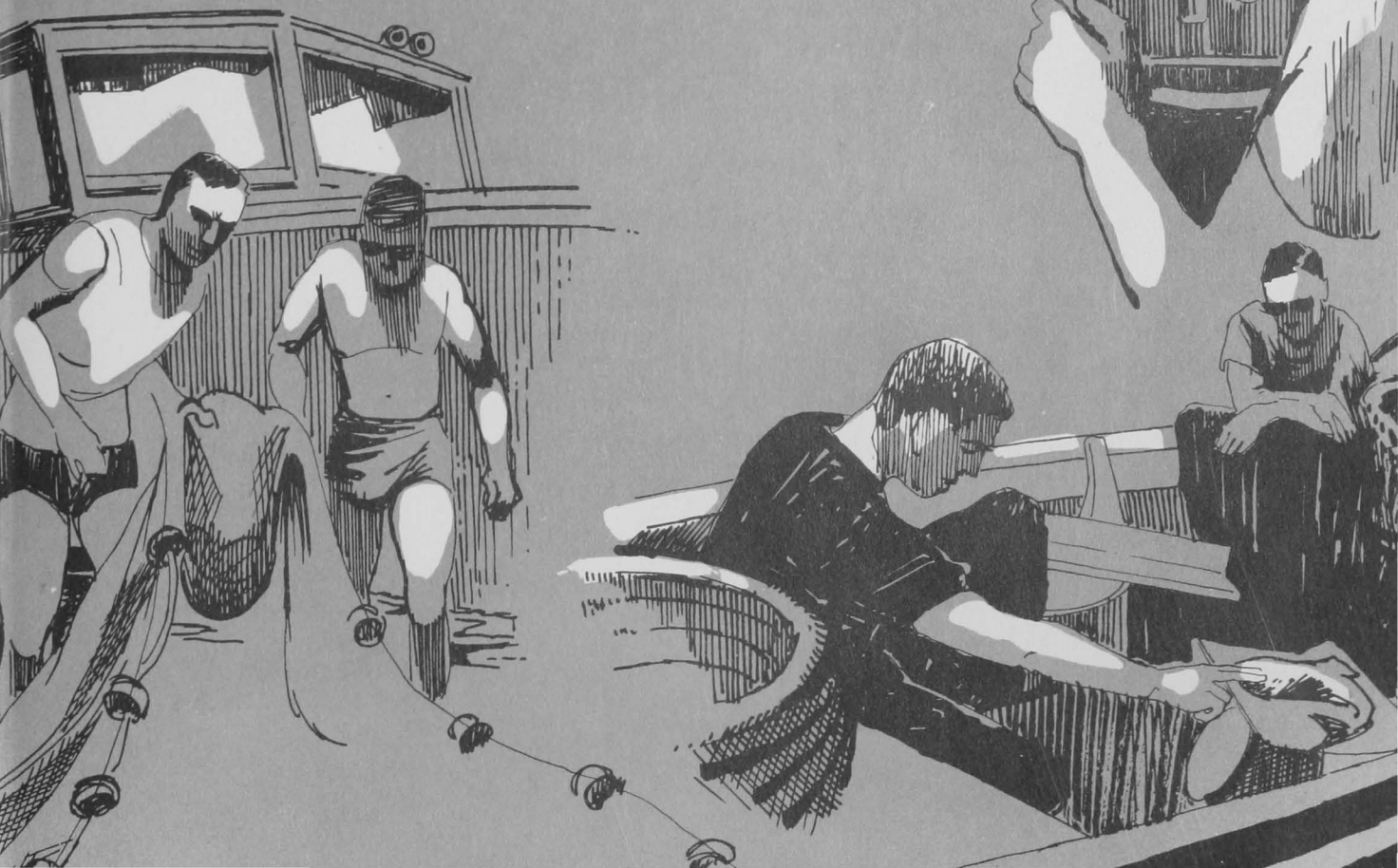
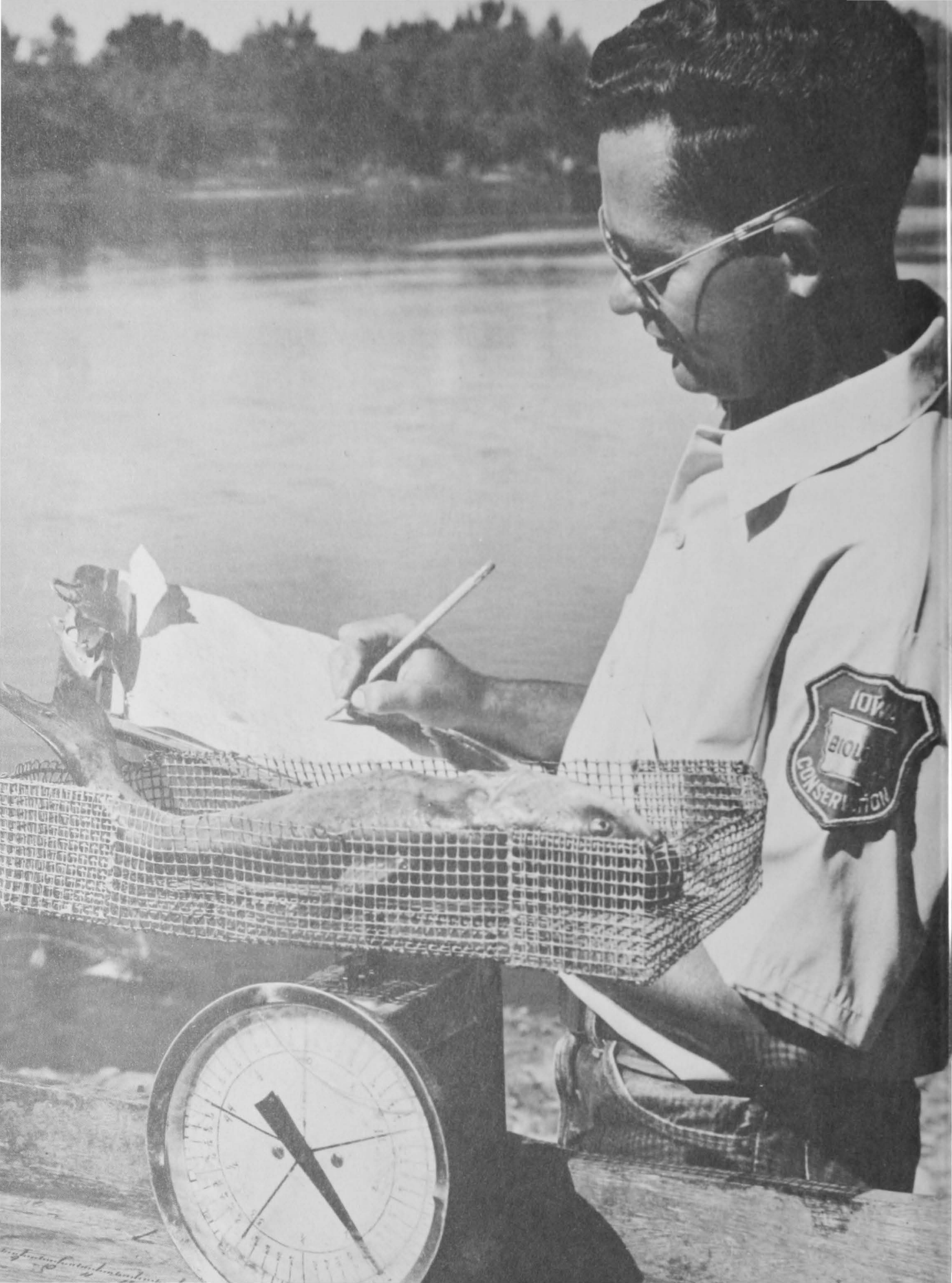




COMMERCIAL FISHERIES FEDERAL AID TO STATES







UNITED STATES DEPARTMENT OF THE INTERIOR

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FISH AND WILDLIFE SERVICE, Clarence F. Pautzke, *Commissioner*

BUREAU OF COMMERCIAL FISHERIES, H. E. Crowther, *Director*

COMMERCIAL FISHERIES FEDERAL AID TO STATES

CIRCULAR NO. 286
WASHINGTON, D. C.
FEBRUARY 1968

Foreword

I am pleased to present this report on three years of progress and accomplishment of State research and development under the Commercial Fisheries Research and Development Act of 1964 (P.L. 88-309). This outstanding example of State-Federal cooperation is playing an important role in the conservation of our aquatic living resources for the benefit of all Americans.

Some of the most important fishery resources in the world are located in coastal waters under State jurisdiction. In addition, developing fisheries in our inland areas will substantially increase the total resource available for harvesting by U.S. citizens. However, the significance and potential of these fisheries have not been fully appreciated. Effective management of our fisheries to provide a resource base upon which our fishing industry can build requires a cooperative State-Federal research and development effort. State fishery agencies and the Bureau have important individual roles to play. The many excellent State projects begun under P.L. 88-309 during the past three years are complementing those of the Bureau and making a valuable contribution to our National objectives of ensuring an adequate, dependable, and diverse supply of fish and shellfish products, and encouraging optimum use of them. In my opinion, State research and development, if adequately supported, could well be the key to survival of important segments of the commercial fishing industry which produce, process, and market high-quality fish and shellfish from coastal, estuarine, and inland waters.

In addition to the new or expanded research and development, P.L. 88-309 funds are making it possible for State fishery agencies to make substantial capital investments in vessels, laboratories, and other research facilities; to employ new personnel; and otherwise to strengthen their research and development capabilities. In some States, particularly in the inland areas, new commercial fishery functions have been established within existing conservation departments. Subcontracts with universities and private research and development firms are bringing an additional wealth of technological skills and new approaches to bear on our varied and complex fishery problems.

I know that continued progress by the States in accumulation of knowledge about aquatic living resources, their environment, and their utilization will bring us closer to our goal of increasing and maintaining a fishery harvest from our coastal and inland waters. The Bureau of Commercial Fisheries welcomes the opportunity provided by P.L. 88-309 to work in partnership with the States in attaining this goal.



H. E. Crowther, Director
Bureau of Commercial Fisheries

THE COMMERCIAL FISHERIES RESEARCH AND DEVELOPMENT ACT

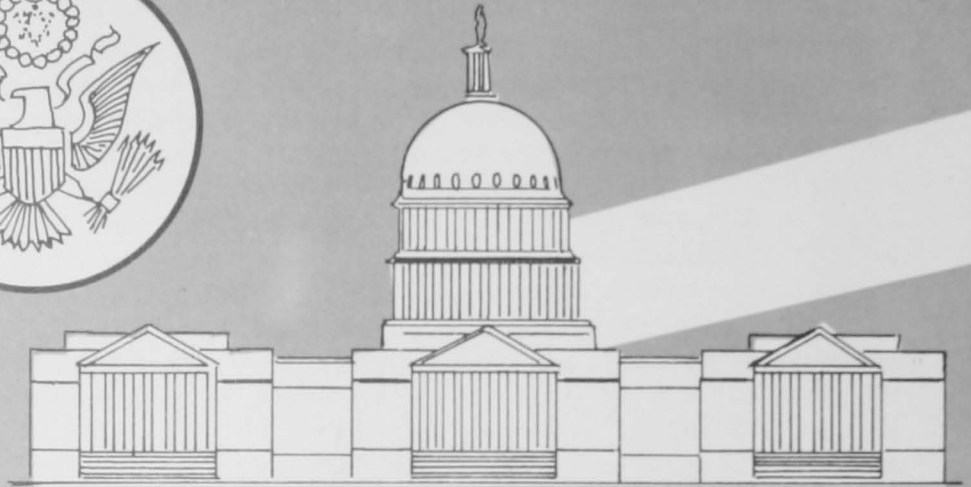
The enactment on May 20, 1964 of **Public Law 88-309** opened a new era in State-Federal cooperation in commercial fisheries research and development. The purpose of this Act is to authorize the Secretary of the Interior to cooperate with the 50 States, the Commonwealth of Puerto Rico, and the Governments of the Virgin Islands, Guam, and American Samoa in carrying out research and development of the Nation's commercial fisheries.

The legislation contains three specific authorizations for appropriation of funds for 5 years beginning July 1, 1964 (fiscal year 1965). **Section 4(a)** provides \$5 million annually for 5 years for apportionment among the States to carry out projects on a cost-sharing basis. **Section 4(b)** provides \$400,000 for each of the first 2 years and \$650,000 for each of the next 3 years to be used by the Secretary to restore a fishery affected by a resource disaster. **Section 4(c)** provides \$100,000 annually for 5 years to be used to establish new commercial fisheries.

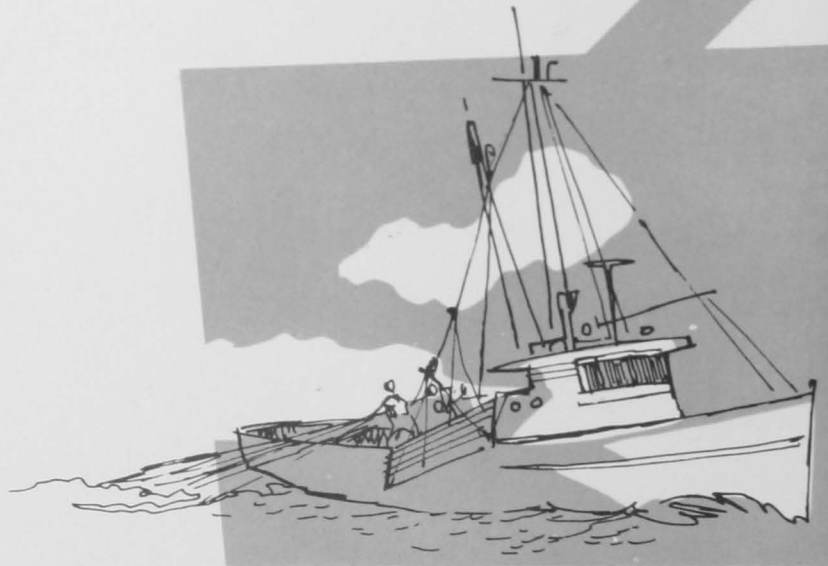
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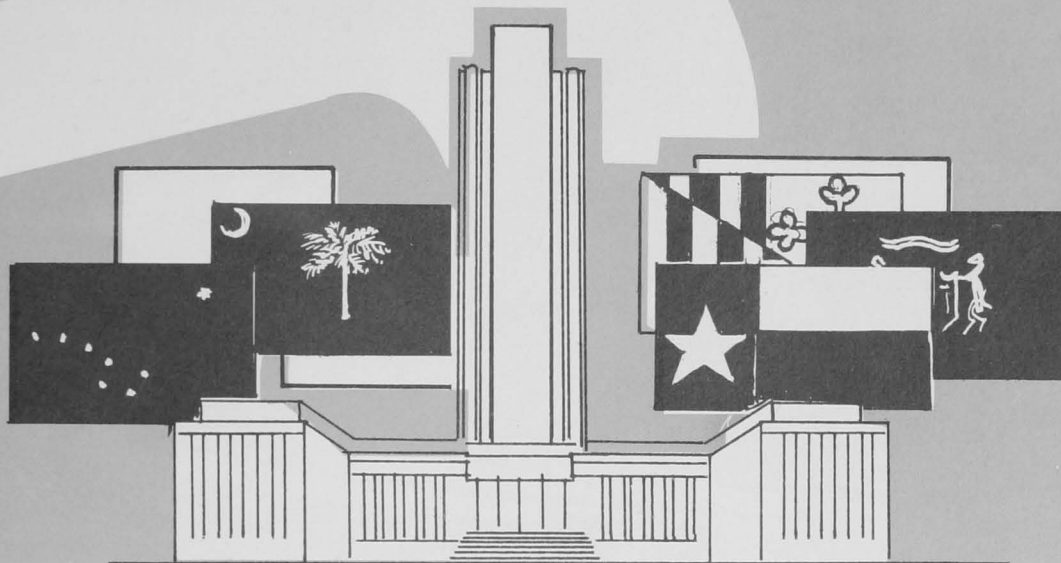
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HOW THE ACT WORKS



Funds are appropriated by Congress each fiscal year. Fund apportionment under Section 4(a) is by statutory formula based on the most recent 3-year averages of value of fishery products landed and processed in each State. Each of the 54 eligible recipients is assured a Federal apportionment of at least one-half of 1 percent and no more than 6 percent of funds appropriated by Congress in any fiscal year. Funds which are not obligated at the end of the fiscal year in which apportioned remain available for obligation until the close of the succeeding fiscal year, and if unobligated at the end of that year, are returned to the U.S. Treasury.





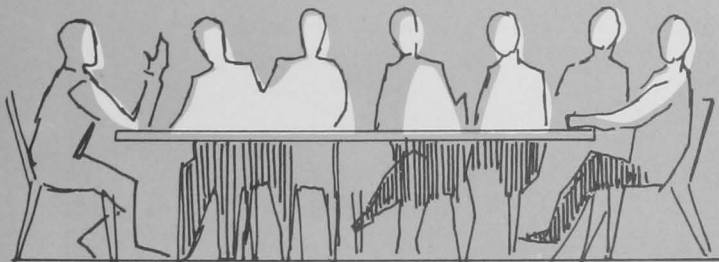
State-matching funds used for approved projects must be new monies not previously used for other commercial fishery research and development activities.

Projects eligible for funding include research, development, construction, and coordination. Funds cannot be used for public relations, law enforcement, or construction of facilities that are to be used primarily for commercial fishing or for processing fish products. **The States select, design and carry out project work.** They must contribute at least 1 dollar for every 4 dollars spent, except that research and development projects approved under Sections 4(b) and 4(c) of the Act may be financed with 100 percent Federal funds.

All major construction projects are funded at a 50-percent level of Federal participation.

All projects must be submitted through a State agency which has been designated by the Governor as the agency authorized by law to regulate commercial fisheries.

The Act is administered in the Department of the Interior by the Bureau of Commercial Fisheries.

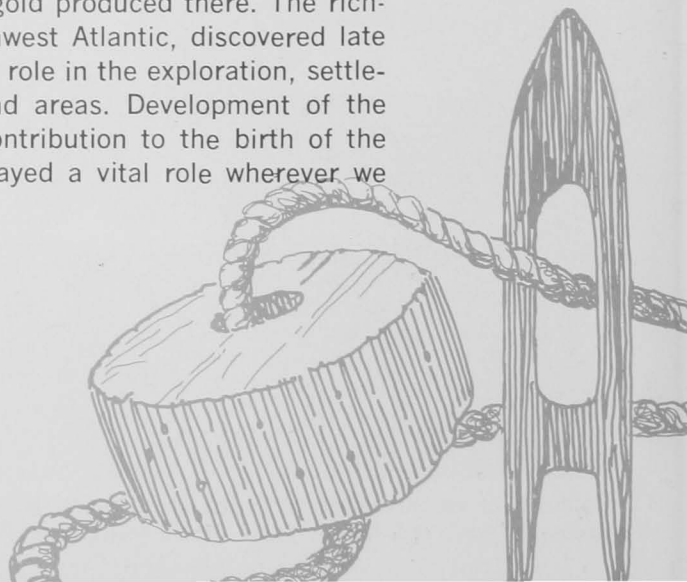


To illustrate accomplishments of the Commercial Fisheries Research and Development Act, statistics from the first 4 years (fiscal years 1965-68) have been used in this report.



THE U.S. FISHERIES — THEN

The fisheries of America have played a unique part in this country's history since its founding. John Cabot, returning to England in 1498 from North America, stated “. . . that the sea is covered with fishes, which are caught not only with the net but with baskets, a stone being tied to them in order that the baskets may sink in the water. . . .” Historians recorded that the founders of the Plymouth Colony came to America to serve God and to catch fish. The colorful New Bedford and Nantucket whaling fleets which ranged the oceans of the world in the 19th century were a large factor in forming the bonds that eventually joined Hawaii to the United States. The great salmon fisheries have been a principal support of Alaska through the years and have been a greater source of wealth than all the gold produced there. The richness of the offshore banks of the Northwest Atlantic, discovered late in the 15th century, played an important role in the exploration, settlement, and development of adjacent land areas. Development of the colonial fisheries made an important contribution to the birth of the Nation. In fact, commercial fisheries played a vital role wherever we have pioneered new frontiers.





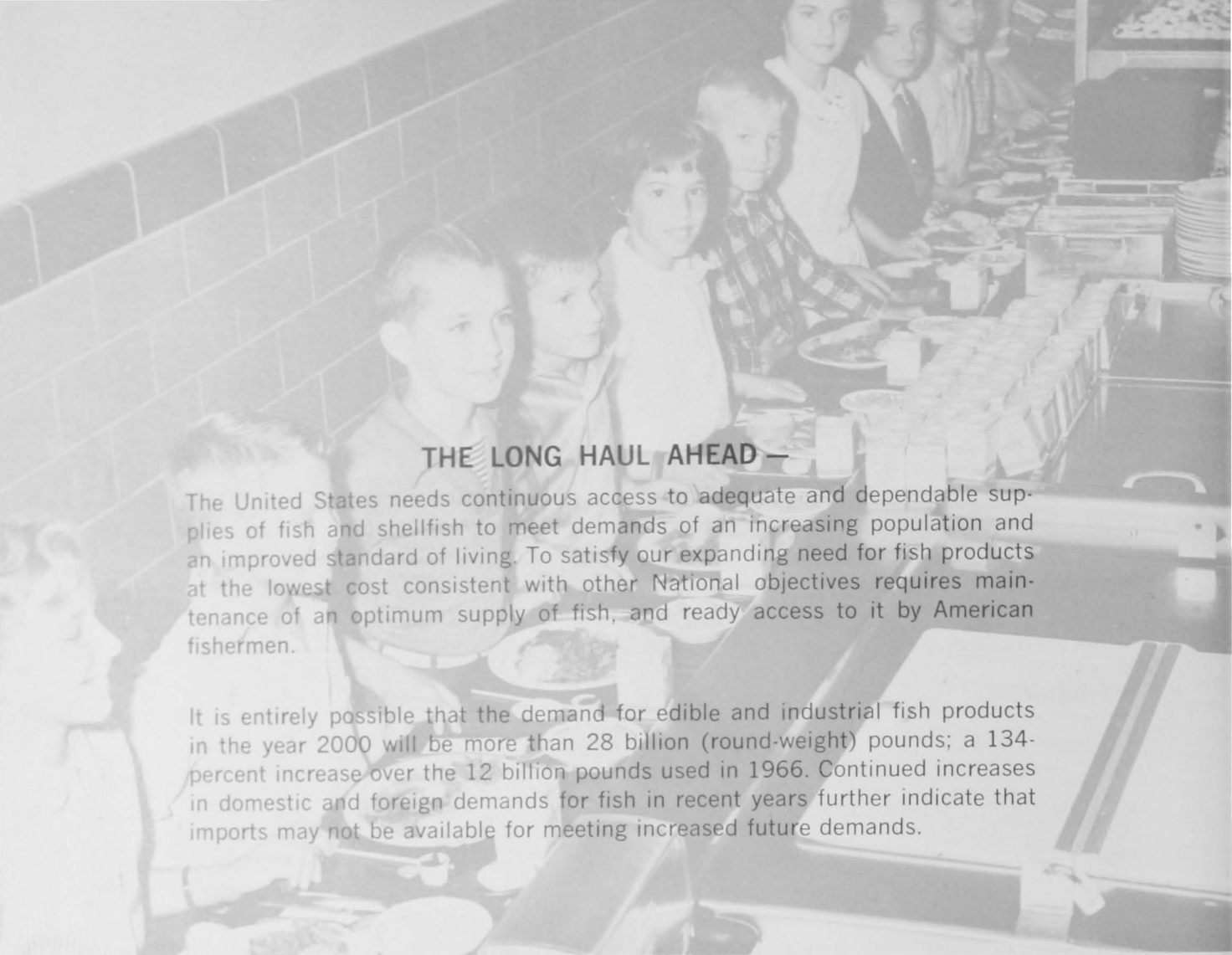
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AND NOW —

Commercial fisheries are of major economic importance to many sections of the country. When allied industries servicing and selling fishery products are considered, the contribution of these resources to the Nation's economy is substantial. When processed, the nearly 5-billion-pound-per-year fish catch is worth well over a billion dollars annually at the retail level. Employment, direct and indirect, is furnished to more than half a million persons.

Recreational use of our fishery resources is showing phenomenal growth. Many businesses such as manufacturing sport fishing gear and operating party boats and resorts are supported by more than 40 million Americans who fish for sport each year.



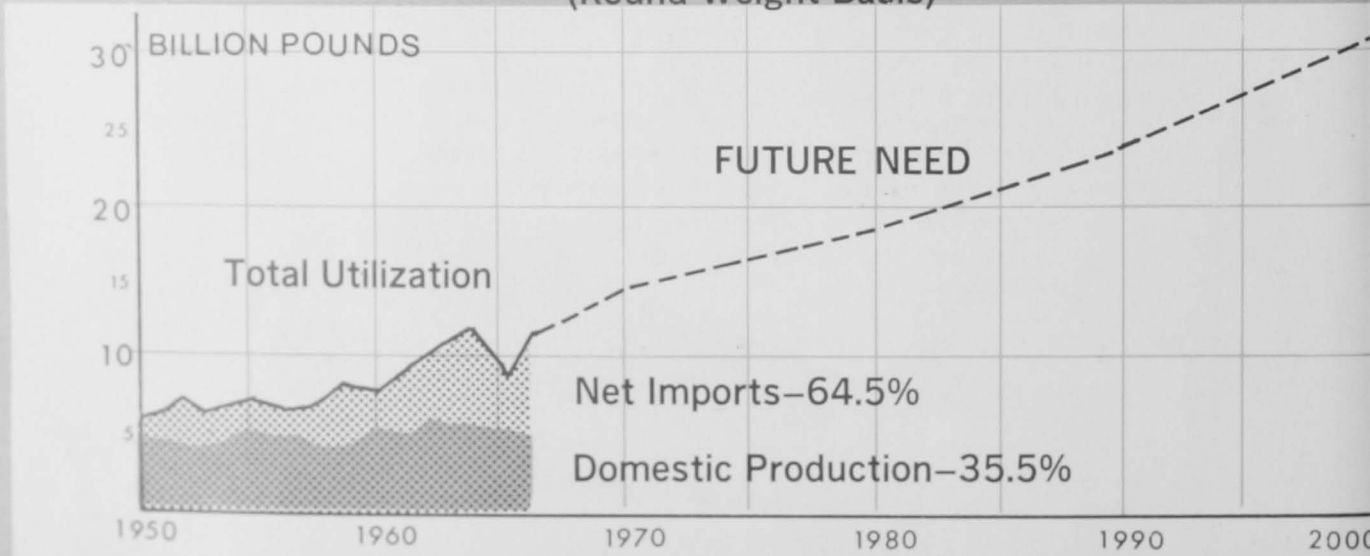


THE LONG HAUL AHEAD —

The United States needs continuous access to adequate and dependable supplies of fish and shellfish to meet demands of an increasing population and an improved standard of living. To satisfy our expanding need for fish products at the lowest cost consistent with other National objectives requires maintenance of an optimum supply of fish, and ready access to it by American fishermen.

It is entirely possible that the demand for edible and industrial fish products in the year 2000 will be more than 28 billion (round-weight) pounds; a 134-percent increase over the 12 billion pounds used in 1966. Continued increases in domestic and foreign demands for fish in recent years further indicate that imports may not be available for meeting increased future demands.

**UNITED STATES UTILIZATION OF FISHERY PRODUCTS
1950-66 WITH PROJECTIONS TO YEAR 2000
(Round Weight Basis)**



Thus, it is clear that State-Federal cooperation in research and development is important to attain two primary national objectives in conserving fishery resources — now and for the future:

TO ENSURE AN ADEQUATE, DEPENDABLE, DIVERSE SUPPLY OF FISH AND SHELL-FISH PRODUCTS OF GOOD QUALITY AT LOWEST COST FOR AN EXPANDING POPULATION AND A GROWING INDUSTRIAL ECONOMY.



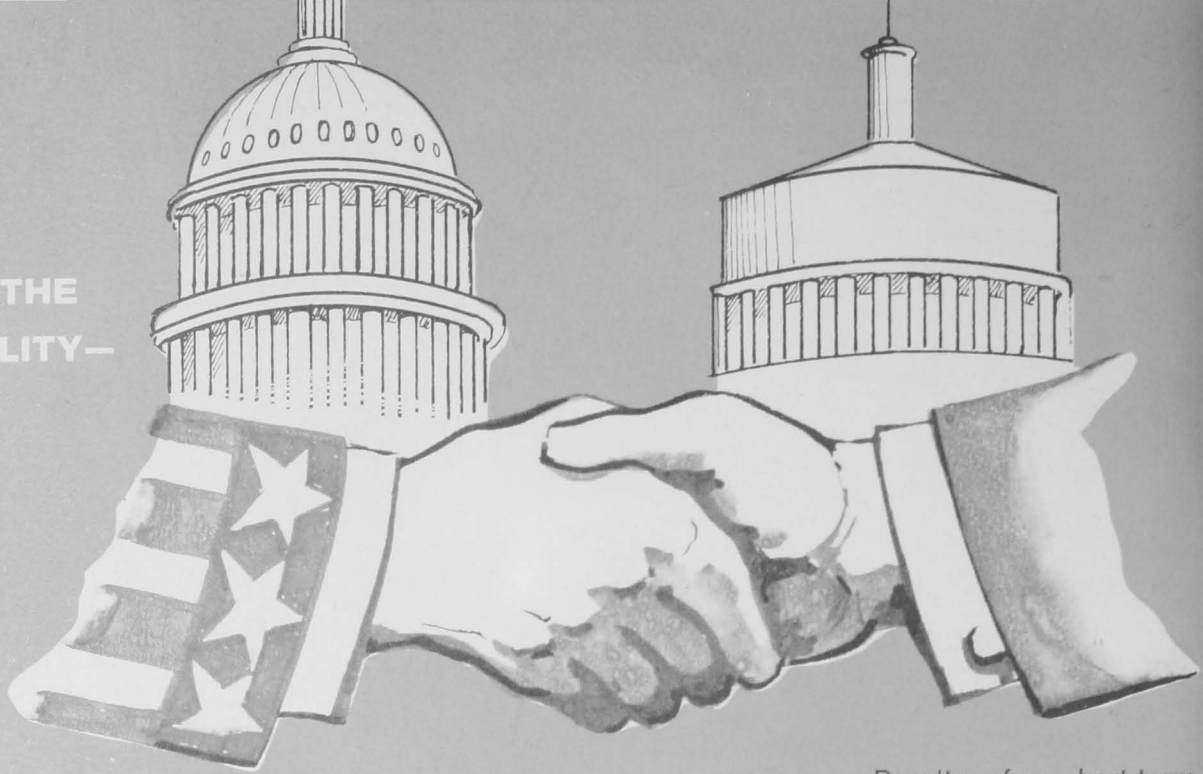
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DEFINING THE OBJECTIVES—



TO ENCOURAGE OPTIMUM USE OF ALL LIVING RESOURCES, THUS CREATING A CLIMATE FOR INDUSTRY TO PRODUCE EFFICIENTLY UNDER COMPETITIVE CONDITIONS AND CREATING EMPLOYMENT OPPORTUNITIES FOR LABOR AND CAPITAL WITH INCOMES AND RETURNS COMPATIBLE WITH EMPLOYMENT IN OTHER INDUSTRIES.

SHARING THE RESPONSIBILITY—



Cooperation of the States and the Great Lakes Fisheries Commission in carrying out research on stocks of fish used by United States and Canadian fishermen in Lakes Superior, Huron, Erie, and Ontario.

Cooperation between two States and the Pacific Marine Fisheries Commission in operating a Pacific Coast port sampling pool.

Results of a short-term study that provided information useful to the Bureau and State Department in their negotiations with the Soviet Union on the effects of intensive fishing pressure on stocks of Pacific Northwest hake and rockfish.



The Bureau continues to emphasize research and development wherever it is the research agency under international convention or interstate compact, and whenever the investigation and management of far-ranging fisheries are beyond the capability of States individually or jointly.

Public Law 88-309 leads to cooperation and coordination in fishery research and development between the Bureau of Commercial Fisheries and the States, and even between several States. These accomplishments result from the close relationships among the Bureau and the individual States, as well as with such interstate organizations as the Atlantic States Marine Fisheries Commission, the Gulf States Marine Fisheries Commission, and the Pacific Marine Fisheries Commission.

Some of the significant results of Federal-State-interstate cooperation in designing and carrying out project work are:

Joint Bureau-State sponsorship of a Governors Conference on Central Pacific Fishery Resources.

Cooperation in an estuarine inventory and a motion picture by the Bureau and five States bordering the Gulf of Mexico.

Bureau-State cooperation in a project that aimed at rehabilitating the seed oyster industry in Long Island Sound.

State compilation of fish statistics to meet National international needs.



Although States may extend their investigations beyond the territorial sea, their greatest efforts will continue to be in the inshore and inland areas — estuaries, rivers, lakes, and reservoirs. Increased competition for the fishery resources in international waters demands that early and adequate attention should be given to increasing the supply of fish and shellfish from waters under State jurisdiction.

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Under P. L. 88-309, the States can so contribute significantly to the total fishery effort — State and Federal — through subcontracts with other non-Federal cooperators such as universities and private research and development organizations.



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The P. L. 88-309 program is in its third year of operation, and more than 200 projects have been funded in 47 States, Puerto Rico, the Virgin Islands, Guam, and American Samoa. Already, these projects are contributing to attainment of National fishery objectives.

HOW THE FUNDS WERE USED

SUMMARY OF PROJECTS FUNDED — FISCAL YEARS 1965-68

| Category | Number of Projects | State Dollars | Federal Dollars | Total Dollars |
|------------------------------|--------------------|---------------|-----------------|---------------|
| ● Marine finfish | 29 | 536,578 | 1,586,937 | 2,123,515 |
| ● Shellfish — clams, oysters | 34 | 844,655 | 1,322,996 | 2,167,651 |
| ● Shellfish — crustaceans | 19 | 310,954 | 809,199 | 1,120,153 |
| ● Inland fisheries | 25 | 204,033 | 590,700 | 794,733 |
| ● Habitat investigations | 15 | 314,882 | 914,477 | 1,229,359 |
| ● Other aquatic resources | 8 | 75,344 | 226,030 | 301,374 |
| ● Harvesting | 7 | 142,300 | 367,600 | 509,900 |
| ● Processing | 13 | 94,792 | 284,375 | 379,167 |
| ● Marketing | 7 | 372,268 | 1,116,904 | 1,489,172 |
| ● Economics | 5 | 24,450 | 66,150 | 90,600 |
| ● Statistics | 11 | 112,251 | 336,840 | 449,091 |
| ● Construction | 17 | 365,608 | 886,822 | 1,252,430 |
| ● Extension | 3 | 22,138 | 66,415 | 88,553 |
| ● Coordination | 10 | 97,454 | 292,359 | 389,813 |
| ● Resource disasters | 11 | 91,000 | 882,000 | 973,000 |

TOTAL 214 \$3,608,707 \$9,749,804 \$13,358,511



THE SUPPLY

Most fish and shellfish in rivers, lakes, estuaries, and the sea are the property of no man until caught. Because these living resources are hidden beneath the surface of the water, special and complicated techniques are needed to find out how they can be managed to benefit the greatest number of people.

In addition to maintaining the yield of our traditional fisheries, it has become necessary to emphasize the research and development of vast underutilized resources about which little is known.

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Research and development in aquaculture can increase production of valuable fish and shellfish by controlling their habitats under semi-natural conditions.

MARINE FINFISH

A sampling method of pumping an air-water mixture into a streambed has been devised to collect and determine the abundance of pink salmon fry just before they emerge from the gravel and begin to migrate to the sea. Forecasts of future abundance, which industry needs for management decisions, are based on the correlation between the abundance of pre-emergent fry and the numbers of adults returning the next year.



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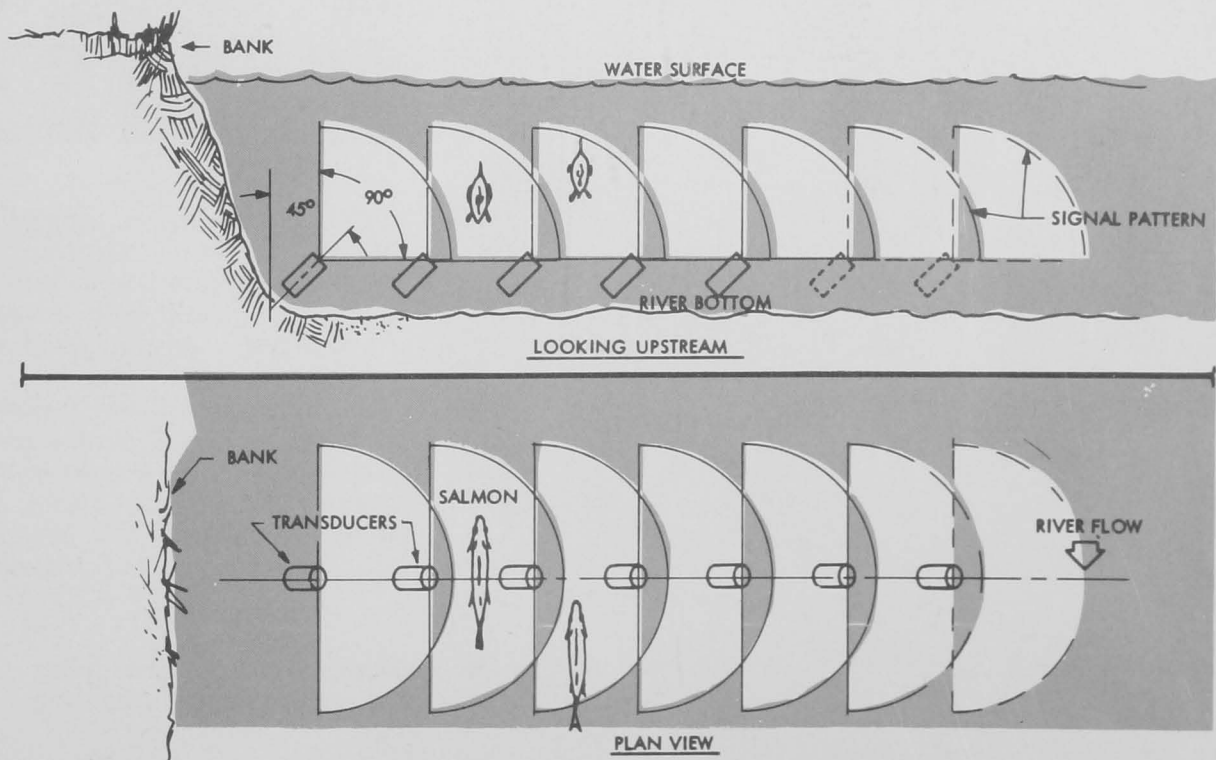


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A project dealing with experimental rearing of steelhead trout is providing valuable information on the development of new techniques for maintaining this valuable species in the Columbia River system.



Sonar equipment for counting salmon migrations is in an advanced stage of development. Sonar will be especially useful in silt-laden streams where it has been impossible to see and count salmon accurately. Scientists and industry will find this equipment most valuable in determining the size of salmon stocks. Further development will make it possible to record the number of salmon migrating past a certain point and to have those data in a form that can be quickly evaluated by computers. The equipment tested to date has an accuracy of 94 percent as compared with visual counts.

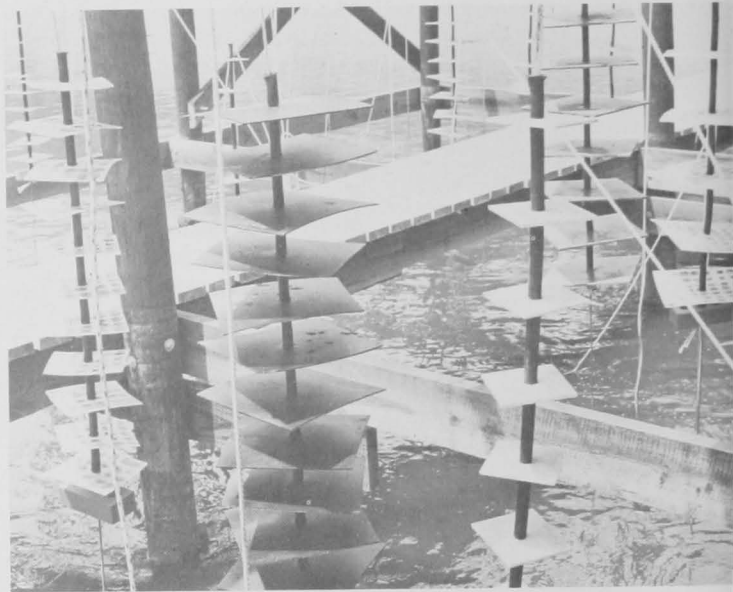




SHELLFISHERIES

An important oyster management practice is to plant shells for the collection of oyster spat. P. L. 88-309 funds have made it possible to purchase and plant 19 million bushels of shells on public oyster grounds and to create new oyster reefs in six Middle Atlantic and Gulf States.

Research continues on other methods of oyster culture. Included are projects dealing with development of artificial cultch to replace natural shells and with raft culture under semi-controlled environments.



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Progress is being made toward solving the problem of pollution on oyster grounds. Investigations are being made on polluting organisms, self-cleansing of oysters, and transplanting of oysters to clean waters.

P. L. 88-309 funds were used to locate new sources of Asiatic seed oysters upon which a profitable Pacific Coast oyster industry depends.



Culture of shrimp under controlled conditions is being developed further so that it may be possible to supplement natural production. (top right)

In the Gulf of Mexico, South Atlantic, North Atlantic, Pacific Northwest, and Alaska, studies of productive shrimping grounds are being made and biological data needed to manage the resource are being obtained. (top left)

The king crab fishery has expanded rapidly in the past 10 years — from 9 million pounds in 1956 to 159 million pounds in 1966. Biologists are seeking to locate inshore and oceanic breeding grounds so that regulations can be developed to protect mating king crabs.





INLAND FISHERIES

In inland areas the States are more aware of their commercial fishery resources and are starting new research and development projects to improve their fisheries. Prior to P. L. 88-309, not all conservation departments in inland States had commercial fishery functions, but since the program began, many have added new commercial fishery divisions or sections.

Research on population dynamics of fish is being emphasized. This research is aimed at determining the best population size for optimum yields. Once an optimum population level is established, commercial fisheries can adjust their fishing to take the desired annual crop. Many stunted fish populations will be improved for the benefit of sport fishermen.

Aquaculture in the Midwest is profiting from a university study on developing new high-energy feeds for the rapidly expanding channel catfish farming industry which supplies fresh fish for the market and live fish for the growing pay-as-you-fish ponds.



OTHER AQUATIC RESOURCES —

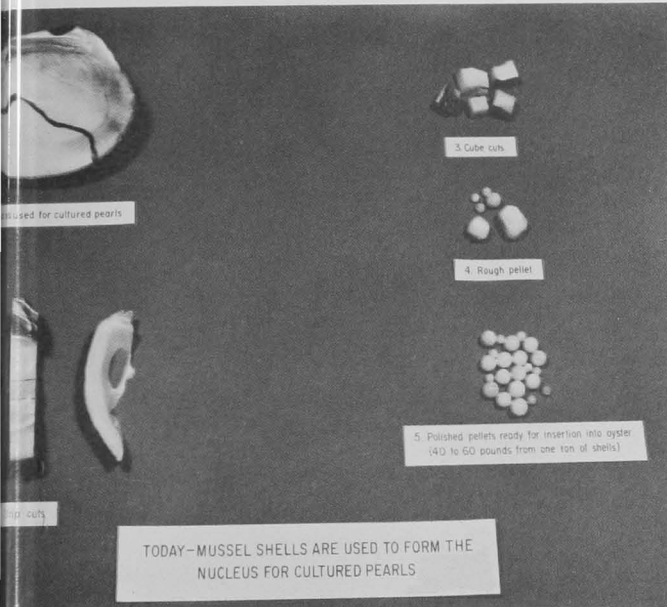
Investigations of fresh-water mussels in four Midwest States are providing basic knowledge for conservation of this resource which produces more than 40 million pounds of shells used as the nuclei for artificial pearls. Harvesting regulations are being formulated and adopted on the basis of research to date.

Biological and technological investigation of a marine worm fishery, totaling over a million pounds annually, is being carried out to assure a supply of bait for recreational fishermen.

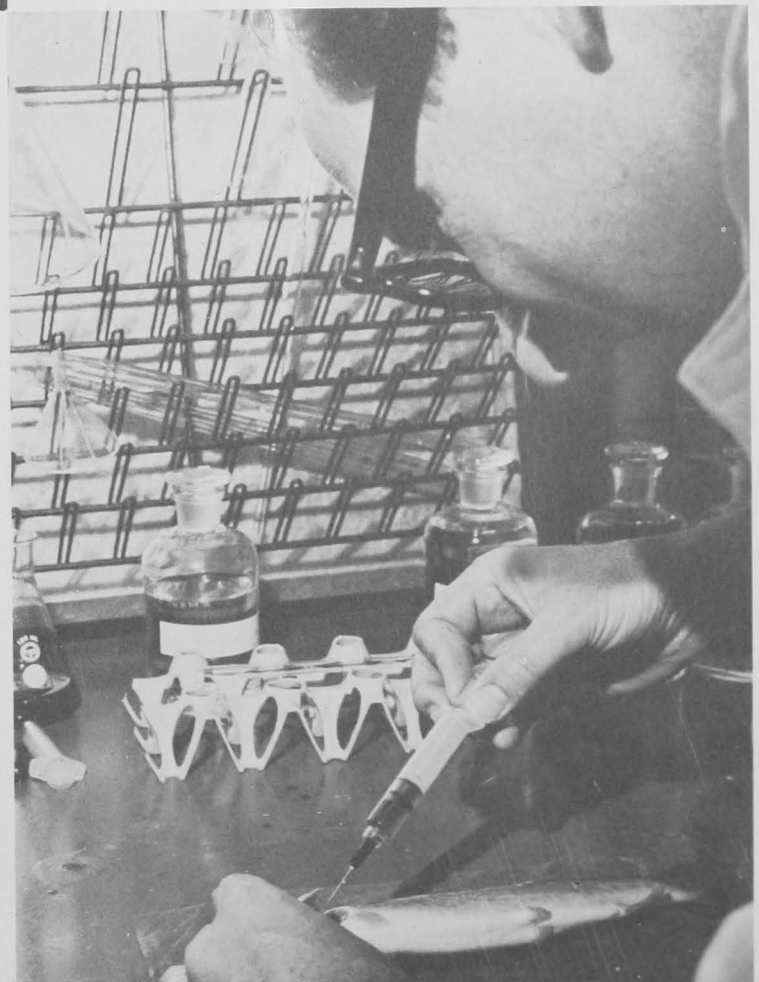
A western university investigation to develop new hereditary strains of rainbow trout in commercial trout rearing ponds will also provide spin-off benefits to the recreational fishery.

A study is underway to provide information on commercial propagation of a hardy bait minnow that can be used in an expanding recreational fishery in the Rocky Mountain States.

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PRESERVING THE HABITAT

There is a need to resolve problems caused by man's encroachment on estuarine areas. Dredging, filling, draining, and polluting have altered the habitat seriously. Although necessary and desirable for man's other uses, the estuary is critically important to a large group of fish and shellfish species, particularly when they are very young. Unless protection is provided by regulations based on sound scientific research, these fishery resources may be damaged irreparably.

P. L. 88-309 projects for estuarine research are urgent and can be most rewarding in areas readily altered by man.



tory is providing for the collection and compilation of information that can be used in an atlas and a film showing the importance of estuaries for both commercial and recreational uses. The study has four phases: area description, hydrology, biology, and sedimentology. This cooperative study and motion picture involve the five Gulf Coast States and the Bureau of Commercial Fisheries.

A large-scale estuarine investigation of the James River estuary has been completed. Field studies and the use of a model of the estuary have led to valuable new knowledge on the physical structure and dynamics of a horizontally-stratified estuary and the movement and setting of oyster larvae.

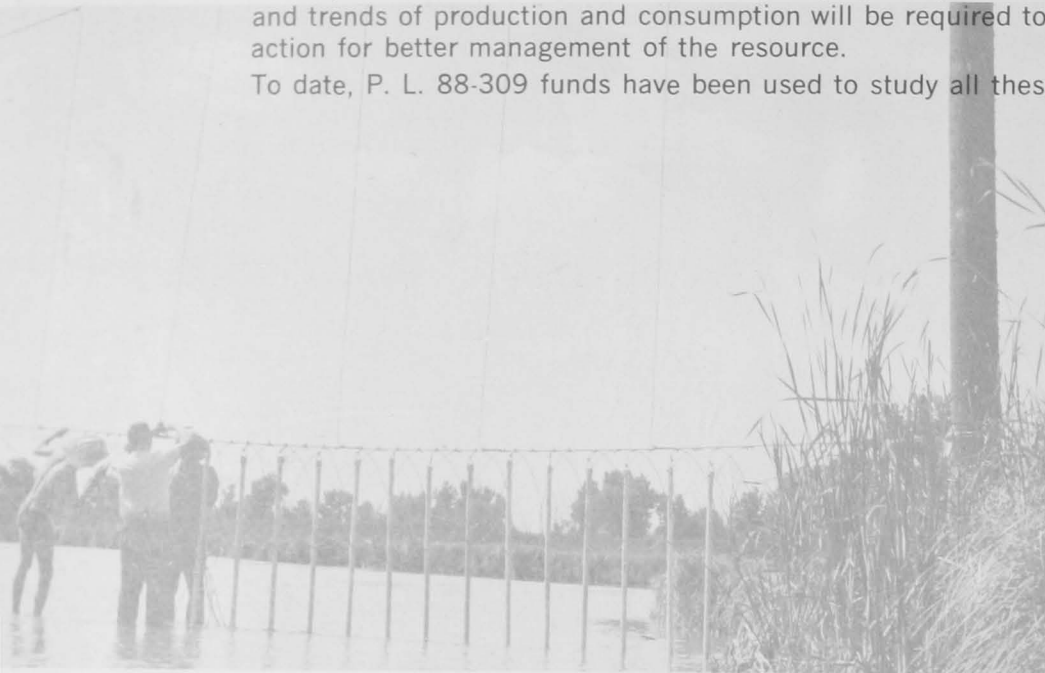
Equally important estuarine studies are being made in the Gulf of Maine, the Mid-Atlantic, and Chesapeake Bay.



ENCOURAGING OPTIMUM USE

Certain problems must be solved before the resources become producing assets. Quality improvement, new processing techniques and mechanization, product development with emphasis on underutilized species, and problems of storage and transportation must be solved. Products will require continuing introduction to consumers through market promotion. New resources must be located and more efficient harvesting gear and methods must be developed. Economics research on fishery employment, investments and returns, and trends of production and consumption will be required to plan a course of action for better management of the resource.

To date, P. L. 88-309 funds have been used to study all these problems.



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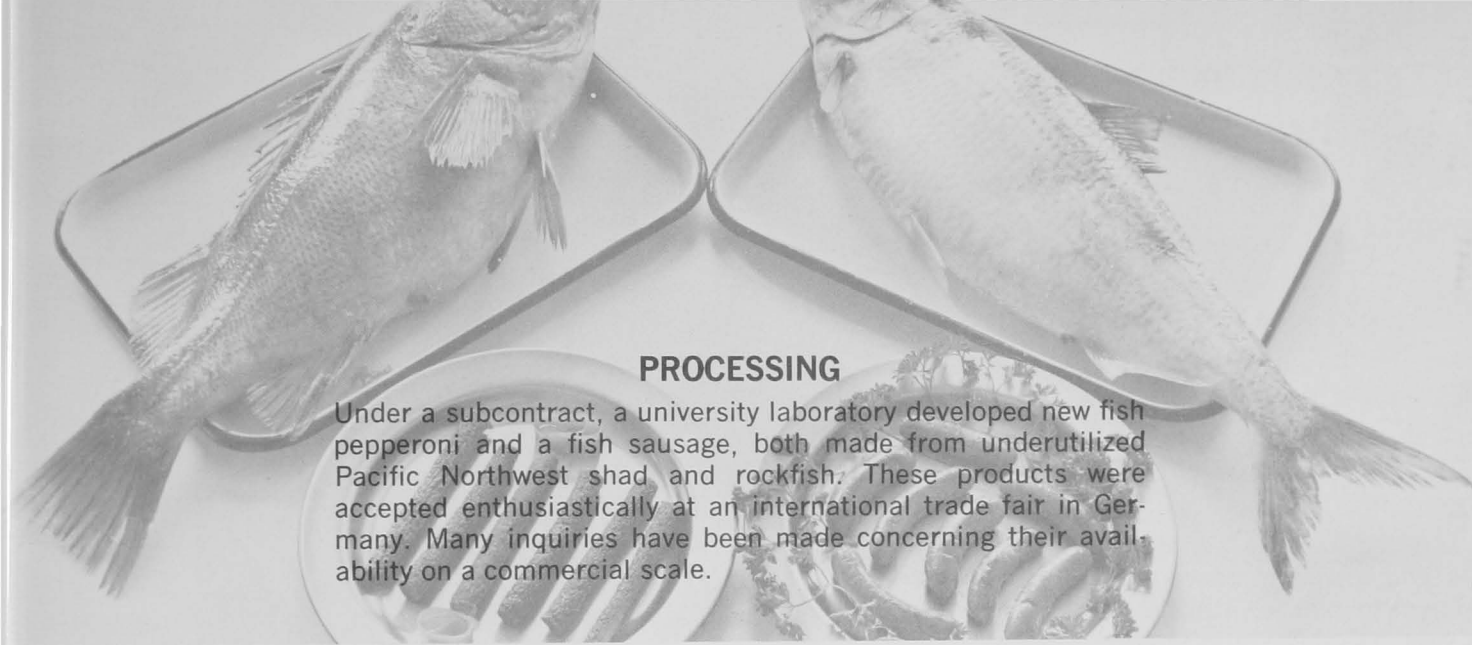
Other significant accomplishments include use of sonar to locate fish schools under ice in lakes and development of a complex electrical apparatus to study and harvest fish in reservoirs and rivers.



EXPLORATION AND HARVESTING

P. L. 88-309 funds have made possible acquisition of vessels and personnel for exploratory fishing that benefits local fishermen in the Virgin Islands, Puerto Rico, Guam, and American Samoa.

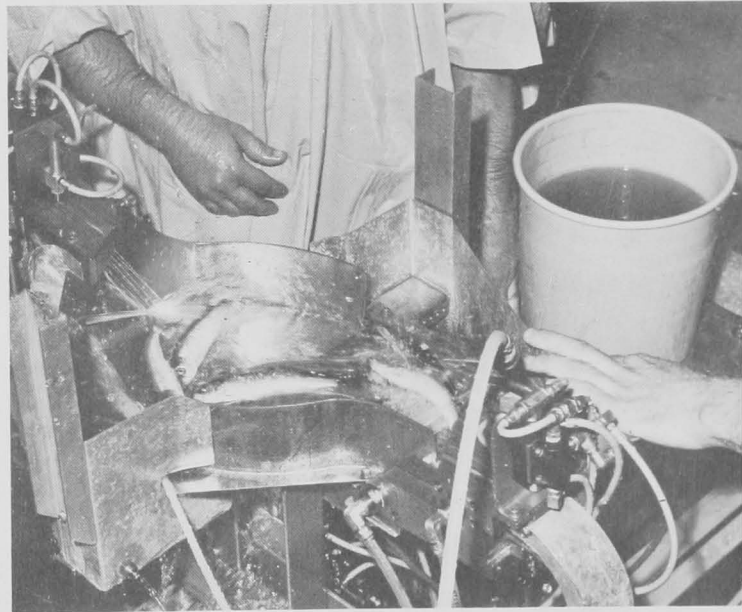
In Guam, species of edible fish formerly rarely seen are being landed regularly by a new exploratory vessel purchased with P. L. 88-309 funds. Especially abundant are several species of deep-sea snappers and groupers.



PROCESSING

Under a subcontract, a university laboratory developed new fish pepperoni and a fish sausage, both made from underutilized Pacific Northwest shad and rockfish. These products were accepted enthusiastically at an international trade fair in Germany. Many inquiries have been made concerning their availability on a commercial scale.

P. L. 88-309 funds have been used to support a project dealing with mechanization of the Maine sardine industry. A private research and development corporation has completed its study of industry problems and has shown that mechanization is feasible. As a continuing segment of the project, prototype equipment has been built and is being tested under actual production conditions.



Four on-going projects involve development and evaluation of fish protein supplements made from fresh-water and marine species and used as feed for poultry, swine, and mink.



Projects on marketing of seafoods at wholesale, retail, institutional, and consumer levels have been started in seven States. Bureau marketing staffs and industry are cooperating to ensure maximum impact from these projects. Industry has cooperated in four projects by providing State-matching funds either by direct contribution or by supporting State legislation for additional tax money specifically earmarked for marketing. Major emphasis is on fishery products from the Gulf of Mexico, South Atlantic, Chesapeake Bay, and North Atlantic areas.

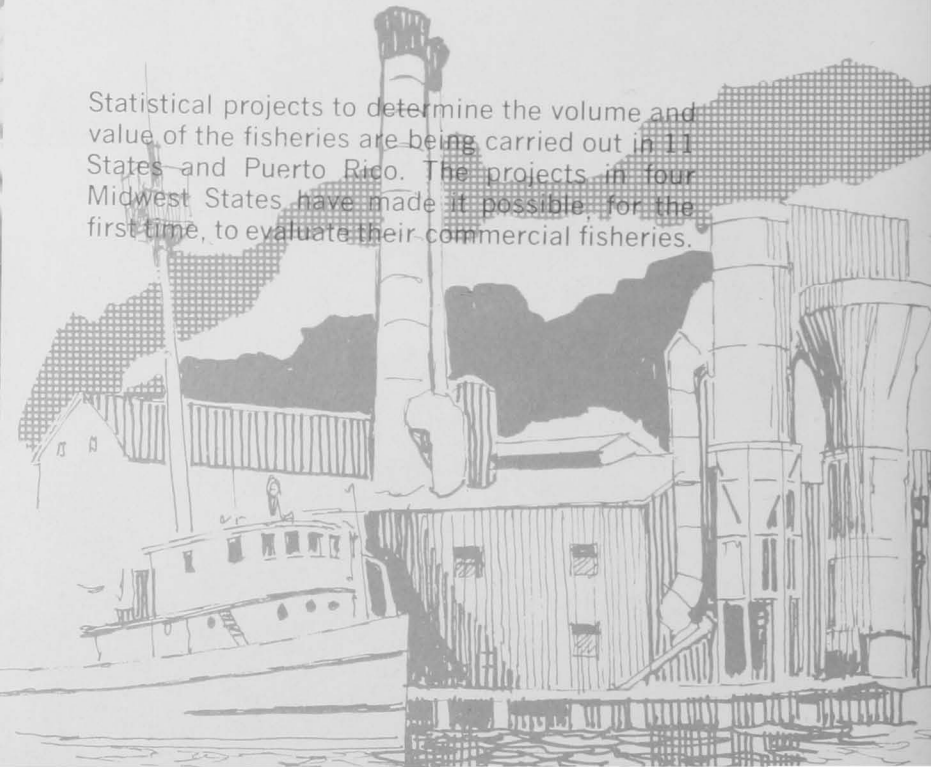
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Economics studies in five States are producing facts on production, processing, and distribution that will help industry make management decisions and will provide for establishment of research and development priorities.

Statistical projects to determine the volume and value of the fisheries are being carried out in 11 States and Puerto Rico. The projects in four Midwest States have made it possible, for the first time, to evaluate their commercial fisheries.



**IMPROVING
STATE
CAPABILITIES**



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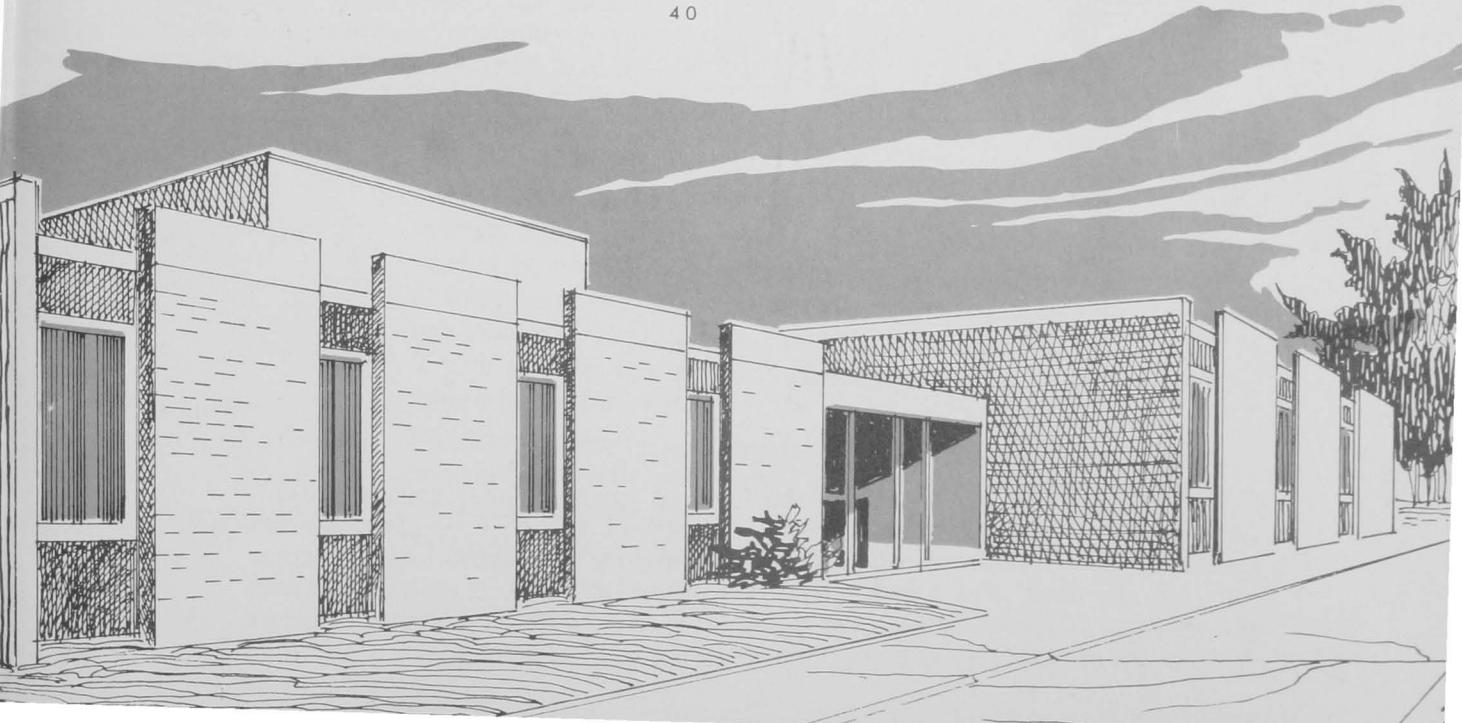
A major objective of P. L. 88-309 is to improve the capabilities of State fishery agencies in more effectively carrying out their responsibilities for resource management. These agencies need to acquire and maintain vessels, laboratories, and other research facilities, and to recruit and retain qualified personnel. Substantial progress has been made.

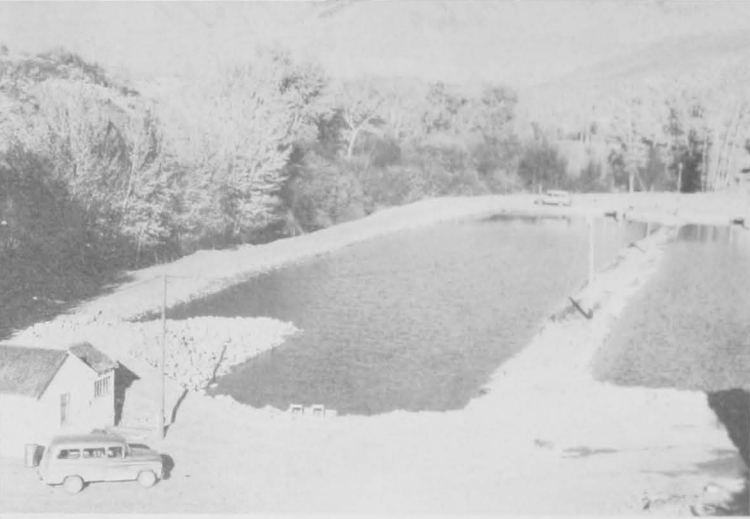


Four vessels designed for investigating fish and shellfish resources have been constructed or acquired in two States, and Guam, and American Samoa. Two other States are acquiring research vessels.

Research laboratory construction has been approved in six States and Puerto Rico. One major State laboratory has been renovated with P. L. 88-309 funds.

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Other completed projects include construction and renovation of fish and shellfish rearing facilities in three States.

P. L. 88-309 funds have financed substantial capital investment in scientific instruments and other equipment needed in research and development projects.



Perhaps the most important problem for State fishery research and development is to recruit and retain qualified staffs. As a result of P. L. 88-309, the States have hired more than 135 new professional and technical personnel specifically for Federal Act projects. State personnel have been shifted to staff some P. L. 88-309 projects. These diversions have resulted in employment of new personnel to fill the vacancies created in non-P. L. 88-309 activities.

In addition to the new personnel hired, many skilled individuals work under subcontracts with educational institutions. Research and development are being performed in specialized fields beyond the capabilities of State fishery agencies. To date, 44 projects are being conducted under subcontract with educational institutions. Furthermore, use of university staffs and graduate students is developing a reservoir of trained personnel to meet continued needs for staffing public and private sectors of the Nation's fisheries.

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COORDINATION

Public Law 88-309 research and development projects are substantial components of the overall commercial fishery programs of the States. They require careful planning and competent direction. Engineering, accounting, procurement of equipment and supplies, and review and reporting of work in progress are necessary. Several States with extensive P. L. 88-309 programs have incorporated these functions into coordination projects.



Section 4(b) of P. L. 88-309 provides funds to assist a commercial fishery when it has a failure due to a resource disaster caused by natural or undetermined factors. After the Secretary of the Interior has determined that a commercial fishery failure has occurred, these funds can be used to restore the affected fishery and for research and development to prevent a similar failure in the future.

In general, resource disaster funds are used to start emergency programs, usually short-term, to assist recovery of a fishery struck by a sudden disaster.

To date, resource disaster funds have been used four times.

CRISIS IN THE SMOKED FISH INDUSTRY

In October 1964, a commercial fishery failure followed reports of bacterial contamination in Great Lakes smoked fish. As a result of this crisis, consumers lost confidence in smoked fish, and producers and processors were at a standstill because their cold storage plants had large quantities of frozen Great Lakes chubs no longer fit for human consumption. After it was established that a commercial fishery failure had occurred, \$282,000 was used to purchase the chubs held in cold storage. About 2 million pounds of these frozen chubs in several States were removed from trade channels, permitting the industry to resume production and processing of fresh supplies. An additional \$118,000 was made available to four Midwest States for microbiological research and monitoring designed to prevent a similar disaster in the future. The industry now is smoking about as many chubs as before the disaster. Research begun with resource disaster funds is continuing under State financing and has contributed to development of new guidelines for smoked fish processing and sanitation standards by State food regulatory agencies, and to improving the economic position of this industry.

HURRICANE DAMAGES —

Hurricane "Betsy," which struck the Louisiana coastline with full force in September 1965, did extensive damage to a valuable oyster resource. A layer of silt, grass, and other debris covered the oyster grounds. Under these conditions, a supply of seed oysters the following year and in succeeding years would not be available to maintain a commercial fishery. Use of \$100,000 of resource disaster funds provided for restoration of the fishery by planting great quantities of shell material for oyster cultch. Federal funds, supplemented by State monies, were used to plant 36,000 cubic yards of shell on 1,100 acres of public oyster grounds. Follow-up inspections showed that oyster spat set successfully on 69 percent of the planted shells. State funds being used for additional plantings of shells are assuring recovery of an industry that provides a livelihood for hundreds of Americans.





SEED OYSTER FAILURE

Southern New England and New York were faced with a serious problem of keeping alive a valuable seed oyster industry which had been suffering from low and declining production for several years from a combination of natural and undetermined causes. Finally, in 1965, for the first time in the 85-year history of the industry, there was no natural set of seed oysters and a failure of the fishery was evident.

Resource disaster funds in the amount of \$200,000 were made available to the State of Connecticut in June, 1966, and a cooperative State-Bureau-industry project was immediately started to restore the fishery. The magnitude and seasonal nature of work required made it necessary to conduct the project for two years — 1966 and 1967.

This project had as its primary goal the commercial setting of oysters through establishment of protected spawning beds and spawning tray-racks of adult oysters at numerous estuarine locations along the Southern New England coast. Although the project work was carried out primarily by the State agency, the Bureau provided scientific knowledge developed through many years of basic research and assisted in monitoring project results. Industry fully cooperated by planting cultch in and near project areas to enhance setting of spat and by providing protection to seed oysters.

Monitoring results suggest that this effort has contributed to the extremely successful set of oyster spat in 1966 — the first general commercial set on these oyster grounds since 1958. The 1967 set was not as abundant as 1966. However, a highly successful set is not required each year to maintain a seed oyster resource at an acceptable level.

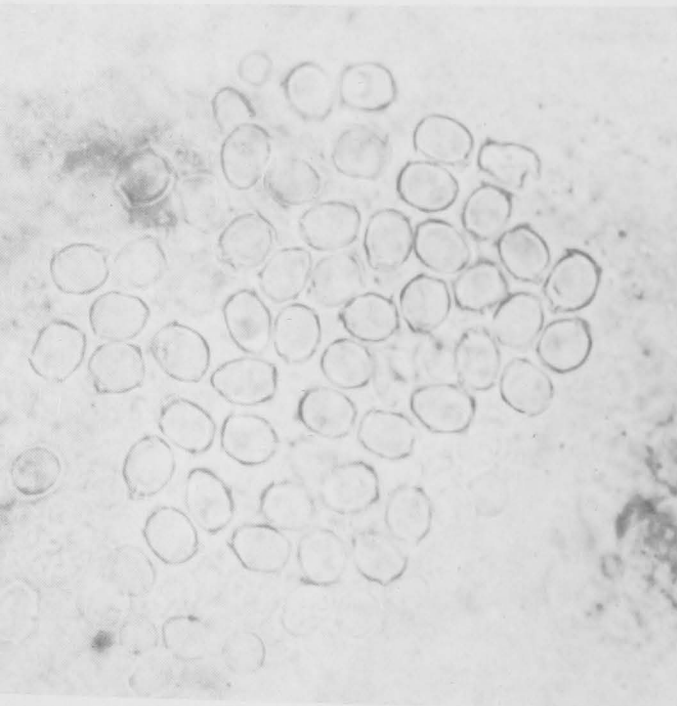
This project is considered the largest applied effort ever undertaken to reproduce seed oysters under natural conditions for rehabilitation of oyster seed grounds. It represents a significant step forward in putting to practical use knowledge resulting from basic research. It may well serve as a demonstration of man's ability to farm the sea for an important aquatic species by manipulation of biological processes to enhance commercial production.

The commercial success of this project will obviously depend on the extent to which industry can manage the oyster set until it reaches harvestable size.



DISEASE RELATED OYSTER MORTALITIES —

A tiny parasitic organism formerly identified as MSX and now named **Minchinia nelsoni** was first noted in oysters in 1957. It has caused many millions of dollars in damage to the oyster industry in Delaware and Chesapeake Bays. In 1965, use of Section 4(b) funds was authorized to continue research on oyster mortalities previously funded under other legislation, and \$100,000 in each of fiscal years 1966 and 1967 was made available to the States of New Jersey, Delaware, Maryland, and Virginia to carry out studies related to this pest. The major emphasis of these studies has been to develop disease resistant oysters — a course of action that offers the quickest possibility for rehabilitating the industry.



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Selected stocks of healthy oysters have been placed where there is MSX. Those that survive are considered resistant and are used as breeding stock to provide additional seed oysters. Since selection of disease resistant stocks over a period of several generations is required, these experiments must continue for several years. Accordingly, commencing in fiscal year 1968, this program will be funded under Section 4(a) of the Act.

Concurrent studies of the MSX organism and its method of transmission will be carried out in an attempt to find means of control.

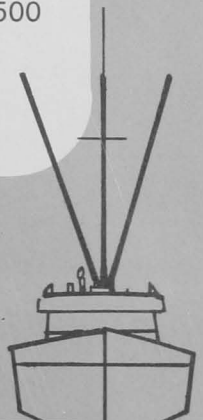
FUNDING THE PROGRAM

| | 1965 | 1966 | 1967 | 1968 | TOTAL |
|-------------------------------------|------------------|--------------------|--------------------|--------------------|---------------------|
| States [Section 4(a)] | \$ 0 | \$4,100,000 | \$4,100,000 | \$4,100,000 | \$12,300,000 |
| Natural disasters [Section 4(b)] | 400,000 | 400,000 | 400,000 | 400,000 | 1,600,000 |
| Commercial fisheries [Section 4(c)] | 0 | 0 | 0 | 0 | 0 |
| Total Funds Appropriated | \$400,000 | \$4,500,000 | \$4,500,000 | \$4,500,000 | \$13,900,000 |

FUNDS APPORTIONED TO THE STATES FISCAL YEARS 1966-1967-1968

| | | | |
|---------------|-----------|----------------|-----------|
| ALABAMA | \$128,200 | NEVADA | \$ 61,500 |
| ALASKA | 738,000 | NEW HAMPSHIRE | 61,500 |
| ARIZONA | 61,500 | NEW JERSEY | 475,000 |
| ARKANSAS | 61,500 | NEW MEXICO | 61,500 |
| CALIFORNIA | 738,000 | NEW YORK | 536,900 |
| COLORADO | 61,500 | NORTH CAROLINA | 164,000 |
| CONNECTICUT | 61,500 | NORTH DAKOTA | 61,500 |
| DELAWARE | 89,000 | OHIO | 148,400 |
| FLORIDA | 738,000 | OKLAHOMA | 61,500 |
| GEORGIA | 277,600 | OREGON | 366,000 |
| HAWAII | 101,800 | PENNSYLVANIA | 156,100 |
| IDAHO | 61,500 | RHODE ISLAND | 78,100 |
| ILLINOIS | 70,700 | SOUTH CAROLINA | 65,800 |
| INDIANA | 61,500 | SOUTH DAKOTA | 61,500 |
| IOWA | 61,500 | TENNESSEE | 61,500 |
| KANSAS | 61,500 | TEXAS | 738,000 |
| KENTUCKY | 61,500 | UTAH | 61,500 |
| LOUISIANA | 738,000 | VERMONT | 61,500 |
| MAINE | 630,300 | VIRGINIA | 531,400 |
| MARYLAND | 527,700 | WASHINGTON | 640,400 |
| MASSACHUSETTS | 738,000 | WEST VIRGINIA | 61,500 |
| MICHIGAN | 67,400 | WISCONSIN | 61,500 |
| MINNESOTA | 61,500 | WYOMING | 61,500 |
| MISSISSIPPI | 367,200 | AMERICAN SAMOA | 163,900 |
| MISSOURI | 61,500 | GUAM | 61,500 |
| MONTANA | 61,500 | PUERTO RICO | 625,600 |
| NEBRASKA | 61,500 | VIRGIN ISLANDS | 61,500 |

TOTAL [Section 4(a)] \$12,300,000



EXTENDING RESULTS

Results of research and development that are not reported are likely to be lost to both the scientific community and to those whose economic well-being is involved. Accordingly, the P. L. 88-309 program strongly encourages timely dissemination of the findings of research and development through published reports and extension projects.

The program to date has produced many publications, technical and semi-popular.

In addition, three States have begun extension projects in cooperation with the fishing industry.

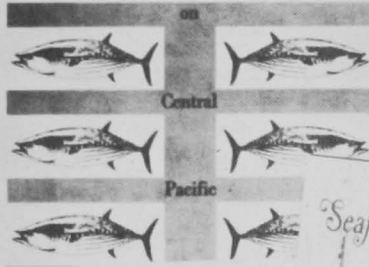


DYNATECH CORPORATION

FEASIBILITY OF AUTOMATING BARKER CANVING

Report No. 474
Prepared by
J. L. West

Proceedings of The Governor's Conference



Informational Leaflet 100

FORECAST RESEARCH ON 1967 KODIAK AREA
PINK SALMON FISHERIES

PRELIMINARY SURVEY OF A POTENTIAL HARD CLAM FISHERY



MARINE FISHERIES DIVISION
GEORGIA GAME AND FISH COMMISSION

CHESAPEAKE

BAY AFFAIRS

COMMERCIAL FISHERIES NEWS
Chesapeake Bay Fisheries Receive Federal Aid
For Research and Development Studies and Pro-
gramming

Seafoods in Seaports



...a cook's tour
of Massachusetts

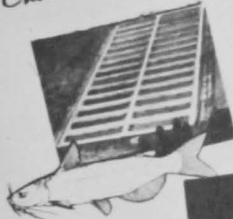


PRELIMINARY STUDY OF THE GEORGIA COMMERCIAL SHRIMP



MARINE FISHERIES DIVISION
GEORGIA GAME AND FISH COMMISSION

Production of Channel Catfish



AGRICULTURAL EXPERIMENT
STATION

MIGRATION AND GROWTH OF COMMERCIAL PENAEID SHRIMPS IN NORTH CAROLINA



Field Test Report Of Array Sonar Salmon Counter

Bendix
Electrodynamics
Division

LOUISIANA Conservationist

LOUISIANA WILD LIFE AND FISHERIES COMMISSION

ALASKA CATCH AND PRODUCTION COMMERCIAL FISHERIES STATISTICS 1966



TOTAL FISHERY VALUE
\$157,296,767



COMPARATIVE TESTING OF MIDWATER RIGS ON SMALL DRAGGERS

DEPARTMENT OF FISH AND
RESOURCE ECONOMICS
COLLEGE OF AGRICULTURE
UNIVERSITY OF RHODE ISLAND

SHELL PLANTING FOR OYSTER CULTCH CONTINUED IN 1967

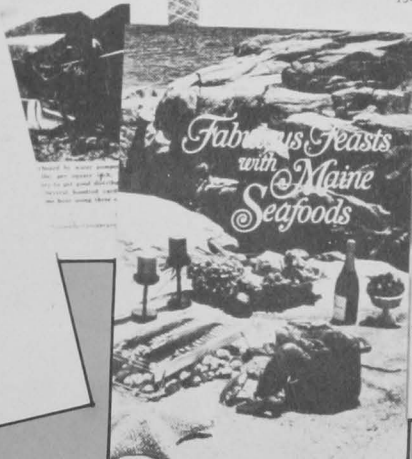
Max Summers



POTENTIAL SOURCES OF PACIFIC OYSTER SEED IN KOREA AND TAIWAN

State of Washington
DEPARTMENT OF FISHERIES
Research Division

LENGTH-FREQUENCY AND AGE-LENGTH-FREQUENCY DISTRIBUTIONS FOR DOVER SOLE, ENGLISH SOLE, PETRALE SOLE, AND PACIFIC OCEAN PERCH LANDED IN OREGON 1948-65



Fabulous Feasts with Maine Seafoods

Cedric E. Lindsay
Assistant Chief of Fisheries
Research and Management



PROVIDING THE BASIS FOR WISE UTILIZATION

Today, many harvesting regulations are major barriers to a viable commercial fishing industry. The establishment and enforcement of such regulations are largely each State's prerogative and problem. Modification will be achieved only after clear demonstration of inefficiencies that result in a waste of the resource. Many practices will persist until replaced through acquisition of knowledge from well-designed and adequately funded research programs.

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State research programs funded under P. L. 88-309 should result in more rapid accumulation and extension of that knowledge and hasten establishment of regulations for more efficient and rational use of marine finfish, shellfish, fresh-water species, and other living aquatic resources. New biological and management techniques from many States will have value to other States and to the Bureau.



- 1 Iowa State Conservation Commission. Project 4-11-R
- 2 Robert Brigham, BCF
- 3 U.S. Department of Agriculture
- 4 Robert Brigham, BCF
- 5 Kenneth G. Ollar, **National Fisherman**
- 6 BCF, Seattle
- 7 Hawaii Department of Land and Natural Resources.
Project H-10-R
- 8 Kentucky Department of Fish and Wildlife Resources.
Project 4-19-R
- 9 Alaska Department of Fish and Game. Project 5-11-R
- 10 Robert Brigham, BCF
- 11 BCF, Biological Laboratory, Ann Arbor, Mich.
- 12 Alaska Department of Fish and Game. Project 5-6-R
- 13 Idaho Fish and Game Department. Project 1-1-D
- 14 Alaska Department of Fish and Game. Project 5-4-R
- 15 New Jersey Department of Conservation and Economic
Development. Project 3-1-D
- 16 North Carolina Division of Commercial and Sport Fisheries.
Project 2-6-R
- 17 BCF, Milford, Conn.
- 18 Alaska Department of Fish and Game
- 19 North Carolina Division of Commercial and Sport Fisheries.
Project 2-26-R
- 20 Wayne Sydnan, Kodiak, Alaska
- 21 Indiana Department of Conservation. Project 4-16-R
- 22 Kentucky Department of Fish and Wildlife Resources.
Project 4-27-R
- 23 Kansas Forestry, Fish, and Game Commission. Project 4-1-R
- 24 Illinois Department of Conservation. Project 4-13-R
- 25 Maine Department of Sea and Shore Fisheries. Project 3-17-D
- 26 Utah Department of Fish and Game. Project 6-10-R
- 27 BCF, Milford, Conn.
- 28 Mississippi Marine Conservation Commission. Project 2-25-R
- 29 Virginia Commission of Fisheries. Project 3-7-R
- 30 Hugh Gambill, Ocean Springs, Miss.
- 31 Nebraska Game, Forestation and Parks Commission.
Project 4-17-D
- 32 Government of Guam. Project H-7-D
- 33 Puerto Rico Department of Agriculture. Project 2-39-R
- 34 Oregon Fish Commission. Project 1-10-D
- 35 Maine Department of Sea and Shore Fisheries. Project 3-17-D
- 36 Ohio Department of Natural Resources. Project 4-26-R
- 37 Florida Board of Conservation. Project 2-11-D
- 38 California Department of Fish and Game. Project 6-6-D
- 39 Texas Parks and Wildlife Department. Project 2-13-C
- 40 Montana Fish and Game Department. Project 1-20-C
- 41 New York Conservation Department. Project 3-10-C
- 42 Idaho Fish and Game Department. Project 1-9-C
- 43 Colorado Game, Fish, and Parks Department. Project 6-2-D
- 44 Massachusetts Department of Natural Resources. Project 3-35-R
- 45 Robert Brigham, BCF
- 46 Albert J. Tullier, Jr., New Orleans, La.
- 47 Connecticut State Board of Fisheries and Game. Project 3-51-D
- 48 BCF, Oxford, Md.
- 49 Maine Department of Sea and Shore Fisheries. Project 3-13-D
- 50 **Chicago Tribune**
- 51 Kentucky Department of Fish and Wildlife Resources.
Project 4-27-R
- 52 Robert Brigham, BCF
- 53 La. Wildlife and Fisheries Commission. Project 2-23-D

LIFE & FISHERIES
OYSTER LEASE
CONTROL MARKERS



Created in 1849, the Department of the Interior--a department of conservation--is concerned with the management, conservation, and development of the Nation's water, fish, wildlife, mineral, forest, and park and recreational resources. It also has major responsibilities for Indian and Territorial affairs.

As the Nation's principal conservation agency, the Department works to assure that nonrenewable resources are developed and used wisely, that park and recreational resources are conserved for the future, and that renewable resources make their full contribution to the progress, prosperity, and security of the United States--now and in the future.



UNITED STATES
DEPARTMENT OF THE INTERIOR
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**REPORT OF THE BUREAU OF COMMERCIAL
FISHERIES BIOLOGICAL LABORATORY,
BEAUFORT, N.C.**

For the Fiscal Year Ending June 30, 1967



**UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES**

Circular 287