Studies Conducted

One interesting study, by German scientists, dealt with the number and size of raindrops. The results could lead to better understanding of different kinds of rain, especially tropical, and to answers about the artificial production of rain.

Another study involved the concentration and mineralogy of suspended sediment transported by ocean currents. This study may provide information on source of deep-sea deposits. It was conducted along with airborne particle studies.

A third study involved internal waves, the mysterious underwater undulations of the sea.



Hawaii Will Get New Experimental Tsunami Warning System

An experimental system will be set up in Hawaii to try to improve the existing system that warns Hawaiians of seismic sea waves (tsunamis) generated by undersea earthquakes near their coasts. It is hoped the new additional system will provide information sooner.

The program, announced Feb. 11 by the Environmental Science Services Administration (ESSA) of the U.S. Department of Commerce, will be established by ESSA and the University of Hawaii under a \$45,700 contract.

The New System

The experimental system will consist of seismic and hydraulic gage stations on several islands. The stations' signals will be telemetered by radio to the observatory of ESSA's Coast and Geodetic Survey (CGS) at Ewa Beach, Oahu.

The system will supplement the existing seismic quadripartite warning net on Oahu. The net is part of the CGS Pacific tsunami warning system. Three seismic stations will be established on the Big Island in cooperation with the U.S. Geological Survey's Hawaii Volcano Observatory; a fourth will be installed on Maui. The system will also use the present hydraulic gage near Kona on Hawaii Island, plus a new one to be installed on the island near Punaluu.

Also, a permanent, ocean-bottom, tsunami recorder using a mid-ocean pressure sensor will be placed under an ocean station ship north of the Hawaiian Islands. The pressure sensor will telemeter wave-height data from sea bottom to ship. From there, the signals will be relayed to the Ewa observatory for analysis.

Swifter Action Expected

Robert A. Eppley, Chief, Tsunami Services Coordinating Branch, Coast Survey headquarters, Rockville, Md., said:

"Having this information immediately available from the continuous recordings at the stations should make it possible, if a large earthquake occurs near the Big Island, the most active seismic area, for the observatory to act swiftly. The seismic data will enable the observatory to determine the earthquake's epicenter and the data from the hydraulic gages will be used to determine if

a tsunami has been generated and, in the case of Aleutian tsunamis, to evaluate the wave height as it approaches Hawaii."

If the experimental system provides reliable results, it will be added to the Pacific tsunami warning system. This would reduce appreciably the time in which a warning can be issued.

Eppley said, too, there was always the possibility of a tsunami being generated by an undersea earthquake in the ocean adjacent to Hawaii. Such a tsunami about 100 years ago off the southeast coast of the island of Hawaii caused considerable damage.



"THERMOMETER" TAKES SEA'S TEMPERATURE

The mighty ocean is having its temperature taken in measurements as precise as five-hundredths of a degree Fahrenheit.

The "thermometer", explained Arthur Nelkin, manager of electroacoustics research, Westinghouse Research Laboratories at Pittsburgh, changes electrical pulsations from deep in the ocean into mechanical vibrations of ultrasonic frequency that can be measured on the sea's surface.

The transducer contains a small aluminum disk, about an inch in diameter, which has a natural vibrating frequency of about 40,000 vibrations per second. This disk is lowered into the ocean, attached to two wires which feed it direct current power.

Set in motion by a transistorized electronic circuit, the disk fixes the frequency at which the circuit produces electrical pulsations. These pulses are sent along the wires to receiving equipment on a ship or platform at the water's surface, where they are counted.

The disk's natural vibration rate changes with the ocean's temperature. Temperatures are measured by observing the corresponding shift in frequency of the electrical oscillations.

Accurate knowledge of the ocean's temperatures is aiding scientists in their extensive study of ocean depths and man's relation to the sea. For example, small changes in water temperature are known to affect the performance of sonar systems. (Reprinted, with permission from "Science News," weekly summary of current science, copyright 1966, by Science Service, Inc.).

Foreign Fishing Off U.S. Coasts in December 1968

NORTHWEST ATLANTIC

Thirty-six Soviet, Polish, and Icelandic fishing and support vessels were sighted in December 1968, far fewer than the 92 reported early in November. Due to a complete withdrawal of East and West German fleets and reductions in Soviet and Polish fleets, only 10 or 12 remained at end of November. In December, weekly sightings varied between 10 and 20 vessels.

Soviet: Twenty-nine individual vessels were sighted. Most were concentrated in a 20-mile area, 20 to 30 miles south of Martha's Vineyard and Nantucket. They were observed actively fishing, probably for herring, but no catches were identified.

Polish: Six vessels were sighted, in contrast to 19 in November. Early in the month they fished briefly 25 to 30 miles south of Martha's Vineyard and Nantucket. Limited catches of herring were observed. Two Polish vessels fished briefly south of Block Island, R.I., early in Dec. 1967.

East and West German: There were no sightings in December 1968. In early December 1967, 1 East German and 8 West German stern trawlers fished 15 and 30 miles south of Montauk Point, L.I. By mid-month, they were reported fishing off the New Jersey Coast. At month's end, there were no further sightings or reports of these vessels.

Icelandic: One herring purse seiner sighted.

MID-ATLANTIC

Several Soviet stern factory trawlers were reported southeast of Cape May, N.J., and off the Virginia coast, probably conducting exploratory fishing.

GULF OF MEXICO AND SOUTH ATLANTIC

No foreign fishing vessels were reported.

OFF CALIFORNIA

No Soviet fishing vessels were sighted in December 1968; 18 were sighted in December 1967.

OFF PACIFIC NORTHWEST

Soviet: Three fishing vessels were sighted--1 medium side trawler, 1 research vessel, and 1 large stern factory trawler. No catches were observed.

Japanese: One long liner was sighted, but no fish were observed aboard.

OFF ALASKA

Soviet: Soviet fishery vessels increased rapidly, from 34 in November 1968, to over 110 by the end of December. Number of vessels also had increased rapidly in December 1967, from 20 early in the month to about 70 by the end.

The winter herring fishery began earlier in 1968 than in previous years--the principal reason for the increase in sightings. Their Bering Sea flounder fishery also started early in December.

A fleet of 11 stern trawlers, 1 medium trawler, and 5 support vessels, observed fishing ocean perch in the western Gulf of Alaska during the first 3 weeks in December, had shrunk to 6 stern trawlers by year's end. Many of the vessels offloaded in the Sanak Island loading zone. Ocean perch fishing in other areas off Alaska was limited.

In early December, 5 stern trawlers started fishing herring northwest of the Pribilofs; by month's end nearly 30 vessels were sighted there. The Soviets did not fish Pribilof Island herring in 1966 and 1967; in 1968 they caught about 10,000 metric tons. In December the best stern factory trawlers were landing 35-50 metric tons a day, and some medium trawlers were averaging 12-13 tons, on a good day. Some medium trawlers, with limited refrigeration capabilities, reportedly were having difficulty as they could freeze only about one-half their average daily catches.

About 10 vessels began fishing flounder in early December; by month's end there were over 50. In recent years Soviet flounder expeditions have developed into one of their most intensive fisheries off Alaska.

Throughout December the Soviets trawled for groundfish along the Continental Shelf edge in the Bering Sea. One group of 5 medium trawlers operated in the central Bering Sea. North of the Fox Islands in the eastern Aleutians a second group, 6 medium trawlers, was

joined by 9 sisterships and 2 refrigerated vessels early in December. This second group was visited by a BCF management agent late in the month. The Soviet Commander confirmed that flatfish was the principal catch. For example, on the vessel he was on 95% of the catch was arrowtooth flounder (frozen whole).

Japanese: About 40 vessels were sighted in December.

Six stern trawlers fished ocean perch, mostly in the eastern Gulf of Alaska. Twelve to thirteen stern trawlers fished perch along the Continental Shelf edge from Unimak Pass to the central Bering Sea.

Two factoryship fleets continued the fish meal and oil and minced-fish-meat fishery in the eastern Bering Sea throughout December. One factoryship and 8 trawlers fished along the Continental Shelf edge from north of the Fox Islands to south of the Pribilofs--proven pollock fishing grounds. The second factoryship and 6 trawlers remained north of the Alaska Peninsula--an area of flounder concentrations.

About 4 vessels long lined for sablefish off southeast Alaska during the month.

South Korean: In late December, a stern trawler appeared near the eastern Aleutians. In June and July 1968 the same vessel had fished north of the Alaska Peninsula.



DO YOU KNOW ?

The sea lamprey or "lamprey eel," scourge of the Great Lakes, is not an eel. It is a primitive, aquatic, vertebrate that has no jaws or paired fins.

The "mouth," a sucking disc by which the animal attaches to a fish, is surrounded by teeth that are used to rasp a hole through the victim's skin.

Originally, the sea lamprey spent its entire life in salt water and spawned in fresh water. However, the lampreys of the Great Lakes now spend their entire lives in the lakes and adjoining streams.

The nonparasitic young, called ammocetes, remain for several years buried in mud bottoms of the streams. Emerging from the mud as adults, they migrate into the lakes. Later, the lampreys return to the streams to spawn before dying.

Adult lampreys have been responsible for destruction of lake trout, burbot, and whitefish populations of Lakes Superior, Huron, and Michigan. The lamprey population has been reduced more than 85 percent in Lakes Superior and Michigan by chemical control methods recently developed by the Bureau of Commercial Fisheries and applied in a joint U.S.-Canadian control program by personnel of the Bureau of Commercial Fisheries and Department of Fisheries, Canada. As a result, fish stocks in these lakes are now being restored, aided by plantings of hatchery-reared fingerlings.

--Catherine Criscione