GULF STATES MARINE FISHERIES COMMISSION

SEVENTH ANNUAL REPORT
1955 - 1956

To The

CONGRESS OF THE UNITED STATES

And to the

GOVERNORS AND LEGISLATORS

of

ALABAMA
FLORIDA
LOUISIANA
MISSISSIPPI
TEXAS

SEVENTH ANNUAL REPORT (1955-56) OF THE

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Presented in compliance with the terms of the Compact and the state enabling acts creating such commission and Public Law 66-81st Congress assenting thereto.

Gulf States Marine Fisheries Commission
312 Audubon Building
New Orleans 16, Louisiana

IN MEMORIAM

Erma Baker
Committee to Correlate Fisheries Laws

Reece O. Bickerstaff
Committee to Correlate Fisheries Laws

GULF STATES MARINE FISHERIES COMMISSION

ROSTER - OCTOBER 1956

E. J. Grizzaffi
Chairman

William H. Drinkard
Vice-Chairman

W. Dudley Gunn, Secretary-Treasurer

Emily C. Carr, Office Secretary

*COMMISSIONERS

ALABAMA

William H. Drinkard, Director,
Alabama Department of Conservation,
Montgomery, Alabama

Garet Van Antwerp, III, Senator,
State of Alabama,
Mobile, Alabama

W. C. Holmes, M. D.,
Foley, Alabama

FLORIDA

Ernest C. Mitts, Director,
Florida Board of Conservation,
Tallahassee, Florida

David C. Jones, Jr., Representative,
State of Florida,
Naples, Florida

Vern Merritt,
Tarpon Springs, Florida

LOUISIANA

Ernest C. Clements, Director,
Louisiana Wild Life and Fisheries Commission,
New Orleans, Louisiana

E. J. Grizzaffi, Representative,
State of Louisiana,
Morgan City, Louisiana

Jeffery J. LeBlanc,
Lockport, Louisiana

MISSISSIPPI

Walter J. Gex, Jr., President,
Mississippi Sea Food Commission,
Biloxi, Mississippi

Stanford E. Morse, Jr., Senator,
State of Mississippi,
Gulfport, Mississippi

Hermes Gautier,
Pascagoula, Mississippi

TEXAS

Howard D. Dodgen, Executive Secretary,
Texas Game and Fish Commission,
Austin, Texas

Jimmy Phillips, Senator,
State of Texas,
Angleton, Texas

Travis Bailey,
Rockport, Texas

*Order of listing - Administrator - Legislator - Gover - nor's Appointee

SUCCESSIONS ON THE COMMISSION DURING THE YEAR

Ernest S. Clements	vice	L. D. Young, Jr.
E. J. Grizzaffi	vice	C. C. Burleigh
Jeffery J. LeBlanc	vice	Donald G. Bollinger
Stanford E. Morse, Jr.	vice	Hermes Gautier
Hermes Gautier	vice	Louis Simmons

COMMISSION OFFICERS ELECTED OCTOBER 19, 1956 FOR YEAR 1956-57

Chairman: E. J. Grizzaffi

Vice-Chairman: William H. Drinkard

STANDING COMMITTIES
ROSTER - OCTOBER 1956

COMMITTEE TO CORRELATE FISHERIES LAWS

A. J. Harris, Jr., Assistant Attorney General,
Alabama Department of Conservation,
Montgomery, Alabama

Mary Schulman, Assistant Attorney General,
State of Florida,
Tallahassee, Florida

Warren M. Simon, Attorney,
Louisiana Wild Life and Fisheries Commission,
New Orleans, Louisiana

T. Upton Sisson, Attorney,
Mississippi Sea Food Commission,
Gulfport, Mississippi

(To Be Appointed)
Texas Game and Fish Commission,
Austin, Texas

COMMITTEE TO CORRELATE RESEARCH AND EXPLORATORY DATA

Harold C. Loesch, Marine Biologist,
Alabama Department of Conservation,
Bayou La Batre, Alabama

F. G. Walton Smith, Director,
Marine Laboratory, University of Miami,
Coral Gables, Florida

Percy Viosca, Jr., Marine Biologist,
Louisiana Wild Life and Fisheries Commission,
New Orleans, Louisiana

Gordon Gunter, Director,
Gulf Coast Research Laboratory,
Ocean Springs, Mississippi

Howard T. Lee, Marine Biologist,
Texas Game and Fish Commission,
Rockport, Texas

SHELLFISH COMMITTEE

Harold C. Loesch, Marine Biologist,
Alabama Department of Conservation,
Bayou La Batre, Alabama

Robert M. Ingle, Assistant Director,
Florida Board of Conservation,
Tallahassee, Florida

Lyle S. St. Amant, Marine Biologist,
Louisiana Wild Life and Fisheries Commission,
New Orleans, Louisiana

Gordon Gunter, Director,
Gulf Coast Research Laboratory,
Ocean Springs, Mississippi

Howard T. Lee, Marine Biologist,
Texas Game and Fish Commission,
Rockport, Texas

ACKNOWLEDGEMENT

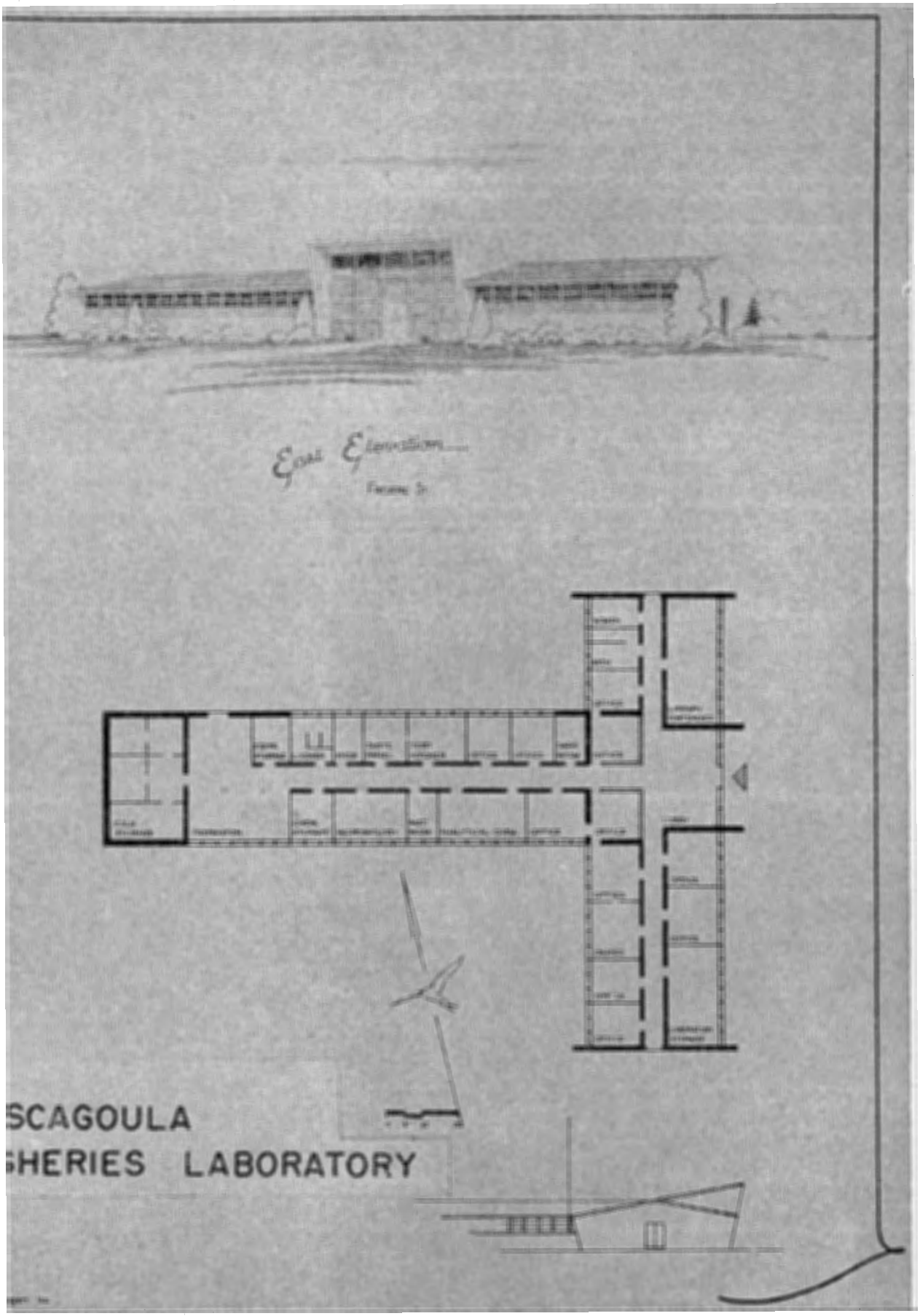
In submitting this seventh annual report the Commissioners wish to express their most sincere gratitude for the splendid co-operation of the members of the Congress and the Governors and Legislators of the compacted States. The Commission fully appreciates that such measure of success as has been attained in the past seven years could not have been possible without such valued assistance. This acknowledgement is also extended to the directorates and staffs of federal, state and interstate agencies and to representatives of all organizations and individuals who have contributed toward the realization of the objectives of the Gulf States Marine Fisheries Commission.

Respectfully submitted,

E. J. Grizzaffi, Chairman

William H. Drinkard, Vice-Chairman

W. Dudley Gunn, Secretary-Treasurer


East Elevation
SCAGOULA
SHERIES LABORATORY

COMMISSION ACTIVITIES
OCTOBER 1955 — OCTOBER 1956

In view of this publication being the Seventh Annual Report of the Gulf States Marine Fisheries Commission, it is the feeling of the Commission that it is appropriate to summarize some points of general interest in the compact and to briefly enumerate some of the activities of those agencies with which the organization is directly associated.

The Commission is the result of the accomplishment of a compact between the States of Alabama, Florida, Louisiana, Mississippi and Texas following appropriate federal and state enabling legislation. The compact was signed in July of 1949.

It is the purpose of the compact to promote the better utilization of the fisheries, marine, shell and anadromous, of the seaboard of the Gulf coast states, by the development of a joint program for the promotion and protection of such fisheries and the prevention of the physical waste of the fisheries from any cause.

In signing the compact the several member states did not relinquish any of their rights to regulate their own fisheries. In this connection, the Commission is given the power only to recommend the enactment of fishery laws to the governors and legislatures of the party states. In furtherance of its liaison activities, the Commission is authorized to consult with and advise the pertinent administrative agencies of the member states regarding fishery problems.

The Commission is composed of three members from each of the five Gulf States; total fifteen. The head of the salt water fisheries administration of the state is one commissioner. The second is a member of the state legislature. The third commissioner is a citizen who is appointed by the governor. The offices of chairman and vice-chairman of the Commission are rotated annually between the states. Regular meetings have been held semi-annually for the past several years and special meetings are called when considered necessary. Regular meetings are rotated between the states in order that the commissioners may better familiarize themselves with the fisheries of the entire seaboard.

The Commission receives annually membership dues from the

member states but not in a sufficient aggregate to financially support fishery research programs. From time to time the Commission suggests research work which might be accomplished at the state or federal levels when it appears such research is of an essential nature.

Fishery activities on the Gulf began to increase with the establishment of a central coordinating medium, the Commission. Shortly after the Commission was formed, the U.S. Fish and Wildlife Service was assigned two trawler type vessels for operation in the Gulf of Mexico. One was assigned to a general survey of the Gulf as related to the classification of fish eggs, larvae and juveniles, and the chemistry of the water. The vessel was stationed at Galveston, Texas, and a shore laboratory was established to analyze the matter collected. The laboratory is still working on the great mass of material collected during the period of the vessel's operation (1951-53), and final report of findings is in preparation. A second vessel, which was placed in operation in the spring of 1950 on an exploratory commercial fishing program, was based at Pascagoula, Mississippi. The exploratory program has succeeded in expanding the offshore shrimp fisheries through the discovery of wider limits of some known beds and through discovery of new commercial concentrations, notably red shrimp. Production class explorations for red shrimp have been completed and some vessels entered the fishery during the past year. Tuna explorations have proven highly successful. It is now known that the Gulf of Mexico supports populations of several commercially important species. The yellowfin tuna, which is currently the predominant species appearing in the catches, has been canned only on a small commercial scale to the present time but it is anticipated the volume will increase considerably during 1957.

Some of the work of the Fish and Wildlife Service on the Gulf has been, and is being, accomplished through regular approporiations. However, a preponderance of the current programs has resulted from the application of funds made available by the Saltonstall-Kennedy Act, which legislation the Commission actively supported at the April 1954 hearings in Washington.

The overall federal program on the Gulf not only includes

various projects designed to provide data needed by the Commission for fishery management studies, but also, a number of projects intended to assist industry in matters economic in character; an example being an economic survey of the shrimp industry. Two research studies of wide interest which are currently being progressed by the Service are: Biologicial and technological research on the oyster, the third ranking Gulf fishery in dollar value to the fishermen; and similar research on the menhaden, which is presently the second ranking fishery of the area.

Shrimp, the nation's first ranked fishery at the ex-vessel price level, and which fishery is the subject of a broad research program and statistical survey, is treated in detail in latter pages of this report. At the request of the Commission, the Service has agreed to explore the Gulf stocks of anchovies and sardine-like fishes beginning early in 1957. Test canning will be an accompanying project.

The City of Pascagoula, Mississippi, deeded a parcel of land for the erection of a Fish and Wildlife Service technological laboratory and contract for the building has been consumated.

Since the formation of the Commission, research laboratory facilities on the Gulf have expanded considerably. The number of state marine fishery agency and university laboratories has more than doubled. More students are being attracted to the marine sciences each year.

With regard to research being accomplished by the state fishery agencies; in more recent months, Alabama has given primary attention to the shrimp and oyster fisheries. Florida has conducted research on the shrimp, oyster, mullet, blue crab, scallop, red snapper and red tide. Shrimp and oyster studies have progressed in Louisiana, as have sectional studies which have produced information on many species of marine life including the menhaden, croaker and others. Shrimp, the oyster and oyster predators, and fin fish inventoring has received special attention in Mississippi. Shrimp, the oyster, drum, red fish and speckled trout are the principal species to which research has been directed in Texas.

Other state activities related to the fisheries include; water

bottom studies, oyster reef development and rehabilitation, gear development; and of particular interest to industry, various classes of economic surveys, technological programs and market development. Activities of the several member states are treated in more detail under an appropriately designated section of this report.

Information developed from these various state programs is freely exchanged among the states through the Commission and in many instances duplication of effort has been avoided. This is likewise true of data published by the Fish and Wildlife Service, and universities located in the Gulf States.

In the aggregate, the fisheries of the Gulf continue to show a year-to-year increase in production and value. It appears there will be a continued expansion of some of the fisheries now in production, and with prospects exceedingly promising for the development of new fisheries, the curve is likely to continue upward for a number of years. The need for more knowledge concerning the fisheries can be expected to increase as greater fishing effort is exerted upon the fishery resources, and it is the hope of the Commission that research at the state and federal levels can progress in such manner as to supply all necessary information required to effect the proper utilization of the fisheries of the Gulf.

The Commission met twice during the past year, the regular spring meeting having been held at Edgewater Park, Mississippi, and the annual fall session in New Orleans, Louisiana. The next meeting is scheduled for March 21-22, 1957 and will be held in Austin, Texas.

The Commission will publish during 1957 all available information on the speckled or spotted trout and the two species of white trout. It is considered that sufficient information is now available on these species of fishes to provide basic data necessary to the consideration of any future programs by the Gulf States which involve the Weakfish Family.

Other action of general interest taken by the Commission during the past year was that of recommending to the marine fishery administrators of the member states consideration of instituting seafood sales promotional programs; to the U.S. De-

partment of the Interior, Fish and Wildlife Service, that its Gulf Statistical Survey be expanded; to the U.S. Department of State that, in consideration of any convention relating to high seas fisheries which incorporates the principles of abstention, certain criteria be included concerning the compilation of scientific data on the fishery in question, the basing of measures of conservation on such scientific evidence, the respect of historic fishing rights of United States fishermen in such considerations, and the right of United States fishermen not to observe such measures, if challenged, pending contemplated arbitral procedures; these, together with further recommendations concerning safeguarding the right of an American state to regulate fisheries in its territorial waters; and, to the U.S. Department of the Treasury requesting increased Coast Guard patrol service in the Gulf of Mexico.

During the coming year, the Commission expects to give considerable further attention to such questions appearing in its Work Plan, which was adopted in April 1953, as: (1) Should areas be set aside as nursery grounds to aid in the annual crop? (2) Is physical improvement to inland waters possible, so as to improve fish production? (3) Is physical improvement to adjacent land needed to improve fish production? (4) What effect does siltation have upon production? (5) Should the Gulf States Marine Fisheries Commission work toward the encouragement of flood control and stoppage of marsh drainage?

The pages to follow present in summary certain accomplishments of the member States of Alabama, Florida, Louisiana, Mississippi and Texas, and of the U.S. Fish and Wildlife Service, which have contributed greatly to the acquiring of a fuller knowledge of the Gulf fisheries. Information resulting from the various programs is available in most instances in greater detail and is freely exchanged at meetings of the Commission and in the interim between sessions either directly or through the New Orleans office of the Commission.

STATE ACTIVITIES
OCTOBER 1955 — OCTOBER 1956

STATE OF ALABAMA

It has been previously reported that the Alabama Department of Conservation, Division of Seafoods, had undertaken the creation of snapper banks by dumping old automobile chassis from six to eight miles off the Alabama coast east of Mobile Bay in 70-80 feet of water, the project being in cooperation with the Orange Beach Fishermen's Association. The Division of Seafoods carried on exploratory fishing in late May of 1956 to determine if snappers were congregated around the artificial banks. Two days' fishing produced 165 snappers weighing from three-quarters up to two pounds. Practically all fish caught over the banks were snappers but 50-100 feet from the banks the catch was primarily catfish, with an occasional snapper. Miscellaneous parts collected from the deposited chassis indicated that the sea water had not caused rust to any appreciable degree. It is expected that the metal of the banks will rust slowly because of lack of free oxygen in the water. Some observers speculate that the crust of barnacles and sea life will become heavy enough to form a permanent bulk in the water and prove a desirable habitat for years in the future. It is the belief of the Department of Conservation that the sum of $3,043.00 spent for purchase and transportation of the chassis has proven a worthwhile investment and it is expected the program will be expanded to create banks in the offshore waters to the west of Mobile Bay.

A program of taking soundings to determine all bottoms suitable for oysters continued during the past year, and the program of oyster reef expansion is expected to move forward. A bottom tract of approximately 1,200 acres was acquired by the Department through two leases during 1956. This acreage together with bottoms previously leased brings the total to approximately 3,000 acres which have been acquired during the past two years for development into public reefs. The bottoms being developed are situated about 30 miles by water from Mobile and approximately 15 miles from Bayou La Batre. During the planting season, May and June 1955, a planting of some 40,000 barrels of shells for oyster cultch collection was accomplished on

the bottoms under lease at that time, some 1,800 acres. No shells were planted on the leased bottoms during the 1956 planting season but instead about 36,000 barrels of seed oysters were set out on the leased and state owned public reefs. Alabama leases specify that the state has exclusive rights to the bottoms for the development of reefs and that the oyster harvesting season may be opened and closed as deemed biologically expedient by the Director of Conservation.

The shrimp research program which began in the summer of 1953 is continuing. A total of 36 stations are now being visited in the collection of data. Information developed on the brown and pink species has been previously reported and additional data on these and the white shrimp are being analyzed. As part of the overall program, an experimental study of the area north of the causeway, at the head of Mobile Bay, was undertaken during the summer of 1956. The objective of this study is to attempt to analyze the movements of shrimp in the rivers. Bottom water samples have been taken periodically, and samples of shrimp measured at monthly intervals. Bait dealers who have cooperated in the study record numbers and locations of shrimp caught.

A previously reported program involving the taking of fish by small mesh nets in the rivers emptying into Mobile Bay to determine the advisability of permitting use of such nets has been completed and report covering the study is available.

During the past year the Department of Conservation contracted for a state-wide survey of fishermen and hunters in various phases, including the number of people fishing, the amount of equipment purchased and other matters affecting these two sports. The report, which was made available in September 1956, shows that during the year 65,000 people, for 730,000 days, indulged in salt water fishing in Alabama and spent a total of $4,909,000.00.

STATE OF FLORIDA

Research work of the Florida State Board of Conservation, Department of Marine Fisheries, is being carried on through contracts with the Marine Laboratory of the University of Miami and by the Department's own laboratory at St. Petersburg.

Biological observations made on the snook are being sup-

plemented by further field work. In pursuance of this work, the Marine Laboratory has enlisted the aid of both commercial and sports fishermen to apply tags which have been widely distributed. Another important Florida fishery under investigation is the spotted sea trout. Age and growth rates have been estimated, and ratios and spawning size have been determined, and amounts of trout caught by sports and commercial fishermen have been determined. Research on the sea trout will continue in order to confirm present life history data. The tarpon, a fin fish of especial interest to sports fishermen, is another subject of investigation. Larval forms believed to be those of the tarpon have been collected in plankton tows in the Boca Grande section. Some tagging was accomplished last fall and will be continued this fall. Sailfish tagging continues and a flow of cards have resulted from the past year's efforts. While this tagging project has been confined to the lower Florida eastcoast, the information developed is of considerable interest to the Gulf, in which area small sailfish of less than an inch in length and longer have been caught in dip nets, but in which area a fishery for large sailfish has not developed to the extent it has off the eastcoast of Florida. Information on the life history of other fin fishes is desired by the Department, and as a cooperative arrangement with a Marine Laboratory project, available basic information is being compiled. Conservation agents of the Department are cooperating with biologists of the Marine Laboratory by collecting for analysis various data provided for in game fish survey questionaires. Supplementing previously developed life history information on the mullet, the St. Petersburg laboratory has been assigned the project of studying the life history and prevalence of the flatworm parasites of mullet.

Concerning shrimp studies, the Marine Laboratory is continuing a study of mesh-size relationship with respect to the Tortugas fishery. Future work is expected to provide data on possible depletion of the fishery, by catch per unit of effort data from dealers' books; obtaining information on size distribution by season; geographical distribution of various sizes of shrimp; frequent and regular sampling of shrimp to give information on gonad development, presence of spermatophores and other anatomical manifestations associated with reproduction and correlated with geographical location and season. Further research

on the shrimp is being accomplished by the St. Petersburg laboratory. Field work extends from Naples to Cedar Keys and includes both inshore and offshore try net drags in likely places at intervals to note condition of gonads and size of individuals, in addition to plankton tows for immature stages of ova. Salinity and temperature is recorded with all hauls. As related information the St. Petersburg laboratory is contacting bait shrimpers for data on seasonality of catches, variation in sizes of individuals, evidence of migration, and evidence of mature gonads. In each case shrimp caught are identified.

Other projects under contract to the Marine Laboratory, and of particular interest to the commercial fishing industry, include: Experiments with ionol and other chemicals in an effort to develop a method to prevent the loss of the desirable red color in frozen red snappers; continued tests in the antibiotic control of shrimp spoilage with use of aureomycin and terramycin, and carrying agents which are free of calcium salts, which salts are thought to lessen the value of antibiotics as spoilage retarding agents because of an acceleration in melanosis (black spot) observed in tests which have proven aureomycin to be effective in retarding spoilage; the developing of techniques to combat melanosis are scheduled to continue with use of sodium bisulfite, ionol and other chemical agents, for even though tests have proven successful with use of the named agents, further field experimentation is desired. Aside from technological studies, the Marine Laboratory is accumulating information on spear fishing in Monroe County which when analyzed will indicate the pressure on the fisheries of that section attributable to this category of fishing effort. The collection and publication of landing figures, prices and value of seafood products continue in cooperation with the U. S. Fish and Wildlife Service.

The St. Petersburg laboratory continues the red tide study with emphasis being placed on the suspected etiological role of sulphur bacteria, while constant vigilance is maintained for any indicated outbreaks of the menace. Additionally, the laboratory continues a study of oyster predators which includes survival under controlled conditions of salinity, and field observations on natural habitat preferences of principal pests. The St. Petersburg laboratory is also investigating the possibility of developing an industrial fish industry since much so-called trash fish is availa-

ble in Florida waters. The possibility of developing a mink ranching industry is being investigated and ten minks are being raised at the laboratory with these fish being their basic diet. During the year, the laboratory completed an ecological survey of Boca Ciega Bay, with primary emphasis being placed on dredging and filling, and the findings have been published.

No shells were planted during 1955 although some were accumulated from local shucking operations. In 1956 two years' production of shells was planted in Apalachicola Bay. The operation totalled about 140,000 bushels. 15,000 bushels of steamed shells were barged to Panama City and planted in equal amounts in West Bay and East Bay. In addition, several barge loads of scrap building block were placed in North Bay.

STATE OF LOUISIANA

During the early summer of 1956, the Louisiana Wild Life and Fisheries Commission merged the Division of Oysters and Water Bottoms and the Division of Commercial Seafoods into a single unit, the Division of Oysters and Water Bottoms and Commercial Seafood.

Studies concerning ecological relationships, growth rates and migrations of the species of commercial shrimp continued during the past year. Population studies on shrimp were summarized in graphic form. The charts, which resulted from many years' of study, indicate that shrimp grow at phenominal rates, especially during the summer months. During this period it is indicated shrimp double their weight every 12 to 15 days, depending upon size, locality, temperature and food supply. Experimental trawling during the past year with small mesh bags tied behind or dragged beside regular commercial trawls is reported to have shown that the larger the mesh, the fewer the catch of shrimp of non-commercial sizes. The 1954-55 biennial report of the Louisiana Wild Life and Fisheries Commission records certain recommendations with respect to the shrimp fishery: (1) Limitation of open seasons for commercial shrimping in inside waters (except in limited quantities for bait) to the months of May, June, September, October and November; (2) Increase of the minimum size of shrimp trawl mesh from ¾ inch bar (1½ inches stretched) to a mesh of ⅞ inch bar (1¾ inches stretched); (3) Permit night and surface trawling. Incidental to the shrimp

studies, information was assembled and intergrated into the overall ecological picture of such species as the blue crab, croaker, flounder, mullet, sheepshead, speckled sea trout and others to a lesser degree.

Tulane University, under contract to conduct a biological study of estuarine and marine waters of Louisiana, rendered a report on the characteristics and habits of two marine and three freshwater species of catfishes taken in estaurine waters; included are the black, bullhead catfish, blue catfish, channel catfish, gafftopsail catfish and sea catfish. A similar report rendered on the family of basses include the yellow bass, white bass, stripped bass and the rock sea bass. The yellow bass was reported to be the only species of the four which is frequently caught in Lake Pontchartrain. The white bass is said to be a common inhabitant of the Mississippi River and the Bonnet Carre Floodway. Striped bass are reported to be taken in small numbers each year from the Bogue Falaya, Tchefuncta, and Tangipahoa Rivers. A single specimen of the rock sea bass taken in Lake Pontchartrain was reported as a probable rare visitor in those brackish waters. A third report covered two species of porgies, the Gulf sheepshead and a pinfish, both found in Lake Pontchartrain as summer inhabitants. Illustrated keys for identification, together with detailed drawings of each species, are included in the reports. A determination was made of the marine elements in the lower part of the Pearl River system and seasonal fluctuations in relative abundance were noted by examination of catch statistics.

Louisiana State University, under contract to conduct certain technological research for the Louisiana Wild Life and Fisheries Commission, developed procedures for rapid determination of bacterial counts in oysters and shrimp. In one test the degree of acid formation in a standardized medium is indicative of the number of bacteria present in an added sample. Another method concerns the time required for reduction of methylene blue by organisms present in a sample added to a basal medium. These reactions are reported to occur rapidly and are measured by color changes. Continuing with experiments to determine the value of storing freshly caught shrimp in containers packed in ice, it was found that shrimp washed in 1000 p.p.m. sodium bisulfite or in 1000 p.p.m. sodium bisulfite plus 50 p.p.m. chlortetracycline and then placed in waxed cartons and stored in ice had much

lower bacterial plate counts, incidence of black spot (melanosis), and were of much better general quality than shrimp which were washed in water and similarly packed in ice; this being especially true from the seventh to the sixteenth days of storage.

In a survey of oyster production in the Sister Lake Seed Oyster Reservation it was found salinities had increased considerably during the past five years and that the rise had caused the oyster drill, **Thais,** to invade most of the area. Seed oyster production has of necessity been confined to some 600 acres of the lake but it is hoped some means for delivering fresh water to the area can be devised in order to restore former productivity.

Experimental shell plantings in Black Bay during May 1956 were for the purpose of increasing seed oyster production; to determine the feasibility of using freshly dredged mud (reef) shells as cultch; and to compare the effectiveness of mud shells and steam shells as cultch. The area planted consisted of 813 acres lying between Snake Island and Lonesome Island. Approximately 38,100 barrels of mud shells were planted on 335 acres, and for comparison, about 20,000 barrels of steam shells were planted on an adjacent 115 acres, both plantings being on hard mud bottom. In a third plot 12,000 barrels of mud shells were planted, this being in effort to restore an old depleted reef. An extensive set occured on all types of shells and a good crop of seed oysters is anticipated. Results indicate mud shells to be almost as effective cultch as steam shells, particularly if the former are greater than one inch in size.

Oyster growth and mortality studies were conducted on four experimental beds. For the period April 1 to June 1, mortalities appeared to be caused principally by **Thais** but from June 1 to October 1 **Dermocystidium marinum** apparently accounted for the bulk of mortality. Other activities of general interest of the Louisiana Wild Life and Fisheries Commission included; cooperation in the field with universities holding contracts and with oil and gas interests; continued fishery explorations and gear development; and expansion of fishery products sales promotion. Plans for a marine laboratory on Grande Terre Island are under consideration.

STATE OF MISSISSIPPI

The Mississippi Sea Food Commission has paid particular attention during the past year to oyster resources. The whole Commission made several inspections of the St. Joe Reef and other reefs, and two inspections were made of dead reefs as possible reef shell resources. The tonging grounds and the steam stock reefs were opened by proclamation whenever the Commission saw fit. During the late spring the total supply of shucked oyster shell (25,000 barrels) was replanted on the reefs at locations selected and recommended by the Gulf Coast Research Laboratory.

The expectations held out for 1955 shell plantings on St. Joe Reef, as stated in the previous annual report, were well realized. Several thousand barrels of steam stock oysters were removed from this reef in the winter of 1956. Under the present dry conditions, this remains the most productive oyster reef in the State of Mississippi and it is expected that a good harvest will be obtained from it in 1957. Good harvests of counter stock oysters were also obtained during the 1956 season from the Pass Christian tonging reef, and in the fall of 1956 the Ocean Springs tonging grounds also came into production. A few hundred tongers operated on both reefs. The Sea Food Commission expects to rework the Pass Christian reef with dredges during the coming year and to plant shells on the Ocean Springs reef, which is near the mouth of Biloxi Bay.

Particular attention has been paid to the oyster borer, **Thais,** by the Gulf Coast Research Laboratory. A laboratory study was carried on and a field survey of **Thais** distribution in the Sound was made during the summer in collaboration with the Fish and Wildlife Service Laboratory of Pensacola. It was found that due to drought and high salinities the invasion of **Thais** was at a peak. A large number of oysters have been destroyed by this pest on beds as far east as Square Handkerchief Reef. In the laboratory it was found that this animal would regenerate its drilling mechanism within two weeks after it was cut off. A thorough study of the drilling apparatus of the conch has almost been completed and will be published with drawings and anatomical descriptions.

The laboratory personnel also made surveys of potential reef

shell in collaboration with officials of the shell dredging companies. Except for two exposed dead reefs, no further locations were found. A trip was made to Texas to examine the sonic shell finding instrument which has been developed by the Texas Game and Fish Commission. It was recommended that arrangements be made to rent or borrow this instrument at some future date.

Work on the finfishes was carried on by the summer staff of the laboratory and during the past spring. New space for the collections was made available, and at least ten new species were added to the known list of fishes from Mississippi Sound. A small handbook on the common fresh and salt water fishes of North America was completed by one of the Laboratory staff members and has been published.

Some new ideas concerning the possibilities of conserving the shrimp resources were developed by the Laboratory personnel and appear in Proceedings of the Gulf and Caribbean Institute published during the past year. Data for a refinement of these ideas, based upon better knowledge of the weight-length relationships of shrimp, were gathered at the Laboratory during the fall of 1956. Both species of common commercial shrimp, the brown shrimp and the white shrimp, were studied. A taxonomic survey of various molluscan groups in the Gulf of Mexico was continued at the Laboratory.

Further studies on the embryology of the common catfish were carried on at the Laboratory by personnel of the Mississippi University Medical Center. This fish has the peculiar habit of carrying its large eggs and early young in its mouth until all young are hatched. It has one of the largest eggs in the world, and has been found to be excellent material for studying the origin and early development of the vertebrate brain and cranial nerves. Other Laboratory work included additional studies of the sediments of Mississippi Sound, especially as they are related to organic components; such studies having been carried out by the geological staff during the past summer. A continuing project is a cooperative effort with the Fish and Wildlife Service at Pascagoula in cataloguing and identifying various organisms caught by the **Oregon** during its exploratory fishing hauls.

A modern teaching laboratory, which was constructed from

funds made available by the Mississippi Sea Food Commission, was completed in the late spring of 1956. This added facility made possible an expanded summer teaching program, which included advanced courses in zoology and marine geology. There were forty-one registrants during the summer. Louisiana State University successfully carried on its summer program at the Laboratory after having done away with its property and summer station at Grand Isle, Louisiana. Louisiana State University personnel also carried on experimental study of the effects of oil field brine upon fishes.

In all, nine research papers from the Laboratory were published in various journals throughout the year.

As a side issue of the biological work at this station, it was found that the long series of salinity samples which have been gathered at the Laboratory have been worthwhile information for various industrial concerns and State boards interested in manufacturing chemicals from sea water.

The Mississippi Sea Food Commission has undertaken a survey and re-appraisal of its seafood laws, and this work is still in progress.

STATE OF TEXAS

The over-all program of the Texas Game and Fish Commission, Coastal Fisheries Division, continued as in past years. Ecology surveys of the bay areas continued and final reports on Baffin Bay and the Upper Laguna Madre are being prepared for publication. An ecological survey of East Bay was made for the third successive year, and was successful in determining the effects of the partial closing of Rollover Pass.

Marine Laboratory: The staff at the marine laboratory in Rockport has carried out a wide variety of duties during the year. Complete records on weekly trawl collections in Aransas Bay were maintained to determine trends in fish and shrimp populations in the area. Tests to determine the effects of seismographic explosions on marine life were carried out in Corpus Christi and Aransas Bays. Shrimp and crab were found to be immune to the effects of the blasts. Oysters were found to suffer considerable damage out to 50 feet and slight damage out to 200 feet from

the explosion. Fish suffered slight to heavy mortality at close range, but were not affected beyond 25 feet. Tests were run to determine the salinity tolerance of various fish and shrimp, but final results have not been completed. Information on oyster reef building and rehabilitation was gathered from all the Atlantic and Gulf states to supplement data gathered by the Texas studies. This information is to be used in outlining a future oyster program.

Mud Shell Resource Survey: A sonic instrument, which will locate exposed and buried shell reefs in the coastal bays, has been installed in a new boat. Necessary modifications on the boat and test runs have been completed. Preliminary surveys are under way, and different methods of location are being tried. The use of this device in a complete survey will give the Game and Fish Commission such needed information on the location, availability, and extent of this valuable resource. This information will also be of value to those industries which rely on the use of this shell.

Sabine Lake Survey: A general ecological survey of the Sabine Lake area was begun in September 1955. Ten sampling stations were set up in Sabine Lake and have been visited weekly to record temperature, salinity, tides, bottom types, and marine life. A catalogue of the species of fish found in the lake was begun and weekly samples of commercial shrimp have been taken from this area in order to determine their abundance, growth rate and seasonal trends.

Galveston Bay Survey: The study of factors affecting the productivity of Galveston Bay oyster reefs was continued. Particular attention was given to the population characteristics of the reefs and to the setting, survival and growth of the oyster spat. Mapping of the principal reefs was begun to determine the extent of the oyster resources. A heavy set of spat was observed on reefs in the midle and lower parts of the bay during the spring and summer of 1956. In Trinity Bay, however, the spatfall was very light. This area has had no adequate spatfall for two seasons and the reefs are highly susceptible to overfishing.

Matagorda Bay Survey: The ecological survey, started in January 1955, has continued with primary emphasis being placed on the eastern half of Matagorda Bay. Approximately 75

species of fishes have been collected and identified, and the relative seasonal abundance estimated. The invertebrates and plants are in the process of being identified. A series of stations have been established in the vicinity of the proposed Matagorda Ship Channel through Pass Cavallo in order to determine the effects of dredging a deep water channel through the bay. Three small oyster reefs, built in Matagorda Bay by private individuals in July 1955, have been studied. These reefs, each about one acre in size, were built primarily as fishing reefs. A mat of coarse mud shell about one foot thick was placed on a mud bottom. The spat attached to the exposed shell and grew rapidly the first nine months after which growth slowed considerably. Average length of the year old oysters were 80mm. with a maximum length of 108 mm. Records have been maintained on salinities, spat set, fouling organisms, appearance of predators and other factors. The three reefs have become popular fishing reefs. Special emphasis has been placed on studies of the commercial shrimp population.

Upper Laguna Madre Survey: The Upper Laguna Madre Survey continued as in past years. In addition to the usual station samplings over 2,100 small redfish were obtained from the lagoon in April 1956. These were utilized in experimental stocking of fresh water lakes in the state. Over 2,000 very large trout were tagged during June and July 1956 and twenty-one of the tagged fish were recovered during the past year. A final report on the ecology of the Upper Laguna Madre was completed and submitted for publication.

Lower Laguna Madre Survey: The survey of the Lower Laguna Madre was continued throughout the year. A program is now underway to determine the extent of use of the Laguna and Cayo Atascosas as redfish nursery grounds. Special growth rate studies of immature redfish are now underway in a brackish water lake on a portion of the King Ranch. Additional work has been done in the Port Mansfield area in order to be able to note more accurately the effects of the proposed channel from Port Mansfield to the Gulf of Mexico. Work on the Channel is expected to begin shortly. (Areas in which passes have been dredged or are being deepened, or where new navigation channels are propossed, have come in for considerable study. Since each of these passes will allow considerable exchange of water between the bays and

gulf, the effect on the bay will be greatest and will more directly affect the sports and commercial catch. The Game and Fish Commission has spent in excess of $200,000.00 on one such pass and naturally is very interested in the effect of any others on the ecology of the bay involved).

U. S. FISH AND WILDLIFE SERVICE ACTIVITIES OCTOBER 1955 — OCTOBER 1956

BIOLOGICAL PROGRAMS

Biological investigations were continued during the year with major emphasis being placed on oysters, shrimp, menhaden and the fish-killing red tide.

In the program of oyster research at Pensacola records were kept of sea conditions for use in studies to relate spawning, setting and growth with environmental factors. Changes in composition of oyster stocks which affect their commercial value were noted.

Studies of the life history of the oyster drill are still in process in an attempt to discover weak spots which will lead to successful control measures.

The Gulf coast is being surveyed to determine the extent and density of oyster drill populations; this will indicate the extent of damage to oyster bottoms, and the economic feasibility of control measures, such as a biological control now being sought.

Continuous sampling of the sea water near the laboratory revealed the presence of plant pigments which are a measure of food available to the oyster. This is an important finding in the study of conditions which lead to "fat" oysters.

The comprehensive shrimp statistical program initiated this year by the Service is furnishing records of shrimp production which are being used to study population fluctuations and shifts in fishing intensity.

The study of shrimp anatomy undertaken by Tulane University through cooperation with the Service is nearing completion. This work, the first of its kind, will be published as an atlas con-

taining over 90 detailed illustrations of shrimp anatomy. A sample of the anatomical atlas is shown on page 29.

The development of new methods of marking shrimp with harmless dyes has provided a way of studying movements, growth and shrimp population dynamics. The University of Texas Institute of Marine Science, under contract, developed the dye marking techniques after many tests of various types of dye substances.

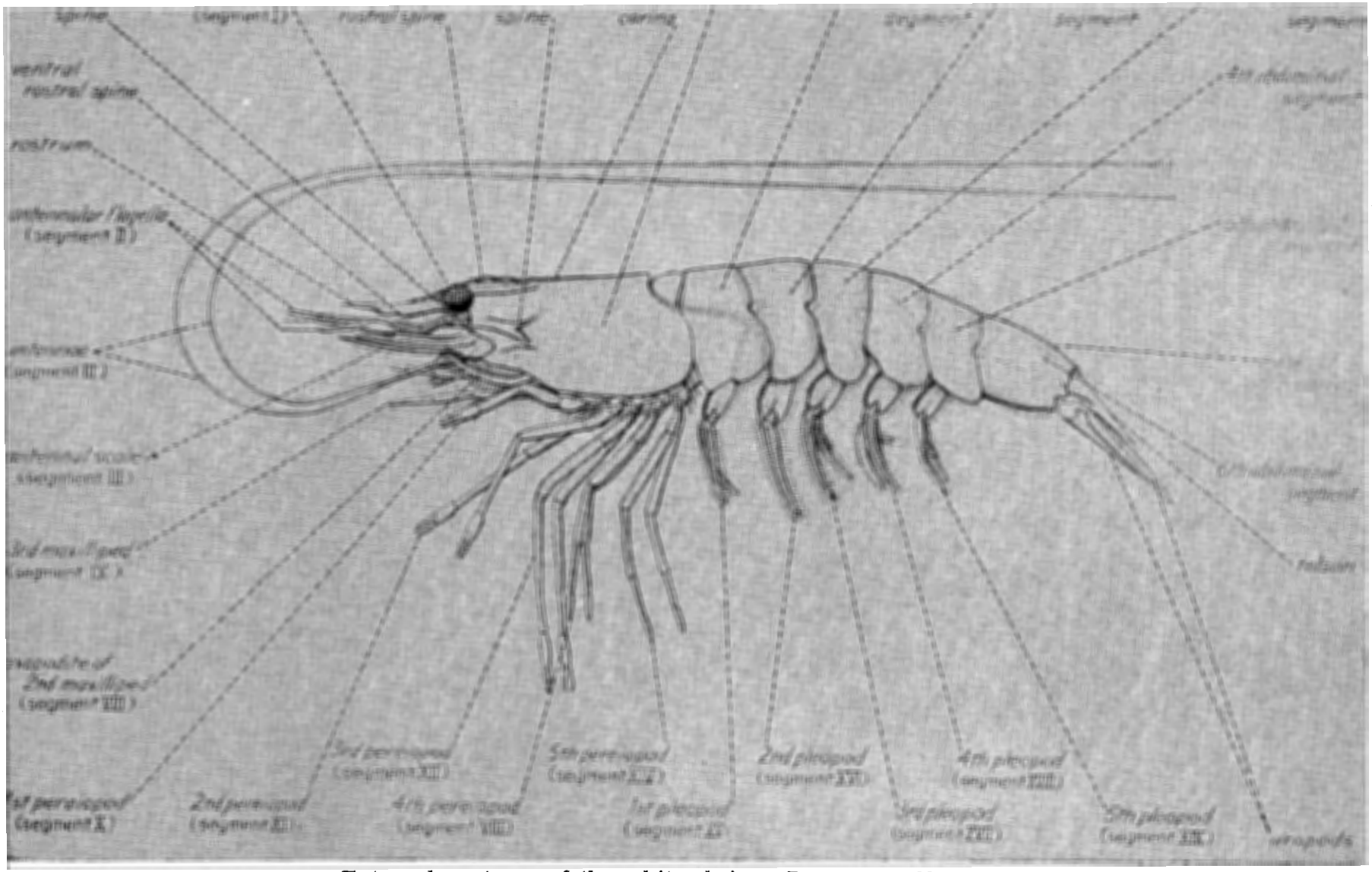
Laboratory studies of brown shrimp have demonstrated that water temperature is closely correlated with growth. Shrimp held in water at room temperature grow almost twice as fast as those held in water 8° C less than room temperature.

Experiments to determine the effects of copper on post-larval shrimp have been conducted in conjunction with red tide studies. Concentrations of copper sulphate likely to be used in red tide control experiments do not kill shrimp.

The microscopic study of the cells which make up the various parts and their function in life processes is fundamental to an understanding of the behavior and survival of shrimp. Molting, which controls the step-wise growth of shrimp, has received special emphasis in these studies and its chemistry has been clarified. This work was done by Texas A. & M. College with financial support from Saltonstall-Kennedy funds.

Studies on the Florida red tide are continuing to produce interesting and valuable information leading to an understanding of the causes underlying overgrowth of the dinoflagellate, **Gymnodinium brevis.** Most important, perhaps, is the discovery of the extreme sensitivity of the organism to environmental factors. This may be the reason for the infrequent and erratic occurrences of red tide outbreaks. Findings show that **G. brevis** is most sensitive to certain metals of which copper is one. In Florida waters, copper concentrations fluctuate widely; another factor which may contribute to the extreme variability in occurrences of red tides.

These results open the way for more specific studies on control of the red tide organism. Present knowledge indicates the best control lies in the prevention of major outbreaks by elimi-



External anatomy of the white shrimp, **Penaeus setiferus,** a part of the anatomical atlas being prepared under a Saltonstall-Kennedy contract with Tulane University.

nating active patches of **G. brevis** before they reach fish-killing proportions.

Analysis of climatic and hydrographic data being collected will aid in predicating conditions conducive to outbreaks. The discovery of **G. brevis** at three widely separated points, Florida, Texas and Mexican waters, suggests the red tide organism to be present at low concentrations over most of Gulf coastal waters.

In studies of Gulf menhaden a system of sampling catches was established which provides information on species, size and age composition. Scales are being studied to establish the relation of scale markings to size of fish to determine age and hence strength of year broods.

Continuing studies of the hydrography and chemistry of Gulf waters reveals that conditions of temperature, salinity and chemical nutrients are different in the western, central and southeastern Gulf. These differences were found by analysis of data collected from the research vessel **Alaska** during 1951 to 1953. The significance of the differences in water conditions is being examined for explanations of variations in productivity of the Gulf waters.

EXPLORATORY, TECHNOLOGICAL AND STATISTICAL PROGRAMS

Research on problems common to the Gulf coast area continued during the period October 1955 to October 1956 at six southern universities and at the College Park Laboratory of the U.S. Fish and Wildlife Service.

Five publications were prepared on oyster research at Florida State University. Two of the reports concern tests which are used to measure quality of samples in iced or frozen storage. The study of irradiation of oysters was stopped because the small radiant source rendered the studies impracticable owing to the necessary smallness of the samples tested. Irradiation resulted in marked changes in the odor of raw oysters and turbidity of the oyster liquor even at low dosage levels. Another report showed that oysters contain significant quantities of several of the B vitamins. The thiamine content was found to decrease sharply during frozen storage.

At Tulane University, research on phases of oyster physiology produced results of considerable interest and practical implications. Using live Louisiana oysters, they have developed time-rate curves for the loss of body fluid under various conditions of stress. The sources within the oyster body and the composition of the exuded fluid have also been investigated. Facts regarding the nature of the pigment causing brown discoloration of the southern oyster, its distribution, etc., have been reported.

At Louisiana State University several lots of commercially shucked Gulf oysters have been handled and packaged in various ways for frozen storage studies. Results to date have not been too encouraging owing to development of fishy or rancid off-flavors and various types of surface discolorations after 5 to 8 months of storage at 0° F. Protective dips and quick freezing of individual oysters are being studied.

The U.S. Fish and Wildlife Service Laboratory in College Park, Maryland, has been conducting more extensive analytical work for two years on oyster samples collected from plants in all the southern states. These data permitted a comparison of the effect on composition of (1) month of collection, (2) state of orgin and (3) plant processing factors.

Black spot formation in shrimp is being investigated at the University of Miami. This work, now fully underway, will emphasize development of methods of prevention of black spot without use of chemical additives. Work on assembling background material by the University of Florida for use in establishing grade standards for sponges was completed.

Having established the location of productive areas and successful gear for catching yellowfin tuna and royal-red shrimp, the Gulf commercial exploratory fishing program has, for the past year, emphasized commercial-scale fishing cruises designed to assess the seasonal production potential of these species. The **Oregon** made four tuna longline cruises and caught over 70 tons of fish. Tuna were available throughout the year but not always in the same areas. Highest catches were made around the Mississippi delta and Gulf of Campeche beyond the 100 fathom contour. Three trawling cruises for royal- red shrimp were complet-

ed. The best catches were made west-southwest of the Dry Tortugas off Key West, Florida, where three days of fishing caught a total of 3,145 pounds of heads-on shrimp.

The Service's exploratory fishing station and fishery technological laboratory at Pascagoula, Mississippi, is expected to be completed early in the summer of 1957 and will be known offically as the Pascagoula Fisheries Laboratory.

The Service continued its program for the annual collection of operating unit and catch statistics for the Gulf States. Information was assembled for 1955 on the number of fishermen, fishing craft, and the quantity of gear operated in the fisheries, and on the catch by species and method of capture. Data were also obtained for 1955 on the number of persons employed in fishery wholesale and manufacturing establishments and on the production of all types of manufactured fishery commodities.

To provide more complete information on the freezings and holdings of fishery products additional cold-storage operators in the Gulf States were induced to supply the Service with information on their activities. As a result, the cold-storage bulletin now provides more complete information on the freezings and holdings of shrimp.

The availability of Saltonstall-Kennedy funds made it possible to inaugurate the program for the collection of detailed data on the catch of shrimp in the Gulf area. New offices were opened at 10 points on the Gulf and the release of a monthly bulletin, entitled **Shrimp Landings,** was begun with the month of January 1956. The bulletins contain data on the volume and value of the various species of shrimp by size classification landed in the various states. Summary information on the catch by area of capture according to species, depth taken, and size is also shown. An additional report, containing detailed information on the catch of shrimp in the Gulf of Mexico by size and species, depth of water, area of capture, and fishing effort expended, is published and supplied to interested persons on request.

PEAT, MARWICK, MITCHELL & CO.

Certified Public Accountants

NEW ORLEANS, LOUISIANA

Hibernia Bank Building, New Orleans 12, La.

ACCOUNTANTS' REPORT

Commissioners

The Gulf States Marine Fisheries Commission

New Orleans, Louisiana

We have examined the statement of income and expenses of The Gulf States Marine Fisheries Commission for the year ended June 30, 1956 and the related statement of resources as of that date. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered neccessary in the circumstances.

In our opinion, the accompanying statements of income and expenses and resources present fairly the results of the financial transactions of The Gulf States Marine Fisheries Commission for the year ended June 30, 1956 and its resources at that date, in accordance with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

Peat, Marwick, Mitchell & Co.

New Orleans, La.
July 5, 1956

THE GULF STATES MARINE FISHERIES COMMISSION
STATEMENT OF INCOME AND EXPENSES
Year Ended June 30, 1956

Income:		
Member states contributions:		
Alabama		$ 1,000.00
Florida		3,500.00
Louisiana		5,000.00
Texas		4,000.00
Mississippi		1,000.00
Total income		14,500.00
Expenses:		
Salaries	$10,600.00	
Traveling	1,227.05	
Rent of office	1,080.00	
Stationery, printing and supplies	546.03	
Telephone and telegraph	473.57	
Postage	110.62	
Electricity	93.94	
Accounting	225.00	
Insurance	244.28	
Depreciation	90.23	
Meeting expense	317.03	
Payroll taxes	144.00	
Sundry	73.02	
Total expenses		15,224.77
Excess of expenses over income		(724.77)
Resources of the Commission, June 30, 1955		9,434.59
Resources of the Commission, June 30, 1956		$ 8,709.82

STATEMENT OF RESOURCES

June 30, 1956

Cash	$ 7,966.48
Traveling advance	250.00
Meter deposit	10.00
Prepaid insurance premiums	91.20
Equipment—at cost less allowance for depreciation, $2,147.03	408.34
	8,726.02
Less accounts payable	16.20
	$ 8,709.82

BUDGET

GULF STATES MARINE FISHERIES COMMISSION

FISCAL YEAR 1956-57

Operating Expenses	
Salaries	$10,800.00
Traveling	1,250.00
Rent of office	1,080.00
Stationery, printing and supplies	550.00
Telephone and telegraph	475.00
Postage	110.00
Electricity	95.00
Accounting	225.00
Insurance	250.00
Depreciation	450.00
Meeting expense	350.00
Payroll taxes	158.25
Sundry	50.00
	$15,843.25
Capital Expense	
Purchase of automoile	$ 1,440.00

(Budget Approved October 19, 1956)