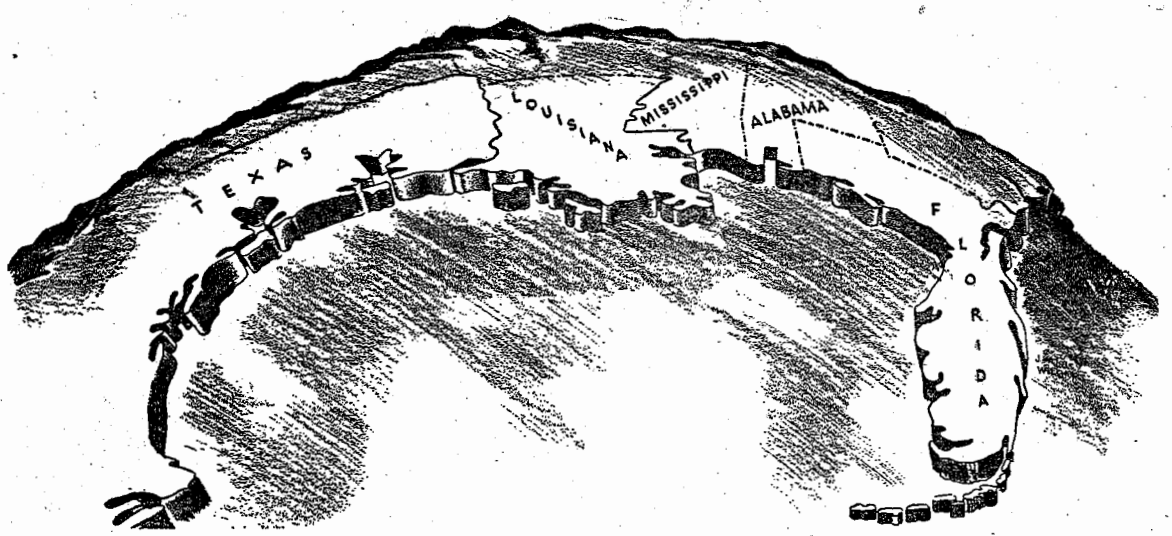
Proofs Pages



GULF STATES MARINE FISHERIES COMMISSION

Eighth

~~SEVENTH~~ ANNUAL REPORT

1956 - 1957

To The

CONGRESS OF THE UNITED STATES

And to the

GOVERNORS AND LEGISLATORS

of

ALABAMA
FLORIDA
LOUISIANA
MISSISSIPPI
TEXAS

EIGHTH ANNUAL REPORT (1956-57) OF THE

GULF STATES MARINE FISHERIES COMMISSION

To The

CONGRESS OF THE UNITED STATES

And To The

GOVERNORS AND LEGISLATORS

Of

ALABAMA
FLORIDA
LOUISIANA
MISSISSIPPI
TEXAS

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

GULF STATES MARINE FISHERIES COMMISSION

ROSTER - OCTOBER 1957

W. C. Holmes — Chairman

Howard D. Dodgen — 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 State Board of Conservation,
Tallahassee, Florida

Walter O. Sheppard, Representative,
State of Florida,
Fort Myers, Florida

Vern Merritt,
Tarpon Springs, Florida

TR
LA

LOUISIANA

F. Lamar Clement, 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 - Governor's Appointee

SUCCESSIONS ON THE COMMISSION DURING THE YEAR FOR YEAR 1957-58

Walter O. Sheppard	Vice	David C. Jones, Jr.
F. Lamar Clement	vice	Ernest C. Clements

COMMISSION OFFICERS ELECTED OCTOBER 11, 1957

Chairman: W. C. Holmes

Vice-Chairman: Howard D. Dodgen

STANDING COMMITTEES
ROSTER - OCTOBER 1957

COMMITTEE TO CORRELATE FISHERY LAWS

A. J. Harris, 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

Don R. Luethy, 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

Don R. Luethy, Marine Biologist,
Alabama Department of Conservation,
Bayou La Batre, Alabama

Robert M. Ingle, Assistant Director,
Florida State 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 eighth annual report the Commissioners wish to express their most sincere gratitude for the splendid cooperation 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 eight 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,

W. C. Holmes, Chairman

Howard D. Dodgen, Vice-Chairman

W. Dudley Gunn, Secretary-Treasurer

COMMISSION ACTIVITIES
OCTOBER 1956 - OCTOBER 1957

The Commission met twice during the past year. The regular spring meeting was held at Austin, Texas, March 21-22, 1957 and the annual fall session at Mobile, Alabama, October 10-11, 1957.

The continuing consideration with respect to the coastal environment resulted in the adoption by the Commission at Austin of a resolution which expresses the concern of the Commission for the fisheries and wildlife resources of the bay shore and estuarine areas of the several member states, due to the vast engineering works in progress, and the vastly expanded work which may be expected because of anticipated growth in population and industrially, and requests the Governors and Legislatures to give consideration to the establishment of such laws as would provide both sufficient time and funds for complete investigation by the state marine fisheries agencies, through biological and associated studies, of salt water areas under consideration for engineering work. Additionally, the resolution

requests the U. S. Corps of Engineers to extend the time limits generally allowed for biological evaluation of proposed engineering projects.

Further considering the coastal environment, the Commission adopted one resolution at the Mobile meeting which requests the U. S. Department of Defense and the military departments to refrain from setting up bombing ranges in coastal areas of the Gulf of Mexico which are recognized fishery nursery and rearing grounds and wildlife sanctuaries, and another which requests the U. S. Corps of Engineers to allocate additional and sufficient funds to the U. S. Fish and Wildlife Service for through ecological and associated studies in connection with the Gulf Tidewater Channel Project in the State of Louisiana.

Another resolution adopted at the annual session approves and supports the measure enacted by the 1957 Session of the Florida Legislature to establish a sanctuary in a portion of the Tortugas area and the proposals to handle the international aspects of the fishery involved.

Concerning the Fish and Wildlife Service Act, a resolution was adopted at the fall session requesting the Congressional Delegations of the Gulf States to urge the providing of necessary funds and authority to the U. S. Fish and Wildlife Service in order that the agency may most effectively comply with responsibilities as prescribed in the Act.

Other action of general interest taken at the Mobile session was reaffirmation of the shellfish certification program resolution adopted by the Commission, October 22, 1954, which program is based on a joint state, federal and industry cooperative plan for the maintenance of sanitary controls, particularly at the source of supply of the raw product.

At the annual session, the Commission assured representatives of the Office of Education, U. S. Department of Health, Education and Welfare, of its considerable interest in fisheries vocational education and its continued full cooperation. Previously, a number of the Commissioners and staff had met with representatives of the Office of Education and State Vocational Directors to discuss programming under Section 2 of Public Law 1027 as passed by the 84th Congress.

A Commission sponsored meeting of state, federal and university marine biologists has been scheduled for early 1958. In a broad sense the purpose of the metting is to discuss the general biological problems facing the administrators and biologists in the Gulf of Mexico; to determine the extent of knowledge becoming available from the various research programs; to determine what further information is needed; and to improve coordination between the efforts of the several states and the federal government through the Commission.

During the past year the Commission has been greatly assisted in its effort through the participation at meetings of representatives from a number of the federal agencies, including; Department of the Interior, Fish and Wildlife Service; Department of State, Office of the Under Secretary for Fisheries and Wildlife; Department of the Army, Corps of Engineers; and Department of Health, Education and Welfare, Office of Education. Also present at meetings have been representatives of interstate agencies; the Council of State Governments and the Atlantic States Marine Fisheries Commission. Representatives of both national and regional commercial and sports fisheries groups have attended Commission meetings, as well as, staff members of the fisheries and educational agencies of the Gulf States. Universitities of the area were likewise well represented at the two 1957 sessions. The cooperative spirit engendered through attendance and participation at Commission meetings, and study of the general fisheries problems common to the Gulf of Mexico at these sessions and in the interim between meetings, becomes more in evidence from year to year.

The Commission's secretary-treasurer made routine visits to various of the fisheries adminstration offices and laboratories, and attended meetings in the five state area during the past year. The chairman and secretary-treasurer attended the annual session of the Gulf and Caribbean Institute in Nassau, Bahamas, in November 1956 and the Atlantic States Marine Fisheries Commission meeting at New York in September 1957.

The Commission continues the scheduling of two regular meetings each year and the rotation of meetings from state to state. The next regular session will be held in Clearwater, Florida,

April 10-11, 1958, and the fall session at a point to be selected in Mississippi.

The pages to follow present in summary certain 1956-57 activities thought to be of general interest, of the Alabama Department of Conservation, the Florida State Board of Conservation, the Louisiana Wild Life and Fisheries Commission, the Mississippi Seafood Commission, the Texas Game and Fish Commission, and the U. S. Fish and Wildlife Service. Information resulting from the various research programs is freely exchanged among the agencies either directly or through the Commission.

STATE ACTIVITIES

OCTOBER 1956 - OCTOBER 1957

ALABAMA The successful creation of artificial snapper banks by the depositing of old automobile bodies from six to eight miles off the Alabama coast east of Mobile Bay prompted the Seafood Division of the Alabama Department of Conservation to expand this project during the past year. Some eight miles off Dauphin Island, 1000 old automobile bodies were deposited and 500 were placed off Gulf Shores in front of Sea Horse Pier.

The oyster program continues and it is expected 50,000 barrels of seed oysters will be planted during the month of November 1957. This planting will result from the securing of seed oysters from polluted areas and from waters too deep for tonging. The planting of 26,000 barrels of seed oysters on state leased bottoms in 1956 was responsible for an increase of 28,000 barrels in the commercial harvest during the past year.

The first year of the study of bait shrimping north of the Mobile Bay Causeway has been completed. This survey, which was made in cooperation with the Bait Dealers Association, indicates that small white shrimp continually appear in the catch until mid-September. The young shrimp averaged 85 per pound and about 2.6 inches in length. The growth rate was approximately 2/25 of an inch per day before mid-September and 1/25 of an inch per day later in the season. Brown shrimp did not appear in the catch until September 20. The percentage of brown shrimp increased with each sampling date until more than half of the catch on November 28 (the last sampling date) was brown shrimp. North of the Causeway it was found that shrimp during the fall

of 1956 were much more abundant than in Mobile Bay proper, though the average size was less. Growth rates were determined to be about the same. Only a few shrimp of legal size, 50 count per pound or approximately 4 inches in length, were found north of the Causeway before October 25. A detailed report of the study, including attending hydrographic conditions, is to be published in Proceedings of the Alabama Academy of Science.

Several fish jubilees were investigated during the past year, one having occurred along the Bellefontaine shore on the western edge of Mobile Bay and several on the eastern shore in the neighborhood of Daphne. The jubilee, during which fish, shrimp and crabs come to the edge of the water and lay stupefied, is only of a few hour's duration and occurs only in summer. Checks made by Marine Laboratory personnel on the plankton and other organisms in the water appeared negative when the several occurrences were investigated during the past year. However, chemical analyses made in the locality indicated a lower than normal oxygen content and a higher than unsual carbon dioxide content. Analysis of deeper water several miles from shore a few hours after a jubilee occurence also indicated low oxygen and high carbon dioxide content. Mobile Bay is deep near shore in the general area of Daphne and the bottom is covered with much derbis consisting of logs, sticks and leaves that wash down the rivers and settle. The rotting of this matter during the warm summer months causes the accumulation of carbon dioxide at the expense of oxygen. Bottom topography and water currents in the area were found favorable to localizing conditions. A complete scientific report of jubilee investigations in Mobile Bay is being prepared.

In cooperation with the University of Alabama, the Seafood Division offered a graduate course in marine biology during the past summer. Nine students were enrolled in the four-week course, which included birds, fishes and invertebrate animals associated with the marine waters of Alabama. It is anticipated additional courses will be offered at the 1958 session and a larger enrollment is expected.

FLORIDA: The State Board of Conservation Marine Laboratory has continued a study of the growth and development of the pink shrimp **Penaeus duorarum** in relation to impregnation, ovar-

ian development and spawning. Reports are to be released as the work progresses. Other research being accomplished includes further study of the effects of dredging and filling operations upon the commercial and sports fisheries. In connection with this work, a general conclusion has been reached to the effect that such operations are primarily detrimental to the industries because of the destruction of turtle grass which grows abundantly along the west coast of Florida. Studies of oyster predators and marine parasites continue, the latter research including parasites of the pink shrimp. Studies on the marine and brackish water algae and sea grasses are being conducted on both the east and west coasts. On the west coast the study centers at present in the Tampa Bay area. Ichthyological research on the shallow water fishes of the west coast of Florida continues. The red tide organism **Gymnodinium brevis** which is causing fish kills in areas of the St. Petersburg beaches, Sanibel Island and Naples is being treated with copper sulphate in cooperation with the Fish and Wildlife Service. It is yet too early to predict the overall effectiveness of the method.

The Marine Laboratory of the University of Miami continues research for the State Board of Conservation. An expanded program of fish statistics is under way. This program will provide sampling data on catches of all species by both commercial and sports fishermen as well as data on fishing effort. Records of Tortugas shrimp dealers continue to be collected to fill in gaps in catch per unit of effort data in the past. An attempt to determine the realationship between the depth fished and size of shrimp caught was not productive, due to the behavior of the fleet. Pink shrimp tagged with small Peterson tags indicate that this tag will be useful to provide evidence on growth and migration. An estimate of mortality using the catch-effort method appears close at hand because the data fulfills the necessary requirements. Shrimp spawning studies suggest a period of greatest spawning activity from January to April. Routine samples of sea trout from northwest Florida has begun. Preliminary data suggests differences between the population in this area and the previously studied population of Florida's east coast. Analysis of salinity and bottom samples from the Florida Bay ecological study areas indicate wide flucations in environmental conditions that may be disastrous to non-migratory animals. Groups of small

tarpon which have been collected from Goulds and Matecumbe Key will provide estimates of growth by holding in tanks and by resampling these areas.

Studies were begun to determine the effect of antibacterial agents other than the antibotics in retarding the growth of spoilage organisms in shrimp. Experiments to control the development of rancidity in frozen fish are continuing. Preliminary results indicate that Ionol in concentrations raging from 200 to 300 ppm is effective in controling the development of rancidity. Studies are continuing to control the loss of the characteristic red color in frozen red snapper. Ionol in concentrations of 200 to 300 ppm has previously been reported to retain the red color after nine months frozen storage. Preliminary results from the present experiment indicate that better results can be obtained when a 500 ppm concentration is used. Studies were commenced on the development of a new type of crab bait. Early results with fish meal were unsatisfactory.

During 1957 the Oyster Division planted 105 baskets of seed oysters in Citrus County and 3336 baskets of seed oysters in Wakulla County; each basket equaling approximately two bushels. The object of these plantings was to confirm the establishment of new growing areas. The spots where oysters were planted were upstream of existing reefs which have been decimated by several years of drought produced high salinities. When checked, the pilot plantings appeared to be doing well and to indicate potential sites for artificial cultivation. Cultch plantings, in the form of shell, were the largest ever undertaken by the Board of Conservation. In Bay County, 32,000 bushels of dredge shells were planted and in Walton County 48,000 bushels of steam shells were planted. No plantings were made in Franklin County, the present center of the Florida oyster industry. All shell collected there was stockpiled, and will be planted later, probably in 1958.

A new tug boat research vessel was purchased and the construction of two barges was begun.

LOUISIANA The Division of Oysters, Water Bottoms and Seafood of the Louisiana Wild Life and Fisheries Commission, through its Seafood Section, has continued to lay emphasis on the ecology of the shrimp nursery grounds. Much data have been

collected, chiefly by the use of the research vessel, **Albacore;** supplemented by studies from smaller boats, and observations of bait trawling and castnetting operations and the landings of commercial vessels.

In view of the obvious decline of the white shrimp population and a possible invasion of their grounds by the brown and pink species, information was sought which might throw light on this phenomenon. Several factors could contribute to these actual and relative changes in shrimp abundance, some natural and some man-made. The former are beyond control, but possibly some of the man-made factors could be minimized or in part nullified by counter-measures.

Population-study blanks were used for recording the sizes of all individual shrimp, crabs and fish taken in a sample. These data are transferred to large charts, one set of which shows the size ranges and another the predominant modes. Each species developes its characteristic patterns which illustrate important facts such as seasonal prevalence of size classes, minimum, maximum and average growth rates and the migrating sizes of the different species. Data which have a bearing on the degree of sexual dimorphism developed in the different shrimp species have also been tabulated. Food habit studies of shrimps and their ecological associates are in progress through stomach examinations and a study of the bottom organisms of the shrimp nursery grounds.

A trip was made in May 1957 to collect a large series of molluscs in the shrimp nursery grounds and along their migration routes, the expedition extending from the fresh water of Lake Maurepas into the Gulf of Mexico beyond the Chandeleur Islands. The collection has been identified and comparisions made with other collections from the Gulf States. A report to be rendered in this connection will provide for easy field identifications and assist in the working out of an ecological classification of bottom organisms.

Submitted for publication is a paper entitled the "Commercial Shrimp of Louisiana." In advanced stages of preparation are two documents; one being recommendations to the shrimp industry and to the Louisiana Legislature regarding proposed changes in the shrimp laws which it is believed will lead to more economic production with less fishing effort, and the other being an outline

of the possible and probable cause of the decline in the white shrimp fishery.

The Oyster Section has cooperated with the Seafood Section during the past year in the weekly collection, identification and measuring of shrimp. Another cooperative endeavor has been with the Louisiana State University in studies of the variations in oyster condition during different months of the year and at different salinities. A joint paper in this connection has been accepted for publication.

Growth and mortality studies of oysters continue. Growth studies are aimed at determining the possibility of using very early spring spat as seed in preference to late spring spat. The mortality studies are designed to determine mortality peaks in relation to area, season, temperatures, salinity and the age of the oyster. Growth and mortality tabulations are made of the set as an accompanying study.

Another study involves plankton distribution and density with relation to seasonal and hydrographic variations. Density and kind of plankton is being determined in areas of different mean salinities and different seasons and results are correlated with oyster growth and conditions in the immediate area.

In order that the time for shell planting, location, and quantity can be more accurately determined, various stations have been established to check monthly spat set. The work is being compared with plankton samples of oyster larvae in each case.

Oyster drill studies continue with emphasis being placed on their activity, breeding, embryology, rate of growth, and feeding habits and feeding rates. To determine the success of snail breeding in various areas, plankton counts of drill larvae are being made at regular intervals along a salinity gradient at established stations. Preliminary investigations of possible chemical control of **D. marinum** and the oyster drill were inconclusive and will be repeated. Experiments were conducted with use of various chemicals generally used as fungicides.

Various controlled laboratory experiments have been made using oil emulsion base and mixed with bottom mud in order to determine the degree to which they would impart an oily taste to oysters. Results to date bear out findings in the field indicating

that oysters will pick up a strong oily taste from such mixtures, sometimes in as short a period as three days.

It has been previously reported that approximately 50,000 barrels of reef shells and 20,000 barrels of steam shells were planted in May of 1956. In August 1957 the area was checked and it was found that 73% of the reef shells and 84% of the steam shells had seed oysters. The reef shells supported an average of 3.1 seed oysters per shell while the steam shells averaged 5.2 seed oysters per shell.

Plans for the Louisiana Wild Life and Fisheries laboratory in the Barataria Bay area are progressing. It is expected the clearing of land, ground work, and canal and turn basin dredging will be completed this fall. Plans for the labortary are being drawn up for estimates.

MISSISSIPPI During the summer of 1957 the Mississippi Seafood Commission planted approximately 22,000 barrels of shucked shells which had been gathered from the packing houses and canneries. Sixteen thousand barrels were planted on the highly productive St. Joe Reef in the western part of Mississippi Sound. The remaining 6,000 barrels were divided equally for planting in Biloxi Bay and in the Sound near Pascagoula. The Commission moved 7,000 barrels of oysters from Biloxi Back Bay, where they were in a polluted area. Four thousand of the lot were transplanted into lower Biloxi Bay and 3,000 were planted off Pascagoula.

The Gulf Coast Reasearch Laboratory staff continued the monthly faunistic and ecological survey along a transect from Biloxi Bay across the Mississippi Sound. This project is building up considerable information on the distribution, seasonal movements, and salinity relationships of various fish and shrimp.

Under contract with the U. S. Fish and Wildlife Service, the Laboratory began a menhaden investigation in June 1957. Literature on the menhaden was studied and work on a general bibliography was undertaken. The general meristic characteristics of both species of Gulf menhaden, **Brevoortia patronus** and **Brevoortia gunteri**, were studied. In connection with the investigation laboratory personnel have visited all menhaden plants and have made several trips out with the boats as well as taking rides with

the spotter planes. According to information gathered from the fishermen from Louisiana and Texas, **gunteri** is a bay or low salinity species. Some indications have been gained that the so-called hairy-back, which is sometime taken by the menhaden fishermen, is possibly not the Gulf fish **Opisthonema oglinum** but may be **Signalosa petenense,** the gizzard shad, which also lives in fresh water.

At the present time the Laboratory scientists are studying ways and means of taking samples of spawning schools. A gill net now in operation seems to be fairly successful and a surface trawl has been fairly well perfected. The main object of this investigation is to differentiate the stocks of menhaden in the Gulf of Mexico, if there are any separate stocks. It is hoped to do this by taking good samples of spawning schools during the spawning period just ahead.

During the past summer there were 51 enrollees in the various classes of Marine Geology and Marine Zoology taught at the Laboratory. There was sufficient demand for a course to be offered in Marine Fisheries Biology.

At the Laboratory a study was completed on the anatomy of the Gulf oyster borer **Thais.** A paper was completed by one scientist on a deep-sea fish collected by the **Oregon.** This specimen was a large female with three parasitic males attached. This scientist also carried on some experiments on light production by one of the shallow water Gulf fishes, the midshipman, which is a relative of the common toadfish or oyster dog. The effect of boiling seawater as a fixative for microscopic sections of the oyster mantle was studied. It was found that for certain cellular components boiling sea water is as good or even superior to the common fixatives used. Some new techniques were developed for the determination of some of the metallic ions and some of the common nutritive salts of sea water.

The Mississippi Seafood Commission is now in progress of having the salt water fisheries laws rewritten for consideration at the 1958 Session of the Legislature.

TEXAS. The Coastal Fisheries Division of the Texas Game and Fish Commission continues its efforts with research, and management based on research as primary objectives. Since manage-

ment practices are applied largely to species within a given area rather than to species alone, the investigational work has been conducted on the same basis.

ARANSAS BAY SHRIMP SURVEY: The purpose of this study is to acquire records of the sizes and numerical abundance of the three different species of commercial shrimp. Trawls are made weekly in Aransas Bay. A 36-foot net is dragged for either one-half or one hour, depending on seasonal abundance. All specimens in the trawl catch are recorded and all shrimp and some of the fish are measured, and all shrimp weighed. The pound count (average number of shrimp per pound) is recorded. Since May, 1956, the pound count of the shrimp has been less than 39 (the legal maxium heads on) for only five weeks (out of a total of 61). These weeks were between September 24 and November 14, 1956.

INDUSTRIAL WASTE CONTROL: Field and laboratory studies have been conducted on effluents from various industries throughout Texas. Samples have been taken from several of the highly industrialized areas and toxicities determined with reference to various species of fish life. One of the policies of this section is to encourage and assist self-improvement programs in water pollution control by the various industries along the coast. This section has successfully cooperated with the Railroad Commission, game wardens and biologists to clean up oil field pollution in several areas. Several major industries now employ technicians to check their operations and seek possible causes of pollution and also to correct situations that might arise in the future.

MESQUITE BAY SURVEY: The Mesquite Bay project was begun intensively in June, 1957, to gain a picture of the bay with Cedar Bayou closed from the Gulf for possible comparisons with later studies with Cedar Bayou open. Since 1956 Cedar Bayou has been open twice — once for a period of a few weeks during the first year through local sportsmen's efforts and again for three days from the high tides of hurricane Audrey. Pass opening changed the picture of the bay considerably, but this immediately reverted to its original condition upon pass closure. Engineering studies are to be made during this fiscal year on the effort, feasibility and cost of opening a pass into this bay.

MUD SHELL RESOURCE SURVEY: The Sonoprobe, an electronic sounding device which will locate exposed and buried shell reefs in our costal bays has been used in preliminary surveys with satisfactory results. Engineers have surveyed and marked areas of Corpus Christi Bay to be sounded and mapped. A barge with a coring device has been rigged and will work in conjunction with the Sonoprobe. Additional personnel to survey and operate the barge have been employed. The use of this equipment in a complete survey will give the Commission much 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: The ecological survey of the Sabine Lake area which was started in September, 1955, has been continued throughout the year. Data including water temperature, salinity, tides, and faunal components have been collected periodically throughout the year. The utilization of Sabine Lake by commercially important species of fishes for a nursery or spawning ground was found to be slight. This is thought to be due to lack of vegetation and to extreme salinity variations. Some fishes such as croaker, spot croaker and sand trout, which are of minor commercial importance, were found to use the area quite extensively as a nursery ground. A salinity tolerance study has been made of marine fishes in the lake. A bottom survey of Sabine Lake was completed. Cores up to ten feet in length were taken throughout the lake along with bottom surface grab samples. Grain size analysis of these samples are to be used to determine the effect of spoil material from dredges upon the natural bottom of the Lake. Data will also be used to draw a detailed map of the bottom of Sabine Lake. Observations of the oyster of Sabine Lake indicate that there was a complete die-off during the spring of the year due to lowering of salinities.

GALVESTON BAY SURVEY: Particular attention was given during the past year to spatfall and population charcteristics of the major commercial reefs. Both Trinity Bay and East Bay have become important centers of oyster production due to increased salinity over the past two years. "Pink oysters" appeared for only a few weeks in December 1956 and caused only minor damage to the industry. The dinoflagellate bloom, **G. splendens,** which or-

ganism has been associated with "pink oysters", occured in Trinity Bay in August, September and October 1956.

MATAGORDA BAY SURVEY: The ecological survey of Matagorda Bay has been interrupted due to resignation of the biologist in charge. A report on the subject will be submitted for publication in the near future. Sampling of the commercial shrimp populations on the nursery grounds and on the inshore fishing grounds species indicated that the number of white shrimp present in the bays in the spring was small, but the population present during the summer months was considerably larger than in recent years. Length frequency data and other information on estimated time of arrival on fishing grounds, species abundance, growth rates and catch per unit of effort are being prepared for publication. The studies of the three small experimental oyster reefs were continued. The reefs, using mud shells as cultch, were built in 1955. The oldest group of oysters, approximately two years old, were five to six inches in length with a large population of three and four inch oysters present. The spring set of spat was light.

LOWER LAGUNA MADRE SURVEY: Special attention was given during the year to ecological conditions in the Port Mansfield-Redfish Bay area. The channel from the intracoastal canal at Port Mansfield to Padre Island has been almost completed. The effects of this channel and pass on the ecology of the area will be studied during the coming year.

The Texas Legislature has enacted a universal fishing license law. Both residents and non-residents under the law will be required to pay a license fee of $2.15. Another law passed at the last session of the Legislature gives the Game and Fish Commission regulatory authority based on continuous scientific investigations in the Sabine Lake area.

U. S. FISH AND WILDLIFE SERVICE ACTIVITIES
OCTOBER 1956 - OCTOBER 1957

GULF OYSTER INVESTIGATIONS: The study by Florida State University of oyster and oyster predators in Apalachicola Bay, Florida, started in June 1955, has now been completed. The first year of study was devoted to an ecological survey of three oyster reefs. The second year of the study was devoted primarily to an

intensive study of one oyster reef, St. Vincent's Bar, which Bar was reported to have been a former producing reef. The other stations were sampled on a seasonal schedule. At the present time, a final report of the two years of study is being prepared.

A program was put into effect in March 1956 designed to demonstrate first, the specific effect of two environments on the growth of oysters and clams, and second, to identify or isolate these factors responsible for the observed growth differences. The two environments selected were only 1000 feet apart and near the Pensacola Laboratory, but over a period of several years it had been found oyster growth differed significantly at the two stations. To date, water analyses and other physical records have shown no obviously significant differences at the two stations. However, since there exists charateristically different growth rates under comparable physical conditions at the two stations, it appears that some relatively subtle factor must be considered. Effort is being made to identify this item which conceivably could be a trace element essential to nutrition.

A continuing project is the survey of the Gulf coast 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. In the past year survey and other data for Mississippi were prepared and revised for publication. The survey of the Florida coastline on the Gulf is scheduled for completion during the winter of 1957. It is hoped that significant amounts of water bottoms suitable for oyster culture will be found where drills will not be a problem.

The ecological relationships of oyster commensals and parasites, which was a project activated in June 1956, continues. During the year 1635 drills from Grand Isle, Louisiana; Biloxi and Gulfport, Mississippi; and Pensacola and Apalachicola, Florida, have been examined. Several thousand more from other Gulf States are to be examined in the search for some parasite that can be used as a biological control of the oyster drill.

Studies of the biology of local oysters continue to demonstrate that they are more responsive to fluctuation in water temperature than to other measurable hydrographic features (assuming the overall suitability of the environment).

Most of the experimental work in the biology of the oyster drill study has been terminated. It has been found that sex reversal either does not occur in mature **Thais** or to such a slight degree that it is without significance. All of the field and laboratory data on the drill is being prepared for publication.

GULF FISHERIES EXPLORATION AND GEAR RESEARCH

Commercial scale fishing trials for tuna using longline gear has been completed during the past year. Some additional longlining is to continue to obtain additional seasonal and geographical coverage and to assist the small tuna fishery that is operating out of Pascagoula.

A project to obtain some preliminary information on the availability of smaller tuna was started this past summer. Numerous school of blackfin and shipjack were seen in the Central Gulf and in the Caribbean. It was planned to capture the smaller tuna with the use of live bait but obtaining of a satisfactory bait supply became a problem.

Some attempts were made during the year to obtain basic information on the types of edible shrimp and associated fauna beyond the red shrimp depth range. Presently the interest lies in seeing what species are to be encountered in deeper water. Catches have been fairly small but there has been no attempt to produce the shrimp in any number.

Considerable time was spent during this reporting period in trying to sample some of the surface schools of anchovies and sardine-like fishes. Information has been logged on the occurrence of such schools throughout the Gulf to pinpoint areas of greatest concentration. Thus far, three species of large anchovies that school along the Mississippi, Louisiana and Texas coasts have been identified. Along the Alabama and Florida coasts numerous schools of thread herring, round herring, and Spanish sardines have been observed. A cooperative seining project with one of the menhaden companies is underway with the use of a California style lampara net. Activities are concerned with the capture of large anchovies off the coast of Mississippi and Louisiana. If satisfactory results are obtained during October and November, an attempt will be made to seine thread herring from Cape San Blas to Key West off Florida.

Although the project concerned with the availability of red snapper to fish trawls is yet young, results have been encouraging. Using various types of New England fish trawls, catches of from 200 to 400 pounds per hour have been made in some areas of the North Gulf. Most dragging has been between the 20 to 100 fathom curves; not over snapper lumps or over ground used by the shrimp industry.

The scollop and clam potential of Gulf waters from off Cape San Blas southerly to Cape Sable was explored to a limited extent during the year. Early next year the area will be revisited and a modified scollop dredge used in the exploratory effort.

GULF FISHERY STATISTICAL PROGRAM. Progress in the collection, tabulation and publication of fishery statistical data has been painfully slow during the past year. The lack of progress has been caused chiefly by inability to find qualified personnel who are willing to accept positions in the Section and certain administrative restrictions on the filling of vacanies. Since the collection of statistical data is largely a manpower job, certain of the programs have suffered. In spite of these obstacles some small progress worthy of mention has been accomplished.

Prior to 1957 the Bureau of Commercial Fisheries published monthly landing data in cooperation with four of the five Gulf States. The States were Florida, Alabama, Mississippi and Texas. In addition the Bureau published in cooperation with the State of Florida an annual landings bulletin giving a recap of the twelve monthly bulletins in total form. Alabama and Mississippi bulletins are now similar to those of Florida. The advantage of having the annual bulletins is that it gives a ready total for the state shortly after the first of the year rather than having to wait for the annual Statistical Digest which follows many months later.

One of the first actions of this Commission when it was organized in 1949 was to request the five Gulf States to improve their statistical coverage and to make the data currently available. Almost immediately thereafter the Service began a cooperative effort with the State of Texas resulting in the publication of Texas Landings. Florida was next to formulate a program which resulted in the release of Florida Landings. Alabama and Mississippi followed suit, bringing to four the number of Gulf

States making available statistical data on a monthly basis. Louisiana Landings came into being during the past year, the first six months having been published under a single cover with no breakdown by sections. With reports being made available by all Gulf States, it is believed that 1958 will see monthly releases on approximately 98 percent of the yield of the fisheries of the Gulf of Mexico as produced by the U. S. Nationals. Contact continues to be made with business machine agencies to study the feasibility of computing landing records electronically.

A survey on the bait shrimp fishery in Galveston Bay was undertaken in June 1957 with the view of obtaining the total take of shrimp from the Bay and quanity of effort expended in making the catch as well as the economic value of this fishery. Less than half of the number of persons required for the program can be hired; consequently, the scope of the program is greatly limited.

The yearly Digest continues to require a substantial portion of the effort of the statistical program, as does the gathering and tabulating of the shrimp catch by area and by depth.

GULF FISHERIES INVESTIGATIONS. During the past year activities have centered chiefly on the shrimp and menhaden fisheries and on methods for the control of red tide.

Shrimp Studies: Laboratory studies are continuing on the physiology of shrimp, especially their tolerance limits for oxygen, light intensity, salinity and other physical factors. Studies were also made to determine the growth of shrimp held on different types of bottoms. Shrimp raised on bottom covered with **Spartina** grew about twice as fast as shrimp grown on mud and sand bottom. This experiment is being repeated for confirmation.

Field studies were commenced late in the spring of 1957 to determine the seasonal occurrence of shrimp larvae in the bayous and estuaries. Different species enter the passes at different times so that adults of one species may be leaving for offshore waters at the same time that larvae of other species are entering the nursery areas. There is considerable overlapping and an endeavor is being made to determine the degree of competition between young of different species on the same nursery grounds. Preliminary data on the growth rates in the nursery areas show that the young shrimp grow in length at a rate of about one milli-

meter, or 1/25 of an inch, per day. These studies are designed to determine the role of the marshes in the life history and abundance of shrimp.

A cooperative field study of the pink shrimp in the important Tortugas area has just commenced. The University of Miami has been awarded a contract to carry on continuous sampling of shrimp at sea from a chartered vessel. This sampling is designed to determine the size and sex of shrimp caught at different depths throughout the year. In connection with this chartered vessel, the Fish and Wildlife Service is also supplying personnel to attempt to determine the feasibility of large scale marking experiments using the colored dyes which were developed by the University of Texas under a Saltonstall-Kennedy contract.

The service has also contracted with Tulane University, which has just completed for publication an Atlas of the morphology of the white shrimp. **Penaeus setiferus.** This contract has now been extended to include Atlases of the morphology of the grooved shrimp, **P. aztecus,** and the pink shrimp, **P. duorarum.** Texas A & M College has just completed a contract on the histology of the organs of the white shrimp, **P. setiferus.**

Menhaden Studies: The Service menhaden studies in the Gulf are not as extensive as those on the menhaden of the Atlantic Coast. At the Galveston Laboratory, Service personnel are working on methods to age the Gulf menhaden from scales, since knowledge of the age is quite essential in studying fluctuations in abundance, and knowledge of the age is the first step in commencing any such studies.

The Gulf Coast Research Laboratory, Ocean Springs, Mississippi, has been awarded a three-year contract to study the means of differentiating different species and stocks of Gulf menhaden. This work has just commenced and, therefore, no results are yet available. The Service is supplying specimens of menhaden from other areas to supplement the Laboratory collections. A contract has also been made with Tulane University to describe the development of the younger stages of menhaden. Both the Service and the Ocean Springs laboratory are aiding this work by supplying specimens from various areas.

Studies on Red Tide: The studies of red tide can be divided

into three chief phases: (1) forecasting and detection, (2) development of the most effective control methods and (3) testing of available control methods.

Under (1) forecasting and detection, work is being done on (a) the development of methods of forecasting the occurrences of red tide through studies of various physical and biological factors. A great deal of material on rainfall, air and sea temperatures, salinities, etc. have been collected to be analyzed by statistical methods. Under (b) an attempt is being made to improve the methods of detecting the occurrences and abundance of **Gymnodinium brevis** in water samples by trying to develop a method for fixing and staining the organisms. At present all counts must be made of the live organisms within a period of hours after collection of the samples and the extreme delicacy of the organisms renders both their detection and their enumeration extremely difficult.

Under (2) the development of the most efficient control method, work is being done on (a) the toxicity of various substances to **G. brevis.** A great many laboratory experiments have been performed and these are in the process of being prepared for a published report. The second part of this study is on the nutrition of **G. brevis.** This is being done with the hope that it may suggest new control methods by determining the nutritional substances, the presence or absence of which mey be construed as limiting the multiplication of **G. brevis.**

Under (3) the testing of available control methods, the Service is presently engaged in two studies on methods of using copper, the only substance that the studies have so far indicated to be economically feasible to use in controlling red tide outbreaks. The first study is concerned with methods for determining the effective concentrations and methods of dissemination of copper sulfate for destroying the organisms. Since the end of the last outbreak early in 1955, the abundance of the organism along the Florida coast has been too low to make it feasible to run actual control experiments. However, as was predicted earlier this year conditions favorable for **G. brevis,** especially abnormally heavy rains, resulted in late September in rapid increase in number of the organisms. In fact, the organisms increased so rapidly that a planned control experiment using copper sulfate

had to be run a week before it was scheduled and under rather adverse conditions. However, the outbreak appeared so threatening that it was judged advisable to make the first attempt ever tried to control **G. brevis** on a large scale. The Service commenced the spraying of the infested areas off the St. Petersburg beaches on September 29, and a few days later the State released emergency red tide funds to use in this struggle. About 35 miles of beach from Pass-a-Grille to Anclote Key were sprayed from the beaches to one-half to one mile offshore. This checked the outbreak which had killed many millions of fish. The State has now assumed complete charge of the control operations with the research staff of the Service acting in a purely advisory capacity.

The first large-scale attempt at control, regardless of whether or not it results in complete success, will yield a great deal of extremely valuable information on the expected effects of the use of copper compounds in controlling **G. brevis** in future outbreaks. It is not believed that the present dissemination of copper sulfate from small crop-dusting airplanes is feasible far offshore. Methods may have to be developed to disseminate material from vessels or larger planes if offshore control is to be attempted. It may be that once an outbreak becomes severe offshore, the areas involved will be too large to make control feasible. However, the history of past outbreaks and of the present one indicate that they first occur inshore. The later offshore outbreaks appear to be triggered by favorable conditions induced by the offshore drift of fish killed in inshore areas. If these surmises prove to be correct, it may be possible to check future outbreaks by extremely close surveillance and control of inshore concentrations of the red tide organisms thus preventing large inshore fish kills that will start offshore outbreaks.

The second method under study for using copper as a control agent is the feasibility of utilizing copper ore placed in beach groins or jetties in order to enhance the natural copper content of the sea water near the passes between the islands (most of the outbreaks occur initially near the passes where the fresh waters bring nutrients from the Land). This study is being conducted in East Bay Lagoon at Galveston. In this mile-long, narrow lagoon a number of live cars have been placed which contain shrimp, conchs, Fundulus and young mullet to bioassay their

sensitivity to copper ions. In this study cement board plates are being used to determine the setting of larval forms of benthis organisms. Also samples of the water are being taken to determine the phytoplankton by chlorophyll analyses, to determine the total zooplankton volume, and to determine the occurrence and abundance of **G. splendens,** an organism closely related to **G. ~~breve~~** which has similar sensitivity to copper. A carload of 60 tons of copper ore from Arizona has been received and as soon as studies have progressed far enough to give some insight into the flora and fauna of the lagoon, the copper ore will be introduced to determine its effectiveness in controlling **Gymnodinium** without harmful effects on other organisms.

Apart from these studies now underway, it should be mentioned that the Service is engaged in studying the basic factors involved in growth and nutrition of shrimp, but these studies are being temporarily held in abeyance until a system of running sea water can be installed at the Galveston Laboratory. The Corps of Engineers is cooperating by preparing preliminary sketches of this sea water system. The sea water system will faciliate behavior studies on shrimp and menhaden in order to answer some of the pressing questions that soon will arise concerning the effects on the marshes, bayous and other nursery areas, of the deep water channels projected for construction along the northern Gulf coast.

GULF TECHNOLOGICAL LABORATORY: The Bureau of Commercial Fisheries has recently opened a technological laboratory to serve the Gulf Coast area. The laboratory is centrally located in Pascagoula, Mississippi, and will, when fully staffed, be the headquarters for a technologist, bacteriologist, and two chemists. The facilities also include a test kitchen, where two home economists will help promote the use of Gulf fishery products through new recipe development and school lunch demonstrations.

The laboratory facilities will include, when completely installed, a chemical and a bacteriological laboratory and pilot plant area where canning, and other processing equipment will permit tests to be made on a semi-plant scale. There are excellent blast and plate freezers and frozen storage rooms where fish can be held for storage tests under closely controlled temperatures.

There is also a library which doubles as a conference room, a photographic dark room and a projection room where Service films can be shown to groups of fishermen and to civic organizations.

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, 1957 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 necessary 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, 1957 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 9, 1957

THE GULF STATES MARINE FISHERIES COMMISSION

STATEMENT OF INCOME AND EXPENSES

Year Ended June 30, 1957

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	$10,950.00	
Traveling	1,610.48	
Rent of office	1,080.00	
Stationery, printing and supplies	696.22	
Telephone and telegraph	421.22	
Postage	98.32	
Electricity	98.50	
Accounting	225.00	
Insurance	234.63	
Depreciation	450.05	
Meeting expense	300.87	
Payroll taxes	160.90	
Sundry	44.57	
Total expenses		16,370.76
Excess of expenses over income		(1,870.76)
Resources of the commission, June 30, 1956		8,709.82
Resources of the Commission, June 30, 1957		$6,839.06

STATEMENT OF RESOURCES

June 30, 1957

Cash	$ 5,066.50
Traveling advance	250.00
Meter deposit	10.00
Prepaid insurance premiums	117.89
Equipment — at cost less allowance for depreciation, $951.28	1,394.67
	$ 6,839.06

GULF STATES MARINE FISHERIES COMMISSION

SUPPLEMENTARY INFORMATION TO ACCOUNTS

June 30, 1957

(1) Cash:

Cash receipts (see accompanying statement)			$ 14,500.00
Cash disbursements:			
Expenses (see accompanying statement)		$ 16,370.76	
Equipment purchase		1,436.38	
		17,807.14	
Adjustment for expenses not representing cash outlay:			
Increase in prepaid insurance	$ 26.69		
Decrease in accounts payable	16.20		
Depreciation	(450..05)	(407.16)	17,399.98
Excess of (disbursements) over receipts			(2,899.98)
Cash balance June 30, 1956			7,966.48
Cash balance June 30, 1957			$5,066.50
Comprised as follows:			
National American Bank of New Orleans checking account			$5,062.96
Petty cash			3.54
			$5,066.50

(2) Equipment:

	Cost	Depreciation	Net
Amount at beginning of year:			
Automobile	$ 1,645.80	1,645.80	—
Furniture and fixtures	909.57	501.23	408.34
	2,555.37	2,147.03	408.34
Automobile purchased (net cash outlay)	1,436.38	—	1,436.38
Automobile traded in	(1,645.80)	(1,645.80)	—
Depreciation allowance for year	—	450.05	(450.05)
	2,345.95	951.28	1,394.67
Amount at [redacted]r:			
Automobile	1,436.38	359.09	1,077.29
Furniture and fixtures	909.57	592.19	317.38
	$ 2,345.95	951.28	1,394.67

(3) Fielity bond insurance carried — $10,000.00 each on chairman, vice-chairman and secretary-treasurer of the Commission.

BUDGET

THE GULF STATES MARINE FISHERIES COMMISSION

FISCAL YEAR 1957 - 58

Salaries	$11,400.00
Traveling	1,400.00
Rent of office	1,080.00
Stationery, printing and supplies	425.00
Publications	1,460.00
Telephone and telegraph	357.00
Postage	150.00
Electricity	98.50
Accounting	225.00
Insurance	235.00
Depreciation	450.00
Meeting expense	650.00
Payroll taxes	175.50
Sundry	40.00
	$18,146.00

(Budget Approved October 11, 1957)