

**FLORIDA DEPARTMENT OF NATURAL RESOURCES
DIVISION OF MARINE RESOURCES**

**CURRENT RESEARCH
OF THE
BUREAU OF MARINE SCIENCE & TECHNOLOGY
MARINE RESEARCH LABORATORY**

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FLORIDA DEPARTMENT OF NATURAL RESOURCES

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BUREAUS
BEACHES AND SHORES
MARINE SCIENCE AND TECHNOLOGY
SALT WATER FISHERIES

This public document was promulgated at an annual cost of \$640.00 or \$.12 per copy to make research results and marine resources information available to scientists and the public.

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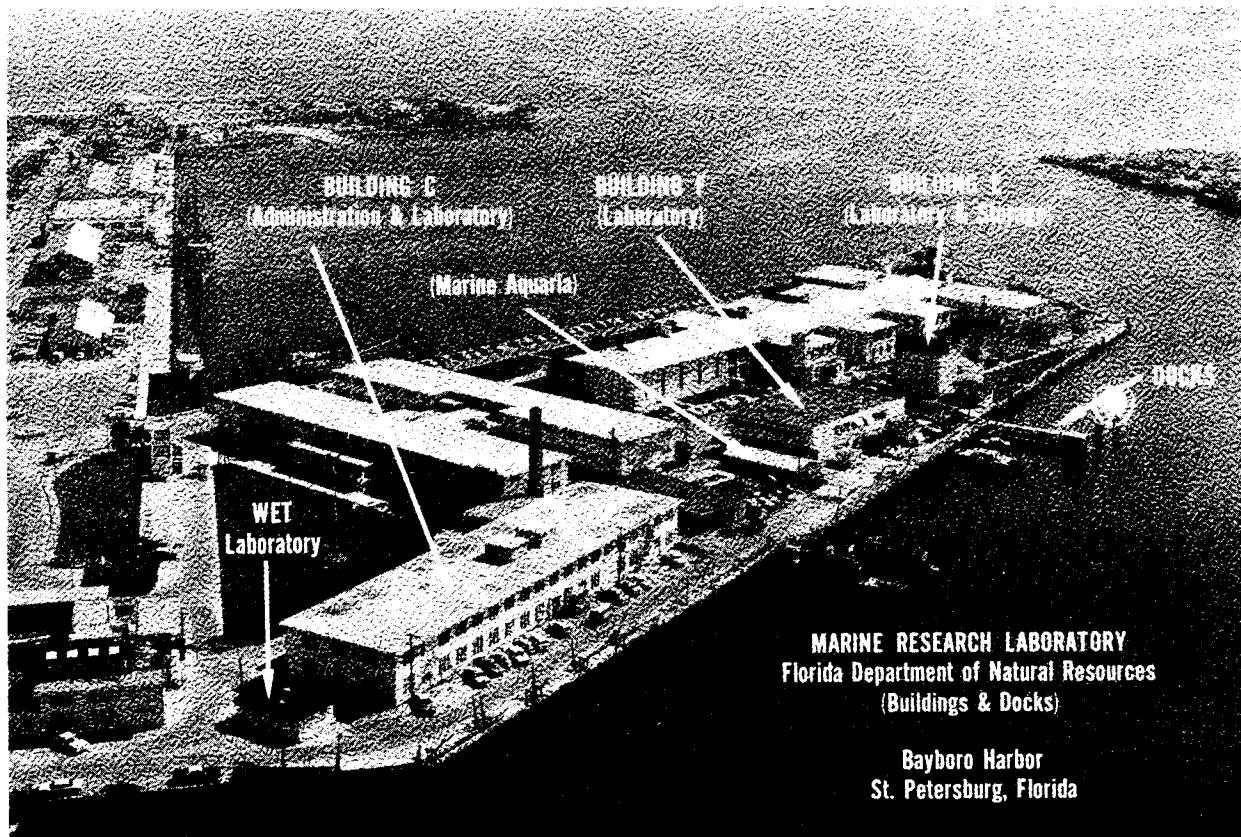
D. S. Beaumariage
Laboratory Supervisor

and

E. A. Joyce, Jr.
Bureau Chief

INTRODUCTION

The Florida Department of Natural Resources supports one of the most diversified marine research programs in the United States. It is also the largest Florida organization exclusively conducting full-time research. The program began originally in 1949 in Apalachicola where investigations are still being carried out. The St. Petersburg Laboratory was founded in 1955 with a total budget of \$15,000 and employed one biologist and one laboratory technician. Since that time the staff has grown to over fifty biologists and technicians and an appreciable number of supporting employees. In 1969 the Bureau of Marine Science and Technology was formed within the Division of Marine Resources. The Bureau's total operating budget is currently just over a million dollars per year with salaries accounting for almost half of that figure.



Buildings and Grounds

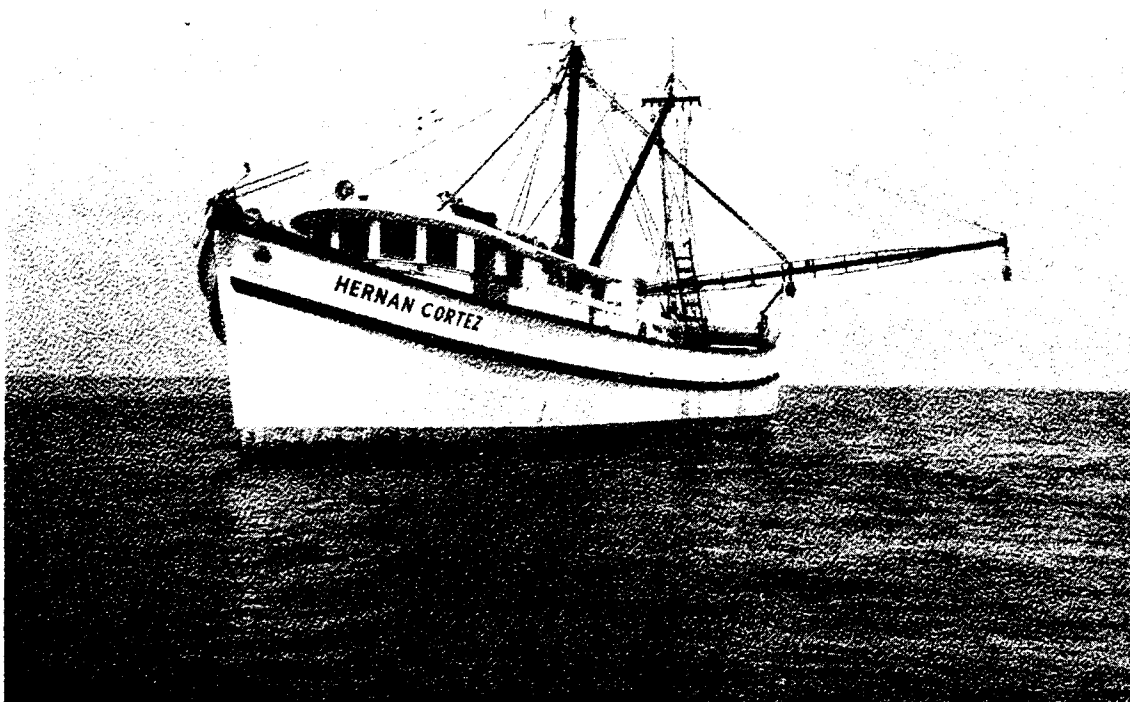
The main Laboratory, with its excellent deepwater harbor facilities, is ideally located on Bayboro Harbor at 100 Eighth Avenue S.E., St. Petersburg, Florida, less than a two-minute drive from the center of one of the most rapidly growing metropolitan areas in Florida. Adjacent to the Laboratory is a small, busy airport frequently used by visitors and DNR planes. The U.S. Coast Guard Air and Rescue Station, which operates helicopters, fixed-wing aircraft, and patrol vessels, is also located in this complex.

The Laboratory now occupies three large two-story buildings and several smaller structures with a combined floor area of over 50,000 square feet. Building C houses the administration and clerical sections, the mariculture wet laboratories, and projects related to red tide, water chemistry, and pathology. Building F, a relatively fireproof concrete structure, houses such irreplaceable assets as the fish and invertebrate reference collections, library and reprint facilities, archives, plankton and other specimen collections. Building E, a large three-story wooden building, provides much needed laboratory and office space while also serving as a warehouse for bulky research equipment and gear.

In addition to these main buildings, the Marine Laboratory has many smaller facilities. Two large enclosed circular concrete saltwater tanks are being used for production assessment studies generally relating to mariculture (commercial rearing of marine species). A medium sized one-story concrete building located just north of Building C also serves as a wet laboratory. Four large walk-in freezers are located just south of Building F and provide freezing and refrigeration for use by all projects. Other facilities include a storage building for gasoline and other flammables, dockage facilities for our research vessels, and staff and visitor parking areas.

Research Vessels

The major research vessel of the Marine Laboratory is the R/V *Hernan Cortez*, a modified 72-foot St. Augustine shrimp trawler. This vessel was donated to the Marine Laboratory in 1964, specifically for use in marine research, by Mr. L. C. Ringhaver of Diesel Engine Sales Company in St. Augustine, Florida. The R/V *Hernan Cortez* was the 1100th shrimp boat produced by this company, now a subsidiary of the Whittaker Corporation.



Less than a half-dozen smaller boats (16-21 foot range) equipped with outboard engines are also utilized by Laboratory personnel. These vessels are of sufficient power to obtain samples several miles offshore with safety and yet are kept on trailers ready for use anywhere in Florida. Over a dozen motor vehicles are also maintained by the Laboratory.

Field Laboratories

A centrally located main laboratory, housing the entire staff, is considered the ideal. However, some situations require permanent assignment of personnel to selected areas to allow continual assessment of unique problems. Consequently, six field stations are dispersed throughout Florida at West Palm Beach, Jensen Beach, Port Canaveral, Sanford, Apalachicola, and Pensacola. Research under way at each facility is described in the appropriate section.

CURRENT RESEARCH

FISHERY BIOLOGY

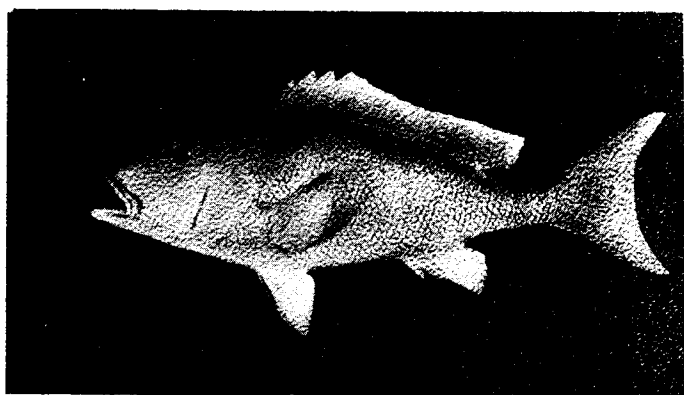
Several important biological facts are required prior to initiating management programs designed to maintain fish or shellfish populations at optimum levels for recreational or commercial usage. We must know how long the animal lives and which age groups are most susceptible to fishing pressure. When growth rates are determined and recruitment rates estimated, then our use rate may be expanded or tempered accordingly, so maximum yields may be sustained without jeopardizing natural stock replenishment. Age of initial spawning, as well as spawning frequency and location, need also be known to predict relative success of larval and juvenile survival. Relative annual abundance and seasonal migration patterns must be consistently monitored for several years before stock availability can be accurately predicted.

An understanding of age, growth, and reproduction in several species of fish is currently being developed at the main Laboratory complex in St. Petersburg and at two field laboratories.



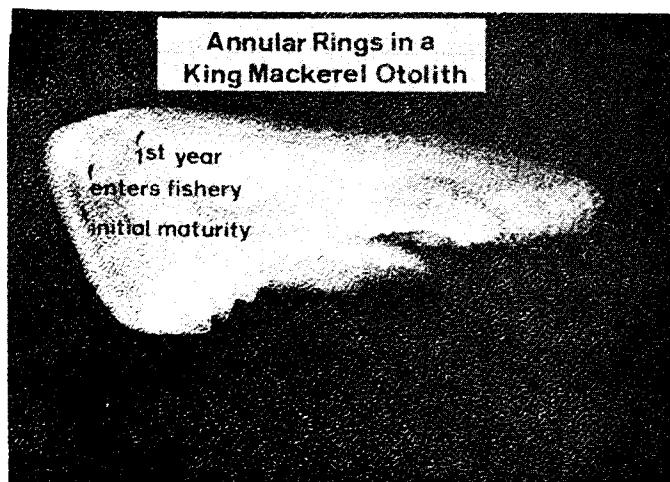
BONEFISH, a prominent south Florida game fish, has been aged for the first time from scale examination, and the stages of reproductive development described. Continual sampling will allow the growth rate to be accurately determined.

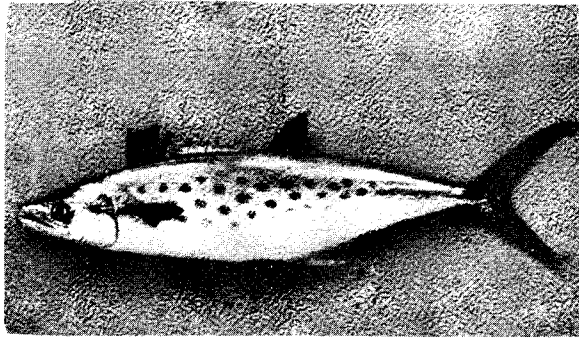
Growth rates of SOUTHERN SEA BASS, prominent in central west Florida party boat catches, are being determined and the age at which sex reversal takes place is being calculated.



Spawning frequency and seasonality of RED SNAPPER from west coast party boat catches is being investigated through examination of slides of gonadal tissue from continual systematic dockside collections.

A thorough analysis of growth rates and spawning frequency of KING MACKEREL, Florida's most sought-after sport fish, has recently been completed. A massive tagging program is now being initiated to map out seasonal migration patterns and determine population dispersal and abundance along both Florida coasts.





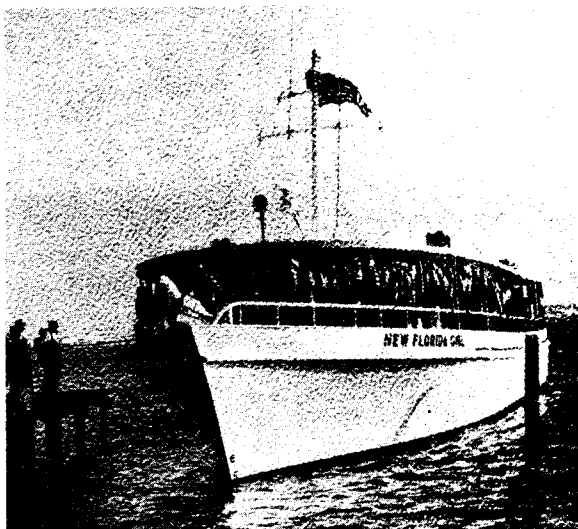
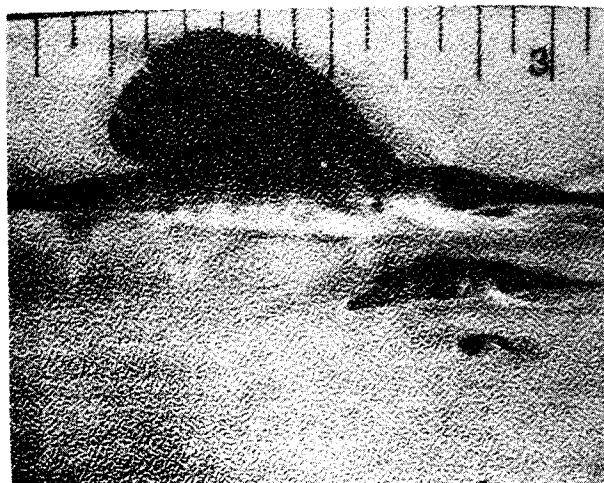
Basic life history research has also been conducted on SPANISH MACKEREL, a fish of similar habits and considerable prominence.

With the assistance of matching federal funds, a study of the growth and reproductive cycles of ATLANTIC STURGEON, an anadromous fish found principally in the Suwannee River, is also being conducted out of the St. Petersburg laboratory.



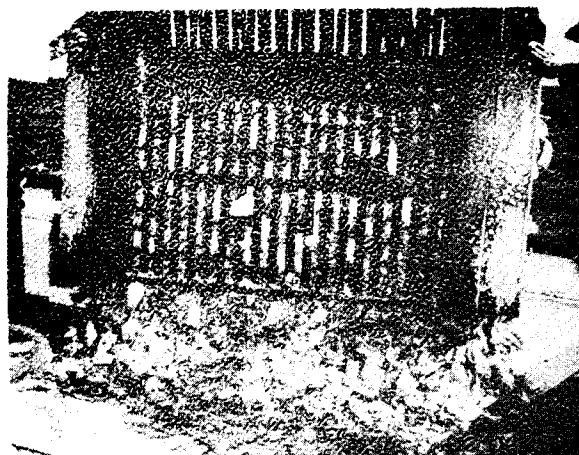
Basic biological research continues to amass considerable knowledge of the spawning habits and survival of BLUEBACK HERRING and HICKORY SHAD, potential commercial and sport fishes of the St. Johns River. Our field laboratory at Sanford has been supported by federal funding for anadromous fish research since 1968.

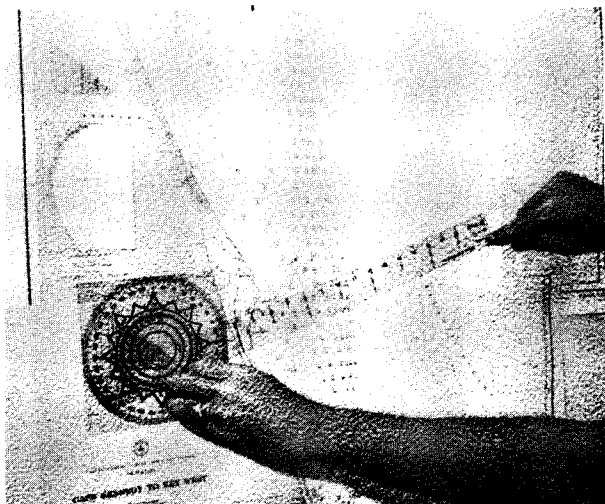
The West Palm beach field laboratory, established through considerable assistance from local sport fishing enthusiasts in 1970, has contributed extensively to basic life history information on ATLANTIC SAILFISH. This prominent sport fish has been accurately aged for the first time through examination of fin spine sections. Continuing work will allow development of information on growth rates, spawning frequency, and seasonal population dispersal.



The use rate of recreational resources is characteristically elusive, so the experience gained from a recently completed survey of fishing effort in Choctawhatchee Bay is being channeled toward documentation of angling effort throughout Florida. Surveys of established fishing tournaments are proposed to be an initial effort to DOCUMENT SPORT FISHING EFFORT and results. A centralized clearing house for tournament results and records will hopefully be formed.

Exploratory fishing is another facet of this section's research. Florida CLAM RESOURCES have recently been surveyed throughout the State with Federal-State cooperative funding and the last of a series of publications of the results is soon to be released.



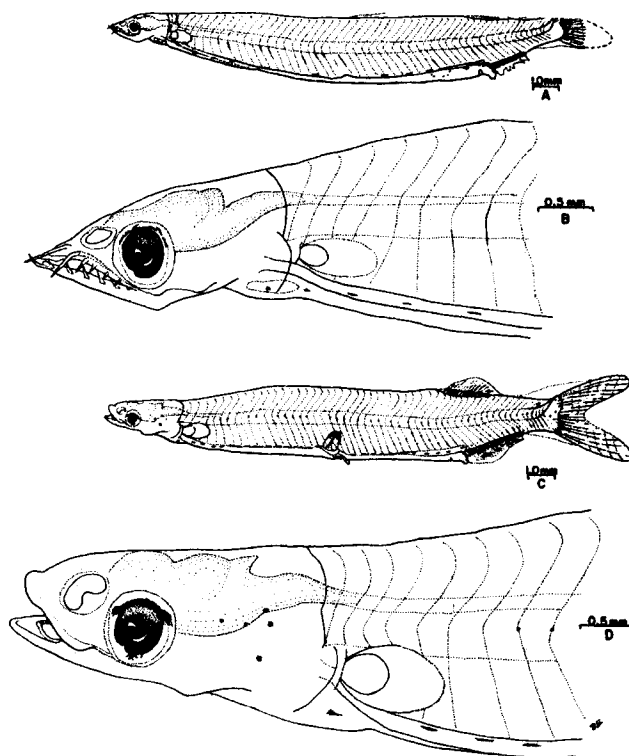


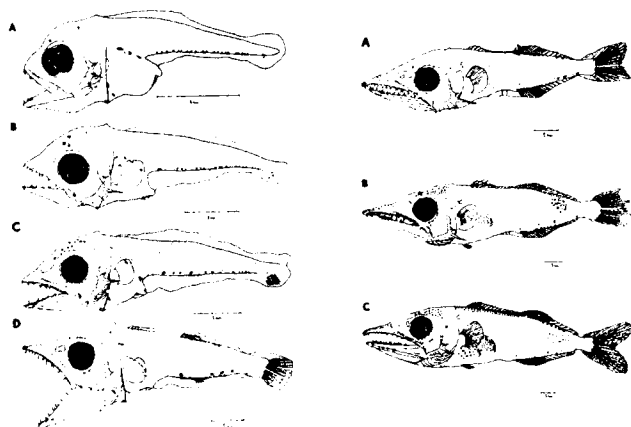
A two-year survey of the ROCK SHRIMP resources of Florida's east coast was initiated in January 1973, when the DNR research vessel *Hernan Cortez* was assigned dockage facilities at Port Canaveral. Part of this Federal-State cooperative project is designed to expand research into some aspects of rock shrimp life history initially developed from Project Hour-glass results.

DESCRIPTIVE BIOLOGY

Certain aspects of fishery biology can be understood only after considerable preliminary work has been done. Much initial effort must be spent developing expertise to identify the thousands of life forms found in the sea, in order that subtle, but extremely critical, differences in species composition can be recognized. Mapping of areas where economically important fishes and shellfishes reside often requires the ability to select significant differences in many contributing factors like food organisms, current patterns, larval forms, and bottom types. When a DNR scientist can examine a jar of water and find that larval lobsters have drifted up from somewhere in the Caribbean, or that shrimp larvae must have the protection of submerged grass beds to survive critical early life stages, or that tarpon may be growing up in northwest Florida marshes, one realizes the significance of having developed such expertise within the Department's Marine Research Laboratory.

Larval fish experts can readily distinguish between 60 types of eels, ladyfish, bonefish, and tarpon, all having a similar appearance. Thirty-seven specimens of the forty-four larval TARPON collected throughout the world have been identified by DNR scientists. Identifications can also be made of beneficial planktonic species (microscopic organisms) upon which some of these fishes feed, and of some planktonic organisms (red tide) which selectively kill them.

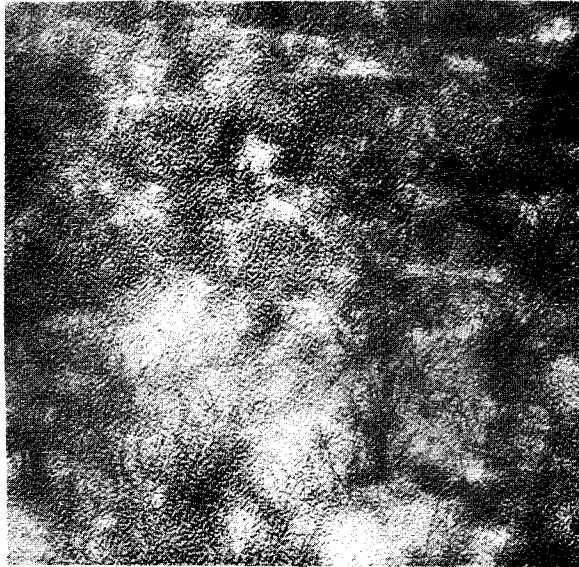




Spawning locations of KING and SPANISH MACKEREL are being sought by DNR scientists through the analysis of collections from a series of plankton cruises conducted in the northern Gulf of Mexico.

Extremely tiny shellfish (micro molluscs) form a major constituent of the diet of ROCK SHRIMP, as well as other important marine animals. Identification of the species most important in the diet must be made from over three hundred species. Analysis of the diet of many marine fishes depends upon identifying certain species of crabs or worms from sometimes only a few body parts.



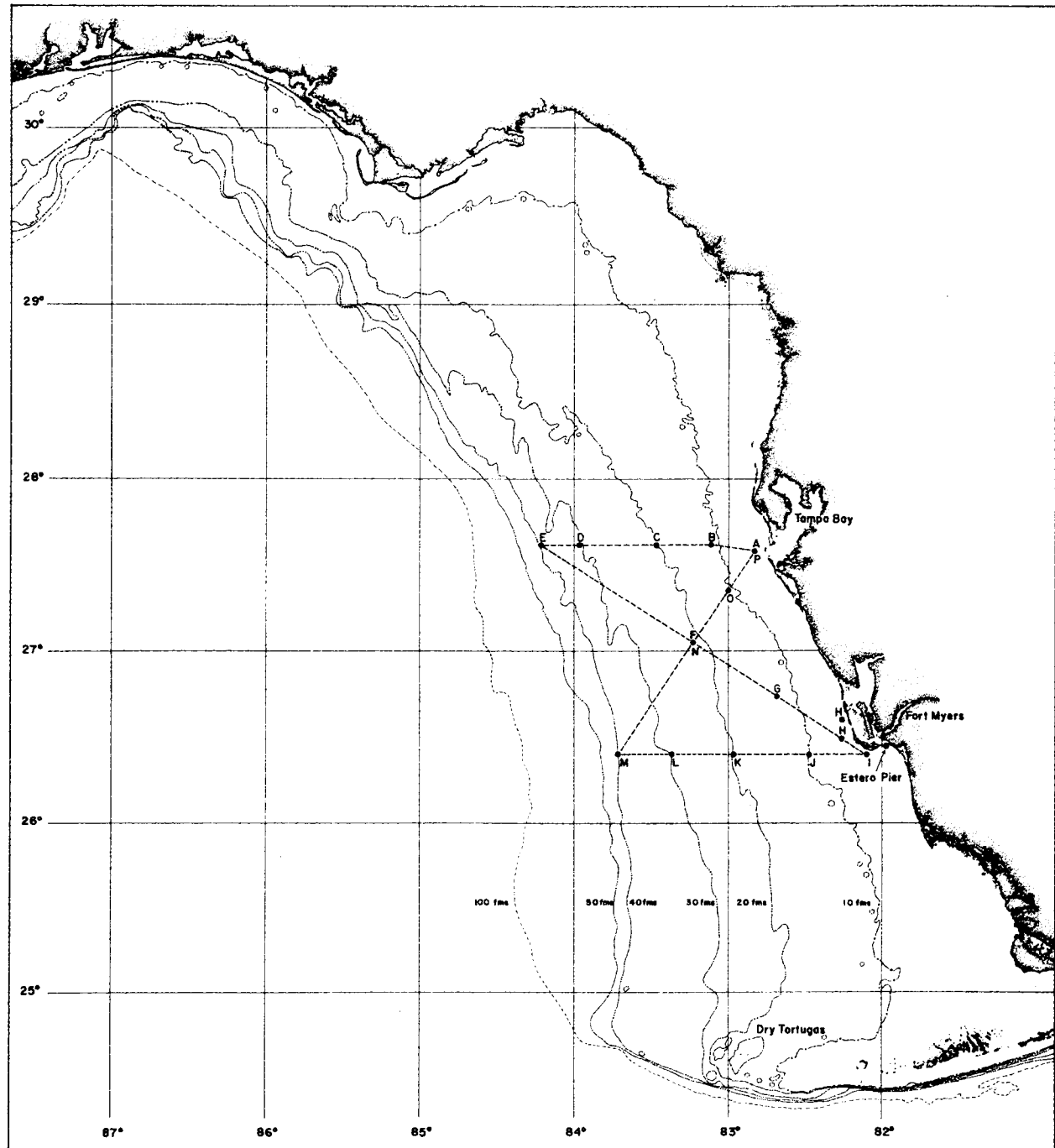


Knowledge of the species composition and distribution of SEAGRASS and ALGAE communities is paramount to evaluating the importance of many marine areas to the life cycle of sport and commercial fishes and shellfishes.

ENVIRONMENTAL STUDIES

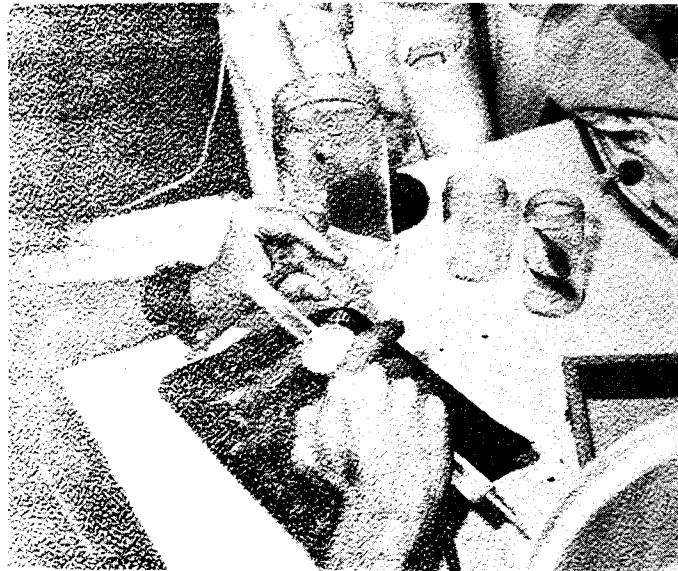
Competence in descriptive biology is no more crucial in maintaining the quality and quantity of Florida's natural marine resources than it is in performing ecological surveys. DNR research scientists have developed the Department's ability to characterize selected environments and to document changes in marine communities. This provides the necessary information to allow the wisest choices to be made in selecting future sites of nuclear power plants or the best practical advice to be given concerning crucial waterfront development. Uninterrupted long-term research is the keystone to proper interpretation of natural cycles. Short-term research, although important in its own place, cannot be substituted for intensive long-term work in the final analysis of environmental changes and effects.

Research results continue to be developed from the most comprehensive continental shelf survey ever conducted, PROJECT HOURGLASS. Over two thousand invertebrate and one hundred fish species comprise the bottom resources discovered during this twenty-eight-month systematic sampling program of the eastern Gulf of Mexico to depths of forty fathoms. In addition, an underwater survey of the fish fauna along central west coast limestone reefs is currently in preparation, and will further document another little-known but well used recreational resource.



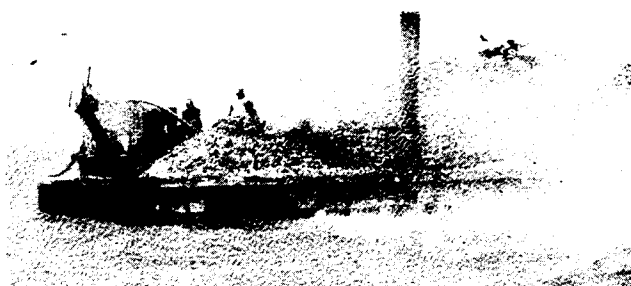
Project Hourglass

Selective sampling with fine-meshed nets and special traps throughout Tampa Bay has further documented the diversity of JUVENILE FISHES, including the habitats and has included some species which are known to reside in coastal waters during their early life.



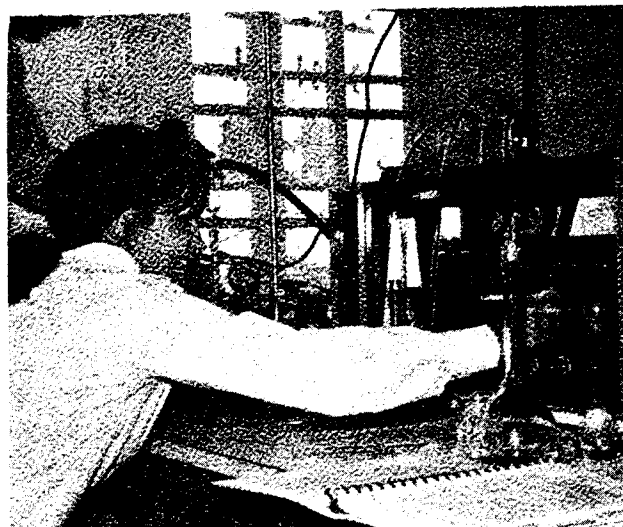
Research is in progress to learn how best to transplant important coastal and submerged vegetation like MANGROVES, MARSH GRASSES, SEA OATS, and SEAGRASSES so that endangered shorelines may be replenished and productive bay bottoms reclaimed. Coastal vegetation is also being monitored throughout Florida to describe basic biological characteristics of plant diversity.

Experiments on the effect of RED TIDE toxin on various species are being conducted to demonstrate its selective effects. Once we know which animals are affected the most severely we will be better able to determine the red tide's natural role in our environment. Studies of the organism's life cycle are still under way to add to proven predictive capabilities developed by DNR scientists.



Surveys of Escambia and East Bays near Pensacola have shown the best areas in which to build artificial OYSTER REEFS to counteract the severe oyster kill which occurred in late 1971. Similar work has been in progress in Apalachicola since the late 1940's and some of the earliest artificial reefs constructed there are still productive.

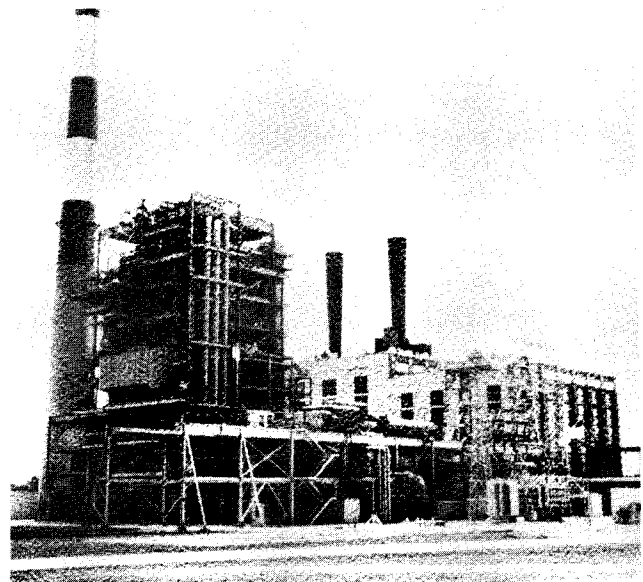
Occurrence of heavy metals such as MERCURY within the environment and their transport through various levels of the marine food chain are also being investigated.





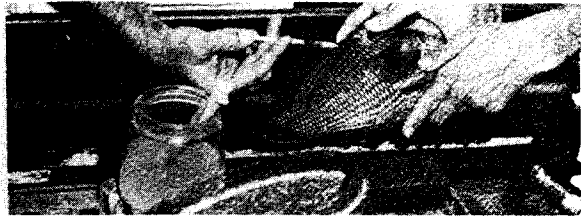
Nesting of SEA TURTLES along Hutchinson Island beaches continues to be monitored to learn survival patterns. Eggs from endangered nests are removed to safety where they are hatched in captivity. Young turtles are reared for about one year and then tagged and released at our Jensen Beach field laboratory.

Electric power plants use water to cool their generators and in the process the temperature is increased from 6 to 15 degrees. The effects of this increased temperature were under study for several years at the Crystal River site and a major project is presently in progress on Florida's east coast at Hutchinson Island. Effects of the HEATED EFFLUENT upon marine organisms is also studied in large aquarium conditioning rooms at the main Laboratory in St. Petersburg.

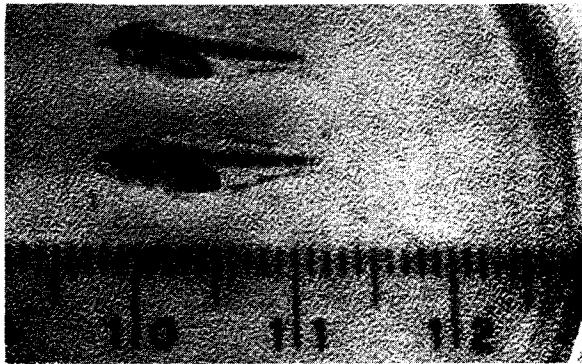


MARICULTURE

The cultivation or controlled rearing of certain seafood species is the goal of this DNR research section. Within the 25,000 gallon wet laboratories of the main Laboratory in St. Petersburg, techniques are being developed to promote rapid growth, prolific spawning, and high survival of several economically desirable species.



Techniques of controlled spawning of POM-
PANO and BLACK SEA BASS have been
achieved at the Laboratory and are being per-
fected.



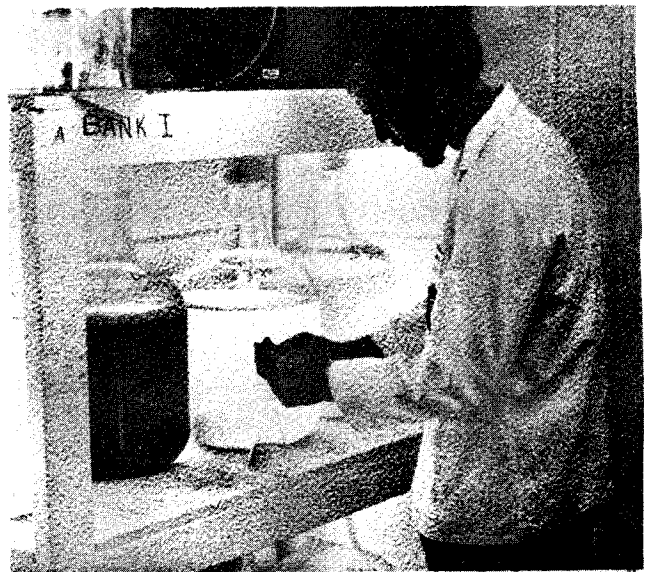
Several species of FRESH/BRACKISH WAT-
ER SHRIMP, *Macrobrachium*, have been
reared through several critical life stages. Work
is continuing toward achieving better survival
rates and rapid growth to harvest.

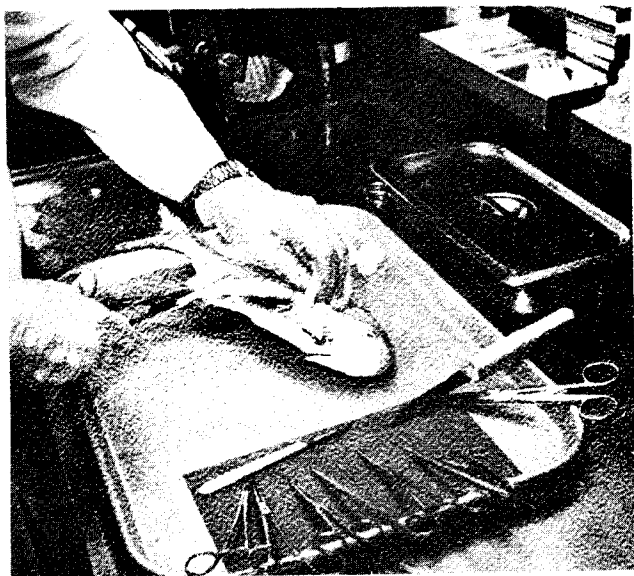




OYSTERS have been cultivated in artificial environments to enhance their marketable qualities. Cornmeal feeding procedures developed at the main laboratory may enable Florida to produce high quality oysters year-round.

Mass rearing of valuable marine fish and shellfish is being accomplished through PLANKTON and ALGAE CULTURING techniques designed to concentrate foods at critical times.





PATHOLOGICAL research aimed at controlling the disease which occurs in the mariculture animals is in progress. This is also providing excellent information on these same diseases as they occur in nature.

Histology

A service to several study areas, our facilities for sectioning and preparing stained slides of selected tissues are continually expanding. Gonadal tissue from several species of fish is prepared for microscopic determination of reproductive cycles. Tissue from sick or dying fish from laboratory experiments is prepared for pathological examination. Spine sections are prepared to assist in fish aging techniques. Larval forms are sectioned and stained to aid in documentation of early development.

Chemistry

Another supportive section which also involves some original research in environmental areas is chemistry. Complex analyses of water quality and nutrient content are required to determine success or failure of numerous experiments. Other studies require a knowledge of the relative toxicity of certain natural marine byproducts.

Library

The heart of any research organization is the library, where synthesis of past and present achievement yields the fruits of scientific endeavor--publications. One of the finest marine-oriented libraries in the world is maintained by the DNR at the St. Petersburg Laboratory. Our reprint collection exceeds seventeen thousand publications, our journal holdings, thirty thousand, and we have over fourteen hundred books, many out of print and thus irreplaceable. Also on file are numerous photographs and slide transparencies used in DNR publications or scientific and civic presentations.

Although provisions do not exist to permit individual loans of State property, qualified persons may use our library facilities during regular working hours. Material may also be obtained in accordance with established inter-library loan procedures by other recognized scientific repositories.

All DNR marine research results are published so that everyone receives the benefit of our labors. Research is expensive, but the full value of research is not realized unless the results are published and made available to everyone. DNR publications are currently exchanged with almost one thousand scientific and academic organizations throughout the world, including distribution to over fifty public libraries in Florida. Over five thousand publications are sent out free of charge annually in response to specific written requests.

Public Contact

The interest of various groups in marine matters is also increasing and the DNR receives more than its share of invitations to provide guest speakers. Civic clubs, professional groups, and other organizations formed the estimated audience of over 10,000 people addressed last year by our biologists. Additional public contact is made through the many groups who arrange for Laboratory tours.

All of our efforts through correspondence, public appearances, television, and other public contacts are designed to make the taxpayer aware of the information that has been developed for him by the Florida Department of Natural Resources. It is only through awareness of the efforts and information provided by the DNR research programs that the public may become truly effective in the preservation of our valuable marine resources.

Although this brochure covers major areas of the research endeavors of the Marine Laboratory, it is impossible to discuss each and every investigation. Consequently, if you have further questions or we may be of additional service, please contact the Florida Department of Natural Resources Marine Research Laboratory, 100 Eighth Avenue S.E., St. Petersburg, Florida 33701 or call (813) 896-8626.

