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GULF STATES MARINE FISHERIES COMMISSION

THIRTEENTH ANNUAL REPORT 1961-1962

To The

CONGRESS OF THE UNITED STATES

And To The

GOVERNORS AND LEGISLATORS

Of

ALABAMA
FLORIDA
LOUISIANA
MISSISSIPPI
TEXAS

ACKNOWLEDGEMENT

In submitting this thirteenth 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 thirteen 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,
Will G. Gaffey, Jr., Chairman
Richard E. Cory, Vice-Chairman
W. Dudley Gann, Director

THIRTEENTH ANNUAL REPORT (1961-1962)
OF THE
GULF STATES MARINE FISHERIES COMMISSION

To The
CONGRESS OF THE UNITED STATES
And To The
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Of
ALABAMA
FLORIDA
LOUISIANA
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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 1962

Will G. Caffey, Jr.
Chairman

Richard H. Cory
Vice-Chairman

W. Dudley Gunn, Director

Emily C. Carr, Office Secretary

* COMMISSIONERS

Alabama

William C. Younger, Director
Alabama Department of Conservation
Montgomery, Alabama

Will G. Caffey, Jr., Senator
State of Alabama
Mobile, Alabama

Max K. Lawrenz, Sr.
Foley, Alabama

Florida

W. Randolph Hodges, Director
Florida State Board of Conservation
Tallahassee, Florida

Bruce J. Scott, Representative
State of Florida
North Fort Myers, Florida

Walter O. Sheppard
Fort Myers, Florida

Louisiana

L. D. Young, Jr., Director
Louisiana Wild Life and Fisheries Commission
New Orleans, Louisiana

Alvin Dyson, Representative
State of Louisiana
Cameron, Louisiana

Feltus Daigle
Golden Meadow, Louisiana

Mississippi

Joseph V. Colson, Chairman
Mississippi Marine Conservation 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

Richard H. Cory, Representative
State of Texas
Victoria, Texas

Weldon Cabaniss
Rockport, Texas

* Order of listing - Administrator - Legislator - Governor's Appointee

SUCCESSIONS ON THE COMMISSION DURING THE YEAR

Feltus Daigle	vice	Sidney A. Bourg, Sr.
Joseph V. Colson	vice	William G. Simpson
Weldon Cabannis	vice	

COMMISSION OFFICERS ELECTED OCTOBER 19, 1962 FOR YEAR 1962-63

Chairman: Will G. Caffey, Jr., succeeding L. D. Young, Jr.

Vice-Chairman: Richard H. Cory, succeeding Will G. Caffey, Jr.

STANDING COMMITTEES
ROSTER — OCTOBER 1962

Committee to Correlate Fishery Laws	(Committee 1)
Committee To Correlate Research And Exploratory Data	(Committee 2)
Shellfish Committee	(Committee 3)
Estuarine Technical Coordinating Committee	(Committee 4)
Committee Membership	
George W. Allen Alabama Department of Conservation Bayou La Batre, Alabama	(3-4)
William J. Demoran Mississippi Marine Conservation Commission Biloxi, Mississippi	(2)
Howard H. Eckles Bureau of Commercial Fisheries Washington, D. C.	(4)
Theodore B. Ford Louisiana Wild Life and Fisheries Commission New Orleans, Louisiana	(4)
Gordon Gunter Gulf Coast Research Laboratory Ocean Springs, Mississippi	(3-4)
Walter A. Gresh Bureau of Sport Fisheries and Wildlife Atlanta, Georgia	(4)
Robert M. Ingle Florida State Board of Conservation Tallahassee, Florida	(2-3-4)
Ellis C. Irwin Louisiana Wild Life and Fisheries Commission New Orleans, Louisiana	(1)
Joseph C. Jacobs Assistant Attorney General Tallahassee, Florida	(1)

- Terrance R. Leary (2-3-4)
 Texas Game and Fish Commission
 Austin, Texas
- Jack C. Mallory (2-4)
 Alabama Department of Conservation
 Bayou La Batre, Alabama
- Howard T. Odum (4)
 University of Texas Institute of Marine Science
 Port Aransas, Texas
- Cleburne A. Schultz (4)
 Mississippi Game and Fish Commission
 Jackson, Mississippi
- Lyle S. St. Amant (2-3-4)
 Louisiana Wild Life and Fisheries Commission
 New Orleans, Louisiana
- Paul E. Thompson (4)
 Bureau of Sport Fisheries and Wildlife
 Washington, D. C.
- Seton H. Thompson (4)
 Bureau of Commercial Fisheries
 St. Petersburg Beach, Florida
- H. Eugene Wallace (4)
 Florida Game and Fresh Water Fish Commission
 Tallahassee, Florida

COMMISSION ACTIVITIES

OCTOBER 1961 - OCTOBER 1962

The Gulf States Marine Fisheries Commission met twice in regular session during the past year. The spring meeting was scheduled for March 15-16, 1962 at Galveston, Texas, while the annual session was held at Dauphin Island, Alabama, October 18-19. Continuing with the policy of rotating meetings from member state to state in order to gain more intimate knowledge of the fisheries of the entire seaboard, the Commission membership has selected Fort Myers, Florida, for the March 21-22, 1963 session. Biloxi, Mississippi, has been designated as the October 17-18, 1963 meeting site.

The Commission's Estuarine Technical Coordinating Committee scheduled a session one day prior to the convening of the regular spring meeting. Further consideration was given to the feasibility of reproducing and compiling into a single atlas the estuarine charts of the seaboard of the Gulf. After due consideration, it was decided that the responsibility for publishing the charts previously prepared by each of the states be left with the states since each state was more familiar with the types of requests for information which the reproduction and distribution of these charts could best serve.

Due to the relatively small number of entries submitted, the publishing of Supplement No. 2 to the Bibliography of Unpublished Estuarine Research In The Gulf Of Mexico has been postponed. The Bibliography (October 1959) and Supplement No. 1 (October 1960) continue to be requested both locally and abroad, which requests are being filed with micro-cards by the Biological Laboratory, Bureau of Commercial Fisheries, Gulf Breeze, Florida. Information relative to the several estuarine programs in progress are contained in the state and federal reports which follow.

The Commission's Shrimp Biological Research Committee also met one day prior to the spring session at Galveston. This committee, which has as its purpose the examining of existing shrimp biological research programs of the Gulf States and the Federal Government in an effort to better coordinate these programs and suggest standardized procedures, previously held meetings at Miami Beach, Florida, in November and at Gal-

veston in January. A fourth session of this committee was scheduled for September at New Orleans, Louisiana.

The Gulf States Marine Fisheries Commission approved a report which is titled "Present Research On Shrimp In The Gulf Of Mexico" (February 1962) and which contains a list of nine (9) recommendations submitted by the Shrimp Biological Research Committee. These recommendations are as follows:

1. The most compelling work remains the population dynamics requested by resolution in Clearwater. Since the full \$500,000 was not made available the tagging and recovery should be done first, with the other studies outlined in Research Prospectus Number One undertaken when supplementary funds become available.
2. The types of studies previously undertaken by Young on anatomy and Stein on histochemistry should be continued and should embrace all commercially valuable species. All presently existing data should be published.
3. Work on the Tortugas grounds being done by the University of Miami and sponsored by the Fish and Wildlife Service should be continued into the next phase.
4. Plans should be made to continue in as many areas as possible the present sampling for larvae and post-larvae. These samplings should include temperature and salinity readings. Two valuable outcomes may be expected from this. Inasmuch as the many habitats available over the Gulf include wide variations in ecological conditions, the empirical observation of shrimp under these different conditions will provide understanding of critical requirements for vital processes in the several commercial species and, with this knowledge, prediction of abundance can become a routine function of biological staffs.
5. As time and money permits, investigation should be made into the more delicate physiological processes of the animals. A greater understanding of these mechanisms will help to refine and make more accurate the two benefits listed in (4), above.
6. Due to the expanding scope and accelerated pace of shrimp research, close coordination becomes more and

more valuable and necessary. To meet this need, the shrimp committee should remain active.

7. Additional suggestions are included in the text of this report.
8. Because the background information is more extensively developed for the Tortugas fishery, the most expeditious location for the studies recommended in (1), above, would be in that area.
9. Any funds not expended on marking and recovery experiments designed for mortality study will be used for dock-side sampling as an adjunct to the statistical program in all five states.

A group of Commissioners and scientific advisors visited at Washington in February 1962 in interest of obtaining a full implementation of the Federal Gulf Shrimp Biological Research Program. The group consulted with officials of the U. S. Fish and Wildlife Service on February 19, and visited with members of the Congressional Delegations of the Gulf States, February 20-21. The previously mentioned September meeting of the Committee on shrimp research considered plans for a fully implemented program; this following announcement that Congress had appropriated an additional \$325,000 for such work during the Federal fiscal year of 1963.

During the course of the Galveston session a meeting of the Tri-State (Alabama-Louisiana-Mississippi) Governor's Seafood Committee was scheduled. The tri-state enforcement conferences has been increased to all five Gulf States and these states maintain contact as the occasion necessitates. A closer cooperation and approach to the enforcement problems of the several states is in evidence.

At the spring meeting the Commission requested the Fish and Wildlife Service to assist in the gaining of a better understanding of the oyster resource through a study of carbohydrate substances in sea water. Such a project has been undertaken by the Galveston laboratory of the Service.

Other action taken by the Commission at its spring 1962 meeting follows:

Recognized pollution of the waters of the Gulf States as a serious problem and urged the five member states of the

compact to implement programs and legislation to curb pollution of the waters.

Approved in principle the broadening of the Marine Game Fish Program of the U. S. Fish and Wildlife Service to include the Gulf States.

Endorsed in principle S.1230 and H.R. 5301 (87th Congress—1st Session), each of which bills is designed to provide additional federal assistance to the states for fishery research programs and fisheries rehabilitation and development projects.

Field trips were made in connection with the two regular meetings held during the year. Visiting the Galveston Bureau of Commercial Fisheries Laboratory, the group viewed the routine laboratory procedures of each of the several programs in progress: shrimp, industrial fish, estuarine, physiology and behavior, and red tide. The chemistry laboratory functions were detailed and the numerous experiments on shrimp and fish made possible by the sea water system were observed.

At Dauphin Island, the group visited the construction sites of the Alabama Department of Conservation Seafoods Laboratory, and the U. S. Public Health Service, Gulf Coast Shellfish Sanitation Research Center. The State laboratory is scheduled for completion early in 1963, while the Service laboratory is expected to be in operation early in the summer of the coming year.

Much of the research and exploration suggested by the Commission during its thirteen years of operation has been undertaken by the cooperating agencies. Information resulting from the various programs is reviewed at meetings and is exchanged among the agencies in the interim between sessions either directly or through the New Orleans office of the Commission. The pages which follow present in summary certain 1961-62 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 Marine Conservation Commission, the Texas Game and Fish Commission, the U. S. Bureau of Sport Fisheries and Wildlife, and the U. S. Bureau of Commercial Fisheries.

STATE ACTIVITIES
OCTOBER 1961 - OCTOBER 1962

ALABAMA



The Capitol
at
Montgomery

A new laboratory is under construction by the Alabama Department of Conservation at Dauphin Island.

SHRIMP

During the past year, the Seafoods Division of the Department has concentrated most of its efforts in shrimp operations in the field of estuarine and growth investigations with special emphasis on the relationship of the estuarine nursery grounds to the environmental changes brought about by shoreline suburban development and the industrial pollution problem as it exists in portions of Mobile Bay. Research in this direction is continuing but the sparsity of concrete and creditable basic information has made the projects proceed much slower than anticipated.

Local landing figures indicate that the catch appears to be 23 per cent above that of last year. The price paid the catchers has held high and as a result the gross income to the commercial shrimpers has been much greater than last year. The counts have been very large with the majority of the shrimp running from 21 to 36 per pound.

OYSTERS

The Division of Seafoods has gone into the transfer of oysters from the areas of a high pollution probability into areas of low pollution probability. During the past season there were planted from such pollution-prone areas into new areas with little if any record of pollution a total of over 150,000 barrels of shell and oysters. Most of this was done by division personnel with Department equipment.

The 85 per cent mortality of the oyster crop in 1961-62 has been over-shadowed by the largest catch of spat on record. Many reefs that have been non-producers for the past ten or fifteen years have been covered with small oysters. It is believed that there are now more oysters in Alabama waters than there have been for many years. At the beginning of the 1962-63 season the average size of the oysters on our reefs were from two and one half to two and three fourths inches with growth still continuing at a rapid rate. The commercial oyster interests in the area believe that the present harvest-year should be one of the best in many years.

SPORTS FISHING

Studies have been underway on the sports fishing activities of the area and some interesting and pertinent data are being obtained. While much progress has been made along the lines of these investigations, they are not as yet complete. Upon completion thereof reports of these projects will be forwarded to members of the Commission.

RESEARCH

At present the Seafoods Division has underway investigations in the following fields:

1. Growth rates of oysters on various reefs in Alabama.
2. Estuarine surveys of shrimp nursery grounds.
3. Relationship of water pollution to the reproductivity of the blue-crab.
4. Determination of micro-biological indicators of pollution mortality in bottom samples in Alabama estuaries.
5. Preference and abundance of red snapper in relationship to artificial snapper banks.
6. Tagging and recapture studies of red snapper on artificial and natural snapper reefs.

With completion of the new laboratory on Dauphin Island more rapid progress can be made on the above. Due to present lack of adequate facilities some of the above projects have been temporarily curtailed.

FLORIDA



The Capitol
at
Tallahassee

Florida's research program was greatly expanded during the twelve month period, 1 July 1961 to 30 June 1962. New investigative centers were established in St. Augustine and Pigeon Key in the Florida Keys (Monroe County). Work at the seven year old laboratory in St. Petersburg was expanded.

Contract work at the University of Miami consisted of two major projects: Florida Bay Ecology and Fisheries Landings Statistics.

Oyster Division
Apalachicola

An unprecedented number of lease applications (there were 97 on file at the close of the fiscal year, 30 June 1962) and the surveillance of the several hundred active leases that were granted previously necessitated the enlargement of the Oyster Division administrative staff. All leases are now processed through the office in Apalachicola by the new personnel.

During the fiscal year about 350,000 bushels of shells were planted in Apalachicola Bay, during which time that area and other regions of Florida, produced the highest landings of record.

Marine Laboratory
Bayboro Harbor, Maritime Base
St. Petersburg, Florida

SALT WATER CHEMISTRY

The program of salt water chemistry was initiated in December, 1961, with a project on vitamin B₁₂ evaluation. The scientific force will be expanded later to undertake investigations on shellfish nutrition.

REEF FISHES

A statistical survey of reef fishing, sports and commercial, was made during the year. Locations of reefs, numbers of boats, bait, methods and other details were compiled for each area.

SHRIMP BIOLOGY

All previous studies having been written up and published, a new long range sampling program was begun to clarify some poorly understood aspects of offshore spawning. Spawning condition of adults, presence of eggs, larvae, post larvae and juveniles are correlated with various physical, chemical and biological parameters. Sampling extends 40 miles offshore.

MUSEUM

Specimens continued to be added to the growing reference collection of fishes and invertebrates.

PARASITES

Research continued on the parasites of shrimp with emphasis on life histories. A catalogue of marine parasites indigenous to Florida was begun.

RED TIDE

Samples are taken periodically throughout each year for presence and abundance of *Gymnodinium breve*. Any minor outbreak is inspected by airplane and sampling. Later, the permanent records made will be useful in correlating these dinoflagellate blooms with weather and hydrographic conditions. These studies have now been carried out over a period of several years.

BASIC ESTUARINE AND COASTAL ECOLOGY

Frequent surveys made in connection with proposed construction projects, dredge and fill developments and other man-made changes provide raw data of great value for ecological interpretation. A synthesis has been started whereby ecological data and geographical distribution information is to be compiled by species for all animals and plants encountered. This long-term project is expected to result in several volumes of reference material for Florida's coastal waters.

During the past three years these inspections have been extended to include information relative to the establishment of artificial fishing reefs.

Northeastern Biology
Headquarters
St. Augustine, Florida

SHRIMP

A center for biological investigations along the northeast coast of Florida was established in St. Augustine. The first project launched was one involving the biology of three species of commercial shrimps found in the area.

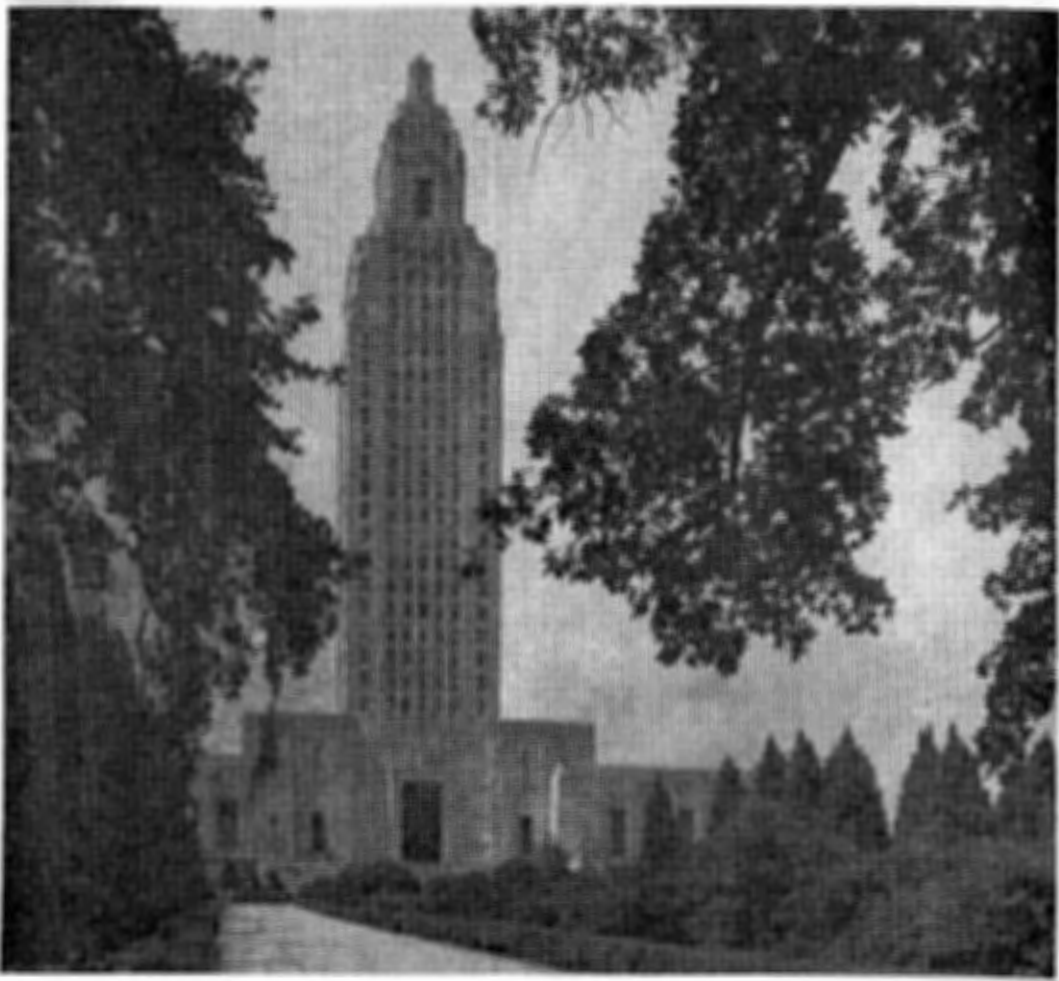
Pigeon Key Laboratory
Monroe County

SPINY LOBSTERS

A marine laboratory was established in the Florida Keys for research on animals indigenous to that area. The first animal to receive attention was the spiny lobster. Samples of plankton were taken in the lower Gulf as far west as the Yucatan Straits. Evidence was thus obtained to support the view that much of Florida's lobster population is seeded from Cuba, Mexico and perhaps countries further south.

A hatchery was established. It is hoped that larvae can be raised through all stages to metamorphosis. By knowing the parentage of these larvae, taxonomic problems connected with larval identification can be solved.

LOUISIANA



The Capitol
at
Baton Rouge

Marine research activities in Louisiana in 1962 has involved three major fields of work. These are shrimp research, which has been greatly intensified, hydrographic studies, and a continuation of the oyster program which has been well established for several years by the Louisiana Wild Life and Fisheries Commission.

SHRIMP STUDIES

The following shrimp research program was carried out and coordinated with research programs of the other states of the northern gulf area and the U. S. Fish and Wildlife Service. Standardized methods set up by Gulf States Marine Fisheries Commission Shrimp Biological Research Committee were employed in order that results could be compared to other areas.

1. Post larval studies were intensified starting in January 1962 and weekly samples were made at eleven stations in Barataria Bay, Caminada Bay and in the three passes feeding these bays. Two offshore stations were sampled one at 7 miles (8 fathoms) and one at 20 miles (20.22 fathoms). Post larvae were first detected in January with peak recruitment occurring May 1-15 for the brown shrimp. Post larval sampling for white shrimp was continued during the summer with less well defined results.

2. An intensive sampling of sub-adult shrimp was carried out prior to the opening of the season.

3. Predicated on growth rates determined and the volume of population available, the season was delayed 15 days.

4. A pond culture program was initiated and carried to completion with brown shrimp and a second experiment is now being carried out on white shrimp.

5. No staining program was set up in 1962 because of possible conflicts with the offshore program carried on by the U.S. Fish and Wildlife Service.

6. All hydrographic data (see below) was correlated with shrimp data in order to determine probable factors affecting the shrimp cycle.

HYDROGRAPHIC STUDIES

The following hydrographic information is recorded and analyzed at the Grand Terre Marine Laboratory in order that it may be used in shrimp, oyster and other marine studies.

1. Water Temperature

- a. South Barataria Bay—continuous recording

- b. Adjacent Gulf Area—weekly recording

The high, low and average temperature of the South Barataria Bay area is plotted graphically each day and averaged each month, season and year, while the ad-

- jaent Gulf temperatures are plotted on bar graphs weekly and averaged monthly, seasonally and annually.
2. Air Temperature—continuous recording
The high, low and average air temperatures are plotted graphically each day and averaged each month, season and year.
 3. Barometric Pressure—continuous recording
The high, low and average barometric pressure is plotted graphically each day and averaged each month, season and year.
 4. Surface Wind Speed and Direction—continuous recording
The surface wind speed and direction is plotted by use of bar graphs each day and vectors are used to record the average prevailing winds monthly.
 5. Tides—continuous recording
The changes in sea level and range of the tide are plotted graphically daily and averaged monthly, seasonally and annually.
 6. Rainfall—daily recording
The daily rainfall of the Barataria Bay drainage area is recorded and plotted graphically each day, and averaged monthly, seasonally and annually.
 7. Mississippi River Stages—daily recording
The daily 8:00 a.m. stages of the river are recorded graphically each day and averaged monthly, seasonally and annually.
 8. Salinity
 - a. South Barataria Bay—continuous recording
 - b. Barataria Bay—semi-weekly recording
 - c. Caminada Bay—weekly recording
 - d. Adjacent Gulf Area—weekly recordingThe salinities of the bays and adjacent Gulf area are shown graphically and by use of isohaline maps.
 9. Currents and bay bottom profiles and maps (as needed)
The bay currents and bottom profiles are done for special projects.

OYSTER STUDIES

Work on oysters has continued in a fixed pattern commensurate with the demands of the industry. Annual shell plantings

are carried out to bolster the production of seed oysters. In 1962, 25,000 cubic yards of clam shells were planted with initial spat set exceeding 75%. Extension type services to oyster growers, especially in relation to industrial damages to leases, average approximately sixty cases per year. A shift from pollution type damage to physical damage from dredging, barges and tugs has been noted in the past two years.

Studies on the snail *Thais* continues at the Grand Terre Laboratory and the film of its life cycle and biology is nearing completion.

Some studies were made of the toxic and taste effect of certain detergents on oysters during 1962.

MISSISSIPPI



The Capitol
at
Jackson

Analytical work on the data on the fauna collected off Grand Isle, Louisiana, during the years 1958, '59 and '60 by the Gulf Coast Research Laboratory was stopped by the industrial concern which supported the project. Apparently these

data will never be properly utilized and the work will remain in the abortive category.

Analyses on the racial studies of the menhaden were completed and the final paper is now being written. The same thing may be said of the studies on the eggs and gonads of the menhaden. Brief results of the racial investigations were presented at the annual meeting of the American Fisheries Society in Memphis, Tennessee in September 1961.

Oceanographers at the Laboratory published papers on the implications, biological as well as others, of the highly saline water off the southeast coast of Florida, the temperature field east of the Mississippi Delta, and some results of drift bottle studies off the Delta. The latter shows among other things that about 25 per cent of the Mississippi River water goes to the eastward after entering the Gulf. Laboratory chemists devised new tests for rapid determination of sulphate, calcium and magnesium in brackish waters. One biologist reported a breeding concentration of pipefish some 200 miles from the Gulf of Mexico in north Louisiana. Taxonomic studies of the North American white shrimp showed that the proper Latin name is *Penaeus fluviatilis*. A paper was published on fishes which suffered extreme accidental injuries and still survived. Laboratory scientists also started collecting all available information on fishes which develop abnormally and grow up with anatomical anomalies. A bibliography of 750 references has already been accumulated. The Laboratory solicits photographs, records and specimens of all kinds of abnormal fishes. A new species of fish was described from the coast of Louisiana.

Volume 1 Number 2 of Gulf Coast Research Laboratory reports was published. It concerned the history and gave a list of the fauna and flora of Horn Island. Volume 1 Number 3 concerned the names of the white shrimp and described the larval stages of a crab, *Rithropanopeus harrisi*.

Seventy-one students attended the 1962 Summer Session of the Gulf Coast Research Laboratory. Forty-four senior and graduate students took courses in marine biology and geology. Nine engineering students took courses in surveying. Twenty-eight high school students attended a Summer Institute in Marine

Science under the auspices of the Louisiana State University and supported by the National Science Foundation.

During the 1961-62 year 48 college field trip groups in geology and biology visited the Laboratory and made boat trips to the outer islands.

The 1962 session of the Mississippi Legislature gave the Laboratory ten per cent of the reef or mudshell sales in the future and voted a \$400,000 bond issue for a research building at the Laboratory.

The biologist of the Mississippi Marine Conservation Commission continued as a member of the Laboratory staff while devoting full time to the Commission's work.

OYSTER BOTTOM IMPROVEMENT, AUTHORITY TO SELL DEAD REEF SHELL AND ECONOMIC SURVEY

During the past year the Marine Conservation Commission has carried on a vigorous program for the improvement of the oyster producing areas of the State.

Between January 24 and June 13, 1962 thirty thousand barrels of fine seed oysters were removed from high salinity areas six miles offshore and re-laid inshore on old established reefs and in new areas. Follow up studies are being carried out to determine survival and growth of the plantings. Mortality of the seed that was moved inshore has been very slight, being approximately 1.4 per cent, and chances for a good survival appear to be excellent.

Another phase of the oyster bottom improvement program consists of moving oysters from polluted areas to clean waters before the 1962 oyster season opens in September. The project is getting underway at the time of this writing.

Some 30,000 barrels of oysters from polluted reefs off Pascagoula were killed by fresh water last winter and spring.

During the 1962 session of the Mississippi Legislature, Senate Bill No. 2125 was passed which gave the Mississippi Marine Conservation Commission authority to sell dead reef shell. Ten per cent of the money derived from the sale of shell will go to the Gulf Coast Research Laboratory and the remainder will

go for oyster bottom improvement and patrol activities. Present known deposits of buried oyster reef shell amounts to two million cubic yards. The same bill raised the contribution of Mississippi to the Gulf States Marine Fisheries Commission.

The Mississippi Marine Conservation Commission has contracted with the Economics Department of the University of Southern Mississippi to conduct an economic survey of the fishing industry. Copies of the survey will be made available.

SHRIMP INVESTIGATIONS

Due to the lack of funds and personnel shrimp investigations of the Marine Conservation Commission were limited again this year. However, weekly sampling was carried out, growth curves were plotted and sizes within the samples were analyzed. No attention was given to the collecting of larval shrimp.

During the first part of this year a larger portion of Biloxi Bay was closed to the taking of shrimp by an ordinance of the Mississippi Marine Conservation Commission due to the constant presence of undersized shrimp in the area.

The first postlarval brown shrimp (*Penaeus aztecus*) were taken in the inshore waters on April 5. Evidence of rapid growth was found and by June 15th a large enough percentage of legal size shrimp (68 count to the pound) had moved into the Sound to merit opening the season. Production since that date has been quite good, with a normal decline of shrimping activity during the last of July. Weekly growth curves and samples of postlarval shrimp paralleled the samples taken in the spring and early summer of 1960. A better recruitment of young brown shrimp stocks, as compared to 1961, was much in evidence during the early spring and summer of this year. General climatological conditions were more normal this year than they were in 1961.

The white shrimp (*Penaeus fluviatilis*) first appeared in the western portion of the Mississippi Sound during the first week of July and samples obtained since that time indicate that there appears to be a good crop of that species.

From January to June, inclusive, Mississippi landings of shrimp for 1962 were up 61 per cent over 1961.

TEXAS



The Capitol
at
Austin

During this fiscal segment of the coastal fisheries program two occurrences in early September had immediate and lasting effect on the operations of the Coastal Fisheries Division, Texas Game and Fish Commission. These were the departmental reorganization and Hurricane Carla. Although the organization in the field was such that only a minimum of procedural change was necessary, the loss of key research personnel to administrative functions hampered the research efforts. Replacements for experienced biologists are not readily available. It was only at the end of the year that the full complement of technical personnel was attained.

The hurricane which struck the Matagorda Bay area on September 10 destroyed field stations at Seadrift and Palacios and the laboratory at Seabrook. Equipment and records were lost, caused great inconvenience, and set back the program by several months. At this time the replacement of the Seabrook laboratory is still in the planning stage. Damage is also re-

flected in the commercial production due to the loss of vessels and packing facilities along the coast.

The basic research program in the Coastal Fisheries function in the past had placed emphasis on life history studies on the important marine species and on studies of the bay habitat and its influence on these various species. As this initial phase of study neared completion, the program was redirected toward the study of population dynamics or the fluctuations in the abundance of the components of these more important commercial and sport fisheries.

State-wide studies or projects utilized standard methods of collection so that results may be comparable throughout the coastal area. Projects on shrimp, finfish, blue crabs, and oysters have been underway for at least one year; and the shrimp project which is the most advanced is in its third year. The status of these studies are outlined below.

SHRIMP PROJECT

This study, consisting of regular and standardized sampling of shrimp population in all Texas bays and the Gulf, is in its third year. Resulting data have corresponded to the commercial shrimp landings, thus enabling early harvest predictions based on the sampling of juvenile populations in the nursery areas. In June of this year biologists were able to predict a poor season comparable to that of the previous year which had shown a decline of 22 million pounds. This dire prediction is being proved valid by reduced commercial landings.

The cause of the reduction in numbers of shrimp is not fully understood; however it is believed to have occurred in the Gulf before the postlarvae reached the bay nursery areas. Thus, the need for expanded Gulf study, particularly in the comparison of varying oceanographic conditions with fluctuating shrimp populations, is emphasized. Such additional studies are scheduled for next year.

During this year, an additional study was begun in which postlarval shrimp just entering the bays are regularly monitored. The procedures conform to those recommended by the Shrimp Research Committee of the Gulf States Marine Fisheries Commission. The results of this continuing study will enable the shrimp biologists to make still earlier predictions, perhaps in April, for the summer fishery.

In early June almost 40,000 brown shrimp were marked and released at Port Mansfield in a study to determine the migration routes of these shrimp from their nursery area in the Laguna Madre. Fewer than one per cent of these shrimp have been returned thus far. The majority of these have been returned by commercial shrimp fishermen. Through a joint program with this department the Texas Shrimp Association will present cash awards to some of the cooperating fishermen by means of a drawing from the list of names of those who returned marked shrimp.

OYSTER PROJECT

The oyster project for the Texas coast is concerned with the biological study of the commercial oyster, *Crassostrea virginica*, through which facts are compiled to be used in the management of the species.

Basic oyster studies in all bay areas are concerned with the growth of the oysters present, the amount of spatfall during the spawning season, and the commercial pressure applied to a specific area during the harvest season. This information is combined with data obtained from additional studies on mortality rates, incidence of diseases, hydrographic conditions, pollution, and other factors which may have some bearing on production within a bay area.

The 1961-62 project year saw initiated a study of oyster diseases. One known disease, *Dermocystidium marinum*, found in 1959, had caused extensive mortalities in Aransas Bay that same year. Other mortalities not associated directly with *D. marinum* increases were suspected to be a result of other disease organisms. This year an interagency contract with Texas A & M College afforded the Game and Fish Commission the services of one of the foremost oyster pathologists in this country. Two platforms were constructed in Aransas and Galveston Bays in conjunction with this survey. Oysters, placed in baskets suspended from the platforms were sampled periodically. Thus far, two diseases not previously reported in Texas have been detected.

In addition to these studies, samples are also being studied for growth, spat set, abundance and incidence of the marine fungus, *D. marinum*, in other bays producing oysters.

Oyster production forecasts are made mainly on the amount of spat set and survival. This year all bay areas had excellent spat sets and survival has been above average in many bay areas. The climatic conditions during the next two years will be the determining factors as to whether or not these young oysters will reach maturity and market size.

Production from public oyster reefs declined during the past year with slightly under a million pounds harvested from September 1961 through April 1962. This decline was attributed to poor production from the San Antonio-Espiritu Santo Bay area caused by excess rainfall and overharvesting which necessitated the closure of Espiritu Santo Bay on March 1, 1962. The 1962-63 season will likely have lower production than the previous season with San Antonio Bay closed until the first of November and Espiritu Santo closed until the first of December 1962. Production from Galveston Bay will be concentrated on Todd's Dump Reef and Hanna's Reef. Matagorda Bay will remain the same as last season with a large portion of the oyster producing area remaining closed by the State Health Department.

Incidence of the parasitic fungus, *D. marinum*, has increased slightly in most bays with a general increase in salinities throughout the coast caused by a decline in precipitation. Aransas Bay has high incidence recordings, but no unusual mortality had been reported by the end of August when the fungus normally reaches its peak and mortalities appear. No excessive mortalities have been reported from other bay areas and it appears that if there is a kill it will probably occur in September.

BLUE CRAB PROJECT

The aims of this study are to determine seasonal abundance of populations, migrations, growth rates, effects of environmental conditions, and fishing pressure.

With recent declines in some of the other areas of commercial fishing a number of commercial fishermen have turned to the rapidly expanding fishery for blue crabs to supplement their income. The production of crab meat has been steadily increasing each year and may reach as high as three million pounds this year. Findings at present indicate no decline in crab populations.

Experimental tagging studies are underway to determine the best method for marking crabs so that mark is retained when the crab sheds. Several methods are being utilized and about 500 crabs have been variously marked.

CONTRACT DRUM REMOVAL PROGRAM

This project concerns the administration and operation of the contract black drum removal program. During the 1961-62 contract season, 24 commercial fishermen were awarded contracts to remove black drum from the waters of Cameron and Willacy Counties under laws of the State of Texas and rules and regulations of the Game and Fish Commission. During the six-month period, 725,561 pounds of black drum were removed from the two county area for an average of 361.9 pounds of drum per contractor per day.

The hard freeze in January limited the operation of the fishermen, and following the freeze many fish houses refused to purchase fish for a week to avoid handling fish killed by the cold. This period of inactivity is reflected in the landings.

FISH PROJECT

Standard sampling methods were instituted in all bay areas and mass tagging efforts were employed to seek population data on the various species of finfish. Although data have not been fully evaluated, it appears that population densities and fluctuations can hereafter be determined from a continuing program of study.

This year was marked by the most severe weather in 11 years. Temperatures dropped below freezing in Corpus Christi at 8:00 a.m. on January 9 and remained below for 67 hours. The minimum recorded was 15° F. Heavy losses of fish occurred in the Laguna Madre but the kill in bays to the north was surprisingly light. In the Laguna Madre about two million pounds of food or game fish died. Most of these were large trout with lesser numbers of drum and only a few redfish.

Heavy mortality of mullet occurred in April and May when fish in Corpus Christi Bay and Laguna Madre were attacked by a bacterium similar to *Chrondrococcus columnaris*. Characteristic symptoms included a ragged appearance, whitening of eyes, and random swimming followed by death.

Tides far below normal were experienced throughout the summer months. This, combined with drought resulted in higher than normal salinity throughout the coastal areas.

POLLUTION CONTROL

Project MP-5-R-4, consisting of seven jobs, was continued to investigate and control industrial pollution throughout Region V. Samples were collected periodically from industries and streams in the region and analyzed for toxic components. Toxicity studies of industrial effluents were made with reference to its effects on various species of aquatic life.

Several refineries have increased their effort in pollution abatement. One refinery requested a bio-assay of their waste and accepted and applied suggestions for reducing toxic components in the waste.

Through cooperation with the Railroad Commission by issuing pipeline and production severances to oilfield operators allowing excess oil to get into a public body of water, the oil content has been reduced considerably in Chiltipin Creek and Copano Bay from the previous year. One operator constructed a large skimming pit in a drainage ditch that contributed 25 per cent of waste to the creek.

A mass kill of mullet during the first two weeks of April extended from Aransas Pass to Port Isabel. A bacterial disease, rather than pollution, was determined to be the cause.

A monthly pollution-causing fish kill report from all personnel has aided in determining areas where pollution is concentrated. This report will assist in establishing jobs in areas where pollution investigation is necessary.

Total complaints reviewed	22
Total number of notices of pollution issued	4
Total number of cases filed	6
Total fish kills occurring	12
Monthly average of man hours spent on pollution activities	423

Pollution control in Region IV was hampered by the loss of the Seabrook Field Laboratory to Hurricane Carla. The number and types of analyses were limited due to the lack of lab facilities. However, excellent cooperation from industry in eliminating many pollution problems was obtained. At least

four large industries on the Houston Ship Channel have started construction of waste water treatment facilities or are having studies made on their waste to determine the best method of treatment. Five industries in the Beaumont-Port Arthur area are also correcting or studying ways to eliminate their waste problems.

GENERAL ACTIVITIES

Four lighted buoys were placed in the Gulf of Mexico to mark the locations of the artificial reefs constructed by this department. Previously un-marked reefs at Port Isabel and Freeport were marked. The buoy off Port Aransas was re-located after breaking loose after being damaged by Hurricane Carla. At the end of this year a buoy was installed off Galveston to mark the site for immediate construction of a new reef. This reef is to be composed of concrete pipe placed on a foundation of slag. Some of the pipe will be placed on the adjacent bare mud bottom to determine the value of the slag pad. This construction was in progress at the end of the year.

Funds for the construction of five fishing reefs, three to be located in Corpus Christi Bay and two to be located in the Laguna Madre south of Flour Bluff, were committed and construction is scheduled for the early part of the next fiscal year.

Eleven artificial reefs in Galveston Bay, in the past years under the shell management program, were marked with lighted pilings. Five additional reefs were under construction in Galveston and Trinity Bays at the end of the year.

During this year a bulletin, THE CRABS OF TEXAS, was published and made available for distribution. Another bulletin, THE MENHADEN FISHERY, was revised and is ready for printing. Several other technical publications have been accepted by biological journals.

The summer student program in which college students studying marine biology are hired as assistants to the coastal biologists was continued. This program has proven to be a good source of technical personnel.

Three biologists resigned during this year; however, they were replaced and at the end of the year a full staff was employed.

U. S. FISH AND WILDLIFE SERVICE ACTIVITIES

OCTOBER 1961 - OCTOBER 1962



The Capitol
at
Washington, D. C.

Bureau of Sport Fisheries and Wildlife

Activities of the Bureau of Sport Fisheries and Wildlife as they relate to the Gulf States Marine Fisheries Commission continue to be confined primarily to work conducted under the authority of the Fish and Wildlife Coordination Act. During the year, investigations and reports of project-occasioned effects on the fishery were prepared cooperatively with the Bureau of Commercial Fisheries and the appropriate State agency on all significant coastal projects. Report recommendations have included fishery measures to reduce construction-occasioned losses as well as resource enhancement opportunities.

The increasing competition for use of coastal waters and fresh water discharge changes associated with inland drainage alterations continues to reduce the natural estuarine conditions.

Investigations undertaken by this Bureau which warrant attention in this report include:

NAVIGATION PROJECTS

Mississippi River-Gulf Outlet Project, Louisiana: Coordinated studies have continued abreast with project construction. Ponding or lagooning of dredging spoil has been effective to date in avoiding spread of dredging effluent over adjacent marsh areas. Studies to better define and control the salt water intrusion wedge when the channel is opened to the Gulf of Mexico are being undertaken. Requirements for a control structure in the Industrial Canal to regulate water exchanges between the ship channel and Lake Pontchartrain are being realized.

Calcasieu River and Pass, Louisiana: Recommendations for containment of spoil during dredging operations are being included in the project construction plans. Also, salinity requirements and pollution problems within Lake Calcasieu are being given specific consideration by the construction agency.

St. Marks River, Florida: Resource needs for placement of project dredging spoil within Apalachee Bay have been included in the construction plans.

FLOOD CONTROL PROJECTS

Lake Okeechobee Regulation, Florida; Any discharges from the lake south through the Everglades will require regulation to protect the Tortugas shrimp fishery and other important fisheries of the area. The U. S. Geological Survey is assisting in hydrological studies necessary to establish these needs.

The Comprehensive Report for the Mississippi River and Tributaries Project: Congressional action is anticipated on this report during the next session of the Congress. Included in the report is a recommendation for fresh water introduction from the Mississippi River into the Louisiana delta marshes, for improvement of production conditions of fish and wildlife, primarily shellfish. This is the first project of this scope and magnitude attempted. Therefore, its further consideration will be of much interest to the Gulf States Marine Fisheries Commission.

Atchafalaya Floodway, Louisiana: Modification for handling flood flows within the floodway is under consideration by the Corps of Engineers. Joint investigations are underway with the Bureau of Commercial Fisheries, the State, and this Bureau to appraise the effects of changes which may result in Atchafalaya Bay.

HURRICANE PROJECTS

Lake Pontchartrain Hurricane Study, Louisiana: Model studies conducted by the Corps of Engineers indicate partial closure of the natural passes connecting the lake with Lake Borgne can be effected without significant changes in existing salinity conditions within the lake. The connection of the Mississippi River-Gulf Outlet channel to the lake through the Industrial Canal must be regulated to maintain required conditions both in the lake and the adjacent channel areas.

NAVIGATION PERMITS

Private construction: During the past year there has been an increase in the number of applications for canals, bulkheading, dredging and filling projects detrimental to fisheries. Even though each construction unit may be comparatively small in size, the accumulative effect of this activity is resulting in a significant loss of important shallow water areas. This condition does depict the urgent need for cataloging of the important productive areas and for providing a united approach of the industry to protect key zones basic to the fisheries. At the same time, there is the need to initiate planning for improvement and/or conversion of specific areas of significant magnitude to re-establish and maintain fishery requirements by a planned operation.

Bureau of Commercial Fisheries

Increased appropriations made it possible for Bureau of Commercial Fisheries activities in the Gulf States to be expanded substantially during the 12-month period prior to September 30, 1962. The programs are coordinated by the Regional Office at St. Petersburg Beach, Florida. In view of the Bureau's responsibility as the primary research agency for the Gulf States Marine Fisheries Commission, particular attention was given to the Commission's recommendations on research and services that would be most effective. A resume of the Bureau's activities for the year follows:

EXPLORATORY FISHING AND GEAR RESEARCH BASE PASCAGOULA, MISSISSIPPI

This program was devoted to industrial fish exploration, gear research on experimental and conventional shrimp trawls,

midwater trawl designs, exploratory snapper trawling and shrimp explorations.

A total of 399 stations were occupied by the Base research vessel M/V Oregon. The gear research vessel M/V George M. Bowers completed eight cruises during this period, including two cooperative cruises with the Bureau of Commercial Fisheries Biological Laboratory, Galveston, Texas, the purpose of which was to conduct shrimp staining and tagging off Florida and in the northwest Gulf.

INDUSTRIAL FISH EXPLORATIONS

The M/V Oregon obtained midwater trawl catches of industrial fish ranging from a few hundred pounds to 1,500 pounds/hour tow in the 20 to 100 fathoms area between Galveston, Texas and Panama City, Florida.

The most abundant species caught were thread herring (*Opisthonema oglinium*), butterfish (*Poronotus triacanthus*), razorbellies (*Harengula pensacolae*), and anchovies (*Anchoa hepsetus*). The thread herring, butterfish, and razorbellies were observed to concentrate in the body and throat of the trawl and showed remarkable endurance during a tow. The anchovies appeared quite passive and displayed little, if any, escape reaction.

Motion picture studies are expected to help determine the most favorable speed/time ratio for maximum efficiency of trawl operations.

Catches of up to 1,000 pounds per 2-hour drag were made of hake (*Urophycis sp.*) and whiting (*Merluccius sp.*) in the Royal Red shrimp depths.

MIDWATER TRAWLING AND GEAR RESEARCH

The M/V Oregon conducted performance tests of experimental midwater trawl designs and various types of doors, flotation and depressor devices, and four-corner elevator depressors. Of particular interest were the tests of a new trawl design, which permitted towing speeds up to 5 knots with no apparent reduction in vertical opening. The use of station-designed and developed electronic equipment and remote controlled underwater photographic trawl test instrumentation gear has become standard operating procedure. Time and motion analysis of film from the remote controlled underwater movie cameras is

furnishing a large amount of new information on trawl design and fish-trawl relationships.

EXPLORATORY SNAPPER TRAWLING

The M/V Oregon conducted snapper trawling experiments in 70 to 110 fathoms off the coast of Nicaragua. Indications of good trawling grounds for yellow-eye snapper (*Lutjanus vivanus*) were found with the best catches from 80-85 fathoms in depth. Exploratory type gear produced catches of from 45 to 120 pounds of 13-inch to 26-inch snapper.

SHRIMP EXPLORATION

Because of the poor commercial production of shrimp on the regular grounds, the M/V Oregon made a total of 117 trawl stations for brown shrimp (*Penaeus aztecus*) in deeper waters of 40 to 72 fathoms from Ship Shoal (Louisiana) to Pensacola, Florida. Shrimp catches were poor in most areas. Fifteen test drags on the continental shelf of Jamaica, between the Minko and Black Rivers produced catches of *Penaeus braziliensis* (up to 104 individuals/15-minute drag) in 14 to 22 fathoms. A total of 85 drags for Royal Red shrimp (*Hymenopenaeus robustus*) were made in depths of 150 to 1,066 fathoms in the north Gulf. These produced catches of up to 261 pounds of tails/3-hour tow. Small concentrations of Royal Reds and *Peneopsis megalops* were found in 200 to 400 fathoms tows off the coast of Nicaragua.

A series of bottom temperatures were made in the red shrimp area of the Gulf of Mexico, and ran between 9° C. (48.2° F.) and 12° C. (53.6° F.).

A Texas shrimp boat worked the red shrimp grounds off the Mississippi River in August and reported catches of 1 to 2 boxes of tails per 3-hour drag.

MISCELLANEOUS DEVELOPMENTS

In the late spring, the M/V Oregon observed numerous schools of small blackfin and yellowfin tuna off the coast of Honduras, Nicaragua, Panama, and the west coast of Jamaica. Interesting catches of a deep water lobster (*Nephrops binghami*) were found in depths of 125 to 300 fathoms off Nicaragua and British Honduras. Catches with small nets ranged up to 30 pounds per tow of 4- to 40-count individuals in 200 fathoms. A

two-day ichthyological collecting project was conducted off the south coast of Jamaica in cooperation with the Los Angeles County Museum and the Institute of Jamaica.

SHRIMP GEAR RESEARCH

The Gear Research Unit completed a 30-minute, 16mm underwater film entitled "Gulf of Mexico Shrimp Trawls", which was well received by the industry and is presently being circulated on a request basis. A sound track was incorporated to facilitate rapid distribution and seven copies are now available. Two copies were purchased by a trade association, and Mexican interests have purchased two copies with Spanish narrations for showing in that country.

The M/V George M. Bowers continued underwater studies of the mechanical performance of shrimp trawls with emphasis placed on the development of instrumentation for measuring significant parameters. Remote reading strain gauges were developed for determining load distribution and towing strain on the various components of a trawl. In addition, a trawl door angle of attack recorder and a bottom speed indicator have been completed and are currently undergoing sea trials. These instruments will help augment the hardware requirements necessary for the proper evaluation of shrimp trawl performance

Work was initiated on the behavior phase of the Shrimp Gear Research Project. Preliminary studies were directed toward the burrowing habits of commercial shrimp as related to harvesting apparatus and toward the reaction of commercial species of shrimp to low level electrical fields. Initial objectives are to determine the extent and duration of bottom penetration by the various species. The M/V Bowers completed two cruises during this period with the express purpose of gathering shrimp behavior information. Data were collected on the manner by which shrimp burrow on various bottom types, depth of burrow as related to size, and total time burrowed during 24-hour periods. All observations were made in the natural habitat to eliminate all but essential artificial environmental effects. Considering the effects of behavior on the efficiency of commercial fishing gear, this study will prove a valuable adjunct to the mechanical phase of the shrimp gear project.

BIOLOGICAL LABORATORY, GALVESTON, TEXAS SHRIMP FISHERY PROGRAM

Increased funds during the past year permitted the Laboratory to commence additional phases of the expanded shrimp research program envisioned by the resolution of the Gulf States Marine Fisheries Commission passed at their Edgewater Beach meeting in 1954.

By using two chartered shrimp vessels, stations from the Rio Grande to the Mississippi River Delta were visited monthly to study the biology of shrimp populations, their spawning seasons, and some of the associated environmental conditions, such as, temperature and salinities as well as the water currents that may contribute to the movement and survival of the larvae.

Several mark and recapture experiments were completed—two on pink shrimp on the Tortugas and Sanibel Grounds and three on brown shrimp off the Louisiana and Texas coasts. Analysis of the pink shrimp data shows that although growth is extremely rapid, there is also a very high rate of mortality indicating that if one desires to obtain the maximum poundage, it is necessary to harvest shrimp at a smaller size than heretofore considered correct.

Sampling over the past three years of the numbers of postlarval shrimp entering Galveston Bay, coupled with an index of the later abundance of juvenile shrimp taken by the bait fishery, enabled the prediction during the spring of a return in 1962 to at least normal abundance of shrimp in contrast to the very low abundance during 1961.

INDUSTRIAL FISHERY PROGRAM

The abundance of the trawl-caught species used in the pet food industry remained stable. The species composition of the catches likewise was similar to previous years. Studies of the length distributions of the croaker indicate that the fishery is drawing chiefly on 1- and 2-year-old fish.

ESTUARINE PROGRAM

During the year, a study was completed to determine the effect on the fauna of Trinity Bay, Texas, of reduced salinities that may ensue from water development plans for the Trinity River. It was recommended that fresh-water discharges be

maintained at a suitable level from March to October, a period when the bay is a valuable nursery area.

A similar special study of the effects of the Colorado River of Texas on the ecology of Matagorda Bay resulted in a recommendation for water control structures to provide regulated flows of fresh water into Matagorda Bay.

PHYSIOLOGY AND BEHAVIOR PROGRAM

Experiments with brown shrimp directed toward determining their environmental requirements have shown that both postlarval and juvenile shrimp can tolerate salinities ranging from 5 to 35 parts per thousand. The postlarvae, however, are more sensitive to temperature variations than juveniles.

BIOLOGICAL LABORATORY, GULF BREEZE, FLORIDA

The Bureau's pesticide research program is now centered at the Gulf Breeze laboratory. Methods have been standardized for evaluating toxic levels of agricultural chemicals on fish, shrimp, crabs and oysters. Approximately 55 common pesticide chemicals have been screened for their toxic effects. In addition, more than half have been tested to determine their toxicity to marine plankton. This measures, essentially, their effect on the primary source of food in estuarine waters. Studies are now underway with pilot experiments to determine whether toxicity levels observed in the laboratory are the same under field conditions. Airplane spraying with a mosquito control agent in one field test caused an immediate high mortality in shrimp held in live cars in the test area. Although many of the common pesticides are lethal to shrimp at concentrations of only a few parts per billion, some of the newer pesticides being developed are much less harmful. We may expect that the pesticide pollution problem will be gradually solved for the most part by the creation of chemicals that are toxic only to specific pests.

Investigations have been completed to determine the feasibility of controlling populations of the southern oyster drill by radiation. It was hoped that by sterilizing part of the population a significant reduction in offspring would take place. Two years of study showed that the minimal doses of X-ray or gamma ray causing sterilization caused too high a mortality for the project to be possible, and this study has been terminated.

Regular sampling of calico scallop populations during the year indicates that there is continual recruitment of young scallops. Population dynamics studies are complicated by the lack of uniformity in samples from the different stations. The sampling program is being intensified to obtain sufficient information so that we can predict optimum levels for commercial harvesting of the crop.

Considerable emphasis has been placed on the program inventorying the animal populations in estuarine areas. Detailed studies are being made to determine the normal seasonal fluctuations in abundance of the various commercial species. Continuation of this project will provide data enabling us to recognize, in the future, changes in abundance due to normal fluctuations and those due to environmental changes resulting from pollution and other man-made factors.

The laboratory continued its annual series of marine lectures and demonstrations for secondary schools. In April, more than 5,000 students visited the laboratory in the ten-day program.

BIOLOGICAL STATION, ST. PETERSBURG BEACH, FLORIDA HYDROLOGICAL SURVEY

Research was completed and a manuscript published on hydrological characteristics of the four main Tampa Bay tributaries. It was found that these waters are strongly influenced by local precipitation and natural phosphate deposits. The nitrate-nitrate nitrogen data indicated that the rivers do not enrich Tampa Bay to an appreciable degree.

RED TIDE

Red tide research was completed and resulting manuscripts are in the process of being published.

ESTUARINE PROGRAM

Most marine species of the Gulf spend some part of their lives in estuarine waters of the Gulf coast. There is much to be learned about the role of the estuary in producing these species and the effects which environmental changes have upon those which inhabit the estuaries. Emphasis in the program for the eastern Gulf, therefore, has been upon synecology and the relationship of organisms to biological, chemical and physical

features. This program is tied in with its counterpart at Galveston for study of western Gulf estuaries.

TECHNOLOGICAL LABORATORY, PASCOUGLA, MISSISSIPPI CHEMICAL ANALYSIS

Monthly analyses of the proximate composition of 17 species of Gulf of Mexico industrial fish and 4 species of South Atlantic industrial fish have been completed. Statistical analysis of the data so obtained shows that it is possible to predict the oil content of a given species or mixed lot of fish by the known moisture content. The geographical location of the catch can exert a wide influence on the proximate composition at a specific time and seasonal influences were found to be quite large in most species.

Further work on the mechanism of iron sulfide discoloration of canned shrimp indicated that canned shrimp meats were capable of binding tin ions, laying bare the steel plate, and thus allowing iron sulfide discoloration. Apparently additives found successful in reducing the incidence of iron sulfide discoloration did so by providing a more efficient transfer of tin ions without reducing the metal lining to the steel plate.

A new project was initiated to provide a study of the biochemical nature and nutritive value of food fish and shellfish. Data from this study will include the following: proximate composition, protein digestability, and the essential amino acid, trace mineral, vitamin, and fatty acid content of economically important food fish and shellfish. The initial subject material is brown shrimp, *P. Aztecus*.

VOLUNTARY STANDARDS AND SPECIFICATIONS

Voluntary Standards of Grade were developed on frozen, raw, peeled, deveined shrimp and will be offered to the industry later. A complete revision of the Voluntary Standards for Frozen, Raw, Breaded Shrimp has been completed and is ready for industry comments at an early date.

Studies continued on development of quality indices on calico scallops. Tests were made to determine freezing and storage characteristics of this valuable seafood. Studies were made on chemical methods for quality determinations.

BACTERIOLOGY

Bacteriological studies were initiated on marine products in an attempt to determine the types and numbers of bacteria found on seafoods in their native areas. Special methods were developed to cultivate and enumerate these sea-water organisms. Additional studies began to determine the effect on quality of these native organisms during commercial storage.

PRESERVATION AND PROCESSING OF MARINE PRODUCTS

A project was renewed on utilization of mullet in an attempt to develop a product to utilize the huge available supply. As an initial step, 500 pounds of mullet fillet were experimentally canned for a program jointly with the Florida Conservation Commission to determine acceptability of the product in state institutions.

INSPECTION SERVICE

An average of 18 seafood producing plants were continued under USDI inspection. Because of the shortage of shrimp during certain periods of the year in the middle and northern Gulf of Mexico, there was a 20-25 per cent decline in products packed under continuous inspection. During the latter part of this reporting time, with the cooperation of the inspected plants, a drive has been initiated to improve product quality by better plant sanitation. Bacteriology has been used as a tool to point out to plant management sanitation improvements needed.

STATISTICS

Direction of the Gulf statistical programs is centered at New Orleans, Louisiana. The employment of an additional employee at Port Arthur, Texas, resulted in obtaining a better coverage of detailed shrimp catch information for landings at both that port and at Cameron, Louisiana. At all other ports, the collection of detailed information and statistics on the shrimp fishery remained at the same level as the previous year.

Issuance of the monthly preliminary shrimp report, which contains timely information on landings in each of the Gulf States, cold storage holdings, and import data, was expedited with a release date of the 15th rather than the 25th of the month.

An annual general canvass of the commercial fisheries of the coastal areas was completed. This canvass provides data on

numbers of fishermen, types and number of fishing gear, and volume and value of catch by individual species by specific gear within the major waterbodies of each state. The annual general canvass of shore plant installations was also completed. Information obtained relates to the volume and value of processed fishery products and employment within shore plant installations.

Monthly landings bulletins, compiled and published in cooperation with the respective state conservation agencies, were issued on as current a basis as possible. Plans were completed for the automatic data processing of Louisiana landings data, utilizing equipment of the Louisiana Wild Life and Fisheries Commission.

MARKET NEWS

The issuance of daily Fishery Products Reports, together with monthly and annual summaries, was continued. Coverage of landings at Gulf ports was increased with the inclusion of daily fish and shellfish landings figures at Port Arthur-Sabine Pass, Texas, and Cameron, Louisiana. Another improvement was the publication on a weekly basis, of fishery imports at Mobile, Alabama, as initiated during the month of August.

The classification of shrimp landings for "canning" or "other" at Gulf ports in the market news report was discontinued. This classification was at times misleading since it could not be determined at time of landing which shrimp would ultimately be utilized for canning. A tabulation of shrimp receipts at canneries was initiated which better depicts the proportion of landings utilized in this type processing.

The value of daily Fishery Products Reports, distributed to over 1,000 subscribers in the fisheries and allied fields, was maintained by the inclusion of all types of fisheries information based upon news releases from a variety of sources.

MARKETING

As part of the national re-structuring of the Bureau's marketing organization, a new marketing office was established in St. Petersburg Beach, Florida, bringing the total to three in the Gulf States. Increased emphasis was placed on consumer education, with activities including fish cookery demonstrations for school lunch personnel, extension service, television audiences and military food service personnel. Test kitchen work at the Pascagoula test kitchen featured several new recipes for Out-

door Fish Cookery. The annual Lenten and National Fish Parade industry-government promotions on seafood were carried out with gratifying results.

FINANCIAL ASSISTANCE

In the Gulf States, including both coasts of Florida, 23 fishery loans amounting to a total of \$485,758 have been approved during the year. This brings the total number of loan applications received during the Bureau program to 253. Fishery loans are granted to qualified commercial fishermen for financing and refinancing fishing operations, repair of gear, purchase of fishing equipment, and for replacement of gear and vessels which have been lost, destroyed or abandoned, or have become obsolete or inefficient.

One application for Federal insurance on vessel mortgages approved in the amount of \$38,560. The mortgage insurance program, principally for the construction of new vessels, provides a means for private lenders to safely extend loans to fishermen over a long period of time.

PEAT, MARWICK, MITCHELL & CO.

Certified Public Accountants

Hibernia Bank Building

New Orleans 12, La.

ACCOUNTANTS' REPORT

Commissioners

Gulf States Marine Fisheries Commission:

We have examined the statement of income and expenses of Gulf States Marine Fisheries Commission for the year ended June 30, 1962 and 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 Gulf States Marine Fisheries Commission for the year ended June 30, 1962 and its resources at that date, in accordance with generally accepted accounting principles applied on a basis consistent with that of the preceding year. Also, in our opinion, the accompanying supplementary information is stated fairly in all material respects when considered in conjunction with the financial statements taken as a whole.

Peat, Marwick, Mitchell & Co.

New Orleans, Louisiana

July 6, 1962

GULF STATES MARINE FISHERIES COMMISSION

Statement of Income and Expenses

Year ended June 30, 1962

Income—member states' contributions:	
Alabama	\$ 3,500.00
Florida	4,500.00
Louisiana	5,000.00
Mississippi	1,000.00
Texas	6,000.00
Total income	<u>20,000.00</u>

Expenses:	
Salaries	\$12,999.92
Publication expense	574.12
Traveling	1,376.38
Office rent	1,080.00
Stationery, printing, and supplies	357.39
Telephone and telegraph	489.14
Postage	156.90
Electricity	95.73
Equipment maintenance	68.07
Accounting	250.00
Insurance	254.21
Meeting expense	230.03
Payroll taxes	272.14
Depreciation	41.11
Sundry	109.02
Total expenses	<u>18,354.16</u>
Excess of income over expenses	1,645.84
Resources of the Commission, June 30, 1961	336.70
Resources of the Commission, June 30, 1962	<u>\$ 1,982.54</u>

Statement of Resources — June 30, 1962

Cash (note 1)	\$ 1,111.74
Traveling advance	250.00
Meter deposit	10.00
Prepaid insurance premiums	122.17
Equipment—at cost less allowance for depreciation, \$2,375.65 (note 2)	488.63
Total resources	<u>1,982.54</u>
Less liabilities	—
Total resources	<u>\$ 1,982.54</u>

For notes see accompanying supplementary information to accounts.

GULF STATES MARINE FISHERIES COMMISSION

Supplementary Information to Accounts

June 30, 1962

(1) Cash:

Cash receipts (see accompanying statement)		\$20,000.00
Cash disbursements:		
Expenses (see accompanying statement)	\$18,354.16	
Equipment purchases	394.13	
Traveling advance	250.00	
	<u>18,998.29</u>	
Adjustment for expenses not representing cash outlay:		
Increase in prepaid insurance67	
Depreciation	(41.11)	
	<u>18,957.85</u>	
Total cash disbursements		18,957.85
Excess of receipts over disbursements		1,042.15
Cash balance, June 30, 1961		69.59
Cash balance, June 30, 1962		<u>\$ 1,111.74</u>

Comprised as follows:

National American Bank of New Orleans, checking account		\$ 1,102.10
Petty cash		9.64
		<u>\$ 1,111.74</u>

(2) Equipment:

	<u>Cost</u>	<u>Depreciation</u>	<u>Net</u>
Amount at beginning of year:			
Automobile	\$1,436.38	1,436.38	—
Furniture and fixtures	1,033.77	898.16	135.61
	<u>2,470.15</u>	<u>2,334.54</u>	<u>135.61</u>
Additions to furniture and fixtures	394.13	—	394.13
Depreciation allowance for year	—	41.11	(41.11)
	<u>\$2,864.28</u>	<u>2,375.65</u>	<u>488.63</u>
Amount at end of year:			
Automobile	\$1,436.38	1,436.38	—
Furniture and fixtures	1,427.90	939.27	488.63
	<u>\$2,864.28</u>	<u>2,375.65</u>	<u>488.63</u>

(3) Fidelity bond insurance carried—\$10,000.00 each on chairman, vice-chairman, and director of the Commission.

BUDGET
GULF STATES MARINE FISHERIES COMMISSION
Fiscal Year 1962-63

Salaries	\$13,700.00
Publications	650.00
Travel	1,900.00
Office rent	1,080.00
Stationery, printing and supplies	675.00
Telephone and telegraph	475.00
Postage	350.00
Electricity	95.00
Equipment maintenance	70.00
Accounting	250.00
Insurance	250.00
Meeting expense	250.00
Payroll taxes	340.00
Depreciation	40.00
Sundry	75.00
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	\$20,200.00
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(Approved October 19, 1962)